

Title: U of I Siebel Center Energy Reduction Project
APPLICATION INFORMATION

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I. Detailed Project Description:

Please include:

- Project goals:
In this project a group of U of I Mechanical Science and Engineering (MechSE) senior design students will identify methods to reduce utility costs at the Siebel Center in conjunction with the Facilities and Services retro-commissioning team. The possible solutions investigated should include physical changes to the building and infrastructure, operational, and behavioral / cultural changes. Operational/behavioral/cultural barriers to implementation will be considered in formulating solutions. In addition, a preliminary design and lifecycle cost analysis of the potential solutions is to be conducted to determine which solutions are feasible. The student team will be able to provide additional analysis and design which will enhance the retro-commissioning team's effectiveness and outline energy saving projects beyond the scope of the retro-commissioning team's focus.
- Definition of sustainability and the relationship of the project to this definition:
Sustainability can be defined as curtailing present usage of resources while fulfilling current needs so that they will be available for future generations without degradation. By reducing energy at Seibel center the use of nonrenewable resources such as coal and natural gas, which are currently used to power, heat, and cool the campus can be minimized. Reducing coal and natural gas usage will also reduce the amount of CO₂, a greenhouse gas, produced as a combustion product.
- Longevity and/or permanence of project results on campus:
Information and designs developed in this study could be used for generations to come. This design could serve as a model to be duplicated across campus.
- Location, including any concerns that may arise from the chosen site; applicants are encouraged to consult with Facilities & Services prior to submitting their proposal to ensure selection of appropriate sites:
The study and design will focus on the Seibel Center. This location was identified with the guidance of Facilities and Services.
- If applicable, comparisons to similar projects at other campuses.
Last semester (Fall 2008) the MechSE Department accommodated a very similar senior design project: "Design of systems to reduce energy consumption of the Mechanical Engineering Laboratory". The students worked in coordination with the F&S retro-commissioning team. In this project the students learned how to identify methods, analyzed various energy conservation measures, and developed schematic designs to save an estimated \$169,000 per year (24% reduction) with an estimated initial cost of \$243,000. Many of the solutions identified by both parties were implemented by the F&S retro-commissioning team. This past project will serve as a guide for the presently proposed project.

II. Budget & Fundraising:

1. Detailed budget

- The MechSE Department requests a \$4,000 donation for a team of 3 or 4 seniors for a semester (see additional information about the MechSE senior design course at <https://www-s.mechse.uiuc.edu/courses/me470/>) The MechSE program, established 17 years ago, has accommodated several successful energy/sustainability related projects in the last couple of years:
 - Advanced computations building cold isle containment
 - Design of a water side economizer for NCSA's new Blue Waters petascale supercomputing building (outlined savings of over \$2Million/year)
<http://engineering.illinois.edu/news/index.php?xId=074108960700>
 - Design of systems to reduce energy consumption MEL (Outlined savings of nearly \$170K/year)
 - Design of systems to reduce energy consumption CSL (currently under way)
 - Design of systems to reduce energy consumption Loomis (currently under way)
 - Design of systems to reduce energy consumption MRL (currently under way)

2. Fundraising

- The F&S retro-commissioning team will attempt to implement as many of the changes/designs outlined as possible..

III. Timeline

Provide a detailed project timeline.

- This project would start at the beginning of the Fall 2009 semester (August 24, 2009) and will be completed at the end of the semester (Week of December 10, 2009). The retro-commissioning team is planning to begin mid way through the semester so that the student findings and designs can be more readily implemented.

IV. Energy, Environmental, Social and Economic Impact

A. Renewable Energy Projects

Students will investigate the feasibility of using renewable energy (solar / passive solar).

B. Energy Efficiency Projects

In 2008 the Siebel Center had the second highest energy usage of all of the College of Engineering Buildings with a utility bill averaging over \$100,000/month . The goal of this project is to develop methods/designs to reduce the energy usage by at least 20% , or approximately \$200,000 annually.

C. All Projects

Environmental Impact:

This project will seek to reduce the amount of steam, electricity, chilled water used by Siebel Center. All of these utilities are currently generated by non renewable energy sources such as coal and natural gas. If the goal of a 20% reduction of energy usage is attained it will reduce the CO₂ generated and emitted to the atmosphere by approximately 4million pounds per year.

Social Impact:

Detail both positive and negative social impacts, if applicable:

Energy saving awareness and methods such as building setbacks may help people get into the habit of dressing differently (wear sweaters in the winter) which may reduce residential energy usage.

Economic Impact:

In 2008 the Siebel Center had the second highest energy usage of all of the College of Engineering Buildings with a utility bill averaging over \$100,000/month . The goal of this project is to develop methods/designs to reduce the energy usage by at least 20%, or approximately \$240,000 annually.

V. Outreach and Education

- visibility of the project to students:
The students will be making a publicly accessible website to advertise the project, which is a requirement of the course. Furthermore, they will prepare a poster for display at the annual Environmental Horizons conference. In addition, students will be giving project presentations to their classmates, faculty, and industry present.
- role that students will play in the project:
Students will identify potential energy saving solutions, evaluate their feasibility of the solutions, and develop preliminary designs and or outline implementation methods of the viable solutions.
- opportunities for involvement in classroom curriculum:
This would be one of the senior design class (ME 470) projects.
- media opportunities:
The students will be required to make a press release advertising their findings and acknowledging the support of the Illinois Student Sustainability Committee