



EUROPEAN COMMISSION
JOINT RESEARCH CENTRE

Directorate B: Growth and innovation
Unit B.5. Circular economy and Industrial leadership

1st Ad-Hoc Working Group (AHWG) meeting for the revision of Green Public Procurement criteria for:

Buildings

**Presentation about policy and project background, product
group scope, definition and initial criteria proposals**

Held online on 21st and 22nd March 2022

Minutes of the meeting

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.



Contents

| | |
|--|----|
| Agenda: Day 1 | 2 |
| <i>Background to GPP criteria for buildings</i> | 2 |
| <i>Selection criteria and Theme 1: Energy efficiency and whole life carbon</i> | 5 |
| <i>Theme 2: Material efficiency and circularity</i> | 8 |
| <i>Theme 3: water efficiency</i> | 10 |
| <i>Closing remarks for Day 1</i> | 11 |
| Agenda: Day 2 | 12 |
| <i>Theme 4: Occupant comfort and health</i> | 12 |
| <i>Theme 5. Vulnerability and resilience to climate change</i> | 17 |
| <i>Theme 6. Life cycle costing (LCC)</i> | 19 |
| <i>Theme 7. Biodiversity</i> | 19 |
| <i>Next steps</i> | 21 |

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.



Agenda: Day 1

21 March 2022

| Time | Agenda point |
|---------------|--|
| 10:00 - 10:10 | Housekeeping and general points. |
| 10:10 – 10:20 | Purpose of this meeting. |
| 10:20 – 11:00 | Background to GPP criteria for buildings: themes for criteria. |
| 11:00 – 11:10 | Scope and definitions. |
| 11:10 – 11:20 | Theme 1: Energy consumption and greenhouse gas emissions. |
| 11:20 – 11:30 | Theme 2: Material circularity. |
| 11:30 – 13:00 | Theme 3: Use stage water consumption. |

Background to GPP criteria for buildings

The JRC briefly explained the general EU GPP criteria revision process (see Figure 1) and how recent policy developments had influenced the decision to group EU GPP criteria for buildings into 7 themes (see Figure 2).

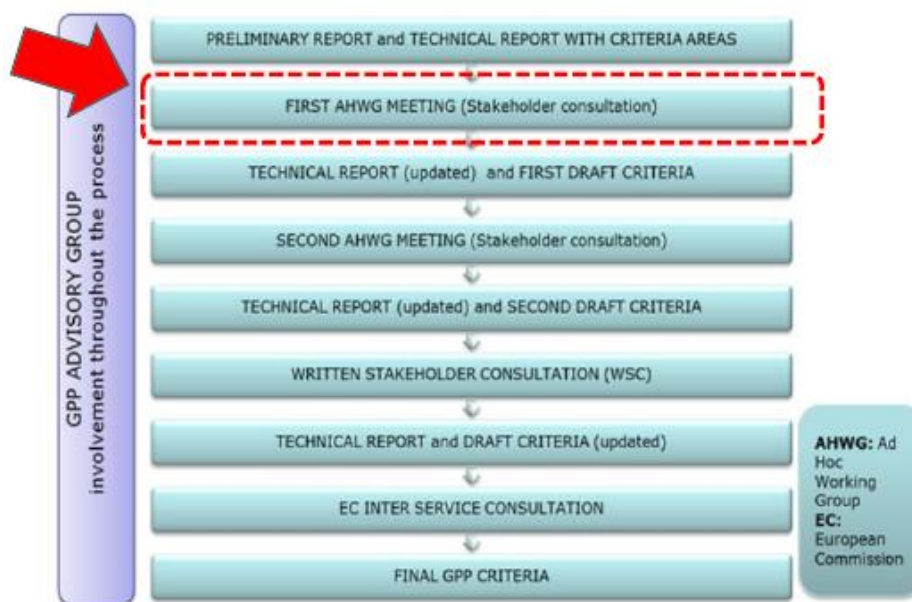


Figure 1. General process for EU GPP projects.

As indicated in the diagram above, it was explained to stakeholders that we are still at an early stage in the process. Due to the complex nature of buildings and the many different types of expertise

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.



involved, it was foreseen to create a number of expert sub-groups to help check, define and refine criteria proposals ahead of the second AHWG meeting.

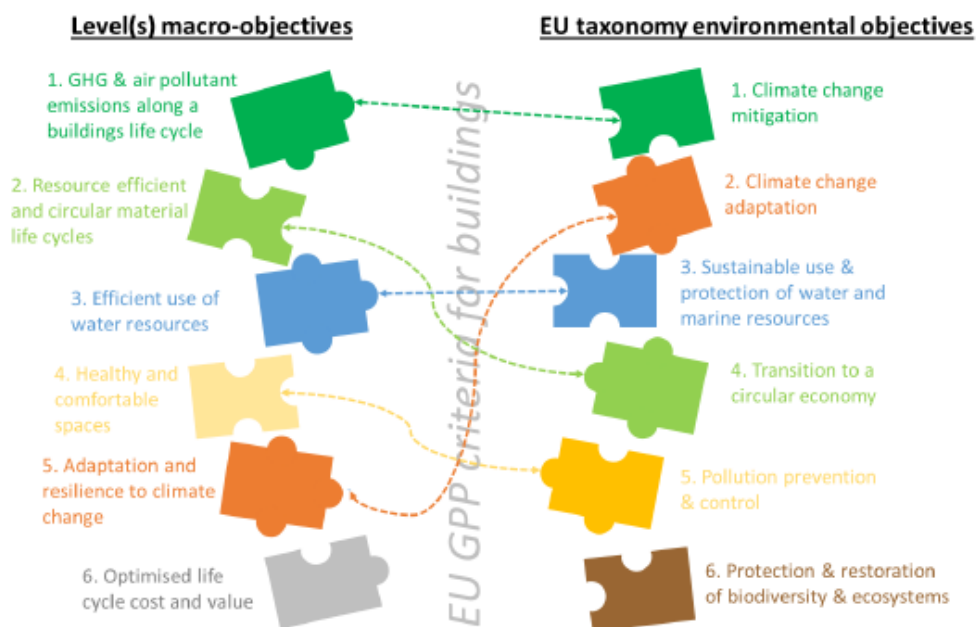


Figure 2. Illustration of EU policy influence on the choice of themes for EU GPP criteria for buildings

The 7 themes for criteria come are based on 6 “macro-objectives” defined in Level(s): a common EU framework for the assessment of sustainability of buildings and the 6 environmental objectives of the EU Taxonomy used to define environmentally sustainable economic activities in the EU and beyond. The main differences in the two were that Level(s) includes life cycle costing (Theme 6 for GPP) while the EU Taxonomy includes biodiversity (Theme 7 for GPP).

When registering for the webinar, stakeholders were asked to state to what extent they agreed on each of the 7 themes being covered by EU GPP criteria for buildings. The results are shown below.

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.

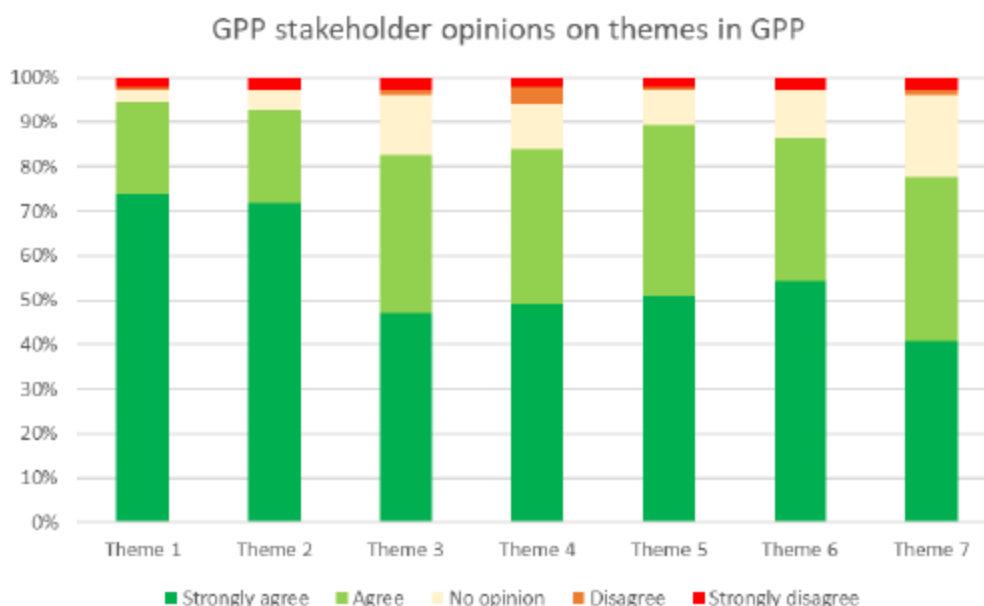


Figure 3. To what extent stakeholders agreed on themes being relevant to GPP for buildings (n=149)

It was clear that stakeholders generally agreed on the relevance of all 7 themes (>75% positive sentiment) although, if some distinction must be made, it is that theme 1 (use stage energy consumption) and theme 2 (whole life carbon) are considered as the most important of all (>90% positive sentiment).

Stakeholders were asked for their opinions about the scope (e.g. types of buildings, types of works and types of services to be included), about definitions and for opinions about the process itself.

Stakeholder discussion - General points and scope:

Several stakeholders raised questions about the project timeline. One of them asked when the 2nd AHWG will take place. JRC replied that the date will be set depending on how smoothly the subgroups proceed and how quickly the JRC can reach clear ideas for the next criteria proposals. However, the length of time between the first AHWG meeting and the second one can be anywhere between 6 months to 12 months. It really depends how much debate is needed to reach good compromises and good proposals. There are many ongoing policy developments that may impact the process.

One stakeholder wished to highlight the fact that there is no reference to EN 15804+A2 on the slide referring to the scope of Theme 1 sub group. JRC responded by saying that indeed the EN 15804 should be mentioned in that particular subgroup of experts which the JRC is trying to build.

A stakeholder asked when will proposed criterial will be split in Technical specifications and Award Criteria. Will more Contract performance clauses will be prepared? JRC indicated that these will come in the second version of criteria, but first it is important to have a clear structure for criteria (i.e. the themes).

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.



A question was raised about how to nominate experts for the subgroups. The JRC replied that a call for interest will be published first, probably via EU Survey. Then, depending on how many responses are received, the JRC may need to prioritise some stakeholders over others. Normally, the optimal number of people per subgroup is around 10 to 12 people.

With regards to the scope, a stakeholder asked whether the JRC has considered expanding it to infrastructure, as these sectors share so many similarities and are interdependent in terms of material streams, supply chains, standards and norms. The joint consideration of buildings and infrastructure by the [European Circular Economy Stakeholder Platform](#) was cited as a justification for this. JRC replied that at the moment, it is not planned to include infrastructure. The subject matter is very different. Although, there are some overlaps such as District Heating from multiple buildings, a larger scale on-site renewables, sustainable drainage systems or even transport and mobility features. The JRC also referred to existing EU GPP criteria for road design, construction and maintenance and EU GPP criteria for road lighting and traffic signals.

A stakeholder indicated that embodied environmental impacts measured with EN 15978 relate to many of the themes. In other words, there are many other impacts, beyond global warming potential, that can be measured when using EN 15978 such as biodiversity, resource use, etc. The JRC accepted the point but highlighted that, at the moment, lifecycle carbon is taken as a first step towards life cycle impacts, and then, maybe in the future other impact categories may be considered.

Selection criteria and Theme 1: Energy efficiency and whole life carbon

The JRC presented an overview of:

- *Selection criteria for: (i) the project manager, (ii) the design team, (iii) the main construction contractor and specialist contractors, (iv) Design-Build-Operate contractors and property developers and (v) energy management systems.*
- *Criteria under Theme 1.1 Use stage energy consumption (1.1.1 on use stage primary energy consumption; 1.1.2 on passive HVAC features; 1.1.3 Energy efficient HVAC, lighting and hot water and 1.1.4 on energy storage, energy management and onsite renewables).*
- *The criterion under Theme 1.2 Whole life carbon (WLC).*

Stakeholder discussion - selection criteria:

Regarding selection criteria, one stakeholder commented that these are focussed on people, when, in a normal 2-stage procurement process, tenderers would not have specific people earmarked at the beginning of the process (this would only come later, at the award stage). The Public Procurement Directives actually allow for **“people-centred”** selection criteria to be applied later on at the award stage. The same stakeholder suggested that **supply chain management or environmental management systems**, be they third-party certified or in-house, could be defined for selection criteria at the initial selection stage. The JRC agreed with this in principle, citing that this could potentially send a strong market signal to the supply chain and that it could refer to EMAS or

Seville



ISO 14001 or to more material-specific schemes such as FSC or PEFC for wood and CSC responsible sourcing for concrete and aggregates.

Stakeholder discussion – Theme 1.1:

One stakeholder urged caution with trying to be **too prescriptive in EU GPP criteria for solar shading, or cross-ventilation** because their relative importance will vary depending on the energy balance formula for the building (e.g. U-value for keeping heat in and G-value for keeping passive solar gain out) and also for the occupation patterns of the building. The stakeholder offered to provide some examples in later written comments. JRC accepted the point and highlighted that this should be explored in more detail in the expert sub-groups. Later in the meeting, the same issue was raised with thermal mass, which led to the JRC commenting that the same issue applies, namely that care should be taken not to be too prescriptive in EU GPP criteria as the optimum requirements will depend on the whole building design and climate.

Regarding criterion ‘1.1.4 Energy storage, management & onsite renewables’ a stakeholder asked whether the **onsite renewables storage** need to meet at least 10% of at least 2 days storage of the renewable production or the total building consumption. JRC replied that it this could be interpreted either way as it was written, but that it should probably be 2 days of renewable production, since the thinking behind the criterion was about how to get the best export price for any excess renewable electricity generated onsite.

Another stakeholder point out that the shower water heat recovery makes a lot of sense and adds that it's a simple and cost-effective way to save up to 40% of final energy and related CO2 emissions of hot water production. JRC completely agreed, going on to emphasise the simplicity of this solution (i.e. no moving parts and no power supply needed).

Stakeholder discussion – Theme 1.2:

Support was generally expressed for the idea of reporting on Whole Life Carbon (WLC) at several stages of the building lifetime under criterion 1.2. However, it was asked why would anyone do a WLC assessment using only rough data? The JRC responded by saying that this could potentially apply if the procurer wants all tenderers to do an initial, non-competitive WLC to demonstrate that they are aware of how to do this and the main influences on results. However, the JRC agreed that if the contractor (i.e. the winning tenderer) is to do the WLC, it should at least use more detailed design data.

Stakeholders involved in reviewing the RICS Professional Statement on Whole Life Carbon were considering to make **Module D** mandatory (currently only Modules A-C are mandatory). The main attraction of reporting on Module D is the link to reporting on benefits of improved circularity. However, this prompted some concerns to be raised about the risk of double counting (i.e. Module A+B+C-D for the original building AND Module D credits being transferred to a second building). It was clarified that Module D should always focus “beyond” the existing building (i.e. no risk of double counting) but that the attraction of reporting is instead to help flag opportunities for urban mining, which links to theme 2 on material efficiency and circularity.

Seville



Important downsides of the current approach to **Module D** reporting were nevertheless highlighted by another stakeholder, namely that: (i) it does not create any difference in results for buildings with great design for deconstruction and buildings that can only realistically go to landfill; (ii) there can be a mismatch between high recyclability (Module D) and low recycled content (Module A) in growing markets and (iii) that it focuses on a distant future rather than decisions that designers can take today.

JRC indicated that **Module D** is important to get a full picture but this may bring a potential double counting. A stakeholder added that national methods for building WLC assessment were taking different approaches to Module D, sometimes combining them with Module A-C results. The JRC confirmed that they would be looking into this with the expert sub-group to check how approaches to Module D compare to the requirements of EN 15978. One stakeholder stated that a new version of EN 15978 is coming, potentially by the end of 2022, but that no change in the approach to dealing with Module D was expected.

Regarding the consistent use of **floor areas**, one stakeholder stated that they hope and expect EU GPP criteria to follow the International Property Measurement Standards (IPMS), which is already stated in the Level(s) framework and the EU Taxonomy. The JRC responded by saying that they also expect criterion 1.2 to be based on IPMS, but the doubt is whether the criterion 1.1.1 on use stage primary energy consumption would use this. Ideally a WLC assessment is simply a case of adding average embodied carbon (per m²/yr) and average operational carbon (per m²/yr) and multiplying by the building lifetime. However, if the m² are not the same for operational carbon, the calculation is more complex. There are potential grey areas for the 1.1.1 floor area, for example closable terraces, underground parking etc. Further research is needed to know how the national and regional methods deal with floor areas for assessing the energy performance of buildings.

A concern about the reliability of **information provided in EPDs** was raised, stating that information for the same products could be different in different countries. How to ensure that conditions of competition are fair? The JRC responded by saying that there is no obvious solution to solving this with GPP criteria and that the importance of the issue can be greatly reduced if GPP does not make quantitative EPD data a part of a competitive element when deciding on the award of a contract (i.e. just ask for the data to be reported, not that the bid with the lowest numbers gets the contract).

In terms of **definitions of major renovation and NZEBs**, caution was urged about simply aligning with the EU Taxonomy Annex on climate change mitigation. Although the EU Taxonomy is very recent, it came before the Fit for 55 and new EPBD proposals at the end of 2021. There is still much room for improvement with national NZEB definitions. The EU GPP criteria should follow and align with ongoing developments wherever possible. The JRC agreed to this in principle, citing the need to closely co-ordinate with Commission colleagues. A proposal to potentially ask for both NZEB (Nearly Zero ENERGY Building) and “A” ratings on a building Energy Performance Certificate (EPC) as a means to ensure that good performance is specified in all countries served to highlight the current lack of a harmonised approach across Member States. According to the new EPBD proposals, Nearly Zero EMISSION Building definitions should be aligned with an “A” rating on an EPC.

Seville



Building renovation passports (and passports for new buildings) were considered as a useful instrument to ensure that suitable information is retained to facilitate the optimum maintenance, repair and end-of-life practices, in line with the Building As a Material Bank (BAMB) principles (see more on BAMB here: <https://www.bamb2020.eu/>). The JRC supports the idea of asking for building passports, but probably only as Award Criteria, which would reward but not oblige operators to do this. This would be the approach to take if procurers are uncertain about the ability of relevant operators to produce a building passport. The best place for this criterion would be under theme 2 (specifically criterion 2.4).

The last point raised for Theme 1 was about the risk of making design decisions based solely on carbon and not on the full suite of LCA impact categories leading to undesirable outcomes. The JRC agreed in principle, but explained that most national schemes are focussing on carbon (especially embodied carbon) and that GPP has to follow that to a certain extent. If multiple impact categories are to be considered, it is important that there is an agreed normalisation and weighting process that can convert the impacts into a single score. While this has been done already for PEF, the JRC asked the audience whether EN 15978 already sets normalisation and weighting rules for generating a single score (one stakeholder offered to check this later). Another stakeholder added that they were unsure about single scores in EN standards, but that a single score approach (based on PEF) was already being applied at the national level in Belgium in the TOTEM tool (see: www.totem-building.be).

Theme 2: Material efficiency and circularity

The JRC presented an overview of the following criteria on Theme 2.

- *2.1: Bill of quantities etc.*
- *2.2: CDEW (Construction, Demolition and Excavation Waste) management*
- *2.3: Design for adaptability*
- *2.4: Design for deconstruction*
- *2.5: Operational waste management*

Stakeholder discussion – Theme 2.1:

Regarding the **bill of quantities** over the projected building lifetime, it was commented that the best gains for circularity tend to be around those building elements and materials that would be replaced most frequently. This would be not only due to more frequent replacements or refurbishments, but because it would be easier to sign extended guarantees or maintenance contracts over these shorter periods (e.g. 25 years instead of 50 years). Further thought and research would be required to understand how such contracts could or should work in EU GPP criteria.

The JRC added that even quicker gains for circularity (and savings for public money) could be achieved if EU GPP could specify **take-back criteria** for over-ordered construction materials that were not needed in the end for the completion of the construction or renovation project.

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.



Another stakeholder added that core EU GPP criteria should ideally focus on the **bill of quantities for Modules A and B** rather than just Module A. The initial proposal for 2.1 used the term “cradle to gate” (for clarity, Module A is a cradle to gate plus transport to the site and onsite construction, whereas Module B would include any replacements during the building lifetime).

A very important point raised in relation to the bill of quantities was the desire for a **universal approach to be taken that can be easily inserted into any BIM models** and which also gives us all the data we need for LCC, LCA and material passport data. The JRC fully appreciated this point and indicated that this will be subject to subgroup discussion in order to explore possible unified approaches.

Stakeholder discussion – Theme 2.2:

It was commented that targets for the reuse, recycling or recovery of CDW should be pushed further up the waste hierarchy.

Stakeholder discussion – Theme 2.3:

Strong support was expressed for addressing requirements for **accessibility** within the broader concept of design for adaptability, especially for housing. Due to the long life of buildings, a common situation could be that an occupant suffers a progressive disease or suddenly suffers from a disability and being able to adapt the building to accommodate the new situation of the occupant would be much less problematic than having to find a new (and suitable) accommodation. Waiting lists for “accessible” social housing are very long and the specific needs for a visually impaired occupant will be very different to a wheelchair-bound occupant.

Consequently, the idea of **“flexibility in use”** (i.e. mixed uses) and adaptable building spaces and features is especially useful. The JRC agreed to follow up on this point after the meeting to explore how “accessibility” could be best brought into requirements on building design for adaptability. One of the main advantages of design for adaptability is to minimise disruption and the waste of materials when a building needs to be “adapted” for a different use or different occupant circumstances.

Stakeholder discussion – Theme 2.4:

The **Reversible Building Design** (RBD) tool developed by Brussels Environment (the same team that was behind BAMB) was mentioned by a number of stakeholders, citing it as a very comprehensive approach. From the discussion, it was not clear if the RBD provided a **scoring system for deconstructability**. A link to further information was also provided, see [here](#).

One stakeholder stated that the **RBD is comprehensive but also quite complex**, and that the most appropriate way for GPP would be to stick to easy-to-understand criteria that can easily be assessed and verified by procurers. As an example, one stakeholder suggested to encourage mechanical, dry and reversible connections, i.e. % of materials which can be reused at end of first life. This would certainly promote future reusability and residual value retention. The stakeholder tried to do this at **ABN Amro Circl pavilion project** in Amsterdam. JRC agreed about the need for simple GPP criteria

Seville



and suggested to engage with the group behind the RBD tool and the ABN project as part of the expert sub-groups to explore possible GPP criteria options.

The importance of the **role of architects** in the design for adaptability and deconstruction aspects was underlined by one stakeholder. The creation of building designs for adaptability and deconstruction demand a lot of effort and time but are not always recognised or valued in procurement exercises. JRC agreed that EU GPP criteria should try to recognise these aspects in a simple, yet comprehensive way, adding that procurers also need to think about possible future scenarios for their building and occupants.

Stakeholder discussion – Theme 2.5:

It was asked if requirements on operational waste management could also include an element for designing appropriately sized/serviced waste storage areas? The JRC responded that this could be done, but care would need to be taken to make sure it remains relevant as a green criterion. Another stakeholder stated that separate waste collection and storage is normally addressed by ISO 14001 and EMAS.

Theme 3: water efficiency

The JRC presented an overview of the following criteria on Theme 3.

- *3.1.1: Per person potable water consumption.*
- *3.1.2: Water efficient devices and appliances.*
- *3.1.3: Rainwater harvesting systems.*
- *3.1.4: Greywater reuse systems.*

Stakeholder discussion – Theme 3.1.1:

One stakeholder inquired whether the 20-30% objectives of the **reduction of potable water consumption** are based of feasibility studies and if they apply to office or housing buildings. JRC responded that the actual scope for savings is to some extent limited to those uses that do not need to use potable water. However, it is possible to go beyond 30% via award criteria, for procurers that want to invest in more comprehensive rainwater/greywater collection, treatment and storage.

The same stakeholder asked if targets should be nuanced for building types (e.g. residential, office and educational). JRC agreed that targets could be nuanced in terms of building type, form and rainfall data. For example, whether or not showers or canteen facilities are used in offices will greatly affect the quantity of greywater generated.

The JRC took the opportunity to point out that the **Level(s) excel calculator for indicator 3.1** (see link [here](#)) allows you to play with these numbers getting an automatic annual rainfall data for the river basin selected (this data can also be overwritten by more locally specific rainfall data).

Seville



The same stakeholder stated that rather than fixing a target of 20 or 30% reduction in potable water consumption, it would be good to first conduct a **feasibility study** that takes into account how potential savings vary as a function of building installations and the local climate. JRC agreed that this point would be considered.

Another stakeholder wanted to check if GPP criteria could address the potential **reuse of water beyond the building boundary** – whether that would be accepting excess greywater/rainwater from another building or providing it to another building. The JRC was not sure if this could be done, but agreed that some public buildings, for example leisure centres with swimming pools, could potentially supply significant quantities of greywater to nearby buildings.

It was asked if any points could be provided on the advantages of 'low tech' water purification versus mechanical purification. JRC proposed to do the background research between now and the second proposal and will try to explain all the greywater treatment options that exist and the pros and cons of each one. This will then be brought to the next proposals.

Stakeholder discussion – final general comments:

There was a request **to normalise the metrics** for all themes wherever possible (e.g. in terms of per person or per m²) for each indicator and to nuance these for the building type. The limitations of normalisation should also be recognised (e.g. sometimes per person normalisation will give a better or worse number than per m² normalisation).

On another note, one stakeholder took the opportunity to flag the imminent publication of a press release and best practice guide on GPP and the Level(s) framework, especially focussing on indicators 1.1, 4.1 and 6.1. The JRC welcomed this contribution, especially since the need to take a closer look at criteria set by Green Building Certification schemes.

Closing remarks for Day 1

The JRC thanked the participants for their time and contributions. Additionally the JRC reminded that the slides were sent by email and explained the topics that would be covered on Day 2 of the AHWG.

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.



Agenda: Day 2

22 March 2022

| Time | Agenda point |
|---------------|--|
| 10:00 - 10:05 | Housekeeping and general points. |
| 10:05 – 10:10 | Purpose of this meeting. |
| 10:10 – 10:15 | Background to GPP criteria for buildings |
| 10:15 – 11:45 | Theme 4: Occupant comfort and health. |
| 11:45 – 12:30 | Theme 5: Vulnerability and resilience to climate change. |
| 12:30 – 12:40 | Theme 6: Life cycle costing. |
| 12:40 – 12:55 | Theme 7: Biodiversity. |
| 12:55 – 13:00 | Next steps |

Theme 4: Occupant comfort and health

The JRC presented an overview of:

- *Criteria under Theme 4.1 on Indoor Air Quality (IAQ): (4.1.1. Ventilation system performance; 4.1.2. In-situ monitoring and feedback control of ventilation; 4.1.3 Low Volatile Organic Compound (VOC) emission and 4.1.4. Access to fresh air spaces.*
- *Criteria under Theme 4.2 on Thermal Comfort: (4.2.1: Time out of thermal comfort range and 4.2.2. Thermal zoning and individual control of thermal comfort.*
- *Criteria under theme 4.3 on (interior) lighting: (4.3.1 Electric lighting requirements; 4.3.2. Lighting levels and control and 4.3.3. Daylighting and glare control).*
- *Criteria under Theme 4.4 on Acoustics: Weighted average sound pressure levels.*
- *Criteria under theme 4.5 on Electropollution: (4.5.1 Design features to minimise exposure to building-related EMFs and 4.5.2. In-situ assessment of wiring installation and EMFs).*

Stakeholder discussion – Theme 4.1:

A number of points were raised about specifications on **openable window areas**. One comment was that the amount of openable windows needed to get adequate ventilation is less if windows are openable on both sides of the building (allows cross-ventilation). So perhaps separate specifications should be made for single-sided and cross-ventilated spaces. Openable windows at different heights can also affect cross-ventilation performance.

However, the benefits of free ventilation from openable windows has to be weighed against **potential downsides related to the outdoor environment** (e.g. noise and air pollution for an office building next to a train station). The JRC later mentioned that even in such cases, there may be useful strategies for locating air intakes in the best places, for example in interior patios.

One stakeholder asked about the purpose of requiring ventilation systems to be wired to a segregated power circuit if independent of the heating and cooling system. The JRC explained that

Seville



the whole point of **monitoring energy consumption of the ventilation system** (or any other system for that matter) would be to optimise the control parameters, for example, in the definition of CO₂ setpoints and combination with natural ventilation from openable windows. However, getting the energy consumption data of the ventilation system alone would not be straightforward if heating and cooling of building spaces is achieved via the movement of hot and cold air through the same ductwork. The stakeholder then suggested that it would probably be better to specify this via Building Management Systems (BMS). The JRC agreed in principle, expressing curiosity to know more about what level of information and control can be expected in BMSs.

A later point on ventilation that was raised is whether or not ventilation requirements can be adequately dealt with in **building codes and regulations**. The JRC expressed doubt that this was currently the case and went on to mention the three main methods for quantifying ventilation performance in the **EN 16798 series of standards**, namely: (i) in terms of L/m²; (ii) in terms of L/person/m² and (iii) in terms of CO₂ air concentrations above background levels. The JRC thought that this third method is especially attractive after COVID in terms of being able to ensure adequate operation of mechanical ventilation equipment (not working too hard or not enough) based on real-time CO₂ concentration feedback. Another advantage of this approach was the fact that occupancy rates are becoming more difficult to predict with the sudden increase in teleworking and online classes.

Later discussion focussed on how simply controlling ventilation by CO₂ (and not **temperature**) could lead to windows automatically opening on winter days and shutting on warm summer days. Likewise, ignoring outdoor **NO_x levels** for buildings near busy roads could lead to windows automatically opening during peak traffic hours. Consequently, openable window controls to maximise passive ventilation need a more complex set of conditions to operate by than just CO₂ alone.

Another issue related to indoor air quality being controlled by CO₂-driven ventilation, especially with passive houses, is the **relative humidity**. Low relative humidity can occur in cold temperatures and lead to dry dust being suspended in air. High humidity can occur in warm temperatures and lead to mould and bacterial growth. So some degree of humidity control could be needed for certain building designs and climates. The JRC commented that the EPBD as a whole did not consider humidification or dehumidification control as being a major issue in EU climates. However, reference to a [recent issue of the REHVA magazine](#) was dedicated to the topic of humidity in buildings and stated that it is an issue in certain cases. Another stakeholder provided a link about ventilation system considerations in the [Building Biology Standard](#).

Stakeholder discussion – Theme 4.2:

It was asked if reference was going to be made to **ecodesign or energy labelling requirements** for heating and cooling equipment since many of these systems are covered by this EU legislation. JRC responded by saying that it would need to be checked where the capacity thresholds sit for ecodesign and energy labelling requirements, because some equipment may be too large (i.e. centralised multi-dwelling or large office block systems) or too small to be covered.

Seville



Regardless, whenever building heating and cooling systems are covered by these policies, energy labelling requirements would be a logical way forward in EU GPP criteria. It was pointed out that this was already mentioned in earlier criteria (1.1.3 to be exact) and was also mentioned again in 4.3 for lighting. It could perhaps be explicitly stated under Theme 4.2. as well. Regardless, whenever a technical system or product is covered and reference to energy labelling classes is made, the next question is whether to follow a **“static” or a “dynamic” approach**. A dynamic approach requires more assessment and verification effort but ensures that the criteria remain valid and represent a fair interpretation of the Article 6 requirements of the Energy Efficiency Directive for public authorities to play an exemplary role in the purchasing of energy efficient equipment. When the **Energy Product Registry for Energy Labelling (EPREL)** is finally published, the additional assessment and verification effort of the dynamic approach will hopefully be minimised.

One stakeholder commented that any requirements on phase change materials could be considered as being too prescriptive. The JRC agreed in principal and that in reality designers would have a suite of options available when optimising the thermal performance of a building.

With reference to **mechanical cooling** (or air conditioning), it was pointed out that EU GPP criteria could lead the way in the specification of ecological refrigerants as the consumption and leakage of these compounds can make a non-negligible contribution to whole life carbon of buildings. The [F-gas Regulation](#) was also flagged as an important piece of legislation to consider here for a broader context. The JRC totally agreed with this, stating that they had seen a recent LCA study by the concrete centre for an apartment block, which found refrigerants accounting for around 5% of total Global Warming Potential of the building. Furthermore, the JRC cited their recent experience with proposals for the new JRC site in Sevilla mentioning a broad range of **“ecological refrigerants”**.

Stakeholder discussion – links between ecodesign and EPBD:

One stakeholder pointed out the current mismatch between information about **energy-related products** used in buildings and the **building-level calculation methodologies** used for the EPBD. The EN 52000 series of standards provide a number of points of freedom and this has led to different approaches in different Member States. The JRC pointed out that they have now sub-contracted some research to look in more detail at the specifics of Member State EPBD methods. Understanding these methods is crucial to ensuring that any GPP criteria on energy performance remain relevant across the EU.

It was highlighted by another stakeholder that the recent Commission proposal for Annex I of the EPBD (December 2021) aims to address this issue in the future by saying that **“national calculation methods shall not require additional information.”** when ecodesign products are required to include EPBD-relevant information.

However, the existing problem with the ecodesign and EPBD mismatch was confirmed by another stakeholder. The mismatch is **especially an issue with heat pumps** and the continued lack of access for the public to the **EPREL database** is a major barrier. The JRC stated that an analogy would be akin to trying to fit a square peg (i.e. ecodesign) into a round hole (i.e. EPBD). In terms of solutions to the problem, the JRC asked if it would be easier to modify the ecodesign methods, or the EPBD, or to
Seville



create a sort of adaptor that could convert data from one format to another. When asked if one option would be more feasible than the other, it was responded that creating an “adaptor” to convert ecodesign data into suitable information for the EPBD would be much easier than changing the ecodesign information itself – due to the major efforts producers would have to make to alter any ecodesign product testing. Even for the adaptor type solution, one stakeholder called for more support to be made available to standardisation committees to do this (i.e. via an official request from the Commission).

Stakeholder discussion – building management systems (BMSs) and User Experience (UX):

One stakeholder wondered if the JRC touched on the validation of sensor data in Building Management System (BMS) and links to smart readiness. The JRC answered that this is a very relevant issue given the common **“performance gap” between design and actual energy performance of buildings** and increasing **energy costs** for occupants. It was planned to dive into this issue via the expert subgroups.

It was mentioned that while the **EPBD would be requiring BMSs** under certain circumstances from 2025 onwards in a general way (*only for non-residential buildings with heating and ventilation system outputs rated ≥ 290 kW and where technically and economically feasible*), GPP could be much more specific and take inspiration from initiatives in the UK and the World Green Building Council on **building energy performance validation**. The key here for procurers would be to minimise the energy performance gap, to get what you asked for and also to help get value for money. The JRC added that given the length of time that building projects take, we need to always have **one eye on future policy and legislative developments** when developing EU GPP criteria.

Another stakeholder questioned whether **BMSs are cost effective for all buildings**, especially smaller ones like single-family homes. The JRC responded that they wished to explore the ranges of BMSs available on the market, their capabilities and costs. One major economic advantage of a BMS, if it can do this, would be to optimise the storage and export of excess renewable electricity during peak hours and to import during off-peak hours.

The **user interface** of a BMS with occupants is critical to the success of a building design. Real life experience has shown many passive houses not being used as intended by the designers (e.g. plugging in electric heaters) because occupants did not understand how to take advantage of the building features correctly. So there is certainly an argument for **simple BMSs**. The JRC agreed in principle, but also highlighted the potential advantages of **more complex BMSs** for larger buildings with more zones and with a dedicated building manager and maintenance teams who could be trained in using the BMS and in the installation and calibration of associated sensors. Ultimately, how complex the BMS needs to be will depend on how “technological” a building is, the degree of automation desired and the quantity and quality of data that building owners want. However, as complexity increases, the **importance of correct placement and calibration of sensors** becomes more critical. Some of the critical aspects from real life experience include: (i) are the sensors plugged in and transmitting signals?; (ii) are they correctly calibrated?; (iii) is the BMS reading signals from sensors?; (iv) is the BMS programmed to react appropriately to these signals and (v) how are

Seville



feedback signals transmitted from the BMS to the relevant equipment or automated devices? One stakeholder confirmed that sensor calibration and maintenance was still **not strongly addressed in the EPBD** and would need some additional product-specific requirements. Another stakeholder commented that the performance gap tends to get bigger as building systems become more complex.

The need and the potential for GPP to **ensure as-built performance** cannot be over-emphasised. The importance of as-built performance is the whole reason why there is a “level 3” in the Level(s) framework, and the details in Level(s) could still be improved quite a lot for energy performance. The JRC agreed with this statement in general, and added that if a good job is done with GPP (for design and for as-built) requirements, then this could then inspire future versions of Level(s).

One stakeholder spoke about the significant room for improvement in **taking UX into account** for building technical systems and BMSs. While a lot of effort and focus of designers is placed on UX in the development of e.g. smart phones, such importance is not generally given to buildings. It is **necessary to explain to occupants what they installations are, how they can be controlled and what are the potential benefits (e.g. KPIs on indoor environmental quality) of optimum control** – in a simple way that is easy to understand for the lay person. When installations do come with user manuals, this is often far too complex and technical. Simplification could be via more graphics and interactive manuals. Another stakeholder asked who should be **“in charge” of these user manuals** for buildings. While this has previously been well defined for architects, the transition to smarter and more complex buildings is changing the **“stakeholder ecosystem”** for building projects. For some real life examples of user manual implementation, reference was made to a book about user experience (UX): [Energy People Buildings](#). The key is ensuring that important information is not lost but continues to be made available to stakeholders along the building **“value chain”** – following the general concept of the **golden thread**.

Stakeholder discussion – Theme 4.3:

Regarding lighting, the importance of **solar shading** was mentioned for the reduction of glare, and the advantages of automated solar shading to prevent situations where occupants put the blinds or shutters down and then forget to open them up again – thus missing out on free daylight, views and passive solar heat gain.

In response to the JRCs doubt about **specifying CCT** for interior lighting, one stakeholder responded that indeed, this might be difficult since good lighting can be quite subjective, both via physiological aspects (e.g. old versus young occupants) and diurnal aspects (e.g. circadian rhythms). Another stakeholder provided a link to the [Building Biology Standard considerations on lighting](#).

Sensor placement is also an issue for **adaptive controls** to account for daylight illumination and presence sensors. The use of **wireless sensors** can make the adjustment of sensor placement a much simpler task. Another option that had been used in practice was to preinstall sockets for detectors in every second wall module, which would allow for simple relocation of detectors if interior space layout are changed.

Seville



The JRC concluded that LED technology brings many possibilities for lighting engineers to the table, but a better **understanding the technical and economic feasibility of all the options available** on the market (in terms of lighting products, sensors, control systems etc.), would be necessary before being able to explain what are the most interesting proposals for EU GPP criteria.

An open question was asked by one stakeholder about **possible trends towards low voltage lighting circuits in buildings** that are easier to adapt. No response was received during the meeting.

Stakeholder discussion – Theme 4.5:

Stakeholders were generally interested in this topic and commented on the importance of certain design aspects such as the location of high voltage panels, solar panels, cell towers and wifi routers. The possibility of **window film designs to filter out electromagnetic radiation** was also mentioned as something for further consultation.

It was recommended that the JRC consult with colleagues in DG GROW working on the [electromagnetic compatibility Directive](#) for possible contributions to background research. Another stakeholder provided a link to the [Building Biology Standard considerations on the 5G aspect of electropollution](#). Buildings in cities can achieve low EMF fields with good design, so it can be done, one example is correct wiring to ensure live and neutral wire magnetic fields cancel each other out. There is the need for a lot of education on this topic for all stakeholders involved in building projects, not only architects, but also electricians and students in schools and universities, as they will be the next generation of professionals and building owners. The JRC fully agreed and emphasised that they want to learn from best practices and be able to communicate this to a wider audience via the EU GPP criteria and background supporting documents.

Theme 5. Vulnerability and resilience to climate change

The JRC presented an overview of:

- *Criteria under Theme 5.1 on Future thermal comfort: (5.1.1. Time out of (thermal comfort) range and 5.1.2. Passive features.*
- *Criteria under Theme 5.2 on Resilience to flooding.*
- *Criteria under Theme 5.3 on Sustainable drainage.*

Stakeholder discussion:

Making reference to a recent publication ([Parkinson et al., 2020](#)) one stakeholder requested that EU GPP criteria pay more attention to the more flexible **adaptive summer thermal comfort** scenarios even when buildings have mechanical cooling systems. Reference was also made to [Annex 80 of the IEA](#) for the state of the art with future climate modelling and ongoing research. A link to a recent PhD about [climate robust buildings](#) was also provided. The JRC agreed that this was a very relevant issue and care should be taken with modelling to avoid perverse outcomes, for example in the installation of mechanical cooling systems in buildings in temperate climates when passive strategies might have been enough. The stakeholder responded that buildings can be built today with future-

Seville



proof architectural solutions (e.g. night-ventilation and thermally active slabs for cooling) or to allow for the potential future installation of a mechanical cooling system in mind if needed - without actually installing the system from the beginning.

Another stakeholder highlighted the potential of **window films** as a technical solution to help strike the right balance between daylighting and reducing passive solar gain. These films can also be retrofitted to existing buildings. However, another stakeholder commented that window films do not allow any flexibility in adapting to different angles and positions of the sun but that **solar shading elements** can potentially be adjusted. The JRC commented that the optimum solution for each individual building should consider both elements (window films and solar shading) when trying to minimise risk against overheating.

Resilience to climate change is a concept that will often extend beyond the building boundary and the JRC was encouraged to look at some case studies on the [climate-adapt portal](#). For example, efforts to address **flood risk** or **urban heat island effects** are best addressed at the urban planning level (e.g. green space, trees, floodplain preservation etc.). Consequently, the stakeholder asked if EU GPP criteria could also link to the **urban planning** stage and relevant actors. The JRC answered that this type of discussion would be very relevant for the theme 0 expert sub-groups and it while it would be interested to know more about how this planning process works in Belgium, it would also be good to know how it works in other Member States. The JRC mentioned the three main issues relating to overheating: (i) improved air-tightness of buildings; (ii) urban heat island effect and (iii) climate change. The effect of urban heat islands can sometimes increase ambient temperatures by 8-10°C, which can completely overshadow effects caused by climate change.

Regarding **future climate data**, one stakeholder shared links to two UK standards: [TM48, on the use of climate data in building simulation](#) and [TM55, on design for future climate](#) (there is also [TM59 on overheating assessment of homes](#)). The use of these or similar standards in Europe was unclear. Another stakeholder mentioned that ISO/TC163 SC2/WG16 is currently revising EN ISO 15927-4 on the hygrothermal performance of buildings and one aspect being considered is how to deal with future climatic data. One point that seemed to be often overlooked in overheating risk assessments was the heat generated by metabolic activity of occupants and electrical equipment (so called internal heat load). It has been proven to be an important factor even today in UK school buildings.

It was asked whether resilience to climate change had specific **adaptability features** in mind, such as higher floor to ceiling heights, exposed thermal mass and floor plate depths. All of these features have a strong impact on whether or not a building needs to be demolished when its use type is changing. The JRC explained that these features are covered in criterion 2.3 but that they do have a relation to climate change resilience as well, not just in changes of occupant needs. The stakeholder also pointed out the potential embodied carbon trade-off in designing for climate change adaptability (e.g. higher floor to ceiling heights to allow for thermal stratification in occupied spaces).

Seville



Theme 6. Life cycle costing (LCC)

The JRC summarized the proposed criteria for Theme 6 on life cycle costing. The long life and complexity of buildings were outlined in terms of life cycle costing efforts.

Stakeholder discussion:

Even just a **capital cost assessment** for buildings is complex, the scope of works, insurance and liability issues, financing models, contracting models and the multitude of different professions involved, each with their own cost uncertainties.

One stakeholder expressed support for including external costs in LCC. Another stakeholder said that this was being done already in Belgium but now they don't monetise and instead ask for a PEF weighted and normalised score. It was admitted that estimating realistic LCC for buildings was a major challenge due to a lack of data.

A useful proxy for improving LCC (without any concrete numbers) is to design buildings that can be easily maintained, adapted to different uses (e.g. office to residential) and deconstructed. The JRC explained that themes 2.3 and 2.4 could be used for such a proxy measure to justify the choice of certain life cycle scenarios.

The JRC also asked that if it made sense to carry out LCA and LCC in parallel since much of the underlying data must be the same (e.g. embodied carbon for a fixed quantity of materials that have a defined unit price and service life; e.g. grid electricity has an assumed carbon footprint per kWh and an assumed unit price per kWh). Some agreement with this way of thinking was expressed by stakeholders.

In the Netherlands, one stakeholder, referring to a [BPIE report](#), quoted the following text about the use of LCC in Dutch buildings: *"The Netherlands has since 2017 required all new residential and office buildings whose surface exceeds 100m² to account for and report their embodied impacts based on a simplified LCA using a national method. All impacts are converted into a monetary value, which since 2018 is used to set a "mandatory environmental impact cap" for new buildings."*

Another stakeholder highlighted the Dutch EMVI tendering (probably the Dutch initials for MEAT: Most Economically Advantageous Tender). This could also include monetisation of long-term sustainability benefits in DBFMO contracts (Design, Build, Finance, Maintain and Operate).

One stakeholder mentioned the potential to monitor and track LCC via ISO 14001 or EMAS systems and through maintenance contract clauses for stages beyond post-occupancy commissioning.

Theme 7. Biodiversity

The JRC summarized the proposed criteria for Theme 7 as well as the rationale followed, stressing the goal for each criterion and the differences between the core level and comprehensive requirements.

Stakeholders were asked:

Seville



- *Are green wall systems always sustainable, or are there certain specifications that must be made to optimise the sustainability of these systems?*
- *Are there any examples in the literature assessing the life cycle carbon (or cost) impacts of green roofs and/or green walls?*

Stakeholder discussion:

An earlier comment by one stakeholder concerned the site selection at the urban planning level and whether EU GPP criteria would address this. The JRC responded that this was something to be discussed with the Theme 0 expert group and Commission colleagues before deciding on what to do.

The same stakeholder also stated that in discussions about biodiversity criteria for the construction sector in the EU Taxonomy, it was found that the largest impacts on biodiversity were centred on the extraction of raw materials further up the supply chain, rather than impacts at the building site. In this case, it was asked if EU GPP would consider setting supply chain biodiversity requirements. The JRC responded by asking first if there were any reports that try to quantitatively conclude the relative biodiversity impacts of a building on its plot with the impacts of the materials that went into making the building. Secondly, the JRC said that setting supply chain biodiversity requirements would only be feasible if there were already in place third party certified schemes for biodiversity that also track the chain of custody. The best known would be FSC or PEFC for wood, but it was not clear how this would work for steel or insulation. For concrete and aggregates, perhaps the responsible sourcing label from the Concrete Sustainability Council would be useful, but it would need to be checked what is the market availability across the EU of such materials. The stakeholder clarified that discussion on the EU Taxonomy were still not finalised, but the JRC admitted that final agreements for the EU Taxonomy could have an impact on EU GPP criteria.

At the building plot level, in cases when the building does not occupy the full plot area, requirements to maintain original soil or biodiversity could perhaps be specified. The JRC thought that this could be plausible, but would depend on site specificities, for example the level of biodiversity initially present. In any case, all building projects can potentially embrace biodiversity since they can all have a green roof. Another stakeholder referred to [roof garden projects](#) in Colruyth and Delhaize in Belgium (urban agriculture). Another interesting link to the "[Biodiversity Net Gain](#)" initiative in the UK.

Another stakeholder stated that not all green walls are equal, and that there is a big difference in life cycle impact terms for green walls from climbing plants rooted in the ground soil to standalone green walls (or cassette systems) with supports for plant rooting and growing media and irrigation over its full area. While these differences seem obvious, the JRC stated that any studies comparing their respective impacts would be very useful. Although not a direct comparison, one stakeholder provided a link to the following [Dutch report](#) on green walls.

Seville



Next steps

- We will email to everyone **draft minutes** of the meeting within one week (2-3 working days for any feedback) then we will upload minutes to the JRC website (slides too).
- We will send you a link to a questionnaire simply asking if you want to be **registered in BATIS** (need to confirm with our secretariat if we need any other details than what you already provided).
- If our hierarchy is okay with uploading the **recording**, we will place it on the [JRC website](#), but only if none of you object after being consulted (EU survey to come on that together with the minutes and request for BATIS registration).
- You will have until 21st April (now extended to **28th April**) to **submit comments** on the initial criteria proposals. The best way to do this is to log in to BATIS and upload your comments directly on the html version of the report. Registered stakeholders will receive a simple guidance document explaining how to comment directly on the html version of the EU GPP criteria technical report.
- We will launch a call for **expressions of interest in the expert sub-groups**. Please note may not be able to accommodate everyone, depending on how many people reply. The deadline for such a call will be the 28th April as well, but we remain flexible to incorporating expertise at a later stage as well. There is no rigid set of rules for the sub-group procedures and consultation rounds, but this will take at least 3-4 months.

Seville

Comisión Europea, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA -

Tel. +34 954 48 8318.