



2001 Savings By Design Awards Competition Announced

The Savings By Design Program is partnering with The American Institute of Architects, California Council (AIACC) to recognize commercial projects that successfully integrate architectural excellence and energy efficient design. The 2001 Savings By Design Energy Efficiency Integration Awards will be bestowed upon those architects who have achieved superlative results in the areas of:

- architectural design,
- energy performance,
- innovative treatment of energy-related elements and technologies,
- environmentally sensitive design, and
- creativity.

To be eligible, each award entrant must be a licensed architect, a member of AIACC, and a member of the design team for the project submitted. The projects must be nonresidential buildings projects completed by January 1, 1998 that are located in California.

The 2001 Savings By Design Energy Efficiency Integration Awards will be presented in conjunction with the Annual AIACC Award Presentation on Friday, June 29, 2001, at the Regal Biltmore Hotel in downtown Los Angeles.

The official Call for Entries will be mailed to all AIACC members very soon. To enter the competition, entrants must complete and return the registration form included in the call for entries brochure by April 13, 2001, along with \$50. Upon receipt of the registration form and fee, Saving By Design will mail a detailed explanation of the requirements, including a submittal binder. The completed submittal binders must be received by Saving By Design no later than May 4, 2001.

For further information, please contact Carol Jester at (626) 812-7329.



Visit the EDR website at:
www.energydesignresources.com

INVESTIGATING THE ENERGY SAVINGS POTENTIAL IN LABORATORY DESIGN

Laboratory-type facilities represent an important segment of the building stock, especially when considered in terms of energy intensity and overall energy consumption. According to researchers at Lawrence Berkeley National Laboratories (LBNL), there are more than 50 million square feet of laboratory-type space in California alone. Energy intensities are often five times higher than those found in other building types such as offices.



Credit: Warren Gretz

The challenge for architects and engineers is to design and build the next generation of laboratories with energy efficiency in mind — while maintaining high standards of comfort, health, and safety.

In 1993, California laboratory facilities were responsible for 8.8 billion kilowatthours of electricity demand and 21 trillion BTUs of natural gas demand. In the absence of energy-efficiency improvements, LBNL estimates these figures will increase 131 percent by the year 2015. The corresponding energy cost in 1993 was \$700 million annually, growing to \$1640 million by the year 2015. The LBNL researchers estimate an overall savings potential of 50 percent in new and existing laboratory facilities.

THE LABORATORY ENERGY CHALLENGES

The challenge for architects and building engineers is to design and construct the next generation of laboratories with energy efficiency and sustainable construction practices in mind—all the while maintaining and even advancing high standards of comfort, health, and safety.

To understand how to capture energy savings in new facilities through an integrated design approach, it's important to know the factors that contribute to laboratories' energy intensity.

Conditioning for Large Ventilation Requirements: According to the U.S. Environmental Protection Agency (EPA), the basic energy challenge of laboratory design is the high cost of condi-

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Introduction to Low-Energy Laboratory Design: A Checklist

Planning and Programming

- Emphasize life-cycle costs when making energy decisions.
- Establish energy efficiency and the use of renewables as project goals.
- Conduct a codes and standards review.
- Understand the implications of narrow operating ranges.
- Catalogue opportunities for energy efficiency and renewables in non-lab spaces.
- Segregate energy-intensive processes by creating mini-environments.

Designing

- Pursue a whole-building approach.
- Insist on clarity and conciseness in mechanical system distribution.
- Try to isolate office and support spaces from lab modules.
- Plan adjacencies by considering mechanical system requirements.
- Don't forget about people!

Engineering

- Be sure to right-size equipment.
- Select equipment by considering part-load and variable operating conditions.
- Specify premium high-efficiency equipment.
- Carefully consider the numbers, size, location, and type of fume hoods.
- Stress low-pressure-drop design.
- Take advantage of your unique climate and locations.
- Separate low- and high-temperature cooling loops.
- Consider using energy recovery systems.
- Incorporate energy-monitoring and control systems.

Commissioning, Operating, and Maintaining

- Require whole-building commissioning.
- Benchmark, monitor, and report annually on energy performance.

From *Laboratories for the 21st Century: An Introduction to Low-Energy Design*, sponsored by the U.S. Environmental Protection Agency in partnership with the U.S. Department of Energy, Office of Federal Energy Management Programs.

tioning the large volume of ventilation air needed to meet safety requirements and building codes. Office buildings are typically designed around a ventilation standard of 20 cubic feet per minute (cfm) per person of outside air, equal to about one air change per hour (ACH) or less. By comparison, lab modules normally require 100 percent outside air, often at exchange rates between 6 and 10 ACH, to meet the aggressive exhaust requirements of fume hoods.

Fortunately, opportunities to reduce the amount of energy required to condition ventilation air arise at each phase of the design and construction process. For example, during the planning and programming phase, designers can zone lab modules based on classification-driven ventilation requirements. And during the selection of mechanical systems, designers can consider energy-efficient technologies such as variable-air-volume (VAV) fume hoods and heat recovery systems.

High Plug Loads: Compared to other institutional and commercial buildings, laboratories may have unusually high plug loads to run equipment such as computers, centrifuges, and spectrometers. Office connected plug loads run between 0.5 to 1 watt per square foot, but laboratory plug loads can range from 2 to 20 watts per square foot. While most of this equipment operates only intermittently, the resulting plug loads can have a significant effect on mechanical system design. During peak plug loads, internal sources of heat gain can exceed 10 watts per square foot. At that point, the air supply rate needed to counteract peak heat gain is sometimes greater than the rate required for exhaust. Because of these variations in requirements, many large, energy efficient laboratories have installed VAV supply and hood exhaust systems.

Integration of Dissimilar Types of Spaces: Most laboratories include support spaces such as conference rooms, libraries, and office suites with significantly less stringent HVAC requirements than the laboratory spaces. This can increase the potential for energy waste, but a clear understanding of the distinct mechanical needs of these diverse spaces can help designers segregate and efficiently provide for different building zones.

THE DESIGN OPPORTUNITIES

As the Energy Design Resources program continually emphasizes, energy efficient design means integrated design. An energy-sensitive design process for laboratories must be supported by a high degree of communication among the design team professionals. This means that the team needs to understand and evaluate the implications of design decisions

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Coming Soon

Annual Laboratories for the 21st Century Conference

October 2-4, 2001
Washington, DC

This annual conference brings together private and public sector laboratory designers, engineers, owners, and operators to address issues related to laboratory energy and environmental efficiency. With a focus on a comprehensive or “whole buildings” approach, conference participants will devise new solutions to reduce costs and increase laboratory design and operational efficiency.

For more information, see
<http://www.epa.gov/labs21century/conf/conf2001>.

High Performance, Low Energy Laboratory Design Workshops

These one-day courses will provide a comprehensive understanding of the opportunities to optimize energy performance of new and existing laboratories. The courses will be taught by seasoned laboratory designers, energy managers, and facilities professionals.

Course topics will include:

- Design programming
- Diversity and right sizing
- Air supply and exhaust systems
- Distribution systems
- Air filtration
- Lighting
- Commissioning
- Resources and tools

June 7, 2001

Kansas City, Missouri
In conjunction with the Energy 2001 Conference sponsored by DOE

For more information, see
<http://www.epa.gov/labs21century/training/index.htm>. To register, contact the Metropolitan Energy Center at (816) 531-SAVE (7283) or labs21@toto.net.

October 1, 2001

Washington, DC
In conjunction with the Annual Laboratories for the 21st Century Conference
For information and registration, see
<http://www.epa.gov/labs21century/conf/conf2001/workshop.htm>.

on the performance of a project at each step of the process. To explore the opportunities for energy efficient design in laboratories, the EPA has put together the checklist on page two organized according to a sequence of steps in the design process. However, design professionals should pursue these steps as part of an iterative, cross-disciplinary effort in which each phase of the process influences and informs the others.

THE LABORATORIES FOR THE 21ST CENTURY INITIATIVE OFFERS TOOLS AND TRAINING

Sponsored by the U.S. Environmental Protection Agency and the U.S. Department of Energy, the Laboratories for the 21st Century Initiative is a voluntary initiative dedicated to improving the environmental performance of U.S. laboratories. It consists of three components: the Labs21 Partnership Program, training workshops (see sidebar on this page) and a Web-based tool kit to be used in conjunction with other building design tools such as those provided by Energy Design Resources. Tools will include the following:

- Up-to-date guide on energy efficient laboratory design
- Design intent tool which provides a structured approach to recording design decisions that impact a lab's energy efficiency
- National database with performance metrics for laboratory energy use to serve as a robust benchmarking tool for laboratory owners, managers, and design professionals
- Case studies to showcase laboratories that exemplify the Labs21 philosophy
- Best practices and profiles of new and proven technologies

You can explore the Labs21 Web site at <http://www.epa.gov/labs21century> to learn more about the Labs21 initiative, including the annual conference, updates on Pilot Partner activities, tools for laboratory design and operation, and details on how to join the Labs21 Network.

For more information on low-energy laboratory design, see the following publications that provided for the basis for this article:

Laboratories for the 21st Century: An Introduction to Low-Energy Design, Environmental Protection Agency,
http://www.eren.doe/femp/techassist/pdf/029413m_BR_Labs21C.pdf

Design Guide for Energy-Efficient Research Laboratories
Lawrence Berkeley National Laboratory, Center for Building Science, Applications Team

<http://ateam.lbl.gov/Design-Guide> 