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Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data

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Nachhaltigkeit von Bauwerken - Umweltproduktdeklarationen - Methoden für Auswahl und Verwendung von generischen Daten

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Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (CEN/TR 15941:2010) has been prepared by Technical Committee CEN/TC 350 “Sustainability of construction works”, the secretariat of which is held by AFNOR.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This Technical Report supports the use of Product Category Rules (prEN 15804) for construction products. Together they are used as the means for arriving at Environmental Product Declarations (EPD).

Introduction

This Technical Report is a supporting document referenced in prEN 15804. The Technical Report provides guidance for the selection and use of different types of generic data available for practitioners and verifiers involved in the preparation of EPD in order to improve consistency and comparability.

The TR provides a common language to improve understanding and introduces the concept of pre-verification to help with the selection of generic data. It also indicates the types and possible sources of data that exist and gives guidance on how to judge their selection. The TR also recognises that there are different levels of aggregation of data for material components, elements and buildings. The TR provides an explanation of the quality requirements for the data.

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1 Scope

This Technical Report supports the development of Environmental Product Declarations (EPD).

It assists in using generic data according to the core product category rules (prEN 15804) during the preparation of EPD of construction products, processes and services in a consistent way, and also in the application of generic data in the environmental performance assessment of buildings according to prEN 15978.

The requirements for the use of generic data are described in prEN 15804.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 15804:2008, *Sustainability of construction works — Environmental product declarations — Product category rules*

EN ISO 14025:2010, *Environmental labels and declarations — Type III environmental declarations — Principles and procedures (ISO 14025:2006)*

EN ISO 14040:2006, *Environmental management — Life cycle assessment — Principles and framework (ISO 14040:2006)*

EN ISO 14044:2006, *Environmental management — Life cycle assessment — Requirements and guidelines (ISO 14044:2006)*

ISO/TR 14049:2000*, Environmental management — Life cycle assessment — Examples of application of ISO 14041 to goal and scope definition and inventory analysis*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
average data
data combined from different manufacturers or production sites for the same declared unit

NOTE Average can relate to a number of issues such as location or time.

3.2
data set
collection of data appropriate for a specific LCA, LCI or for information modules

3.3
generic data
surrogate data used if no system specific data are available

NOTE 1 Data can be site specific or average.

3.4
meta data
information about the data being used, e.g. the data source, its age, the accuracy and precision, etc.

3.6
product
goods or service

[Adapted from EN ISO 14024:2000]

3.7
site specific data
data derived from one production site

NOTE Data might include different production lines.

3.8
system specific data
data specific to the product system under study

3.9
upstream, downstream process
process that either precedes (upstream) or follows (downstream) a given life cycle stage

3.10
verification
confirmation, through the provision of objective evidence, that specified requirements have been fulfilled

[EN ISO 9000:2005]

4 Generic data

4.1 General

Generic data are used instead of system specific data to describe the environmental impacts and aspects of a product's life cycle in an LCA study. Generic data are used for calculations where system specific data LCI/LCA data are not available or where other non-system specific LCI or technical data are required.

Generic data are needed for calculation of LCA/EPD as well as for the development of scenarios supporting the use EPD for the assessment of the environmental performance of construction products and construction works. Therefore, the methodological requirements of prEN 15804 also apply to generic data.

The guidance on selection of generic data illustrates different aspects the LCA practitioner is confronted with when collecting data for a LCA/EPD.

Generic data and average data are not necessarily the same. Average data are information that has been calculated as a mean value. Generic data are information (a data set) not specific to the system under study, although they may be average (i.e. calculated as a mean value) or obtained from a specific site.

4.2 Types of Generic Data

There are different types of generic data relevant within the practice of the building assessment arrived at by using information from EPDs:

a) generic LCI data for the development of the LCI results for an EPD (example: generic LCI result data set for the "production of 1 kWh electricity" used in the production process or data set for "incineration of 1 kg cardboard (packaging waste)" for end-of-life treatment of product packaging);

b) generic technical data for scenarios in the foreground system (example: default distance (km) to disposal place, unless known);

c) generic LCA, LCI and information module data for the use in building assessment (example: generic LCA result data set for the "production of 1 m^2 outer wall bricks-and mortar-built" or for "delivery of 1 kWh space heating from a heat pump using geothermal energy".

It is always important to choose data that fit to the goal and scope of the performed LCA study. The selection of generic data must not skew the results of the study with respect to its scope and goal.

4.3 Application of generic data in EPD

4.3.1 Manufacturer's EPD

Normally when undertaking LCA for an EPD, specific data for a certain product or process should be used. Often, however, such specific data are missing and the practitioner has to seek information from other sources; generic data then replaces specific data. Generic data should never replace specific data if specific data are available.

A manufacturer knows his own product and its production processes and the EPD can be prepared using specific data for theses processes. Generic data however describe upstream and downstream processes in addition to the data describing the manufacturer's own process, e.g. on his site. Generic data may also help to describe a product's position in the supply chain of the building.

4.3.2 Trade Association EPD

When industry associations create EPDs, they are normally based on average system specific data, representing the products of the association members in average values. Producers having production at multiple sites as a rule apply average data to represent their product.

4.3.3 Scenarios in EPDs

4.3.3.1 General

Generic data are often used when scenarios have to be created in an EPD, to fill out data gaps and to make the study plausible.

Generic data can be used both for the direct calculation of a process, but it is also used for the creation of scenarios where no direct information about future conditions are available or where it is impossible to know precisely how the information shall be applied since there may exist more than one option for its application. The latter is often the case when applying scenarios in a sensitivity analysis to track how sensitive the outcome of a study is in relation to different influencing parameters.

Generic data for scenarios should be as realistic as possible and properly documented (covering the present or anticipated situation), rather than idealistic or "carefully selected".

4.3.3.2 Building elements description scenarios

The aggregation of (specific or average) data from individual components into new generic elements is helpful for calculations in the early design stages, when the details of the construction and materials are not yet decided.

4.3.3.3 Construction process scenarios

Construction process scenarios are of importance for the construction, use and end-of-life stage; and of particular importance for comparing products over the entire life cycle of the building. The reference scenario for which the EPD is calculated, should reflect and be extrapolated from a present, realistic situation and not

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from a future "visionary" situation. The scenario should fit with the life cycle considered (examples: the appropriate electricity grid for a material or component produced on a global market, i.e. on another continent, versus for local recycling of demolition waste; transport for primary raw materials versus transport during the construction stage, etc.).

4.3.3.4 End of life scenarios

The use of generic data for scenarios describing the end-of-life stage (downstream processes) should reflect:

a) existing technology;

b) current regulations;

c) today's average practice and mix of different end-of-life treatments of the product group in the location where the process takes place.

4.3.4 Compensating with generic data for differences in local conditions

Often generic data will not directly reflect the local conditions (i.e. the actual situation) under study. Data compensation then has to take place. Compensation on a quantitative empirical basis for local conditions is always the best option. This however presupposes the practitioner's detailed understanding of the information under the local conditions and therefore understanding the different measures to be taken for compensating any bias in the information. When informed compensation of the data is not possible, informed assumptions have to be made. These kinds of assumptions are common in LCA since often no other option is available. Such assumptions should always be reported in the LCA-report and the sensitivity of the analysis resulting from such assumptions should be evaluated.

4.4 Sources of Generic data

4.4.1 General

Generic data vary in their nature and quality. Sometimes they include information from sources with a long tradition in gathering, sampling and processing information. In other cases, they may include information that is gathered or sampled in just a few observations or even a single observation. Generic data used in LCA is therefore often a mixture of data with different quality, which makes it important to understand how the data influences the precision and validity of the result.

Typical sources of generic data and qualitative information where to find them are provided below.

4.4.2 LCI/LCA data for materials or processes

a) European platform for LCA, (European Life cycle Data base, ELCD);

b) LCA software and database suppliers;

c) EPD;

d) sector-specific trade associations;

e) reports from earlier LCA;

f) industrial experts/LCA-experts;

g) sector-specific science institutes;

h) universities and their different departments;

i) companies of the supply chain.

4.4.3 Bibliography and documented expert experiences

Quantitative information is not always available from the outset but may be derived from qualitative information sources (texts) combined with information extracted from other kinds of sources such as databases or encyclopaedias. In addition to the above listed sources, generic data can be derived from bibliographies and documented expert experiences (e.g. transport model, landfill model), etc. as follows:

a) business internal and public statistics;

b) legislation and threshold values;

c) environmental reports / concessions;

d) annual reports;

e) encyclopaedias, e.g.:

   1) Ullmann's Encyclopaedia of Industrial Chemistry;

   2) John J. McKetta: Inorganic Chemicals Handbook;

   3) Kirk – Othmer: Encyclopaedia of Chemical Technology;

   4) environmental encyclopaedias, etc.;

f) measurements;

g) on site survey;

h) bibliographical source;

i) models and assumptions.

4.5 Generic data quality

4.5.1 General

A comprehensive life cycle inventory involves the collection and integration of very many pieces of data regarding the product, process, or activity under study. Depending on the scope of the study, information may be gathered from different companies, regions and even continents. As such, it is essential that the management of data quality is an integral part of the overall process (see ISO/TR 14049 for further information).

Generic data quality should be considered in the same light as that of other data for LCA. In this respect, there is no difference between use of specific data or generic data. The following topics should be assessed in order to select an appropriate generic dataset if specific data are not available:

a) Representativeness:

   1) regional coverage;

   2) age of the data;

   3) technology coverage;

b) plausibility;

c) completeness;

d) consistency;

e) uncertainty:

   1) reliability of the source;

   2) significance and representativeness.

4.5.2 Judging the quality of generic data

The quality of the data and information is a relative concept. It may be good or bad relative to the use of the study or relative to the overall information quality.

Generic data should:

a) be consistent with the goal and scope of the LCA-study used in the EPD and be in line with the rules for the PCR given in prEN 15804:2008;

b) be transparent with respect to its sources;

c) avoid double counting, information overlap is not allowed.

It is always preferable to use data, which have the highest precision and accuracy that can be practically obtained for an LCA study.

4.5.3 Meta data

All types of generic data are characterised by corresponding meta data, the relevant information necessary to judge the selection and applicability of generic data. Meta data ideally includes all information needed to determine the provenance of a data set and what the data set stands for. It will include information about the origin of the data, geographical and temporal coverage, etc., transformation of the data in any way such as averaging of different kinds and how well it represents what it is meant to represent. Meta data are therefore very important for judging the quality of the generic data used.

Meta data are also important in order to make sure that the LCA study reflects the actual on site case. In scenario calculations, meta data give information about the validity of the scenario and the resulting conclusions.

Meta data are also necessary during the interpretation stage of the LCA and should be recorded in the project report for the EPD verification. When using commercial software and databases the meta data information is normally given in parallel to the data itself, which makes it easier to check whether the data chosen best serves the purpose and intended use of the LCA study.

Data derived from bibliography, documented expert experiences, etc. also need to be accompanied by meta data information. This is especially true when the generic data used in the LCA study are prepared by combining different information sources.

4.5.4 Data verification

Only information that originates from reliable sources should be used. In cases where the generic data is directly created for a specific study (e.g. using sources described in 4.4.3), the practitioner should seek to use data from sources, which he can check.

A way of arriving at reliable data is to check if they are verified, i.e. if a peer review has been made.

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Peer reviewed data in this case means that one of the following options have been followed:

a) pre-verification by the data provider ensuring that the data are in line with prEN 15804;

b) critical review in line with EN ISO 14040 and EN ISO 14044 when using data from earlier reviewed LCA studies or EPDs as information modules.

Actual measured data could be considered the best since it provides an understanding of variability inherent in the processes to be modelled.

However, properly documented, calculated, or estimated data provide valuable input as well. If using data from such secondary sources, one has to check if the data are already referring to other data sources. The original source of data is relevant for the assessment of the age of the data (ISO/TR 14049:2000).

5 Pre-verification

5.1 General

Pre-verification is an optional procedure to verify whether a generic data set meets the requirements given in prEN 15804 for correct methodology, data and reporting and whether it is consistent with the principles of the PCR. Pre-verification also confirms whether the information given in the data set reflects the information in the documents on which the data set is based and whether this information is valid and scientifically sound.

Pre-verification alone can never verify nor validate the way in which generic data are used, this can only be done in the context of the EPD. Therefore, pre-verification of generic data can never replace the verification of the EPD. However, the EPD verification can be significantly simplified if pre-verified data are used in the LCA. Using pre-verified data can be a good way of lowering the cost for the LCA itself and also the cost for the total EPD.

The use of both pre-verification for the generic data plus verification of the EPD covers all aspects of verification according to 8.1 of EN ISO 14025:2010 (Procedure for review and independent verification). See 7.1 of EN ISO 14040:2006 and 6.3 of EN ISO 14044:2006 for further information.

Any pre-verification procedure should be set up in accordance with the verification requirements of prEN 15804, EN ISO 14044 and EN ISO 14025.

The status of the data with respect to pre-verification, can be given as information in the database as such, or as an answer to a question directed to the data base supplier.

Pre -verification can be carried out in two different ways:

a) The data can be pre-verified for specific applications, e.g. in EPD and that in case should be in line with prEN 15804.

   This can be the case when data from a large data base supplier are used. This means that the information that is used is quality controlled by the data base supplier for use within some area/areas of application. However, such data are not universally applicable.

b) The data can be selected from a previous LCA study or verified EPD.

   In this case, verification has been made on the study or the EPD according to the series of ISO standards from EN ISO 14040 to ISO/TR 14049, and EN ISO 14025. The information has, in such a case, also been verified with respect to the context of use and can therefore be used again in a similar case. It is the responsibility of the practitioner to check if the information suits the conditions in the new LCA study being prepared.

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5.2 Scope of pre-verification

The scope for pre-verification of generic data is covered by the requirements for data given in prEN 15804 and 6.1 of EN ISO 14044:2006.

The independent pre-verification of generic data from LCA, LCI and information modules should investigate as a minimum:

a) the guidance given with this Technical Report and prEN 15804;

b) quality criteria: completeness, consistency, coverage, precision, documentation of representativeness, documentation of sources, plausibility, accuracy and uncertainty;

c) whether meta data and any other necessary information for an appropriate use of the generic data is documented.

If generic data are developed for a specific Type III EPD program, the conformance of the data with the general programme instructions of the Type III environmental declaration program should also be confirmed.

5.3 Procedure

An appropriate pre-verification procedure to ensure the generic data complies with prEN 15804 should be established.

The procedure includes, for example:

a) the selection of the reviewers, including the requirements on the qualification of the reviewer;

b) independent pre-verification;

c) the possibility to review related data sets together;

d) the pre-verification format and documentation;

e) adequate access to pre-verification rules and results.

5.4 Documentation of results

The pre-verification procedure should be organised in a transparent way. The independent verifier documents the pre-verification process. This documentation should be made available together with the data set, preferably as part of the data set documentation.

The documentation should include:

a) the confirmation of independent pre-verification;

b) the reviewer name(s) and affiliation(s);

c) the scope of the verification; and

d) the final review comments addressing all aspects of the scope of the verification.

See 8.1 of EN ISO 14025:2010 for further information.

6 Quality Criteria

6.1 Time-related coverage

6.1.1 Age of data

The fact that data is old does not automatically mean that it is unsuitable for use.

However, control of its validity should have been made within the last ten years to ensure that it is still suitable for use in an LCA or EPD. The time frame for data validity is highly dependent on the subject of the LCA study. In some areas (e.g. production of electronic components) data become unusable earlier than in other areas (e.g. mining of limestone).

Several decisions need to be taken regarding the age and source of data to be used for the calculation of generic data. The age of primary data (site specific) and the secondary data (e.g. published sources) should be distinguished.

To allow an appropriate assessment of the time-related coverage, the age of generic data always should be documented. In cases where specific data and/or background data from different years are combined, the reported reference year will be the most representative year of the data set's inventory.

NOTE The reference year does not refer to the year of publication or calculation, but to the measurement or other derivation of the inventory.

6.1.2 Period of Data Collection

6.1.2.1 Seasonal Data

Where possible, data should be collected over a minimum period representing a year. Such data provide clarity on potential seasonal effects, natural process variation and accidental events. In addition to the specific period of study, it is useful to review the previous 12-month period to check the consistency and to help identify any anomalies or potential reporting errors (see ISO/TR 14049 for further information).

6.1.2.2 Long term data

Some processes have the characteristics that their environmental impact is happening over a long period (e.g. landfill). For generic data, the integral intervention of the first 100 years should be calculated and taken into consideration. "Long term" environmental interventions, e.g. emissions or absorptions, should be reported separately from the environmental interventions occurring during the first 100 years.

6.2 Technology coverage

The data should have appropriate technology coverage. For the validity of an LCA study or an EPD, which covers a part of an industrial production system, it is very important that data should describe the technology of processes correctly. Technology coverage should be considered in connection with time related coverage.

To allow an appropriate assessment of the technology coverage, the technology represented by the data set should be documented. If different technologies or resources are used (technology-mix) the share of each should be stated.

In addition, the level of aggregation of production processes should be stated:

a) site-, company- or sector-specific;

b) resolution or clustering of products in groups, clear description of the functional or declared unit;

c) way of averaging data (horizontal, vertical).

NOTE This Technical Report recommends the use of weighted average by production volume.

6.3 Geographical coverage

Generic data should have an appropriate regional coverage, i.e. information that from the beginning was made to cover one specific region is not used for calculations for another region. For example it would not be appropriate to use data for Italian electricity generation to describe processes using Swedish electricity generation. If a data set for the Swedish conditions was not available it may be better to use a European average value for electricity instead.

Generic data can represent consumption or production mix of a certain region, for example:

a) production - the mining of hard coal in Australia;

b) consumption - consumption of 1 kWh electricity in Germany.

To allow an appropriate assessment of the geographical coverage, the geographical area for which the data set is representative should always be stated. In cases where specific data and/or background data from different geographical areas are combined, the stated representativeness of the geographical coverage should be that of the most representative region of the data set's inventory.

6.4 Plausibility

The check of data always should include a plausibility check, which includes:

a) cross-check for selected elementary balances, e.g. carbon or metals;

b) comparison with other existing data;

c) reasonable mass balance;

d) reasonable energy balance, etc.

6.5 Completeness

Completeness describes whether information from the stages of a life cycle assessment is sufficient for reaching conclusions in accordance with the goal and scope definition of the LCA study.

The treatment of missing data and other gaps should be documented.

Downstream processes should only be considered complete when they are modelled "to the elementary flows", i.e. there are no waste flows in the inventories left (unless left as additionally provided "General reminder flows", e.g. mineral waste (deposited)).

The only exception is radioactive waste for which no agreed approach is available as yet. Consequently, the final deposition of radioactive waste is not modelled and such waste flows remain in the inventory.

6.6 Consistency

A consistency check is a qualitative way to assess how uniformly the generic data and the study methodology are applied to the various components of the study. This quality measure is one of the most important to manage in the inventory process.

A consistency check attempts to determine whether the assumptions, methods, models and data are consistently applied. This includes the same or equivalent:

a) system boundaries;

b) cut-off rules (input and output side);

c) allocation rules;

d) age of data;

e) technology coverage;

f) time-related coverage;

g) geographical coverage;

h) consistency with LCI methodological conventions with and conventions for elementary flows;

i) life cycle impact assessment.

6.7 Uncertainty

6.7.1 Reliability of the source

The reliability of the source varies largely depending on who has produced the information. As a control of the data reliability, the original data source should be established and be appropriate to the use of the data. For example, data might be compiled by a school class, published by a producer of a specific product, or collected for a master thesis; knowledge of the source will give guidance to the practitioner.

6.7.2 Data differences

Choices will often need to be made between different data sets that fulfil the same information needs in an LCA study. It is important to understand why these data sets differ before one of them is selected and used. There can be many good reasons to reject apparently similar data, these might include: precision in the data differs, the age of the data, etc. The significance of any differences in data sets needs to be understood before one of them is chosen.

6.7.3 Sensitivity analysis

An important issue is how much the result of an LCA changes in any respect depending on the variations in the data used for the study. In the choice between different generic data, one should create an estimation of this variance in result. In that way, less the study is subject to less bias and thus more robust results and interpretation of the study can be created.

Bibliography

[1] Data search engine of the European Commission hosted by the DG Joint Research Centre - Institute for Environment and Sustainability; http://lca.jrc.ec.europa.eu/lcainfohub/index.vm

[2] EN ISO 14024:2000, *Environmental labels and declarations — Type I environmental labelling — Principles and procedures (ISO 14024:1999)*

[3] EN ISO 9000:2005, *Quality management systems — Fundamentals and vocabulary (ISO 9000:2005)*

Other relevant future standards from CEN/TC 350 include:

[4] prEN 15643-1, *Sustainability of construction works — Assessment of buildings — Part 1: General framework*

[5] prEN 15643-2, *Sustainability of construction works — Assessment of buildings — Part 2: Framework for the assessment of environmental performance*

[6] prEN 15643-3, *Sustainability of construction works — Assessment of buildings — Part 3: Framework for the assessment of social performance*

[7] prEN 15643-4, *Sustainability of construction works — Assessment of buildings — Part 4: Framework for the assessment of economic performance*

[8] prEN 15942, *Sustainability of construction works — Environmental product declarations — Communication format — Business to Business*

[9] WI 00350003, *Sustainability of construction works — Environmental product declarations — Use of environmental product declaration (EPD)*

[10] prEN 15978, *Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method*

[11] WI 00350014*, Sustainability of construction works — Environmental product declarations — Communication format — Business to Consumer*

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