BENCH VALUE

Open Space workshop on sustainability indicators for buildings

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ivl

In cooperation with Formas, FCBA and EFI

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Foreword

This report summarizes an Open Space workshop and details its results. The workshop was held as part of the BenchValue project, which is funded through the European ERA-NET framework SUstainable forest management; Multifunctional Forestry, European Forest Policy (Sumforest). This report is Deliverable D2.1 in the BenchValue project.

The Open Space workshop is a participatory procedure with a structure intended to stimulate informal discussions. The procedure gains from involving participants with complementary views, expertise and experience. However, the outcome from this procedure should not be interpreted as a formally negotiated consensus document. The results in this report should also not be interpreted as the official view of the participants or of the organisations they represent. The authors are responsible for the interpretation of the results.

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Summary

This report presents an Open Space workshop aiming to identify and discuss indicators and aspects that are important in a sustainability assessment of buildings. The workshop was held towards the end of the WoodRise Congress, a conference on medium and high-rise wood buildings. The 26 workshop participants included a mix of environmental researchers, sustainability consultants, architects, policy makers, etc. They generated ideas for 14 potentially important indicators to include in a sustainability assessment (see table below). Nine of these were selected for in-depth group discussions with an aim to agree on why the indicator is important, and on what aspects and facts should be considered and accounted for when including the indicator in a sustainability assessment of buildings. At the end of the workshop, each participant was given 6 yes-votes and 2 no-votes to freely distribute among all ideas for sustainability indicators, and all aspects and facts identified in the group discussions.

Indicator	Selected for group discussion	yes-votes*	no-votes*
Climate impact	yes	9	0
Resource depletion and conservation	yes	10	0
Energy efficiency	no	4	0
Life cycle analysis	no	0	0
Waste	yes	13	0
Adaptability	yes	10	0
Beauty	yes, as a joint topic	12	2
Biophilia (harmony with nature)			
Health and well-being	yes	14	3
Local impacts	yes	12	0
Employment	yes	8	0
Production cost	yes	4	2
Value added	no	0	0
Green economic growth	no	0	0

* Including votes on specific aspects of the indicator

A few broad themes emerged as important in the workshop:

- Resource efficiency in terms of reusability of the building and building components, the recyclability of materials, and energy efficiency.
- The health and well-being of the residents in the buildings and the workers along the life cycle of the buildings.
- Local impacts that, besides direct impacts on health and well-being, also include impacts on the local economy and employment.

The results of an Open Space workshop depend strongly on the participants and also on the context. Well established indicators, such as economic cost, value added, and energy efficiency, received little attention in the group discussions and few votes in the end, possibly because the participants found it more interesting to discuss new and emerging issues.

Sammanfattning

Denna rapport presenterar en Open Space-workshop som syftade till att identifiera och diskutera indikatorer som är viktiga i en hållbarhetsbedömning av byggnader. Den arrangerades i slutet av WoodRise, en konferens om höga och medelhöga trähus. De 26 deltagarna vid workshopen var en blandning av miljöforskare, hållbarhetskonsulter, arkitekter, policy-makers m.m. De pekade ut 14 indikatorer som potentiellt viktiga in en hållbarhetsbedömning (se tabell nedan). Nio av dessa valdes ut för mer djupgående gruppdiskussioner, med syftet att komma överens om varför indikatorn är viktig, och om vilka aspekter och fakta som bör övervägas och tas hänsyn till när den indikatorn inkluderas i en hållbarhetsbedömning av byggnader. I slutet av workshopen fick varje deltagare 6 ja-röster och 2 nej-röster att fritt fördela både mellan alla hållbarhetsindikatorer och mellan alla aspekter och fakta som listats under gruppdiskussionerna.

Indikator	Utvald för gruppdiskussion	ja-röster*	nej-röster*
Klimatpåverkan	ja	9	0
Resursanvändning	ja	10	0
Energieffektivitet	nej	4	0
Livscykelanalys	nej	0	0
Avfall	ja	13	0
Flexibilitet	ja	10	0
Estetik	ja, som ett gemensamt ämne	12	2
Harmoni med naturen			
Hälsa och välbefinnande	ja	14	3
Lokala effekter	ja	12	0
Arbetstillfällen	ja	8	0
Produktionskostnader	ja	4	2
Förädlingsvärde	nej	0	0
Grön tillväxt	nej	0	0

* Inklusive röster på specifika aspekter av indikatorn

Tre breda teman framträdde som viktiga:

- Resurseffektivet i termer av återanvändning av byggnaden och av byggkomponenter, materialens återvinnbarhet, och energieffektivitet.
- Hälsa och välbefinnande för de boende och för arbetare längs byggnadens hela livscykel.
- Lokala effekter som, förutom direkta effekter på hälsa och välbefinnande, även inkluderar effekter på den lokala ekonomin och arbetsmarknaden.

Resultaten från en Open Space-workshop styrs av dem som deltar och påverkas också av det sammanhang där workshopen ges. I denna workshop fick väletablerade indikatorer (exempelvis kostnader, ekonomiskt värde och energieffektivitet) relativt liten uppmärksamhet i diskussionerna och få röster vid workshopens slut. Det kan bero på att workshopens deltagare i slutet av WoodRise-konferensen var mer intresserade av att diskutera och reflektera över nya frågeställningar.

1 Formalities

1.1 Context and aim of workshop

This Open Space workshop was held in the afternoon September 14th, 2017 at Palais des Congrès in Bordeaux at the end of WoodRise, the 1st World Congress on mid-rise and high-rise wood buildings.

The workshop was part of the EU Sumforest project BenchValue[1], which aims to develop and demonstrate a new method of using the tool ToSIA[2] (Tool for Sustainability Impact Assessment). ToSIA currently focusses on sustainability impact assessments of wood-based material flows along value chains. BenchValue aims to transform it into a versatile tool for comparative sustainability assessments of wood products with other (non-renewable) products and value chains in a life cycle perspective. The category of products in focus in the BenchValue project is buildings and building components. The aim of the workshop was to collect ideas and perspectives regarding what indicators and aspects are the most important to consider in a sustainability assessment where wood buildings are compared to buildings constructed from other materials.

1.2 Participants

Invitations to this workshop were distributed through the research partners of the BenchValue project to researchers, policy-makers and stakeholders in Europe. We also advertised the workshop at the website of the WoodRise Congress and during the event. The 26 participants who attended the workshop included several environmental researchers from the BenchValue project, but also several policy makers, architects, sustainability assessment consultants, etc. (see the list of participants on next page). Most participants were European (the majority of which were French).

1.3 Workshop format

Open Space is a self-organising technique aiming to generate creativity and informal discussion on a common theme (Owen 2008). Open Space workshops begin without a fixed agenda beyond this overall theme; specifying the agenda is instead one of the tasks assigned to the workshop participants. We have found such workshops useful for identifying important indicators and research questions, for example at the beginning of life cycle sustainability assessments (Ekvall et al. 2016).

[1] http://benchvalue.efi.int
[2] http://tosia.efi.int

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1.4 Agenda

The agenda of the meeting included the following points:

1. Generating ideas for important sustainability indicators
   a) Individual brainstorming
   b) Sifting in small groups
   c) Presentation in plenum
2. Generating a schedule for group discussions
3. Group discussions on important indicators, Round A (with coffee)
4. Group discussions, Round B
5. Presentation in plenum
6. Voting on sustainability indicators
7. Discussion in plenum

The last item at the agenda was not carried through at the meeting, because of lack of time.

2 Ideas for important sustainability indicators

After an initial individual brainstorming, five small groups each selected 3-5 sustainability indicators that they considered important for sustainability assessments of buildings. The ideas were presented for the rest of the workshop participants and posted on a wall. When the overlaps had been eliminated, we had the following ideas/indicators listed on the wall:

- Climate impact*
- Resource depletion and conservation*
- Energy efficiency
- Life cycle analysis
- Waste*
- Adaptability*
- Beauty*
- Biophilia (harmony with nature)*
- Health and well-being*
- Local impacts*
- Employment*
- Production cost*
- Value added
- Green economic growth

The ten indicators with an asterisk were selected for group discussions, but beauty and biophilia were combined into a single discussion topic. The indicators left out of group discussions were still considered when the most important indicators were selected at the end of the workshop (see below).

3 Group discussions and final voting

3.1 Procedure and detailed results

The workshop included two rounds of group discussions with nine groups in total. Each group discussed one indicator. For each indicator, the groups were asked to discuss the following questions:

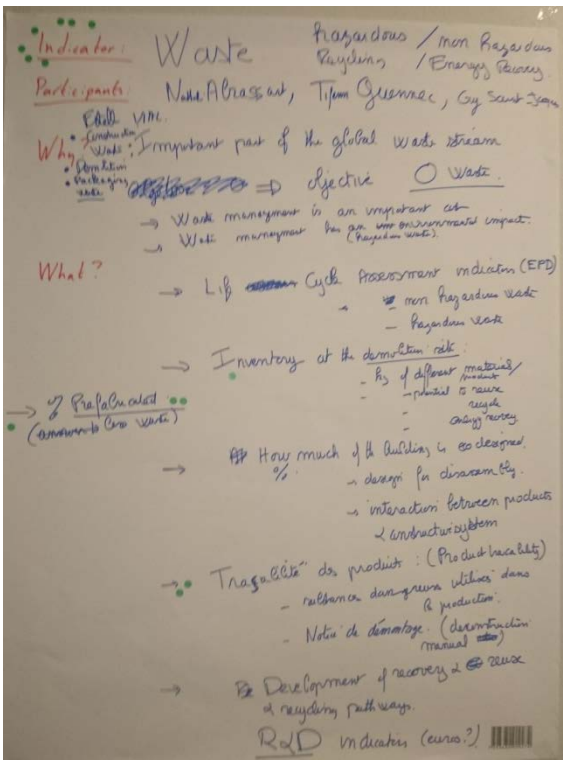
1.) Why is the indicator important?
2.) What aspects and facts should be considered and accounted for when including the indicator in a sustainability assessment of buildings?

The outcomes of the discussions were summarized on flipchart sheets, presented for the rest of the workshop participants and posted on a wall to facilitate voting.

Each participant was given a maximum of 6 votes in the form of green dots to freely distribute among the indicators and aspects to show that they consider the indicator or aspect important. Each participant was also given a maximum of 2 red dots to use if they wanted to show an indicator or aspect should preferably not be included in the sustainability assessment. Not all votes were used in the voting process.

The results of the group discussions and voting are presented here:

Waste: hazardous/non-hazardous, recycling, energy recovery (7 greens dots)
Participants: NA, TG, GSJ, EV



Why include in assessment?

- Construction, demolition and packaging waste are important parts of global waste stream
- Waste management has important environmental impacts
- Target: zero waste

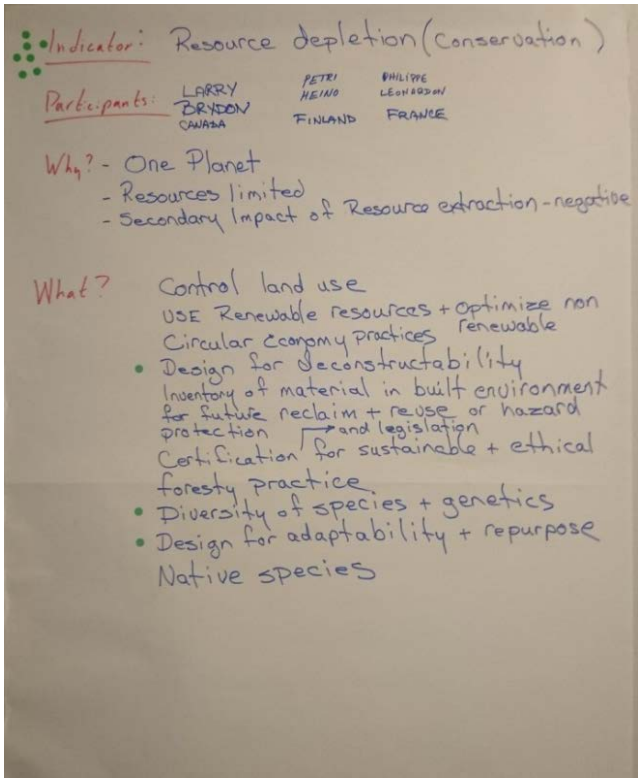
What to account for?

- Life cycle assessment indicators (as used, for example, in Environmental Product Declarations)
- Distinguish between hazardous waste and non-hazardous waste
- Inventory at the demolition site (1 green dot):
  - kg of different materials and products

- potential to reuse, recycle and recover energy
- The share of the building that is prefabricated (because it causes less waste; 3 green dots)
- The share of the building with ecodesign:
  - design for disassembly
  - interaction between products and constructive systems.
- Traceability of products (2 green dots)
  - information on hazardous substances used in the production
  - manual for deconstruction
- Development of recovery, reuse and recycling pathways
- Indicators of research & development (Euros?)

Resource depletion and conservation (7 green dots)

Participants: LB, PH, PL



Why include in assessment?

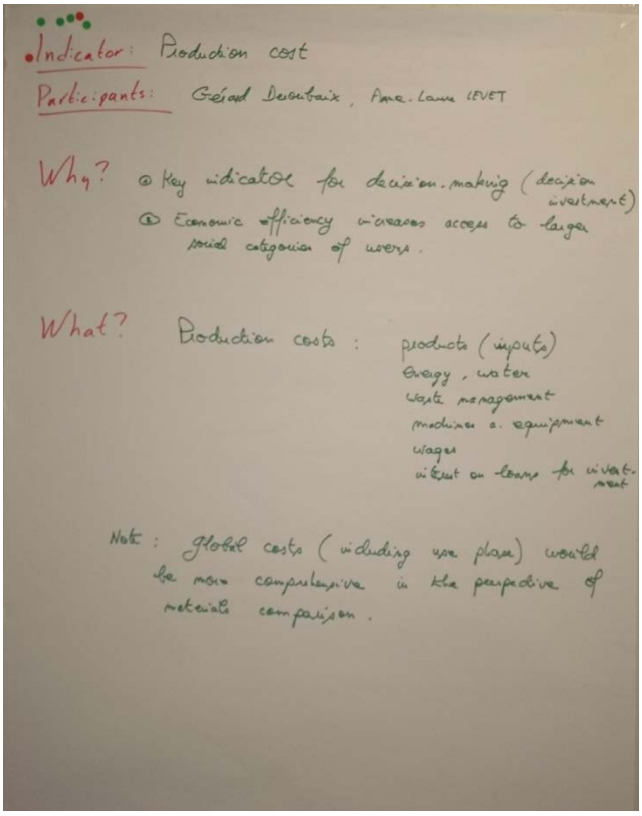
- One planet
- Resources are limited
- Negative secondary impacts of resource recovery

What to account for?

- Control land use
- Use renewable resources and optimize the use of non-renewable resources
- Circular economy practices
- Design for deconstructability (1 green dot)
- Inventory of material in built environment to allow for future reclaim aiming at reuse or safeguarding against hazardous substances
- Certification and legislation for sustainable and ethical forest practice
- Diversity of species and genetic variation (1 green dot)
- Design for adaptability allowing for using the building for new purposes (1 green dot)
- Native species

Production cost (4 green dots; 2 red dots)

Participants: GD, ALL



Why include in assessment?

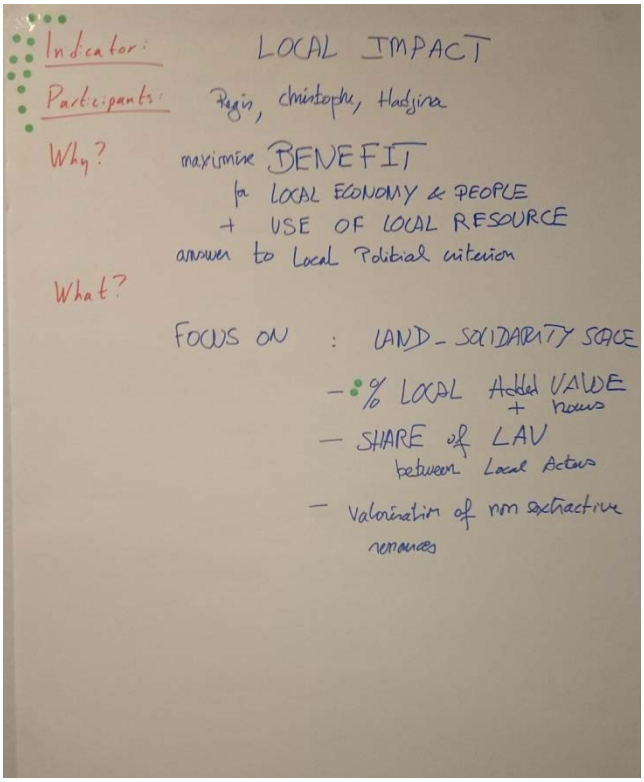
- Key indicator for decision-making (investment decisions)
- Economic efficiency increases access to larger social categories of users

What to account for?

- Production costs:
  - products (inputs)
  - energy and water
  - waste management
  - machines and equipment
  - wages
  - interest on loans for investments
- Note: global costs (including use phase) would be more comprehensive in the perspective of materials comparison

Local impact (12 green dots)

Participants: RM, CO, HPE

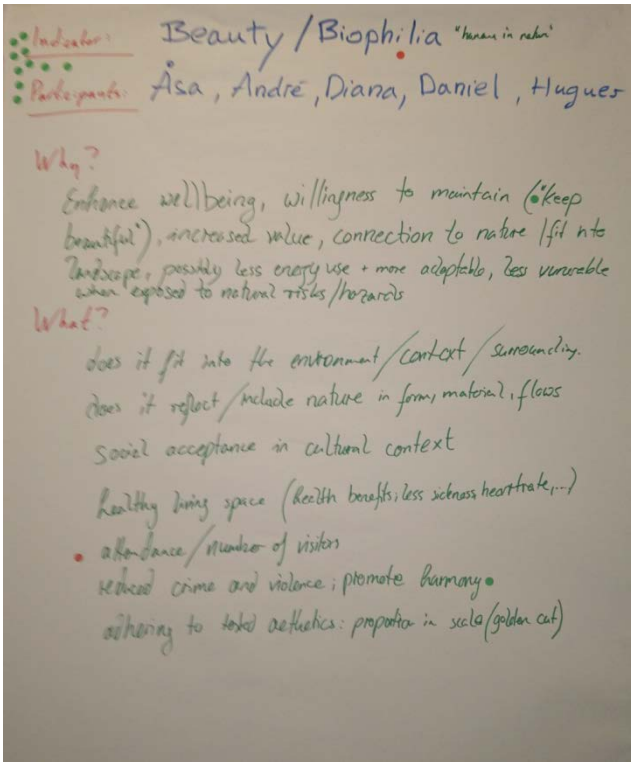


What to account for?

- Focus on:
  - land-solidarity scale
  - % of local added value and hours (2 green dots)
  - distribution of local added value between local actors
  - valorisation of non-extractive resources

Beauty and Biophilia (10 green dots for total indicator; 1 red dot for Biophilia)

Participants: ÅH, AP, DT, DS, HS



Why include in assessment?

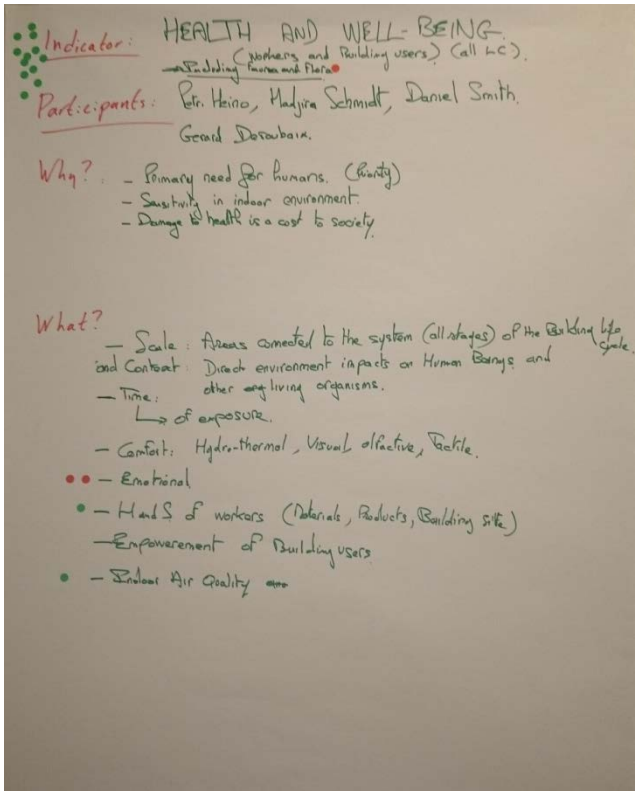
- Enhance well-being
- Willingness to maintain ("keep beautiful"; 1 green dot)
- Increased value, connection to nature (fit into landscape)
- Possibly less energy use plus more adaptable
- Less vulnerable when exposed to natural risks and hazards

What to account for?

- Does it fit into the environment, context or surrounding?
- Does it reflect and/or include nature in form, material and flows?
- Social acceptance in cultural context
- Healthy living space (health benefits, less sickness, heart rate, ...)
- Attendance or number of visitors (1 red dot)
- Reduced crime and violence; promoted harmony (1 green dot)
- Adhering to established aesthetics: for example, proportion in scale (golden cut)

Health and well-being (12 green dots) (including users and workers all through the life cycle) (including fauna and flora; 1 red dot)

Participants: PH, HS, DS, GD



Why include in assessment?

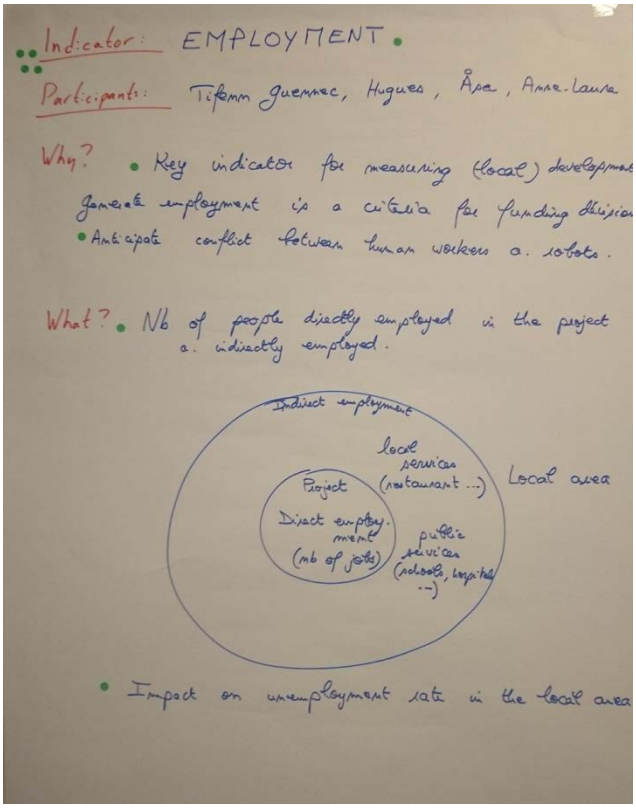
- Primary need and priority for humans
- Sensitivity in indoor environment
- Damage to health is a cost to society

What to account for?

- Scale: areas connected to the system (all stages of the building life cycle)
- Context: direct environmental impacts on human beings and other living organisms
- Time of exposure
- Comfort: hydrothermal, visual, olfactive, tactile
- Emotional (2 red dots)

- Health and safety of workers involved in the production of materials and products, and at the building site (1 green dot)
- Empowerment of building users
- Indoor air quality (1 green dot)

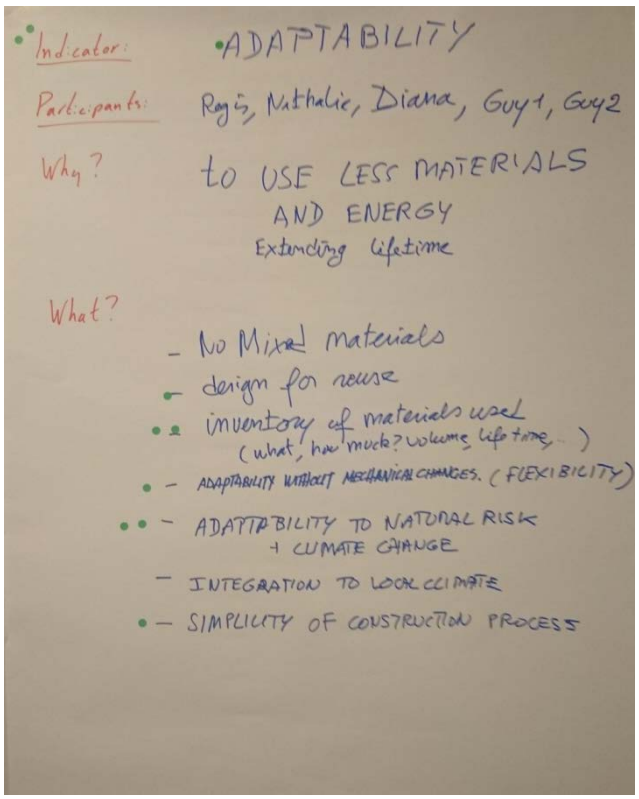
Employment (5 green dots)
Participants: TG, HPE, ÅH, ALL



Why include in assessment?
- Key indicator for measuring (local) development (1 green dot)
- The generation of employment is a criterion for funding decision
- Anticipate conflicts between human workers and robots (1 green dot)

What to account for?
- Number of people directly employed in the project
- Number of people indirectly employed in the local area: in local services (restaurants, etc.), and public services (schools, hospitals, etc.) (1 green dot)
- The unemployment rate in the local area (an increase in employment is more important if unemployment rate is high; 1 green dot)

Adaptability (3 green dots)
Participants: RM, NA, DT, GSJ, GC



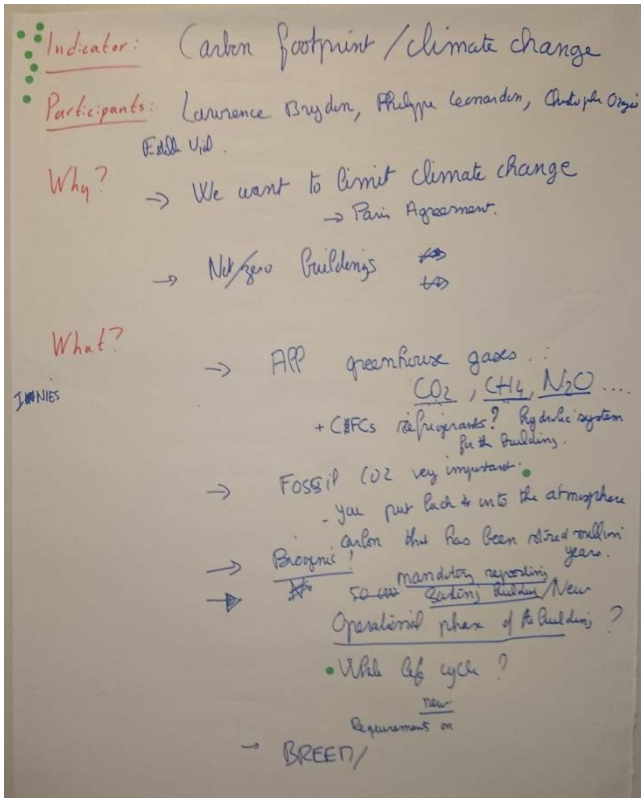
Why include in assessment?
- To use less material and energy
- Extending lifetime

What to account for?
- No mixed materials
- Design for reuse (1 green dot)
- Inventory of materials used (what? how much? volume, life time,...; 2 green dots)
- Flexibility of building without mechanical changes (1 green dot)
- Adaptability to natural risk and climate change (2 green dots)

- Integration to local climate
- Simplicity of construction process (1 green dot)

Carbon footprint / climate change (7 green dots)

Participants: LB, PL, CO, EV



Why include in assessment?

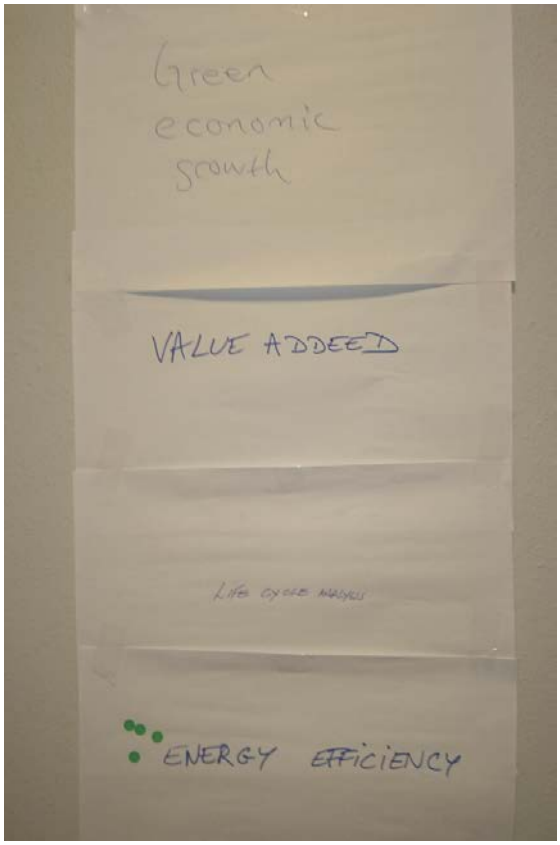
- We want to limit climate change (cf. the Paris Agreement)

What to account for?

- Zero emissions buildings
- All greenhouse gases: CO_2, CH_4, N_2O (+CFC refrigerants from hydraulic systems?)
- Fossil CO_2 is more important than biogenic CO_2 as you put back into the atmosphere carbon that has been stored for millions of years (1 green dot)

How to assess it?

- Mandatory reporting for new and existing buildings on their operational phase
- For new building: LCA of the whole building, including production and end-of-life? (1 green dot)



The following suggestions for important indicators were not topics of group discussions:

- Green economic growth (no votes)
- Value-added (no votes)
- Life cycle analysis (no votes)
- Energy efficiency (4 green dots)

3.2 Summary of results

The workshop participants identified a total of 14 indicators that are potentially important. Of these, 10 were chosen as the topic in nine different group discussions (one group decided to deal with both beauty and biophilia). The results of the voting procedure at the end of the workshop indicate the following list of top-priority indicators in sustainability assessments of bio-based products, which all received at least six positive votes:

- Local impacts (12 green dots)
- Health and well-being (12 green dots; 1 red dot on the health and well-being of flora and fauna)
- Beauty and Biophilia (10 green dots; 1 red dot on Biophilia)
- Climate impacts (7 green dots)
- Resource depletion (7 green dots)
- Waste management (7 green dots)

The ranking order above is based on the votes cast on the heading of the group discussion, i.e., on the indicator itself. However, several votes were spent to state an opinion on details in the results from the group discussions. Seven green dots were, for example, distributed between different aspects of Adaptability. If votes cast on specific aspects of the indicator are included in the results, we get the following list of top-priority indicators (see Figure 1 below):

- Local impacts (14 green dots)
- Waste management (13 green dots)
- Health and well-being (14 green dots; 3 red dots)
- Resource depletion (10 green dots)
- Adaptability (10 green dots)
- Beauty and Biophilia (12 green dots; 2 red dots)
- Employment (9 green dots)
- Climate impacts (9 green dots)

Social and environmental concerns dominate the top-priority indicators, but local impacts also include impacts on the local economy. The purely economic indicators Production cost and Value added received few votes.

Several of the indicators are quite broad. Some of them also overlap, for example, waste and adaptability, and local impact and employment. Looking at the results as a whole, two or three broad themes emerge as particularly important. The first is resource efficiency. This was mentioned by several discussion groups in terms of reusability of the building and building components, and the recyclability of the material. It also includes energy efficiency, an indicator that received several votes, although it was not discussed in a group.

The second theme that emerges in the results is the health and well-being of the residents in the buildings and the workers along the life cycle of the buildings. Several aspects of beauty and biophilia belong to this theme. The discussion of hazardous substances in a couple of groups also relates to this theme.

A third theme concerns the local impacts. This theme is not separate from the others, but strongly overlaps the second theme. However, besides direct impacts on health and well-being, this theme also includes impacts on the local economy and employment.

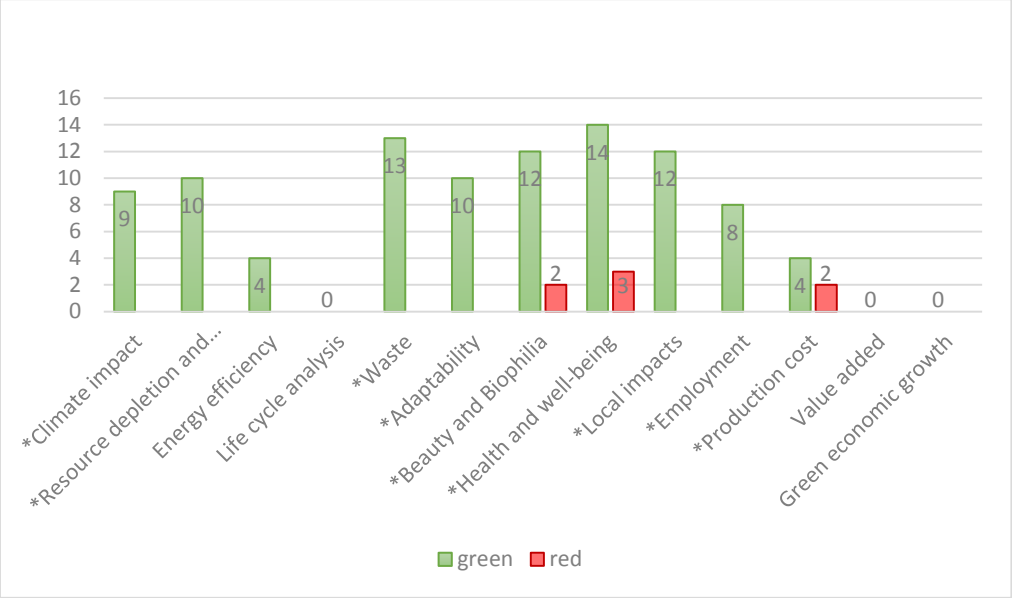


Figure 1: Summary of the voting results on sustainability indicators, taking votes on specific aspects of the indicator into account. Green bars represent votes stating that the indicator is important to include in a sustainability assessment; red bars represent votes stating that the indicator should not be included. Indicators with an asterisk were chosen as topics for group discussions.

4 Discussion

The results of the workshop represent the views of the individuals participating in the workshop. The participants included, for example, several environmental researchers, a few policy makers, and a few architects. The workshop was held at a conference on wood buildings, which means the participants are likely to have, on average and in total, more interest and knowledge on wood buildings than on buildings constructed from other materials. The workshop was held in Bordeaux, which means most participants were European and many of them French.

To be more precise, the results represent the views the participants held the afternoon when the workshop was held. The priorities of the participants might, for example, be influenced by topics presented and discussed earlier in the WoodRise Congress.

For comparison, another Open Space workshop was organised last year at IVL Swedish Environmental Research Institute (Ekvall 2017). The topic of that workshop was to identify and discuss indicators important in a sustainability assessment of bio-based products. Most participants were Swedish environmental researchers. Environmental issues dominated both the ideas for indicators, the group discussions and, particularly and the outcome of the voting. The top-priority indicators were impacts on climate and biodiversity.

Contrasting the two workshops, it is evident that social aspects such as well-being and employment are given more weight in our case. This might be because of the presence of architects and policy-makers in our workshop. It might also be because we discussed a specific product category: buildings. This makes it easier to discern affected groups of people and aspects of their well-being. It might also have made it easier to identify and, hence, give weight to aspects of reuse and recycling.

On a final note, well established indicators, such as economic cost, value added, energy efficiency, and most of the indicators in life cycle assessments, received little attention in the group discussions and few votes in the end. This might be because the workshop participants found it more interesting to discuss new and emerging issues, rather than the indicators used in conventional assessments.

Energy efficiency, for example, was identified as a potentially important indicator but was not chosen as a topic for group discussions. In the end it received more votes than the other indicators that were not chosen for group discussions, but much fewer votes compared to the top-priority indicators. This might have been because the indicator is well established, and also because of the context of the workshop at the WoodRise Congress in a city with temperate climate. Energy use in the use phase dominates the environmental life cycle impacts of traditional buildings in cold climates (see, e.g., Brunklaus & Baumann, 2002). It grows less important over time as modern buildings become more energy efficient. However, the energy efficiency is very important for the life cycle impacts of buildings in cold climate. It can also be very important for buildings in hot climate, but less so in a temperate climate.

5 Future work

The results from this Open Space workshop will be used as input to the research project BenchValue, which aims to transform ToSIA into a tool for comparative sustainability assessments in a life cycle perspective of wood buildings and other wood products with products based on competing materials (see Section 1.1). The output from the workshop will be used, together with existing literature, as the basis for discussions on what indicators should be given priority in the future version of ToSIA and on how these indicators should be modeled.

The workshop and its results can also be used by any reader as inspiration for future research in this area.

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