*Please submit this completed application and any relevant supporting documentation by the deadline listed on the SSC website 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 SSC at* *Sustainability-Committee@Illinois.edu**.*

# General Information

**Project Name:** Geothermal exchange for greenhouses at UIUC Woody Perennial Polyculture Research Site

**Total Amount Requested from SSC:** $200,000

**Project Topic Area(s):** [x] Energy [x] Education [ ] Food & Waste

 [x] Land [ ] Water [ ] Transportation

# Contact Information

Applicant Name: Andrew Stumpf

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**Project Team**

|  |  |  |
| --- | --- | --- |
| **Name** | **Department** | **Email** |
| Tim Stark | Civil and Environmental Eng | tstark@illinois.edu |
| DoKyoung Lee | Crop Sciences/ACES | leedk@illinois.edu |
| Bruce Branham | Crop Sciences/ACES | bbranham@illinois.edu |
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# Project Information

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

The proposed project will design, install, and monitor a geothermal exchange system at the UIUC Woody Perennial Polyculture Research Site to provide continuous heat to three greenhouses. The geothermal system will offset some of the current and planned propane consumption, which will reduce campus' Green House Gas (GHG) emissions. Heat will be provided to an existing greenhouse that is heated by propane and used to grow seedlings for the Student Sustainable Farm. The system will also serve two high tunnel greenhouse that will be built for a UIUC-supported study of climate change on food and energy crops being led by Dr. Lee. PI Stumpf and partners Drs. Stark and Lin will be involved with the design, installation, and monitoring of the system with a geothermal contractor hired to complete the installation. The collection of additional temperature data using a fiber-optic distributed temperature sensing (FO-DTS) system from boreholes in an active geothermal installation will assist the current effort to evaluate the feasibility of geothermal energy on campus, and provide with additional information about how the geology and hydrogeology affect heat transport in the subsurface. The SSC previously funded two projects " High Resolution Temperature Profiling for Geothermal Energy Alternatives" and "Thermal Response Test Unit for Geothermal Pilot Project" conducted at UIUC Energy Farm. The results from these projects will help us in guiding the implementation of this installation.

Please provide a brief summary of how students will be involved in the project:

Students will be involved in both the design and installation of the geothermal system. Dr. Stark and his students will use existing data from previous geothermal and geology projects on campus, and newly acquired subsurface information at the Woody Perennial Polyculture Research Site to help the partnering geothermal contractor design the borefield and surface piping. Drs. Stumpf and Stark will apply for additional seed funding from iSEE to develop this site as a "living laboratory", which students and faculty can use for research and education. The proposed project will also provide training for students in the collection and analysis of geology and geophysical data, and installation of a geothermal heat exchanger with FO-DTS cables. We expect the students would be enrolled in the departments of Geology, Civil and Environmental Engineering, Crop Sciences, and Natural Resources and Environmental Sciences or the Engineering Energy Systems program. Research findings from the iSEE seed funding program are expected to provide scientific support for attracting external funds from a national research agency.

Please provide a brief summary of the project timeline:

July to August, 2018: Design and installation of geothermal borefield with DTS system.

September to November, 2018: Design and installation of surface infrastructure.

November to December, 2018: Testing of system.

December, 2018 to December 2019: Continuting FO-DTS houly measurement, data collection, data calibration and analysis.

December, 2019 to February, 2020: Writing final report.

Additional comments

1) There is an existing geothermal system at the Woody Perennial Polyculture Research Site. It is connected to the main office building, which is several hundred feet from where the greenhouses will be located. At this time, it is not known whether the existing system could be expanded to meet the demands at the greenhouses.

2) Installation of the two new high tunnel greenhouses will commence in April, 2018. Dr. Lee's study in the greenhouses will begin January, 2019.