Critical analysis of environmental benchmarks for buildings
Trigaux D., Allacker K. and Debacker W.

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Content

1. Introduction
2. Literature review existing benchmarks
3. Results critical analysis
4. Conclusions
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Life Cycle Assessment in the Belgian building practice
Development of environmental benchmarks for buildings

- **Policy applications**: definition of environmental targets
- **Private / commercial applications**: market positioning
Content

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Evaluation aspects

**Definition of benchmark values**
- Comparative base
- Benchmark approach
- Benchmark typology
- Sources for benchmark

**Benchmark scope**
- Life cycle stages
- Environmental indicators

**Benchmark applications**
- Building types
- New construction versus refurbishments

**Benchmark communication**
Selected benchmarking systems

Regulations

Labelling systems

Sustainability rating tools

Research studies
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Comparative base

External benchmark
Representative value for a building category within the building stock

Internal benchmark
Comparison to baseline building
Comparative base

**External benchmark**
- Comparison with the building stock
- Impact of full design

**Internal benchmark**
- No building stock modelling
- Limited to impact of material choices
Benchmark approach

Top-down approach
Benchmarks from environmental goals

Bottom-up approach
Benchmarks from building stock analysis
Benchmark approach

**Top-down approach**

+ Fulfilment with environmental goals
- Availability of targets and allocation procedure

**Bottom-up approach**

+ Feasible benchmark values
- Availability of data on reference buildings and market variations
Benchmark typology

- **Target value**: Upper value (highest theoretically possible level)
- **Best-practice value**: Value reached in experimental or demonstration projects
- **Reference value**: Average or median value (present state of the art)
- **Limit value**: Lower value (minimum acceptable performance)
Benchmark typology

Medium or long term values

+ Steer towards policy targets
- Might not be feasible for all buildings

Short term values

+ Exclude high environmental impacts
+ Address all stakeholders
- Will not lead to major improvements
- Regular update towards more severe values
### Benchmark scope – life cycle stages

<table>
<thead>
<tr>
<th>Life cycle stages</th>
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<th>Type 2</th>
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</thead>
<tbody>
<tr>
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<td>C 1-4 End-of-life stage</td>
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- **Embodied impact benchmark**
- **Whole life cycle benchmark**
### Benchmark scope – life cycle stages

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#### Embodied impact benchmark
- Only impact of material use

#### Whole life cycle benchmark
+ Global impact optimization
+ More design flexibility
Benchmark scope – environmental indicators

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Individual indicators

Aggregated indicator
Benchmark scope – environmental indicators

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**Individual indicators**

- + Focus on urgent issues
- - Difficult to handle a huge set of indicators

**Aggregated indicator**

- + Easier to understand and communicate
Benchmark applications – building typologies
Benchmark applications – new construction and refurbishment

Applicable to the whole building stock

1940 1960 1980 2000 2020

Existing buildings

New buildings
Benchmark communication

Communication based on benchmark values

Communication based on performance classes or score
Benchmark communication

Communication based on benchmark values
+ More transparent

Communication based on performance classes or score
+ More user-friendly
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Conclusions and further research

- **Combined top-down** and **bottom-up** approach

- Different **performance levels** for short term and long term

- **Flexible benchmark scope**: main benchmark and indicative values

- Application to **most widespread building types, new construction and refurbishments**

- **Transparent and user-friendly communication**: benchmark values and performance classes

- **Further research**
  - Extension to research studies
  - Consultation of policy makers and building stakeholders
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