"Sustainable construction a challenge -

OPEN HOUSE methodology as common European tool for assessment"

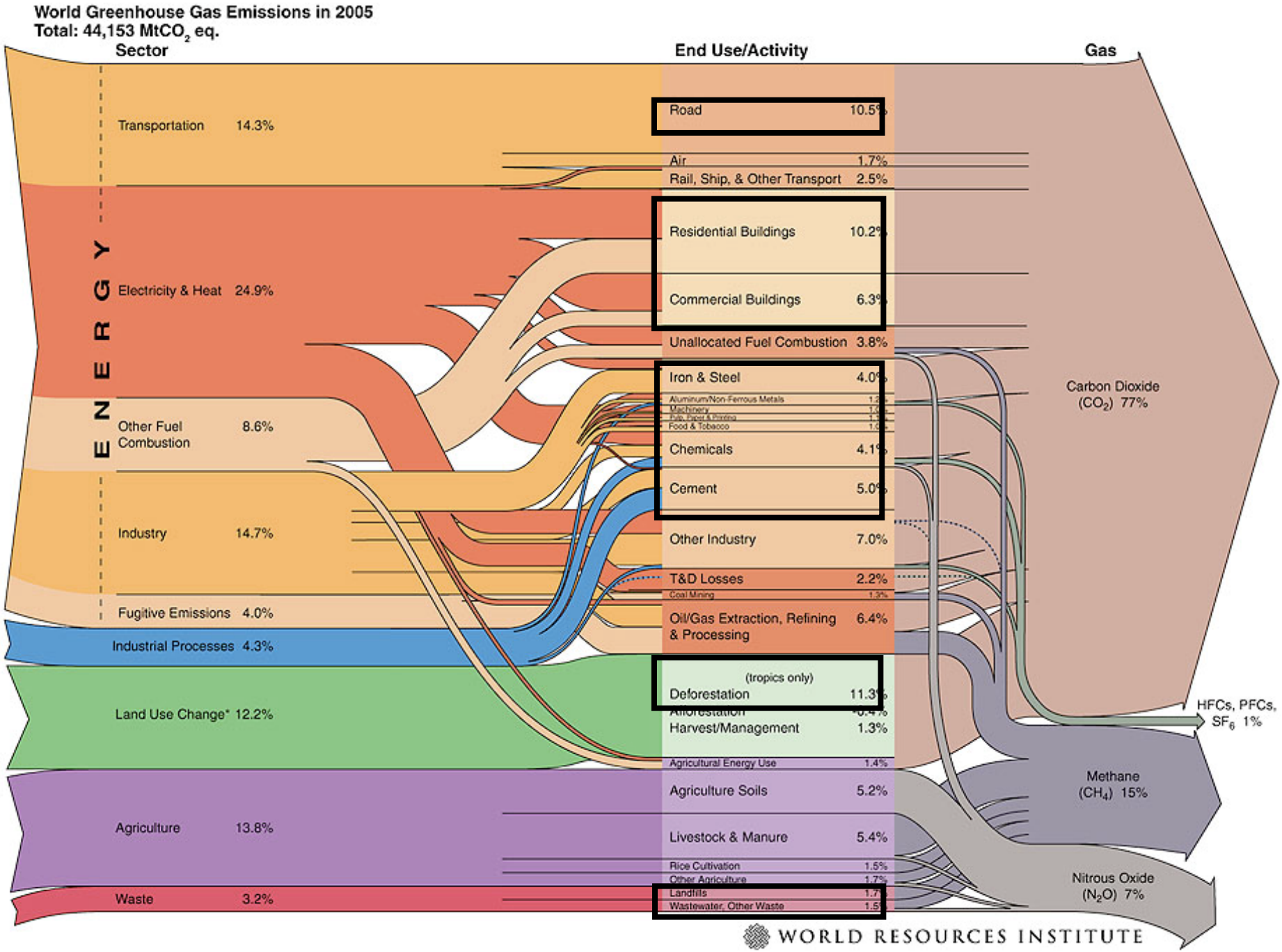
Prof. D-r. Strahinja Trpevski

Faculty of Architecture , Skopje, Macedonia
FBE Faculty, Skopje – Director of German Center for Energy Efficiency and Renewable energy

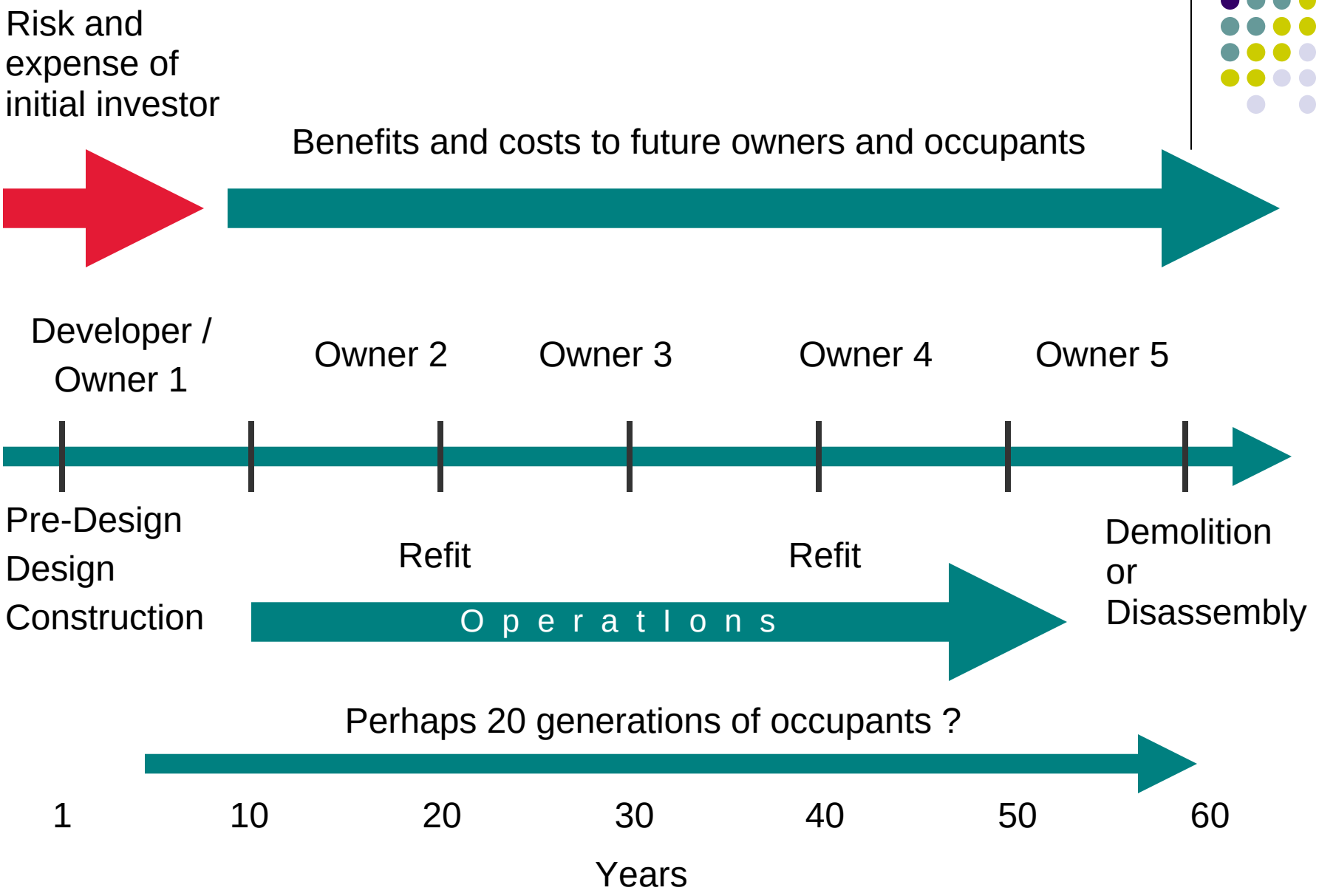
Benchmarking and mainstreaming building sustainability in the EU based on transparency and openness

to develop and to implement a common European transparent building assessment methodology

The cause of the problem



Design and Construction is quick; Pain or Gain is long-term



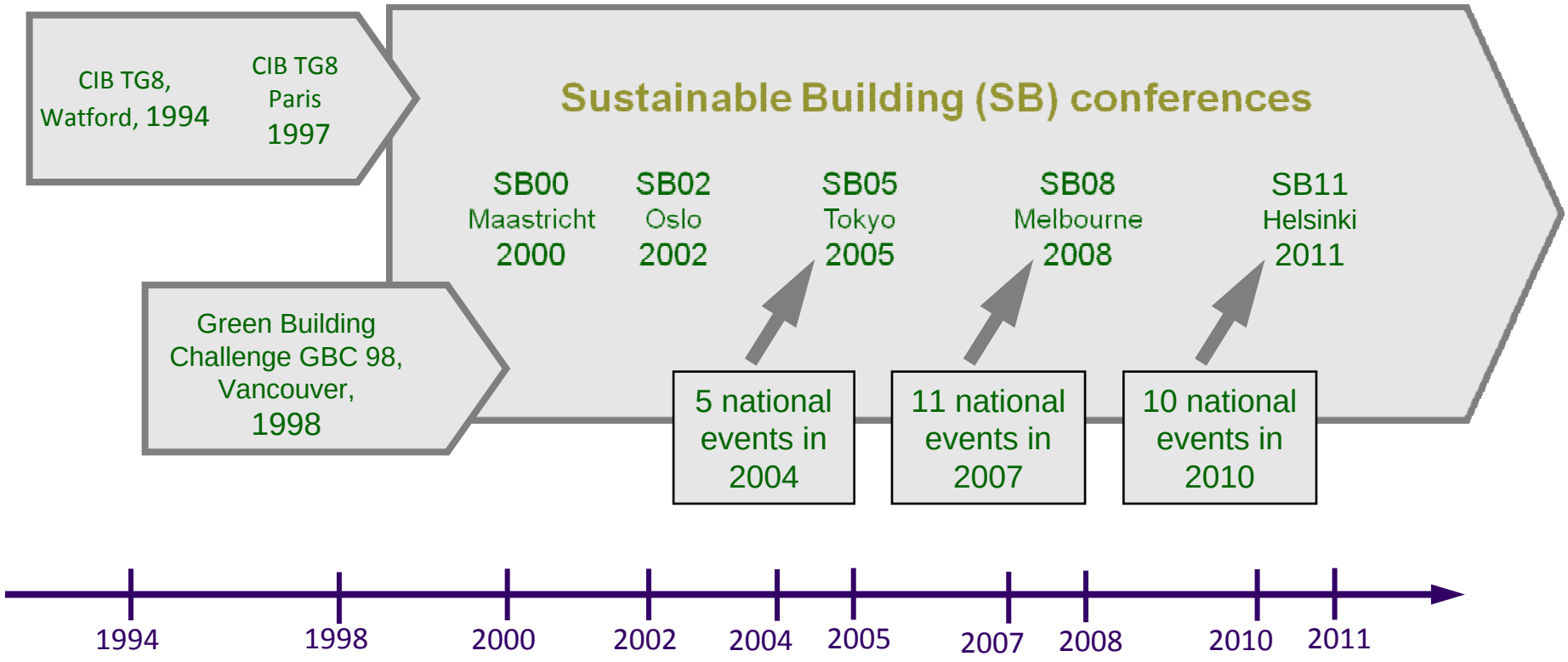
Finally, to provide factual performance information in a field that is crowded with claims and wildly varying figures.

Dubai World Trade Center, 1979,
278 kWh/m2

Emirates Tower, 2000,
560 kWh/m2

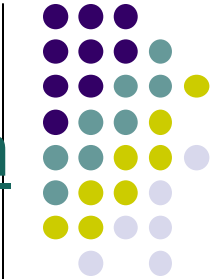
Source: Khaled A. Al-Sallal

SB conference timeline



Thanks to Pekka Huovila

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.

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;
- 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 similar pattern.

BREEAM and LEED market penetration

- A 2008 BREEAM document shows that 116,000 buildings are certified while 714,000 buildings have been registered, a higher level of penetration, but still small compared to total starts;
- A USGBC document from 2009 indicated that the total of LEED Certified projects at the end of 2008 was 2,476;
- This is a cumulative total since 2000, so it represents a miniscule proportion of total construction starts;
- The small proportion of certified v. registered projects probably reflects the high educational value of being registered v. the high cost of certification, which includes consulting fees for data preparation and also commissioning.

LEED	New Construction	Commercial Interiors	Existing Buildings	Core & Shell	Neighborhood Development	Schools	Retail	Total
Registered Projects	11,597	2,047	2,490	2,488	225	713	189	19,524
Certified Projects	1,600	479	200	157	13	4	36	2,476

Green Building Facts, USGBC, April 2009

Concept and objectives

The overall objective of OPEN HOUSE is to develop and to implement a **common European transparent building assessment methodology**, complementing the existing ones, for planning and constructing sustainable buildings by means of an **open approach and technical platform.**

OPEN HOUSE baseline are existing standards (both CEN/TC 350 and ISO TC59/ SC17), the EPBD Directive and its national transpositions and methodologies for assessing building sustainability at international, European and national level.

The most relevant innovative

- It is designed and developed by a **transparent and consensus process**. Therefore, it is automatically **suitable for all European countries**.

- It is a **non proprietary method**, thus fostering the exploitation.

- It is a **comprehensive and user-friendly methodology,** support by an interactive web tool (OPEN HOUSE Plat-form) that will facilitate the communication and interaction between the building stakeholders.

- It is **based on international/European standards**.

- It is based on **objective, scientifically rigorous and stringent performance criteria.**

elements of OPEN HOUSE are:

- **Address the unresolved issues** concerning building sustainability (e.g. performance requirements such as accessibility, weighting, variables such a building type, target user and climate). elements of OPEN HOUSE

- Develop **new indicators**, especially those related with economic and social factors, like for example safety and security, spaces for privacy or conviviality (e.g. co-housing, cafeteria in a office building), externalities (e.g. use of local services or products, unemployment rate of the area), European concept of cost and value (the cost for improving the labeling classification of the building, value of the labeled building after a time period, value for policy makers and end users), radioactive wastes, etc.

Technical Information

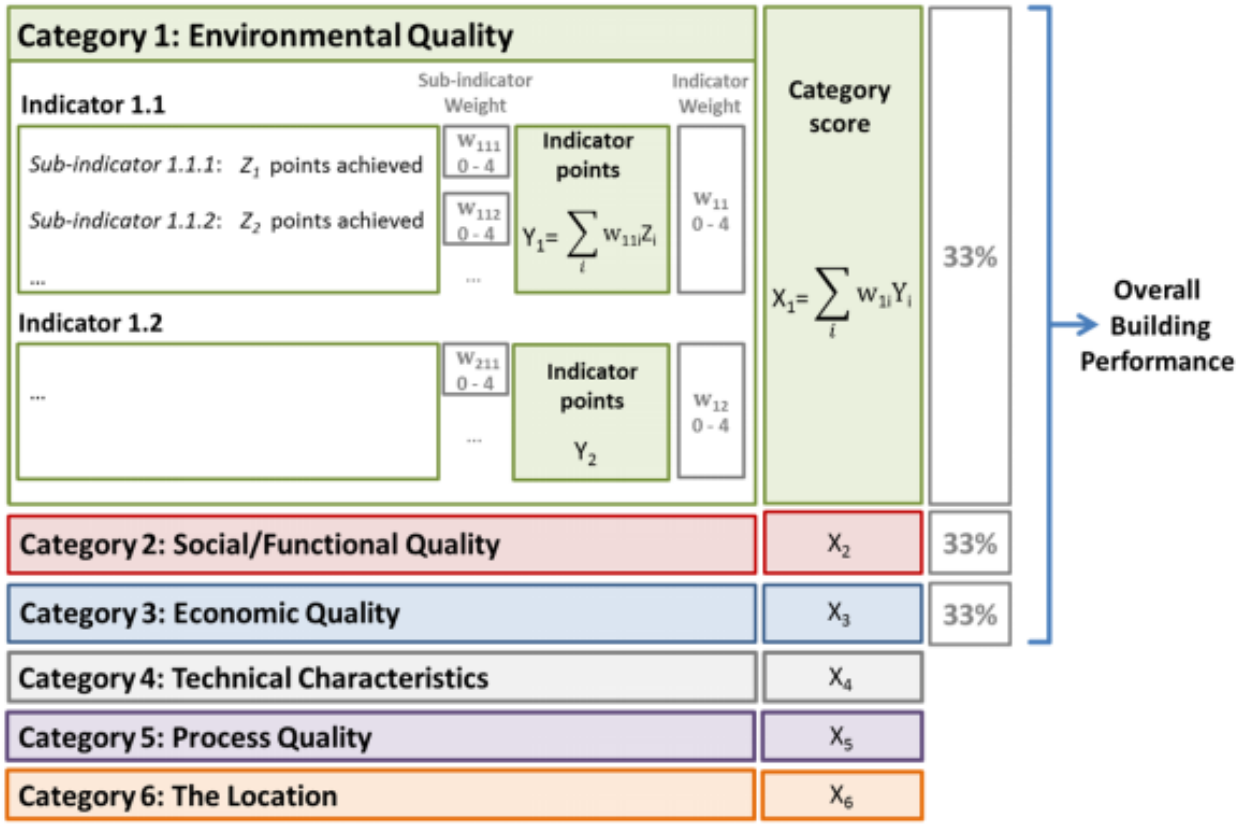
Evaluation framework

•The evaluation framework defines the hierarchical structure of the assessment methodology.
•It is composed of 6 main **categories**:
•Each **category** is composed of several **indicators** assessing different key issues for the sustainability performance of the project.
•Each **indicator** consists in one or several **sub-indicators** that evaluate a precise issue covered by the indicator topic.

Scoring process

• The scoring process describes the way points are calculated, from the evaluation of each sub-indicator to the global performance of the building.
• Fulfilling requirements set by sub-indicators awards a certain amount of points ranging from 0 to 100 depending on the performance met. Each sub-indicator is weighted from 0 to 4, with 0 meaning the sub-indicator is irrelevant, and 4 it is of high importance.
•The score for each indicator is the weighted average of the points awarded for the sub-indicators. Each indicator is weighted from 0 to 4, and the score achieved for each category is the weighted average of the points awarded for the indicators.

• The final building performance is obtained by calculating the averag of the environmental, social and economic category scores. (Environmental, social and economic categories are equally weighted)
• The three other categories are
•evaluated separately.

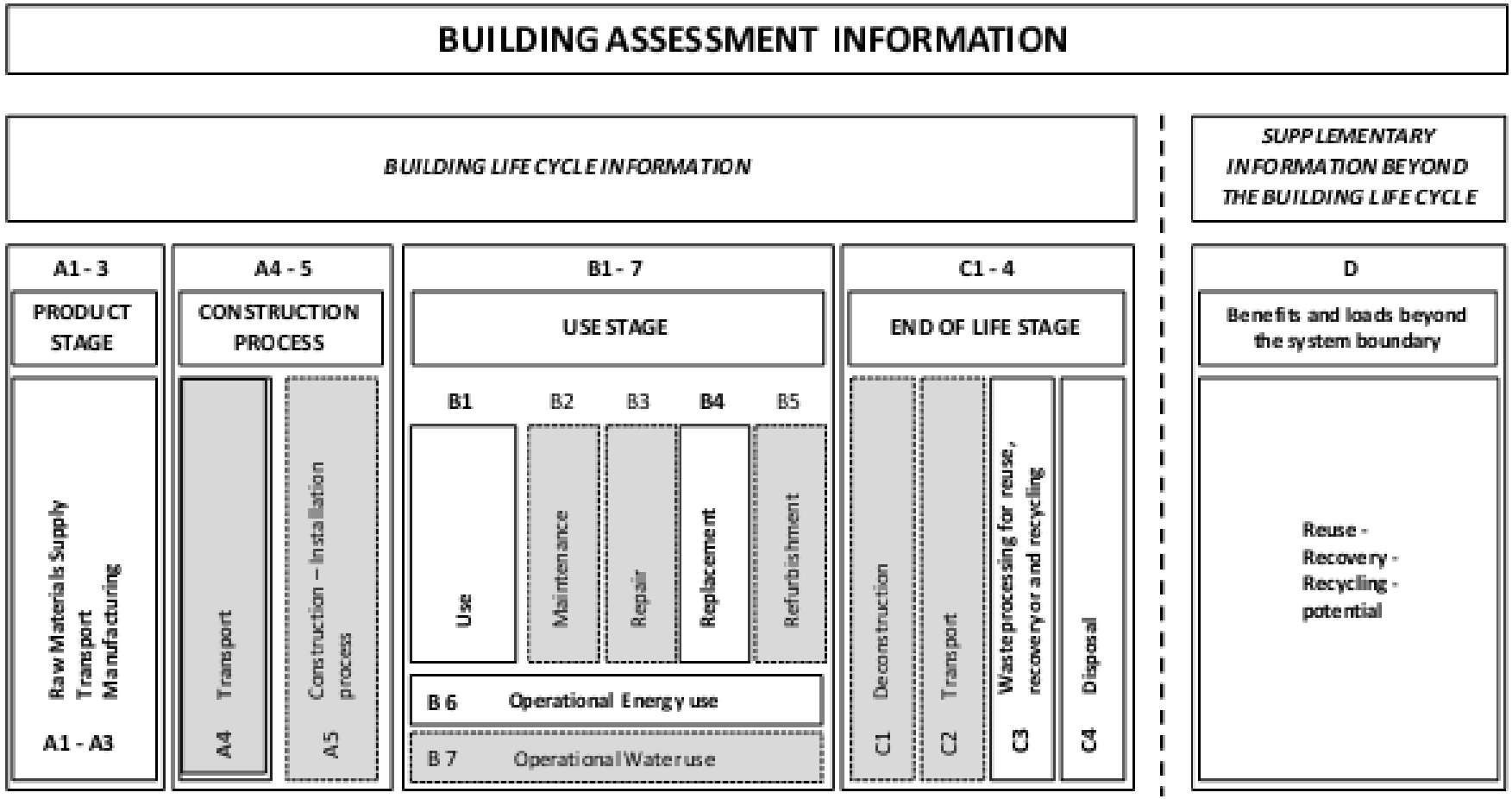


Scoring card

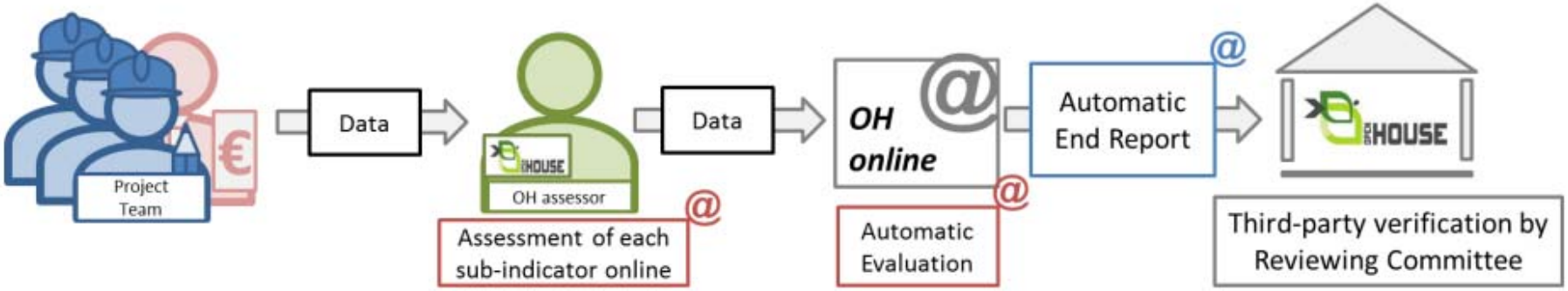
- The scoring card is the table containing all information about the **score achieved for each sub-indicator**, indicator, category and overall building performance.
- It also displays the **different weightings for each sub-indicator**, indicator and category.

		Sub-indicator Weight [EU]
Environmental Quality		
1.1	**Global Warming Potential (GWP)**	
1.1.1	Global Warming Potential (GWP)	4
1.2	**Ozone Depletion Potential (ODP)**	
1.2.1	Ozone Depletion Potential (ODP)	4
1.3	**Acidification Potential (AP)**	
1.3.1	Acidification Potential (AP)	4
1.4	**EutrophicationPotential (EP)**	
1.4.1	EutrophicationPotential (EP)	4
1.5	**Photochemical Ozone Creation Potential (POCP)**	
1.5.1	Photochemical Ozone Creation Potential (POCP)	4
1.7	Biodiversity and Depletion of Habitats	
1.7.1	Change in ecological value of the site	4
1.8	Light Pollution	
1.8.1	Light on properties	4
1.8.2	Luminaire intensity	4
1.8.3	Upward light	4
1.8.4	Luminance	4

Building Life Cycle Phases according to FprEN 15978, adapted

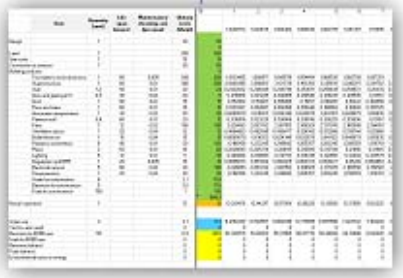


OPEN HOUSE Assessment Process



Online Assessment tool
http://oh.building-21.net/

LCA tool



LCC tool

Specific tools

OPEN HOUSE Assessment Process

Primary Quality	Status		Title	Indicator Score	Indicator Weight	Category Weight	Overall Score
Environmental Quality		1.1	Global Warming Potential (GWP)	0%	1	33%	
		1.2	Ozone Depletion Potential (ODP)	0%	1		
		1.3	Acidification Potential (AP)	0%	1		
		1.4	EutrophicationPotential (EP)	0%	1		
		1.5	Photochemical Ozone Creation Potential (POCP)	0%	1		
		1.6	Risks from materials	0%	1		
		1.7	Biodiversity and Depletion of Habitats	0%	1		
		1.8	Light Pollution	0%	1		
		1.9	Non-Renewable Primary Energy Demands (PEne)	0%	1		
		1.10	Total Primary Energy Demands and Percentage of Renewable Primary Energy	0%	1		
		1.11	Water and Waste Water	0%	1		
		1.12	Land use	0%	1		
		1.13	Waste	0%	1		
		1.14	Energy efficiency of building equipment (lifts, escalators etc.)	0%	1		

Results

		Score (%)
Environmental Quality		
1.1	**Global Warming Potential (GWP)**	**-**
1.2	**Ozone Depletion Potential (ODP)**	**-**
1.3	**Acidification Potential (AP)**	**-**
1.4	**Eutrophication Potential (EP)**	**-**
1.5	**Photochemical Ozone Creation Potential (POCP)**	**-**
1.6	Risks from materials	**X**
1.7	Biodiversity and Depletion of Habitats	**0**
1.8	Light Pollution	**100**
1.9	**Non-Renewable Primary Energy Demands (PEnr)**	**-**
1.10	**Total Primary Energy Demands and Percentage of Renewable Primary Energy**	**-**
1.11	**Water and Waste Water**	**0**
1.12	**Land use**	**50**
1.13	**Waste**	**0**
1.14	Energy efficiency of building equipment (lifts, escalators and moving walkways)	**37**

Social / Functional Quality		
2.1	**Barrier-free Accessibility**	**75**
2.2	Personal Safety and Security of Users	**83**
2.3	**Thermal Comfort**	**87**
2.4	**Indoor Air Quality**	**67**
2.5	Water Quality	**20**
2.6	**Acoustic Comfort**	**0**
2.7	**Visual Comfort**	**64**
2.8	**Operation Comfort**	**36**
2.9	Service Quality	**10**
2.10	**Electro Magnetic Pollution**	**50**
2.11	**Public Accessibility**	**80**
2.12	Noise from Building and Site	**100**
2.13	Quality of the Design and Urban Development of the building and Site	**30**
2.14	Area Efficiency	**100**
2.15	**Conversion Feasibility**	**87**
2.16	**Bicycle Comfort**	**0**
2.17	**Responsible Material Sourcing**	**0**
2.18	**Local Material**	**X**

Results

Economic Quality		
3.1	**Building-related Life Cycle Costs (LCC)**	**43**
3.2	Value Stability	**43**

Technical Characteristics		
4.1	Fire Protection	**X**
4.2	Durability of the structure and Robustness	100
4.3	Cleaning and maintenance	95
4.4	Resistance against hail, storm high water and earthquake	**X**
4.5	Noise Protection	30
4.6	**Quality of the building shell**	63
4.7	**Ease of Deconstruction, Recycling, and Dismantling**	17

Process Quality		
5.1	**Quality of the Project's Preparation**	31
5.2	Integrated Planning	85
5.3	Optimization and Complexity of the Approach to Planning	35
5.4	Evidence of Sustainability during Bid Invitation and Awarding	25
5.5	**Construction Site impact/ Construction Process**	0
5.6	Quality of the Executing Contractors/Pre-Qualification	50
5.7	Quality Assurance of Construction Execution	50
5.8	**Commissioning**	50
5.9	Monitoring, Use and Operation	52

The Location		
6.1	**Risks at the Site**	84
6.2	Circumstances at the Site	83
6.3	**Options for Transportation**	44
6.4	Image and Condition of the Location and Neighbourhood	40
6.5	Vicinity to amenities	70
6.6	Adjacent Media, Infrastructure, Development	100

+ Rationale

- All sustainable construction aspects are covered by the methodology
- Process of assessment requires integrated approach of different sectors and stakeholders – experienced experts for assessment;
- Assessment package is well prepared, very detailed with high technical quality;
- Online platform and online assessment tool are well outlined and easy to use;
- It requires concentration and time to do it

- **OPEN HOUSE is a data intensive and time consuming methodology** that could be problem for non experienced experts
- **It requires experience and specific knowledge** of relevant national policies and legislative;
- **There are many indicators for which the expert should have broader and deeper knowledge** than simple interpretation of the number
- The sustainability assessment of buildings with OH methodology **will create problems to the small countries that haven't developed institutional mechanisms for all proposed indicators**
- **The assessment for newly constructed buildigs is possible** but for the old ons could be a problem for some of the indicators.

Partners

- Acciona Infraestructuras, ES
- Cae Services Geie, BE
- Applied Industrial Technologies Ltd, GR
- Ove Arup & Partners International Limited, GB
- Eusko Jaurlaritza-Gobierno Vasco, ES
- Bouygues Construction, FR
- Miasto Stoleczne Warszawa, PL
- Slovenski gradbeni grozd - GIZ, SI
- D'appolonia Spa, IT
- Deutsche Gesellschaft Für Nachhaltiges Bauen, DE
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- Eidgenössische Technische Hochschule Zürich, CH
- Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E.V, DE
- Instytut Techniki Budowlanej, PL
- Mostostal Warszawa S.A, PL
- SP Sveriges Tekniska Forskningsinstitut AB, SE
- Vivienda Y Suelo de Euskad, S.A., ES
- Gradbeni inštitut ZRMK d.o.o., SI
- Fundación Agustín de Betancourt, ES

THANK YOU FOR ATTENTION!