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MTSU Clean Energy Initiative Project Funding Request

There are five (5) sections of the request to complete before submitting. See <http://www.mtsu.edu/~sga/cleanenergy.shtml> for funding guidelines. Save completed form and email to cee@mtsu.edu or mail to MTSU Box 57.

1. General Information	
Name of Person Submitting Request Dr. Mina Mohebbi	
Department/Office Engineering Technology	Phone # (Office) 6158982106
MTSU Box # 19	Phone # (Cell) 8144411124
E-mail mina.mohebbi@mtsu.edu	Submittal Date 9/30/2021

2. Project Categories (Select One)	
Select the category that best describes the project.	
<input checked="" type="checkbox"/> Energy Conservation/Efficiency	<input type="checkbox"/> Sustainable Design
<input type="checkbox"/> Alternative Fuels	<input checked="" type="checkbox"/> Other Research and Education
<input checked="" type="checkbox"/> Renewable Energy	

3. Project Information
<p>a. Please provide a brief descriptive title for the project.</p> <p>b. The project cost estimate is the expected cost of the project to be considered by the committee for approval, which may differ from the total project cost in the case of matching funding opportunities. Any funding request is a 'not-to-exceed' amount. Any proposed expenditure above the requested amount will require a resubmission.</p> <p>c. List the source of project cost estimates.</p> <p>d. Provide a brief explanation in response to question regarding previous funding.</p>
3a. Project Title Sustainable Food Waste Management on Campus
3b. Project Cost Estimate \$1600 (2 UG students stipend) + \$1200 (1 G student stipend)+\$800 (supplies)= \$3600
3c. Source of Estimate Office of Undergraduate Research, Blue Print Solutions on Campus, MTSU Dining Services
3d. If previous funding from this source was awarded, explain how this request differs? N/A

4. Project Description

(Completed in as much detail as possible.)

- a. The scope of the work to be accomplished is a detailed description of project activities.
- b. The benefit statement describes the advantages of the project as relates to the selected project category.
- c. The location of the project includes the name of the building, department, and/or specific location of where the project will be conducted on campus.
- d. List any departments you anticipate to be involved. Were any departments consulted in preparation of this request? Who? A listing may be attached to this form when submitted.
- e. Provide specific information on anticipated student involvement or benefit.
- f. Provide information for anticipated future operating and/or maintenance requirements occurring as a result of the proposed project.
- g. Provide any additional comments or information that may be pertinent to approval of the project funding request.

4a. Scope: Work to be accomplished

Approximately one-third of the food produced in the U.S. is never eaten. Food waste has long been a major component of the municipal solid waste stream. Environmental Protection Agency (EPA) estimated that in 2018, more food was sent to landfills than any other single material in everyday trash. When food is unnecessarily wasted, all the resources used to grow and transport the food including water, energy, and land are wasted. Decomposition of food waste in landfill produces methane, which is a potent greenhouse gas that traps heat and contributes to climate change. Reducing the volume of generated surplus food is the most effective solution in the food recovery hierarchy. Diversion of food waste from landfills to other management schemes such as composting or anaerobic digestion can also reduce methane emissions from landfills, and recover valuable nutrients and energy from food waste.

While University campuses significantly contribute to generating food waste, these institutions could serve as models in championing sustainability solutions. In this study, we aim to evaluate the food waste production in two campus dining halls, McCallie and Farmers Market, and estimate the volume/day and approximate composition of food waste. Dining services office has agreed to cooperate to collect data. In the next step, we will use EPA waste reduction model (WARM) to assess the feasibility of food waste intervention alternatives in campus. The model calculates and totals the greenhouse gas (GHG) emissions, energy savings, and economic impacts for baseline and alternative waste management practices, including source reduction, composting, anaerobic digestion, and landfilling. WARM is currently available as a tool based on a database developed in open life cycle assessment (openLCA) software. The alternatives will be compared and the most sustainable solution on campus will be introduced.

4b. Scope: Benefit Statement

In partnership with university dining services, this study provides a better understanding of the current production rate of food waste and its composition in campus, which is the first step for sustainable management of this valuable byproduct by university administration. Posters will be added on the dining hall front doors on a weekly basis showing the average food waste volume and composition to increase awareness. The posters will also include reduction solution messages to motivate students, faculty, and staff to produce less waste.

Using waste reduction model (WARM), we will be able to compare different management scenarios (landfilling, composting, anaerobic digestion, and source reduction) in terms of GHG emissions, energy conservation, and economic impacts, and recommend the most feasible solutions. The results of this preliminary study will be used for future implementation of anaerobic digestion sites (to recycle GHG emissions), composting gardens (save land and reduce the need to landfill), and developing practical guidelines for food waste reduction in campus and surrounding public community (save energy).

Undergraduate and graduate students will gain knowledge about sustainable management of food, and will share it with friends and family. Students will be trained to perform research, specifically to run the life cycle assessment model (WARM), analyze, interpret, and present the results, and share the findings with scientific community via conferences and potential publications.

<p>4. Project Description (continued)</p>
<p>4c. Location of Project (Building, etc.)</p> <p>Data will be collected from two dining halls McCallie and Farmers Market. Data analysis and other research-related tasks will be performed in Environmental Research lab in Davis Science building 147.</p>
<p>4d. Participants and Roles</p> <p>Dr. Mina Mohebbi: Project supervisor. planning and implementing the project, directing students in data collection and analysis.</p> <p>Two undergraduate students: collecting data, promoting food reduction solutions in campus via posters and presentations, helping the graduate student with data analysis</p> <p>One graduate student: Running WARM model, analyzing, interpreting, and presenting the results</p> <p>MTSU Dining Services office: Ms. Rachel Hunter, Marketing Manager, will help with data collection step</p>
<p>4e. Student participation and/or student benefit</p> <p>Student participants will learn about the concepts of life cycle analysis, and various food waste management scenarios. They will be trained to use predicting tools and models to compare waste reduction alternatives from environmental and economical aspects, and make decisions on the most feasible and sustainable solutions. Students will also enhance their presentation skills, and learn to communicate their findings with peers and public community.</p> <p>This project will raise awareness in the larger population of students in campus regarding food waste production and its environmental and economical impacts, and simple ways to reduce the volume of food waste.</p>
<p>4f. Future Operating and/or Maintenance Requirements</p> <p>This project is a preliminary step to evaluate the feasibility of adding food waste management facilities (e.g., composting gardens, anaerobic digester, etc.) to the campus and community. Dining services has been working on a composting project, which can be an alternative how this project will operate in the future.</p> <p>The implementing of future projects will be dependent of external fundings.</p>
<p>4g. Additional Comments or Information Pertinent to the Proposed Project</p> <p>The results of this project will be summarized in a technical report available to MTSU and public community. Graduate student participant will present the results in a relevant conference/symposium/Scholar Week. Also, the results will serve as preliminary data for a major external funding proposal on a similar topic.</p> <p>Students will be paid for performing research, and the materials and supplies are needed to share the results of the project with the community via posters, brochures, etc. The WARM software is available in EPA website free of charge.</p>

<p>5. Project Performance Information</p> <p>Provide information if applicable.</p> <p>a. Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc.</p> <p>b. Provide information on estimated annual energy cost savings in monetary terms.</p> <p>c. Provide information on any annual operating or other cost savings in monetary terms. Be specific.</p> <p>d. Provide information about any matching or supplementary funding opportunities that are available. Identify all sources and explain.</p>
<p>5a. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.)</p> <p>The preliminary analysis showed that energy savings per ton of food waste composted is 0.73 MMBTU a. Energy savings per ton of food waste anaerobically digested is estimated to be 1.44 MMBTU. GHG emissions of landfilling, composting, and anaerobic digestion is 0.5, 0.12, and 0.04 MCO₂E per ton of food waste respectively.</p> <p>WARM will compare four food waste reduction scenarios in terms of GHG emissions, energy savings, and costs. The saving figures depend on the volume and composition of waste in campus, and other parameters defined in the model, and will be reported at the end of the project.</p>
<p>5b. Annual Energy COST Savings (\$)</p> <p>See 5a</p>
<p>5c. Annual Operating or Other Cost Savings. Specify. (\$)</p> <p>See 5a</p>
<p>5d. Matching or Supplementary Funding (Identify and Explain)</p> <p>Project supervisor will match for the supplies up to \$200.00 from startup funding.</p>

Linda Hardymon

From: Mina Mohebbi
Sent: Thursday, September 30, 2021 11:08 AM
To: Center for Energy Efficiency
Cc: Danny Kelley
Subject: Request- Clean Energy Initiative Project Funding
Attachments: CleanEnergyProjectFundingRequest08LH - Mohebbi.pdf

Good morning,

Attached please find the request for Clean Energy Initiative Project Funding. Please let me know if any other information is needed.

Best Regards,

Mina Mohebbi, Ph.D.

Assistant Professor

Department of Engineering Technology

Middle Tennessee State University

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