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IMPROVING ENERGY STEWARDSHIP AT MICHIGAN TECHNOLOGICAL UNIVERSITY'S ATHLETIC COMPLEXES

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IMPROVING ENERGY STEWARDSHIP AT MICHIGAN TECHNOLOGICAL UNIVERSITY'S ATHLETIC COMPLEXES

By

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List of Abbreviations

MTU Michigan Technological University

SDC Student Development Complex

NCAA National Collegiate Athletic Association

GHG Greenhouse Gas

MTCDE Metric Tons of Carbon Dioxide Equivalent

AASHE STARS Association for the Advancement of Sustainability in Higher Education's Sustainability Tracking, Assessment & Rating System

EPA Environmental Protection Agency

IRB Institutional Review Board

UP Upper Peninsula Region of Michigan

UPPCO Upper Peninsula Power Company

LED Light Emitting Diode

APPA Association of Physical Plant Administrators of Universities and Colleges

HVAC Heating, Ventilation and Air-Conditioning

COVID-19 Coronavirus Disease of 2019

UMD University of Minnesota, Duluth

Abstract

Athletics departments are showcases for universities, serving as a public face and recruitment outlet that communicates university identity to the world. This applied research project examines the state of electrical energy infrastructure at Michigan Technological University with special attention to the Athletic Department and reports on the process for energy decisions in both settings. I take a qualitative research approach analyzing University documents and conducting interviews with informants in Athletics Administration, Facilities, and MTU's Office of Sustainability and Resilience. Four major barriers to efficiency emerged: (1) lack of University-wide climate action goals, (2) staffing issues due to a large number of unfilled positions, (3) lack of financial incentives to change current electricity consumption practices, and (4) lack of investment in efficiency and maintenance. I recommend that the President's Council adopt clear targets for climate action, work to reduce critical staffing shortages, and invest in efficiency and maintenance by streamlining the funding process, incentivizing units to reduce their energy waste, and complete identified "low-hanging fruit" projects as soon as possible. These strategies for improving energy efficiency have positive implications, including return on investment, reduced carbon footprint, and improvement to the safety, resiliency, and functionality of the campus. These near-immediate benefits lead to improved branding, visibility, and optics, elements that are crucial for student recruitment and stakeholder engagement.

1 Introduction

University Athletic Departments serve as a platform for showcasing campuses and reiterating institutional norms. There is an opportunity to utilize the unique visibility of Michigan Technological University's Athletic Department to set a benchmark for energy stewardship; a commitment that can serve as a valuable example of sustainable behavior both on campus and in the community. Simple but effective energy-saving strategies can demonstrate that athletics and sustainability can and should go hand-in-hand, rather than being mutually exclusive of one another. MTU's President Dr. Richard Koubek has outlined the concepts of sustainability and resilience as key focus areas now and in the future, both for university research and in operations.

This applied research project examines the state of energy infrastructure at Michigan Technological University with special attention to the Athletic Department and reports on the process for energy decisions in both settings. This project has a distinct focus on policy implementation at the University through the eyes of street-level bureaucrats at the University, who have a front-line position on organizational decision-making and policy implementation. The aim of this project is to shed light on the state of energy stewardship at Michigan Tech's athletic complexes and suggest strategies for future improvements so that the ground-level employees can be better seen and heard and to contribute to a more sustainable and resilient University. The information in this report should assist in future campus planning decisions at Michigan Tech and allow for both the University and Athletic Department to become more significant players in environmental stewardship.

2 Literature Review

2.1 Sustainable Universities

Energy efficiency matters at universities to minimize the organization's carbon footprint, save money, exemplify cutting-edge technologies, implement evidence-based policies and practices, and demonstrate responsibility about sustainability. By adopting and implementing sustainable practices, like energy waste reduction, universities can reduce both their bottom line and carbon footprint simultaneously. Schelly et al. (2012) argues that schools can dedicate more resources toward their core mission of education when they reduce their energy bills by making changed toward more sustainable campus operations. At Michigan Technological University, the concept of sustainability is woven into overarching campus themes. According to University President Dr. Richard Koubek (2020), "sustainability is a top priority and we have committed to making our campus as sustainable as possible by being at the cutting edge of innovation and education". Schools can serve as an educational tool by demonstrating how to integrate conservation efforts into day-to-day operations, such as maintenance and repairs, grounds work, and custodial duties (Schelly et al., 2012).

The motto "tomorrow needs Michigan Tech" supports the enhancement of resilience and sustainability as a way of life on campus and as a core value that graduates are encouraged to take with them beyond their studies (Tech Forward, n.d). A commitment to sustainable practices on campus not only demonstrates that such investments are worth the cost of implementation once payback periods are achieved, but also improves the visibility and reputation of an institution.

Universities have a responsibility to be leaders in their communities and tend to be unique environments in which diverse groups of students and faculty can "facilitate dialogue and change efforts related to environmental issues" (Casper, 2014). They are places of instruction and exploration aimed at innovation and advancement. Higher learning institutions set an example of creating and disseminating knowledge in the classroom, so it is important that campuses demonstrate a commitment to sustainability practices in real time (Mohammadalizadekhorde, 2020). Such a positive example is important within the context of the surrounding community because "university campuses tend to function as their own spatially-based communities and might, therefore, offer scalable models for creating more sustainable neighborhoods, cities, and regions" (Mohammadalizadekhorde, 2020). This suggests that by demonstrating energy waste reduction, Universities could serve as an example to their surrounding communities to be more energy efficient.

2.2 Sustainability in Athletics

Sustainability in athletics is an under-researched topic yet is gaining traction as the importance of sustainability is becoming more important across all areas. McCullough (2020) notes, “the relationship between sport and the natural environment is bidirectional” meaning that it is impossible to separate the impact of the natural environment on the sporting landscape and vice versa. While outdoor sports are the most affected by environmental conditions, particularly with regards to climate change, we can look at the impacts that indoor athletic infrastructure has on the environment as well. Implementing energy waste reduction strategies among athletic infrastructure will be helpful in limiting the amount of greenhouse gas emissions and reducing the building’s carbon footprint.

An athletic department can utilize their public platform for good by demonstrating a commitment to energy efficiency which would allow for an increase in stakeholder buy-in, including fans and prospective students. McCullough (2020) explains that “a sport organization’s commitment to reducing its impact on the natural environment was favored by sport fans [who] felt a deeper connection to the team because of the team’s apparent concern for the natural environment.” Additionally, athletes themselves are showing more interest in being part of positive environmental change as they are “becoming increasingly alarmed about the impacts of climate change on their communities, on their health, their livelihoods and their future” (Ramsak, 2020). It is important for Athletic Departments to engage all of their stakeholders and align themselves with the greater University community regarding sustainability.

In the 2010 College Athletic Department Sustainability Survey, more than half of the respondents indicated that environmental initiatives have become a high priority but cite a gap between their vision of sustainability and implementation (Steinbach, 2010). Resistance to implementing sustainable practices within an Athletic Department is based on an unclear return on investment as departments, at their core, are businesses focused on the bottom line (Steinbach, 2010). Regarding the relationship between the athletic department and the broader university, advancement seems to be delayed because of concerns over the perceived costs of environmental programming paired with insufficient knowledge about environmental sustainability strategies (McCullough, 2020). Further, McSherry (2009) explains that athletic departments face “unique sustainability challenges” that tend to be not fully addressed in campus-wide sustainability initiatives due to the fact that the overall impact of hosting events and operating sporting facilities is largely not measured or quantified. It is important for research of this kind to be conducted with specific regard to the athletic community to work toward bridging this gap.

2.3 Energy and Environmental Policy

Sustainable development is a nearly universal goal supported by a variety of strategies, yet oftentimes these efforts fall short due to policy implementation failure. Policy implementation failure is one of the most significant barriers to improvement and can be a result of economic, political, and communication factors (Howes, 2017). Policies fail for a variety of reasons. For one, political barriers in which organizations either do not have the will nor the capacity to implement sustainable policies can hinder implementation (Howes, 2017). Further, the urgency and seriousness of natural resource issues has not been effectively communicated to stakeholders leading to an inability to understand the importance of sustainability (Howes, 2017). Finally, there is a perception that environmental and economic objectives can be at odds with one another when in fact they are mutually linked and the issue is really about short-term versus long-term investments and payback periods. While in the short term there are sometimes higher upfront costs that take time to pay back with energy savings, long term investments in energy efficiency yield positive economic benefits. In particular, doing piecemeal improvements is more expensive than making the real investment because piecemeal approaches are inefficient and waste human resources and labor time. For example, if an organization were to perform an integrated renovation of a space to all LED lighting rather than piecemeal each fixture, there would be both financial savings and a reduction in man-hours.

A comprehensive and inclusive decision-making structure is crucial for the implementation of successful policies. Policies must be effective, efficient, and appropriate to gain social backing and be successfully implemented (Howes, 2017). In the pursuit of improving energy efficiency, two potential policy structures exist: a “top-down” approach in which governing bodies (the university, conferences, NCAA, etc.) initiate sustainable action in the form of compliance mandates or a “bottom-up” approach in which sustainable behaviors are adopted and promoted by individual actors without a mandate from a higher organization (McCullough, 2020). Schelly et al. (2012) explains that a system of participatory governance in which leadership articulates a clear vision of sustainability for the organization based on shared values while simultaneously empowering students and support staff at the lowest levels to have buy-in to the process. They show how involving custodians as active participants in energy conservation decisions at a school in Colorado, for example, sparked effective changes because they felt empowered as active stakeholders in operations (Schelly et al., 2012).

Accountability plays a major factor in committing to sustainability investments. Particularly, a lack of accountability makes it easy for organizations to overlook their

responsibility in reducing the impacts of climate change. Mohammadalizadekhorde (2020) notes that often "sustainability-related initiatives in higher education are established within non-binding declarations in which the University can be lax in their pursuit of sustainability...as violations typically do not result in sanctions." Further, there must be an emphasis on accurate data monitoring and reporting of sustainable practices within the organization. Inaccurate measurements of individual improvements leave room for "greenwashing", or the over-exaggeration of sustainable efforts (McCullough, 2020), and limits the validity of an organization's overall progress.

In terms of accountability in decision-making, the "Street-Level Bureaucrats Theory" is a useful concept to keep in mind when seeking solutions in large diverse organizations. Lipsky (2010) examines how decisions made by overworked low-level public service employees, or street-level bureaucrats, translate into ad-hoc policy implementations that have a resonating impact on institutional operations. In their day-to-day jobs, street-level bureaucrats represent the frontlines of policy and use a considerable amount of discretion as decision makers to implement programs for the greater organization (Lipsky, 2010). The problem is that the structure of the street-level bureaucrats' jobs makes it difficult to effectively make beneficial policy decisions because of factors like time constraints, ambiguous leadership, lack of funding, and limited resources (Lipsky, 2010).

O'Meara (2021) applies this theory to the university environment arguing that faculty and staff are uniquely positioned to understand problems at various levels of an institution and should be trusted to exercise their judgment to work toward greater goals outside of formal scrutiny (O'Meara 2021). Discretion is a defining characteristic of many jobs in the university setting, however conditions under which street-level bureaucrats exercise discretion can foster rushed decisions, insufficiency feedback, and ambiguity due to time constraints and/or feeling stretched in their job duties (O'Meara 2021). Time pressures and being overstretched can increase the likelihood that cognitive and social biases will enter the decision-making realm, meaning that street-level bureaucrats may fall back on old habits in the use of their discretion, hindering effective policy-making (O'Meara, 2021). O'Meara (2021) argues that discretion and accountability must be balanced through a system of checks in certain domains of work because human judgment is inherently flawed, mistakes will always be made, and certain cognitive biases can be difficult to recognize and overcome. Additionally, O'Meara (2021) explains that in this discretionary environment, we need both checks from above and from within to ensure that

workers implementing university policies on the ground do so in a manner that reflects the greater university's mission and stated goals.

Several factors are at play when universities show resistance to adopting sustainability initiatives but according to the literature, financial constraints dominate the narrative. Concerns over high up-front investment costs and unclear timelines on returns undermine implementing meaningful electrical energy upgrades (Mohammadalizadekhorde, 2020). Administration may be apprehensive to take on projects that do not immediately demonstrate a cost savings, especially when it may seem easier to operate as normal and there are no immediate threats from lack of action. There may be other renovations required based on facility age and additional space needs that could take precedence over forward-thinking sustainability projects (McCullough, 2020). With long lists of deferred maintenance being a pervasive issue among Universities (SHW, 2011), administrators may not feel that they have the time and financial means to seek out forward-looking projects. To promote the successful implementation of these or any environmentally-friendly technologies at a university, there needs to be evidence of a clear return on investment. The first step to moving beyond "business as usual" practices is to demonstrate that the implementation of a strategy both decreases energy consumption and costs, therefore convincing university decision makers to invest (Mohammadalizadekhorde, 2020).

3 Methods

3.1 Project Design

This is a descriptive applied research project designed to fulfill the requirements of an MS Report in the Environmental and Energy Policy MS program at Michigan Technological University. I take a qualitative research approach analyzing University documents and conducting semi-structured interviews with key informants in Athletics Administration, University Facilities, and MTU's Office of Sustainability and Resilience. The aims are to document university goals and procedures related to energy stewardship and particularly electrical energy in the Athletic Department and to understand the day-to-day decision-making processes and activities of those working directly on programs that could impact electrical energy waste reduction in Athletics.

3.2 Objectives

This project explores strategies for improvements in energy efficiency, waste reduction, and conservation within MTU's Athletic Department by reporting on the policy process at Michigan Tech and evaluating associated policy implementation in the Athletic Department by outlining how decisions about energy are made and suggesting improvements as applicable.

3.3 Methodological Approach

This study uses an inductive qualitative framework analysis approach to describe energy policy implementation and related decision-making processes at Michigan Technological University and its Athletic Department. This method of analysis is aptly suited for applied research that has "specific questions, a limited time frame, a pre-designed sample and a priori issues that need to be dealt with" (Srivastava, 2009). The framework method provides clear and systematic steps with the aim to produce structured outputs of summarized data (Gale, 2013). It allows for a comprehensive review of the collected data in an easy-to-utilize format. Drawing on Srivastava (2009), I employed this approach by completing the following process:

[1] Familiarization with the interview transcripts collected from key informants

[2] Identifying a thematic framework using themes, issues, and concepts to filter and classify the data in a code book

[3] Coding & indexing by categorizing the data into particular themes.

[4] Charting and arranging indexed pieces of data into thematic charts consisting of the headings drawn during the thematic framework stage

[5] Mapping and interpreting the data set by finding associations, providing explanations, and developing strategies

The strengths of the inductive qualitative framework analysis method are well-suited to the nature of this applied research project. It is a comprehensive review of collected data acquired through a systematic approach (Srivastava, 2009) and is flexible by allowing for natural changes and amendments throughout the process by letting the data dictate the direction of the outcome. By relying on data in the form of interview transcriptions, the framework analysis allows for easy retrieval of original material, demonstrating transparency in the research (Srivastava, 2009). This approach, based on the accounts and observations of the participants involved, allows for a thorough review of the decision-making processes regarding electrical energy at Michigan Tech and its Athletic Department.

3.4 Positional Statement

My position as a full-time employee and Graduate student at Michigan Technological University means that I am a stakeholder in the University. I am uniquely positioned within the Athletic Department being on staff for over seven years. Many of the participants in this research study are immediate coworkers with whom I interact on a regular basis. Because of relationships and trust established over the years in the professional setting, I suspect that many of the interviewees felt comfortable sharing their story with me. Many expressed that they want to be seen and heard in the greater context of the University and that the concerns they have regarding building infrastructure and maintenance are not unique to the Athletic Department, but should be acknowledged as perhaps a microcosm of the larger institution. While my formal job title is neither in Administration nor Facilities, my day-to-day job functioning within the Student Development Complex requires interactions with all levels of employees in the Athletic Department. I understand the plight of those who take on multiple job titles and use skills like creativity, resourcefulness, and flexibility to make their job environment the best that it can be.

3.5 Data and Sources

Prior to conducting my research, I obtained a limited review exemption from Michigan Technological University's Institutional Review Board (IRB) in which my project was determined to meet the federal exemption category 2 requirements meaning that my research only includes interactions involving interview procedures where "the information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination" (see Appendix A). The classification of "exempt" deems my research as no greater than minimal risk to participants and has been exempt from annual continuing review. During the course of the interview process, I was mindful of the importance of

anonymity in data collection and analysis. Since the topics of conversation included specifics related to individual job responsibilities and the relationships between themselves and their chain of command, it was imperative for me to maintain confidentiality. The vast majority of participants share common sentiments about the people and processes at the University and almost all participants work in the same building. It was important for me to treat each conversation independently from the next so as not to prompt any of the interviewees and allow them to express their opinions without influence.

Data was collected through semi-structured interviews with employees in Athletics Administration, University Facilities, and MTU's Office of Sustainability and Resilience to determine the decision-making structure for energy stewardship at both MTU and the Athletic Department. Key informants were selected strategically because of their job scope and status level in the organization. I spoke with employees of Michigan Tech among many different levels of power and status from ground-level workers to high-ranking members of administration. Eight total interviews were conducted and typically lasted between 30 minutes to 1 hour. Seven interviews were held during the summer months of June and July 2022 and one interview was conducted in September of 2022. The interview protocol is included in Appendix B. I was the sole interviewer for all interviews and performed all of the transcribing and analyzing of the raw data myself. Interviews were recorded on my personal phone using Otter.ai and partially transcribed using this application, of which I reviewed and edited from the software. Raw transcripts, my code book of summary results, and other documents were kept in a password-protected Google Drive folder that only I can access.

Each interview was a conversation in which predetermined and organic questions were asked of each interviewee, allowing for both parties to have open-ended discussions of the topics in detail. Because of this structure, I was able to acquire a more in-depth data set than with a rigid script. Interviewees articulated their roles and responsibilities unique to their position and outlined the decision-making process to include purchasing and capital planning within their department. Participants expressed their opinions on the importance of energy efficiency and conservation as well as how they observe the actions of others on campus. Participants shared their knowledge of any planned electrical upgrades, where upgrades in general rank on the "to-do" list, and discussed potential barriers to improving energy efficiency (among other topics that resulted from organic conversation). The questions were specifically about electrical energy efficiency, but interviewees talked about broader issues related to energy stewardship in multiple forms. These interviews were recorded, transcribed, and analyzed. The results were coded with

special attention paid to opportunities for stakeholder input, incentivizing change, and barriers to implementation.

Information regarding Michigan Technological University's energy infrastructure was collected through publicly published documents and supplemented through interviews with key informants at the University. Resources include "Campus Master Plans", "Deferred Maintenance Logs", AASHE STARS, and information from University-related websites to include Administrative departments and student groups. Michigan Tech's Athletic facilities researched include the following:

[1] Student Development Complex (SDC), which includes the Varsity Gym, Pool, Multipurpose Room, ESports Arena, and Fitness Center.

[2] Sherman Field at Kearly Stadium, Hubbell Field, and practice Soccer Fields

[3] John J. MacInnes Student Ice Arena

[4] Gates Tennis Center

3.6 Limitations

The results of the interviewing process have been kept confidential so as to achieve identity protection. Because the scope of this project is targeted specifically at Michigan Tech University and the interviewees are employees of the University, discretion has been maintained so that the participants could speak freely about their observed experiences without consequence. This project is targeted specifically at Michigan Technological University and the research conducted is intended to be unique to these facilities. There was limited access to data on energy use from University Facilities during the course of my research. While opportunities for energy efficiency and organizational policy-making improvements may be derived from this applied study, the research is not aimed at being generalizable.

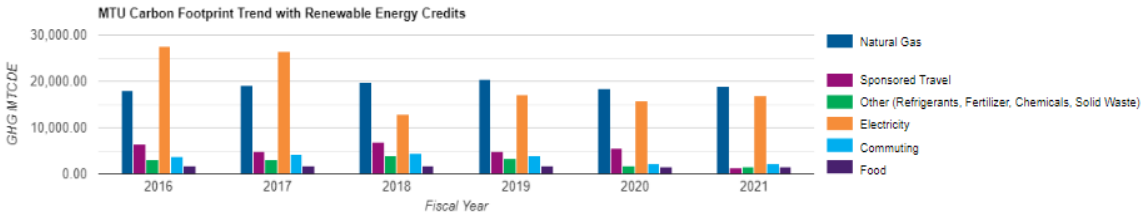
4 Results

4.1 Energy Overview

Operating a sizable university campus is an energy-intensive endeavor. In fiscal year 2021, MTU required more than 38 million kilowatt hours of electricity in campus operations and over 300,000 MMBtus of natural gas, an expenditure of roughly $4.5 million (MTU, 2022-a). A member of the Environmental Protection Agency's (EPA) Green Power Partnership (MTU, 2022-b), Michigan Tech takes part in the state's Electrical Customer Choice Program and sources electricity from Wolverine Power Marketing Cooperative in lower Michigan. MTU has negotiated a renewable energy portfolio in which 50% of the electricity bill goes toward wind generation (Koubek, 2020). The current contract with Wolverine Power extends through December 2025 and is saving the University a reported $3.6 million during this contracted period (MTU, 2022-c), compared to what MTU would pay for the same power if sourced directly from UPPCO. According to one interviewee, the University is negotiating a contract extension which would include an increase in the percentage of renewable generation.

Every year, students in MTU's Green Campus Enterprise conduct a carbon footprint of the institution using a carbon calculator to develop an inventory of electricity and fuel usage in buildings, the motor fleet, travel, refrigerants and chemicals (AASHE, 2020). They aim to increase awareness and to find ways to improve sustainability by reducing this footprint. Figure 1 below shows the University's carbon footprint trend with renewable energy credits from 2016-2021. The royal blue bars show natural gas emissions and the orange bars show electrical energy. We can see that these energy sources dominate the carbon footprint model. MTU's contract for 50% renewable wind sourced electricity with Wolverine Power began in June 2017 (AASHE, 2020), which would account for the significant drop in electricity emissions from 2017 to 2018. According to MTU's Office of Sustainability & Resilience, the variability in electricity and natural gas usage beyond 2018 is likely a result of the weather, particularly heat needed during the winter months (MTU, 2022-a). Notably, there was a slight decrease in electricity emissions in 2020 from the prior year, which could have been a result of reduced building occupancy and university-sponsored travel due to COVID-19. Based on the graph, MTU emitted roughly 16,800 metric tons of greenhouse gas metric tons of carbon dioxide equivalent (GHG MTCDE) in electricity consumption in 2021. This is equivalent to 3,500 gasoline-powered vehicles on the road annually or 3,100 homes' electricity use for one year (US EPA, 2022). These numbers

demonstrate the importance of prioritizing reducing electrical energy emissions on campus to minimize greenhouse gasses into the atmosphere.



[Figure 1: MTU's Carbon Footprint Trend with Renewable Energy Credits (MTU, 2022-a)]

Michigan Tech's administration has demonstrated a commitment to accuracy and transparency by hiring a Director of Sustainability and Resilience to oversee reporting to external governing bodies. The University's membership with the United States Environmental Protection Agency's (EPA) Green Power Partnership and Silver Level rating with the Association of Sustainability in Higher Education's (AASHE) Sustainability, Tracking, Assessment & Rating System (STARS) program demonstrate that commitment. These self-reporting databases are intended to allow universities to compare their environmental performances against their peers and identify areas for improvement. Facilities Management shares in this initiative by stating its commitment to "continuous reduction of our carbon footprint and utilities expenditures by: (1) minimizing the energy demand in new construction or remodeling projects, (2) improving the energy efficiency of existing buildings, and (3) working with our utility provider to increase renewable energy production" (MTU, 2022-a). Affiliations with such programs demonstrate that MTU shows a strong interest in becoming a more environmentally responsible University.

As previously stated, Michigan Tech maintains a Silver rating through AASHE STARS, which is a self-reporting sustainability framework that higher education institutions utilize to gauge their progress toward sustainability categories using assigned metrics. The earned rating is a cumulative score from a wide variety of sustainability-related categories like Academics, Engagement, Operations, Planning & Administration, and Innovation & Leadership (AASHE, 2020). The scores for parts of the Operation category were the most relevant to the scope of this research. For example, MTU scored a 3.22 out of 10 points for Air & Climate: Greenhouse Gas Emissions. This poor score is a combination of a high reported annual GHG emissions inventory and a lack of demonstrated ability to reduce emissions over time compared to a baseline measurement. MTU also scored poorly in the Operations - Energy category with only 3.31 out of 10 available points due to heavy energy consumption in campus buildings and an overall lack of on-site renewable energy-generating capacity. Objectively, the scores for all subcategories in

Operations were dismal and this area is one that will need to be addressed if Michigan Tech were to pursue a Gold rating in the future.

Additionally, under the Planning & Administration umbrella, the Coordination & Planning subcategory scored 3 points out of 8. This category judges if and how institutions are dedicating resources toward coordinating, planning, and engaging students, staff, and faculty in sustainability initiatives (AASHE, 2020). In other words, the extent in which the university is providing the governance and guidance necessary to achieve sustainability goals. This score may have gone up since the initial submission as MTU hired a full-time Director of Sustainability and Resilience in September 2021 who reports directly to the University's President, providing more of a backbone for sustainability to become a priority on campus. However, the STARS report indicates that Michigan Tech does not have a published climate action plan, nor does it have a formal statement in support of sustainability endorsed by the Board of Trustees (AASHE, 2020). A submission note on the report expresses that "although some areas have goals, we need to do a better job of making measurable sustainable objectives" (AASHE, 2020). There seems to be a lack of publicly stated goals related to sustainability and climate change at MTU.

One interviewee expressed the benefits of MTU's involvement in the AASHE STARS program as "good for sustainability and for being good stewards of the environment. Making the necessary changes to improve your score would ultimately save money, and a better score would increase the publicity and reputation of the institution." Based on the AASHE STARS report, there are substantial gaps in campus operations and planning that need to be addressed in order for the institution to work toward achieving lasting sustainability goals.

4.2 Barriers for Implementing Energy Waste Reduction Strategies

Interviewees provided valuable insight into how energy infrastructure decisions are executed at Michigan Tech in addition to general attitudes and opinions into the importance (or lack thereof) of energy waste reduction on campus. Four major themes noting barriers to energy waste reduction emerged from the interviews, which will be explored in detail in the following sections: (1) lack of measurable climate action goals endorsed and promoted by the President's Council and Board of Trustees, (2) staffing issues from a large number of unfilled positions, (3) lack of financial incentives to change current practices with regard to electricity consumption, and (4) lack of investment in efficiency and maintenance. All of these themes are nuanced and interconnected, yet vital to address if MTU wants to prioritize environmental sustainability and stewardship in the campus community.

4.2.1 Lack of Measurable University-Wide Climate Action Goals

Michigan Tech's definition of sustainability includes accountability to the "environmental, social and economic welfare of the campus to secure a more suitable future" (AASHE, 2020). Core values include a demonstration of sustainability leadership, being stewards of natural resources, an awareness of "the broader social impacts of our decisions" while managing the economic interests of the institution (AASHE, 2020). However, in reviewing public documents, press releases, and the University website, it became apparent that Michigan Tech does not actively have a measurable climate action goal, such as "net zero" by a certain target date. This was supported by interviews with members of University Administration that MTU does not have any concerted effort for energy efficiency, reducing waste, or carbon reduction. While there are vague statements on topics like sustainability, the institution lacks a quantitative climate action goal that is both endorsed and promoted by the President's Council and Board of Trustees.

"We have not yet officially set the goals for renewable energy and by what date...50% by 2030 or 'net zero' by 2050...we have not set those. It doesn't matter what the Sustainability Director says, it matters what the President's Council says...until [goals] are set by somebody in the administration, they don't mean anything. We need to figure out what a good [reasonable] number should be and then we need to make sure that the President says 'yes, that's our goal' out loud and written down."

In the fall of 2022, Michigan Tech's Board of Trustees voted unanimously to adopt a long-range campus master plan that would extend at least through 2045 and aims to "align the University's facilities with its sterling reputation" (*Michigan Tech Board*, 2022). This plan came about as a result of two years of discussion and community input and is intended to be a realistic and flexible framework for strategic improvements to campus facilities (*Michigan Tech Board*, 2022). Through "efficient use of limited land…the outcome will be a sustainable, innovative Michigan Tech with state-of-the-art facilities" (*Michigan Tech Board*, 2022). The initial phase of the master plan has been revealed, noting that renovations of classrooms and laboratories to include LED lighting and upgraded system controls will comprise the initial phase of the master plan (*Michigan Tech Board*, 2022). Notably absent from the published master plan at this point is any specific goals or targets regarding energy conservation, waste reduction, climate action, or similar. This lack of stated goal impacts decision-making by perpetuating ambiguity in day-to-

day processes as campus-goers may not feel a sense of urgency in working toward a specific target, so there may be missed opportunities for improvement by street-level bureaucrats.

The Office of Sustainability and Resilience is working on a 'Strategic Proposal on Sustainability and Resilience' as a supplement to the master plan, which they aim to present to the Presidents Council in December 2022. A major component of this proposal would be the creation of a specific pool of funds dedicated to pursuing energy efficiency upgrades on campus and would fall outside of both capital planning and deferred maintenance budgets. Essentially, this fund would focus on new projects so that tracking the return on investment could be easily achieved. At the same time, the funds would revolve as energy performance improves, so the money replenishing the fund could be used for subsequent projects.

This lack of measurable climate action goal creates an environment of ambiguity in the interpretation of the greater vision of the University because the aims are not clearly stated. Failing to provide a compelling vision for an institution hinders change efforts (Schelly et al., 2012) and perpetuates misinformed decision-making as ground-level workers exercise their discretion without a clear target to aim for. Employees I spoke with feel a sense of urgency toward the adoption of a climate action goal so that the University can work toward reducing its carbon footprint and save money in utility costs. These stakeholders are all but asking the President to provide a tangible sustainability goal so that there can be a guided coalition working toward the same result. There is a real sense of urgency among street-level bureaucrats at the University for more guidance at the top with regard to environmental strategies and targets.

4.2.2 University-Wide Labor Shortage

When asked to list the potential barriers to energy efficiency improvements in the Athletic Department and/or University as a whole, all respondents expressed their concerns about unfilled jobs on campus. At the time of writing, Michigan Tech had open job postings for 70 full time staff positions, 27 union positions, and 13 faculty positions. Available jobs that relate directly to energy infrastructure include six Custodians, three Building Mechanics, two Assistant Directors for Major Gifts, Construction Manager, Chief Financial Officer, Chief Human Resources Officer, Business Manager for Facilities, Senior Vice President in Administration, and Executive Assistant for Administration. With so many job vacancies in critical areas of decision-making regarding University infrastructure and operations, it is no wonder that there are issues in moving forward with improvements. A possible reason for all of the vacancies stems from what was called a "mass exodus" of staff during the COVID-19 pandemic due to forced layoffs, furloughs, and proposed vaccine mandates. A tight job market and relatively low wages at the

University were also cited as concerns from interviewees. Regardless of the reason, there is a serious shortage of staff which aggravates an already stretched system.

Interviewees spoke of feeling stretched in their job duties and feeling like they have to take on additional responsibilities to make up for a position currently unfilled. “There are times where not having a support person or another person to work alongside is somewhat stressful” according to one interviewee. “At the end of the day, it's just me so a lot of the smaller projects unfortunately have to wait, which I would wish they didn’t…I wish I was able to get to everything right away.” The Student Development Complex, for example, is short a building mechanic and at least one custodian based on the square footage of the building which is a definite barrier to electrical energy improvements. “We just don’t have any time or nearly the amount of staff to do renovations in-house” noted one SDC employee. Ground-level staff (custodians, building mechanics, etc.,) are too busy simply meeting the core objectives of their day-to-day jobs that forward-thinking renovations or strategic decisions are unable to be made at this time.

4.2.3 Lack of Financial Incentives to Change Current Practices

Interviewees spoke of an overall sense of lack of financial incentives to change current practices toward a more sustainable system. The state of Michigan allows a limited number of customers to choose their electric power provider and as a “choice” customer, MTU has the ability to go onto the energy marketplace and choose their provider, which has resulted in an electricity rate of “pennies on the dollar” compared to an average business or household receiving energy through UPPCO. “If we were paying the full rate, I'm sure that the University would definitely be pushing a lot harder to upgrade everything a lot faster” according to a respondent. Low utility rates increase the time to pay back the upfront costs of efficiency investments. As a result, there is a lack of urgency to move toward a more sustainable product because the bottom line is manageable relative to the alternative. If MTU is not paying very much for electricity in the first place, then what incentive does the institution have to reduce consumption and energy waste? Administrators shared that reduction targets have not risen to the top of the priority list because of the low utility rate and is reinforced by a lack of reduction goals year-to-year when setting budgets. One interviewee expressed the following sentiment with regard to lack of budgetary incentives:

“Money talks and there’s not an incentive to save money on this campus for anybody, Facilities included. They say what their budgets are going to be based on market value and past use.

There's nothing driving that down so there's no incentive for anybody to make a change. That is the barrier. For decision makers, there's no incentive across campus at any level."

Michigan Tech pays for its electricity upfront through the General Fund and then Facilities charges each department for their metered usage, which goes back to the General Fund. Facilities charges the General Athletics Index for building utility usage; the details of that electricity, water, and natural gas usage can be seen in a monthly spreadsheet report by the Athletic Director and the Manager of Budget and Planning. The department does not look at the detailed usage often but rather projects their budget based on previous numbers, meaning that there is minimal incentive to reduce usage based simply on the utility costs.

Purchases toward repairs and maintenance come out of either the SDC Building Operations Index or the Ice Arena Index, both of which are tied to the General Athletics budget. Large projects receive their own index through Financial Services and each project is unique in where the funding comes from: Campus General Fund, General Athletics Index, or through a specific grant or earmarked donation. Notably absent is any sort of tracking process built on sustainability criteria; expenditures like new LED bulbs, for example, are not categorized as going toward a sustainability initiative. At present, unless one were to go through each line item and research the motivation behind each purchase, it is not possible to track how much money is going toward energy saving acts. Because Michigan Tech does not track the payback on energy investments, there is a perception of an upfront economic cost but there is no way to see the economic benefit.

Departments seeking to request infrastructure upgrades and/or related projects must use the *Capital Project Planning Form* that is reviewed by Facilities Administration & Planning, a branch of MTU's Engineering Services department. According to the guidelines for work orders, requests are "managed on a first come-first serve basis and prioritized based on the severity of impacts to the campus community and the critical nature of the request of the University mission" (Michigan Tech Facilities, 2022-b). Each request must pay attention to the funding aspect as to whether it will come out of the General Fund, the index of a specific department, grant funding, or through targeted donation. Facilities, guided by the Association of Physical Plant Administrators of Universities and Colleges (APPA), states that anything considered routine maintenance would likely be covered by the General Fund, such as electrical repairs and "certain lamp replacements" both indoors and outdoors (Michigan Tech Facilities, 2022-a). While this process may seem straight-forward, there does not appear to be explicit language on if the

General Fund would cover electrical infrastructure upgrades unless something was an immediate risk to the campus community or broken and in need of repair. “There's not a clear delineation” in whether projects are paid for by Athletics or General Fund, according to one interviewee, “budgets are separate and there are facilities professionals that are in auxiliary services.” This sense of confusion is a barrier that prohibits the long-range planning process as well as the ability for ground-level workers to enact change. Michigan Tech should recognize that financial flows need to be more transparent and efficient in the way that projects are financed and executed.

Interviewees expressed a range of responses when asked where they perceive electrical energy upgrades to be on the so-called priority list in the Athletic Department (or University as a whole) based on a “low”, “medium”, or “high” scale. I was struck by how all respondents provided two answers to the question: where they personally rank the importance of upgrades and where they think the upgrades rank in the eyes of campus decision makers. There was a discrepancy between the personal ranking and the perceived departmental ranking in every case. Generally speaking, more people provided rankings in the “medium” and “low” categories when referring to the departmental or administrative context but expressed that energy upgrades are a “high” priority as their personal belief. Ground-level workers (custodians, mechanics, and building managers) tend to believe that electrical energy upgrades are more immediate priorities and generally understand that the return on investment from switching to LED lighting, for example, is near-immediate and “a no brainer.” Higher up on the administrative chain, however, there tended to be less urgency regarding upgrades. First, it was expressed that other issues take more of a priority at the present time and that the lights are “doing their job…[lighting] is something that we want to get done when we have the time and resources to do it.” Finally, some feel that lighting uses such a small amount of overall energy in the building load that it has not become much of a priority to make changes.

4.2.4 Lack of Investment in Efficiency & Maintenance

Nationwide, there is an extensive backlog of deferred maintenance among higher education institutions with public universities experiencing greater project totals than private (SHW, 2011). Backlogs are troublesome because they divert attention and resources away from forward-looking infrastructure projects. When not properly budgeted for and prioritized, deferred maintenance “represents a threat to the capability of higher education facilities to support university missions” (SHW, 2011). Michigan Tech last performed a facility condition assessment in 2011 in conjunction with SHW Group (now Stantec) and the collected data was used to

identify key areas needing improvement while also providing estimates for renovation costs. While this report is somewhat outdated, it does give context to the condition of MTU's facilities.

According to the SHW Report (2011), Michigan Tech's facilities range from "good" to "poor" condition based on their age and original construction quality. The Student Development Complex was cited for an estimated $19 million of deferred maintenance to include extensive natatorium repairs, exterior brick and plaster repairs, and HVAC problems (SHW, 2011). Observed areas of issue for the Gates Tennis Center include water damage, missing insulation on critical water pumps, piping, and valves, ceiling issues, broken bricks, and a lack of lightning protection (SHW, 2011). Project totals for this facility were reported to be in excess of $1.7 million in the 0-5-year timeframe (SHW, 2011). These monetary totals demonstrate the massive financial undertaking required to keep an athletic complex at acceptable levels of infrastructure. The report warns that the issues predicted to become critical in the following five years would move the institution's overall rating from "good" condition to the edge of "poor" unless funding for immediate repair and 0-5-year maintenance projects were obtained before they cause critical damage (SHW, 2011). Some of the key recommendations were addressed by the University, while others have not. Specifically, major renovations to the SDC natatorium took place in the last 5 years and there has been some work to improve the HVAC systems in Gates Tennis Center. SHW did not report on any specific electrical energy upgrades in either building, but noted recommended upgrades like LED lights and building controls campus-wide. I was unable to find any documents reporting on specific progress since the 2011 Deferred Maintenance Report, nor does there seem to be a follow-up report on the current state of MTU's infrastructure.

Data collected during the interview process revealed that regarding MTU's Athletic Complexes, nearly every aspect of the facilities need attention. "The SDC is an average building and it's been a couple [of] decades since the last major renovations happened. This building needs a good overhaul" according to one interviewee. Similar to many other buildings on campus, "the deferred maintenance has been put off for too long, [so] we are playing catch up." Another interviewee expressed that the SDC is "a very well-used building and just patching it up [is] not cutting it anymore." Regarding electrical energy specifically, respondents cited deep retrofits in energy infrastructure to include upgraded system controls and changing lighting fixtures to LEDs complex-wide as some of the biggest areas for improvement. According to the AASHE STARS (2020) submission, MTU is "in the process of changing over to LED lighting in our buildings. We initially switched to T8 fluorescent lights and within a year found that switching to modern LED lighting can have a one-year payback." The report explains that LEDs emit more light and

use less energy than fluorescents, which allows for a reduction in the overall number of LED bulbs required for a building.

Athletics manages their own buildings under the umbrella of Facilities Management and has the ability, generally speaking, to operate in a manner in which they can immediately propose and tackle projects without quite the lengthy process as the remainder of campus. While there is collaboration between administrators in both Athletics and Facilities, the Athletic Department is granted a fair amount of autonomy in infrastructure planning and execution. Athletics administrators report that the current aim is to complete at least one major project annually: full renovations of the men's basketball, women's soccer, and men's hockey locker rooms were completed in the summer of 2022 through donated funds and feature all new LED lighting. Additionally, the Varsity Gym was changed over to all LED lighting using General Athletics funds this fall. Future projects in the 1-5-year timeframe include changing all of the lights in both the Varsity Gym and MacInnes Ice Area to LEDs and retrofitting LED lighting as bulbs and/or ballasts fail in the Multipurpose Gym, offices, hallways, and common areas. So, while some key spaces in athletics facilities have been upgraded or are included in next year's budget for a full upgrade, there are still large spaces with no clear plan for LED lighting replacement other than replacing individual bulbs as they burn out (the piecemeal approach). This is despite high potential for cost savings, reduced energy consumption, reduced man-hours, and improved functionality of the spaces in question.

Most agree that the list of projects has been well-identified and prioritized, but funding is the main issue. Facilities is forthcoming in providing instructions for departments to apply for a project through either the department's index or through the General Fund (meeting certain requirements), but it is unclear how the process for applying for external funding works. New projects seem to lag in the approval process beyond Athletics administration unless there has been a targeted donation for a specific project. Certain lighting projects in the Student Development Complex would likely require a high-dollar energy efficiency grant, like changing all of the lights in the Multipurpose Room to LED all at once rather than a piecemealed approach as individual fixtures die. Interviewees recognized this and were aware that relevant grant funding is available, but they didn't know who or how an application should be initiated. Some interviewees expressed that grant funding would be very much welcomed and a definite possibility, but "nobody's making it a priority to look for any grant money or to look for external funding." Ground-level employees see the immediate opportunities to improve aspects of the University, but feel that it is neither their place nor do they have the extra time to seek out and apply for grants. The workers I

spoke with did not feel empowered to make changes that are their priority or to suggest or seek funding for them from those with more decision-making authority. “Most of our grant stuff is handled down on campus and I don’t necessarily think they really look a whole lot for Facilities grants,” noted one SDC worker, “I’m sure that we might be able to get some energy efficiency grants, but I don’t necessarily think that that would be our place in the totem pole to be able to go and get those grants.”

The other budgetary issue is that unless an electrical project is in immediate need of repair, allocated infrastructure upgrade dollars seem to be continuously reprioritized to more pressing issues. Several interviewees expressed that from an administrative standpoint, “as long as the lights work, then we don’t have incentive to change them”. I did not get the sense that decision makers were against energy efficiency upgrades, it seems more that these same people are constantly “putting out fires” and do not have the time or resources to think about tasks that are not immediately putting building-goers at risk. Employees in the Athletic Department spoke very highly of their coworkers and the general working atmosphere, yet they all share the sentiment that everyone is trying to be resourceful and just meet their core objectives, so forward-thinking projects typically do not rise to the level of swift action on the priority list. Many felt that tackling even just a few “low-hanging fruit” projects would go a long way, but their optimism waned when they remembered the extensive backlog of deferred maintenance that is dragging down progress. “If we can find efficiency and cost savings over time in one area, then it’ll spread my resources out to other areas that we might be able to reprioritize,” noted one interviewee on this topic.

5 Recommendations

5.1 President's Council Adopt Clear Targets for Climate Action

Michigan Tech's President's Council should adopt and implement clear sustainability targets with firm dates and tangible numbers to include both a carbon action plan and complementary energy use and/or utility savings goals. Employees at various levels from custodians to supervisors and department heads should be given discretion for making decisions to meet these goals, but also with checks and accountability built into the process to ensure goals are met. With a strategic goal in mind, subsets of the University can draft a clear picture of how their department or area can assist with achieving that goal. One interviewee expressed that "it is important to say 'we're trying to be better' and we [should] hit a greenhouse gas reduction [goal] by 2035, which is when all of the Presidential goals are. We're gonna make campus better by doing it and people can get behind that." It is important that this goal be both attainable and a challenge so that the University can push itself to be a better institution. Accountability and transparency are going to be key factors in planning and executing such a climate action goal.

Part of the ecosystem of decision-making is to think about what others are doing that are considered "best in class". Peer institutions have implemented the following goals for their own campuses, of which Michigan Tech should follow suit. Institutions such as the University of Buffalo, University of Maryland, Baltimore County, and University of Massachusetts, Amherst, have adopted strategic climate action plans and/or climate mitigation plans that outline explicit goals for reducing emissions to eventually achieve carbon neutrality by 2030-2050 (*30 Colleges*, 2022). Colgate University, for example, became net-zero carbon in 2019 in part by managing its heavily forested campus for carbon sequestration (Wise, 2020). Central Michigan University, the University of Michigan, Ann Arbor, and Michigan State are all AASHE Gold institutions while Northern Michigan University and Western Michigan are AASHE Silver.

The University of Minnesota, Duluth, an AASHE Gold member, is an excellent example of a peer institution for Michigan Tech and is at the forefront of climate action with their UMD Energy Action Plan enacted in 2007. This plan outlines specific climate goals and actions for the campus with a heavy emphasis on energy efficiency and conservation. The first goal in the Action Plan was for UMD to reduce campus greenhouse gas emissions by 25% from 2007-2020, a goal which was achieved (UMD, 2021). They now look forward to a 50% reduction in greenhouse gas emissions by 2030 and becoming carbon neutral by 2050 (UMD, 2021). UMD is transparent about the challenges they face in achieving these goals, such as time and resources, but are clear that "higher-cost strategic investments in the near future to reduce greenhouse gas emissions now

will still be lower than the costs of dealing with crisis-level climate events and disruptions in the future" (UMD, 2021). Future steps they intend to take include the empowerment of campus leaders at all levels, retrofitting or decommissioning energy infrastructure, investing in solar and other carbon-neutral energy sources, converting the entire campus to LED lighting, and also to "communicate and celebrate success[es]" (UMD, 2021). A Sustainability Operations Committee oversees and advises on all aspects of campus sustainability initiatives and is comprised of campus leadership, faculty members, Athletics representatives, custodians, and staff in Dining Services, housing and residential life, and grounds, among others (*Updated Committee Assignments*, n.d.). UMD uses an integrated approach to actively involve stakeholders at all levels of the University to promote inclusion and assist in comprehensive decision-making. By these measures, UMD is experiencing real success with clear and concise energy efficiency and sustainability targets for the University that are quantifiable, achievable, and impactful.

While drafting and adopting a comprehensive climate action goal, Michigan Tech should involve the Athletic Department in sustainability conversations not just regarding building infrastructure, but also the departmental structure of how decisions are made across campus. Given the relative autonomy that the Athletic Department is given in its ability to make decisions that best suit the needs of Athletics and Recreation, administrators should be involved in every aspect of sustainability talks so that they can buy-in to the process. This includes the Capital Planning process, setting climate action goals, and discussions regarding the implications of these topics, such as student recruitment and retention, donor funding, and the general health and safety of the institution.

Members of Athletics feel that the Student Development Complex oftentimes operates as an island because of its physical detachment from the rest of the academic campus, which often lends the department to be a step removed from strategic planning and is perhaps detrimental to overall collaboration. As O'Meara (2021) argues for the balance between maintaining discretion but within a system of checks, there must be a healthy interplay between the Athletic Department's autonomy in decision-making and a system of checks from above and within the University to make sure that such decisions are in line with the University's stated goals. The Athletic Department should be subject to the same sorts of sustainability checklists and periodic reporting requirements as the remainder of on-campus departments are required to do, yet be able to use their discretion to implement policies that will help work toward those goals. For example, perhaps a requirement (check) that units must submit an annual energy report that summarizes usage and costs over certain timeframes, drawing that data from bills provided by Facilities.

Further, street-level bureaucrats within the organization should be empowered by their leaders to be active participants in the decision-making and associated implementation with regard to building renovations and day-to-day maintenance. Participatory governance through the involvement of staff members at all levels of the organization increases ownership and promotes the idea that their actions matter (Schelly et al., 2012).

Collegiate athletic departments must be in alignment with the greater University's environmental sustainability goals in order to maintain perceived fluidity between the academic and athletic realms. It is no secret that many Universities invest vast amounts of resources into their athletic departments, but it needs to be apparent that decisions made for the sake of athletics are benefitting and in accordance with the University's goals for sustainable campus planning and resource allocation. Michigan Tech should embrace the inherent visibility of its Athletic Department and utilize it as a platform to showcase energy efficient buildings and demonstrate environmentally sound practices.

5.2 Reduce Staffing Shortages

Staffing shortages are an issue nation-wide, but Michigan Tech should implement an urgent and concerted effort to fill vacant positions on campus. Building the staff base will not only reduce ambiguity in processes across campus, but will relieve already stretched employees that are having to perform the work of multiple people to keep the campus in operation. It is important for the University to fill its vacant positions while taking measures to retain employees so that man-hours can be more evenly dispersed and forward progress can be made.

To that end, one interviewee expressed the importance of incorporating a sustainability component to the job descriptions of new hires. As we "identify some of these challenges, we hire new people in key areas that have a sustainability component in their job description and are charged with overcoming some of these obstacles as part of their day-to-day, rather than asking a bunch of overworked custodians to do more." Adding an element of investment in the University's sustainability initiatives by weaving specific responsibilities into job descriptions would be a subtle but effective way to promote greater goals and begin to see tangible progress. Simply adding the word "sustainability" to job descriptions and/or titles might encourage more applications, which would make it easier to fill posted jobs.

5.3 Invest in Efficiency & Maintenance

Michigan Tech should invest in the importance of efficiency both in its energy systems and in operations by streamlining the process for acquiring funds for projects, incentivizing units

to reduce their energy waste, and begin to tackle a short list of "low-hanging fruit" projects as soon as possible.

Several interviewees voiced their concerns about the funding aspect of desired electrical energy infrastructure upgrades in the Athletic complexes specifically, citing that in spite of the relative freedom to operate independently from the rest of campus, there are some aspects in the funding process that are confusing. At times, according to the interviews, workers feel like the SDC is treated as an auxiliary service, meaning that they do not receive approval for General Funds as freely as an academic unit on campus would, for example. Auxiliary units, such as Mont Ripley and Portage Lake Golf Course, rely on patronage for their funding so generally speaking do not rely on the General Fund for operation and minor maintenance costs. The SDC, while collecting some revenue from the Ticket Office, is a student-centered operation and utilized by University-affiliated students and staff almost exclusively. It was expressed that in the past, the SDC was an auxiliary operation but was moved under the main campus umbrella several decades ago. Some feel that the Athletics and Recreation Departments are still viewed in that way, so there may be some hesitation from Facilities in allocating General Fund dollars for renovation projects. Michigan Tech should be more inclusive of Athletics and Recreation and commit to absorbing more maintenance and construction costs through the General Fund, rather than treating the SDC like an auxiliary service as it was in the past.

When a proposed project falls outside of the General Fund or Athletics General Fund, respondents are unsure of the process in applying for external grant funding. Michigan Tech's administration should clearly define the process for external grant applications to make it easier for ground-level employees and their supervisors to seek out and apply for funding beyond what the institution can offer. It may be possible for MTU to apply for energy efficiency optimization funds from either UPPCO or Wolverine Power. Respondents generally do not feel that they have the time and resources to seek out external funds, nor do they know if "it is their place" to apply for them. It is important for the University to have a clearly defined structure so that those who identify problems in their day-to-day job functioning have the knowledge and resources to contact the appropriate person and work toward making positive changes to their environment.

Secondly, Michigan Tech should capitalize on its low electricity utility rate and provide strategies for campus units to further reduce their consumption and waste, thus contributing to an even greater overall costs savings. Involving more members of campus in reduction targets by empowering them to become stakeholders would contribute to a more complete culture of sustainable practices on campus and inspire further organizational change. MTU should promote

awareness of electricity consumption among departments and units more intensely and provide financial incentives for a reduced energy bill. MTU could ignite a competition between departments or buildings to see which unit can reduce their usage by 10% by a certain date or perhaps the Athletic Department could compete with Northern Michigan University to be the first to demonstrate a reduction in energy waste by a certain metric and date.

Further, Michigan Tech should invest the time and resources to complete a host of "low-hanging fruit" energy infrastructure projects now to both alleviate the ever-growing backlog of deferred maintenance and to realize the payback from these projects as soon as possible. For example, there should be a targeted effort to invest in changing all of the remaining light bulbs in the Athletic Complex to LEDs, which would not only decrease electricity consumption but would save the University money once the roughly one-year payback period is achieved and reduce the maintenance man-hours in the longer term. According to the U.S. Department of Energy, LED lights consume roughly 90% less energy than incandescent bulbs and can last 25 times longer (U.S., n.d.). By installing a more efficient and resilient product, building mechanics can move on to more pressing projects by not having to change as many lightbulbs saving precious man-hours.

"When I look at energy efficiency opportunities on campus, there are many that make a lot of economic sense. We've got to remove the barriers to do it. It's an advantage to all of campus and it could be an advantage to individual actors. There's things that are within reach to start making improvements and none of it is lost if we start now."

Energy-saving strategies are simple and effective ways of curbing greenhouse gas emissions. By utilizing existing and emerging technologies, building managers and organizations can make positive and lasting changes that are both visible to stakeholders and beneficial to the environment by reducing emissions, saving money, and increasing the positive perception of the organization. By demonstrating a commitment to action in the form of completing smaller-scale energy infrastructure projects, the University can further its commitment to sustainability and be proud of measurable progress while building momentum to move on to larger issues across campus. The administrators in Athletics are committed to completing at least one major infrastructure project annually and have a clear vision with regards to prioritizing future projects while managing the backlog of deferred maintenance. It is imperative that Michigan Tech incorporate sustainability targets into annual budgets and account for energy infrastructure upgrades, understanding that the payback periods of these upgrades will be relatively short.

5.4 Additional Recommendations

Listed briefly, interviewees voiced some additional ideas and recommendations regarding energy infrastructure improvements or upgrades that may prove useful once the above baseline recommendations are achieved:

[1] Invest in the possibility of on-campus solar generation to reduce reliance on utility companies and decrease the overall carbon footprint of the University. MTU's Sustainability Demonstration House is already powered by solar generation so there could be an immediate opportunity to expand the array or implement a new array in a prime location. The Office of Sustainability and Resilience is working on identifying areas that would be potential areas for solar panels.

[2] Involve undergraduate students in the research and proposal process for on-campus projects. Allow them to use the skills they are learning in the classroom to help with feasibility studies and assembling proposals. This would save money and foster more of the "learning laboratory" environment that Michigan Tech's leaders are striving for.

[3] Give equal attention to conservation efforts and renewable energy procurement on campus. "The demand keeps growing [and] a lot of interest you see on the electrical side of sustainability is more on the sourcing (renewables), but that turns our attention away from the conservation side. You've got to make sure you're playing both sides: that you're reducing your demand over here and you're cleaning up your supply." Promoting both electrical energy conservation and generation from renewable sources are key to reducing the overall carbon footprint of the university.

6 Implications

All of the recommended strategies for improving energy stewardship at Michigan Technological University have positive implications such as positive return on investment, a reduced carbon footprint, and an improvement to the safety, resiliency, and functionality of the campus. All of these near-immediate benefits lead to improved branding, visibility, and optics, elements that are crucial for an increase in stakeholder engagement. It is important for MTU to act now to set an actionable climate goal, get its staff and systems in place, and begin completing the "low-hanging fruit" projects around campus in order for any of these positive implications to be realized.

"There are so many opportunities that are mutually beneficial...to our strength as an institution, to our recruitment of students that we want to solve the problems of the world, to financial performance, to be more resilient, to having top-notch facilities. Sustainability informs every one of those and helps improve them."

There are many projects on campus that can be completed with relative ease that would have a short return-on-investment period and reduce the campus carbon footprint simultaneously, such as changing all lights to LEDs. The cost savings over time with these projects is clear and the reduction in emissions would be apparent over time. Upgrading energy infrastructure to newer technologies would increase infrastructure resiliency by alleviating some of the burden of maintenance and repair from already over-stretched building mechanics, allowing them to move on to more pressing projects. Completing such projects would improve the safety aspect of buildings by improving the overall lighting quality, as well as increase the functionality of spaces in a more efficient way.

It should be a priority for Michigan Tech to align its high-quality academic programs and research with facilities that showcase them properly. Setting clear climate action goals and completing infrastructure projects would be important to improve the overall optics of the University. It would behoove MTU to brand itself as sustainable in order to improve its reputation, increase both enrollment and retention, and boost stakeholder engagement in the sense of donations for further improvements. Many people are passionate about sustainability and interviewees noted that there is a tangible desperation among students, alumni, and the industries employing Tech graduates about the lack of environmental action at MTU. One interviewee explained that there is a trend now for students to decide where they attend college in part based

on its sustainability rating, recalling a former student's sentiment that "If I had known Michigan Tech was this bad, I wouldn't have come here, so I'm going to do everything I can to make it better." Simply put, if MTU continues to ignore sustainability and environmental stewardship through lack of action, the University may lose students and further disengage alumni.

"A lot of alumni have contacted me and said 'We're not doing anything about [sustainability]. I can't donate to Michigan Tech because you guys are bleeding money from all of your terribly inefficient buildings and energy systems'."

Ultimately, Michigan Tech needs to understand the implications of aligning itself as an institution that prioritizes environmental stewardship and prove it by both stating a climate action goal and working to improve campus infrastructure through investment. The direct and peripheral benefits are immense and would prove to have a lasting effect by demonstrating that Michigan Tech can deliver on its promises of a better tomorrow.

7 Conclusion

Staff members interviewed for this research project were largely optimistic about the state of the University and their respective department as well as their own position. Many are overstretched, meaning that they take on so many different obligations in their day-to-day job functioning that they feel, at times, that not all responsibilities can be met in a timely manner. Participants expressed optimism that impactful changes with regard to sustainability are possible at MTU and would be welcomed. All agreed that MTU's aging infrastructure presents significant challenges. Paired with sentiments of underinvestment, to include staffing issues, it is easy to understand why the backlog of deferred maintenance is growing longer and longer. Multiple participants alluded to the analogy of a sinking ship, where you plug one hole just to have another pop up in another area. Based on the results of the research, I believe that if MTU's Presidents Council pushed forward a targeted initiative aimed at sustainability with objective goals and measurable targets, the employees and student body would be on board.

Many people on campus are actively pursuing sustainability goals, but largely independent of one another. We have several Enterprise organizations that target environmental issues, Senior Design projects aimed at research and innovation, and student organizations that are speaking out on sustainability issues at the grassroots level. Yet, without a clearly stated goal, these groups are operating in the abstract. Having a goal of this nature would benefit the entire campus community by providing a target to work toward while also improving the optics of the University from both an enrollment and retention perspective and also from a research funding perspective. Universities strive to be on an upward trajectory of enrollment, retain as many students as they can, and be the recipients of research funding and donations from alumni and industries that employ these students after graduation. MTU prides itself on being at the cutting edge of research and innovation by using taglines such as "change the world" and "tomorrow needs Michigan Tech", but how can we expect to change the world if we cannot change our campus for the better? It would go a long way to specifically address infrastructure and sustainability issues and demonstrate that by fixing ourselves first, we are responsible enough to claim to produce graduates that can then fix the world. By improving energy stewardship within the Athletic Department at Michigan Technological University, the institution's carbon footprint can be reduced and cost savings can be realized while publicly demonstrating the institution's commitment to sustainability initiatives.

8 Reference List

30 Colleges That Are Fighting Climate Change – This Is How American Colleges Are Working To Save The Planet. (2022). Great Value Colleges. https://www.greatvaluecolleges.net/colleges-fighting-climate-change/

Association for the Advancement of Sustainability in Higher Education (AASHE).. (2020). *Michigan Technological University STARS Report*. https://reports.aashe.org/institutions/michigan-technological-university-mi/report/2020-07-08/

Campus Sustainability. (n.d.). *Green Campus Enterprise*. http://greencampus.enterprise.mtu.edu/

Casper, J., Pfahl, M., & McCullough, B. (2014). Intercollegiate sport and the environment: Examining fan engagement based on athletics department sustainability efforts. *Journal of Issues in Intercollegiate Athletics, 7*, 65–91.

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, *13*, 117. https://doi.org/10.1186/1471-2288-13-117

Howes, M., Wortley, L., Potts, R., Dedekorkut-Howes, A., Serrao-Neumann, S., Davidson, J., Smith, T., & Nunn, P. (2017). Environmental sustainability: A case of policy implementation failure? *Sustainability*, *9*(2), 165. https://doi.org/10.3390/su9020165

Koubek, R. (2020, June 26). *Re: Michigan Technological University STARS Submission* [Letter]. https://reports.aashe.org/media/secure/916/submission-5240/Michigan_Tech_Signed-AASHE_STARS_LETTER_2020-06-24_1.pdf

Lipsky, M. (2010). *Street-Level Bureaucracy: Dilemmas of the Individual in Public Services*.

McCullough, B. P., Orr, M., & Kellison, T. (2020). Sport ecology: Conceptualizing an emerging subdiscipline within sport management. *Journal of Sport Management, 34*(6), 509–520. https://doi.org/10.1123/jsm.2019-0294

McSherry, M. (2009, August). NCAA athletic department sustainability practices survey report. *SportsTurf, 25*(8), 25–27.

Michigan Tech Board of Trustees Votes to Adopt New Campus Master Plan. (2022, October 7). Michigan Technological University. https://www.mtu.edu/news/2022/10/michigan-tech-board-of-trustees-votes-to-adopt-new-campus-master-plan.html

Michigan Tech Facilities Management. (2022-a). *Funded and Non-Funded Services | Michigan Tech Facilities Management*. Michigan Technological University. https://www.mtu.edu/facilities/operations/maintenance/cost/

Michigan Tech Facilities Management. (2022-b). *Repairs or Services FAQ*. Michigan Technological University. https://www.mtu.edu/facilities/operations/repairs/

Michigan Technological University. (2022-a). *Energy and Climate*. Sustainability at Michigan Tech. https://www.mtu.edu/sustainability/campus/energy-and-climate/

Michigan Technological University. (2022-b). *Energy Management*. Facilities Management, Michigan Technological University. https://www.mtu.edu/facilities/admin-planning/energy/

Michigan Technological University. (2020). *FY2021 Five-Year Capital Outlay Plan.* https://www.mtu.edu/facilities/resources/documents/fy21-capital-outlay-five-year-plan.pdf

Michigan Technological University. (2022-c). *Measuring Our Carbon Footprint*. Facilities Management, Michigan Technological University. https://www.mtu.edu/facilities/admin-planning/energy/carbon/

Mohammadalizadehkorde, M., & Weaver, R. (2020). Quantifying potential savings from sustainable energy projects at a large public university: An energy efficiency assessment for Texas State University. *Sustainable Energy Technologies and Assessments, 37*. https://doi.org/10.1016/j.seta.2019.100570

O'Meara, K. (2021). Leveraging, Checking and Structuring Faculty Discretion to Advance Full Participation. The Review of Higher Education, 44(4), 555–585.

Ramsak, B. (2020, June 8). *Athletes and the environment: Answering the sustainability call*. World Athletics. https://www.worldathletics.org/news/feature/athletes-environmental-sustainability-project

Schelly, C., Cross, J. E., Franzen, W., Hall, P., & Reeve, S. (2012). How to Go Green: Creating a Conservation Culture in a Public High School Through Education, Modeling, and Communication. *The Journal of Environmental Education*, *43*(3), 143–161. https://doi.org/10.1080/00958964.2011.631611

SHW Group, LLP. (2011). *Facilities Assessment and Deferred Maintenance Capital Planning Report.* Michigan Technological University. https://www.mtu.edu/facilities/pdfs/2011-mtu-facility-assessment-report-2011-10-13-update.pdf

Srivastava, A., & Thomson, S. B. (2009). Framework Analysis: A Qualitative Methodology for Applied Policy Research. *Journal of Administration & Governance*, *4*(2), 8.

Steinbach, P. (2010, September). *Survey of NCAA athletic departments finds sustainability interest*. Athletic Business. https://www.athleticbusiness.com/survey-of-ncaa-athletic-departments-finds-sustainability-interest.html

Tech Forward Initiative on Sustainability & Resilience Working Group. (n.d.). *Sustainability & resilience at Michigan Tech: What is Michigan Tech doing?*. https://www.mtu.edu/sustainability/documents/what-michigantech-doing.pdf

UMD Office of Sustainability. (2021). *Progress Update: University of Minnesota Duluth's Carbon Commitment*. https://drive.google.com/file/d/1TTOCbgc8vyZNLR5HRBpWNCCwI7ajv3cN/view?usp=sharing&usp=embed_facebook

United States Environmental Protection Agency. (2022, March). Greenhouse Gas Equivalencies Calculator [Data and Tools]. US EPA. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Updated Committee Assignments. (n.d.). University of Minnesota Duluth Sustainability Committee. Retrieved December 2, 2022, from https://docs.google.com/spreadsheets/d/1eAGzL4GyrGbI_Ogsnx3W1Rs63N_JDQeGq3IQmh1jRTA/edit?usp=embed_facebook

U.S. Department of Energy. (n.d.). *Lighting Choices to Save You Money*. Energy.Gov. Retrieved November 30, 2022, from https://www.energy.gov/energysaver/lighting-choices-save-you-money

Wilcox, M. (2019, April 4). *Michigan Tech, EPA Partner for Renewable Energy*. Michigan Technological University. https://www.mtu.edu/news/2019/04/michigan-tech-epa-partner-for-renewable-energy.html

Wise, M. (2020, September 16). *Carbon Neutral Universities in the United States*. Second Nature. https://secondnature.org/media/carbon-neutral-universities-in-the-united-states/

Appendix A: IRB Exemption

Michigan Technological University

Research Integrity

DATE:	May 11, 2022
TO:	Richelle Winkler Cynthia Pindral
FROM:	Christina Lehmann, Director Human Research Protections Program
RE:	M2171, [1779293-1]
TITLE:	Improving Electrical Energy Efficiency at Michigan Technological University's Athletic Complexes: An MS Project
SUBMISSION TYPE:	New Project
HRPP ACTION:	Exempt
STATUS:	Exempt

After a limited review performed by an MTU-IRB member, the above-referenced study project was determined to meet the following federal exemption category per 45 CFR 46.104d:

Exemption Category: (2) (iii)

> *(2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:*
>
> *(iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).*

This determination is based on no greater than minimal risk to research participants. When a research project is determined to meet the criteria for an exempt status, it means the project as submitted is exempt from Michigan Technological Institutional Review Board (MTU-IRB) oversight and does not require annual continuing review.

This determination only applies to the activities described in this IRBNet submission and does not apply should any changes be made to the project. If changes are being considered, please submit a study modification through IRBNet for review. You can submit a modification by navigating to the initial submission and selecting to "Create a New Package". Be sure to include a "**Renewal, Change, or Closure Request**" form to the new package. **You must receive notification of HRPP determination of "Not Research", "Not HSR", "Exemption", or an MTU-IRB approval PRIOR to implementing change(s).**

While this study does not require MTU-IRB oversight, investigators and study team members must comply with all applicable federal, state, and local laws, as well as FERPA and MTU Policies and Procedures. Studies incorporating human participants requires all team members to complete training to ensure the protection of human subjects and adherence to the ethical principles explained in the Belmont Report. MTU utilizes CITI Program (citiprogram.org) to provide these training courses and receives notifications of CITI training courses completed.

If you have any questions or need guidance on human subject research training, please contact HRPP personnel at 906-487-2902 or send an e-mail message to irb@mtu.edu.

Lakeshore Center | 1400 Townsend Drive, Houghton, MI 49931-1295
906-487-2902 | f. 906-487-1979 | **mtu.edu**

Appendix B: List of Interview Questions

What is your role in making decisions about electrical energy efficiency within the Athletic Department?

How is your work distinct to your job title, compared to your supervisor(s) and/or subordinates?

Can you describe which areas/departments need the most attention with regards to electrical upgrades?

To your knowledge, can you describe any future electrical upgrades planned for any of the athletic complex buildings?

Where do energy upgrades rank on the list of things that need to get done? Low, medium, high?

To what extent is electrical energy conservation promoted within the Athletic Department?

What is your involvement in purchasing decisions for building infrastructure (i.e. lighting fixtures, ordering renovations, etc.)?

In your opinion, how important is electrical energy conservation in your day-to-day job functioning?

What attitudes toward electrical energy conservation do you observe in the building?

Do you foresee any barriers to improving electrical energy efficiency in the Athletic Department? i.e. legal, budgetary, organizational, etc.

Appendix C: Code Book for Inductive Research

Code	Definition	Example	Minor Theme
Organizational Barrier	Lack of communication between employees that hinders organizational processes	Lack of leadership/guidance on climate action at the top	1. Lack of Stated Goals
Tracking	Following expenditures and activities in detail	Lack of tracking system for sustainability-related purchases	1. Lack of Stated Goals
Personal Conservation Attitude	One's personal belief about the importance of energy conservation	Energy conservation is more of a priority at home than at their job	1. Lack of Stated Goals
Process Ambiguity	Lack of clarity regarding how a task should be accomplished or how objectives can be met	Street-level bureaucrats are unsure of the process for grant applications/writing	2. Staffing Issues
Personnel	Those employed in an organization	100+ open jobs, many in areas of decision-making	2. Staffing Issues
Time Pressure	Stress resulting from feeling like one has less time available than is necessary to complete a task	Feeling "too stretched" in their daily responsibilities to look forward	2. Staffing Issues
Power Dynamics	Strategies used by different groups of people in a hierarchy to influence or control each other	Workers do not feel it is their place to apply for grants, rather they should defer to Administration	2. Staffing Issues
Daily Demands	Directives and tasks related to job function that are typical of a work day	Struggling to keep up with daily tasks due to lack time/resources	2. Staffing Issues
Financial Barrier	Amount of available money required of an activity or initiative	Not enough funding to complete projects	3. Lack of Financial Incentives
Budget	An estimate of available funds for a one-year period	Budgets are set based on prior years spending, lacking any rationale for conservation	3. Lack of Financial Incentives
Cheap Power	Inexpensive electrical utility rate paid by the University	Low electricity rate, no incentive to change consumption	3. Lack of Financial Incentives
Prioritization	Listing tasks or problems in order of importance	No incentive to change lightbulbs to LED when they still work	4. Lack of Investment in Efficiency & Maintenance
Deferred Maintenance	Postponed/delayed infrastructure repairs because of budget limitations & lack of funding	Extensive backlog dragging down forward progress	4. Lack of Investment in Efficiency & Maintenance