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Q metadata for EPD

QUALITY-ASSURED ENVIRONMENTAL PRODUCT DECLARATIONS (EPD) FOR HEALTHY COMPETITION AND INCREASED TRANSPARENCY

SMART BUILT ENVIRONMENT

Q metadata for EPD

Quality-assured environmental product declarations (EPD) for healthy competition and increased transparency

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Med stöd från:

VINNOVA

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formas

STRATEGISKA INNOVATIONS-PROGRAM

Preface

The Smart built Environment (SBE) is a strategic innovation program for how the built environment focuses sector can contribute to Sweden's journey towards becoming a globally pioneering country that realizes the new opportunities that digitalisation will bring. Smart built Environment is one of 16 strategic innovation programme that have received support within the framework of strategic innovation areas, a joint venture between Vinnova, the Swedish Energy Agency and Formas. The aim of the initiative is to create conditions for Sweden's international competitiveness and contribute to sustainable solutions to global societal challenges.

SBE Lifecycle Perspective is one of the focus areas of the program. It has been led by Kajsa Byfors (project coordinator) and Jeanette Sveder Lundin and Martin Erlandsson (sub leaders).

The goal of the focus area lifecycle perspective is to integrate life cycle cost (LCC) and life cycle assessment (LCA) into community building information structures and processes, in order to achieve greater efficiency throughout the life cycle and thus a more sustainable built environment. In order to achieve sustainable community building, it is necessary to take into account a lifecycle perspective in terms of planning, design, construction and use of our built environment. The vision is that the integration of life cycle costs (LCC) and Life Cycle Assessments (LCA) into the sector's information structures and processes is an important part of achieving the environmental objectives that we have before us.

In the focus area we coordinate and catalyze ongoing good initiatives and expertise in the field. In this way, we can use the expertise that already exists in the sector to ensure that we have a clear system of lifecycle perspectives. We will create national applications based on international standards and analyze how digitalization and object-based information management from other program activities can support the lifecycle perspective, at all stages of the community building processes.

The work includes analyses of different scenarios for material selection and management in planning, design and construction as well as for operation, maintenance and use. It also includes procurement perspectives and how life-cycle issues are driving forces in the early stages.

This report has been conducted in collaboration with funds from SBUF and the Foundation IVL (SIVL) and is one of several reports from the focus area 'lifecycle perspective'.

Stockholm, 28 December 2018

Summary

If an EPD is supplemented with Q metadata, it is possible to ensure that an EPD has the quality required that it can be can be used for a direct comparison between two products, a so-called supplier assessment. Since EPDs can be made based on different interpretations of the standards, different levels of ambition and different representatives exists, these factors must be clarified before deciding whether an EPD can be used for a particular purpose. In simplified terms, it is possible to divide the purpose of an LCA or EPD in the following stepwise order and need for increased data quality; the first step is about to get information and to assess hotspots, the seconds step is to support on how to make environmental improvements of the same product or construction works, and the final step is the potential use of LCA to actually make an comparison on different suppliers products, different constructions solutions or constructions works made of different materials that meet the same basic function as requested.

Q metadata describes the following aspects of the LCA data contained in an EPD;

- Is it for a unique product or product group,
- Is it for one specific manufacturer or several,
- Is the environmental data based on specific process data or generic (database) data
- How is the environmental indicator result verified
- Are significant assumptions made in the underlying LCA
- If the EPD is not certified how is the indicator result calculated
- Who is responsible for establishing the Q metadata for the current product

Q metadata contains documentation of methodology choices that could affect the results of an LCA as part of an EPD. Methodology choices include interpretations and assumptions for the modelling of the LCA.. In other words, Q metadata provides data on LCA data and an increased transparency of the methodology settings and assumptions made.

The inclusion of Q metadata in an EPD allows for a quality assessment of the data. Thus, it facilitates the decision if it can be can be used for a direct comparison between two products, a so-called supplier assessment. In addition to these Q metadata for the EPD used, the options must have the same basic function to allow a comparison.

Content

Introduction

The Project Smart Built Environment (SBE) lifecycle perspective develops support, implements and evaluates how a future digital environmental calculation for a construction work can be made as efficiently as possible. The future Life Cycle Assessment (LCA) calculation is assumed to be made as part of the ICT tool already used for other purpose, as an additional environmental performance based information. The user of the LCA information may not have LCA competence. It is therefore essential that the quality of the LCA source data or the calculation result is supplemented with information that provide the end-user with an idea of what kind of decision support such figure can be used for. Q-metadata has been developed to address this need and is further discussed and presented in this report.

An LCA makes it possible to calculate the environmental impact during the entire life cycle of the construction works. The result includes several environmental impact categories such as impact on climate change, acidification, eutrophication, ground-level ozone. One can therefore say that an LCA gives an environmental performance profile or footprint of a product etc. Today, there are several environmental assessment systems that only ask for the impact on climate change. Using the LCA methodology to assess the environmental impact allows not only calculating and presenting the impact on climate change, but also other environmental impact categories. This can be done by using the same background system and model.. Furthermore, the environmental performance of each specific resource can be calculated and when improvements are made, new environmental performance for the entire construction works can be calculated. A resource can be a commodity, such as materials, products, inputs, energy goods, or various services needed to build, manage, and in the future dismantle a construction work. For a more detailed description of LCA, please refer to the report "Robust LCA: Metodval för robust miljöjämförelse med livscykelanalys (LCA) – introduktion för nyfikna " (Erlandsson 2013).

This report focuses on EPD for construction products and how documentation on data quality related to the included LCA – Q metadata –can be used as supporting information not reported in the EPD itself. This report describes the first version of Q metadata set developed for Smart Built Environment and how to interpret the aspects covered. A supplementary report will be produced from the project to describe how data quality on a constructions works level can be defined for practical use in business-to business or business-to-consumer relations. As an addition to the current format of an EPD, Q-metadata is supposed to include additional information to the digital and machine-readable format of an EPD. In this format of an EPD for a construction product, LCA information is divided in life cycle stages from A to D, further referred to as the ILCD+EPD format[1]. This format is jointly developed and harmonised within the InData group. An extension of this current applied EPD format is added as part of the SBE life cycle perspective project that allows aspects like Q metadata among other aspects to be added to the EPD in order to simplify and improve a digital use of it. This

[1] http://eplca.jrc.ec.europa.eu/LCDN/developer.xhtml
http://www.oekobaudat.de/en/database/schnittstellen1.html. Go then to ”Information for software developers”

extension is here referred to as ILCD+EPD+. The Q metadata is suggested to be included in an SBE extension that is referred to as ILCD+EPD+SBE, and published in a separate report (Erlandsson et al 2018).

1 Q metadata: quality assessment of an EPD

Since EPDs can be made based on different interpretations of the standards, different levels of ambition and different representatives, these factors must be clarified before deciding whether an EPD can be used for a particular purpose. In simplified terms, it is possible to divide the purpose of an LCA or EPD according to the LCA staircase, see Figure 1. The first step is about to get information on the environmental performance and impact and to assess what is large or small, the seconds step is to support on how to make environmental improvements of the same product or construction works, and the final step is the potential use of LCA to actually make an comparison on different suppliers products, different constructions solutions or constructions works made of different materials that meet the same basic function as requested.

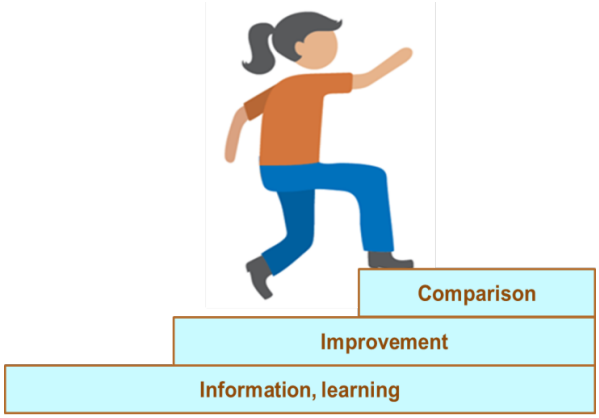

Figure 1 The LCA staircase where different quality of environmental data and ambition with the life cycle analysis leads to the result being used for comparison, improvement or just as part of a learning process of what is small or large (image based on Magnusson et al. 2016).

If an EPD is supplemented with Q metadata, it is possible to make a judgement if an EPD has the quality required that it can be used for a direct comparison between two products, a so-called supplier assessment. The compared options must have the same basic function to allow for a comparison. For construction product EPDs the manufacturing process is a mandatory part (cradle-to-gate) and normally is a full life cycle (cradle-to-grave) needed if a comparison is asked for. If such cradle-to-gate EPD shall be used for comparative purpose the user of the EPD has to be sure that the downstream environmental impact is the same or similar. This is often the case in a supplier assessment where products made of the same kind of material are compared, but typically differ if different materials are applied for the same function. The most construction product EPDs are only covering the manufacturing cradle-to-gate LCA data (information module A1-3). This information may be complemented with downstream information, so that the end-user of the EPD receives a complete lifecycle

inventory. It is, however, needed to consider the use of the EPD and to be sure that the quality of the EPD – i.e. its Q metadata – is good enough for the intended use.

Q metadata describes the following aspects of the LCA data contained in an EPD;

- Is it for a unique product or product group,
- Is it for a manufacturer or several,
- Is the environmental data based on specific process data or generic (database) data
- How is the environmental indicator result verified
- Are significant assumptions made in the underlying LCA
- If the EPD is not verified how is the indicator result calculated
- Who is responsible for establishing the Q metadata for the current product

Furthermore, Q metadata contains documentation of methodology choices where various interpretations may occur or assumptions could be made that could affect the LCA results in an EPD significantly. In other words, Q metadata provides additional information related to the LCA result, with the goal to increase transparency of the methodology settings and assumptions made.

How can Q-metadata be useful for private or public commissioners, purchasers and LCA calculators? The short and simple answer is that Q metadata gives information about the most significant and recognized method uncertainties (Erlandsson & Martin 2018). It also provides additional information to assess whether an EPD can be used for a direct product comparison or a comparative assertion.

How can Q metadata be practically used? First of all, it is important to understand that Q metadata as defined here is a limited number of aspects, but enough to cover the most important aspects that we know from practice that influence the overall data quality. Q metadata will not give an exact value on the data quality but rather an indication on good and bad data quality. The number of Q metadata aspects should be limited to a minimum. The time to fill in the Q metadata information for a person that has been involved in the development of the LCA data should be as little as (maximum 30 minutes). The Q metadata is not for scientific purpose, but to secure a trust-worthy commercial use of EPDs and fair competition between different suppliers.

How to decide what is good enough? On a general level Q-Metadata helps the LCA user to get information 1) if the current EPD can be used for a product comparison between two different vendors, or 2) if the EPD can be used to analyse improvements made for the same product, building element etc from the same supplier or 3) to get some basic environmental data on the product. The system is flexible so that different parties can use Q metadata to define a "customized" quality level that is typically requested depending on what the environmental data is to be used for. Therefore, Q metadata is divided in different aspects, which in their turn are subdivided in predefined ranked quality steps, typically from 1 to 5, where 1 is the best quality and 5 is the lowest quality or that information to set the quality is missing. This allows the final end user to define their own level of quality. The goal with this approach is that all kind of parties may use the Q metadata and adopt it to their context and ambitions.

Who should then produce these Q-metadata? Ideally, only those who have access to the background analysis can develop adequate Q metadata or those who gain access to the

underlying LCA report. Preferably, Q-metadata should therefore be reviewed by the same person who reviewed the EPD, as part of the regular third party verification process. As for the EPD, there is no requirement for the underlying LCA report to be made public according to standards applied and common practice. However, there is a general requirement in the standard that significant assumptions made should be described in the EPD. In the first place, we see that Q-metadata is reviewed by the same verifier as for the EPD. Secondly, an external LCA expert can make an assessment and fill in the Q metadata based on what is available typically reported in the background LCA report and ask supplementary questions. When information is missing, this is essential information as well and will indirectly limit the practical use of the EPD.

How will Q metadata be used in public procurement in Sweden by the Transport Administration? The Swedish Transport Administration (in Swedish Trafikverket)has now introduced a requirement that if generic LCA data, which currently are used as part of public procurement and a mandatory climate declaration, are replaced with a products specific EPD, such EPD has to be complemented with a Q metadata. An acceptance inspection managing process will be established to check Q metadata. If Q metadata is not produced as part of the regular third party EPD verification process, the Transport Administration may require in their acceptance inspection access to the underlying LCA report, which should contain the information necessary to obtain the requested Q metadata. If there are problems with confidential data, the transport agency may allow an independent LCA expert to access the LCA report. As the purpose of Q metadata is also to strengthen healthy competition, Q-metadata should be an important complement to the proper use of the EPD.

What is the vison? The vision of the Q metadata developed in collaboration with Swedish Transport Administration (Erlandsson & Martin 2018) and the research project SBE lifecycle perspective, is that it will be used as a supplement to an EPD. We assume that this initially has to be on a voluntary basis, but actors like the Swedish Transport Administration and their requirement that EPDs has to be complemented with quality documentation, is a key actor to make Q metadata commonly required. If other and more important users of EPD require and ask for Q metadata, it will de facto become mandatory for access to the market.

2 Quality aspects covered

The set of Q metadata introduced by SBE Life cycle perspective is given in this section. The Q metadata has been send out for consultation within the project in 2017[2] and then modified in order to adopt for further aspects asked for by the Swedish Transport Administration. This include how to treat and classify uncertified EPDs and therefore not published by an program operator that is typically based on LCA tools (also known as project EPD) or other not certified EPD that includes calculations based on source data from certified EPDs. All such EPDs not published by a program operator, but else following calculations rules given EN 15804, will here be referred to as a sample-EPD.

2.1 Q metadata criteria

The origin of the core LCA data and degree of origin is dependent on what product, products or product groups that are covered and the variation within this selection made for the EPD. A rule of thumb is that LCA data always include an uncertainty of +/- 10%. This ruff figure is therefore constantly used as definition of the highest data quality. According to a number of program operators' additional requirements the variation shall be below +/- 10%, if a product group is declared. This has to be calculated and verified by the reviewer. The calculation need here only refers to the contribution from cradle-to-gate (i.e. information module A1-3) and GWP_{GHG} including the contributions to greenhouse gases (meaning that 1 kg $C0_2$ = 0 kg CO_2e). This GWP indicator result is in line with how IPCC characterisation factors and is the same as they are used for national climate reporting, why such original GWP indicator result is referred to as GWP_{GHG} in this report, and is in line with how this indicator actually is defined in EN15804:2013. It is common that some indicators like ozone depletion potential (ODP) or photochemical ozone creation potential (POCP), often vary more due to the fact that ODP is a comparison of small numbers and POCP is calculated with different levels of details for the differentiation between NO and NO_2. Where the latter interpretation problem typically creates negative contribution to POCP according to the impact assessment method and characterisation factors referred to in EN15804. Therefore the GWP_{GHG} is assumed to be more precise and robust and used here to calculate the variation.

[2] Suggested Q metadata for EPDs for construction products. PM from SBE subproject 1.4. Erlandsson M, 2017-03-24.

Criteria 1: Product comparability	Answer
1.1 Valid for a single product	◎
1.2 Valid for several products with variation below 10%	◎
1.3 Valid for products with variation above 10%	◎
1.4 Valid for a product or several products where variation is not defined	◎
Comment:	

Criteria 2 Manufacturing representativeness	Answer
2.1 Valid for a single manufacturing site	◎
2.2 Valid for several manufacturing sites from the same company with variation below 10%	◎
2.2 Valid for several manufacturing sites from the same company with variation above 10%	◎
2.2 Valid for a manufacturer or manufacturers products where variation is not defined	◎
Comment:	

The guarantee of origin is important when EPD is used to replace generic LCA data. The whole idea with EPD is to use as accurate and representative data as possible for the actual construction products. This is reflected for instance in the LEED criteria where sector EPD and likewise is degraded in the scoring system, when EPD is used. The criteria No 1.1 and 2.1 therefore address the ideal situation where the EPD is for the actual product bought and its manufacturing site where it is produced. This also support that the correct transport scenario can be set. If more than one manufacturing site is included in the EPD it should be reported in the comments field how this average is calculated, and a justification of this choice. In the latter case when more than one manufacturing site is reported in the very same EPD a calculation on GWP_{GHG} for the same product from the different sites has also to be calculated in order to determine the variation. A common rule is that if the variation created by including more than one manufacturing site is above 10% this should be reported in the EPD (or better reported in several EPDs). This verification calculation shall be found on the GWP_{GHG} indicator result A1-3.

Criteria 3: Data accuracy	Answer
3.1 Specific data for > 90%	◎
3.2 Specific data for > 80%	◎
3.3 Specific data for > 60%	◎
3.4 Specific data not defined	◎
Comment:	

A very good indicator of the quality of the LCA data used is the amount of real data from the actual processes that are collected, meaning that a high ambition is put to the inventory work, and database data is put to a minimum. In order to establish an EPD with top quality, specific data should cover more than 90% of the GWP_{GHG} contribution (A1-3).

Criteria 4: Declaration review type	Answer
4.1 Certified EPD according to EN 15804 and ISO 14025	◎
4.2 Self-declared environmental declaration based on certified EPD:s according to EN 15804 (i.e. categorised as 4.1) that contributes to at least 90% of the GWP_{100} indicator result A1-3, or an environmental declaration made as copy of an already published EPD made from an LCA tool that is verified and the only possible change by the end user is the product recipe.	◎
4.3 Third part verified LCA that complies with EN 15804 and ISO 14021 and made transparent via a public available LCA report and Q metadata report	◎
4.4 Any other third party verified EPD according to ISO 14025 but not according to EN 15804, or any other self-declared LCA result not published by a program operator but following EN 15804 and not made transparent via an LCA report. Q metadata has to reported for this category	◎
Comment:	

Ideally all LCA result or EPDs are following LCA methodology according to EN 15804 and published by a program operator according ISO 14025. If such EPD data is lacking it could be need to use of proxy LCA data as outlined in the table above. It is noticed that in public procurement in Sweden is the wordings "...an EPD according to EN 15804 or likewise shall be used...". Therefore is it a need to define what this "likewise" means in the context of Q metadata. A common alternative is then a self-declared environmental declaration that follows ISO 14021 that means that a public available LCA

report shall be supplied on request. Another interesting case is the different type of simplified EPD that exist. We recognize that in some cases is an so called object specific EPD made from an LCA tool, where the exact recipe is used instead of the one used in the certified "mother EPD", why the object EPD is more precise (but not necessary registered and public available). This EPD has therefore in practice a better representativeness than the "mother" EPD that is certified and public available.

Criteria 5: Additional documentation specifications	Answer
5.1 Allocation procedure applied where a by-product is not attributed to any impact?	Yes/No
5.1 Comment:	
5.2 Inherent properties are allocated away and do not reflect the physical flows?	Yes/No
5.2 Comment:	
5.3 System expansion applied?	Yes/No
5.3 Comment:	
5.4 Recycling of a technosphere flow is handled with non-symmetry	Yes/No
5.4 Comment:	
5.5 EPD is not based on core process data from the actual manufacturing site	Yes/No
5.5 Comment:	
5.6 The inventory for the core process is less than 1 year	Yes/No
5.6 Comment:	
5.7 Impact on climate change (GWP result) includes biogenic carbon dioxide emissions that are not reported separately, or it is not possible with information in the EPD to separate GWP_{GHG} and GWP_{bio}.(biogenic CO2 emission and uptake and stored carbon in the product)	Yes/No
Comment:	
5.8 Not all mandatory environmental indicators are reported?	Yes/No
Comment:	
5.8 Any other assumption made?	Yes/No
Comment:	

The table above is structured so that a "No" answer means that no assumption or limitation compared to the product category rules are made. If the answer is "Yes" it

does not mean that the EPD result is of poor quality, but it indicates that an assumption is made that the user of the EPD has to be aware of, especially if the use of the EPD is for comparative purpose on product level. The product category rules used may have to be interpreted when it is not precise enough. If significant assumptions are made it shall be reported in the EPD and further declared and explained in the table above. The list given above shall be seen as a minimum list to consider and to give an answer to.

Criteria 6: Q metadata validation	Answer
6.1 The same verifier as for the EPD and part of the verification procedure	◎
6.2 Any other third party verifier with access to underlying information	◎
6.3 Self claim by the company responsible for the EPD	◎
6.4 Any other external LCA-expert without access to underlying information	◎
Comment:	

It is also relevant to know how the Q metadata was established. The goal is that it will be part of the ordinary verification process. If this is not the case it has to be made by someone else and the reliability will be lower. Note that option 6.2 could be as good as option 6.1 if this third party will get access to the underlying LCA. This option is likely to be the best alternative when the Q metadata approach will be launched.

2.2 Example of quality settings for different intended use/purpose

The structure of the Q metadata is designed so that everyone can set their own level in relation to the current goal and scope for each study performed. A suggestion of levels for some purpose is given below, just to illustrate this flexible approach, see table below.

Table 1 Suggestion of setting of Q metadata for different intended use.

Application	Critera No					
	1	2	3	4	5	6
Public procurement on a specific construction product	1.1	2.1	3.1	4.1	Only “no”	6.2
As source data in an LCA to replace database/generic data and to make improvement on the same construction works	1.2	2.2	3.2	4.2	“yes” appears but consider not significant	6.3

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