



ENERGY EFFICIENCY PROGRAM MANAGER

Xiaohui (Joe) Zhou, Ph.D., P.E.

ECONOMIC DEVELOPMENT

The Iowa Energy Center is:

- Providing a platform through its Energy Resource Station for testing new commercial building energy efficiency technologies.
- Performing research and development on advanced commercial building control systems.
- Hosting training sessions for energy efficiency workforce development.
- Partnering with the Iowa Economic Development Authority to provide web-based tools to prioritize and plan retrofits to improve building efficiency.
- Building relationships with federal sponsors to promote Iowa energy efficiency innovation.
- Actively seeking funding opportunities for Iowa and facilitating partnerships to capture new investment in the state.
- Spurring innovation through its grant programs that help Iowa colleges, universities, and nonprofits secure sustainable funding from federal agencies and other external sources.

ENERGY EFFICIENCY

PROGRAM OVERVIEW

The Iowa Energy Center's Energy Efficiency Program includes building, industrial, agricultural, and transportation efficiency. The Energy Center's internal research and training focuses on the commercial building sector, given the unique features of the Energy Resource Station in Ankeny, Iowa. In FY 2014, the Energy Center continued to lead the U.S. Department of Energy (DOE) supported Iowa Public Building Energy Benchmarking Phase II Project, which successfully benchmarked the energy usage of 657 Iowa public buildings (in addition to the 1,200 buildings benchmarked in Phase I). Building and utility data for another 377 buildings are now being compiled. The project has been successful in populating a statewide database for a wide range of public building types. Moreover, the project team has engaged Iowa utilities on integrating the benchmarking platform into utility energy efficiency initiatives.

The Iowa Energy Center has capitalized on its technical expertise to secure new external funding. The Energy Center is teaming with the Iowa Army National Guard and Taylor Engineering to lead a two-year, \$500,000 U.S. Department of Defense (DOD) award to demonstrate

advanced control algorithms on building energy systems at five Army National Guard facilities throughout Iowa. The project will attempt to demonstrate significant energy savings in the pilot buildings through a control methodology first developed at the Energy Center. If the methodology is successful, DOD will likely widely adopt it.

The Energy Center has also won a two-year, \$124,000 award from the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) for the project "Low Energy LED Lighting Heat Gain Distribution in Buildings." The results from the research will help building professionals design and build more energy efficient buildings and will be published in the ASHRAE fundamental handbook.

In addition, the Energy Center partnered with the Iowa Capital Complex facility management team and The Weidt Group on a two-year project to monitor and analyze the energy of the Iowa Utilities Board/Office of the Consumer Advocate building in Des Moines. This building is an exemplary high-performance building with over 74% net reduction in energy use compared to building energy codes. A technical report was published and is accessible to the public in the grant library database on the Iowa Energy Center's website (www.iowaenergycenter.org/grant-and-research-library).

GRANT PROGRAM HIGHLIGHTS

In FY 2014, the Iowa Energy Center supported 16 projects in energy efficiency related projects through its grant programs. During the first year of implementing its new competitive grant programs, the Energy Center awarded three Planning Grants, one Opportunity Grant, and five Matching Grants in the energy efficiency area, with \$292,591 awarded overall. Of the seven projects funded under the Legacy Grant Program—projects begun prior to the Energy Center's three new grant programs—two projects are worth special mention here.

AGRICULTURE | DR. MARK HANNA IOWA STATE UNIVERSITY

Dr. Hanna and his team at ISU worked with the Farm Energy Task Force to study energy efficient grain drying techniques and provide on-site education and outreach for Iowa farms (<http://farmenergy.exnet.iastate.edu/>).

MANUFACTURING | CHRISTOPH BECKERMANN THE UNIVERSITY OF IOWA

Professor Beckermann leads a team of researchers exploring efficiency opportunities within the casting industry. Risers are used for the delivery of liquid metal to the casting and are removed during finishing. Existing sleeves tend to use overly conservative designs that result in waste and inefficiencies. With the support of an Energy Center grant, the team is creating an industry database of sleeve properties and preparing standardized modeling guidelines for commonly used riser sleeves in the casting industry. Optimally sized sleeves have the potential to improve the casting yield by 5-10%.





IMPACT AWARD RECIPIENT ENERGY EFFICIENCY

Mufit Akinc, Materials Science and Engineering and Chemical and Biological Engineering, Iowa State University

REVOLUTIONARY INSULATION TECHNOLOGY

With the help of an Iowa Energy Center grant, Professor Mufit Akinc and his team of graduate students are developing the next generation of insulation materials that will radically improve the energy efficiency of buildings and appliances. Akinc's focus is on novel, but inexpensive, nano-porous materials that can be used as core material for vacuum insulation panels. These will have a thermal conductivity 10 times lower than conventional polyurethane foam insulation. His ideas to reduce the manufacturing costs of vacuum insulation panels may lead to the widespread use of this energy-saving technology.

A BREAKTHROUGH

Insulation is one of the most important components of refrigerating appliances, cold rooms, containers, transportation vehicles, and buildings. Traditional closed-cell polyurethane foam is the most commonly

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This project will have a huge impact on energy efficiency and fuel use in buildings and many other applications. In particular, the heat loss through the buildings represents half of the energy use in the buildings. If we can cut down on this heat loss, it's going to be huge. – Mufit Akinc

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used material for refrigerators and freezers. Ever increasing ecological concerns and demand for energy conservation are driving manufacturers to offer appliances and structures with higher energy efficiency. Since heat loss is the primary source of energy inefficiency in these systems, there is a critical need for developing materials and systems with better insulation characteristics. Vacuum insulation panel

technology is emerging as one of the most promising solutions for the reduction in energy consumption in these applications. Replacing polyurethane foam insulation with vacuum insulation panels will not only result in significant energy savings, but can also reduce the volume of bulky insulation needed. Vacuum insulation panel technology has potential applications in appliances, building envelopes, home and industrial insulation systems, refrigerated transportation containers, as well as food preservation and processing industries.

“If this project is successful, even partially successful, and leads to the establishment of a new, small, start-up company, which will manufacture these vacuum insulated panels to be used in a refrigerator or in a building—if I walk by that building and say I had something to do with it or my graduate students developed this thing, this would be the greatest accomplishment I can imagine,” said Akinc.



ABOUT THE ENERGY RESOURCE STATION (ERS)

The Iowa Energy Center's Energy Resource Station (ERS) is helping to solve the most critical problems and to enhance technologies in commercial building energy efficiency. No other facility in the nation has capabilities that are as integrated as those at ERS. The facility, in Ankeny, Iowa, is designed to simultaneously test and demonstrate multiple, full-scale commercial building heating, ventilating, and air conditioning (HVAC) systems. The facility allows for real world demonstrations of HVAC equipment and control systems, as well as training opportunities related to energy efficiency. Research projects conducted at ERS are part of the Energy Center's applied research portfolio and often involve collaborations with national energy laboratories, universities, and industry.

KEY BENEFITS:

The Energy Resource Station supports the state's economy and environment, as well as Iowa's role as a national leader in implementing energy efficiency technology.

- Cost and energy savings for commercial, industrial, and residential buildings.
- Increased energy efficiency, boosting Iowa's economy and reducing energy dollars leaving the state.
- Establishing unbiased product performance information for businesses and homeowners to make more informed investments.