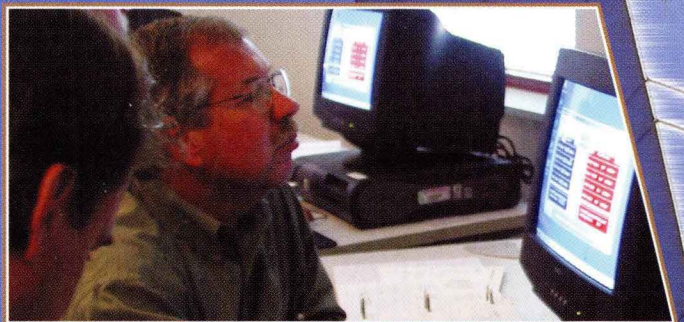
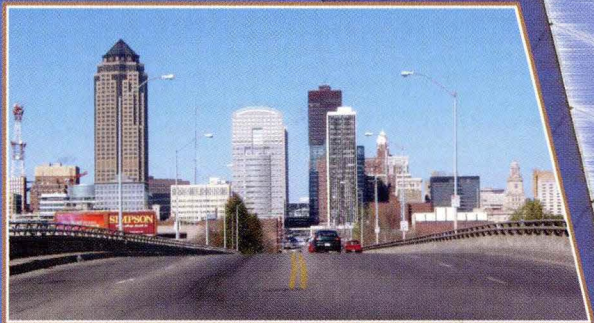
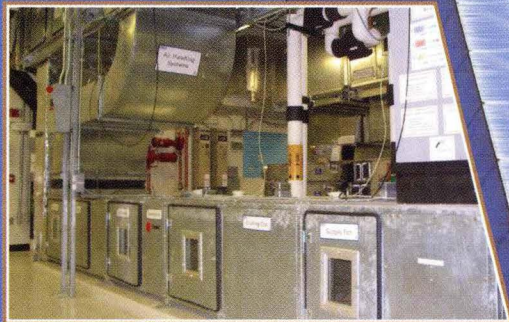
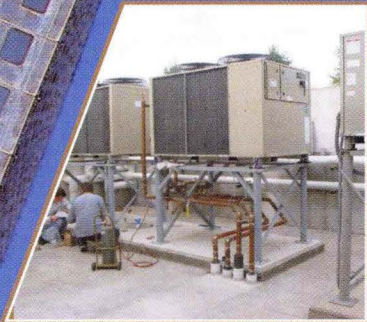


**HD  
9502  
.E77  
2003**

**ERS : Energy Resource Station**

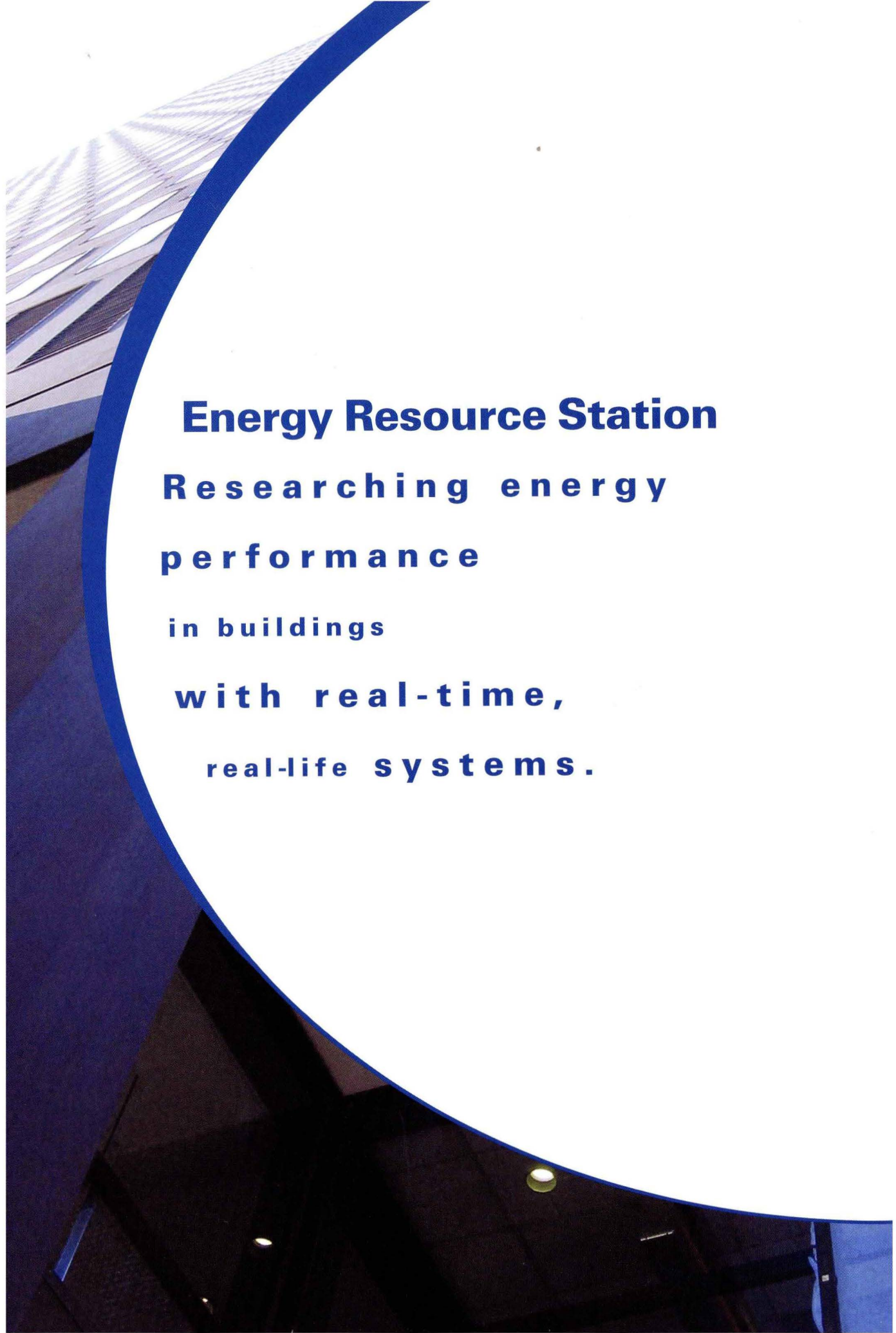
0111100011010101100  
0101011101010101  
01010101001011  
100011010101  
01110101010  
010100101  
011010101  
0101010  
001011  
010110  
01011  
0110  
1001  
110  
0101  
010  
010  
0010  
0110  
010  
00101  
0101010  
110101010  
01001011101  
0101011001010  
010101110101010



# ERS

Energy Resource Station

IOWA ENERGY CENTER

The logo for Energy Resource Station is a large, thick blue arc that curves from the top left towards the bottom right, framing the text. The background features a photograph of a modern building's exterior with a white, grid-like facade and a dark interior with recessed lighting.

**Energy Resource Station**  
**Researching energy**  
**performance**  
**in buildings**  
**with real-time,**  
**real-life systems.**

## Our primary objectives

- Establish high-quality, research-based information on energy-efficient building technologies.
- Test and demonstrate commercial HVAC (heating, ventilation and air conditioning), building controls and daylighting systems.
- Provide a basis for quality energy efficiency programs that boost local economic activity.
- Serve Iowa's building owners and operators, engineers, architects and utilities.





## **A facility with unequaled capabilities**

### **The Energy Resource Station (ERS) is:**

home to the Iowa Energy Center's Commercial Building Energy Efficiency Program; a nationally known research, demonstration and training facility conceived of, designed and built by Iowans; a resource for Iowans seeking information about building energy efficiency

**R**esearchers continually test the capabilities of the ERS, examining:

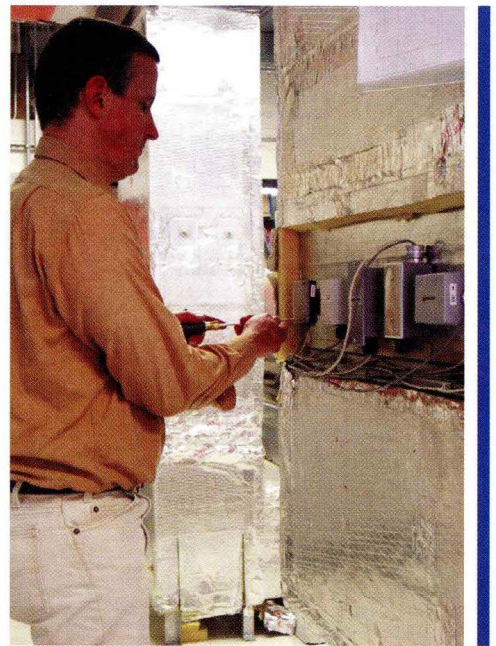
- HVAC System Combinations
- Control Strategy Options
- Daylighting Options
- Computer Design Tools

**The ERS is designed for** the simultaneous testing and demonstration of multiple, full-scale commercial building HVAC systems. No other facility in the nation has the system capabilities that are integrated within the ERS, making it a truly unique laboratory building.

**The information gathered** at this research facility provides practical information for building owners, architects, engineers and building operators on cost-effective, energy-efficient technologies for commercial and industrial buildings. The ERS also provides an environment for hands-on training for this group of energy professionals – showing rather than telling them how to maximize the efficiency of the building systems they already have and what to look for when it comes time to invest in new HVAC equipment.

**Research results and hands-on equipment** demonstrations at the ERS give consumers information to select the most cost-effective and efficient options for their businesses. Besides encouraging the use of energy-efficient products, this information provides the supporting data necessary to simplify analyses of energy options and life-cycle costs. Innovative research being pursued at the ERS is helping develop and evaluate energy efficient technologies of tomorrow.

**Tests performed at the ERS** measure the performance of an entire integrated energy system, rather than simply testing individual pieces of equipment. This method of testing emphasizes the interactive effects of HVAC, building controls and lighting energy use.



IOWA ENERGY CENTER  
Energy Resource Station



## How Iowa benefits

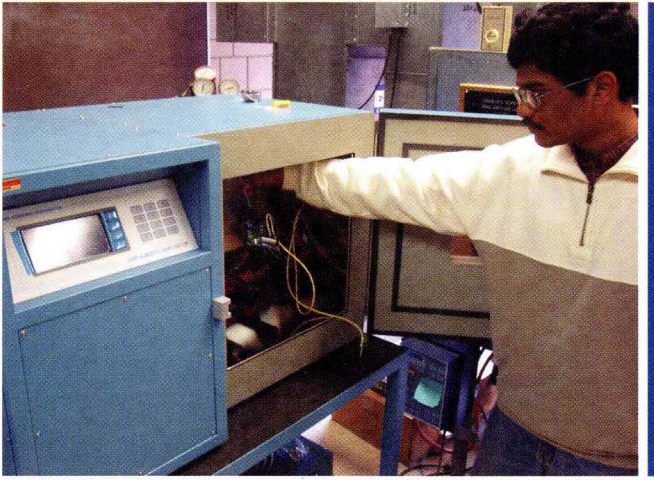
**The research** done at the ERS has far reaching benefits for Iowa, encompassing the state's economy and environment while supporting Iowa's role as a national leader in implementing energy-efficient technology.

### A Team Effort

**T**he ERS was conceptualized under the direction of a Planning Team made up of industry leading architects, engineers, contractors, utility representatives and building managers. This group continues to offer guidance in an ever-changing building technology market, maintaining the ERS as a reliable, credible source to evaluate energy efficient products, a central resource for energy-efficiency information, education and training.

### These benefits include:

- Saving building and business owners money and energy.
- Increasing energy efficiency to boost Iowa's economy and reduce the number of energy dollars leaving the state.
- Establishing research-based product performance information, allowing Iowa businesses and building owners to make more secure investments in energy-efficient technologies and systems.
- Providing technical training programs for energy and building professionals.
- Introducing new energy-efficient technologies to Iowans.
- Reducing Iowa's dependence on imported energy.



## An Impact Beyond Our Borders

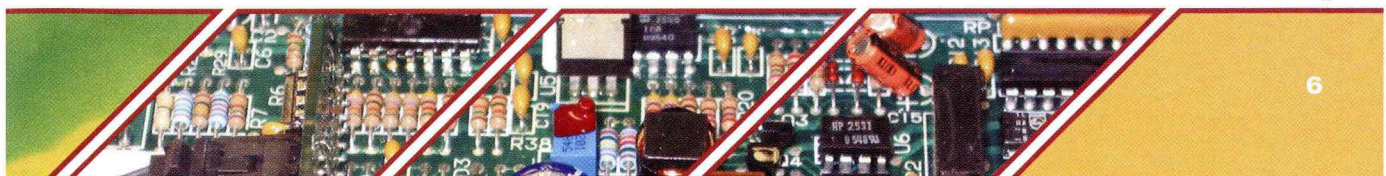
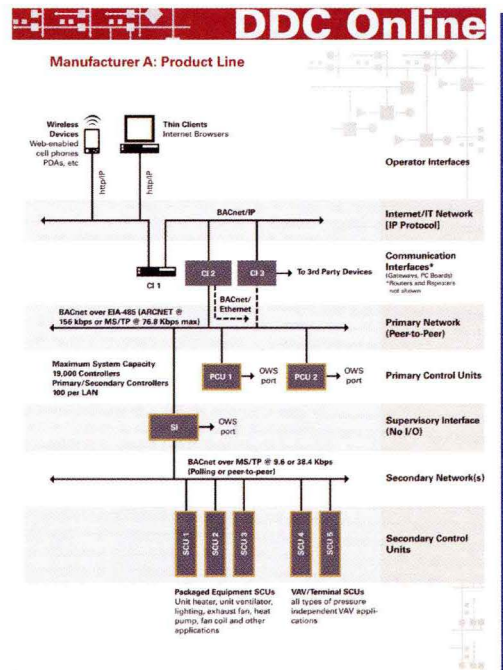
The Energy Center team has gained a reputation for producing credible information. This reputation has grown locally and nationally thanks in part to efforts targeted at building controls.

## National Building Controls Information Program

The National Building Controls Information Program (NBCIP) is dedicated to disseminating research-based information on energy efficient building control products and strategies. NBCIP helps design and specifying engineers, owners, building operators, facility managers, installers, manufacturers, and service providers keep pace with the rapidly changing building controls market. The long-term goal of NBCIP is to change the market for commercial and institutional building controls through testing, demonstration, education and dissemination of unbiased product information.

## Direct Digital Controls Online

DDC Online is a popular web-based resource that provides unbiased information on Direct Digital Controls (DDC). This online reference features the DDC product lines of many widely used control systems as well as basic information about control components and strategies.

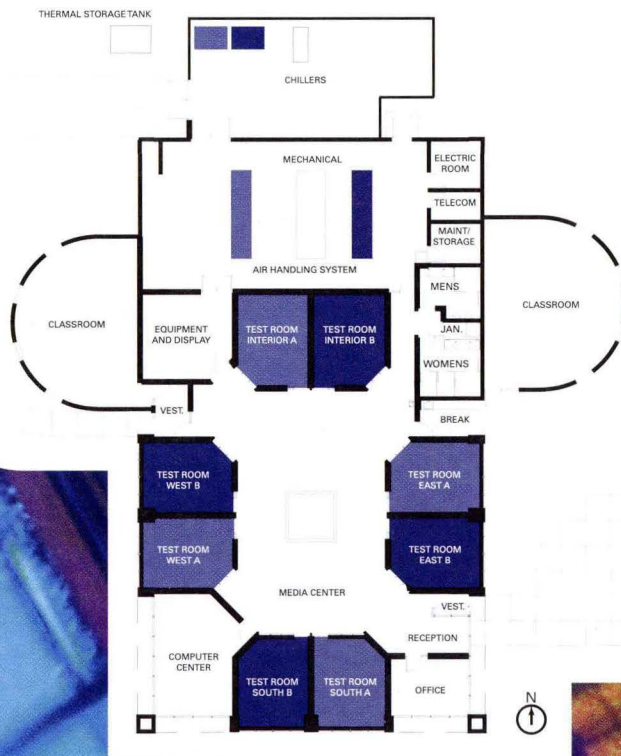




# Test Rooms & Systems

**The matched pairs** of test rooms at the ERS create a facility that is truly unique. Each pair is built with mirror image identical construction - having the same geometry and construction specifications.

**The four matched pairs** ("A" & "B") of test rooms are east facing, south facing, west facing and interior space oriented. Side A of each test room pair is isolated from side B and is served by a separate HVAC system. This design enables side-by-side comparison of the systems and/or the algorithms that control them.





### **Unique**

The ERS is the only facility in the country with an arrangement for controlled system testing in a real world operating environment. The test rooms feature both overhead and perimeter heating and cooling systems.

### **Flexible**

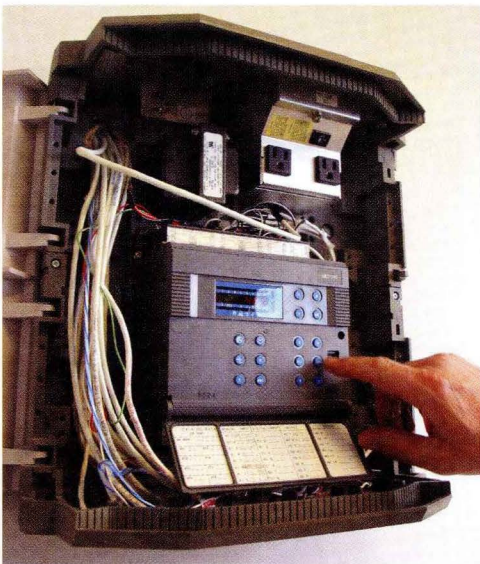
The facility accommodates a wide variety of system types and offers the ability to introduce false internal heat gains to simulate the occupancy schedule of a typical building.

### **Options**

Each test room is equipped with an overhead air distribution system that includes a pressure independent VAV box and the choice of hydronic or electric reheat capability. Other system options include Fan Powered VAV, Constant Volume, and Dual Duct arrangements. Various testing objectives can be accommodated such as energy and comfort comparisons of overhead versus perimeter heating and cooling, and hydronic versus electric reheat.

### **Controls**

Each test room is equipped with a system control panel to monitor and adjust the VAV box, lights, and baseboard heat. The controllers can be custom programmed, allowing researchers to directly embed customized algorithms.



# Controls & Central Systems

**At the ERS, researchers** have the tools to test various HVAC system types and control strategies, capturing over 750 control and monitoring points at 60-second intervals or less. Multiple commercially available DDC systems are employed in various roles at the ERS, providing a broad range of testing capabilities and giving visitors the opportunity to see and experience first hand the similarities and differences in the systems.



## Other Controls features

- Internet remote monitoring and control of the system
- Raw data processed and converted to text files
- High grade precision sensors replace HVAC grade
- Weather Station Instrumentation
- Routine Calibration for all critical data sensors

**The equipment room** is a laboratory, a research area, a demonstration area and a hands-on classroom. The equipment in this part of the building is designed to be extremely flexible and allow maximum equipment visibility, expansion and accessibility. The mechanical equipment area allows several full-scale commercial HVAC systems to be operated simultaneously.



## Facility Equipment

- Three independently operating air handling systems
- 10 heating and cooling circulation loops
- Gas hydronic boiler
- Three chiller units
- Thermal energy storage system
- Variable frequency drives

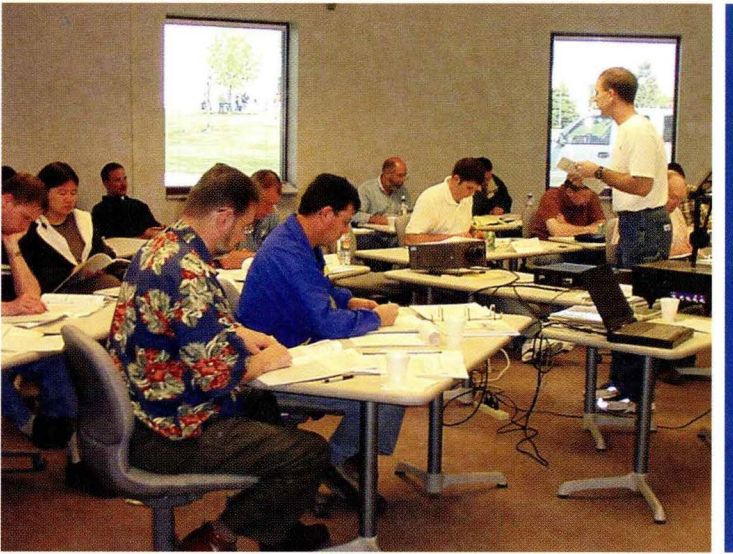


A microscopic view of a circuit board, showing various components and traces. A large white circular area is overlaid on the right side of the image, containing text. The text is in a dark blue font. The background image is a close-up of a circuit board, showing various components and traces. A large white circular area is overlaid on the right side of the image, containing text. The text is in a dark blue font.

## Resources

**Two, 25-seat classroom/meeting rooms** are available at the ERS. These rooms are ideal for smaller training programs, meetings and workshops. The ERS invites energy-related groups to hold meetings in this part of the facility.

**The equipment display area** provides an opportunity for equipment suppliers to display their products inside the ERS and demonstrate state of the art technologies. In turn, it allows architects and engineers, building contractors and other energy professionals to get a closer look at new products and technologies.

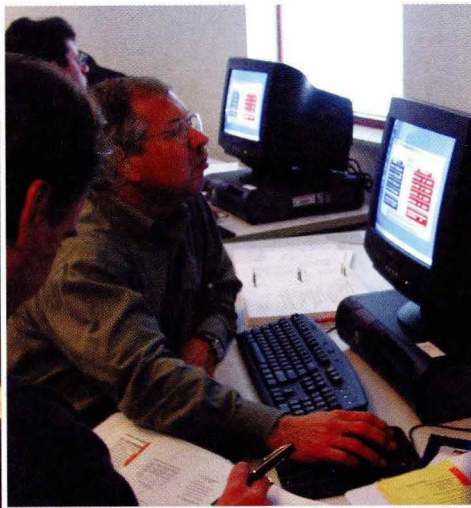


**A library and computer information center** at the ERS offers public access to technical reference material, energy system case histories, manufacturer's information, an audio/video viewing area, as well as computer access to local, state, national and international energy information.



## Training and Conferences

**Educational opportunities** at the ERS include training sessions for architects and design engineers relating to the proper selection, application and control of HVAC equipment. Programs provided for building operators focus on achieving the full energy savings potential of HVAC systems and controls. The ERS becomes an education laboratory for professionals interested in building commissioning, geothermal heat pump systems and DDC systems. Additionally, the facility is used by the educational programs at Des Moines Area Community College (DMACC) and other energy related organizations.



**Conferences and tour groups** with an energy interest are invited to hold meetings at the ERS. Additionally, individual tours are available by contacting the ERS staff.



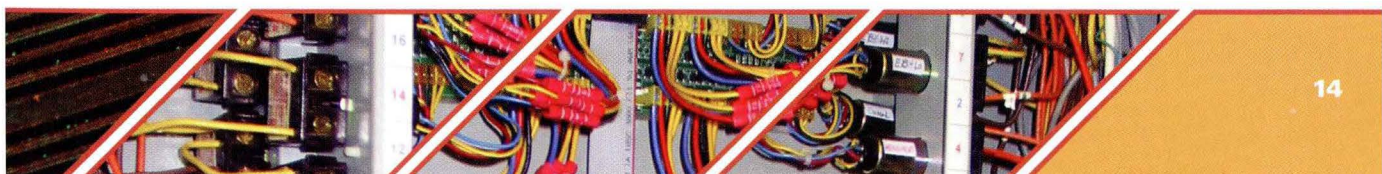
## Other Resources

The Energy Center is able to use many of DMAACC's facilities including a conference center, a 350+ seat auditorium and a residential HVAC training program. The Energy Center has also developed valuable partnerships with professional associations and private industries. This gives Energy Center staff access to specialized expertise in a variety of energy arenas.

## About the Iowa Energy Center

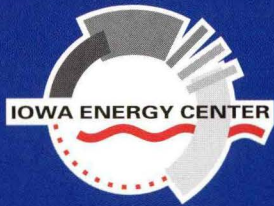
The Iowa Energy Center is a non-profit research, demonstration and education organization dedicated to advancing Iowa's energy efficiency and use of renewable energy. The Energy Center has established a number of programs to address energy-related issues and their associated economic environmental benefits.

For more information, visit our Web site:  
[www.energy.iastate.edu](http://www.energy.iastate.edu).





**Energy Resource Station**  
2006 South Ankeny Blvd.  
Ankeny, IA 50021  
(515) 965-7055



**Iowa Energy Center**  
2521 Elwood Drive, Suite 124  
Ames, IA 50010-8229  
(515) 294-8819  
[www.energy.iastate.edu](http://www.energy.iastate.edu)

STATE LIBRARY OF IOWA



3 1723 02099 7003