Assessment, labeling and certification systems:
where we have been and where we might be going

Nils Larsson
Executive Director, iiSBE,
the International Initiative for a Sustainable Built Environment

October 2011
A bit of history

- Early 1990’s: the Building Research Establishment Environmental Assessment Method (BREEAM) was developed by BRE and a private-sector architect, John Doggart;

- Mid 1990’s: the Leadership in Energy and Environmental Design (LEED) was developed by the U.S. Green Building Council (USGBC);

- Both of these initiatives began essentially as checklists of what to do and what not to do in the design of commercial buildings;

- Basically, these systems provided guidelines for good design and management suited to the region of origin;

- As the field developed, more emphasis was placed on the assessment of performance, but some of the guideline aspects remained, so we might call them hybrid systems;

- Many other systems have been developed, e.g. CASBEE, Greenstar, etc., with most following the same pattern.
Rationale

There are several distinct reasons for using rating systems depending on who you are:

1. **Developer**: obtain certification of green or sustainability performance from a third party, for purposes of market advantage or public relations;

2. **Investors, developers, designers and operators**: self-education about the range of issues related to sustainability performance;

3. **Design teams**: carry out internal simulations of possible performance achievement;

4. **Owner or operator**: comply with government regulatory requirements, usually limited to core issues such as energy GHG, water;

5. **Clients** with multi-building projects, or large competitions: to define specific client requirements.
Finally, to provide factual performance information in a field that is crowded with claims and wildly varying figures.

Dubai World Trade Center, 1979, 278 kWh/m²

Emirates Tower, 2000, 560 kWh/m²

Source: Khaled A. Al-Sallal
Assessment, rating, labeling & certification

- **Assessment**: an evaluation

- **Rating**: a score or result relative to a norm or global benchmark. Ratings can be based on self-assessment or carried out by third parties.

- **Certification**: validation of rating or assessment results by a knowledgeable third party that is independent of both the developer / designer and the tool developer.

- **Labeling**: proof of a rating or certification result, issued by the certifier.
The options: Green and Sustainable Building

- Fuel consumption of non-renewable fuels
- Water consumption
- Land consumption
- Materials consumption
- Greenhouse gas emissions
- Other atmospheric emissions
- Impacts on site ecology
- Solid waste / liquid effluents
- Indoor air quality, lighting, acoustics
- Maintenance of performance
- Longevity, adaptability, flexibility
- Efficiency
- Safety and security
- Social and economic considerations
- Urban / planning issues
Potential v. Actual performance

- Most existing systems focus on *Potential* performance, as determined before occupancy, often during design;
- *Actual* performance can only be assessed after commissioning and occupancy, or much later during operations, but in any case too late to change the design;
- *Actual* performance is suitable for existing buildings, which represent 95% to 98% of the total building stock, but *Potential* allows the initial design of a new building to be modified;
- Therefore, both approaches are useful.
Total building stock

Existing buildings

We should remember that new buildings are a small proportion of the total stock

Approximate proportions in the building stock

Certified buildings

New buildings
Rating systems and regulations

- The increasing popularity of rating systems means that, in some cases, the achievement of certain rating results has become mandatory;

- This means that a requirement by a municipal government for LEED Silver status for all its buildings, might be considered a *de facto* regulation;

- Since most government mandates extend only to issues of health and safety and, more recently, energy, emissions and water, does this not present a long-term problem?

- We need compact rating system alternatives that are quicker and cheaper to implement, but whose criteria are consistent with larger systems.
Structure for regulations v. market needs

Market issues:
- Site development
- Site impacts
- Indoor comfort conditions
- Controllability
- Flexibility
- Functionality
- Efficiency
- Capital cost
- Operating cost etc.

Regulatory issues:
- Non-renewable fuels;
- GHG
- Non-renewable water

Regs / incentive issues:
- IAQ
- Daylighting
- Non-renewable materials
- Solid waste
- Liquid waste
- Mixed use
Rating v. Certification

- A performance rating can be a useful internal result, but official status demands certification by a reputable third party organization;
- Required information includes materials provenance, energy simulation results, and a wide range of local information;
- An independent assessor will have to carry out the work;
Governments want more focused criteria: Energy Performance Certificate - UK

An Energy Performance Certificate (EPC), shows the predicted energy efficiency of a particular building, based on the performance potential of the building itself (the fabric) and its services (such as heating, ventilation and lighting), compared to a benchmark.

Source: Carbon Trust and www.communities.gov.uk
A Display Energy Certificate (DEC), or operational rating, records the actual CO2 emissions from a building over the course of a year, and benchmarks them against buildings of similar use.

Source: Carbon Trust and www.communities.gov.uk
Regional adaptability

- Most rating systems are developed within a specific region, as exemplified by:
  - Local units of measure
  - National or local standards
  - Local climate
  - Solar hours
  - Relative scarcity of water resources
  - Cultural aspects of design
  - Availability of some materials and equipment
Regional adaptability

Rating systems also contain assumptions about:

- relative importance of issues (weights)
- Benchmarks for minimum acceptable and desirable performance levels;

*The relevance of rating results therefore diminishes greatly when systems are used in regions outside of their origin;*

Countries should therefore:

- develop their own systems, such as GreenStar,
- adapt one of the existing systems, as with BREEAM,
- or else use a general framework that supports the development of rating systems suited to any specific region, such as SBTool;
Building characteristics

- Phase
- New / renov.
- Occupancy type
- Benchmarks
- Site info
- Project basic info

System requirements, weights & benchmarks

Interim Label

Certified Results

Final Label

Local regs and info

Typical elements of a labeling system
Cross-border considerations

- Many trans-national companies have a preference for rating systems that can be used without modification in all the different countries where they operate;

- Even independent local owners and developers find the use of a well-known international brand to be attractive;
Excerpt from a survey of 28 rating organizations carried out by iiSBE in 2010
Excerpt from a survey of 28 rating organizations carried out by iiSBE in 2010
Cross-border considerations

- The appeal of a single global rating system is easy to see, but this ignores the need for systems to respond to local conditions in order to provide meaningful results;

- But a significant proportion of commercial building developers care more about obtaining the performance label than in achieving a high level of performance, so the adaptation of a rating system may not be a major concern for them;

- The use of unsuitable rating systems should be a major concern to national professional associations and governments but, sadly, this does not seem to be the case.
Assessment and rating: some unresolved issues

- In the USA and Canada, many architect complain that assessors earn more than they do;
- Ratings need to be carried out much less expensively, and that points to the need for an optional reduced assessment set;
- Scope (number of criteria) should be adjustable and compatible for different types of applications (regulation v. market);
- Two types of outputs are needed; performance relative to similar buildings in the region, and absolute results that can be compared globally;
- It is widely recognized that different criteria are needed for various building types, but most rating systems do not recognize that many modern buildings have multiple occupancies;
- Do we need weighting?
Assessment and rating: some unresolved issues

- A full life-cycle treatment is needed, including integration of embodied and operating phase loadings, but decimal places seem pointless when we guess at lifespans;
- It is advantageous to have a structure for criteria that is consistent for all project phases;
- Point scores should adjust for applicable or non-applicable situations; e.g. whether or not there is an existing structure on the site that can be re-used, or is there public transport nearby...
- Most rating systems do not recognize that some criteria vary by occupancy, while other issues apply to the whole building;
Building-scale example of relationships between Elements or Strategies, Performance Factors, Loadings and Impacts

**Elements & strategies**
- Use of other materials & elements
- Land / site development
- Window orientation, size, glazing type, frame type and exterior shading
- Insulation type and amount
- Quantity/type of water-using equipment

**Performance factors**
- Material / element cost
- Daylighting & glare
- Radiant & convective heat gain or loss
- Operational modes

**Loadings & Qualities**
- Depletion of non-renewable materials
- Lifecycle cost
- Economic impact
- Ecological impact
- User & occupant comfort & productivity
- Acidification
- Climate change
- Depletion of non-renewable fuels
- Depletion of water resources

**Impacts**
- Depletion of non-renewable materials
- Economic impact
- Ecological impact
- User & occupant comfort & productivity
- Acidification
- Climate change
- Depletion of non-renewable fuels
- Depletion of water resources

**Site characteristics**
- Exterior EQ
- Interior EQ
- SOx emissions
- GHG emissions

**Fossil fuel consumption**
- Space heating or cooling demand
- Gross water consumption
- Net water consumption
- Rain water & grey water use

**Depletion of non-renewable materials**
- Material / element cost
- Daylighting & glare
- Radiant & convective heat gain or loss
- Operational modes

**Lifecycle cost**
- Depletion of non-renewable materials
- Economic impact
- Ecological impact
- User & occupant comfort & productivity
- Acidification
- Climate change
- Depletion of non-renewable fuels
- Depletion of water resources
Conclusions

- Rating, certification and labeling systems have become very important types of tools for the building industry;

- Members of the commercial buildings sector are the most enthusiastic, because they see a possibility of market clarity and advantage;

- Professional associations, universities and governments should be active participants in the debate, to ensure that any system adopted provides results that are locally meaningful and objective;

- This requires that systems be developed locally or that foreign systems be carefully adapted to local conditions before being accepted;

- A priority now should be to develop compact systems that are inexpensive to use, and also new systems for neighborhood scale.
Contacts & Info

- Nils Larsson, larsson@iisbe.org
- www.iisbe.org