

2008 ENERGY-EFFICIENT BUILDING TECHNOLOGIES CHALLENGE



THE CHALLENGE:

To create innovative products for existing buildings (residential and commercial) that will reduce the demand for energy from non-renewable sources while exhibiting a payback time of one year or less

AVERAGE HOUSEHOLD ENERGY CONSUMPTION

Heating and Cooling	45%
Appliances	20%
Water Heating	13%
Lighting	11%

According to the United States Department of Energy *2004 Buildings Energy Databook*, buildings make up 39 percent of the total energy consumed in the United States, including 71 percent of the total electricity consumed. Further, about 30 percent of home energy usage goes to power appliances. While great strides have been made in creating new greener buildings that consume much less energy than their conventional counterparts, much less attention has been paid to reducing energy use in existing buildings. Conventional means by which to reduce energy consumption in older buildings are burdened by relatively long payback times, even in the face of high (and increasing) energy costs, providing little consumer incentive to modify existing structures to reduce energy, despite a national need to do so.

COMPETITION OBJECTIVES

In *The Innovator's Dilemma*, Clayton M. Christensen outlined his theory on disruptive innovation, where one of the key criteria to be met in disrupting an existing market is finding "a large population of people who historically have not had the money, equipment, or skill to do this thing for themselves, and as a result have gone without it altogether or have needed to pay someone with more expertise to do it for them." This phrase seems quite apt where reducing energy use in existing buildings is concerned, as consumers typically pay contractors large sums for solutions whose payback times are long.

As such, your challenge is to design a product or system that could be incorporated into an existing building that would reduce annual demand from the electrical grid such that the design would pay for itself in one year or less. The sustainability of the product or system, particularly in comparison to existing technologies, also should be considered. Viable entries will include both means by which to reduce energy demand and non-grid distributed energy generation technologies.

ELIGIBILITY

- Must be an undergraduate student enrolled at any college or university in Allegheny, Butler, Westmoreland, or Washington county
- Open to all undergraduate students of any discipline and level
- Multidisciplinary and cross-institutional teams are strongly encouraged
- Teams are encouraged to secure a faculty member or industry professional to fill an advisory role
- Teams must consist of a minimum of two and a maximum of five students

JUDGING CRITERIA

An independent panel of individuals with expertise in sustainable building design and construction and energy efficient building technologies will serve as the judges for the competition. Project proposals must be received by 5 p.m. on October 17, 2008. The review committee will announce five recipients of Phase II grants by October 31. Final proposals are due by 5 p.m. on March 31, 2009. Winners will be announced on April 20, 2009, during Engineering Sustainability 2009 (www.mascarocenter.pitt.edu/conference).

Projects will be judged on:

- Whether the product fulfills individual needs and decreases energy consumption with fast project payback,
- Whether the product reduces the overall demand for energy while maintaining quality of life,
- The degree of innovation,
- The clarity of the presentation, and
- Likelihood of successful implementation.

PROPOSAL CRITERIA

Phase I

- Phase I proposals should concisely present the new product or process, explain how it differs from previous energy-saving strategies, and discuss why the proposers feel it will lead to a payback time of less than two years. Successful Phase I teams, as judged by our panel of experts, will move to the second round of the competition as described below.
- Concepts should be limited to 2 pages and provide sufficient content and information for adequate evaluation by the committee.
- Proposals should be sent electronically to msi@pitt.edu by 5 p.m. on October 17.
- Each concept should include the following information:
 - o Project title;
 - o Name of team captain to serve as lead contact;
 - o List of team members, school and department, and contact information;
 - o List of faculty/industry advisor(s), if any, and contact information; and
 - o Concept text (2 page maximum).

Phase II (5 finalists)

- Full proposals are due on March 31, 2009.
- Each written report should include the following information:
 - o A general description of the product or system;
 - o Technical details of the fabrication and installation of the product or system;
 - o Projected energy savings for a given market or range of markets;
 - o Estimated economic costs, payback periods, and potential market share; and
 - o Metrics for assessing the environmental impact or sustainability of the product or system.
- A poster for presentation at Engineering Sustainability 2009.
- Where applicable, a working demonstration prototype.

FUNDING

Each Phase II team will receive a \$2,500 grant that may be used for supplies, equipment, travel, etc. Funding may not be used for salary support.

AWARDS

- 1st Place: **\$5,000** + registration to Engineering Sustainability 2009
- 2nd Place: **\$2,500** + registration to Engineering Sustainability 2009
- 3rd Place: **\$1,000** + registration to Engineering Sustainability 2009

SCHEDULE

What	When
Project concepts due	October 17, 2008
5 Finalists selected and announced...	October 31, 2008
Projects Due	March 31, 2009
Winners announced at ES09	April 20, 2009
<i>All 5 projects will be showcased at the conference poster session</i>	

SPONSOR

The Mascaro Center for Sustainable Innovation at the University of Pittsburgh is a center of excellence in sustainable engineering, specifically focusing on the design of sustainable neighborhoods. The Mascaro Center was created to encourage and nurture new collaborative projects based on strong and innovative research helping to translate the fundamental science of sustainability into real products and processes. The center's goal is to create innovations that positively impact the environment and improve quality of life. Research conducted under the auspices of the Mascaro Center includes projects on greening the built environment, more sustainable use of water, and the design of distributed power systems. www.mascarocenter.pitt.edu

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RESOURCES

NREL: National Renewable Energy Laboratory
www.nrel.gov/

Department of Energy: High Performance Buildings
www.eere.energy.gov/buildings/highperformance/

Conservation Consultants Inc.
www.ccicenter.org/

Energy Savers
www1.eere.energy.gov/consumer/tips/index.html