**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. This may be a direct impact or an impact through education and engagement. All SSC funding is 100% from student green fees, so the projects funded by the students must benefit them.
4. SSC encourages innovation and new technologies – creative projects are encouraged to apply.
5. Unless a type of expense is specifically listed below as having restrictions, SSC can generally fund it. The items referenced below should not be taken as comprehensive list.

**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 funding requests for food and prizes but will consider proposals on a case by case basis that prove significant reasoning.
5. SSC can fund repairs and improvements to existing building systems as long as it works toward the goal of improving campus sustainability; however, a preference is shown to projects utilizing new or innovative ideas.
6. SSC can provide departments with loans for projects with a distinct payback on a case by case base. 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 for students beyond standard student employee wages.

**Your Step 2 funding application should include this application, the supplemental budget form, and any letters of support.**

*Please submit this completed application and any relevant supporting documentation 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 Student Sustainability Committee at* *sustainability-committee@illinois.edu.*

**General & Contact Information**

**Project Name:** Eco Illini Supermileage G5e Vehicle

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

**Project Topic Areas:** [ ]  Land & Water [ ]  Education [ ]  Energy

[x]  Transportation [ ]  Food & Waste

**Applicant Name:** Stefan Kamzol, Graham Campbell

**Campus Affiliation (Unit/Department or RSO/Organization):** Eco Illini Supermileage

**Email Address:** skamzol2@illinois.edu, grahamc3@illinois.edu

**Check one:**

 [ ]  This project is solely my own ***OR***

 [x]  This project is proposed on behalf of (name of student org., campus dept., etc.): Eco Illini Supermileage

**Project Team Members**

|  |  |  |
| --- | --- | --- |
| **Name** | **Department** | **Email** |
| Stefan Kamzol | Eco Illini Supermileage (MechSE) | skamzol2@illinois.edu |
| Katherine Wurtz | Eco Illini Supermileage (MechSE) | grahamc3@illinois.edu |
| Justin Kao | Eco Illini Supermileage (MechSE) | justink8@illinois.edu |
| Michael Rhee | Eco Illini Supermileage (MechSE) | mr14@illinois.edu |

**Student-Led Projects (Mandatory):**

Name of Faculty or Staff Project Advisor: Michael Philpott, Bruce Flachsbart
Advisor’s Email Address: mphilpot@illinois.edu, mems@illinois.edu

**Financial Contact *(Must be a full-time University of Illinois staff member)***

Contact Name: Marcia Mathis

Unit/Department: MechSE Business Office

Email Address: mmmathis@illinois.edu

**Project Information**

*Please review the proposal materials and online content carefully. It is highly recommended you visit a working group meeting sometime during the proposal submission process.*

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

*You may copy and paste your Step 1 application answer if nothing has changed.*

Eco Illini Supermileage will complete the design, production, and testing of a fully-electric prototype vehicle-optimized to achieve the highest mileage per kWh of any competitor at Shell Eco-Marathon America’s competition. The team will emphasize principles of sustainability and consider the effects of the project’s lifecycle, especially concerning the sustainability of materials use/produced. The project will gather an interdisciplinary team to finish the development, production, and testing of student-designed battery management systems, optimized motor controllers, regenerative braking, and lightweight components. Eco Illini Supermileage aims to enrich student experiences through pursuing the next generation of automotive propulsion, mobility, design, and systematic efficiency in performance parameters, and sustainable design methods. Our previous project submission 2018 aimed to pursued and develop an electric drivetrain using the chassis of the vehicle designed and funded in part from financial support by SSC in 2017. This project aims to sustainably reuse as many foam molds and existing parts/designs in the development, construction, testing, and innovation of a dedicated electric vehicle. This intergenerational innovation of our fifth generation vehicle allows the team to responsibly and sustainably pursue technical innovations using technical evaluations and analyses of our previous car to aid in the most optimized and carbon-neutral vehicle built by the team to date.

**Where will the project be located? Are special permissions required for this project site?**

*If special permission is required for this location, please explain and submit any relevant letters of support with the application.*

**The project and team is located in the Engineering Student Projects Laboratory with the storage of other organizational items in the Student Design lab Annex. Space is granted and given to teams on a yearly basis by the Engineering Design Council, and it is not expected than any time in the near future that this space we currently operate in will change while we are in good standing.**

**Other than the project team, who will have a stake in the project? Please list other individuals, groups, or departments affiliated directly or indirectly by the project. This includes any entity providing funding (immediate, future, ongoing, matching, in-kind, etc.) and any entities that benefit from this project.**

*Please attach letters of commitment or support at the end of the application.*

owenjs2@illinois.edu, lukerm3@illinois.edu, hadisc2@illinois.edu, bfunez2@illinois.edu, antunez3@illinois.edu, aw7@illinois.edu, davidm12@illinois.edu, mepai2@illinois.edu, seanlt2@illinois.edu, derekvl2@illinois.edu, psiyer2@illinois.edu, jaredta2@illinois.edu, cmku2@illinois.edu, brodyas2@illinois.edu, kwrobe5@illinois.edu, aortwig2@illinois.edu, josephv3@illinois.edu, caseyjo2@illinois.edu, hsawwa2@illinois.edu, haotian8@illinois.edu, irk2@illinois.edu, mck4@illinois.edu, jy30@illinois.edu, jiyoon3@illinois.edu, sgosavi3@illinois.edu, grahamc3@illinois.edu, kathymd2@illinois.edu, jl6@illinois.edu, nwagher2@illinois.edu, muthuga2@illinois.edu, amantk2@illinois.edu, bva2@illinois.edu, lipman3@illinois.edu, dziubek2@illinois.edu, beichen2@illinois.edu, mahuja3 @illinois.edu, arnav5@illinois.edu, aem14@illinois.edu, kwurt2@illinois.edu, jbalig2@illinois.edu, apate403@illinois.edu, shivamp5@illinois.edu, jiaenew2@illinois.edu

University departments such as:
Grainger College of Engineering, Gies College of Business, (MechSE Department, ECE Department, both sources directly aid the team), College of LAS (Colleges of team members)

Sponsors such as but not exlcuding, Dassault Systems, Ansys, Composite Envisions, Ingersoll Rand, 3M, and other future and potential sponsors.

University funding sources such as Engineering Design Council, SORF, and potentially Engineering Council

**How will this project involve and/or benefit students?**

*This includes both direct and indirect impact.*

**Directly, the project is designed, manufactured, tested, and led by students. Any student, regardless of their major, is welcome to join and participate in the organization and the project defined above as long as they are willing to give their best, be eager to learn and try new things, and stay active in the project's goals and processes. Sub-projects, tasks, and goals are driven by student leaders and members on daily, weekly, monthly scales. Academic advisors assist the team by guiding the project and organization through administrative or university-oriented challenges while acting as an experienced leader in design reviews and project evaluations.**

**Indirectly, the project actively applies engineering and sustainably-driven concepts to the ever-critical goal of lowering greenhouse gas emissions (CHG) by applying content they learn or gather during their team. Many students of the team take their extracurricular knowledge and apply it to their courses and careers by offering them an outlet to practice and or participate in small-team group projects where they must navigate and overcome challenges together. Many students from the organization that has worked on and or led SSC-funded projects have positioned themselves in fields such as aerospace, transportation, and energy sectors in sustainability centric roles: in particular, a lead member that designed and built a custom engine that used drastically less fuel now works at Ford Powertrain division, responsible for building the most efficient line of 4-cylinder engines in their Ecoboost division, replacing 6-cylinder engines that consumed more fuel and produced less power.**

**How will you bring awareness and publicize the project on campus? In addition to SSC, where will information about this project be reported?**

In the previous year prior to the pandemic, Eco Illini Supermileage participated in a large range of events. Eco Illini is committed to outreach events not just within the University, but also to the Champaign-Urbana area. Some of the University events the organization participated in last year and or this year pending their virtual transition include: Quad Day, E-Week, Student-Run Quad Day, ENG 100 Student Showcase, the Homecoming Parade, ESPL Student Showcase, and Engineering Open House. Outside of the University, our team attended the Champaign Children's Orpheum (Science Museum) Robot Day, McHenry Community College Sustainability Showcase, SSC Events organized by other student organizations such as the Sustainable Farm Dinner, SSC Movie Night (affected by COVID), and MLK Day of Service. Our team is committed to not only educating others about sustainability but also giving back to the communities that support us.

Future events the team hopes to collaborate on directly to publicize the good work of an SSC-funded project include organizing an SSC Transportation Showcase (other ESPL funded SSC teams such as EV Concept, Illini Solar Car, and Illini Formula Electric, amongst others), further engage with other SSC funded organizations for more student showcases become the first iSEE Green Certified RSO on campus, participate in the campus Rent-a-Road/Walkway program (if still available), hold open-to-all tech talks on sustainable student design and production, and showcase our vehicle to local and state high school students to inspire them in a career with an intersection in STEM and sustainability.

The team actively reports and shares its success and developmental work both internally to sources within the university and externally to the community locally and across the world. Internally, the team reports its success and fundings to departmental sources in yearly project evaluations through the ME 199 Design Seminar, Engineering Design Council project request and proposals, SORF and Student Engagement with respects to registration as an organization, and across various different college communications departments, such as the ECE and MechSE departments. Externally, the team shares glimpses and information about our successes and projects through our newly redesigned and overhauled website, LinkedIn, Facebook, and Instagram pages to engage with an international audience. Reports of the projects competition results are posted to the Society of Automotive Engineers and Shell Eco-Marathon webpages.

# Financial Information

*In addition to the below questions, please submit the supplemental budget spreadsheet available on the Student Sustainability Committee* [*website*](http://ssc.sustainability.illinois.edu/?page_id=2087)*. Submission of both documents by the submission deadline is required for consideration of your project.*

**Have you applied for funding from SSC before? If so, for what project?**

The organization has requested funding for two projects in the past, one submitted in the Fall of 2017 for the construction, design, and testing of our generation 5 vehicle and chassis dynamometer. We also applied for a project request in 2018 for the testing and development of an electric powertrain and drivetrain with the goal of engaging in the research/development of a dedicated electric prototype vehicle, as listed and defined with this project request.

**If this project is implemented, will you require any ongoing funding required? What is the strategy for supporting the project in order to cover replacement, operation, or renewal costs?***Please note that SSC provides funding on a case by case basis annually and should not be considered as an ongoing source of funding.*

If the project is implemented, the team will require ongoing funding, as echoed in previous project proposals due to the project and organizations nature of attending competitions to validate, test, and quantify the performance of the project proposed. The greatest barriers to requiring ongoing funds are travel and lodging costs along with registration fees to attend competitions in California and Michigan respectively, challenging the organization to stimulate members by compensating their travel for their participation, and even more so going forward, responsibly traveling and transporting our vehicle responsibly across the country with battery-storage and shipping concerns. In addition, the organization is required to and engages in continually updating and innovating the project/vehicle to improve systematically and aerodynamic efficiency and implementing lighter weight components across the chassis and various subsystems of the project/vehicle. It should be acknowledged that the organization and project aims to self-fundraise these outstanding travel and lodging costs: wehave no intention or desire to seek or apply these SSC funds to cover any such travel. As the team pursues advanced designs and innovations for a more sustainable vehicle through fuel mileage and other metrics, advanced manufacturing tools outside the capability of students within our workshops will lead to an increased cost in the project.

Outside of project funding supplied by SSC, the team requests funding from a variety of University Sources as listed above in organizations and entities that are affiliated with the organization and ensuing projects requested for funding herein. The team continually seeks funding, donations, and grants from other university departments and organizations, also pursuing outside sponsors that directly and indirectly operate with the team. Donations and in-kind sponsorships for discounts including machining and licenses for software and other organizational services used.

**Please include any other obtained sources of funding. Have you applied for funding elsewhere?**

*Please attach any relevant letters of support as needed in a separate document.*

To design and build a prototype, high-mileage vehicle as outlined in the SSC project description above, the team spends nearly $60,000 in materials, in-kind donated technical licenses, equipment, and manufacturing costs associated with the vehicle's ultimate construction and subsequent testing. The Generation 5 Electric (G5e) vehicle reduced these costs by nearly $15,000 through the team's innovative approach to reuse chassis molds and partial redesign over the previous Generation 5 vehicle (G5). Through in-kind donations, sponsorships, and other funding sources within the university, the requested funds for this project of SSC represent less than a quarter of the overall cost of the vehicle and will aid in the construction, testing, and future component upgrades of the G5e project vehicle.

Eco Illini Supermileage, the student organization that manages this project, operates on a $14,000 loan supplied on a yearly basis by the Mechanical Science and Engineering Department (MechSE). At the end of the academic year, the organization is responsible to repay any and all funds used from said $14,000 budget. Repayment of this loan comes from sources such as annual Engineering Design Council (EDC) organization grants, project grants from Engineering Council (EC) , or from cash donations from sponsors. For example, if the team were to spend $10,000 in the academic year of Fall 2020 - Spring 2021, at the end of the Spring semester, the organization would be required to show that $10,000 has been raised by the team from the aforementioned sources we may collect from.

The organization secures nearly $10,000 annually from Engineering Design Council for technical projects for the academic year, with another $5000 allocated for travel fees for our competitions. Engineering Design Council is a funding board for engineering student organizations that compete in regional or national competitions hosted by professional societies and or corporate entities. Funding is dependent on annual success and improvement in these competitions.

The organization has recently secured inkind donations essential to the design and testing evaluation for the project from sources such as Dassault System's Solidworks CAD and Electronics packages and Ansys' Workbench FEA that total north of three million dollars in value. The organization actively is seeking sponsorships to sustainably source and recycle carbon fiber composite materials, advanced manufacturing of metal components to further reduce weight and improve efficiency, and overall seek material sponsors to reduce project spend. We will continue to be actively engaging in contacting former sponsors to either continue existing discounts and in-kind donations or actively reaching out to pursue cash/new discounts for suppliers of components actively used in the development and assembly of the aforementioned project.

Funds are traditionally allocated at the discretion of the team towards our gas and electric prototype vehicles, dependent on the technical innovations pursued by technical team members and executive officers to produce reliable innovations on both cars. However, for projects with proposed or allocated SSC grants, a separate line-item account is managed by the MechSE Business Office for active SSC projects only. This account is kept separated from all other funds and is present throughout the entirety of the projects proposed timeline. For example, if the team is granted the full $10,000 budget request, these funds have their own account number under the umbrella bank account of the organization, like a separate spend account or a savings account. If a component or a product identified in the SSC Supplemental Budget is purchased by the team, the organization notes that the purchase is an SSC-related debit, and the business office pays for the component from the SSC-account only. The exectutive officers of the organization have recently worked with the MechSE Business Office to better track said funds from both sides, ensuring funds are properly deducted from the right account and tracked internally.

In summary, Eco Illini Supermileage requests less than a quarter of the total project's funds from SSC, with funds being allocated to the construction, testing, and future innovations of the G5e project. Funds from EDC, EC, alumni, and sponsors are used to repay an initial loan offered by the MechSE department. These funds are generally pooled together for technical work for all projects the team pursues: with regards to this funding proposal, funds are allocated to both the G5e vehicle in question, and other cars where need be. However, products and components under the scope of the SSC-funded project in question are separetly deducted from a unique account within the organization and tracked over the project lifetime. Although part of the vehicle has already been constructed, only future purchases of components outlined in the supplemental budget will be deducted from the funds allocated to the project from this proposal.

# Environmental, Economic, and Awareness Impacts

**How will the project improve environmental sustainability at the Urbana-Champaign campus? If applicable, how does this project fit within any of the** [**Illinois Climate Action Plan**](https://icap.sustainability.illinois.edu/) **(iCAP) goals?**

The organization is an active participant in iCAP's Outreach (11.1, 11.2, and 11.3) not only through its use of the aforementioned funds for previous projects by the organization. We offer sustainably-driven, project-based activities for students to engage in and learn about. The involvement of the students on the team revolves around maximizing the energy performance in our projects to traverse the longest distances in a prototype vehicle. Students directly apply their academic education to practical undergraduate experiences (10.2) that members can directly work hands-on with and see the fruits of their labor and design in a year's time through our attendance to high-mileage centered competition, engineering, and student showcases, and drive-days. The organization actively participates in metal recycling efforts and looks to further push the ESPL towards reducing landfill usage (6.2) and exploring more efficient building standards such as ISEE's Green lab (2.2). The project also inherently works on a student level to reduce GHG through the design, construction, testing, and innovation of an electric vehicle (1.0). iCAP goals have been denoted in parenthesis.

Outside of efforts to reduce the carbon footprint and waste products from a student organization that is inherently forced to annually redesign and improve upon our projects, the the the current project proposed aims to create a highly efficient and sustainable single-person capacity carbon-neutral prototype vehicle. We aim to recommit our efforts alongside other sustainably-minded student organizations on campus to pursue a unique blend of research and development of technologies and sustainably driven-skills that out student body and organizational participants can then apply to their careers.

As echoed before in previous project proposals of our organization, we are committed to helping reshape the community's perspective of the intersection of efficient and sustainable travel and mobility. Everything our team is focused on revolves around efficiency in one way or the other: be it the efficiency of our wheels and powertrain or of our aerodynamic performance.

**How will you monitor and evaluate the project’s progress and environmental outcomes? What short-term and long-term environmental impacts do you expect?**

*Some examples include carbon emissions, water conservation, green behavior, and reduced landfill waste.*

**The team and current proposed electric vehicle project herein inherently focuses on eliminating carbon emissions from the operation of our vehicle. GHG emissions of our vehicle are actively mitigated in the transport and travel of the vehicle itself by carpooling with other teams on testing events and showcases to competitions wherever possible, such as carpooling and transporting both our car and EV Concept's vehicle to the Shell Eco-Marathon America's competition in Sonoma, California. The team walks, bikes/skateboards, or take public transport wherever possible to social and technical events such as meetings/workdays, carpooling otherwise wherever possible when safely feasible (COVID-19 mitigation efforts). The team actively avoids the common practice of "wet-sanding" wherever possible which is the process of sanding high density foam and Bondo composites under running or buckets of water to increase the efficacy of sanding and surface finishing, favoring instead safe dry sanding and cutting, even reducing the amount and materials used where possible in dry conditions. The organization actively separates metal scraps for recycling efforts in the ESPL and participates in laboratory efforts to pursue iSEE Green Lab with the installation of LED lights and climate control measures for heating and cooling. The organization would love to engage and lead efforts to introduce separated recycling into the ESPL over the current comingled trash setup.**

**In particular, the organization plans on reaching out to a conservator responsible for pursuing the safe recycling and reuse of carbon fiber composite materials, a significant barrier to the team's production and landfill use. Unfortunately, the carbon fiber/resin/and structural interstitial material composite combination used to achieve the lightweight structure of the vehicle is not easily recycled when the project is completed or no longer needed. Since the resin is a thermoset, the material cannot be reused and recycled. However, the team was notified of an industry leader used by aerospace giants such as Boeing to recycle and reuse the carbon fiber threads into new weaves. As such, the team looks forward to contacting this company with the intent of representing the ESPL and any student organization that works with carbon fiber composites to find a sustainable solution at either low or no cost to the university. We aim to research and report on these findings later into the 2020-2021 academic year.**

**The organization purchases projects and supports shipping initiatives that are carbon-neutral whenever possible with orders and purchasing. The organization also aims to undergo a systematic cleaning/red-tag 5S event to evaluate the use and repurposing of components from prior projects and vehicles in the design of the current system: in short, the team aims to make new tasks and projects adaptable to already built solutions, seeking ways to remanufacture and improve the efficiency of subsystems without complete redesign and scrap to reduce landfill use.**

**What are your specific outreach goals? How will this project inspire change at UIUC?**

**Specific goals for outreach and publication of the project and organization cas be found above on page four of this report. The team continues to commit to and redouble its effort to entertain outreach events within and beyond the local Champaign-Urbana community. Outside of recruitment and showcase events such as EOH and Quad Day among many other listed above, the team pursues outreach events such as the Champaign-Urbana Orpheum Robot Day for local kids to explore university STEM projects and take an interest in STEM. The project aims to also safely tour local and Illinois high schools to motivate students in a future in STEM X Sustainability. The team seeks to safely participate and/or organize sustainability-oriented events such as an ESPL SSC Showcase of EV Concept, Eco Illini Supermileage, Illini Formula Electric, and Illini Solar Car at minimum, with the intent on being a part of a larger showcase of SSC Transportation funded projects.**

**The team actively inspires change by challenging the norms of what mobility and transportation look like: every year the energy and transportation sector takes steps to curb the use of fossil fuels and develop long-lasting and suitably clean replacements in these industries, whether it be automotive, industrial transportation, aerospace, or energy production. We aim to pursue the most rigorous and challenging projects to not only strengthen the academic and interpersonal relationships of our team members, but also become an international leader in the supermileage and sustainability competitions we perform in across the country. We aim to use this platform as a podium-finishing organization as a lightning rod in the student community locally for sustainably driven, student projects under the university's iCAP goals and nationally as a leader of change.**

**If applicable, how does this project impact environmental injustice or social injustice?**

**While the project does not directly impact or take active measures to solve the root causes of environmental injustice, the project and the associated organization does acknowledge the project has the opportunity to aid in efforts to curb emissions and pollutants that lead and entrench those most impacted by environmentally unjust policies and conditions. The team actively recruits and supports members of any ethnic or cultural background: we believe that everyone is created and should be treated equally without bias but know internally that everyone is not treated equally. The team aims to be an ally to current movements and organizations, taking an active stance against discrimination of all forms within the organization and actively discovering our inherent biases amongst other steps. The members of the team now annually participate in the Martin Luther King Jr Day of Service events on campus to perform acts of kindness and support those who need it most through the donation of our time and effort. Comprised of a team of fifty or so total members, with maybe twenty to thirty members in active participation on a weekly basis, the team aims to better understand the issues of suppressed voices and looks forward to taking an active role to better understand our voice and implicit compliance in current injustices.**