INDUSTRY/UNIVERSITY RESEARCH COLLABORATIONS
**OUR MISSION**

The Center for the Built Environment (CBE) at the University of California, Berkeley, provides timely, unbiased information on promising new building technologies and design techniques. Our research serves CBE’s industry partners, a consortium of leading building industry firms and organizations.

**CENTER ORGANIZATION**

The Center was created under the National Science Foundation (NSF) Industry/University Cooperative Research Center Program. The Center is guided by an Industry Advisory Board that meets semi-annually to discuss research findings and directions, review and approve annual budgets, and discuss ideas for future research. This Advisory Board provides valuable feedback which helps CBE focus its research on issues of relevance and importance to the building industry today.

Advisory Board members evaluate all active CBE projects to assure that the Center is responsive to its membership. Past evaluations have been highly favorable; an independent NSF reviewer reported that the industry evaluations showed “overwhelming support for the direction of CBE’s research,” and that the Center is “especially good at responding to industry partners’ needs.”

**PRIMARY OBJECTIVES**

Our research has two broad purposes. First, our research team and industry partners are developing ways to “take the pulse” of occupied buildings, asking occupants what they like and don’t like about the interior environment, and linking these responses to physical measurements of indoor environmental quality.

Secondly, we are studying new building technologies, applications, and design strategies that hold promise for making buildings more environmentally friendly, more productive for occupants, and more economical to operate.

**FACULTY, STAFF, AND RESOURCES**

CBE is an interdisciplinary group comprised of UC Berkeley faculty, researchers, and staff. The core research team currently includes nine faculty and research staff members, with research affiliates and graduate students from numerous UC departments including Architecture, Building Science, Electrical Engineering, Mechanical Engineering, Business, and Computer Science.

Research facilities at CBE include a controlled environment test chamber, a full-scale underfloor air facility, a boundary-layer wind tunnel, and a sky simulator. Additional facilities include instrumented thermal mannequins, and an extensive set of mobile and wireless instruments for measuring the performance of buildings.

**REPORTS AND PUBLICATIONS**

The Center publishes research findings in summary reports that may be made available to the building industry at large. Prior to public release of reports, CBE distributes drafts for review by industry partners. In addition, articles and papers from CBE research appear regularly in journals, trade magazines, and conference proceedings.

CBE also distributes to partners internal reports—technical summaries produced at interim points in a project, or in lieu of a summary report. These internal reports provide our industry partners with valuable details on research findings and methodologies.
OUR RESEARCH PORTFOLIO

A challenge to the building industry is to understand the opportunities offered by new technologies, and learning how best to apply them. The Center’s portfolio of research projects has been developed based on industry partner needs, and represents relevant and timely topics in building science research.

INDOOR ENVIRONMENTAL QUALITY (IEQ)

CBE has developed methods to measure the performance of occupied buildings in terms of occupant comfort and productivity, energy efficiency, and operations. For example, CBE’s Web-based Occupant IEQ Survey quantifies how a building is performing from the perspective of its occupants. This provides immediate feedback for building owners and operators, and assists architects, engineers and builders in the development of future buildings. Project areas include:

- Occupant IEQ survey and building benchmarking
- Occupant satisfaction in green buildings
- Personal environmental control systems
- UCB advanced thermal comfort model
- Team space and collaboration
- Workplace productivity studies
- Speech privacy and acoustical studies

BUILDING HVAC SYSTEMS

Effective design and operation of building systems can provide comfortable indoor environments while optimizing energy performance. Building HVAC approaches such as mixed mode, radiant, and underfloor air distribution (UFAD) systems are being rapidly adopted, providing opportunities for energy savings and benefits to occupants. CBE is a leader in integrated systems research, and is conducting a number of related projects including:

- Advanced integrated building systems
- Commissioning and measuring indoor environmental conditions
- Case studies and energy performance of mixed-mode buildings
- EnergyPlus simulation tool development
- Radiant systems design guidance
- UFAD research, including tools and guidance for energy analysis, design, and commissioning

BUILDING ENVELOPE SYSTEMS

Building occupants in perimeter zones are affected by outdoor influences such as noise, temperature, and solar radiation, and by their ability to control these influences. CBE is developing tools and criteria for evaluating facade performance in terms of occupant comfort and energy efficiency. We have also conducted extensive field studies to determine how operable windows and control of building features affect occupant comfort. Research areas include:

- Evaluation methods for facades and perimeter zones
- High performance facade case studies in Europe and North America
- Impacts of facades on occupant comfort
- Operable windows and natural ventilation case studies

BUILDING INFORMATION TECHNOLOGY

New information technologies provide ways to optimize the performance of building systems. We are developing applications for sensing and control of buildings using wireless communications technology, micro-electromechanical systems (MEMS), and web-based software. These technologies enable energy savings, and improve the control of the indoor environment with low costs. Building IT research areas include:

- Control systems for mixed-mode buildings
- Demand-response enabling technology development
- Visualizing building information
- Wireless sensing and control strategies
- Wireless lighting control systems
**OUR INDUSTRY PARTNERS**

CBE's partners are leading organizations across the spectrum of the building industry, including design firms, manufacturers, builders, utilities, and government. Member involvement frequently goes beyond participation in regular events, and many CBE projects directly involve member representatives, buildings, and resources.

**BENEFITS OF MEMBERSHIP**

CBE welcomes firms and organizations to become involved through membership in its industry consortium. The consortium is a rare opportunity for partners to identify information needs and to advance research in directions to benefit their organizations, without the high costs of in-house research.

Partner benefits include:

- Participation in semi-annual Industry Advisory Board meetings and training workshops (up to 7 individuals per firm).
- Quarterly updates on active CBE projects.
- Advance review of research findings and summary reports.
- Free implementations (4 per year) of CBE's Occupant IEQ Survey, with access to CBE's building benchmarking database.
- Priority access to specialized research tools, facilities, and staff.
- Acknowledgement in CBE reports, websites, and publicity materials.

Affiliation with UC Berkeley gives CBE's research a high level of credibility within the industry. Industry partners benefit from this research, by using empirical results to influence clients and regulators, and through recognition of their commitment to promoting sustainability and improving our built environment.

**CBE’S INDUSTRY PARTNERS**

Our partners include: (as of May 2012):

- Affiliated Engineers, Inc.
- Armstrong World Industries
- Arup*
- California Energy Commission
- Cannon Design
- Charles M. Salter Associates
- Dialog
- EHDD Architecture
- HGA Architects and Engineers
- 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
  - Pacific Gas & Electric Company
  - Price Industries
  - REHAU
  - RTKL Associates
  - San Diego Gas & Electric
  - Skidmore, Owings, & Merrill
  - Southern California Edison
  - Syska Hennessy Group
  - Tate Access Floors*
  - Taylor Membership Team:
    - Taylor Engineering
    - Cadmus Group
    - Guttmann & Blaevoet
    - Southland Industries
    - Swinerton Builders
  - Webcor Builders*
  - WSP Flack + Kurtz
  - ZGF Architects

* founding members