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Environmental Energy Technologies Division News

ADVANCED TECHNOLOGIES | ATMOSPHERIC SCIENCES | BUILDING TECHNOLOGIES | ENERGY ANALYSIS | INDOOR ENVIRONMENT

California Consumers Kept the Lights On

In this Issue

ENVIRONMENTAL ENERGY TECHNOLOGIES DIVISION

The mission of the Environmental Energy Technologies Division is to perform research and development leading to better energy technologies and the reduction of adverse energy-related environmental impacts.

California consumers—not mild weather or the cooling economy—should get credit for avoiding blackouts and keeping the lights on in summer 2001 by embracing energy efficiency and conservation and reducing their peak demand by 3,000 to 5,500 megawatts (MW), according to research by scientists at the Environmental Energy Technologies Division.

This is the conclusion reached in a new analysis of the consumer response to the California electricity crisis by Charles Goldman, Joe Eto, and Galen Barbose, researchers in EETD.

"Many observers predicted that California would face widespread rolling blackouts in the summer of 2001," says Goldman. "In April 2001, the North American Electric Reliability Council predicted that the state would have about 250 hours of rolling blackouts. Others predicted that the cost of these blackouts would range from $2 billion to $20 billion. But the blackouts never happened last summer. Our research addresses the question of what role customer load reductions played."

The report analyzes the effects of six factors on the reduction in load: (1) increased public awareness of the crisis as a result of media coverage; (2) electricity and natural gas price increases; (3) utility energy efficiency programs; (4) the 20/20 rebate program; (5) utility and California Independent Systems Operator (ISO) load management/demand response programs; and (6) other state programs, including energy use reduction by federal, state, and local government facilities and partnerships with the private sector.

"Each of these factors contributed to customer load reductions to varying degrees," says Goldman, "although separating the effects of one from another is difficult. For example, many customers may have qualified for a rebate through the 20/20 program by simultaneously taking advantage of a utility incentive program for high-efficiency appliances. The synergies between these various factors were an important reason that customer load reductions were as great as they were."

In response to the state's offer to rebate 20 percent on utility bills if consumers achieved a 20 percent use reduction—an offer that has been renewed for this summer—scientists in EETD created the http://savepower.lbl.gov web site. It identifies energy-efficiency measures and their predicted percentage savings.

Goldman says customers responded to the electricity crisis through a variety of means: installing energy-efficient equipment, installing onsite generation, and modifying their electricity consumption habits or patterns.

Some amount of the conservation behavior and changes in energy management practices will persist, depending on the continued awareness of energy issues and the sensitivity of customers to the increases in their electricity rates, he adds. "We estimate that energy-efficiency measures and clean distributed generation will continue to save the state about 1100 MW when all the installations are completed from projects initiated during 2001," says Goldman.

Eliminating Weather and Economic Factors

A central conclusion of the study is that consumer actions to reduce electricity consumption were the driving force behind the load reductions observed in summer 2001 (load reduction means reduced demand for electricity).

"Some analysts argued that cooler-than-

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normal temperatures in 2001 lowered electricity use and peak demand compared to 2000," says Goldman. "We analyzed hourly temperature data from 122 weather stations throughout California, aggregated by county, and weighted according to population of the county. The analysis indicates that summer temperatures in 2000 and 2001 were almost indistinguishable, suggesting that weather was not a factor."

Other analysts have suggested that the downturn in the California economy, including the collapse of the "Internet economy," contributed to decreasing electricity use in 2001. "Economic indicators do not support this hypothesis," says researcher Joe Eto. Gross State Product is estimated to have grown 2.3% in 2001, and average employment during the summer months increased 0.8% compared to 2000.

Impacts of the Load Reduction

To estimate the potential impact that load reductions had on avoiding rolling blackouts in the state, the researchers combined detailed information on customer load reduction (reduced demand for power compared to the previous year) with information from the state Independent System Operator (ISO) on aggregate demand (total demand for power in the state at any moment) and generation capacity (the amount of power available to California at any given moment), including the approximately 2,000 MW of generation capacity added during summer 2001.

Rolling blackouts are usually ordered when the state's excess power reserve to serve current demand falls below 1.5 percent. This is called a Stage 3 Emergency. "We calculated the available operating reserve margin greater than 1.5 percent for every hour of the summer of 2001," says Eto. "Our analysis showed that the customer load reductions maintained the operating reserve margin over 1.5 percent for between 50 and 160 hours, potentially avoiding rolling blackouts."

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Preventing Future Crises

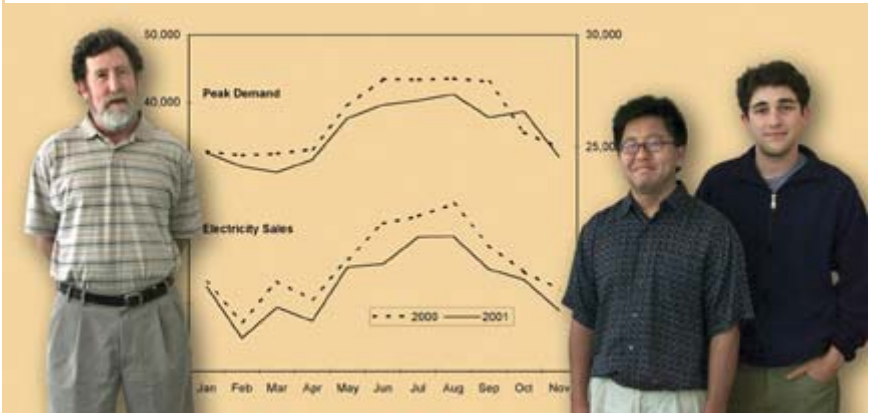
An important lesson to take from these results, according to the report, is that a pre-existing energy-efficiency services infrastructure can help the state's policymakers respond quickly to short-term power shortage emergencies. California was able to undertake massive energy-efficiency projects quickly because the underlying services were already there, which is, in turn, because the state's policymakers and regulators have historically supported and funded energy-efficiency programs.

"Another important lesson is that utility-load management, demand-response, and retail-pricing programs need to be re-designed well in advance of restructuring the electricity markets," Goldman says. "California regulators and utilities essentially mothballed these programs during the transition to the restructured market."

"However, if a region does find itself facing a short-term crisis, the effectiveness of the load-reduction programs in California demonstrates that such initiatives can contribute significantly to maintaining the reliability of the electric system," he adds. "The $1.3 billion that California taxpayers and ratepayers invested in energy-efficiency and demand-response programs in 2001 was a good investment compared to the estimated $2 to $20 billion in potential losses from rolling blackouts, not to mention the savings associated with avoided wholesale power purchases."

—Allan Chen

California consumers deserve most of the credit for avoiding blackouts and keeping the lights on in the state during the summer of 2001 according to a study by EETD researchers, shown here from left: Charles Goldman, Joe Eto, and Galen Barbose.



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This research will be published in the *Journal of Industry, Trade and Competition*. It is also available as an LBNL report 49733, "California Customer Load Reductions during the Electricity Crisis: Did They Help to Keep the Lights On?" by Charles Goldman, Joseph Eto, and Galen Barbose.

Download at:
http://eetd.lbl.gov/ea/EMS/reports/49733.pdf

This research was funded by the Electricity Restructuring and Transmission Reliability programs of the U.S. Department of Energy's Office of Power Technologies.

A Quick and Easy Web-Based Assessment Tool for Day/Electric Lighting

To help architects, engineers, lighting designers, and consultants meet or exceed increasingly stringent Title 24 (California's building energy-efficiency standard) requirements, Southern California Edison and other California utilities have been developing tools for the Savings by Design program. This program aids building managers, who often lack an easy and quick means of assessing daylighting and electric lighting performance. When lighting decisions are made, key parameters that impact energy use and affect the quality of the luminous environment need to be taken into consideration. These factors include window size and orientation, glazing type, luminaire types and layout, and reflectance of interior surfaces, among others.

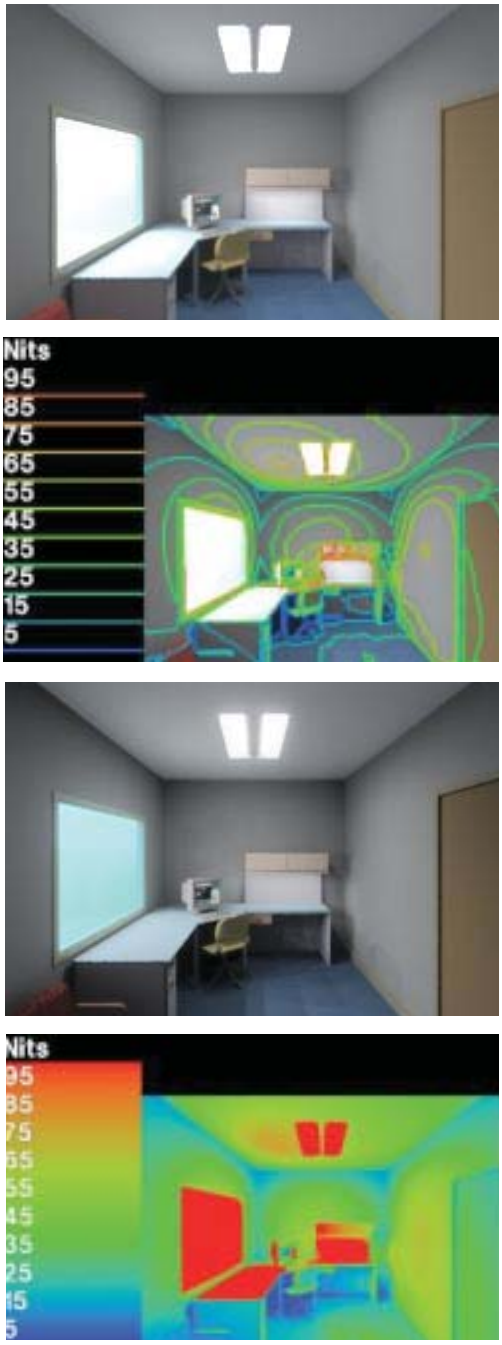
To consider daylighting and electric lighting performance properly, decision makers need to use lighting-simulation tools, which compute work-plane illuminance and, in many cases, surface luminance values. However, such tools have long learning curves and are time consuming, which increases design costs. There is a clear need to provide options for assessing quantitative and qualitative aspects of daylighting and lighting designs that beat Title 24 requirements but in a more cost-effective manner than through the conventional use of simulation tools.

To address this need, EETD's Building Technologies Department is developing a web-based tool that allows lighting and daylighting designers to quickly and easily assess the effects of key parameters on qualitative and quantitative aspects of daylighting and lighting performance. The tool uses a large database of images and statistical data, which were generated through many parametric lighting simulations in prototypical architectural spaces. The data were generated with the Radiance lighting simulation and rendering software (http://radsite.lbl.gov). The end result is equivalent to a web-based, virtual lighting simulator, which allows users to change the values of key design and context parameters and displays the corresponding images and data for qualitative and quantitative assessment of luminous performance.

The tool, currently referred to as the "Radiance Image Database," is available at http://gaia.lbl.gov/rid. The current version includes two main modules, one focusing on daylighting in a small office space and the other on electric lighting in five space types: a classroom, a small office space, a large open office space with partitions, a large warehouse, and a small retail store. The web-based user interface allows quick and easy selection of values for the key parameters that were varied in the simulations and provides instant response by displaying the corresponding pre-calculated images and data.

The user interface is designed to allow side-by-side comparison of alternative scenarios or of the same scenario in different display modes. The display modes include a "camera exposure" display, which is the equivalent of what a camera would produce in an average expo-

Figure 1. Each image is available in four display modes: camera exposure, based on average luminance (a), camera exposure with superimposed iso-contour lines of luminance or illuminance (b) human exposure, based on the sensitivity and adaptation of the human eye (c), and false color mode, showing magnitude of luminance or illuminance (d).



sure mode; a "human exposure" display, which adjusts the image to reflect the sensitivity and adaptation of the human eye; and "iso-contour" and "false-color" displays, for quantitative assessment (see Figure 1).

The output includes perspective views of the architectural spaces, showing luminance values, and plan views, showing work-plane illuminance values. Quantitative statistical information is also provided in the form of minimum, average, and maximum work-plane illuminance. The electric lighting module also includes quantitative information about installed and used lighting power density; the latter varies for scenarios with dimmed and/or switched lighting fixtures. All lighting designs are at least 10 percent more energy efficient than Title 24, to demonstrate the effectiveness and encourage the use of energy-efficient lighting designs.

Acknowledgments

The development of the Radiance Image Database was supported with funding from Southern California Edison (SCE) through the California Institute for Energy Efficiency (CIEE), a research unit of the University of California. Publication of research results does not imply endorsement of or agreement with these findings by CIEE or any CIEE sponsor. This work was also supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technology, State and Community Programs, Office of Building Systems of the U.S. Department of Energy under Contract No. DE-AC03-76SF00098. The architectural and electric lighting designs were based on input from Lisa Heschong from the Heschong Mahone Group and James Benya of Benya Lighting Design. The development team included Judy Lai, Daniel Fuller, and Tara Tariq.

—Konstantinos Papamichael

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Berkeley Lab Model Tracks Indoor Anthrax Dispersal

Three fumigations spanning three months were needed to rid the Hart Senate Office Building of anthrax after a single contaminated letter was sent to Senator Tom Daschle last October.

Although the epicenter of the $14 million cleanup was Daschle's office, the nine-story building was sealed after traces of anthrax were found in other rooms. No one knows precisely how the aerosolized spores drifted from the envelope to the far corners of the building, but Berkeley Lab researchers are zeroing in on an understanding.

"We've always included aerosol behavior in our modeling and experimental work, but the seed crystal was what happened in the Hart Building," says Richard Sextro, of EETD's Indoor Environment Department. "It became very clear that one of the big unknowns is what happens after you open the envelope. Where does the anthrax go?"

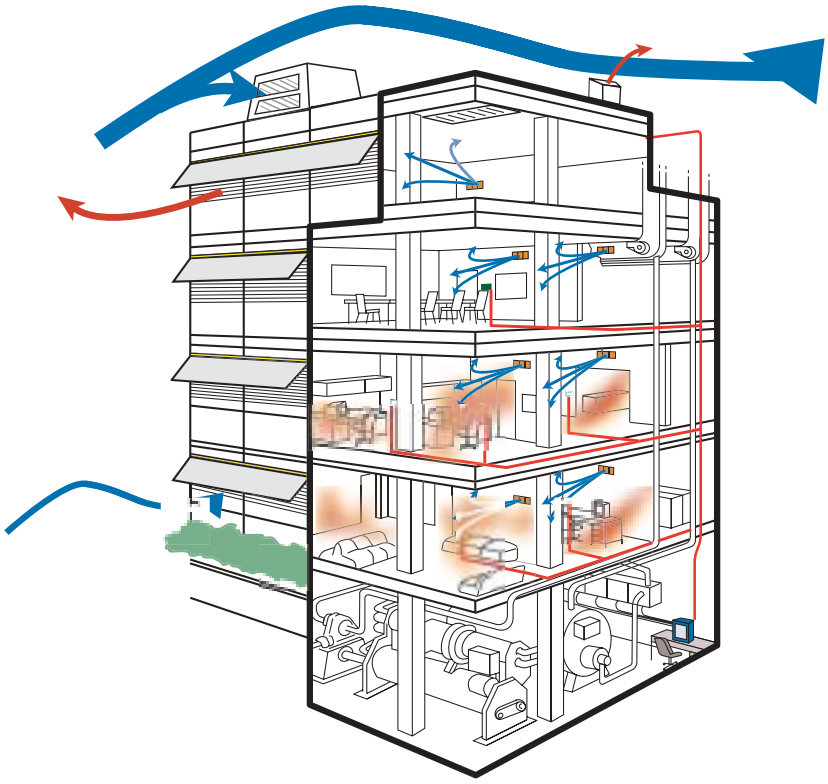
The indoor anthrax model developed by Sextro and colleagues David Lorenzetti, Tracy Thatcher, and Mike Sohn had its origins in the Department of Energy's Chemical and Biological National Security Program, begun in 1997. The program initially included only Lawrence Livermore and Los Alamos laboratories' work on outdoor modeling of biological and chemical attacks. However, because Berkeley Lab's Indoor Environment Department has one of the nation's most comprehensive indoor air programs, Joan Daisey (the late head of the department) successfully submitted a proposal to DOE in 1998 for funding to explore chemical and biological agent dispersion in buildings. A fourth DOE lab, Argonne, rounds out the program by modeling subway contamination.

Sextro and his colleagues have developed a model with a singular purpose: to track the fate of airborne anthrax spores and use these simulations to estimate exposures. Their rationale is based on the unnerving fact that one gram of anthrax contains 100 billion spores, and only 10,000 spores are needed to spur a lethal case of inhalation anthrax. This also means that almost every spore counts, so the model has to be robust enough to depict anthrax dispersal in considerable detail.

To start, the team used information obtained from Indoor Environment Department experiments that studied aerosol transport and deposition in both rooms and ducts. In addition, a multizone building airflow model, developed in part by Berkeley Lab scientists, was used to simulate the room-to-room airflows that might transport anthrax spores between rooms.

Combined, the two models paint a rough picture of what happens when an anthrax-laden letter is opened. For example, because anthrax is a relatively large aerosol, (between two and four microns in size), the models reflect that it is more susceptible to gravitational settling than smaller particles. In other words, more of a given amount of anthrax settles on tabletops and carpets than would be true for the same amount of a smaller, combustion-produced aerosol, which is more likely to adhere to walls and ceilings. The models also predict how much aerosol leaks through a building's shell and accumulates in air ducts.

An anthrax-contaminated letter closed the Hart Senate Office Building for several months. Berkeley Lab researchers have developed a model for studying the dispersal of anthrax spores that may eventually be used to guide decontamination efforts in such situations.



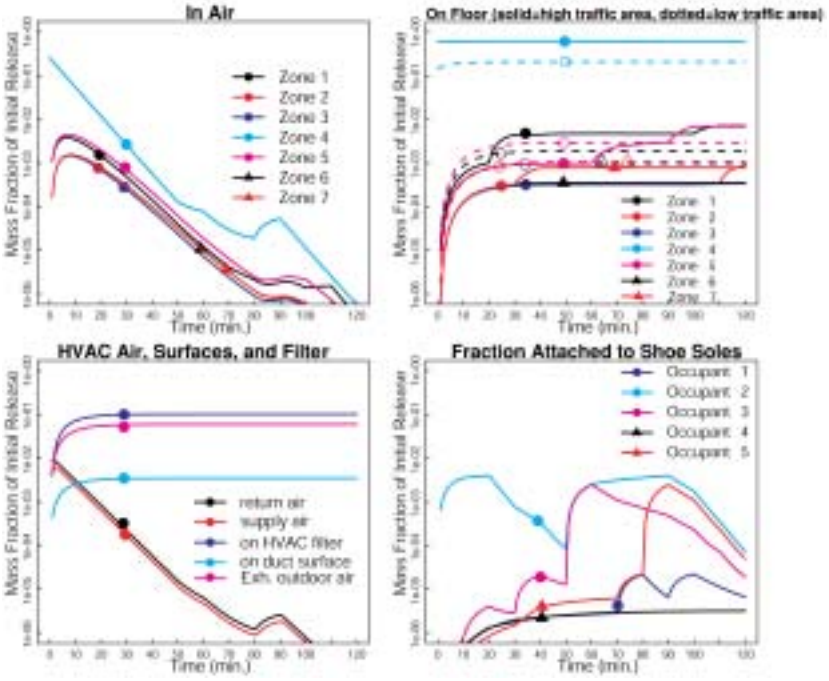
Most airflow models do not account for the activities of people. What happens when someone steps in anthrax that has settled on the floor and tracks it from room to room? Or resuspends it into the air by simply walking on the floor? To explore this poorly understood component of anthrax dispersion, the modeling team incorporated terms that describe foot traffic's influence on deposition and suspension. Delving deeper, they subdivided surfaces into two types: accessible areas—surfaces on which people can walk and unwittingly disturb deposited anthrax—and inaccessible areas composed of hard-to-get-to surfaces like corners and areas behind desks; once anthrax settles in such places, it typically isn't tracked or resuspended. These additional variables enable the model to map in detail the chain of events that affects anthrax dispersal.

Aerosol research conducted at this dispersion testing facility was used to help develop the indoor anthrax model. (Photo by Robert Couto)

"This pushes us, conceptually, into a new area of knowing what happens to particles on accessible surfaces where they can be resuspended or tracked." Sextro says. "This is important, because, by examining anthrax dispersal in as complete a picture as possible, we determine where we need to focus our research."

So far, the model has been unleashed in a hypothetical, computer-generated, 190-square-meter office floor, subdivided into a main hallway surrounded by six offices, each occupied by one person. A letter carrying one gram of anthrax is opened in one room. Some anthrax remains in the envelope, some settles on the floor, and some disperses into the air. Several scenarios are played out. In one, everyone remains in his or her office and the HVAC system is the sole means of dispersal. In more complex scenarios, people move from room to room and track, resuspend, and redeposit anthrax throughout the office floor.

For each scenario, anthrax exposures of each individual are predicted as well as the concentrations of anthrax spores that end up on various indoor surfaces.



Although the model is still under development and is primarily a research tool, Sextro believes it can eventually be used to map real-world exposure cases. "It's very important to know how much anthrax is in the HVAC system, on the floor, and on the backside of ceiling tiles," Sextro says. "In addition to the important task of estimating potential exposures and—ultimately—how to avoid high exposures, the model can help focus decontamination efforts by determining where anthrax accumulates."

—Dan Krotz

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Rating "Green" Laboratories—Labs21 Environmental Performance Criteria

Laboratory facilities present a unique challenge for energy efficient and sustainable design, with their inherent complexity of systems, health, and safety requirements, long-term flexibility and adaptability needs, energy use intensity, and environmental impacts. The typical laboratory is about three to five times as energy intensive as a typical office building and costs about three times as much per unit area. Any efforts to reduce energy use and environmental impact are heavily impacted by special functional and health and safety requirements, which need to be considered in the design and operation of laboratories.

The Laboratories for the 21st Century (Labs21) Program addresses these issues, and is aimed at improving environmental performance of public and private laboratory buildings. The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) are the lead sponsors of this effort. EETD's Applications Team plays a major role in the Labs21 program, in the development of design tools, energy efficient fume hoods, lab design courses, and in providing technical assistance to public and private sector laboratory projects.

Labs21 EPC—Building on the Success of LEED

The Labs21 Environmental Performance Criteria (EPC) is a rating system for use by laboratory building project stakeholders to assess the environmental performance of laboratory facilities. It builds on the U.S. Green Building Council's LEED™ Rating System. LEED (Leadership in Energy & Environmental Design) has become the de facto standard in the U.S. for rating sustainable design. Some city, county, and federal agencies have adopted it and even require its use in new building projects. However, LEED was primarily designed for commercial office buildings and as such, lacks some attributes essential to encouraging the application of sustainable design principles to laboratory buildings. Labs21 recognized the need for a tool to provide guidance and evaluate laboratory environmental performance, and that building upon a recognized rating tool like LEED would avoid "re-inventing the wheel."

The Labs21 EPC follows the format of LEED Version 2.0. In this point-based rating system, credits are awarded for various green design features. Based on the number of credits earned, a building can be rated as certified, silver, gold, or platinum. The EPC adds to the existing LEED credits and prerequisites and in a few cases has modifications to the existing LEED credits. Figure 1 compares the total number of credits in each section of the EPC. The EPC is more heavily weighted towards energy and atmosphere credits, since energy use has a more significant environmental impact when compared to other commercial buildings.

The laboratory-specific prerequisites and credits added in the EPC are included in the following areas:

Sustainable sites

- Use of physical and computational modeling to assess and reduce impact of air effluents.
- Elimination of water effluents into sanitary sewer.

Water efficiency

- Eliminating use of potable water for open loop water systems for laboratory equipment.
- Documenting and reducing process water use and process waste water generation.

Energy and Atmosphere

- Selection of minimum ventilation rate to achieve optimal balance between user needs, health/safety protection and energy consumption.
- Reduction of energy consumption through the use of energy efficient laboratory systems and equipment.
- Use of efficient on-site energy generation systems to reduce source energy use.
- Right-sizing mechanical equipment by improving estimates of heat gain from laboratory equipment.

Materials and Resources

- Reduction and management of hazardous material stream.
- Chemical resource management plan to reduce and manage laboratory chemical supplies.

Indoor Environmental Quality

- Use of computational fluid dynamics to optimize indoor air-flow for contaminant containment.
- Conducting fume hood commissioning as per ASHRAE standard 110.
- Use of fail-safe and self-identifying alarm systems.

The Labs21 EPC is a work in progress. EPC version 2.0 was released in October 2002. It is being developed in a consensus-based approach by a diverse group of more than 40 architects, engineers, consulting experts, health and safety personnel and facilities personnel. EETD's Applications Team leads the development of the EPC for the Labs21 Program.

Future Directions—LEED for Labs?

From the standpoint of rating systems, complex buildings may be defined as those that have special functional requirements that directly and significantly impact sustainability criteria e.g,. laboratories, large hospitals. Such buildings challenge the applicability of a general rating system for all commercial buildings, and may well justify the development of a LEED version for that particular

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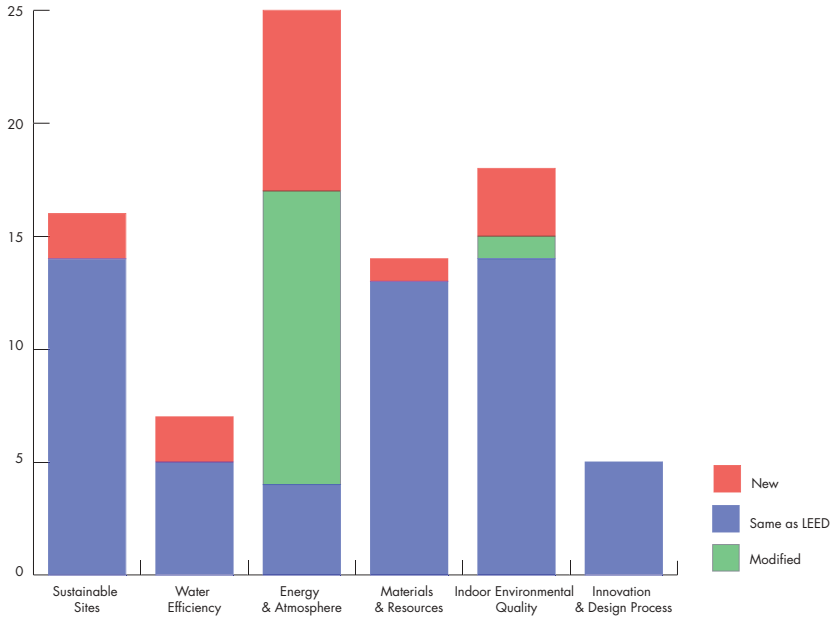
Figure 1.EPC credits in each section.



building type. The U.S. Green Building Council (USGBC) has shown considerable interest in the EPC and its potential application as a LEED for Labs. Obviously, there are advantages to having only one version of a rating system, and the number of "special" versions should be kept to a minimum. Also, the special versions should as far as possible maintain all the existing LEED credits (e.g,. the EPC modifies only two LEED credits). With appropriate guidelines and standards for creating special versions for complex buildings, LEED can broaden its scope while maintaining overall consistency.

—Paul Mathew

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For a copy of the draft EPC Version 2.0 and the response form to participate in the evaluation of the EPC rating system, please see http://issf-ps.lbl.gov/Labs21/epc.html. For more information on the Labs21 program, please see http://www.epa.gov/labs21century. If you are interested in participating in the development of the EPC or in pilot testing it in your laboratory facility, please contact Paul Mathew.

RESEARCH HIGHLIGHTS

Congressional Clean Energy Expo

Berkeley Lab's Environmental Energy Technologies Division and Carrier Aeroseal Inc. joined forces recently to show off to Congress the fruits of their public/private partnership, an aerosol-based sealing process that can nearly eliminate air leakage in a home's ducts, which is often 20% or more of a total air flow.

While munching on Ben & Jerry's ice cream, members of Congress, their staff, and the general public mingled and viewed a demonstration of Aeroseal, and many other exhibits of energy-efficient and renewable energy technologies on July 9 in the Cannon House Office Building in Washington D.C. Berkeley Lab's booth was located at the entrance to the caucus room where the event took place, so everyone attending the event saw this technology first.

Developed at Berkeley Lab after years of research and development under the leadership of EETD's Mark Modera, Aeroseal, a start up, was founded to commercialize the technology. Carrier Corp. acquired the company and is training its national distributors to offer the energy-saving process to homeowners. The technology could save each homeowner up to $300 a year in heating and cooling costs; nationally, savings could add up to billions of dollars a year.

From left to right, Berkeley Lab's Jeff Harris explains the Aeroseal process to Representative Mark Udall (Colo.) and DOE Assistant Secretary for Energy Efficiency and Renewable Energy David Garman while William Walter of Carrier looks on.

Berkeley Lab Licenses Low-Emission Natural Gas Burner to Maxon Corp.

Berkeley Lab has licensed a patented next-generation, low-emission burner to Maxon Corporation, a small business that manufacturers industrial combustion equipment (oven burner, furnaces burners, incineration burners, etc.) and shut-off valves.

The low-swirl burner technology (profiled in EETD News, Vol. 1 Number 2) was developed and patented by EETD's Robert Cheng and colleagues. The burner exploits a unique aerodynamic feature of premixed combustion that affords a more than 50:1 power turndown. Throughout this load range, it burns at close to 100% combustion efficiency and releases at least 10 times less NOx than non-premixed conventional burners—fewer than 10 parts per million—and lowers carbon monoxide emissions.

NOx is a key ingredient in photochemical smog, which is responsible for the dirty brown air over most U.S. cities and unsafe ozone levels that exceed federal health standards. Many cities are considering limiting installation of new conventional gas burners, but advanced technologies like the low-emission burner can contribute to cleaner air and more efficient use of fuel.

EETD Staff part of Award-Winning Team

Building 850, the U.S. Navy's Energy Showcase, in Port Hueneme, California was named one of the Top Ten Green Projects by the American Institute of Architects (AIA) Committee on the Environment (COTE). The Top Ten awards were begun by COTE in conjunction with U.S. DOE in 1998 to recognize the work of designers who strive to minimize the environmental impacts of their projects. Projects are evaluated based on their energy consumption, effects on local ecosystems, use of high-performance products and technologies, and connection to the local setting and context. Building 850 will serve as one of the U.S. Navy's two national "Energy Showcase" facilities to demonstrate application of the latest concepts in energy-efficient and sustainable facility design, construction, and operation.

One of the important systems designed into Building 850 was a retrofit of the existing lighting. EETD's Eleanor Lee and Charles Ehrlich acted as advisors to Constructive Technologies Group, Inc., of Irvine, California, who performed the retrofit work. During the design process, a number of different fixtures and layouts were considered; the final configuration included, among other elements, building shading and glazing elements, high-efficiency task-ambient fluorescent lights, and electronic ballasts and occupancy controls.

EPOB Head Made Member of Academy

Max Sherman, head of the Energy Performance of Buildings Group (Indoor Environment Department) was recently made a member of the International Academy of Indoor Air Sciences.

The academy is an international, independent, multidisciplinary, scientific, non-profit organization whose purpose is to promote international scientific cooperation in the field of indoor air sciences.

Fellow IED scientists Bill Fisk and Mark Mendell are already academy members.

Published Work Lauded

"Associations between indoor CO_2 concentrations and sick building syndrome symptoms in US office workers: An analysis of the 1994-1996 BASE study data" was recognized as one of four best papers published in *Indoor Air*, between 1999-2002. Co-authored by Mike Apte, William Fisk, and the late Joan Daisey, the paper was published in *Indoor Air's issue* 10(4):245-257, 2002.

Indoor Air 2002 Attracts Widespread Participation

Held June 30-July 5 in Monterey, California, the Indoor Air 2002 Conference attracted nearly 1,100 participants and published a volume of proceedings of more than 725 papers. The annual conference was presided over by Hal Levin, Indoor Environment Department scientist. IED scientists Bill Nazaroff and Bill Fisk served as vice presidents of the organizing committee and Rich Sextro, another IED scientist, participated as well. The conference program included sessions on ventilation, HVAC hygiene, bioaerosols, environmental tobacco smoke, particles and dust,volatile organic compounds, pollutant emissions, perceived IAQ and IAQ modeling; air cleaning, asthma, sick building syndrome, and children's health. A special session focused on the causes of the increases in allergies and asthma.

Thanks to support from the World Bank, participants were able to discuss indoor air-quality issues in developing countries.

Proceedings are available on a searchable CD and in print format. All abstracts of the papers are now available at the conference web site http://www.indoorair2002.org.

Correction

In our last issue we mistakenly reported that Dr. Don Gasser of UC Berkeley was retired. We learned from Dr. Gasser that he is still Professor of Physics and of Neurobiology of the Graduate School, and that he runs a very active lab with two PhD physicists/neuroscientists, one PhD Vision scientist, one physics graduate student, and about six undergraduates.

We regret any inconvenience our error may have caused.

—EETD News Editorial Staff

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Ernest Orlando Lawrence Berkeley National Laboratory is a multiprogram national laboratory managed by the University of California for the U.S. Department of Energy. The oldest of the nine national laboratories, Berkeley Lab is located in the hills above the campus of the University of California, Berkeley.

With more than 4,000 employees, LBNL's total annual budget of nearly $400 million supports a wide range of unclassified research activities in the biological, physical, computational, materials, chemical, energy, and environmental sciences. The Laboratory's role is to serve the nation and its scientific, educational, and business communities through research performed in its unique facilities, to train future scientists and engineers, and to create productive ties to industry. As a testimony to its success, LBNL has had nine Nobel laureates. EETD is one of 13 scientific divisions at Berkeley Lab, with a staff of more than 400 and a budget of $40 million.

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LBNL/PUB-821 Vol. 3. No. 4, Summer 2002

Berkeley Lab Scientist Honored with World Technology Network Award

The World Technology Network has voted EETD's Ashok Gadgil winner of the 2002 World Technology Award for Individual accomplishment in the Energy category.

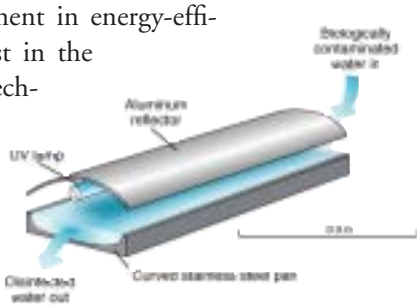
Gadgil was honored for his lifetime achievement in developing energy-efficient technologies as well as his invention of the UV Waterworks device, an energy-efficient technology for disinfecting water.

"With this device," says Gadgil, "we can disinfect one ton of drinking water using only 1/16 of a kWh of electricity." UV Waterworks has been commercialized and is now in use in a number of developing countries, including the Philippines, Mexico, and India.

Cited for its research and development in energy-efficient technologies, EETD was a finalist in the Energy category for the 2002 World Technology Award for corporate accomplishment.

The winners were announced at the World Technology Summit on July 22 in New York City. The decision was the result of a six-month-long selection and voting process in which 100 eminent authorities from 20 technology-related fields drew up their list of potential nominees for consideration by the World Technology Network's current membership of 430 leading technologists eligible to cast votes. There are 20 individual and 20 corporate awards given each year, chosen from five finalists in each category. The award is given "to honor innovative individuals whose recent work will have the greatest likely future significance and impact over the long-term... and who will likely become or remain 'key players' in the technological drama unfolding in coming years."

The World Technology Network was created to "encourage serendipity"—happy accidents—among individuals and companies deemed by their peers to be the most innovative in the technology world. It brings together leading individuals and corporations from 20 technology-related disciplines to share knowledge and develop new working relationships.



For more information on UV Waterworks, see http://eetd.lbl.gov/iep/archive/uv/

A complete list of 2002 World Technology Network award winners can be found at: http://www.wtn.net/awards/awards2002/welcome.html

Sources

EREC: Energy Efficiency and Renewable Energy Clearinghouse
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