Energy Audit Green Fund Proposal
2/12/2025

GREEN FUND
Sustainability Through Student Innovation

Project Application

Green Fund Mission Statement: "The NAU Green Fund promotes student participation in and provides funding for projects that reduce NAU's negative impact on the environment and create a culture of sustainability on-campus."

Requirements for Funding:

• The project must be implemented on campus.

• The person submitting the project must be a NAU student, faculty, or staff member.

• Projects must provide all necessary documents, letters of support, and authorizations prior to submission. • The Green Fund distributes funding on a **reimbursement basis**. Project teams should partner with an administrative office to provide upfront funding for the project. Once the project has been successfully completed, the Green Fund will reimburse the administrative partner.

• All project applications should be submitted to greenfund@nau.edu for review.

Disclaimer: All applications will go through a comprehensive vetting process. We highly recommend meeting with a Green Fund Committee member prior to submitting the application. The Green Fund Committee member will assist you with every step of writing your project application. If your project is approved, you may be asked to provide more detailed information regarding specific deliverables. The Green Fund is not responsible for acquiring the necessary permits, permissions, or approvals for a project, although we are happy to assist with this process if needed. Additionally, the Green Fund does not provide any ongoing maintenance costs. A sponsoring department must take responsibility for operations and management.

Review Process: Upon project application submission, the Green Fund will review your project within two weeks. At this time, the Green Fund will provide comments on the project. Incomplete applications will not be reviewed until all components are submitted. **Note:** The Green Fund Committee only meets during the academic year. All projects submitted outside of the regular academic year will be reviewed at the start of the next academic session.

Contact Information

Project Leader Name: Climate Action Committee

Project Contributors:

Kenna Dinsdale (Project Lead)

Paul-Martin Fearon Hernandez

Phoenix Eskridge-Aldama

Caleb Atsu Nyatuame

Expected Graduation Date for Main Contact: May 2026

Project Advisor Name: Dr. John Fegyveresi Phone: 928-523-2522 E-mail:

John.Fegyveresi@nau.edu

Sponsoring Department: Office of Sustainability? - TBD

Project name: Campus Energy Audit

NAU Department/Unit for funding reimbursements (Attach letter of commitment from departmental representative): _____

Abstract

This proposal seeks funding to conduct a comprehensive energy audit at Northern Arizona University (NAU) to identify inefficiencies in campus buildings and provide actionable data for energy-saving initiatives. By assessing energy consumption patterns, outdated equipment, and structural inefficiencies, this project aims to create a data-driven foundation for future energy optimization efforts. The audit will be carried out by student workers under the guidance of the Climate Action Committee, the Office of Sustainability, and Facility Services, fostering student engagement in campus sustainability initiatives. The data collected will help prioritize retrofitting projects, optimize energy use, and support NAU's Climate Action Plan by reducing energy waste and lowering operational costs. Additionally, this project will serve as a pilot for ongoing energy assessments, demonstrating the potential for student-led sustainability research to drive meaningful institutional change. The findings will be made publicly available for use in future Green Fund projects and broader energy efficiency planning. By investing in this initiative, NAU has the opportunity to achieve significant long-term financial and environmental benefits while advancing its commitment to sustainability.

Literature Review

A growing body of research highlights the economic and environmental benefits of conducting energy audits in institutional settings. Energy audits help identify inefficiencies in building operations, leading to targeted retrofits that can significantly reduce energy consumption and associated costs (Mills, 2011). Studies have shown that universities implementing systematic energy audits can achieve energy savings between 10-30% through upgrades such as improved lighting and insulation improvements (Ürge-Vorsatz & Novikova, 2008). Additionally, integrating student participation in energy audits has been found to enhance sustainability literacy and institutional engagement in climate action (Klein-Banai & Theis, 2013). Given that higher education institutions are major energy consumers, proactive energy assessments are essential for meeting carbon reduction goals while improving operational efficiency (Güneralp et al., 2020). By leveraging the expertise of student researchers and campus sustainability offices, this project aligns with best practices in campus energy management, demonstrating the potential for long-term cost savings and emissions reductions at NAU.

Güneralp, B., Lwasa, S., Masundire, H., Parnell, S., & Seto, K. C. (2020). Urban sustainability and the Global Sustainable Development Goals. *Annual Review of Environment and Resources, 45*, 55–89.

Klein-Banai, C., & Theis, T. L. (2013). The quantitative impact of a university campus green fund. *International Journal of Sustainability in Higher Education, 14*(4), 414-432.

Mills, E. (2011). Building commissioning: A golden opportunity for reducing energy costs and greenhouse gas emissions. *Energy Efficiency, 4*(2), 145-173.

Ürge-Vorsatz, D., & Novikova, A. (2008). Potentials and costs of carbon dioxide mitigation in the world's buildings. *Energy Policy, 36*(2), 642-661.

Methods, Data Collection, & Dissemination

The energy audit will be conducted using a structured methodology that includes site assessments, equipment inspections, and data logging to identify inefficiencies in campus buildings. Student workers, trained in energy assessment techniques, will systematically collect data on lighting, insulation, and appliance usage using standardized data sheets. Observations will include equipment age, efficiency ratings, and potential energy waste, which will be recorded in a centralized Google Sheets database for real-time collaboration and analysis. Data validation protocols, including supervisor reviews and cross-checking with facility records, will ensure accuracy. Once collected, the data will be analyzed to identify patterns of inefficiency, estimate potential cost savings, and prioritize energy retrofitting opportunities. Findings will be compiled into a report shared with NAU's Office of Sustainability, Facility Services, and the Green Fund to inform future campus energy initiatives. Additionally, data will be made publicly available through an online repository to support future Green Fund projects and broader institutional sustainability efforts.

Enhancing Sustainability at NAU

This energy audit will directly enhance sustainability at NAU by identifying and addressing inefficiencies that contribute to excessive energy consumption and greenhouse gas emissions. By pinpointing outdated or wasteful energy practices, the audit will provide actionable insights for implementing efficiency upgrades, such as LED lighting retrofits and improved insulation, which can significantly reduce the university's carbon footprint. Additionally, the project will contribute to long-term sustainability by establishing a data-driven foundation for future energy reduction initiatives, ensuring that energy efficiency remains a priority in campus planning. Engaging students in the audit process fosters a culture of sustainability, equipping them with hands-on experience in energy management and climate action. Moreover, by making the data publicly available, the project will support continued research and future Green Fund projects, reinforcing NAU's commitment to sustainability and climate resilience.

Project Overview

Executive Summary

Please provide a brief overview of your proposal. Please address how this project will support the goals of the Green Fund (student involvement, creating a culture of sustainability, and lessening NAU's impact):

Our idea is to install window films in every East, South, and West facing window of the Physical Sciences building. North windows do not receive much sun and are not in need of films. The films will reflect UV rays and maintain cooler summer temperatures while simultaneously insulating heat in winter and reducing overall energy costs.

In terms of student involvement, members of the Climate Action Committee student organization will be conducting the pre and post-installation research to assess the effectiveness of the films in reducing energy usage and increasing thermal comfort. This visible student-led project will contribute to a culture of sustainability by demonstrating the kind of experimental and innovative steps students can take to reduce the university's carbon footprint.

We can also use this as a pilot project to assess its viability for other campus buildings, as well as to share with other universities looking to reduce energy demands.

Please answer the following questions detailing the components of your project:

1. Does your project require space or construction on campus? If so, where? Please review the "Space Committee Document" located on our webpage and follow the steps to begin requesting a location.

No

2. Have you obtained all necessary approvals for this project? Please attach all letters of support to this application. Letters of support should include confirmation from the sponsoring department that the sponsoring department will cover all upfront expenses and work with the Green Fund Business Manager to acquire reimbursement after project completion. If any ongoing operations and maintenance is required of your project, provide a letter of support from the entity that will be covering those costs and/or services.

No, we are looking to have the Office of Sustainability as our sponsoring department if this is possible.

3. Will this project provide funding for student wages?

Yes

4. Please list all additional sources of funding you have pursued. Include departments, grants, ASNAU, Graduate Student Government, etc.

None

5. Have any of the Green Fund Committee members been involved in this project?

Yes

a. If Yes, please identify all committee members:

Caleb Atsu Nyatuame

Project Specifics

Please address the following questions. One or more of these questions may not apply to your particular application. Answer as many questions as are applicable to your project.

Relationship to NAU Climate Action Plan (CAP)

1. How does your project align with one of the seven CAP categories (Energy, Water, Transportation, Waste Minimization, Sustainable Landscaping, Environmental Justice, Communication)?

This audit would focus on energy efficiency as a pillar of NAU's sustainability infrastructure. Identifying inefficiencies such as obsolete technology and overconsumption in our energy systems would assist NAU's facilities department to quickly and accurately overhaul necessary fixtures. With maximum energy efficiency, we could expect savings in

both dollars and carbon emissions.

Community

2. Is there a public outreach plan? How will faculty, staff, and students learn about this?

Hiring for this project will likely be done through Handshake as to prioritize student employees, but other jobs boards (such as LinkedIn) may be necessary to fill positions. Information about the position will be posted on Climate Action Committee Instagram, with similar information posted on physical flyers in NAU buildings. Staff in the facilities department will also be made aware of the project through direct contact, as the information gathered will need to be funneled through them for proper adaptation. Building occupants will also be made aware of the presence of student workers and their purpose by notifying building managers through email. This will also be done in collaboration with the Office of Sustainability and Facility Services.

3. Are you working with other groups on or off campus? If so, describe your partnership.

Yes, we will be working with Facility Services, Green Fund, and the Office of Sustainability, who will be the ones able to apply information about energy inefficiencies to future energy efficiency projects. Depending on the results of the project, follow up energy initiatives through the Green Fund may be necessary if updated audits are desired, and we will collaborate with these groups to support a future energy optimization strategy.

Project Parameters

4. What are the environmental costs and benefits associated with your project?

The environmental costs and benefits are difficult to quantify for this project given certain unpredictable variables (i.e., whether student workers drive or bike/walk to campus to conduct the audit, to what extent future projects utilize our results to advance sustainability, etc.). Instead, a qualitative description of costs and benefits are provided below.

Costs: Conducting the audits requires minimal resources (e.g., electricity and potentially paper for documentation). Additionally, if student workers are traveling by car to campus, there may be some carbon emissions associated with transportation.

Benefits: The audit will identify areas where buildings are wasting energy, leading to targeted efficiency upgrades that could reduce overall energy consumption. Additionally, the data gathered will serve as a critical baseline for tracking NAU's progress on energy reduction and sustainability goals.

5. Provide an economic cost/benefit analysis for your project. Focus on identifying specific cost savings.

Costs: Addressed in budget section; totals $52,595.85

Benefits: Conducting an energy audit at NAU is economically important because it identifies inefficiencies that, once addressed, can significantly reduce energy costs, potentially saving hundreds of thousands of dollars annually. For example, inefficient lighting systems may still rely on older fluorescent bulbs instead of LEDs, or multiple individual offices may have certain appliances that are also available in a shared office space. By pinpointing these inefficiencies, our data can help prioritize retrofitting efforts, inform targeted upgrades, and guide policy changes that maximize cost savings and energy conservation. This project will serve as a baseline for future energy efficiency projects on campus by providing concrete data on energy usage patterns, identifying the most impactful areas for improvement, and offering recommendations for long-term sustainability initiatives. In this sense, it is difficult to calculate the exact economic benefits that it will provide, as it is unclear as of now what types of projects it will inspire. However, potential projects could include upgrading inefficient equipment, optimizing building automation systems, or implementing behavior-based energy reduction strategies, all of which could lead to measurable financial and environmental benefits.

6. Is this a one-time expense or will you require future funding?

This is a one-time expense.

7. When your project members no longer attend NAU, who will be responsible for running the project?

We suggest that such an audit be performed every 3-5 years on campus in order to account for any changes. After the current project members graduate or leave NAU, responsibility for the energy audit initiative can be transitioned to a designated department such as the Office of Sustainability. A faculty or staff advisor (such as Dayna Cook) could oversee continuity, ensuring new students take over for each audit.

8. How will you monitor the impact of your project after implementation?

We hope to collaborate with the Green Fund to ensure our data is publicly available for anyone who would like to use it for future Green Fund projects. We also hope to make our data available more broadly to Facilities and the Office of Sustainability so they may refer to it for any future energy efficiency upgrades. The impact of the project can then be monitored through energy consumption data tracking before and after implementing efficiency upgrades which use our data.

Project Budget

Please include a thorough breakdown of all project costs, **as well as a 5% line item for contingency**.

** This budget is based on the assumption of installation on every East, South, and West facing window and comes from a quote from Metro Tint installation company. See the quote below.

Budget			
Item	**Price**	**Quantity**	**Total**
Student Workers (Sustainability Associates)	15.50	10 students, 30 hours a week, for 10 weeks	46,500.00
Costs to Print Recruitment Posters and Data Sheets	0.05	300	15.00
Clipboards for Student Workers	3	10	30.00
8% Project Management Fee			3723.60
5% Contingency			2327.25
			$52,595.85

Data Management System:

Students will first collect data using pen & paper on pre-printed data sheets. We will create a structured Google Sheets spreadsheet with predefined columns to ensure consistency across all data entries which aligns with these data sheets. Part of the student workers' job will be to input their hand-written notes into this system. The cloud-based access to Google Sheets will allow for real-time collaboration and backups. We will also maintain a master file and have students enter data into individual sheets before merging. Weekly backups will be made to prevent data loss. Data entries will also be reviewed and approved by a supervisor (Office of Sustainability staff, like Dayna Cook). Data to be collected will include:

- Date
- Building Name/ID
- Room/Area Description
- Type of System (e.g., HVAC, lighting, insulation)
- Equipment Details (e.g., model, age, efficiency rating)
- Energy Consumption (if available)
- Observed Issues (e.g., inefficient lighting, air leaks)
- Suggested Fixes
- Photos/Notes Link (if applicable)

Job Description:

Summer Internship- Sustainability Associate

Job Details: Want an easy and rewarding paid summer position? Become a sustainability associate and help NAU achieve their Climate Action goals! This job entails performing an audit of campus buildings electrical infrastructure including but not limited to: lights, exit signs, motion sensors, vending machines, microwaves, refrigerators, desktops, coffee machines, etc. This valuable data collection project will provide NAU with the information needed to estimate energy emissions from each individual building to quantify where reductions can be made or improvements can be implemented (such as LED lights, solar panels, etc). Student employees will be expected to work 30 hours a week (ideally 6 hours a day, but the exact schedule could be flexible). Students will receive a week of training from Campus Facilities/Office of Sustainability to learn how to identify different light structures, how to fill out the data sheets, and why this work is important. Students will also be expected to enter the data they collect into the data management system as part of their duties, thus it is preferred that students are able to bring a personal laptop with them. If the student does not have access to a personal laptop, data entry can be completed at the library or other on-campus computer facilities.

Employee requirements/eligibility:

- CV/Resume and Personal Statement/Goals in the project
- NAU student
- Interest in sustainability initiatives
- Summer availability
- Mode of transportation
- Good attitude

Project Timeline

The timeline should include significant implementation dates for your project. Please add information such as shipping time and consider any holidays or breaks.

Timeline		
Action	**Parties Involved**	**Month/Year**
Preliminary Research • Collecting current building energy usage data • Acquiring building plans with lighting information • Identifying buildings of concern • Develop data management system	• Climate Action Committee • Office of Sustainability • Facility Services	March-April, 2025
Hiring • Post job description and application • Hold interviews	• Climate Action Committee • Office of Sustainability	April, 2025
Audits • Student workers trained • Student workers sent out to campus buildings to collect data	• Climate Action Committee • Facility Services • Office of Sustainability	May 19th-July 25th 2025th

Project Checklist

Please ensure you have completed all of the following items before submitting your application:
x Meet with a Green Fund Committee member
x Obtain all necessary letters of support (sponsoring department, ongoing maintenance, etc.)
x Project Overview
x Project Specifics
x Project Budget
x Project Timeline
x Complete Project Checklist

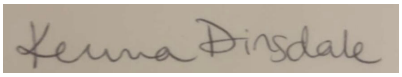
Commitment to Present Research

Please read and sign the statement below, acknowledging your commitment to present the findings of your research.

If selected as a recipient of the Green Fund Student Research Grant, regardless of the outcome of my research project, I ___Kenna Dinsdale and Phoenix Eskridge-Aldama___ commit to presenting the status of the research as described in this application in the form of an oral presentation to the Green Fund Committee or a poster exhibit presentation at the Undergraduate or Graduate Research Symposium, no more than 1 year after receiving notification of funding.

The oral presentation to the Green Fund Committee will consist of an approximately 10 minute long PowerPoint that includes the following aspects of your project: ● Original goal and purpose of research ● Conflicts or changes to the original purpose ● Results/Conclusion ● All relevant graphical displays of data

Student Signature:  2/12/25

 2/12/25

Thank you for your submission. We deeply appreciate your commitment to sustainability at NAU, and we look forward to reviewing your application. Please direct any further questions to GreenFund@nau.edu