



STUDENT SUSTAINABILITY COMMITTEE

Funding Application – Step II

Funding Criteria

A. General Rules

1. Students, faculty, and staff are encouraged to submit requests for funding. Student-led projects require a faculty or staff sponsor in order to have funds awarded.
2. Funding can only go to university-affiliated projects from students, faculty, staff, and departments.
3. All SSC projects must make a substantial impact on students. This may be a direct impact or an impact through education and engagement. All SSC funding is 100% from student green fees, so the projects funded by the students must benefit them.
4. SSC encourages innovation and new technologies – creative projects are encouraged to apply.
5. Unless a type of expense is specifically listed below as having restrictions, SSC can generally fund it. The items referenced below should not be taken as comprehensive list.

B. Things SSC Can Fund, On A Case-By-Case Basis

1. SSC can fund feasibility studies and design work; however, it must work toward ultimately addressing a sustainability need on campus.
2. SSC can fund staff positions that are related to improving campus sustainability. Strong preference will be given to proposals receiving matching funding from departments and/or plans for maintaining continuity of the position after the end of the initial grant.
3. SSC can fund outreach events with a central theme of sustainability, provided their primary audience is the general campus community.
4. SSC discourages funding requests for food and prizes but will consider proposals on a case by case basis that prove significant reasoning.
5. SSC can fund repairs and improvements to existing building systems as long as it works toward the goal of improving campus sustainability; however, a preference is shown to projects utilizing new or innovative ideas.
6. SSC can provide departments with loans for projects with a distinct payback on a case by case base. Loans will require a separate memorandum of understanding between SSC and departmental leadership pledging to repay the award in full and detailing the payback plan.

C. Things SSC Will Not Fund:

1. SSC will not fund projects with a primary end goal of generating revenue for non-University entities.
2. SSC will not fund personal lodging, food, beverage, and other travel expenses.
3. SSC will not fund any travel expenses.
4. SSC will not fund tuition or other forms of personal financial assistance for students beyond standard student employee wages.

Your Step 2 funding application should include this application, the supplemental budget form, and any letters of support.

Please submit this completed application and any relevant supporting documentation to Sustainability-Committee@illinois.edu. The Working Group Chairs will be in contact with you regarding any questions about the application. If you have any questions about the application process, please contact the Student Sustainability Committee at sustainability-committee@illinois.edu.

General & Contact Information

Project Name: Production of Safe Leafy Greens via Hydroponics by Recycling of Wastewater Nutrients

Total Amount Requested from SSC: \$10000

Project Topic Areas: Land & Water Education Energy
 Transportation Food & Waste

Applicant Name: Michael Stablein

Campus Affiliation (Unit/Department or RSO/Organization): PhD Candidate Agricultural and Biological Engineering

Email Address: stablei1@illinois.edu

Check one:

- This project is solely my own **OR**
 This project is proposed on behalf of (name of student org., campus dept., etc.): Agricultural and Biological Engineering; Illini Urban Farmers

Project Team Members

Name	Department	Email
Michael Stablein	Ag/Bio Engineering	Stablei1@illinois.edu
Camila Bogarin	Ag/Bio Engineering	Bcb4@illinois.edu
Jamison Watson	Ag/Bio Engineering	Jtwatso2@illinois.edu
Matthew Mote	Illini Urban Farmers	Mfmote2@illinois.edu

Student-Led Projects (Mandatory):

Name of Faculty or Staff Project Advisor: Yuanhui Zhang; Paul Davidson

Advisor's Email Address: yzhang1@illinois.edu; pdavidso@illinois.edu

Financial Contact (Must be a full-time University of Illinois staff member)

Contact Name: Ronda Sullivan

Unit/Department: Department of Agricultural and Biological Engineering

Email Address: rsully@illinois.edu

Project Information

Please review the proposal materials and online content carefully. It is highly recommended you visit a working group meeting sometime during the proposal submission process.

Please provide a brief background of the project, its goals, and the desired outcomes:

You may copy and paste your Step 1 application answer if nothing has changed.

There is a great need to develop sustainable food systems around the world, and the academic community can significantly enhance these activities by supporting student programs, collaborating for community engagement, and advancing innovative projects. Under the supervision of faculty from the Agricultural and Biological Engineering Department, graduate students and the Illini Urban Farmers Group will work together to design, build, and operate a hydroponics system to simultaneously generate leafy green produce for human consumption and investigate the use of wastewater in these systems as a demonstration of advanced sustainability practices in agricultural engineering. The professors who have previously worked on designing and using such systems both for biological and wastewater applications. The graduate students will build the system off of these preexisting plans and experiments performed in the department. Given that these experiments have been successful previously, the updated model will be used to educate and be implemented by the undergraduate students under direction of both the faculty and senior students. It should be noted that the professors are well versed in supervising students with these water and plant systems to ensure its proper use and success in this seed stage of the hydroponics system, which has been in development for multiple years now. This funding would substantiate the continued development and operation, student and community involvement, and expansion of the system applications especially for campus sustainability and benefit. In doing so, we hope to generate products for use on campus, educate the campus and local communities on the importance of these efforts, and share our results with the scientific community. The project will be initially hosted in the ABE Department. When proof of concept is achieved and a larger system can be set up, arrangements will be made to expand the system at the ABE farm on Race Street in Southeast Urbana. The department and college already arranges classes, tours, demonstrations, and visits from campus visitors at this site, which would support our community engagement initiatives. As this project is expected to last two years, there will be numerous cycles of growth of different leafy greens, testing variables that maximize the hydroponics production and evaluate the quality of the food grown with wastewater for human consumption. In addition to designing the hydroponics system and collecting data, students will work together to divulge these results to numerous stakeholders.

Where will the project be located? Are special permissions required for this project site?

If special permission is required for this location, please explain and submit any relevant letters of support with the application.

The project will be initially hosted in the Agricultural Engineering and Sciences Building (ABE Department). When proof of concept is achieved and a larger system will be set up, arrangements will be made to expand the system at the ABE farm on Race Street in Southeast Urbana. The department and college arrange classes, tours, demonstrations, and typically visits from campus visitors at this site. No special permission is required.

Other than the project team, who will have a stake in the project? Please list other individuals, groups, or departments affiliated directly or indirectly by the project. This includes any entity providing funding (immediate, future, ongoing, matching, in-kind, etc.) and any entities that benefit from this project.

Please attach letters of commitment or support at the end of the application.

The system will be principally managed by the graduate students listed in the beginning of the proposal. Under the direction of these project leaders and mentorship of the supervising PIs, the Illini Urban Farmers will also be able to access the equipment in preparation of tours, workshops, or campus events like Engineering Open

House (EOH), etc. The project leads will manage the project objectives and meet the milestones, while the undergraduate students will get both the experience of working hands with the system and presenting it to the community through outreach goals listed below.

How will this project involve and/or benefit students?

This includes both direct and indirect impact.

All levels of students will be directly working on the project, supporting its advancement and expansion to campus sustainability. Indirectly, students that are involved or visit the project will learn about agriculture, hydroponics, and renewable systems by being able to seeing the product grow and accompanying the graduate students who test different wastewaters or other variables to optimize production. These operations and activities aim to engage different groups as to have a greater connection and impact on the community. As stated before, the professors will oversee the larger objectives and long-term goals for the previously designed and reserached hydroponics system, which have been in progress for a few years. The graduate students will carry out the initial setup and preliminary operations to standardize day to day maintenance on the system, and they will teach the undergrads how to carry out these functions while learning about the larger implications for the system and how it can be applied in either food production or wastewater applications. There will be a manual and guidelines created to instruct individuals on these processes,as well as to ensure its future success and implementation. Its enhanced operation through student teamwork will permit great community access, education, and enrichment. Moreover, this endeavor will serve to build new networks between different student levels, connect student organization projects to campus sustainability, and attract new attention to innovative student works under the umbrella of SSC. If results are promising and later proposal approved, the intent would be to teach students about sustainable food production and allow them to taste such products in appropriate settings, such as Bevier Café, so that our community can be inspired by our efforts.

How will you bring awareness and publicize the project on campus? In addition to SSC, where will information about this project be reported?

We can engage the community in a number of ways through this project. The first and most accesible to students working on this project would be the previously mentioned tours, workshops, and campus events. In this way, students on campus can learn about and discuss these topics in campus forums through our department. More locally, once the system proves to be successful in producing crops and utilizing wastewater nutrients to improve yield, we can reach out to local producers to teach them about our initiative and connect with them through these contexts. These two examples of extension and outreach allow us to address multiple audiences and inspire advancement in local agriculture, which is a key motivator among students, our club, the department, and the overall university agenda. More broadly in terms of media, our department activities are announced semesterly through the College of ACES. This is distributed to campus members, alumni, and the extented community. We would also likely to share our student successes and experiences through the SSC instagram and social media platforms. Lastly, any research related results of the hydroponics project will be shared with the scientific community, as well as with the campus media.

Financial Information

In addition to the below questions, please submit the supplemental budget spreadsheet available on the Student Sustainability Committee [website](#). Submission of both documents by the submission deadline is required for consideration of your project.

Have you applied for funding from SSC before? If so, for what project?

Yes, some members of the team are affiliated with our Pilot-Scale Implementation of Environment-Enhancing Energy (E2E) Paradigm for Food Waste to Biofuel and Biomaterial.

If this project is implemented, will you require any ongoing funding required? What is the strategy for supporting the project in order to cover replacement, operation, or renewal costs?

Please note that SSC provides funding on a case by case basis annually and should not be considered as an ongoing source of funding.

While this project will begin as a student and club initiative under the supervision of the listed PIs, further development of this effort will be supported through larger grants. There are potential opportunities available in the Spring/Summer 2020, ranging from SSC phase 2, campus research grants, and government funding through EPA and DOE. These funds will be sought out by project leads and PIs in ongoing project development, related both to community engagement and large scale implementation of these immediate campus efforts and promising results from hydroponic systems utilizing wastewater resources.

Please include any other obtained sources of funding. Have you applied for funding elsewhere?

Please attach any relevant letters of support as needed in a separate document.

No funding has been procured yet for this specific initiative.

Environmental, Economic, and Awareness Impacts

How will the project improve environmental sustainability at the Urbana-Champaign campus? If applicable, how does this project fit within any of the [Illinois Climate Action Plan \(iCAP\)](#) goals?

Hydroponics is a key component to the enhancement of Food, Energy, and Water systems for sustainable agriculture and the future of our population. Certainly, UIUC is a global leader in agricultural engineering and can integrate these systems into our own campus resources and systems. While this small scale project will demonstrate proof of concept and deliver some preliminary results on the use of wastewater in produce cultivation, these principles and key lessons could potentially help to improve methods and farming practices at the SSC farm. More immediately, a potential implementation would be to apply these nutrient enhancement strategies to campus kitchens that produce their own ingredients, as an example. One could imagine that wastewater could be ultimately applied to the current crops in order to improve yield, and this could be done simultaneously while reducing the need for wastewater treatment, which presents a major cost to the campus and society. Potential campus savings will be calculated in the project results from preliminary data and can be correlated to iCAP goals.

How will you monitor and evaluate the project's progress and environmental outcomes? What short-term and long-term environmental impacts do you expect?

Some examples include carbon emissions, water conservation, green behavior, and reduced landfill waste.

The impacts of this project can be monitored in a few different capacities. First, we will recycle wastewater containing valuable nutrients, such as nitrogen and phosphorus, into plant growth. This can offset the costs of both wastewater treatment, which is based on nutrient concentration, and our food production because through food quality analysis of these leafy greens, we can assess how to treat them for human or animal consumption. Certainly, any innovations or practices that can increase produce yields resultant from this work will be highlighted outcomes as local producers who learn from these community outreach modules can consider implementing such methods in their own systems. Thus, we see that our efforts can manifest in short term and long term outcomes with respect to environmental and economic sustainability impacts. In the long run, we would like to follow up with local producers and campus contributors about how these strategies can be regularly incorporated into UIUC sustainability efforts.

What are your specific outreach goals? How will this project inspire change at UIUC?

We can engage the community in a number of ways through this project. The first and most accessible to students working on this project would be the previously mentioned tours, workshops, and campus events. In this way, students on campus can learn about and discuss these topics in campus forums through our department and relevant collaborations. More locally, once the system proves to be successful in producing crops and utilizing wastewater nutrients to improve yield, we can reach out to local producers to teach them about our initiative and connect with them through these contexts. These two examples of extension and outreach allow us to address multiple audiences and inspire advancement in local agriculture, which is a key motivator among our students, club, department, and the university agenda.

If applicable, how does this project impact environmental injustice or social injustice?

One clear way this project can have an impact on societal injustices is the lack of local economies. These types of systems have the potential to make agriculture and produce more sustainable on a local scale. We hope that establishing these ideas, demonstrating our innovation, and enriching the community will engender initiative for others to create their own gardens or organic products. Moreover, this idea and its implementation could help to eliminate food deserts that occur in other parts of the country. Thus, we hope that achieving success with our new technology and engaging the community will help to create this value.

