**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. All SSC funding is 100% from student green fees, so the projects funded by the students must benefit them.

**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 requests for food and prizes but will consider proposals on a case by case basis.
5. SSC can fund repairs and improvements to existing building systems as long as it works toward the goal of improving campus sustainability.
6. SSC can provide departments with loans for projects with a distinct payback. 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.

**Instructions**

*Submit this completed application and one map, graphic, or picture to* *Sustainability-Committee@Illinois.edu**. Please adhere to the session word counts. The committee holds the right to decline applications over the designated word counts. If you have any questions about the application process, please contact the Student Sustainability Committee Coordinator at* *sustainability-committee@illinois.edu.*

**Project Name:**  A Living-lab Platform Based on the Campus Institutional Facility Geothermal Project

**Total Amount Requested from SSC:** $10,000

**Primary Project Leader Name & Email: Name: John Zhao. Email: zilongz2@illinois.edu**

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| **Project Abstract:** In less than 100 words, briefly describe your project.  |
| **Campus Institutional Facility (CIF) Geothermal realized a significant energy-saving goal. However, its impacts on the reduction of fossil fuels’ consumption, carbon emission and electricity savings are just hidden underground and not visible to the public. To further stimulate the students’ and citizens’ enthusiasm on the engagement in renewable energy applications, it is urgently needed to develop a software platform to quantitively display the real-time energy transfer & savings of CIF geothermal, from an educational perspective. This virtual living-lab will show the influence of geothermal energy animatedly and arise the public’s awareness of the importance of renewable energy on campus.** |

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|  | Education | Energy | Food & Waste | Land & Water | Transportation |
| Project Category | 🗹 | 🗹 |  |  |  |

**Project Team Member List** (student projects must include their faculty/staff advisor’s information)

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| Name | RSO/Department | Email Address |
| Zhao John | Department of Agricultural & Biological Engineering | zilongz2@illinois.edu |
| Xinlei Wang | Department of Agricultural & Biological Engineering | xwang2@illinois.edu |
| Yu-Feng Lin | Illinois Water Resource Center | yflin@illinois.edu |
| Andrew J. Stumpf | Illinois Water Resource Center | astumpf@illinois.edu |
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| Questions | Yes | No |
| Is this a student-led project? | 🗹 |  |
| If applicable, have you received approval from Facilities & Services and/or site manager? | 🗹 |  |
| Do you have a plan for ongoing funding beyond SSC? (SSC cannot guarantee ongoing financial support) | 🗹 |  |
| Beyond SSC, do you have sources contributing funding or support (ex. staff time, external grants, etc.) to this project? | 🗹 |  |
| Have you applied for SSC funding previously? |   | 🗹 |

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| **Project Timeline** |
| SSC funding agreements remain active for two years. Please list your project’s timeline and/or milestones. |
| **Phase 1 of this project:** **1st to 3rd month:**Investigate on the thermal properties of the envelopes of CIF building, the outdoor temperature distribution and solar radiation over a year. These parameters will all be shared with the database on campus. When the targeted software is developed, these parameters will be available online on campus. **Phase 2 of this project:****4th to 6th months:**Choose proper HVAC model to represent the traditional space heating/cooling approaches, which can be used to calculate the real-time energy consumptions, carbon emissions and electricity bills.Simulate a ground source heat pump working condition based on the CIF building loads and the parameters of ground loop heat exchanger including a cooling season, a transitional season and a heating season. Construct a model to represent the geothermal space heating/cooling method, which can be used to calculate the corresponding energy consumptions, carbon emissions and electricity bills.**Phase 3 of this project:****7th to 13th months:**Develop a toolbox based on MATLAB or Python to integrate the parameters and models together. By inputting the values of envelopes’ thermal properties, weather conditions, and geometrical parameters of geothermal heat exchanger, the energy consumptions, carbon emissions and electricity bills will be calculated fast as outputs. Build a smart screen inside the CIF building with the integration of the simulation software toolbox. The real-time facts of geothermal heat exchanger will be displayed on the screen, serving as an educational tool. |

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| **Project Description** |
| In 250 words or less, describe your project. What does your project hope to accomplish? What are your project’s deliverables? Bullet points welcome. |
| **The goals of this project consist of:*** + Thorough investigation on the CIF buildings’ envelopes’ thermal properties, indoor and outdoor environments, weather conditions’ variation over a year, and the geothermal parameters.
	+ Construct two models for designing the traditional HVAC system and the renewable geothermal HVAC system, based on input building information, ground loop heat exchanger geometries and climate conditions.
	+ Develop an open-source, hands-on-easy tool software to quantitively show the real-time energy transfer and energy savings of the CIF project. Convert the CIF geothermal project to a living-lab for educational purpose. Bring more visible information to the sight of public to arise their awareness of importance of renewable energy on campus.

**The deliverables include:*** + A software open to public to show the real-time savings on energy consumptions by using CIF geothermal heat exchanger.
	+ A smart screen to display the animation and real values related with energy savings.
	+ A report which lists the parameters and explain the models.
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| **Environmental Impact** |
| In 200 words or less, how does your project increase environmental stewardship at UIUC? If applicable, what is the carbon, water, waste, and/or energy savings? Does your project relate to the iCAP? Bullet points welcome. |
| * + Geothermal energy has a large potential in alternating the fossil fuels and electricity in traditional space heating, due to its clean, quietness, high efficiency and long-term economics. The implementation of geothermal heating systems can largely reduce the university’s electricity consumption. This project will arise public’s awareness of the importance of utilizing renewable energy applications by specifically quantitively showing the values of energy savings and emission reductions from the CIF geothermal project.
	+ Based on the product of this project, students can have a chance to design their own geothermal project according to their preferred conditions. This will greatly improve students’ interests in geothermal and renewable energy applications.
* This project is closely related with the strategic framework of iCAP, because the utilization of shallow geothermal energy will reduce the emissions and carbon footprint, thus having a large positive impact on preventing the rapid climate change. It will help strengthen the leadership of UIUC in renewable energy applications and the iCAP committee. Given the analysis based on this project, the shallow geothermal energy can be utilized much more efficiently on campus. This will enormously aid in the leadership of UIUC in the aspect of geothermal applications over the country.
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| **Student Impact** |
| In 200 words or less, how will this project benefit students? How will students be involved with this project? What educational components are in your project? Bullet points welcome. |
| * + The proposed project can be incorporated as part of the curriculum so that students can play a role in the project. Professor Xinlei Wang teaches two courses TSM 438 – Renewable Energy Applications and ABE 436 – Renewable Energy Systems which are both closely related with the utilizations of geothermal energy. This provides a great opportunity to involve students into geothermal space heating/cooling design.
	+ Undergraduate/graduate students will also be hired in the experimental measurements, which involves gathering data regarding the indoor and outdoor temperature variation. The CIF building can serve as a living lab for further educational purposes.
	+ The results of this project will be presented in the seminar and other events on our campus to increase students’ awareness on energy savings.
* The project will enable students to deeply understand the characteristics and utilization of geothermal energy in sustainable ways of space heating and cooling. By accessing to the open-source software toolbox, students can more clearly understand the energy-savings and emission reductions from the geothermal applications. This will enhance the students’ awareness on the importance of geothermal energy and stimulate further interests in this area.
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