

Final Report

*Thank you for your commitment to green initiatives at the University of Illinois. One of the ongoing requirements listed in the terms of the funding agreement for your project is the submission of semesterly reports with key information about your project. In addition to this form, please provide additional financial documentation and/or progress photos if available.*

*Please be as accurate as possible in describing the project (including possible setbacks or challenges in meeting the initial goals of the project). Not fully meeting your project's goals will not disqualify you from making future funding requests as long as your reports are as complete and accurate as possible. If you have any questions, please contact the Student Sustainability Committee, at* *sustainability-committee@illinois.edu**.*

**Project Name:** High Resolution Temperature Profiling and Thermal Analysis for Geothermal Energy Alternatives

**Date of Report Submission:** 9/21/2020

# Project Purpose:

Establishing a geothermal exchange experiment for evaluating the feasibility of geothermal energy on campus, and sharing the knowledge with campus and community for future geothermal energy development. The following report only include the final conclusion after previous semesterly reports (attached).

# Detailed Accounting of Expenditures:

The budget has been well managed within the revised scope of the project with the balance of -$0.02 as shown in the attached file (1-303692-547005-547080-547A00-2020-06.pdf).

# Project Progress:

Three students involved in this project were awarded funding for a student led project from the SSC to develop an innovative Thermal Response Testing (TRT) Device by collaborating with students from the University of Wisconsin – Madison. All the student members have graduated and established their careers related to renewable energy development. There have been several geothermal projects established on campus based on the results from this project as the following:

* Campus Instructional Facility (CIF) geothermal installation
* Energy Foundations at the Hydrosystems Lab
* Geothermal exchange planning on campus at the Energy Farm on the South Farms
* Installation of geothermal systems for heating and cooling greenhouses
* Geothermal Monitoring well on Bardeen Quad
* Gable House project, DTS and Horizontal geothermal loop
* Enhancing energy efficiency of Solar Decathlon Element House using geothermal exchange and geopolymer material

# Student Involvement and Outreach:

The three students involved this project have graduated with accomplishing two project reports for ENG 573 with the TRT student project. A CEE doctoral student, Mr. Franklin Holcomb (fholcom2@illinois.edu), has been using the Geothermal Research Station to develop his Ph. D. dissertation. Professors Stephen Altaner in Geology and Professor Arthur Schmidt in CEE have been using this project as part of his curriculums.

# Marketing and Promotion Efforts:

The project team leveraged the initial data from the Energy Farm in a proposal to the DOE Office of Energy Efficiency and Renewable Energy. The proposal was awarded with $720,000 to conduct feasibility study on using geothermal energy on campus and nearby community in district scale. More details about this project are available at:

https://www.isgs.illinois.edu/achievements/october/isgs-receives-720000-award-doe-geothermal-research

Additional requests have been made by national and international research institutes to visit the station. The team has hosted scientists from U.S. Army, U.S. Department of Energy, U.S. Geological Survey, University of São Paulo (Brazil), Chinese Academy of Sciences (China), China University of Mining and Technology (China) British Geological Survey (UK), University of Western Ontario (Canada), National Chiao Tung University (Taiwan) and many scholars from other U.S. universities to visit the Geothermal Research Station.

Several presentations about the research have been made by the team at symposia, conferences, and workshops. One peer-review research journal paper was published based on the geothermal experiment, including the data from this project (McDaniel A., J. Tinjum, D. Hart, Y. F. Lin, A.S. Stumpf, and L. Thomas. 2018. Distributed Thermal Response Test to Analyze Thermal Properties in Heterogeneous Lithology, Geothermics. 76: 116-124. doi: 10.1016/j.geothermics.2018.07.003.). One ISGS technical report was published which also has been used as class material in Fall 2020 (Lin, Y.F., C-Y Tseng, and S.L. Sargent. 2020. User’s Manual for the Portable Thermal Response Test Device. Illinois State Geological Survey, Circular 603, 11 p. http://isgs.illinois.edu/publications/c603).

# Additional Comments:

This project's successful contributions were only possible because of the strong support received from the SSC, UIUC Energy Farm, Facilities & Services (F&S), and many other campus units. We have shared many photographs and video with SSC, iSEE and other campus units.