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Area 3 - Responsible Architecture
Resource Efficiency for the Building Sector - JRC consultation on draft proposals for indicators to assess the environmental performance of buildings
ACE response
Date: 5 October 2016

AUTHOR

ESA Work Group

BACKGROUND

- In July 2014, the EU Commission released the Communication on Resource Efficiency Opportunities in the Building Sector, which identified the need for a common European approach to assess the environmental performance of buildings throughout their lifecycle, taking into account the use of resources such as energy, materials and water.

- The Commission's Joint Research Centre (JRC) is entrusted with a study to develop this common framework of indicators. For that purpose, a steering committee and different sub-groups of stakeholders were set up to guide the process at different stages. ACE is represented in the Steering Committee by Judit Kimpian, Chair of the ESA Work Group.

- The aim is to develop a common framework that is open source in the sense that it should be possible to use it: 1) directly by building professionals and their clients to prioritise their focus for making environmental improvements, as well as; 2) indirectly by assessment and certification schemes to ensure that their criteria reflect priority areas of focus for resource efficiency at a European level and to assure the comparability of data and results.

- In June 2016, the JRC launched a public consultation on the first draft proposals for indicators (open until 7 October). The findings from both the consultation and the stakeholder working group meeting will then be used to inform preparation of the final framework of core indicators.

ACE RESPONSE TO THE CONSULTATION

General comments

The aim of indicators
ACE welcomes the Commission's work on Resource Efficiency Indicators. Transparent and harmonized metrics are needed to transform our built environment to require significantly less natural resources to be healthy, comfortable and productive. The proposed framework of indicators needs to be robust enough to enable a routine assessment of the lifecycle impact of decisions relating to the design, operation and retrofit of buildings.

The scope of indicators
Indicators that facilitate a better consideration of lifespan as well as the lifecycle impact of buildings and components should have Life Cycle Assessment at its core, supported by Environmental Product Declarations. The inclusion of indoor environmental quality, life cycle cost and climate change resilience is essential to support a greater emphasis of occupant

needs and better architectural quality as part of such assessments. A greater emphasis on the importance of architectural design to successfully synthesise the complex drivers into a spatial and material configuration would be welcome.

The role of data and feedback – a framework for continuous improvement

A set of clearly defined and measurable indicators will allow professionals to compare building performance predicted in the design phase with the achieved and maintained operational performance, underpinning a virtuous cycle of feedback and continuous improvement. The benefits of such a framework of indicators would be greatly enhanced by mechanisms that allow the data collected to be shared in the public domain to facilitate feedback loops for continuous improvement. Furthermore, it would be extremely important to develop a European database with information on sustainable building materials. Technical data should herby be directly linked to applied calculation tools and its use should ideally be cost-free.

Indicators vs ratings

As a general observation, the document should make a clear distinction between INDICATORS and RATINGS as this may not be clear to the intended audience. The aim of the project should be to create a data structure with associated methodologies for the disclosure (not evaluation) of key building data

Use of the data

It would be helpful to include a clear vision of how data will help overcome existing barriers to productivity. References to a potential Building Passport and efforts to take advantage of BIM would be useful. As part of the scope for developing indicators. The Commission should be encouraged to compile all methods for sustainability that exist in Europe. Some reference should be made to how the management of such data may happen in the future via digital means and how that would facilitate the exchange and aggregation of good quality building performance data.

'Sustainability' vs 'quality'

It would be useful for the document to highlight that these indicators are essential for establishing a new consensus on the definition of building quality. The terms sustainability and resource efficiency are often perceived as an on-cost with gains that are long-term. The experience of the profession is that these approaches deliver value for money for all stakeholders involved even in the short term and should be referred to as 'best practice' design and construction.

ACE largely supports the response submitted by the World Green Building Council (WGBC) to each question and adds the following commentary:

Part 2 – How the framework of indicators should work

Comment: It is not helpful to differentiate between advanced and basic core indicators – the scheme is voluntary and as such it needs to be clear about the direction of travel. As a voluntary set of indicators, users are likely to adopt the indicators they are able to supply data for. It is particularly important for LCAs not to be considered an advanced approach but one of the cornerstones of the core indicators. It is important that users of the indicators receive guidance on how to proceed if only some of the data is available, including clarity on how to indicate the source and nature of any data collected.

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Q2.1 Please tick the boxes which best reflect your opinion about the following:

	Strongly disagree	Disagree	Neutral opinion	Agree	Strongly agree
*A set of basic indicators should be used, each with a similar 'basic' ambition level	○	○	●	○	○
*A set of basic indicators should be used, complemented by optional additional indicators, all at a similar 'basic' ambition level	○	○	●	○	○
*A set of basic indicators should be used, complemented by optional additional more challenging 'advanced' indicators	○	○	●	○	○
*A combined set of 'basic' and 'advanced' indicators should be used, complemented by optional additional indicators, for different levels of ambition	○	○	●	○	○

- **Q2.2 How many indicators do you think there should be in total?**

ACE: There should be as many as required.

- **To what extent should the indicators require differing levels of expertise?**

ACE: All macro-objectives should have a combination of indicators requiring a basic and a greater level of expertise.

- **Q2.4 Would there be value in offering additional, more targeted indicators to measure intensity of resource use (e.g. on a per occupant basis instead of per m2)?**

ACE: The use of additional, more targeted indicator metrics should only be recommended for internal use.

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- **Q2.5 To what extent could narrower *life cycle stage boundaries* (e.g. production, construction, use, End of Life etc.) be defined in order to encourage greater reporting on life cycle Global Warming Potential (GWP), Life Cycle Assessment (LCA) and Life Cycle Costing (LCC)?**

ACE: The life cycle stage boundaries set out in standards should not be narrowed – for the reasons stated above.

- **Q2.6 To what extent could a narrower building component scope (e.g. structure, facade, fit out materials) be defined in order to encourage greater reporting on life cycle Global Warming Potential (GWP), Life Cycle Assessment (LCA) and Life Cycle Costing (LCC)?**

ACE: The building component scope set out in standards should not be narrowed – for the reasons stated above.

- **Q2.7 What should be the approach given that data may be limited in quality/availability in some member states?**

ACE: Users shall report on data sources and quality in order to be transparent – a clear definition of source, quality, life cycle stage, element and whether it is measured or calculated is needed. If the figures are calculated than the core assumptions behind these should be disclosed.

- **Q2.8 At what level do you think it is most appropriate that the indicators support performance comparisons?**

ACE: Across the whole of Europe.

- **Q2.9 To what extent should the indicators allow for the tracking of quantifiable aspects of building performance from design through to post-occupation?**

ACE: Performance at both design and post-occupation stages with the potential for occupant surveys. – All three pillars of building performance should be assessed: indoor environmental quality, occupant satisfaction and the resources required to achieve these to ensure that none take preference at the cost of the others.

Part 3 – Questions relating to the initially proposed indicators

- **Q3.1 Please tick the options which best reflect your opinions about the suitability of each indicator to measure performance:**

ACE: The responses to this question are copied in the table below. It is highly recommended that LCAs form the core of the methodology and that indicators are created within this framework. The contentious areas are in climate change resilience and design for disassembly where the metrics and associated calculation/disclosure methodologies are still in development.

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	Unsuitable	Neutral opinion	Partly suitable	Suitable as proposed
*Indicator 1.1. Total primary energy consumption (kWh/m2/yr)	○	○	○	⦿
*Indicator 1.2. Operational and embodied Global Warming Potential (kg CO2 eq/m2/yr)	○	○	○	⦿
*Indicator 2.1. Cradle to grave Life Cycle Assessment (LCA) (Impact category results normalised to m2)	○	○	○	⦿
*Indicator 2.2. Service life reporting(design service life for building and specified elements/components)	○	○	○	⦿
*Indicator 2.3. Ease and scope for disassembly and recycling (Sum of category scores)	⦿	○	○	○
*Indicator 2.4. Construction and Demolition waste arisings (i. tonnes/100 m2 floor area; ii. % diversion from landfill to recycling and re-use excluding backfilling)	○	○	⦿	○
*Indicator 3.1. Total mains drinking water consumption (m3 per person per year)	○	○	⦿	○
*Indicator 4.1. Quantitative reporting on specific pollutant levels: CO2, total VOC, Carcinogenic VOCs, R-Value, formaldehyde, benzene and particulates (PM 2,5/10,0)	○	○	○	⦿
*Indicator 4.1. Qualitative reporting on the presence of mould	○	○	⦿	○
*Indicator 5.1. Overheating risk assessment (adaptive degree hours)	○	○	⦿	○
*Indicator 5.2a. Additional cooling primary energy consumption (kWh/m2)	○	○	⦿	○
*Indicator 5.2b. Green factor (sum of weighted cooling effect for green features on/around the building)	○	⦿	○	○
*Indicator 6.1a. Long term utility costs (€/m2.yr over 30 or 50 years)	○	○	⦿	○
*Indicator 6.1b. Long term acquisition and maintenance costs (€/m2.yr over 30 or 50 years)	○	○	○	⦿
Indicator 6.2. Value and risk factors (Reliability rating for the input data and assumptions for each indicator)	○	○	○	⦿

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- **Q3.2 Please enter a value of 1-5 (1 = strongly disagree, 2 = disagree, 3 = neutral opinion, 4 = agree and 5 = strongly agree) which best reflect your opinions about the following statements for each indicator:**

	...is simple, accessible and easy to understand.	...is based on readily available and accepted methodology, tools and units.	...supports comparison of building performance at project and local level.	...is easy and cost effective to verify.
Indicator 1.1. Total primary energy consumption (kWh/m2/yr)...	5	5	5	5
Indicator 1.2. Operational and embodied Global Warming Potential (kg CO2 eq/m2/yr)...	4	4	4	4
Indicator 2.1. Cradle to grave LCA (Impact category results normalised to m2)...	3	4	5	4
Indicator 2.2. Service life reporting (design service life of the building and specified elements/components)...	3	3	3	3
Indicator 2.3. Ease and scope for disassembly and recycling (Sum of category scores)...	2	1	3	3
Indicator 2.4. Waste arisings a. Demolition; b. Construction (i. t/100 m2 floor area; ii. % diversion to recycling and re-use excluding backfilling)...	3	2	3	3
Indicator 3.1. Total mains drinking water consumption (during use stage) (total mains water consumption m3 per person per year)...	5	5	5	5
Indicator 4.1. Quantitative reporting on specific pollutant levels: CO2, total VOC, Carcinogenic VOCs, R-Value, formaldehyde, benzene and particulates (PM 2,5/10,0)...	4	4	4	4
Indicator 4.1. Qualitative reporting on the presence of mould...	4	3	3	3
Indicator 5.1. Overheating risk assessment (adaptive degree hours)...	5	4	5	3
Indicator 5.2a. Additional cooling primary energy consumption (kWh/m2)...	4	4	4	4
Indicator 5.2b. Green factor (Sum of weighted cooling effect for green features on/around the building)...	3	3	1	3
Indicator 6.1a. Long term utility costs (€/yr normalised per m2 over 30 or 50 years)...	5	5	5	5
Indicator 6.1b. Long-term acquisition and maintenance costs (€/yr normalised per m2 over 30 or 50 years)...	3	3	3	3
Indicator 6.2. Value and risk factors (Reliability rating for the input data and assumptions for each indicator)...	4	3	3	3

- **Q3.3 For office buildings, which aspects of indicator 1.1 (total primary energy consumption: kWh/m2/yr) should be aligned with the proposed EU Voluntary Certificate Scheme?**

ACE: all options ticked:
- Harmonisation with the headline indicator.
- Use of hourly dynamic energy simulation.
- Reporting of both calculated and measured performance.
- Disclosure of input assumptions.
- Option to also report on CO2 emissions.

Additional aspects: EVCS is still under development and it is not yet certain that the reporting of operational energy consumption will be part of the final scheme. Irrespective of this outcome the high level indicators need to show a clear alignment of metrics between calculated and measured energy use. On this basis it should be a major objective to obtain one single calculation procedure/method for energy performance and energy saving that should include sufficient endogenous variable taking into account different conditions such as climate

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conditions.

- **Q3.4 Does indicator 1.1 (total primary energy consumption) provide a strong enough incentive to design more resource efficient buildings?**

ACE: It should have a stronger focus on delivered (final) electricity/fuel use e.g. heating and cooling demand – This is to ensure that all architectural means for reducing energy demand are exhausted prior to applying renewable technologies.

- **Q3.5 What form should reporting on a full LCA (indicator 2.1 Cradle to grave LCA) take?**

ACE: Provision of results for the impact categories listed in EN 15978, together with results for some additional impact categories.

- **Q3.6 Opinions about certain aspects of indicators 2.1-2.4**

ACE: Some of the indicators relating to occupant satisfaction and indoor environmental quality could be further strengthened.

	Strongly disagree	Disagree	Neutral opinion	Agree	Strongly agree
A 'design for adaptability' indicator does not need to be developed, because it is already considered within indicators 1.2 (Operational and embodied GWP) and 2.1 (Cradle to grave LCA)	○	●	○	○	○
Indicator 2.2 (Service life reporting) has added value being reported as a separate indicator	○	○	○	○	●
Indicator 2.3 (Ease and scope for disassembly and recycling) will encourage design teams and contractors to focus on this issue at design and construction stage	○	○	●	○	○
The in-situ reuse of large building elements such as structures in new or remodelled buildings should be specifically encouraged by a dedicated indicator	○	○	●	○	○
A 'recycled content' indicator for building materials **does not** need to be developed because it is already addressed within indicators 1.2 (Operational and embodied GWP) and 2.1 (Cradle to grave LCA)	○	○	●	○	○
Indicators 1.2 (Operational and embodied GWP) and 2.3 (Ease and scope for disassembly and recycling) should be linked to allow for any potential net CO2 benefits from the reuse and recycling of materials at the end of life of a building (EN 15978, Module D) to be consistently accounted for	○	○	◉	○	○

- **Q3.7 Is the proposed indicator 3.1 (Total mains drinking water consumption (during use stage)) sufficient to measure intensity of water use?**

ACE: Water consumption should be normalised to the predicted building occupation.

- **Q3.8 What type of data do you consider appropriate to use for the water consumption of sanitary fittings?**

ACE: Water consumption of sanitary fittings should be verified by third party verification of manufacturers claims.

- **Q3.9 Considering average residential water consumption with indicator 3.1 (Total mains drinking water consumption (during use stage)).**

ACE: Strongly agree with calculated residential water use to be adjusted to reflect average consumption in a specific are of the EU.

- **Q3.10 The appropriateness of the pollutants covered in indicator 4.1 (Reporting on specific pollutant levels or pollutant presence).**

	Strongly disagree	Disagree	Neutral opinion	Agree	Strongly agree
CO2 should be included	○	○	○	○	◉
TVOC should be included	○	○	○	○	◉
Formaldehyde should be included	○	○	○	○	◉
R-value should be included	○	○	○	○	◉
Carcinogenic VOCs should be included	○	○	○	○	◉
Benzene should be included	○	○	○	○	◉
Particulates (PM 2.5 / 10) should be included	○	○	○	○	◉
Presence of mould should be included	○	○	○	○	◉

- **Q3.11 How should the scope of building products, for which emissions testing results should be obtained, be defined?**

ACE: The scope of building products should be based on a complete list of construction, renovation and fit-out products wherever these are available.

- **Q3.12 Opinions about certain aspects of indicators 5.1, 5.2a and 5.2b.**

ACE: See responses in the table below. Even though the indicators could be incorporated as part of an LCA it is useful to create a separate indicator for climate change resilience. This is because how we assess the key risks associated with climate change are still being developed, such as overheating and flood risk. The indicators as they stand are not yet firm enough.

	Strongly disagree	Disagree	Neutral opinion	Agree	Strongly agree
Both *Overheating risk assessment* (indicator 5.1) and *Additional cooling primary energy consumption* (indicator 5.2a) should be reported	○	○	○	◉	○
The two main indicators 5.2a (*Additional cooling primary energy consumption*) and 5.1 (*Overheating risk assessment*) should be covered in indicators 1.1 (*Total primary energy consumption*) and 4.1 (*Reporting on specific pollutant levels or pollutant presence*) respectively, negating the need for any macro-objective 5 section	○	○	○	◉	○
A proxy measure for the *microclimate cooling effect* (indicator 5.2b Green factor) would be a useful alternative to a building thermal simulation	○	○	◉	○	○

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- **Q3.13 Further opinions about indicators 6.1a, 6.1b and 6.2. relating to life cycle costing**

	Strongly disagree	Disagree	Neutral opinion	Agree	Strongly agree
The "cost optimal" EU methodology (as described in Delegated Regulaton (EU) No 244/2012) should be used as a simplified methodology for indicator 6.1a (*Long term utility costs*)	○	●	○	○	○
The Life Cycle Costing (LCC) focus on operational costs and long term acquisition and maintenance costs for indicator 6.1b (*Long-term acquisition and maintenance costs*) is appropriate	○	○	○	●	○
A simple reliability rating based on a scoring of the input data and assumptions for each of the other indicators (e.g. *1.1 Total primary energy consumption*) would be useful for valuers	○	○	◉	○	○

- **Q3.14 What do you think are the most appropriate life spans for maintenance plans for the following building types?**

	<10 years	10-15 years	15-20 years	20-30 years	30-50 years	50-100 years	>100 years
Individual houses	○	○	○	●	○	○	○
Apartment blocks	○	○	○	○	●	○	○
Office buildings	○	○	○	◉	○	○	○

Part 4 – Open questions

- **Q4.1 How should the framework of indicators work and to which actors would it be most relevant?**

ACE: Developing a building design that balances performance against core indicators with occupant needs and return on investment is the role of the architect. Greater emphasis on the prediction and tracking of the whole life impact of buildings across all top level indicators will greatly support architectural design and likely to result in more resilient buildings when coupled with validation of achieved performance. The importance of architectural design should be acknowledged by the document.

Please see Part 1 for further responses to Q4.1 & Q4.2

ANNEXES

- [Consultation questionnaire](#)
- [Short background guide to the consultation](#)
- [Summary findings and indicator proposals for the life cycle environmental performance and resource efficiency of EU office and residential buildings](#)