

2019-2020

Green Fund Yearly Report



Office of Sustainability



Vision Statement

Implementing student-led projects and developing campus wide partnerships to drive visionary, impactful, and sustainable initiatives and serve as a leading example in higher education

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.



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Introduction

The student body of Northern Arizona University (NAU) established the Green Fund in March of 2010. The fund was set up in the form of a \$5.00 per student semester fee, and was established to promote student participation in and provide funding for projects that reduce NAU's negative impact on the environment and create a culture of sustainability on campus. Upon the approval of the Arizona Board of Regents, this fee was raised to \$15 per student per semester in Spring of 2019. The Green Fund committee is a primarily student-based group and Green Fund project proposals can come from students, faculty and staff. All funded projects are required to have a goal of reducing the carbon emissions directly on campus and/or contributing to the culture of sustainability on campus. The Green Fund voting committee, which consists of six students, a graduate student representative, and three faculty/staff advisors, vote on submitted proposals. The committee has approved over 85 projects with a total amount spent at \$1,635,527.59. The results of the funded projects range from increased awareness of sustainability initiatives on campus, the creation of a more sustainable culture, and a reduction in greenhouse gas emissions.

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This document includes all projects approved in the Spring and Fall 2020 semesters. The projects approved in the Fiscal Year 2020 come a total of \$637,321.55, including spent and encumbered finances.

San Francisco Solar Array

San Francisco Solar is an ongoing project, the committee is continuing to pay off the \$1,000,000 solar installation fee located on the San Francisco Parking Garage in \$100,000.00 per year installments. This 561.6 kW array was installed in April of 2017. As of this fiscal year, the Green Fund has paid \$600,000 towards this project.



Yellow Bikes

\$27,489.65

The Yellow Bike Program provides an essential service for our student population; a means of independent transportation. Bicycles in this program are in high demand, and frequently all equipment is checked out and students are turned away. The Green Fund committee assisted in re-launching this program, by providing capital, and continuing to provide an environmentally and socially sustainable transportation option for students. With an expanded program, more students will have the opportunity to lessen NAU's overall impact, particularly regarding Carbon Neutrality Goals, and cultivate a better understanding of the benefits and ease of alternate transportation, contributing to a culture of sustainability at NAU.

There are myriad environmental benefits associated with the Yellow Bike Program. Increased biking is associated with decreased automobile use; when this occurs even as few as one to three miles, it can have a significant impact on emissions and fuel consumption, decreasing each (1). Additionally, the more NAU promotes bike use on campus, the fewer automobiles are



required, leading to fewer cars physically taking up space at NAU. While there are some costs associated with the materials to make bicycles, lock, and upkeep, this is far outweighed by the benefits.

The Yellow Bike Program aligns most with NAU's Carbon Neutrality Goal regarding transportation. Part of the NAU Transportation Action Plan discusses decreasing emissions from community to and from campus, as well as from community across campus, and the Yellow Bike Program is specifically named as Action 8 of Objective 2. The average of 57 working bikes in the Yellow Bike Program were used by 1,092 people during the 2018-2019 academic year, helping to not only cultivate a Biking Culture on campus, but in turn contributing to decreased

emissions and helping achieve NAU's transportation goal.

The project included purchasing 100 new bicycles to be added to the fleet of yellow bikes, along with these bikes the committee approved the purchasing bicycle locks, lights, and helmets.

Printing Services E-Bike

\$3,000

This vehicle would not depend on fossil fuels and will not contribute to air pollution, it will provide a healthy method of alternate transportation. The e-bike would be added to our fleet to be used in lieu of our existing delivery van, whenever possible. This would also allow us to



expedite our delivery route by being able to utilize the central pedway and bike paths around campus. Our delivery team consists of student workers, directly linking student involvement into this project. Overall, an e-bike would allow us to work to create a culture of sustainability on campus, while simultaneously lessening NAU's impact on the environment. Our project directly aligns with

the transportation section of NAU's Climate Action Plan.

There are several benefits associated with this project. As a zero-emission vehicle, the e-bike will not contribute to air-pollution. E-bikes are lighter than other forms of transportation, so we would be promoting less wear on the University's roadways. We would also be reducing congestion on NAU's roadways by utilizing alternate routes and paths. The potential environmental costs would be minimal, compared to the benefits. Since we would be utilizing electricity to charge the battery, there would be a small impact from the production of that electricity, but the positive impacts and benefits heavily outweigh the costs.

This project was originally approved for a total of \$2,736.26, however, after more consideration the printing services department decided to purchase a different model of electric bike:

There is a difference in the body style between the two models, but more importantly, the models have two different types of motors. The motor differences (direct drive hub motor on the Rad City vs. Rad Rover's geared hub motor), and the geared hub motor is going to provide twice the amount of torque (40Nm vs 80Nm). Since the bike will be travelling across campus,

frequently encountering hills, this boost in torque will prevent losing significant momentum while climbing hills.

Ecological Restoration Demonstration Site at the SNAIL Garden

\$21,260.89

The Society for Ecological Restoration (SER) defines ecological restoration as “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.” Restoration ecologists and ecological restoration practitioners work to promote biodiversity, environmental structure, and ecological function, as well as investigate the mechanisms and effectiveness of restoration.

In collaboration with Students Nurturing Alternatives in Landscaping (SNAIL), SER NAU will further develop the immediate area around the existing SNAIL garden to include an Ecological Restoration

Demonstration Site surrounding the SNAIL Garden footprint. The proposed Ecological Restoration Demonstration Site will serve as an educational tool to teach restoration techniques and engage students in ecological stewardship, while improving both the environmental function and aesthetics of an underused corner

of NAU’s campus. We envision creating a space where SER NAU members can work with SNAIL and other campus and community collaborators to implement the practice of ecological restoration.

Objective 2: (*Implement Water Conservation Projects for Landscaping*) and Objective 3 (*Improved Storm water Management*) from the Water section of the SAP. The project would include planting native perennial plants that, once established, will require little to no supplemental water while providing aesthetic and ecological benefits. Additionally, the project will include micro-catchment and erosion control features that efficiently channel storm water



run-off to promote infiltration of water into the soil. These water management features will enhance water conservation on campus. By demonstrating the beauty and efficacy of native plants and erosion control techniques, the project can serve as an on-campus laboratory to test and learn from alternative approaches to water-efficient landscaping.

Additionally, the project aligns with the Landscape Master Plan south campus drainage guidelines. The project will enhance the natural drainage patterns in the area with small scale controls, including a swale and Zuni bowl, to evoke a sense of water while slowing and mitigating run-off from the adjacent parking lot. By slowing the water running off of the parking lots, the Ecological Restoration Demonstration Site will enhance infiltration and support native plantings surrounding the controls.

Objectives 2 (*Reduce the impact of chemicals used in operations of campus buildings and grounds*), 3 (*Increase conservation of on- and off- campus natural resources*) and 5 (*Function as a Living Laboratory*) from the Operations section of the SAP. To meet Objective 2, the expanded project site will be managed organically without herbicides or pesticides. We will maintain the site using mechanical and non-toxic methods including manual weed removal and the use of mulch to help shade out potential weed species. In support of Objective 3, we will establish a diverse and attractive native plant community with restored hydrologic and ecosystem function where there is currently a weedy patch of nonnative vegetation. As a demonstration site, this project has been specifically designed in alignment with Objective 5: as a living laboratory, this site will be a place for students to engage in hands-on learning and discovery. In accordance with the Landscape Master Plan, plantings will be selected based upon the mountain south campus Ponderosa Pine-Arizona Fescue habitat. Only native plants with appropriate water requirements will be used since these are important principles of restoration.

Refrigeration for Louie's Cupboard

\$1,829.40

Food insecurity is a prevalent issue on the NAU campus. In 2016, a study showed that 46% of university students were food insecure and 22% of those students identified as very low security or hungry. To solve this problem on the NAU campus, a group of social work students



designed a project that would impact the lives of students on campus. Louie's cupboard was founded as a nonprofit to fight food insecurity on NAU campus. Within the first year of its founding, Louie's Cupboard served almost 80 students. Now Louie's Cupboard is an essential resource for students, faculty, and staff who are food insecure.

In order to provide a large selection of options, as well as fresh food, the Green Fund committee assisted in purchasing a refrigerator for Louie's Cupboard. This refrigerator not only provides students with greater access to fresh produce, but the model of the refrigerator utilizes a low impact refrigerant to help minimize the environmental impact.

Faculty Seminar: Designing for Sustainability Across the Curriculum

\$3,570

This project requested funding to support an increase in the number of faculty that can attend a Faculty Teaching Seminar in May as well as a second seminar speaker. The seminar in May was focused on transformative learning within sustainable food systems and climate change. This event will be the first in a series of annual three-day workshops to encourage and support faculty in integrating sustainability and GLI learning outcomes in areas of diversity and global learning into their curriculum. The Global Learning Initiative assisted in the funding and provided an initial \$9,950.

Tersano Ozonated Water

\$145,345.80

The NAU Custodial Department would like to replace our current chemical inventory with the Tersano Aqueous Ozone cleaning system. This system converts tap water into an aqueous ozone solution that uses ozone molecules to clean and sanitize surfaces. This solution gradually degrades over time reverting back into tap water leaving no chemical residue behind



on surfaces, and no other waste to be disposed of.

Tersano units would be placed in buildings across campus to produce the aqueous ozone solution on site, and upon completion of the project, almost completely eliminate chemical waste and campus occupant and environmental risks of chemical exposure as a result of the custodial department's daily duties.

This project will support the goals of the Green Fund by eliminating up to 90% of the department's daily chemical use, significantly reducing the types of chemicals found on campus, eliminating a significant amount of plastic waste from used chemical containers, significantly reduce the amount of chemical NAU puts into the local environment, and increasing the level of safety for all campus occupants. As time goes on, this system can also be introduced for student use in the residence halls for cleaning dorm rooms, as well as be made available to student workers across campus.

This project will have a minimal impact on water usage across campus. The department's waste water from cleaning activities that is poured down the drains will no longer have any chemical hazards associated with it.

BLUELINE Grizzly Compost Screen

\$24,330.75

NAU's composting facility processes over 4000 cubic yards/year of compost. This material is acquired from both dining halls on campus, yard trimmings from the grounds department, and yard trimmings from the city of Flagstaff. These materials are processed with manure and wood chips in order to produce high quality, usable compost. This program has achieved all of this without any specialized composting equipment, and much of its success is owed to Howard Coldwell's passion and hard work. All of the materials composted would otherwise be put in a landfill.

This project involves the purchase of a BLUELINE GRIZZLY screen to be used to screen out large pieces of material before composting. This screen would replace the current screen that is falling apart and needs to be welded every few weeks. Screening is a necessary part of the compost process as the material would otherwise not breakdown within a reasonable time frame. The new screen includes two different screening sizes to improve the operation of the composting process, contributing to the production of better quality compost.



This project aligns with Waste Minimization and Sustainable Landscaping. This project supports the diversion of waste from landfills while providing sustainable sourced soil for the NAU Grounds/ Landscape and Outdoor Services Department and all other outside purchasers.

According to EPA's WARM model, the net carbon emissions from composting one wet short ton of mixed organics and applying it to agricultural soil is -0.14 MTCO₂e. By composting approximately 175 short tons of compost per year, the compost operation stores an estimated 23.8 MTCO₂. This project will support the continuation of these emission reductions and landfill diversion. The EPA's WARM model includes the GHG emissions associated with collection, transportation, and mechanical turning of compost (as well as other non-CO₂ emissions

associated). The environmental aspects not included in the estimated net carbon emissions listed above would be in the manufacturing of the screen, the emissions of equipment used during construction/installation, and the end of life of the equipment.

Sustainable Period Products: Green Time of the Month

\$35,220.50

This proposal will include the distribution of menstrual cups, reusable pads, and non-applicator organic tampons in three different sizes. In the Fall 2020 semester, there will be a launch event where these products will be distributed as well as having a medical professional discussing the use of these products. After this initial launch event, we will have these available for distribution at two locations on campus: Health Promotions and Louie's Essentials/ASNAU.



By providing students with an event to come and learn about these products, as well as obtain these products, we will be getting the student community involved. The students

will also have access to these products at our distribution locations, where they can enjoy the access and share with others about what this project was about. Similarly, students who attend the event or procure products after the event will be given information on how the use of these products help to lessen their impact on the environment. Additionally, this project will hopefully serve as the catalyst for creating new habits and behaviors surrounding menstruation and the products used. This new direction and thought process will hopefully continue to influence their future decisions about sustainability.

This product will significantly reduce the amount of waste that is generated from these plastic and/or single-use menstrual products. According to a study conducted by National Geographic, “a single menstruator will use somewhere between 5 and 15 thousand pads and tampons, the vast majority of which will wind up in landfills as plastic waste”(Borunda). Plastic applicators and disposable pads have become a massive waste generator in our country, yet received very



little awareness. By allowing menstruators to switch to reusable and sustainable products, we will be reducing NAUs waste by hundreds of thousands of pounds.

This project aligns with both Waste Minimization and Environmental Justice. Providing students with access to free menstrual products, specifically, creates a culture of social sustainability. Students who may experience financial hardship are given an opportunity to meet their menstrual needs through this project which helps to alleviate period poverty. Alongside that, shifting student use from single use menstrual products will significantly reduce waste, for example, the plastic applicator for tampons.

Improving Sustainability and Expanding Capacity of NAU Gartersnake Research Facility

\$20,370

NAU's Narrow-headed Gartersnake Program's captive husbandry and breeding facility currently houses 42 federally threatened Narrow-headed Gartersnakes, ranging from wild-caught adults to juveniles and neonates born in captivity between 2017 and 2019. All aspects of the captive husbandry program are run and co-managed by undergraduate student interns and graduate students. The proposed project includes improving the sustainability of the program through: 1) the construction of two mini-vivaria; and 2) the rehabilitation of existing features in the semi- outdoor vivarium, which was funded in part by the Green Fund, and improvement of the functionality of indoor facilities.

1) The mini-vivaria are structures that replicate the snakes' semi-natural habitat, and are modeled after the existing semi-outdoor vivarium. The living space will include treated soil, bark, and rocks to give the snakes a more natural setting. The construction of the mini-vivaria will aid in decreasing the amount of waste produced by the basic, daily care of federally threatened Narrow-headed Gartersnakes, thus improving the sustainability of our program.



Each mini-vivaria will house up to four same-sex snakes and will prevent inbreeding, and by decreasing handling of the snakes, will aid in the reduction of stress in snakes (Lauger, 2019) and decrease potential disease spread between groups (e.g., Toth, 2019). During the snakes' active season, each snake must eat every five days; each group of snakes must be fed in separate tanks, which results in approximately 544 gallons of water used every year just for feeding. We will build fish habitat within each mini-vivaria; thus reducing the amount of water required for feeding by 136 gallons per year, since the snakes will be housed with their food source and will not require additional water during feeding. In addition, 483 gallons of water are used per year to provide snakes with fresh, clean water daily. By moving some snakes to the mini-vivaria, we will decrease our water need by at least 162 gallons of water per year. This decreased water need will

decrease the amount of trips needed for students to drive across campus to acquire reverse osmosis water by one trip per week, which will reduce the amount of greenhouse gas emissions (CO₂) by 56 pounds per year (D. Huntzinger, unpubl. data). Due to biosecurity concerns (i.e., cross-contamination prevention and disease prevention), precautionary measures must be taken while caring for these snakes, such as the use of disposable gloves. The gloves must be changed between handling different groups of snakes and disposed of.

The mini-vivaria will lessen the amount of handling, therefore reducing the number of non-reusable nitrile gloves by 300 pairs per year. Due to the switch to using native dirt in the mini-vivaria, we will also eliminate the need for 67.5 pounds of non-reusable, recycled paper bedding, per year.

2) A few existing structures also require rehabilitation and improvement to enhance sustainability and improve functionality. In the existing semi-outdoor vivarium, there is a water feature that currently wastes about 15-20 gallons of water per week through leakage. Fixing this feature would decrease the amount of water that the facility uses by 780-1,040 gallons per year. The vivarium also contains a rock wall to create a more natural experience for the snakes. Unfortunately, the rock wall has provided snakes with the ability to wedge themselves in crevices, becoming lost and unavailable for routine health checks. The rock wall has been taken apart and rebuilt many times to fix this problem, but in order to decrease student labor and increase snake safety, the wall must be cemented to fill in these crevices. To reduce the use of non-nitrile gloves and water usage for the snakes that will remain in indoor enclosures due to lack of outdoor space, self-feeding tanks will be connected to existing living spaces. This will further decrease the 544 gallons of water used during the feeding season and decrease the use of nitrile gloves. All proposed improvements will decrease handling time for the snakes, and also decrease the amount of time students spend caring for snakes, which will create a healthier and more sustainable work environment.

Campus Environmental Monitoring Station

\$25,867.47

The Campus Environmental Monitoring Station (CEMS) will provide a sophisticated weather station and air quality monitor to Northern Arizona University's Flagstaff Mountain Campus. This station itself will collect real time data on weather variables (such as air temperature, precipitation, wind speed, wind direction, solar radiation, lightning detection, humidity, and air pressure) and air quality (particulate matter (PM 2.5 and 10), nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, and carbon dioxide). Currently, Northern Arizona University does not have a weather station or air quality meter that collects data on all of these variables simultaneously.

Microclimate conditions across the city of Flagstaff result in disparate weather, necessitating a campus focused environmental monitoring system. For example, a recent snowstorm (December 23-26, 2019) provides evidence of this disparity with 14.1 in of snow accumulating at the Flagstaff airport, 5-10 in. in west Flagstaff, and only 2-3 in. in east Flagstaff despite these locations being only 1-3 miles away from each other (National Weather Service Flagstaff). A highly



advanced environmental monitoring station, as proposed in this application, will provide a long term data set of each of the variables described above, specific to campus, and at high resolution. Current weather stations on campus collect simple weather data such as temperature, wind speed, wind direction, and humidity. The primary weather station that collects year round data is run by the School of Earth and Sustainability (<https://www.cefns.nau.edu/~nauws/index.html>). The CampusEnvironmental Monitoring project seeks to expand on NAU's current capabilities and provide more sensitive sensors for each of these variables as well as collect new ones such as solar radiation, lightning detection, doppler radar capabilities, and air quality measurements.

The Pulsar 800 weather station proposed in this application is a top of the line piece of equipment from Columbia Weather and the highest quality version from the Pulsar product line. The station is an all-in-one device with no moving parts, significantly reducing any type of maintenance and allowing for easy installation. Sensors included in the device measure temperature (-50 to +60°C; $\pm 0.2^\circ\text{C}$), relative humidity (0-100%; $\pm 2\%$), precipitation type (drop size 0.3-5 mm; resolution 0.01 mm), precipitation intensity accumulation (responding resolution of 0.01 mm), air pressure (300-1200 hPa; ± 0.5 hPa), wind direction (1-359.9°; $\pm 3^\circ$), wind speed (0-75 m/s; ± 0.3 m/s), solar radiation (response time < 1s, accuracy of 5%), lightning detection (coverage area of 5-10 km), and contains an electronic compass. Sensors for climatic parameters that are continually measured (temperature, humidity, and air pressure) collect data at 5 second intervals. Other sensors that are detection based (wind speed and precipitation) are collected at extremely low thresholds (0.2 mph and 0.002 mm respectively).

The Orion AQM Plus air quality monitor proposed in this application is also a top of the line device produced by Columbia Weather (<https://columbiaweather.com/products/air-quality/>). The monitor measures suspended particles (PM 2.5 and PM 10; 0.3 - 10 μm ; sampling time = 60s, sampling interval = 10 min), concentration of gases (NO₂, 5-2,000 ppb, ± 25 ppb; SO₂, 5-2,000 ppb, ± 60 ppb; CO, 10-10,000 ppb, ± 200 ppb; and O₃, 5-2,000 ppb, ± 50 ppb). Additionally a CO₂ sensor has been proposed as an add-on to the air quality monitor (0-1000 ppm, ± 40 ppm). Sampling time of each gas is 10 minutes. A significant advantage of ordering a dual system such as the combination Pulsar 800 and Orion AQM Plus sensor systems from Columbia weather is that both systems seamlessly share data on the same microserver (Weather MicroServer), both mounted on the same tower, and can share a solar power system. FTP output of data from the Weather MicroServer allows for university network communication, web display of live data, and SQL storage of long term data.

Long-term, high resolution weather and air quality measurements on campus would provide a vital dataset to help improve understanding about campus weather and air quality patterns, and can be used to inform future sustainability related projects. For example, highly accurate wind speed and direction measurements will benefit future campus wind power

projects, of which there is an already existing and robust wind power research group (<https://in.nau.edu/clean-energy-research/wind-for-schools/>). Measurements of solar radiation intensity and timing over the course of a year will improve the ability to implement campus specific solar panel projects. Data collected on the timing, volume, and type of precipitation throughout the year will assist in understanding hydroclimate variability and potential wildfire risk. Measurements of particulate concentration in the air will allow the university to understand the impacts of wildfire activity and transportation emissions on student health. Additionally, long term campus specific datasets will improve the efficiency and management of both vegetable and native plant gardens on campus (<https://in.nau.edu/green-nau/gardens/>).

An environmental monitoring station that collects extremely high resolution and highly accurate data will also provide an excellent learning tool for students from a variety of disciplines. Specifically, ENV360 (Physical and Chemical Processes in the Atmosphere and Hydrosphere) has committed to utilizing data provided through this project to develop lab activities based on individual sensors. More generally, statistics or environmental science courses can utilize the data sets collected to practice statistical analysis. Engineering students can use the wind speed and solar radiation data to develop alternative energy infrastructure projects.

Environmental studies and science students can utilize the general weather data to further understand how weather is changing on campus. Health or biology students will be able to utilize the particle size and air quality data to understand potential human health effects of air quality on campus during different times of the year.

Because of the precision of the proposed environmental monitoring station, data collected will be able to be used by undergraduate students completing capstone projects as well as graduate students and faculty conducting research. Additionally, high precision data could help facility services forecast energy usage and adjust heating and cooling services. Currently, a faculty member is assigned the task of reporting campus weather conditions to the administration during snow storms, requiring a physical presence on campus. A high precision weather station would provide campus specific weather conditions and allow for remote access to snow accumulation data.

The proposed location for the CEMS is the roof of the International Pavilion. This site has been selected for two reasons. First, the site is located geographically near the center of campus, 0.8 miles from W. Butler Ave (north end of campus) and 0.8 miles from interstate 40 south of facility services (south end of campus). A central location will allow the station to collect weather data that more likely represents an average of campus conditions. Secondly, the International Pavilion is a LEED Platinum status (the highest possible LEED certification) building and is an important facility for Northern Arizona University's commitment to sustainability. Placing the weather station on top of this building will improve its visibility to campus guests and solidify its place as the hub of sustainable building on campus.

This project will also benefit the greater community of Flagstaff, by adding an additional high quality weather monitoring station. Current weather forecasting for the community of Flagstaff is primarily from the Flagstaff Pulliam Airport weather station. The nearest doppler radar station is next to Blue Ridge Reservoir to the southeast of Flagstaff. The CEMS seeks to expand upon these current capability, but at a finer scale resolution specific to campus itself.

3rd Annual Student Water Symposium

\$1,141.10

The 3rd Annual Student Water Symposium (SWS), now online instead of in-person, will showcase undergraduate and graduate student research through posters, story maps, or Powerpoint slides. Through the SWS, students have the opportunity to showcase water-related research among interested peers as well as professional evaluators who will provide comments and suggestions on their presentations. These evaluations are beneficial in developing presentation skills. In addition, the SWS features perpetuate a culture of sustainability through awareness of current water-related issues and their potential solutions.

Previous presentations have explored water use and misuse, and how our community can act to lessen our impacts. In addition, the website will screen the film Hidden Rivers for all to enjoy, free of cost.

The SWS perfectly aligns with the CAP categories of Water, Environmental Justice, and Communication. Water is an inalienable human right, and it ought to be considered as such. In its most simple understanding, water is essential for all life on Earth. Issues pertaining to water use and misuse should be actively discussed, especially in events such as ours. Students that have studied water-related issues should thus be able to share their findings with concerned community members. Communication is key to ensure future changes, as those in our University will go on to be future water advocates in multidisciplinary fields.

Free City Bus Pass Pilot Program

\$19,800



This initial pilot program will provide free bus passes to 200 students in the Fall 2020 semester. Prior to getting the free passes students will need to take a survey about how they are getting to campus, how often they use different modes of travel, and what type of vehicle they use to commute. We will take this initial survey data and compare it to a survey that the students will be required to take at a couple points during the program. We hope to quantify changes in emissions stemming from behavioral changes due to these students having free city bus passes. To this end, we hope to identify participants that had a parking pass previously and are willing to take the bus instead. 100 passes will go to these students, and the rest to students in the general population that don't get a parking pass. Once we are through with the surveys we will report on total emissions reductions and use the results to argue for setting up a Social Cost of Carbon fund at NAU that would then provide free bus passes to all students in the future. This pilot project will also serve as a proof of concept for expanding the EcoPass to students in January 2021, when we hope to submit again and provide 500 EcoPasses to students. This project aligns with NAU's Sustainability Action Plan and will lead to an immediate reduction in commuter emissions with the potential to have great impact moving forward.

This project will help students by improving access to campus for 200 people and eventually the whole student body. We will reduce personal vehicle trips to campus, thereby decreasing both our emissions and pollution as well as commute times. We will help NAIPTA improve the city bus system by buying these passes and providing them with information to improve the locations and frequency of stops. We will work with Parking Services to connect us with participants and collect survey data at various points during the program. This data will be analyzed, and results will be provided. We will use this information to show NAU the benefits of providing bus passes to all students and continue to work towards a Social Cost of Carbon fee that would ultimately provide funding moving forward.

NAU Solar Capstone

\$545.99

This proposal is seeking funds to support the testing and analysis of existing NAU solar thermal technology that is not currently in operation. The goal of the tests is to determine the performance of the system, on a BTU/day basis, in order to inform the economics of future solar thermal designs. This analysis can in turn inform future decisions regarding the approach to carbon neutrality and other emission reductions of NAU's campus heating systems. The NAU Solar Capstone team has been working throughout the Spring 2020 semester to design a solar thermal system for the Engineering building that can heat the internal hydronic loops, offsetting some of the heating load from our centralized natural gas boiler plants. The main goal is to decrease the use of natural gas and associated emissions from the South Campus boiler plant, thus promoting NAU's goals of becoming more environmentally friendly. At the current stage of the project, the exact performance of a solar thermal system has been estimated using a government based, System Advisory Model. The purpose of the testing is to validate the online modelling software and hand calculations to best inform the performance and economics of this renewable energy technology on the Flagstaff Mountain campus.

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modelling software and hand calculations to best inform the performance and economics of this renewable energy technology on the Flagstaff Mountain campus.

Climate Action Plan**\$189,450**

In order to create a new plan for NAU's carbon neutrality goals, the university brought in an outside consultant to assist with the creation of a new Climate Action Plan. The Green Fund funded the entire creation of this project including various aspects of student involvement and data reporting. The creation of the CAP is still in progress but it will provide a guide for NAU to reach carbon neutrality and will also assist the Green Fund in implementing future projects that promote the goal of carbon neutrality.