



## AIA Best Practices: Learning from experience with green building POEs

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Contributed by the editors of AIArchitect

### Summary

Post-occupancy evaluations (POEs) can benefit the architecture industry, strengthen client-architect relationships, and provide mechanisms for evaluating new technologies. The University of British Columbia (UBC) conducted a POE and uncovered findings that will help the university improve energy efficiency and develop future designs that maximize the benefits of previous projects and minimize the drawbacks.

### Learning by doing

POEs, while useful for evaluating the success of any building design, are particularly useful in evaluating buildings designed using sustainable, or “green,” technologies and design strategies.

The University of Minnesota’s Center for Sustainable Building Research (CSBR) has conducted POEs of the sustainable design efforts of several state agencies.

According to CSBR director John Carmody, researchers found, for example, that when more daylight is incorporated into green buildings, too little thought is given to shading and light control. The result is excessive glare, particularly in spaces where computers are used. To minimize the glare, occupants not only install blinds but also often resort to creative—and inelegant—strategies such as covering windows with cardboard or using umbrellas over their desks.

### POE benefits

“The sad fact is that hardly any architecture or engineering . . . [firms] consistently collect information on whether or not their buildings work, and none make the information available [to others],” wrote the authors of the “Probe Studies,” a series of building performance evaluations commissioned by the *Building Services Journal* in the U.K. and completed between 1995 and 1999. “All this despite clear evidence that managed feedback produces better buildings.”

While a POE helps determine whether a building functions as the architect and owner intended, its added benefits for architects include strengthening the client-architect relationship; validating life-cycle performance projections; and enhancing knowledge for developing design guidelines that challenge long-held, often erroneous, assumptions. POEs are particularly valuable in evaluating new technologies, including innovations in resource conservation, natural ventilation, use of daylight, and photovoltaics.

“Through POEs we’ve learned that certain sustainable materials don’t hold up if applied incorrectly,” Carmody said. “In one project, a biocomposite material was well suited for paneling and cabinets but failed to hold up on a heavily used countertop.” CSBR also learned that certain sustainable technologies or design strategies can have unexpected and undesirable side effects, such as early underfloor air systems that transmitted sound in a way that undermined the acoustical privacy of enclosed offices. On the other hand, positive results of a POE may accelerate acceptance of a sustainable product or design process among design professionals and in the marketplace.

## POE results may surprise you

POEs of sustainable building designs reveal some widely relevant lessons, both surprising and unsurprising:

- There is no correlation between energy use and occupant comfort.
- Simple buildings tend to work well.
- Complicated and high-tech buildings work only if everyone in the supply chain—architects, engineers, builders, and building managers—understand the technologies and know how to use or apply them properly.

POEs also reveal that buildings and their uses are not static but in a constant state of change that affects their performance. POEs and ongoing monitoring of two buildings at the UBC, for example, revealed a gradual—and puzzling—increase in energy usage over the years. As Rosamund Hyde, Ph.D., of Keen Engineering Co. Ltd. notes, “This appears to be a somewhat common problem where lower maintenance levels have occurred. Over the last nine months, more attention has been paid to energy [consumption] issues on campus, and the energy usage figures have returned to their original lower levels.”

UBC’s C. K. Choi Building for the Institute of Asian Research, a 30,000-square-foot building completed in 1996, was intended to “set new standards for sustainable design” by incorporating natural ventilation, a “gray water” recycling system, composting toilets, and a rainwater collection and irrigation system. The university’s Liu Centre for the Study of Global Issues, an 18,800-square-foot facility completed in 2000, was designed to minimize energy use while maximizing natural ventilation.

Keen Engineering reviewed the original design intent of the buildings, documented their current and historical consumption of energy and water, interviewed the facility manager and maintenance staff, and conducted an occupant survey. The web-based survey, produced by the Center for the Built Environment (CBE), was modified to gather data on user satisfaction with the Choi Building’s composting toilets. Thirty percent of the occupants responded to the survey, a statistically significant sample.

Among the findings of Keen’s POE were the following:

- The height of the hinged windows in the Choi atrium makes them difficult to close properly.
- The floors in the men’s washrooms are vulnerable to staining in front of the urinals.
- Acoustical privacy in both buildings is unsatisfactory.

- Although both buildings consume more energy than originally anticipated, extended hours of use account for nearly all of the difference.
- Occupants appreciate the uniqueness of the buildings and their proximity to green space.
- The Choi Building's composting toilets were rated more favorably than the Liu Centre's conventional toilets.

The POE findings will help the university to improve the energy efficiency of the buildings and occupant satisfaction. Equally important, Keen Engineering will be able to use the data to develop future building designs that capitalize on the successes of their previous designs and avoid their shortcomings.

## Acknowledgments

This article is excerpted and adapted from an article that appeared in the September 2003 issue of *Environmental Building News*, by Nadav Malin with Jessica Boehland, with research support provided by Kristen Johnson.

Among the sources used by the original authors was the paper, "Operating Experiences at the C.K. Choi and Liu Centre Buildings at the University of British Columbia," by Blair McCarry, P.E., and Rosamund Hyde, Ph.D., Keen Engineering Co. Ltd. ([www.keen.ca](http://www.keen.ca)), which was presented at the U.S. Green Building Council's 2002 Conference in Austin, Tex.

## For more information

Copies of the "Probe Studies" are available for download at no cost by visiting the website of [the Usable Buildings Trust](http://theUsableBuildingsTrust.org).

To learn more about the Center for the Built Environment and its occupant satisfaction survey, visit [the center's website](http://theCenterfortheBuiltEnvironment.org).

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This article corresponds to:

*Architect's Handbook of Professional Practice, 15th edition* Unit 1 – The Profession  
Chapter 10 – Design Project Management  
Section 10 – Project Completion and Post-Construction Services