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### IBPE Symposium – Building Performance Evaluation Research Projects and Case Studies from around the World

**Session Title:**

IBPE Symposium – Building Performance Evaluation Research Projects and Case Studies from around the World

**Submitter Email:**

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**Learning Objectives:**

- Become familiar with current issues in participatory programming, evidence-based design, occupancy research, and practice.
- Enhance knowledge of building performance/post-occupancy evaluation.
- Gain an understanding of a variety of evaluation and certification tools for sustainable buildings.
- Through case studies in a global context, learn how performance-based building research influences occupant comfort, health, and well-being around the world.

**Session Abstract:**

Building Performance Evaluation (BPE) informs and enhances the usability and sustainability of building designs through lessons learned from evaluation of building performance throughout the building life cycle, including: strategic planning, programming, design, construction, occupancy and recycling.

Formed 20 years ago, the International Building Performance Evaluation (IBPE) consortium is a group of researchers from around the world who undertake evidence-based building research. The work of the IBPE consortium has been published in three books: *Assessing Building Performance* (Elsevier, 2005), *Enhancing Building Performance* (Wiley-Blackwell, 2012), and most recently *Building Performance Evaluation* (Springer, 2018).

The IBPE Symposium contains five presentations concerned with both methodological issues of BPE and its application to sustainable settings around the world. The first presentation highlights the significance of BPE for sustainable buildings from a German point of view, focusing on the updated certification system of the German Sustainable Building Council DGNB. The second contribution shares the experience of teaching BIM and BPE in Japan as participatory and evidence-based strategies for sustainable design, using the student-centered pedagogy of Problem-Based Learning (PBL). The third addresses the early phase of facility programming, requiring that the assessment of organizational culture be part of it. To this end, besides various participatory methodologies for information-gathering, the author introduces the Organizational Culture Assessment Index (OCAI). The fourth presentation compares the performance as well as occupants' perceptions of multi-comfort, health, and well-being of new and retrofitted educational, LEED-certified platinum buildings in the US. Finally, the fifth contribution, explores sustainable housing design in remote First Nation communities of Canada, through evaluation of existing buildings, participatory planning, and project-based skills training. The presentations show the need for more BPE with contemporary methods and tools in support of more sustainable environments. The audience is invited to discuss this need.

**Abstract id# 6304**

The Relevance of Building Performance Evaluation for Sustainable Buildings: A German Perspective on Practice, Research, and Teaching

Ulrich Schramm, Bielefeld University of Applied Sciences, Minden, Germany

In Germany, sustainability is a buzzword that has already been in circulation in politicians' speeches, research programs, or company reports for many years, an often-used term that sometimes seems to be employed just as a fancy catchword. And it is apparent: as diverse as the fields of use are, so different seem to be its meanings. An insight that is apparently true – according to a recent survey among German architects – for the construction industry as well: on the one hand, high-tech constructions and innovative materials promise better solutions for sustainable buildings in the future, on the other hand, low-tech architecture delivers sustainability by using local resources and indigenous handicrafts.

Certification systems, like that of the German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen – DGNB), aspire to describe and assess buildings that are exceptionally environmentally friendly, resource-efficient, and economical. Yet even today, more than a decade after its introduction, planners, architects, and other stakeholders view the system with some skepticism, considering it more or less a tool for money-making and marketing.

Regardless, owners and occupants of buildings deserve to know that the structures they own and use will meet their requirements and that no part of the process fails in meeting this goal. The latter may help explain the increasing importance of Building Performance Evaluation (BPE) over the last 20 years. It represents a participatory and evidence-based approach to continuously improve the built environment.

In this paper the author outlines today's challenges for sustainable building in Germany and compares the updated 2018 version of the DGNB System with the well-established BPE Process Model, pointing out similarities and differences as well as strengths and weaknesses. The presentation includes selected case studies taken from practice, the latest research findings, and long-standing university-level teaching.

**Abstract id# 6305**

Teaching BIM and B P E Using Problem-Based Learning (PBL) at Mie University, Japan

**Akikazu Kato**, Mie University, Tsu, Japan

The challenge of using Building Information Modeling (BIM) systems is becoming an important issue in the building industries of the USA and Japan, as well as in other countries. BIM is a digital representation of physical and functional characteristics of a facility and its usage impacts the entire building delivery process. BIM enables front-loading decision-making in planning, programming, and design phases, meaning more is discussed and decided in the basic design stage, rather than in the succeeding detailed design stage. This enhances the quality of each phase in the project's development. The use of BIM provides a holistic picture for the general contractors, where in the conventional construction process the information is scattered throughout architectural, structural, mechanical, and electrical drawings. This increases productivity in the construction phase. When the information needed in the management and operation of the building is suitably extracted before the actual completion of the building, as in the virtual hand over stage, the use of BIM supports efficiency in the facility management stage. Lastly, BIM enables simulations by use of evidence uncovered through research, benefitting from Building Performance Evaluation (BPE) stages.

At the Department of Architecture, Mie University, Japan students learn BIM in Problem-Based Learning (PBL) classes. PBL is a student-centered pedagogy and teachers do not give all the necessary information to students in PBL classes. Students research information themselves, and new knowledge is obtained through group discussions. It is expected that PBL increases students' understanding ability and retention ability of gained knowledge, and that students develop higher levels of critical thinking and gain other skills that enhance their employability and increase their productivity. The presentation will show the experience gained through PBL classes and sustainable design studio classes focusing on the topic of BIM and BPE.

**Abstract id# 6306**

## Organizational Culture Assessment As Part of Building Programming

**Martin Hodulak**, Hodulak Workplace Consultants, Munich, Germany

In professional practice, building programs in general outline the client's project goals, his existing restrictions together with his available resources as well as his needs in terms of required quantities and qualities. In the authors practice experience of the past years, the need for a further consideration as part of the building program evolved, that of assessing the current and desired culture of the client's organization. Knowledge on this aspect proved to be valuable as a basis as well as a guideline for all further considerations.

In the process of gathering information for a building program, various participatory methodologies are deployed. On the one hand, quantitative information, such as number of workplaces, size of spaces needed for archiving, or the number of monitors at particular workplaces are often collected via questionnaires and later aligned in work sessions. On the other hand, information and requirements on functionalities and qualities are more complex, less explicit and often need to be gathered and aligned in interviews and workshops to maintain accuracy and credibility. Organizational culture is implicit and deeply hidden information. It is based on beliefs and values, which are rarely discussed, as it is assumed that these are universally shared across an organization. To uncover this information for building programs, the author made use of the *Organizational Culture Assessment Index* (OCAI), developed by Cameron and Quinn.

In this paper the author briefly outlines his approach on programming. Based on a case study, he describes in more detail the OCAI methodology in context to program development and discusses the effects of OCAI on needs assessment and on building programs.

### **Abstract id# 6307**

Reconciling Apples with Oranges: Comparing the Performance of New and Retrofitted Green Buildings from Design to Post-Occupancy Evaluation

**Ihab Elzeyadi, Ph.D., FEIA, LEED AP**, University of Oregon, Eugene, OR

Employers, building owners, designers, and developers are persuaded, in response to an increasing marketing campaign by the building industry, that green buildings affects the health and well-being of occupants. As a result, many business owners attempt to build or renovate their building stock and certify it to green buildings standards. With staff accounting for 90% of business operating costs, a 1% improvement in productivity and well-being can have a major impact on the bottom line and competitiveness of any business. Despite the favorability of these projections, these findings have not been equally confirmed related to the impact of green buildings new construction or major retrofits on their occupants. The specific question of this project is whether there is conclusive difference between green newly-constructed buildings and those retrofitted to green buildings standards on their building performance and the occupants' perceptions.

This presentation reports on a longitudinal assessment of two educational high performance LEED™ platinum buildings from design to Post-Occupancy Evaluation (POE), comparing building performance as well as occupants' perceptions of multi-comfort, satisfaction, well-being, health, and productivity. The buildings were monitored for Indoor Environmental Quality (IEQ) parameters of visual, thermal, acoustical, indoor air, and spatial comfort over a period of one year after 12-months of continuous occupancy. IEQ measurements were performed and standardized POE surveys were conducted. Results show strong correlations between thermal, acoustical, and indoor air qualities of the newly constructed green environment that is well correlated with improved employees' productivity and satisfaction. Visual comfort and perceptions of the impact of the building on employees' satisfaction and productivity varied between both building types. Lessons learned and recommendations for future applications of the design innovations employed for both new construction green-certified buildings and majorly renovated ones are discussed.

### **Abstract id# 6308**

Boreal Builders: Exploring Sustainable Housing Design in Remote First Nation Communities through Participatory Planning and Training

**Shauna Mallory-Hill, Ph.D, LEED AP**, University of Manitoba, Winnipeg, MB, Canada

In Northern Manitoba, Canada, First Nations (FN) people are surrounded by abundant natural resources and have a deep understanding of their land, but often live in economic poverty without healthy housing, potable water, sanitation, or adequate roads (Thompson et al., 2012). In the traditional territory of Island Lake the state of substandard, disrepair, and mold damaged housing has reached a crisis level (Puxley, 2016). Indigenous people on Island Lake are seeking to re-generate their economies and improve self-sufficiency by building capacity to sustainably use the territorial resources to build homes, support energy independence and improve food security (Anderson et al., 2006). This presentation is of the first phase of a six-year long community-led project to address critical housing needs in two FN communities on Island Lake through participatory design and project-based skills training. Participatory planning workshops with local community members and evaluation of existing housing in the community are identifying needs and potential opportunities for better housing design. A collaborative, projects-based training program provides local students with knowledge and skills in design and sustainable building techniques, forestry, milling, carpentry, small engine repair, and building maintenance through the repair and building of homes in the community. Developing better, more sustainable northern FN housing design and skills training aims to result in a legacy of certified individuals who can continue to teach, design, maintain, and build homes.

All contributors to this research include: Mallory-Hill, S.; Coar, L.; Bonnycastle, M.; Harper, E.; Harper, I.; Monais, E.; Surkan, J.; Thompson, S.; Whiteway, N.; Wilson, A.

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