

centerline

Newsletter of the Center for the Built Environment at the University of California, Berkeley

Winter 2012

THE WAYS PEOPLE INTERACT WITH BUILDINGS DECADES OF LOWER ENERGY COSTS
OUR IMPACT ON MAKING THE PLANET A BETTER PLACE WITH A UNIQUE ATRIUM FEATURE
DEMONSTRATES ULTRA-LOW ENERGY WHILE PROVIDING THE HIGHEST COMFORT LEVEL
NOISE PROBLEMS IN OFFICES THE NOTION OF URBAN RESILIENCE EXISTING BUILDINGS
DECISIONS ABOUT BUILDINGS THEY CREATE HEADQUARTERS AS A LIVING LABORATORY
NUMEROUS ADVANTAGES IN TERMS OF OCCUPANT SATISFACTION DURING THE HOT SEASON
WHY ARE WE OVERCOOLING BUILDINGS CONSUMING LARGE AMOUNTS OF ENERGY AND
MAKING OCCUPANTS UNCOMFORTABLE PSYCHOLOGICAL AND PHYSIOLOGICAL ASPECTS
PERSONALIZED COMFORT CAN PROVIDE NO COOLING OR HEATING EQUIPMENT
UNDERFLOOR AIR DISTRIBUTION DEVELOPERS AND ENERGY SERVICE PROVIDERS
ROLL UP YEARS OF RESEARCH INTO ONE EVENT FISH-EYE PHOTO EVERY FIVE MINUTES
INDOOR ENVIRONMENTAL QUALITY MEMBERS REPRESENT LEADERSHIP EFFICIENCY
ADOPTION OF NATURAL VENTILATION WIND TUNNEL MODELS SUCH AS THIS DYNAMICS
RADIANT FLOORS FOR HEATING, CHILLED BEAMS FOR COOLING AWARD-WINNING
UNDERSTAND AND MANAGE THEIR BUILDING'S ENERGY SEVERAL CREATIVE CONCEPTS
SEVERAL TOOLS APPROPRIATE FOR BUILDING-SCALE GREENHOUSE GAS CALCULATION
SIMULATIONS INSTALLED SENSORS TO MONITOR FOCUSED ON THIS PROBLEM
PROFESSIONALS REPRESENTING ALL DISCIPLINES THERMALLY ACTIVATED SLAB
SERVICE PERFORMANCE CONTRACTS EASY INTEGRATION AND MONITORING SURVEYS
PRACTITIONERS AND CLIENTS PRODUCTS AND RECOGNITION ENABLING LOW ENERGY
CELEBRATED ITS 20TH ANNIVERSARY DESIGN A SCHOOL WITH SUPERIOR ACOUSTICS

Director's Note

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Dear Industry Partners,

A fundamental goal of CBE's work is helping people make smart decisions about the buildings they create and operate. By studying promising design approaches, and looking at the ways people interact with buildings, we hope to enable the creation of energy efficient, productive and healthful spaces.



In this issue of *Centerline* we have updates about several research efforts that serve this core goal. We report on a new study being done in collaboration with several industry partners, focusing on comfort in naturally ventilated buildings, and a related study of acoustical issues with operable windows. We also share news about ongoing research being done in the areas of personalized comfort, occupant surveys, and underfloor air distribution systems. We also update you on industry events on which our research staff and partners are working to disseminate new research, and to raise the knowledge capital of our industry peers. Projects such as these build on CBE's completed research, and move our work into new territory.

Your participation, and that of other partners, is a necessary ingredient to CBE's ongoing success. In the Partner section of *Centerline* we are pleased to introduce the newest industry partners, and we also provide exciting news from many partner firms who have recently announced new publications, products and recognition.

Sincerely,
Edward Arens

Project Updates

Research Team Launches Collaborative Study of Naturally Ventilated Offices

In collaboration with industry partner firms and affiliated institutions, CBE is undertaking a comprehensive study of indoor environmental quality in buildings relying on natural ventilation (NV). The field study, which began last October, has now reached the end of the winter monitoring season, allowing the research team to gain a preliminary look at the results.

This goal of the project is to address two key barriers to the broad adoption of natural ventilation in commercial buildings: thermal comfort with elevated air movement, and air quality. In pursuit of this goal, CBE is conducting detailed monitoring of indoor conditions in a naturally ventilated office building in Alameda, CA, and also monitoring occupants' use of windows, ceiling fans, and [personal comfort systems](#). We are also conducting "right now" surveys to measure occupants' satisfaction with thermal comfort, perceived air quality, and acoustics.

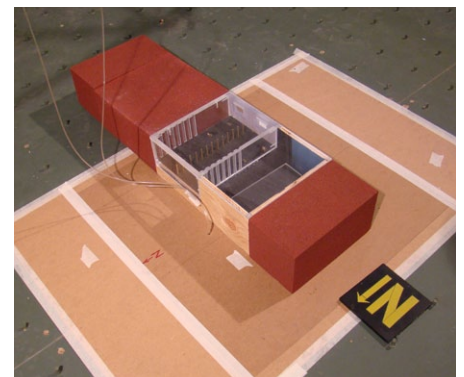
This study, sponsored by the California Energy Commission with co-funding from CBE, is unique as it deals with many aspects of NV, requiring a research team with a wide range of capabilities. Collaborating team members include: CBE Industry

Partner David Banks of CPP, who is conducting wind tunnel tests to document airflow dynamics in the space to characterize the cooling and ventilation potential; Industry Partner Isabelle Lavedrine of Arup's San Francisco office, who is conducting research on code and architectural barriers to NV; and Paul Linden of UC San Diego, who is leading computational fluid dynamics (CFD) simulations to better understand indoor airflow patterns, so that they can be approximated in energy simulation tools such as EnergyPlus. Finally, researchers at Lawrence Berkeley National Lab monitored air quality both inside the office and outside, documenting levels of particulates, ozone, and CO₂.

Last October, CBE installed sensors to monitor air temperature and movement in the space, automated cameras with fisheye lenses to record positions of windows and blinds, an outdoor weather station, and sensors to monitor the use of fans and personal heaters. We have also implemented occupant surveys, which are to be taken for two weeks each month, three times a day. Over 1000 survey responses have been recorded, and so far they indicate that the levels of satisfaction for temperature, air



Fisheye photos taken every five minutes will document occupants' use of windows and shades in this natural ventilation field study.



CPP is using wind tunnel models such as this one to characterize cooling and ventilation potential. Image: CPP.

CBE Study Finds Outdoor Noise is No Problem for Operable Windows

(continued from page 3)

quality, and acoustics were high during the recent period.

The project team met in CBE's offices in January to discuss the ongoing monitoring and to view preliminary findings. The next milestone for the project will be implementing the survey during the summer months, and monitoring the use of ceiling fans and personal comfort systems during the hot season. CBE and other members of the research team will report on this work in progress at the April advisory board conference.



CBE researchers installed climate monitoring equipment at the field study site last October.

Operable windows offer numerous advantages in terms of occupant satisfaction and enabling low energy approaches to cooling and ventilation. However a potential barrier to including operable windows in commercial buildings has been the fear that outdoor noise, especially in urban areas with construction, traffic, and other sources, would have a negative effect on the workplace environment. A study recently completed by CBE reveals that, in fact, people with access to operable windows are more satisfied with their workplaces on average, and that outdoor noise poses little problem for office dwellers.

Research specialists John Goins and Zhang Hui collaborated with Chungyoon Chun, a visiting scholar from Yonsei University, using data from CBE's occupant indoor environmental quality (IEQ) survey to study the degree to which outdoor sources contribute to noise problems in offices. The team used a subset of the survey data, consisting of surveys in 92 buildings with approximately 23,000 occupants. The study found that among occupants dissatisfied with noise, complaints about indoor noise sources — such as people having

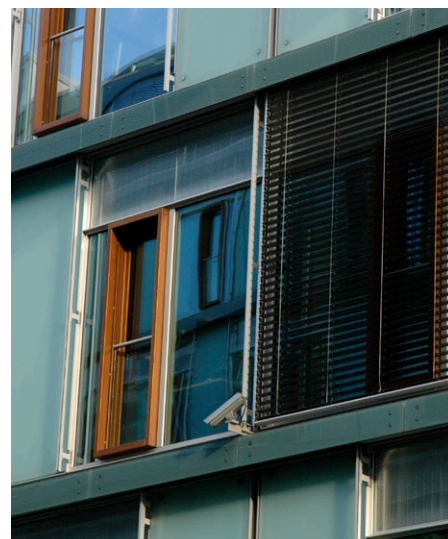


Image: Mark Peropeltza

conversations or talking on the phone — are about ten times more prevalent than outdoor noise complaints. The study also found that occupants who work near operable windows are generally more satisfied with their workplaces than those near sealed windows or those far from either type of window. The paper will be presented at the Windsor 2012 Conference on Energy and Comfort, and will be distributed at the April advisory board conference. We expect that these findings will benefit practitioners and clients interested in including operable windows on their projects.

Ongoing Guidance for Underfloor Air Distribution (UFAD)

As the percentage of buildings with underfloor air distribution (UFAD) systems began to grow during the late 90s, staff at CBE began a research effort that has grown to become a widely acclaimed source for unbiased information on UFAD design and operation. With over a decade of UFAD research now completed, the UFAD research team will present a symposium on UFAD design and operation on Wednesday, April 18th, in collaboration with the PG&E Pacific Energy Center in San Francisco, leading off the spring CBE advisory board conference.

The purpose of the symposium, explains UFAD researcher Fred Bauman, is to “roll up years of research into one event,” providing information on tools and design guidelines that have been released from numerous publications and articles. The symposium will include CBE-developed tools, such as the EnergyPlus simulation tool and a simplified cooling load calculator for UFAD, and design recommendations that are currently being compiled in the revision to the ASHRAE Design Guide for UFAD Systems, scheduled

for peer review beginning this summer. A detailed agenda and registration information will be provided on the CBE website in March. For additional information, email Fred Bauman at fbauman@berkeley.edu.

New UFAD publication

One example of the design guidance to be presented at the April UFAD symposium can be found in a new CBE paper on thermal decay in UFAD plenums, to be released in the March 2012 issue of *Applied Energy* (thermal decay here refers to the increase in supply air temperature that may occur as it travels through a UFAD plenum). Through simulations using EnergyPlus, the study characterizes the potential implications of thermal decay under a variety of building and system configurations. The report concludes with recommendations for controlling thermal decay: for example, using ductwork or other approaches to deliver cooler air into the building perimeter, and allowing warmer air (after thermal decay) to be supplied to interior zones for improved thermal comfort. The complete paper is available at: <http://www.escholarship.org/uc/item/6tn9246f>.

New Tools Will Speed Analysis of Survey Data

CBE’s occupant survey is being used by dozens of CBE’s industry partners to evaluate the effectiveness of projects including offices, schools, hospitals, and other building types. The survey team is now working to create a new tool, using the powerful visualization software Tableau, that will allow fast and simple analysis of survey data. The analysis tool will allow interested industry partners to filter survey data based on building characteristics, occupant designators (office type, location in building) and/or to responses to questions, using all the survey responses in aggregate form. (Information about specific buildings will remain confidential as it is currently.) The single-building survey reports that are now available for view in a browser, or in downloadable PDFs, will continue to be supported.

We will provide a demo of the new tool at our April conference. We will be looking for industry partners who are interested in beta-testing the new tool soon. If you are interested, please email John Goins at john_goins@berkeley.edu.

With Study of Heated/Cooled Chair Complete, Tech Company Seeking Users

In our last issue of *Centerline* we described several clean-tech ventures resulting from, or related to, CBE's research. One of the companies featured was Tucson, Arizona-based Tempronics that is developing a mesh office chair that can be heated or cooled as desired by the user, using thermoelectric solid state chips. Last fall researchers at CBE completed an extensive series of human subject tests with the chair, and are currently finalizing the findings which will be presented at a conference on building energy and environment later this year. The tests revealed that the chairs can keep users thermally comfortable in a wide range of room temperatures, from a low of 61°F all the way up to 84°F. Using such a chair, in combination with a wider "dead band" between cooling and heating thermostat settings, can save a significant amount of HVAC energy, potentially reducing a company's

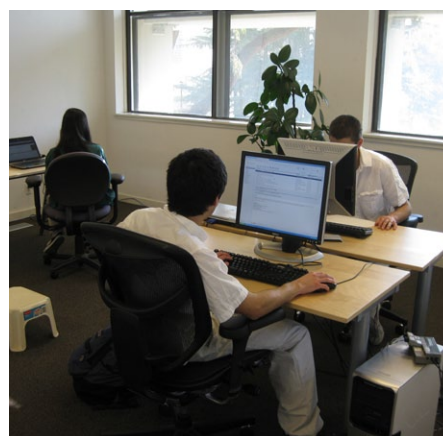
electrical costs and carbon footprint.

The findings of this study have been accepted for the The Second International Conference on Building Energy and Environment (COBEE), in Boulder, Colorado, taking place in August. This work builds on related research underway at CBE, studying how the use of personal comfort systems may improve comfort while reducing overall building energy use.

Tempronics is now planning to manufacture several hundred chairs to sell in the Bay Area, with hopes of getting feedback and developing the market for its innovative technology. The chairs will have a price similar to other high-end chairs. For more information, contact Mark Evers at mevers@tempronics.com.



Tempronics' chair prototype as tested by CBE. Users control heating and cooling with desktop controls. Image: Tempronics.



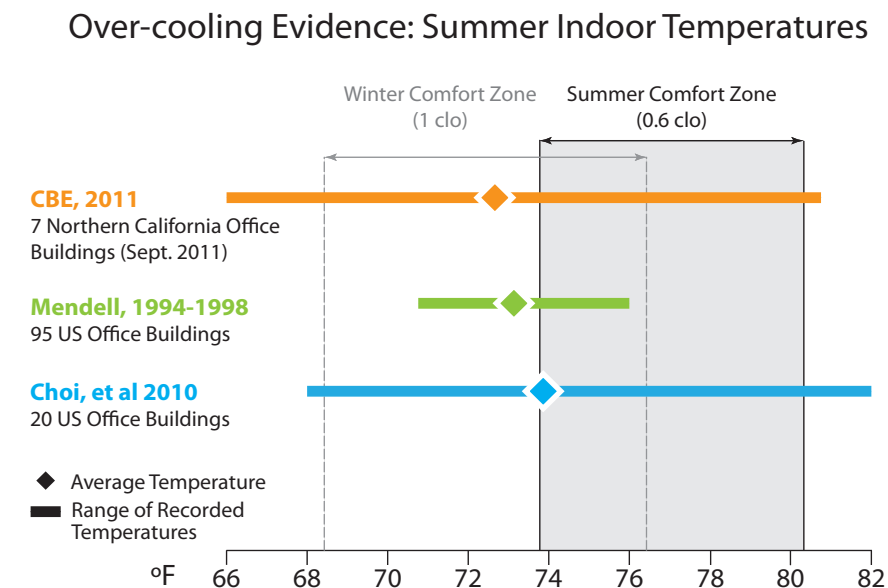
Subjects in CBE's human test chamber.

Related Events

Why Are We Overcooling Buildings in Summer?

A recent field study conducted by CBE is consistent with research led by two leading research institutions, revealing that many U.S. office buildings are being overcooled in summer, consuming large amounts of energy and making occupants uncomfortable and even sick. To increase awareness of this problem, and to begin work towards workable solutions, a panel of experts chaired by CBE Researcher Zhang Hui focused on this problem at the last ASHRAE winter meeting in Chicago in January.

The panelists included CBE Industry Partner Gwelen Paliaga of Taylor Engineering, Ken Parsons of Loughborough University (UK), and Chandra Sekhar of the National University of Singapore. These experts provided multiple viewpoints on why summer overcooling is happening, and considered design, controls, as well as psychological and physiological aspects. For example, if air conditioning is associated with affluence and luxury, some individuals may simply think that “more of a good thing” is better. Another explanation is that thermostat set points are not adjusted seasonally, so set points that are appropriate for winter are carried over to summer simply by default. A number



Multiple field studies of US office buildings show that summer indoor temperatures regularly fall below the ASHRAE comfort zone. From a presentation by Gwelen Paliaga.

of system design problems may also be contributing to the problem, such as low loads combined with limited zone capacity turn down, and dehumidification without reheat.

Feedback on the session was very positive, with over 200 attendees. One attendee emailed to say that the presentations “were among the best I’ve ever attended at ASHRAE. All the speeches addressed a topic that is seemingly very straightforward but is

actually very complex.”

To address the overcooling problem, CBE is collaborating with Taylor Engineering and Price Industries on a field study that is examining the comfort effects of reducing zone minimum airflow, an operational approach that could potentially save a great deal of energy in commercial buildings. The study is scheduled to be complete in May, and findings will be presented in early summer 2012.

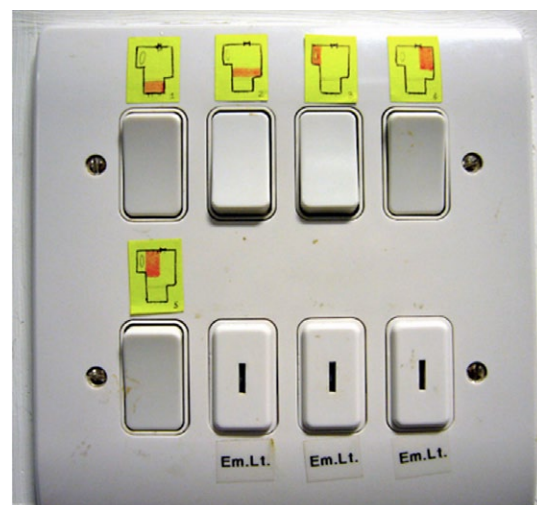
GSA and CBE Leading Panel on Energy and Behavior at ACEEE Summer Study

In a previous edition of *Centerline* (Winter 2012) we included a feature article on behavioral aspects of energy use in buildings, a topic that has gained considerable attention in recent years. At CBE we are now pursuing two [projects related to occupant behavior and energy use](#), studying how various energy feedback systems can inform and influence commercial building occupants with respect to energy use.

Judi Heerwagen of the U.S. General Services Administration (GSA) and David Lehrer of CBE are contributing to our understanding of occupant behavior, by leading a panel on Building Efficiency, Human Behavior, and Social Dynamics at the 2012 ACEEE Summer Study on Energy Efficiency in Buildings, which takes place August 12-17 in Pacific Grove, California. This conference draws experts from industry, government and academia, and hosts 14 panels featuring close to 400 peer-reviewed papers on building energy topics.

Over 230 abstracts were submitted for the behavior panel, up from 166 submitted for the 2010 conference, and 73 in 2008, showing the increased

interest in this topic. The abstracts included a range of topics, including electricity curtailment programs after the tsunami in Japan, residential feedback studies, and evaluation of large scale commercial building behavior programs. Several creative concepts were accepted, such as a plan to create a whole-building scale Tamagotchi (digital pet) intended to provide occupants with information and a sense of building nurturance. Researchers from UC Berkeley, UC Davis and LBNL will present a study of “folk labeling” that studied some of the do-it-yourself actions people take to clarify controls and other building features, highlighting general building usability problems. CBE Industry Partner Marcel Harmon of M.E. Group writes on anthropological approaches to promoting energy efficiency. The wide range and high quality of the abstracts illustrate the considerable energy and attention now being focused on leveraging occupant behavior for energy conservation, and evaluating results of such efforts. Information about the conference can be found at <http://www.aceee.org/conferences/2012/ssb>.



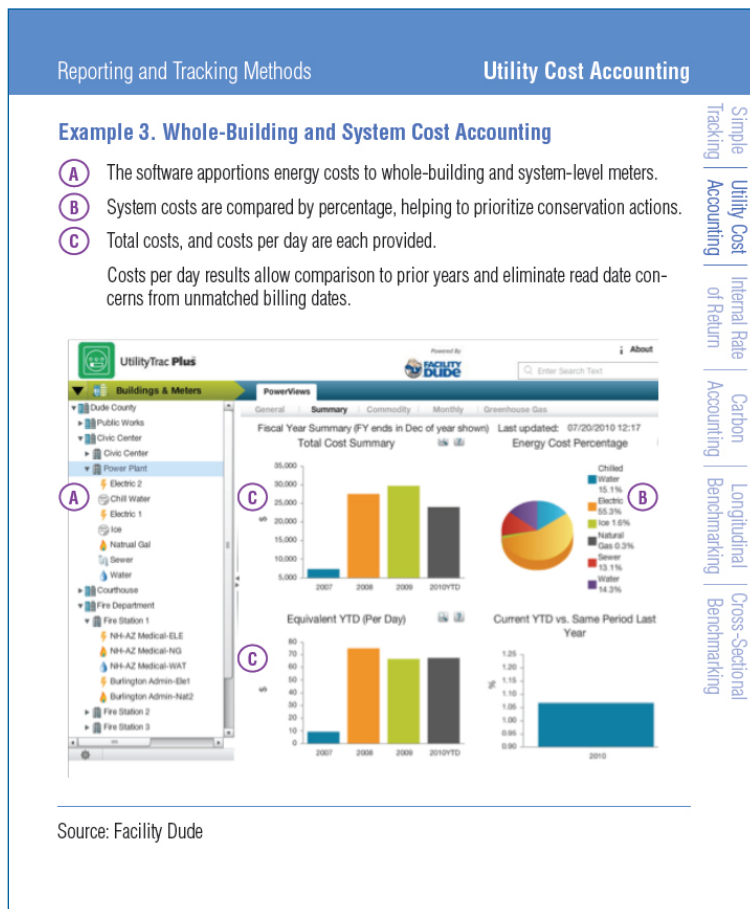
Examples of “folk labeling” created by occupants to make buildings more understandable.
Images: Therese Peffer.

Related Research on Energy Information Systems

The research CBE is conducting on visualizing energy information has benefitted from our interactions with colleagues at the Lawrence Berkeley National Laboratory (LBNL), who lead ongoing research on energy information systems in commercial buildings.

Their latest effort, the **Energy Information Handbook: Applications for Energy-Efficient Buildings**

Operations, guides building owners and operators in analyzing the energy use of buildings, and to use their analysis to lower energy costs by operating buildings more efficiently. Software developers and energy service providers in the commercial building industry, as well as more experienced owners and managers who wish to improve how they visualize, analyze, and manage their building's energy use, will also find the book useful. The handbook was written by Jessica Granderson, Mary Ann Piette, Ben Rosenblum, and Lily Hu of LBNL, and Dan Harris of New Buildings Institute. You can download the handbook at eis.lbl.gov.



Example page from LBNL's handbook on energy information.
Source: eis.lbl.gov.

Partner News

New CBE Members Represent Leadership in Governmental Operations and A/E Design

At CBE's October 2011 advisory board conference we welcomed the representatives of four new member firms; three design consultancies and one federal agency. These organizations represent the leading edge in sustainable design, engineering, and operations, and boast a multitude of award-winning projects and forward thinking approaches.

First, we welcomed our newest federal agency to join CBE, the **National Security Agency/Central Security Service (NSA/CSS)**. The agency leads the U.S. government in cryptology, confronts the challenge of preventing foreign adversaries from gaining access to sensitive or classified national security information, and collects, processes, and disseminates intelligence information from foreign signals for intelligence and counter-intelligence purposes and to support military operations. The Sustainable Design and Construction Program at NSA incorporates a number of features and program areas, including use of materials with recycled content, recycling of construction materials, waste minimization, the use of biologically-based storm water management, and water and energy conservation. The broadest portion of the program is the incorporation of the green building program known as Leadership in



School of Education Building at University of Wisconsin – Madison. HGA lead the design team and provided architectural design and mechanical and structural engineering services for the project. Image: HGA.

Energy and Environmental Design (LEED).

NSA is using the principles of LEED to enhance the quality of future construction and renovation within the Agency, both with and without formal certification. Even when projects are not scored, the use of LEED criteria affects the selected materials, construction techniques, and design approaches. Formal scoring is performed on new construction efforts and in leased facilities fit-up and renovation.

We also welcomed new CBE Industry Partner **HGA Architects and Engineers, Inc.**, an integrated architecture, engineering and planning firm with more than 600 professionals located in seven U.S.

locations, including 170 LEED accredited professionals representing all disciplines of the practice. The firm is active in healthcare, corporate and government organizations, arts, community, higher education, science/technology and energy infrastructure sectors.

HGA strives to create places that meet aggressive performance targets that enhance eco-system health and provide financial best value. An example of this commitment is shown in the recent renovation and addition to the historically significant School of Education Building at the University of Wisconsin – Madison. The building is LEED Platinum-certified and is the first LEED certified project on the Madison campus and the first



Rendering of the Venturi Effect Turbine Array (VETA) as envisioned for downtown Chicago. Image: RTKL.



OUS/OHSU Collaborative Life Science Building. Interface is providing MEP design and building performance simulations for this new medical, lab, and research facility. Architecture: SERA Architects, CO Architects.

Platinum certification in the state university system. The project uses chilled beam technology, also a first in the state system, both to reduce energy consumption and to minimize space needed for ductwork in the original historic building.

Last fall we were also contacted by three dynamic young architects with **RTKL Associates**, who had won an in-house competition for an innovative proposal to place wind turbines in “urban canyons” in locations such as downtown Chicago. The proposal, the Venturi Effect Turbine Array (VETA), was awarded research funding from RTKL’s parent company, Arcadis, to study the proposal’s technical and economic feasibility. The project team came to UC Berkeley last November

to conduct a series of tests in CBE’s wind tunnel facility, using a model of Chicago’s central business district to evaluate the energy potential of such a site. Graduate students from the Berkeley Energy & Resources Collaborative also contributed to the study, providing a report on regulatory, climatic, and economic aspects of the VETA system in selected cities around the globe. RTKL, which re-joined CBE’s consortium in October, (the firm had been an industry partner from 2005-2008) has a staff of more than 1000 professionals in 12 offices in North America and abroad, and offers a range of services from planning, architecture, and interior architecture, to MEP, structural engineering, and landscape architecture.

Last October CBE was also joined by **Interface Engineers**, a multidisciplinary consulting and engineering firm established in 1969. The firm currently has a staff of 180 located in four West Coast offices and in Doha, Qatar. Its services include MEP design, specialty system design (building technologies, lighting and fire/life safety systems), building performance simulations, construction administration, building commissioning and post-occupancy evaluations. For more than a decade, Interface’s practice has focused on high performance buildings, resulting in 88 LEED certified buildings, over 200 LEED buildings in design and construction, two net-zero buildings, and 10 net-zero buildings in design and construction.

News and Announcements from CBE Industry Partners

Many of CBE's industry partner firms have recently announced mergers, opened offices abroad, received awards and recognition, and published new books on sustainable design and practice. For this edition of *Centerline*, we are happy to provide the following news and announcements from a number of our partners:

Movers and Mergers

Integral Group has expanded its services through two recent mergers, bringing onboard the firms **Integrated Design Associates (IDeAs)** and **Cobalt Engineering**. Integral Group and IDeAs already had a 13-year history of collaboration on over 50 award-winning green projects. With this addition, Integral Group West Coast now offers fully integrated MEP services. David Kaneda will serve as principal-in-charge of the firm's West Coast electrical team, operating out of the "Z Squared" (net zero energy consumption, zero carbon emission) building that CBE featured in a previous issue of *Centerline* (Summer 2008). In joining forces with Cobalt, Integral now offers services from three offices in Canada. Cobalt's notable project firsts include the first neighborhood in British Columbia to target LEED-ND Platinum, Canada's first LEED-CS Platinum office

building, and the first LEED Certified aquarium facility in the world. Integral Group also notes that its 21st LEED Platinum project was just certified, and that they have 25 net-zero energy buildings currently in design.

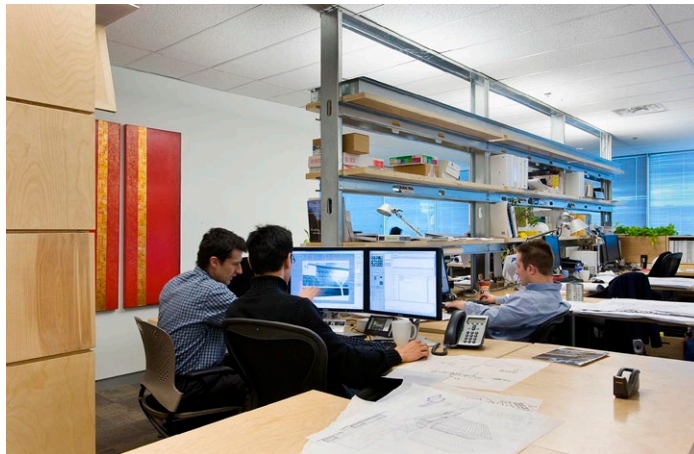
CTG Energetics was acquired by the Boston-based technical consulting firm The Cadmus Group, Inc. The acquisition is aimed to enable the energy, environmental, and public health consultancy to leapfrog to the forefront of firms providing creative, multi-disciplinary sustainability solutions for the built environment. "The environmental challenges facing business and society are huge, and combining CTG's industry-leading building performance practice with the resources and technical breadth of Cadmus will enable us to expand our impact on 'making the planet a better place,'" noted Malcolm Lewis, Ph.D., CTG's founder and CEO who now also joins the Cadmus executive committee. Lewis was recently named to the inaugural class of LEED Fellows by the Green Building Certification Institute, for his substantial contributions to the green building industry throughout his career.

New Initiatives and Events

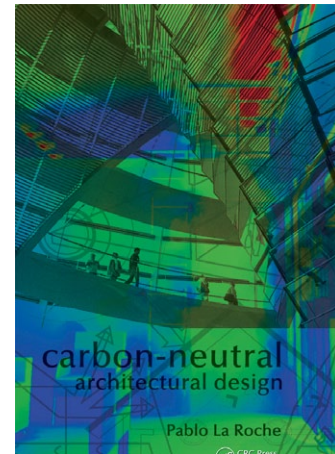
The PG&E Pacific Energy Center (PEC) in San Francisco celebrated its 20th anniversary in December.

The celebration, which was attended by hundreds of building industry professionals, including many CBE members, commemorated the PEC's two decades of work. The PEC has assisted thousands of customers to improve their knowledge of energy efficiency, demand response, and onsite generation concepts, ultimately helping customers understand and manage their building's energy use. In 2011, PEC held over 225 classes for 8000 students in 13 cities and via the web, provided over 230 technical consultations, held 140 outreach events, and had over 1160 tool lending library loans.

As the number of net-zero buildings grows, the **U.S. General Services Administration (GSA)** is taking on the important challenge of meeting new net-zero standards in existing buildings. Last October, GSA introduced an initiative to challenge the private sector to improve energy performance in federal buildings through energy service performance contracts (ESPCs) aiming for net-zero energy use. Under these contracts, a private-sector energy services contractor installs energy improvements, which are repaid by the building owner over a period of time (up to 25 years). The program allows federal buildings to capture decades of lower energy costs without the



DIALOG's carbon neutral Toronto studio is a past winner of CBE's Livable Buildings Award. Image: Tom Arban.



Carbon Neutral Architectural Design, by Pablo La Roche of HMC Architects.

upfront investment. Under the new program, 16 energy service companies now providing ESPCs will compete for retrofit projects in 30 federal buildings across the country. For more information, email dan.cruz@gsa.gov.

The issue of workplace acoustics has been an ongoing area of research and a concern for many industry partners and their clients. **Armstrong China** co-sponsored the first student competition for acoustical design last year with Tongji University in Shanghai and Tsinghua University in Beijing with the goal of encouraging students to collaborate in teams to design a school with superior acoustics. This competition was targeted to students in architecture, engineering, physics or other programs that involve building design and/or acoustics. During the design development phase, Armstrong Senior Principle Scientist Ken Roy conducted acoustic workshops over the summer at both universities.

Craig Applegath of **DIALOG** founded ResilientCity.org with the objective of helping planners, architects, and engineers to explore strategies that help cities develop capacities to absorb shocks and stresses to their social, economic, and technical systems and infrastructures caused by climate change. As Craig explains, "It became apparent that with cities facing so many future shocks and stresses resulting from climate change, sustainable thinking was getting us only halfway there. That lead me to explore the notion of urban resilience."

On a related note, after making all possible carbon reductions as part of a carbon action plan for its Toronto studio, DIALOG's principals wanted to offset the remaining net carbon load. Rather than simply purchasing credits from a "carbon broker," they decided to invest in a specific parcel of land and, more importantly, its owner. DIALOG worked with non-profit Community Forests International

(CFI) to establish a land trust for a farm in financial need, so that the land would only be selectively harvested using FSC standards in perpetuity. At 469 tons of CO₂ annualized, the farm represents five years of carbon offset for DIALOG Toronto. But with CFI managing the land, this project has a targeted lifespan of more than a century. It has also created the opportunity for the farmers to remain on the land, practicing organic farming principles as well as good forest stewardship.

Publications and Resources

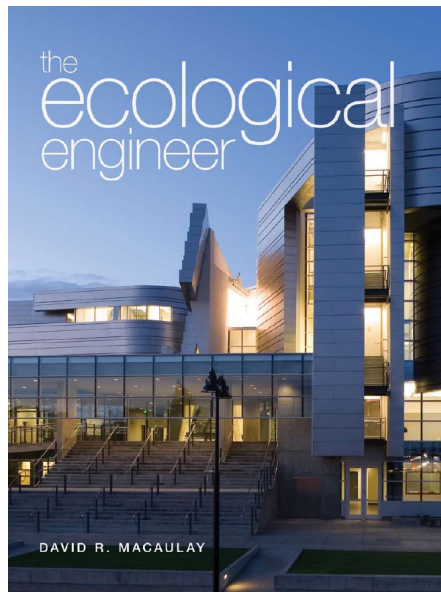
Pablo La Roche, the Director of Sustainable Design at **HMC Architects**, and also a Professor in the Department of Architecture, at California State Polytechnic University Pomona, has completed a new book, Carbon Neutral Architectural Design. This well-illustrated book covers fundamentals of climate-responsive design, with specific guidance on

reducing the carbon footprints of new and existing buildings. The book examines CO₂ emissions associated with the construction and operation of buildings, and discusses several tools appropriate for building-scale green-house gas calculation. The book is available from on-line retailers, and from the publisher at: <http://www.crcpress.com/product/isbn/9781439845127>

HMC also announced in January that the firm has become a 100% employee owned company. This follows the news of being named one the Best Firms to Work For in 2011 from *Building Design + Construction Magazine*.

Glumac recently published a new book, *The Ecological Engineer*, giving readers an in-depth perspective on the essential role that systems engineering plays in sustainable design. It also highlights practices and principles needed to push sustainable design for commercial buildings toward high-performance outcomes. Detailed case study projects engineered by Glumac, including many with architectural design from CBE partners, are included. More information about the book is at: <http://www.glumac.com/announcements/news-the-ecological-engineer>.

Building upon years of Asia-based business and experience, Glumac established its tenth office in Shanghai in the vibrant Jing'an Temple District. With this new office, Glumac continues its strategic growth and support of global clientele in China, Japan, Korea and the Philippines.



The *Ecological Engineer* includes case studies engineered by Glumac, many in collaboration with CBE member architects.

New Products

REHAU recently announced the launch of its Smart Controls line, an internet-based controls package that allows easy integration and monitoring of all mechanical systems. Its adaptation to high-end residential to mid-sized commercial projects can effectively combine systems such as radiant, forced-air, geothermal, and solar collectors into one interface that allows building operators to access, monitor and control their building from any Internet-accessible location. This allows for remote control of HVAC adjustments as simple as adjusting a thermostat, or as complex as reconfiguring multi-zone setpoints.

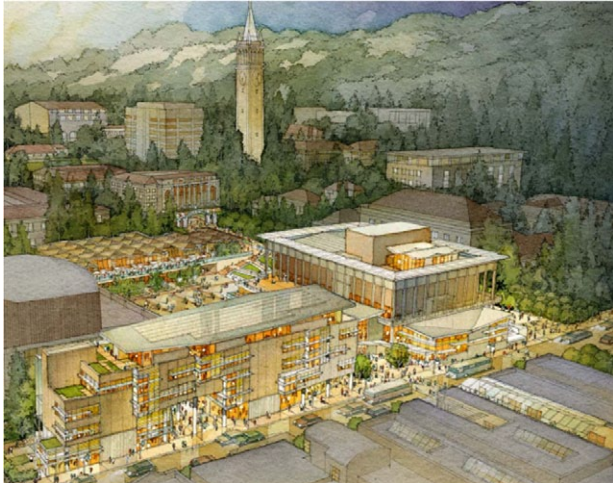
Tate Access Floors has released several new products aimed at commercial building and data center underfloor air distribution (UFAD). For example,

Tate's In-floor Active Chilled Beams combine the benefits of UFAD with the efficiencies of water heating and cooling. Water pipes pass chilled and hot water through a heat exchanger, or "beam" which is then capable of heating or cooling the air in the space. The beams cool or heat air directly at the perimeter of a building, where heat loss and heat gain can significantly impact energy use. The product was recently selected as a 2011 Product Innovation Award (PIA) recipient from *Architectural Products* magazine. Researchers at CBE are in discussion with Tate representatives to conduct energy simulations to document the energy benefits of the system. Tate has also launched EcoCore raised floor panel containing micro-encapsulated phase change material designed to improve the building's energy efficiency by absorbing thermal load during the day and expelling during off hours.

To increase energy and cooling performance in new and existing data centers, Tate launched a line of patent pending in-floor cooling solutions including the DirectAir™ directional airflow panel, SmartAir™ variable-air-volume damper and ContainAir™ solutions, a full range of containment products useful for segregating hot and cold airflow in data centers.

Recognition, Awards and More

LPA Inc. received six design awards from the AIA Orange County Chapter (AIAOC). Among the buildings honored is the Recreation and Wellness Center (RAW) at California State University East Bay in Hayward,



Syska Hennessy Group is providing engineering services for UC Berkeley's Student Community Center Renovation and Expansion. Image: Moore Ruble Yudell.



Cal State East Bay's award winning Recreation and Wellness Center, with architecture and engineering by LPA Inc. Image: LPA.

California. The RAW received a merit design award in addition to an award from the AIAOC Committee on the Environment. The project has an impressive list of features, including: a ventilated trombe wall; 70% of spaces are naturally ventilated, with no cooling or heating equipment provided; and 100% of stormwater is collected and polished by bioswales before recharging the groundwater. Funded entirely by student fees, the RAW serves as an exciting place to “see and be seen” where students can exercise, socialize and relax in a sustainable environment.

Rob Bolin of **Syska Hennessy Group** was named to the inaugural class of LEED Fellows, recognizing his exceptional contributions to green building and significant professional achievement within the global community of LEED Professionals. Mr. Bolin was among 34 of the world's most distinguished green building professionals to be selected

as LEED Fellows through a peer nomination and portfolio review process. Recently, Rob has applied his design leadership in the development of UC Berkeley, Student Community Center Renovation and Expansion. The university has set a goal for a minimum of LEED Gold certification, but the team is striving for LEED Platinum with energy goals of 20-30% below Title 24, and better than 40% potable water use reduction. Further expanding Syska's relationship with UC Berkeley, recent building science graduate David Fannon joined the firm's New York office in December. Attendees of recent CBE conferences will remember David's work on the CBE Personal Comfort System, which he says he hopes to continue in his pursuit of the “perfect little fan.” Finally, Syska announced its expanded commitment to serving clients in the Middle East/North Africa region with their opening of a permanent office in Dubai, United Arab Emirates (UAE).

The Chicago office of **Skidmore, Owings & Merrill LLP (SOM)**, with its culture of inter-practice innovation, design excellence, and commitment to the city where the firm was founded, has earned the 2011 Firm of the Year Award from the AIA Chicago Chapter. The award recognizes SOM's contribution to the advancement of the architectural profession in the areas of design, research, planning, technology and architectural practice, spanning a period of 75 years. SOM Chicago also won a competition to design the Greenland Group Suzhou Center, in Suzhou, China, a high-rise that incorporates a unique atrium feature. Luke Leung, SOM Director of Sustainable and MEP Engineering, explains that the building “utilizes an atrium as the ‘lung’ of the building to provide ventilation and will incorporate a series of high efficiency measures” with the objective to achieve a 60% savings in energy and potable water consumption compared to a conventional U.S. high-rise.

Livable Buildings 2011

Recognizing Design, Energy Performance, and Occupant Sentiment

Last fall we announced the winners of CBE's 2011 Livable Buildings Award. The awardees, selected by a jury of industry partners, ranked among the highest scorers in CBE's Occupant Indoor Environmental Quality (IEQ) Survey, a benchmark of building occupants' experience.

The top award went to the new headquarters for Canada-based **Enermodal Engineering**, a building that demonstrates ultra-low energy use while providing the highest level of comfort for its owner-occupants. Also recognized by the awards jury with

honorable mentions were the **Kresge Foundation Headquarters** and the **Tahoe Center for Environmental Sciences**. All three projects have all received one or more LEED-Platinum certifications.

For the design of their new headquarters, Enermodal Engineering acted as design engineer, owner and tenant. The jury commented on the project's overall design, use of simple design approaches and on-the-shelf technologies. After a year of operation, measured data shows that the building's energy use is 82 percent less than a conventional office

building in Canada. The building is also the first in Canada to hold three LEED-Platinum certifications — for the building itself, for its interior architecture, and for its operational performance.

The project team considered the project's site overlooking the Grand River in Kitchener, Ontario, as a constant reminder of the importance of water stewardship. Drought tolerant native plants, a sizable rainwater cistern, and low-flow plumbing fixtures have led to measured water use that is 89 percent less than that of a standard building.



Enermodal Engineering Headquarters, Livable Buildings Award Winner 2011. Images: Enermodal.





Courtyard view of the Kresge Foundation Headquarters.
Image: Kresge.



Laboratory space at the Tahoe Center for Environmental Sciences.
Image: Vance Fox.

The satisfaction survey administered by CBE showed that employees were overwhelmingly pleased with their workspace, and the survey scores for all but one category put the building in or above the 95th percentile when compared to other buildings. While the score for acoustics was good, in the 70th percentile, Enermodal's management decided to improve on this by installing sound masking in open office areas, and has encouraged employees to hold meetings and conference calls in meeting rooms.

The award jurors also recognized the Kresge Foundation Headquarters, in Troy, Michigan, with an honorable mention. The building's architecture includes vegetated green roofs and daylighting features such as exterior

shades and interior light shelves. The building's mechanical system, designed by CBE Industry Partner Arup, incorporates underfloor air distribution and a geothermal heating and cooling system to reduce energy use. The project's site design uses bioswales, a constructed wetland, a cistern for rainwater storage, and native prairie landscaping. The Kresge Foundation has used its headquarters as a living laboratory, and commissioned a team led by CBE to conduct a detailed post-occupancy evaluation of the building and its site, which was released by CBE last year.

The jurors also recognized the Tahoe Center for Environmental Sciences in Incline Village, Nevada, with an honorable mention for systems inte-

gration. The innovative mechanical system, designed by Integral Group's Oakland office, another CBE industry partner, includes radiant floors for heating, active chilled beams for cooling, and underground storage tanks that hold chilled water generated at night using a cooling tower, reducing daytime electrical loads. The building uses 60 percent less energy than a standard code-compliant building, and has a 32 kW photovoltaic array that can generate up to 11 percent of the building's total electrical use.

More details about these projects are online at: <http://www.cbe.berkeley.edu/livablebuildings>.

Industry Partners at the Center for the Built Environment

CBE's research is supported and guided by a consortium of industry partners, a diverse group of building industry leaders who are working to advance standards for the design and operation of commercial buildings through their collaborations with CBE.

The Center's membership includes the following firms and organizations:

Armstrong World Industries

Arup*

California Energy Commission

Cannon Design

Charles M. Salter Associates

DIALOG

EHDD Architecture

Glumac

Haworth

HGA Architects and Engineers

HMC Architects

HOK

Integral Group Membership Team:

Integral Group

CPP

DPR Construction

Mahlum Architects

Perkins+Will

Interface Engineering

KlingStubbins

LPA Inc.

M.E. GROUP

National Security Agency/Central

Security Service (NSA/CSS)

Pacific Gas & Electric Company

Price Industries

REHAU

RTKL Associates

San Diego Gas & Electric

Skidmore, Owings & Merrill (SOM)

Southern California Edison

Syska Hennessy Group

Tate Access Floors*

Taylor Membership Team:

Taylor Engineering

CTG Energetics

Guttman & Blaevoet

Southland Industries

Swinerton Builder

U.S. Department of Energy*

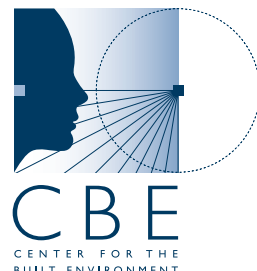
U.S. General Services Administration*

Webcor Builders*

WSP Flack + Kurtz

Zimmer Gunsul Frasca Architects

* founding partner



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