

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

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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 Duggart;
- 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

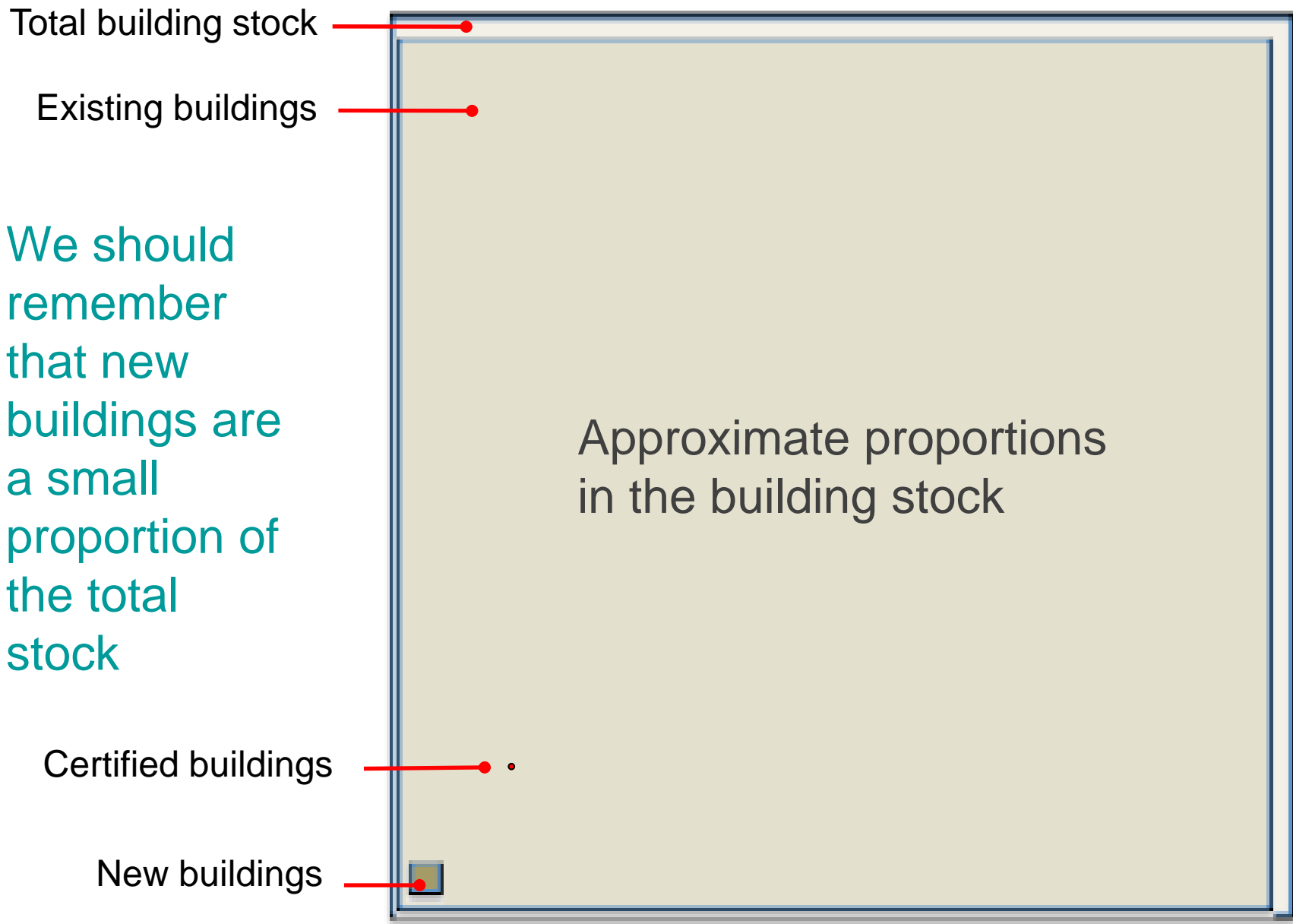
- Fuel consumption of non-renewable fuels
- Water consumption
- Land consumption
- Materials consumption
- Greenhouse gas emissions
- Other atmospheric emissions
- Impacts on site ecology
- Solid waste / liquid effluents
- Indoor air quality, lighting, acoustics
- Maintenance of performance
- Longevity,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

Green Building

Sustainable Building

Potential v. Actual performance

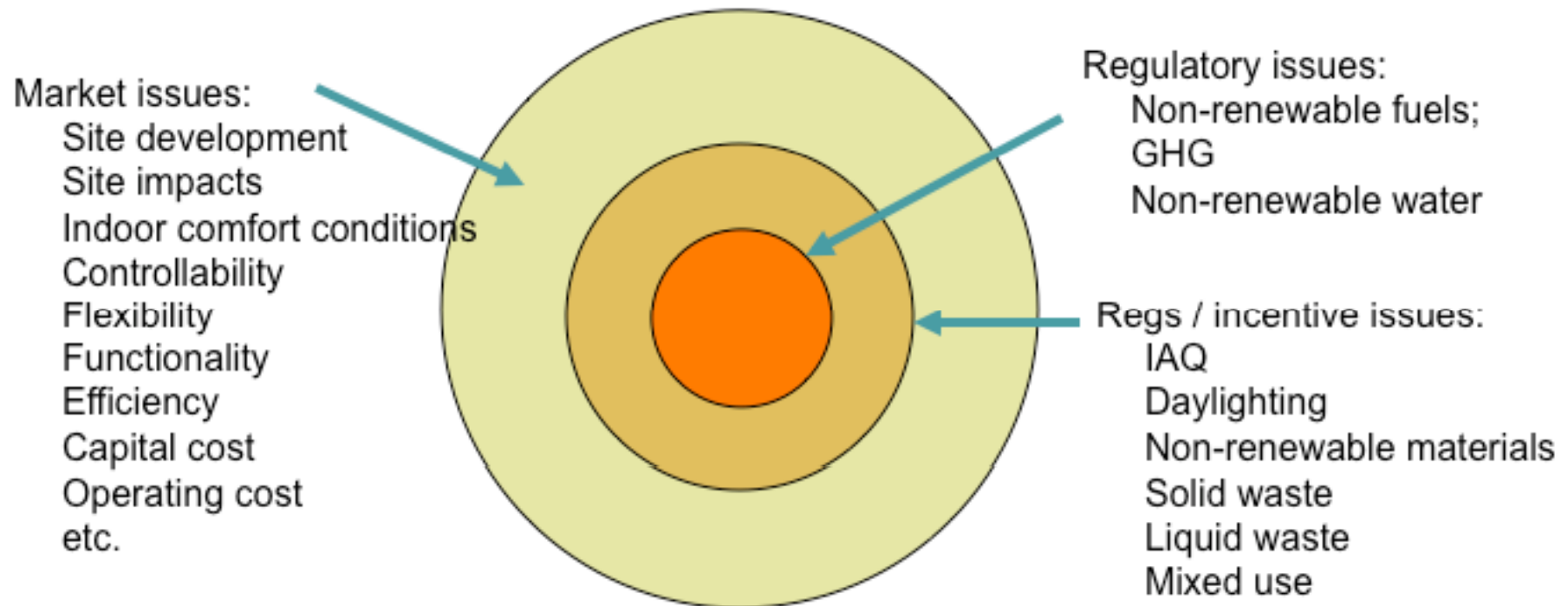
- Most existing systems focus on *Potential* performance, as determined before occupancy, often during design;
- *Actual* performance can only be assessed after commissioning and occupancy, or much later during operations, but in any case too late to change the design;
- *Actual* performance is suitable 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.



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

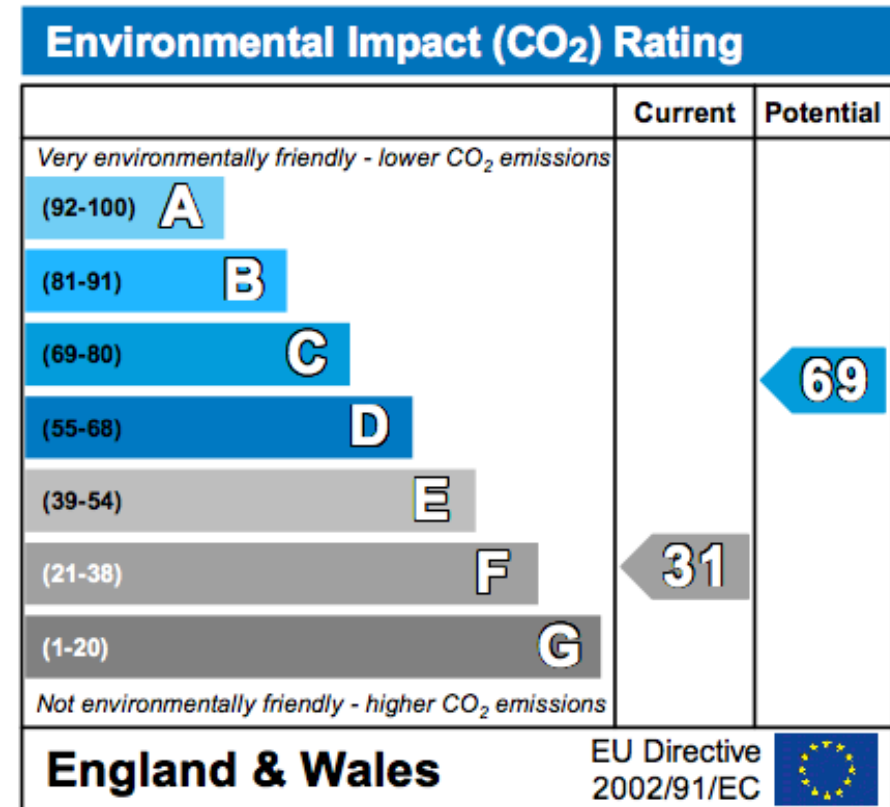
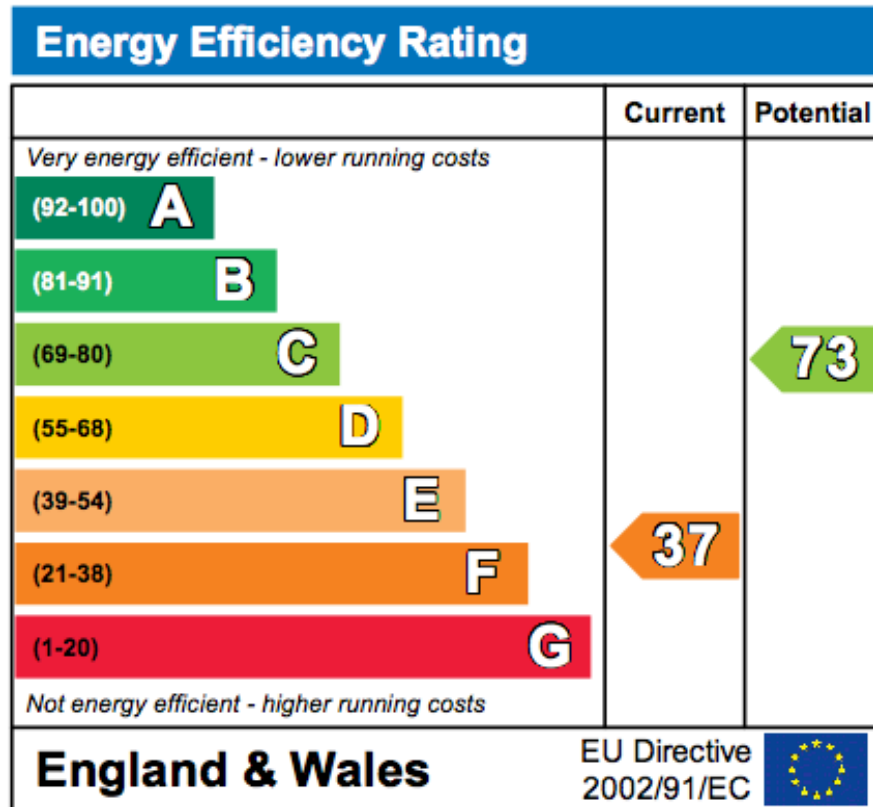


Rating v. Certification

- 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

Source: Carbon Trust and
www.communities.gov.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.

Display Energy Certificate

How efficiently is this building being used?

A Government Dept
12th & 13th Floor
Jubilee House
High Street
Anytown
A1 2CD

Certificate Reference Number:
1234-1234-1234-1234

This certificate indicates how much energy is being used to operate this building. The Operational Rating is based on meter readings of all the energy actually used in the building. It is compared to a benchmark that represents performance indicative of all buildings of this type. There is more advice on how to interpret this information on the Government's website www.communities.gov.uk/epbd.

Energy Performance Operational Rating

This tells you how efficiently energy has been used in the building. The numbers do not represent actual units of energy consumed; they represent comparative energy efficiency. 100 would be typical for this kind of building.

More energy efficient

A 0-25

B 26-50

C 51-75

D 76-100

100 would be typical

E 101-125

F 126-150

G Over 150

Less energy efficient

Total CO₂ Emissions

This tells you how much carbon dioxide the building emits. It shows tonnes per year of CO₂.

Period	Electricity	Heating	Renewables
Mar 2006	~180	~80	~0
Apr 2006	~150	~70	~0
Apr 2007	~130	~60	~10

Previous Operational Ratings

This tells you how efficiently energy has been used in this building over the last three accounting periods.

Period	Rating
Mar 2005	128
Apr 2006	133
Apr 2007	108

Technical information

This tells you technical information about how energy is used in this building. Consumption data based on actual readings.

Main heating fuel: Gas
Building Environment: Air Conditioned
Total useful floor area (m²): 2007
Asset Rating: 92

	Heating	Electrical
Annual Energy Use (kWh/m ² /year)	120	120
Typical Energy Use (kWh/m ² /year)	120	95
Energy from renewables	0%	20%

Administrative information

This is a Display Energy Certificate as defined in S2007:991 as amended.

Assessment Software: OR v1
Property Reference: 891123776612
Assessor Name: John Smith
Assessor Number: ABC12345
Accreditation Scheme: ABC Accreditation Ltd
Employer/Trading Name: EnergyWatch Ltd
Employer/Trading Address: Alpha House, New Way, Birmingham, B2 1AA
Issue Date: 12 May 2007
Nominated Date: 01 Apr 2007
Valid Until: 31 Mar 2008
Related Party Disclosure: EnergyWatch are contracted as energy managers
Recommendations for improving the energy efficiency of the building are contained in Report Reference Number 1234-1234-1234-1234

Display Energy Certificate - 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

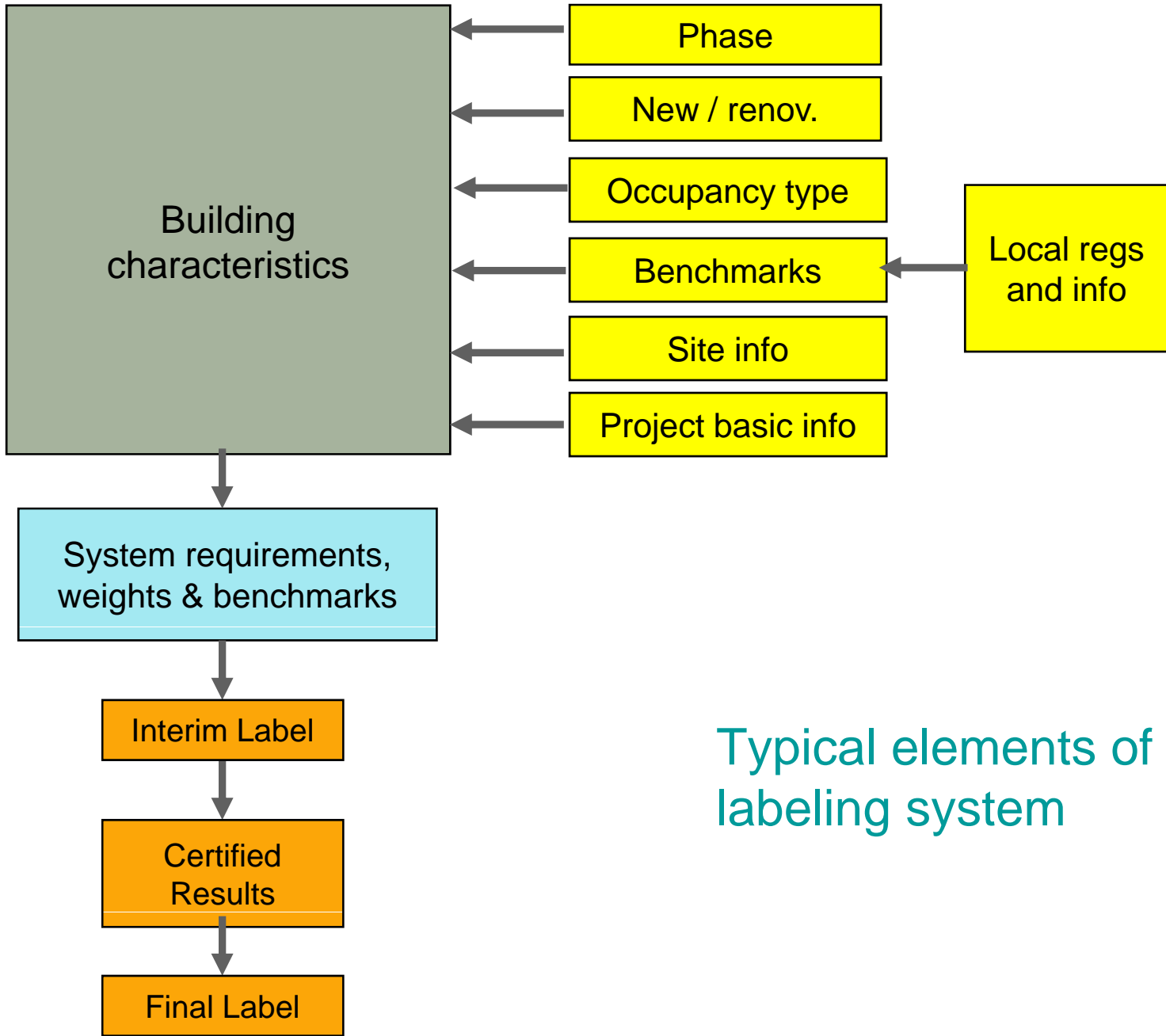
- Most rating systems are developed within a specific region, as exemplified by;
 - Local units of measure
 - National or local standards
 - Local climate
 - Solar hours
 - Relative scarcity of water resources
 - Cultural aspects of design
 - Availability of some materials and equipment

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;*

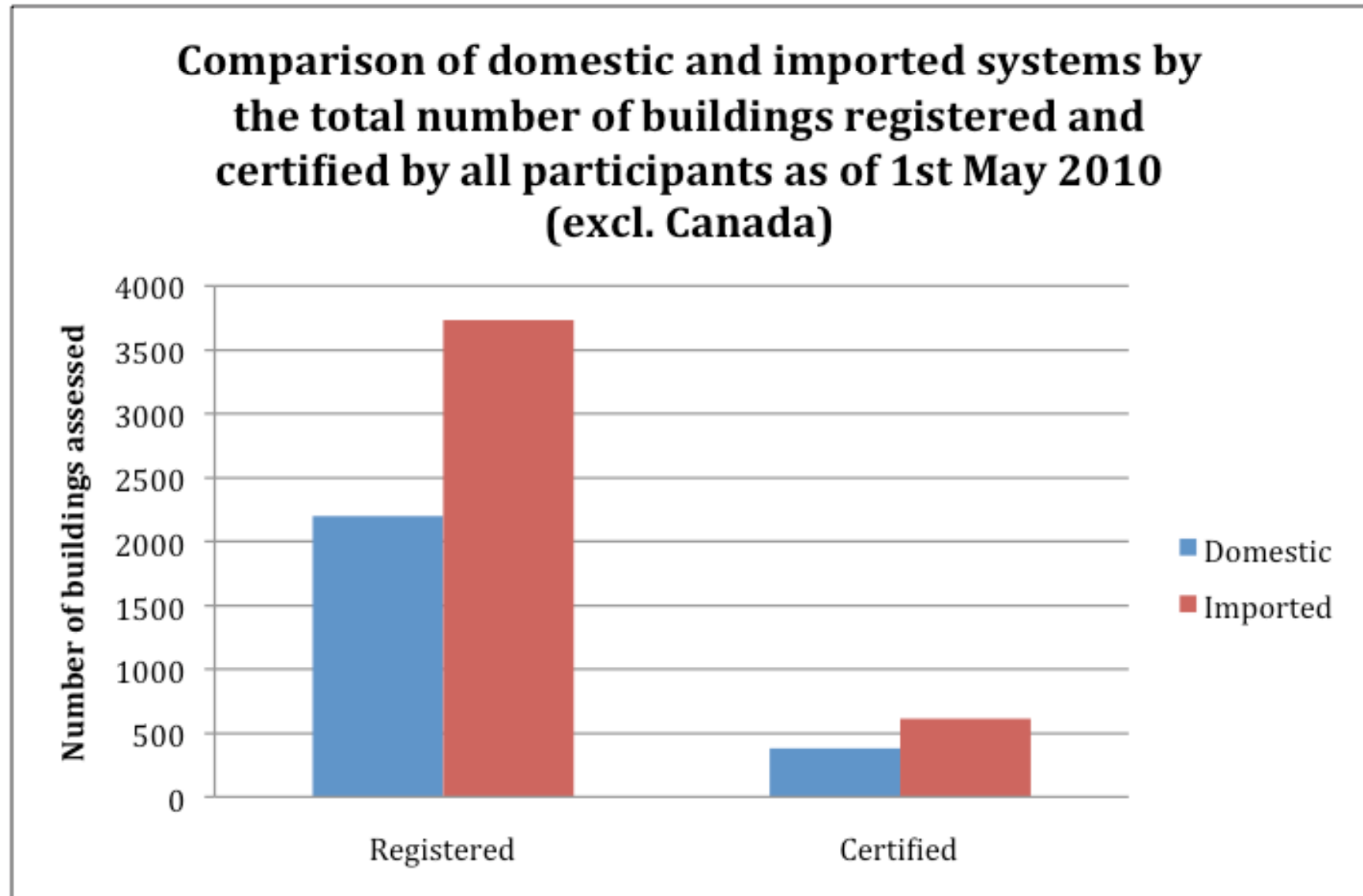
- Countries should therefore:
 - develop their own systems, such as GreenStar,
 - adapt one of the existing systems, as with BREEAM,
 - or else use a general framework that supports the development of rating systems suited to any specific region, such as SBTool;



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

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.

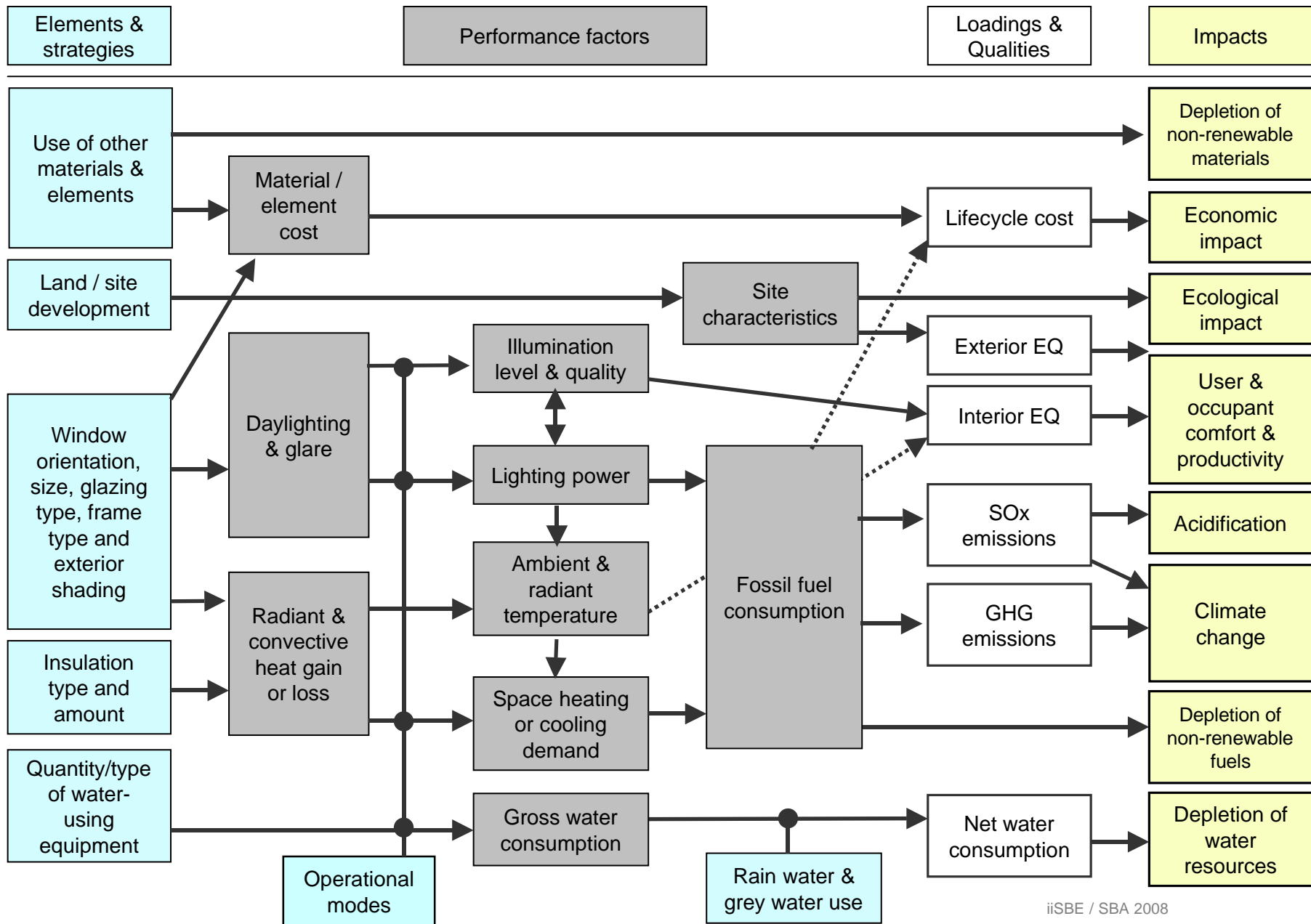
Assessment and rating: some unresolved issues

- 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



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

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