Building Environmental Assessment Tools: Current and Future Roles

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Until the 1990 release of the *Building Research Establishment Environmental Assessment Method* - BREEAM, little, if any, attempt had been made to establish an objective and comprehensive means of simultaneously assessing a broad range of environmental considerations against explicitly declared criteria, and offering a summary of overall performance. Moreover and often controversially, to do so in a way that motivates change in the construction industry and market transformation by attaching a label of environmental performance that increases the real market value of buildings with improved environmental qualities. The field of building environmental assessment has matured remarkably quickly since the introduction of BREEAM, and the past thirteen years have witnessed a rapid increase in the number of building environmental assessment methods in use world-wide (e.g. BREEAM – UK; LEED – US, TGBRS – India; CASBEE – Japan; NABERS, Australia, etc.)

Initially, the development of building environmental assessment methods was largely an exercise in structuring a broad range of existing knowledge and considerations into a practical framework, rather than requiring or demanding new research. All of the major international conferences since 1994 have allocated a significant portion of their programs to the description and comparison of these methods and "assessment" now represents a central focus for the building environmental design and performance debate. Now building environmental assessment is a defined realm of enquiry with more rigorous explorations into weighting protocols, performance indicators, effectiveness – market and physical etc. At SB05, we want to reflect on the continuing evolution of building environmental assessment by asking the question – what are their current and future roles?

The emergence and evolution of building environmental assessments responds to a tension between the desire for objective, scientifically rigorous and stringent performance criteria with the desire for practical, transparent, simple to understand criteria that ask the industry to respond to manageable step changes in practice. Building environmental assessment methods were conceived as being *voluntary and motivational* in their application and their current success (both in terms of the amount of total new construction floor area being assessed and practitioner acceptance) can be either taken as a measure of how proactive the building industry is in creating positive change or its responsiveness to market demand. However, public authorities are increasingly using market-based tools as a basis for specifying a minimum environmental performance level for their new facilities. Certainly these tools have:

- *Given focus to green building practice.* Whereas design guidelines provide a broader range of issues, assessment methods give structure and priority, and as such provide greater strategic advice to the design team. The structure and

organization of environmental knowledge is proving to be as important as the individual elements.

- *Enabled building performance to be described comprehensively.* Performance-based indicators, where actual amounts of resource use and loadings enable improvements to be demonstrated relative to known or declared benchmarks and to be aggregated to establish overall patterns of consumption or environmental loading. Since the field is still maturing, it is not possible to formulate performance-based indicators for all of the issues covered within a comprehensive building environmental assessment. Proscriptive requirements are often specified as proxies for actual performance values, e.g., proximity to public transit stops is often used as a proxy for increased use of mass transit, reduced use of automobile for commuting and hence reduced energy consumption and pollution and reduced traffic congestion.
- *Assisted in re-shaping the design process.* Improving the environmental performance of buildings within current cost and time constraints requires a more thoughtful, multi-discipline and integrated approach to design with all parties involved from the start of the process. Assessment methods play a valuable role by providing a clear declaration of the key environmental considerations and their relative priority.

With many countries either having, or being in the process of developing domestic assessment methods, international exchanges and coordination are increasingly evident. In 1997, for example, the International Organization for Standardization's Technical Committee 59 (ISO TC59) - Building Construction resolved to establish an *ad hoc* group to investigate the need for standardized tools within the field of sustainable building. This subsequently evolved and was formalized as Sub-Committee ISO T59/SC17 – *Sustainability in building construction* – the scope of which includes the issues that should be taken into account within building environmental assessment methods.

Although life-cycle energy analyses have provided a broader view of performance since the 1970s, it failed to enter mainstream environmental discourse at the time. Research by Kohler [1987] and other Europeans in the late 1980s heralded the beginning of a much more rigorous and comprehensive understanding of life-cycle building impacts. The notion of *Life-Cycle Assessment* (LCA) has now been generally accepted within the environmental research community as the only legitimate basis on which to compare alternative materials, components, elements, services and whole buildings. Many assessment tools such as EcoQuantum (Netherlands), EcoEffect (Sweden), ENVEST (UK) and ATHENA (Canada) adhere to the rigours of LCA. Meaningful LCA assessment methods are usually data intensive and can involve enormous expense of collecting data and keeping it current, particularly in a period of considerable changes in materials manufacturing processes. Some of these tools aim to simplify this for practical use within the design process (ENVEST), but this can make these tools inflexible to novel design elements..

Currently none of the existing simplified building environmental assessment methods are comprehensively or consistently LCA-based, nor do they necessarily need to be given their primary role in market transformation. While some performance criteria in these methods are increasingly based on conventional LCA data, their strength lies in bringing a broader range of considerations to the assessment process while being respectful of simplicity and practicality to make them widely accessible. Provided the relative number of points assigned to each issue are derived through a transparent, consensus process, widely different criteria can be legitimately combined and aggregated to offer overall building performance scores.

But how is the widespread use of "assessment" methods affecting building design? There are several *direct* impacts:

- Firstly, it is having a profound effect in providing focus to the building/ environmental debate and offering a host of indirect benefits such as requiring greater communication and interaction between members of the design team and various sectors with the building industry, i.e., environmental assessment methods encourage greater dialogue and teamwork.
- Secondly, they represent an 'industry standard' of what constitutes a green building taking into account both the desire to improve building performance while recognizing issues of cost and practicality.
- Thirdly, they declare a set of environmental issues and assign significance to them and organize information in an explicit manner. The pros and cons of the categorization of environmental issues remains a relatively unexplored issue. While the organization of environmental issues within building environmental assessment methods has provided clarity and structure, rigid categorization can be counter to the need to acknowledge and resolve links and synergies.
- Fourthly, they provide summaries of building performance that can be used to communicate to stakeholders. Here, the method by which the results are depicted has a direct bearing on how various performance indicators are used and understood – and by whom.
- Fifthly, they motivate innovation, encouraging materials and product suppliers to develop new environmentally beneficial products, services and practice and to bring down the costs of these new technologies as they reach economic production scales.
- Sixthly, they provide a vehicle for both public and corporate policymaking.

The interest in quantification and assessment is much more widespread than for building environmental performance, and this increase may be signalling a growing mindset for demonstrated action rather than continued rhetoric. For example:

- Fueled by the capability of information technologies, there is an increasing search for "indicators" to measure and benchmark performance at every scale – from buildings to national progress in sustainable development.

- Gann *et al* indicate that a “new culture of performance measurement has began to take hold across the UK construction sector” particularly for production processes. [Gann, *et al*., 2003] The development of a Design Quality Index (DQI) to assess a broad range of issues is signaling interest in whole building performance assessment to embrace considerations that extend way beyond the current interest in environmental assessment.

There is little doubt that building environmental assessment methods have contributed enormously to furthering the promotion of higher environmental expectations, and have directly and indirectly influenced the performance of buildings. This success derives from their ability to offer a recognizable structure for environmental issues and, more importantly, provide a focus for the debate of building environmental performance. This momentum will likely increase over the next few years, and the systems will evolve in terms of benchmark performance requirements and level of complexity attainable within acceptable costs. Similarly, the organizational structures within which the methods are administered will respond to concerns over the costs of making an assessment by streamlining the certification process and the necessary support documentation.

Several possibilities can be postulated regarding the possible ways that assessment methods may evolve in the longer future:

1. Assessment methods will need to be cast within a broader array of initiatives for creating necessary change. Here, the current success that assessment methods enjoy within both research and practice has potentially adverse consequences. By being almost the sole focus of the debate, too much expectation may be being placed on their ability to create the necessary change.
2. While establishing appropriate performance metrics and scales is a critical issue, a critical challenge for developers of building assessment methods will be the recognition and accounting for possible synergies between environmental performance criteria. Currently, an overall building performance score is derived from the aggregation of the points obtained within the constituent environmental credits. As such, the selection of the performance credits is based on ensuring their independence to avoid the possibility of “double-counting.” In practice, this translates to a checklist approach where individual performance criteria of identified and pursued in the quest for a certain overall rating. More skilled design teams recognize that successful green design with demanding performance expectations is as much about the interrelationship between the strategies and systems as it is with their individual merits and consequences. The way in which assessment methods nurture systems thinking will be an increasingly important characteristic.
3. Assessment methods will have to be recast under the umbrella of sustainability – environmental, social and economic. We are at an intriguing juncture in the debate, let alone practice, about “sustainable” building. Broadening the scope of discussion beyond environmental responsibility and embracing the wider agenda of sustainability is an increasingly necessary requirement. Yet, in the short term, this

may create a loss of focus for improving the environmental performance of buildings. And, because current discussions of sustainability have already been diffused and appropriated by the "here and now," an important issue will be whether it can provide a sufficient catalyst for changing attitudes and expectations.

4. Market-based assessment methods will have to reinvent themselves to maintain potency. This can be achieved, to a degree, through the release of updated versions.

The session – *Building Environmental Assessment Tools* – focuses on the current and emerging role of building environmental assessment tools. Papers are solicited that address the following issues:

- The extent to which LCA methodologies can and should be integral to market place building environmental assessment tools.
- How can assessment tools balance the opposing needs for increased comprehensiveness of assessment with ease of application?
- The advantages of building-type specific versions of an assessment tool verses single, unified versions.
- How are assessment tools viewed by various stakeholders in the building industry.
- The shift from building environmental assessment to sustainability assessment.
- While assessment tools are currently providing a valuable role, are there long-term problems. For example, does the categorization of environmental issues blur the many synergistic effects between them, or will chasing a high performance score constrain green design.
- The desirability of comparing building environmental assessment tools and the pros and cons of international standardization in a rapidly evolving field of enquiry.
- The future of building environmental assessment tools – how are they likely to evolve, how will they be used and how will they dovetail with other change instruments (regulations, codes, incentives)
- Which areas or aspects of performance assessment are likely to gain in significance in the short and long-term (e.g. existing buildings, district, etc.).

References

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