

Dec 21/15



# 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](mailto:cee@mtsu.edu) or mail to MTSU Box 57.

| 1. General Information   |                                  |
|--|----------------------------------|
| Name of Person Submitting Request<br>Daniel Morgan                         |                                  |
| Department/Office<br>Society of Automotive Engineers                       | Phone # (Office)<br>615-494-8786 |
| MTSU Box #<br>19   | Phone # (Cell)<br>269-743-9250   |
| E-mail<br><a href="mailto:dwm3j@mtmail.mtsu.edu">dwm3j@mtmail.mtsu.edu</a> | Submittal Date<br>Feb 17, 2015   |

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

| 3. Project Information   |
|--|
| <ul style="list-style-type: none"> <li>a. Please provide a brief descriptive title for the project.</li> <li>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. <b>Any funding request is a 'not-to-exceed' amount. Any proposed expenditure above the requested amount will require a resubmission.</b></li> <li>c. List the source of project cost estimates.</li> <li>d. Provide a brief explanation in response to question regarding previous funding.</li> </ul> |
| <u>3a. Project Title</u><br>Formula Hybrid Vehicle Project   |
| <u>3b. Project Cost Estimate</u><br>\$7200.00  |
| <u>3c. Source of Estimate</u><br>The cost to purchase, build, and test project components  |
| <u>3d. If previous funding from this source was awarded, explain how this request differs?</u> Previous funding for this project has served to provide the SAE with a proof of concept vehicle initially, then upgrade the hybrid drive system to more efficient 3-phase AC motors and Sevcon Controllers. This  |

request will explore the effects of aerodynamic drag reduction to further increase fuel efficiency.

#### 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

An adjustable aerodynamic package will be designed and produced by the students of the Society of Automotive Engineers.

Extensive FEA and fluid dynamics analysis will be utilized to test the effectiveness of the aero package at reducing drag and thereby increasing fuel economy.

Testing will be done to verify the results of the aero package, and these results will be published for other teams to view.

##### 4b. Scope: Benefit Statement

This project will take the Formula Hybrid vehicle which has already made great strides in improving the fuel efficiency of performance vehicles, and strive to further improve this efficiency through the intelligent utilization of aerodynamics. Performance vehicles typically utilize great amounts of drag in order to increase downforce, thereby improving vehicle handling. However, this drag is useless in straight lines, only serving to drastically increase fuel consumption. We will strive to develop a selective downforce system which will add drag when it is desired, and completely remove it when unnecessary.



**4. Project Description (continued)**4c. Location of Project (Building, etc.)

Voohries Engineering Technology Building – room 170D

4d. Participants and Roles

Jeremy Posey, Graduate Assistant & SAE President, will act as faculty supervisor.

Daniel Morgan, SAE Officer, will act as Project Manager.

Members of the Society of Automotive Engineers will perform all research, design, and implementation.

4e. Student participation and/or student benefit

Students in the Society of Automotive Engineers will perform all research and development associated with this project, as well as the implementation of the final design. Students will apply high-level classroom concepts in thermodynamics, fluid dynamics, and physics in order to solve a real-world problem. In the process of solving these problems the students will gain invaluable skills such as teamwork, leadership, and effective communication.

4f. Future Operating and/or Maintenance Requirements

None

4g. Additional Comments or Information Pertinent to the Proposed Project

## 5. Project Performance Information

Provide information if applicable.

- a. Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc.
- b. Provide information on estimated annual energy cost savings in monetary terms.
- c. Provide information on any annual operating or other cost savings in monetary terms. Be specific.
- d. Provide information about any matching or supplementary funding opportunities that are available. Identify all sources and explain.

### 5a. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.)

Our initial estimates indicate that our vehicle could increase its fuel efficiency by an additional 7-10% on fast tracks. This would equate to approximately 40 gallons direct fuel savings annually, with the indirect fuel saving being dependent upon on the application of our technology by other teams.

### 5b. Annual Energy COST Savings (\$)

Direct cost savings for us will be around \$100 per year, but again, the indirect cost savings are hard to calculate.

### 5c. Annual Operating or Other Cost Savings. Specify. (\$)

None

### 5d. Matching or Supplementary Funding (Identify and Explain)

No additional funding sources.