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# ECOproduct

Method description version 5.0



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## Method description

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### **Summary**

ECOproduct is a method and database designed to carry out environmentally friendly material- and product selection in construction projects.

A revision of method version 4.0 has been done to make extensions of the method as well as some improvements and corrections, which has resulted in version 5.0 covered by this report.

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# History

VERSION	DATE	VERSION DESCRIPTION
2.0	2008-12-09	ECOproduct method description version 2.0
3.0	2015-07-01	ECOproduct method description version 3.0
4.0	2017-04-27	ECOproduct method description version 4.0

## Preface

ECOproduct is a method and database designed to enable environmentally friendly material and product selection in a construction project based on the content of a third party verified environmental declaration (EPD) in accordance with EN ISO 14025 and EN 15804. Information on content of hazardous substances and emissions to the indoor environment are often voluntary in an EPD, in addition to foreign EPDs not having information on the Norwegian priority list. It is therefore necessary to obtain information about this from the manufacturers. For this purpose, there is a self-declaration form to be signed by a legally responsible person in the company.

The scientific background for the method is based on a PhD thesis at NTNU, entitled *"The MaSe decision support system: Development of an integrated information system for the selection of environmentally preferable materials and products in the building process"* (Sigrid Melby Strand, 2003).

ECOproduct was initially developed through a collaboration between Norsk Byggtjeneste AS (Norwegian Building Centre Ltd.), NAL | ECOBOX and SINTEF Byggforsk (SINTEF Building Research, now SINTEF Community). Norwegian Building Centre, NCC, SINTEF Building Research and Norwegian EPD Foundation were involved parties. SINTEF Building Research has been professionally responsible for the method up to and even version 4.0. Since then, Grønn Byggallianse (Norwegian Green Building Council) has taken over responsibility for the development and quality assurance of the method. A panel consisting of representatives from various companies in the construction industry has been established that provides input to professional development. The Board of the Norwegian Green Building Council, which has representatives from the entire value chain in construction and real estate, is the decision-making authority for new versions.

Norwegian Building Centre is responsible for the development and operation of the commercial database using the method with an educational interface. Presentation of completed reviews can be found both in Norwegian and English language as a subscription service on the Internet.

Version 1.0 was launched in March 2006. A further development work was carried out in 2007 and 2008 which resulted in version 2.0. In 2012, it became clear that Norwegian EPDs should comply with NS-EN 15804: 2012 and this initiated a revision process to redo the method to fit this standard (v3.0). Version 3.0 was launched on 01.07.15, and after one year of experience in using it, some minor adjustments were made which resulted in version 4.0 which was released on 27.04.2017, where the adjustment was mainly how to evaluate the content of EPDs. However, after some time, it was found that version 4.0 contains some ambiguities in the environment area "Hazardous substances", in addition to the desire to include circular economy as a new environmental area as well as some improvements that will result in more fair reviews and updates regarding new European standards.

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## 1 Introduction

ECOproduct is a method to make it easier to assess the climate and environmental impact of individual products for use in buildings, based on a current Environmental Product Declaration (EPD) and any supplementary product information.

### 1.1 Refinements and news in version 5.0

#### **ECOproduct is basically intended for product-specific assessments**

The criteria set in this method description can be used on all environmental documentation.

However, we strongly recommend that only valid third-party certified EPDs provide the basis for an assessment, as well as any additional documentation needed to assess the content of hazardous substances, emission to indoor climate and suitability for recycling. This is also a requirement for registration in the ECOproduct database for Norwegian Building Centre.

There are two alternative EPDs approved by the Norwegian Building Centre:

1. An EPD for one or more specific products from one manufacturer/supplier. The product may be manufactured in several different factories, but may only come from one supplier,
2. An EPD for one or more specific products from one manufacturer/supplier for one specific customer/project. Such a project EPD need not necessarily be registered and published if it is referenced to an already registered and published EPD.

EPDs prepared by e.g. an industry organization on behalf of two or more member companies is rejected.

The purpose of an ECOproduct assessment is primarily to obtain an environmental assessment of a specific product in order to be able to compare this with other products with approximately the same function/area of use. Since it can be difficult to compare individual products without seeing them in the context of the respective building sections (and the finished building), Norwegian Building Centre has established a reference to the relevant building section(s) to clarify the uses of the building product.

It is also a goal that more knowledge of a product's environmental performance will motivate manufacturers to develop increasingly environmentally friendly products and gain this as a competitive advantage.

#### **The data basis should be complete for the entire product**

In order to do a comprehensive environmental assessment of the product, the data base should cover the entire product. Therefore, the Norwegian Building Center does not initially accept data sets with data that comprise less than 100% of the product. Exceptions are made for products with "cut-off" in accordance with the rules of ISO 14044: 2006 and relevant PCR. Note that the cut-off does not apply to hazardous materials or substances.

If the manufacturer requires special additional products (glue, sealant, surface treatment, etc.) in order to meet any warranty requirements, the Norwegian Building Center will provide information on this together with the assessed product in the database, and if possible with a link if there is a separate ECOproduct assessment for the additional product.

#### **Version 5.0 includes information on potential for reuse and material recycling**

EPDs are considered with regard to cradle-to-gate as well as waste treatment. By using the terms in EN 15804 this means modules A1 – A3 and C3. Assessment of C3 is new to version 5.0 to increase knowledge about the possibility of reuse and material recycling.

One of the reasons that only cradle-to-gate as well as waste treatment is considered is that it is this manufacturer's responsibility and opportunity to influence. Transport to the building site in A4 is based on generic data, and the operating phase is largely scenario-determined. Because of this, there is too much uncertainty to be able to evaluate phases A4 – C2. Another reason is that there are many EPDs that include only environmental impact data up to the factory port and omit the remaining ones. In EN 15804:2019, the C3 module is mandatory, so that there will be better data on the recycling potential of the building product. Since module C3 is now implemented in the method, this could help manufacturers to arrange better receiving equipment and capacity for recycling their own building products.

It is now natural to include increased focus on circular economics. Circular economy (cf. parliamentary report 45 (2016-2017) means better utilization of material resources. Today, manufacturers have better reception and recycling routines and opportunities than before, and the view on waste is changing). It is likely to believe that in the future there will be schemes that facilitate the reuse/recycling of products.

### **Information on environmental toxins and degassing is required for a complete ECOproduct assessment**

According to the European EPD standard NS-EN 15804:2012+A2:2019 the content of hazardous substances and documentation on degassing are voluntary information. Therefore, many foreign EPDs do not contain this information. Norwegian EPD Foundation requires that this be included for EPDs that must be approved by them.

ECHA's regulations (only REACH Candidate List of Substances of Very High Concern for Authorisation (SVHC) and Authorisation List (Annex XIV)) does not require information on foreign EPDs. EU's *"Regulation on classification, labelling and packaging of substances and mixtures, amending and repealing. Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006"* (CLP Regulation) came into force in Norway on June 1<sup>st</sup> 2015, and is not yet a mandatory information in neither foreign nor Norwegian EPDs. The same applies to REACH Restriction list (Annex XVII).

However, the ECOproduct criteria include both the Norwegian priority list, REACH candidate list, REACH authorisation list and REACH prohibition and restrictions. In view of this, a complete ECOproduct assessment therefore usually requires additional information to the EPD from the manufacturer in part 1 of *"Hazardous substances/emissions to indoor environment"* if this is relevant to the product.

If a building product is intended for indoor use (ie within the vapor barrier system), a complete ECOproduct assessment requires that tests that show values for emissions are performed. EN 15251<sup>1</sup> or EN 16798, if relevant to the building product (construction products that are classified as very low-emitting and untreated wood are excluded). If test result or certificate reference is not stated in the EPDs, this must be answered in part 2 of *"Hazardous substances/emissions to indoor environment"*.

### **Global warming units**

Initially, global warming emissions were assessed in emissions "kilo CO<sub>2</sub> eq. pr. kilograms of building products" regardless of declared unit in the EPDs, which favored heavy products e.g. boards rather than roll products. Thus, from 01.07.2017 this was changed to emissions "kilo CO<sub>2</sub>-eq. pr. m<sup>2</sup>" for typical surface products, with m<sup>3</sup> or m<sup>2</sup> x material thickness as declared unit in EPDs. However, there is still a challenge for the product categories "Construction Materials", "Surface Treatment" and "Beams, columns and uprights" where lightweight materials (porous concrete, burnt clay, wood etc.) get worse grades than heavier for the same reason as above. Therefore, these groups will also be assessed on the basis of m<sup>3</sup> regardless of declared entity in EPDs.

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<sup>1</sup> EN 15251 was withdrawn on 01.08.2019, but references in EPDs and laboratory tests prepared before this date are accepted.

### Calculation of global warming reference values

As of version 3.0 klimagassregnskap.no's data was used as a basis for external reference values. Klimagassregnskap.no is no longer operational, and the data from this will be gradually removed from 2021 until 2024. From 2021 new external reference values will be added based on valid, third-party verified EPDs which will gradually replace data from klimagassregnskap.no. Calculations from external EPDs will be valid for three years after the expiry date.

To calculate the reference value of a product, this is based on average values from the database and data from external EPDs with weighting ratio 75/25. This is because external EPDs are not quality assured in the same way as in the database. In addition, external EPDs that have extreme impacts are rejected, ie 250% above or 100% below the reference value. The remaining results are also removed from the 5% highest and 5% lowest as a safety margin.

For the products that are registered in the database, the GWP emissions for the relevant building product are registered. Then, an average for each generic product is used as the basis for establishing the reference value for the product category. This is to avoid that an over-represented building product can affect the reference value.

### Calculation of biogenic carbon sequestration

The assessment of the sequestration and emission of carbon dioxide is based on EN 16485:2014. This method is based on the modularity principle in EN 15804, where emissions are to be counted in the life cycle module where it actually occurs. During the growth phase of the tree, biogenic carbon sequestration has been included, but since the emission in the carbon sequestration occurs in module C3 which has not been included in the method so far, this will be neutralized. Biogenic carbon sequestration in A1 – A3 is removed as a result. However, the effect of biogenic carbon sequestration will appear in the database as additional information.

### Impact categories from EN 15804: 2012 + A2: 2019 which are evaluated through ECOproduct:

- **GWP** GWP Global warming potential (kg CO<sub>2</sub>-ekv.)
- **RPEE** Renewable primary energy resources used as energy carrier (MJ)
- **NRPE** Non renewable primary energy resources used as energy carrier (MJ)
- **RSF** Use of renewable secondary fuels (MJ)
- **NRSF** Use of non renewable secondary fuels (MJ)
- **SM** Use of secondary materials (kg)<sup>2</sup>

The use of resources is based on an assessment of “sustainable renewable”, “sustainable non-renewable” and “non-sustainable, non-renewable”, as well as secondary materials based on the **SM secondary materials** (kg) and the table of contents.

### Impact categories included in EN 15804:2012+A2:2019, but expire in ECOproduct version 5.0:

- **RPEM** Renewable primary energy used as raw material (MJ)
- **NRPM** Non-renewable primary energy used as raw material (MJ)

The reason is that these two effect categories are already included in the resource table for content use and will therefore be a double count. However, the effect of energy as a raw material will be shown in the database as an additional information.

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<sup>2</sup> By secondary materials means raw materials from an installed product which is then returned to the factory for inclusion in a new product.



**Impact categories included in EN 15804: 2012+A2:2019, but which for now are omitted in ECOproduct:**

- **ADPE** Abiotic depletion potential for fossil resources (MJ)
- **ADPM** Abiotic depletion potential for non-fossil resources (kg Sb ekv)

The reason for not including these is that fossil resources are to some extent covered in the energy and resources table through other power categories. It has also been chosen to disregard the non-fossil resource category, as it has not been part of the ECOproduct method initially. More experience related to this category is needed before it is implemented in the method.

- **EEE** Exported electrical energy (MJ)
- **ETE** Exported thermal energy (MJ)

The reason for not including these is the risk of double counting. One production line gets points while the next producer that uses this surplus energy gets to count this same amount of energy in his energy account. The energy will thus be scored twice.

**Impact categories not included in EN 15804 but being assessed in ECOproduct:**

- Indoor climate (EN 15251/EN 16798)
  - o Emission of gases
  - o Odour dissatisfaction (voluntary, does not give credit)
- Hazardous substances, see Chapter 2.1

## 1.2 Product categories

In order to be able to compare the environmental assessment for different products, each product must be evaluated in relation to other products in the corresponding product category. For relevant assessments such as the assessment of global warming, the reference product must also be assessed against, limited to a defined product category. Norwegian Building Center has defined different product categories in their database. This list is dynamic and will change as needed, but gives an indication of where a specific product belongs. The list is also basically related to the product classification in Green Material Guide version 2, June 2017.

### Building boards, indoor

Solid wood Panels  
Plasterboard  
MDF  
OSB  
Fibreboard  
Pressed fibreboard  
Plywood  
Polymer composites  
Fiber cement sheets  
Cement bonded wool wood panels

### Building boards, outdoor

Façade panel  
Polymer composite panel  
Fiber cement panel

### Doors and gates

Exterior doors  
Internal doors  
Solid wood doors  
Framed doors  
Garage door  
Bi-entrance doors  
Window doors  
Lift-/sliding door  
Overhead sectional door

### Façade elements

Massive timber  
Precast concrete  
Lightweight Concrete blocks  
Insulated facade element  
Sandwich panels  
Facade panels  
Ethylene tetrafluoroethylene (ETFE)  
Glasselement

### Membranes and mesh

Radon stopper  
PE-membrane  
PU-membrane  
PVC-membrane  
PP-membrane  
Reinforcement mesh  
PET-membrane

### Flooring

Vinyl  
Carpet  
Linoleum  
Ceramic tile  
Parquet  
Laminate  
Solid wood flooring  
Natural stone flooring  
Rubber  
Epoxy  
Composite

### Interior cladding

Wood paneling  
Ceramic tile

### Insulation materials

Extruded polystyrene (XPS)  
Expanded polystyrene (EPS)  
Vacuum Insulation (VIP)  
Translucent insulation materials (TIM)  
Stone wool  
Glass wool  
Foamglass  
Cellulose fiber  
Lightweight aggregates  
Fibreboards  
Mineral insulation

**Construction materials**

Structure Steel  
 Glued laminated structural joist  
 Construction timber  
 Light gauge steel profile  
 Reinforcing steel  
 Prefabricated concrete beam  
 Prefabricated concrete column  
 Aluminium profiles

**Surface treatment**

Dry Mortar  
 Floor screeds  
 Primers and facade paints  
 Facade mortar  
 Reinforcing mortar/basic plaster  
 Shotcrete

**System suspended ceilings**

System suspended ceilings  
 Acoustic suspended ceiling

**System walls**

Interior glass  
 Glass/parapet  
 Gypsum walls

**Roofing**

Roof tiles  
 Untreated wood  
 Green roofs  
 Plastic-based single ply membranes  
 Bitumen-based roofing  
 Slate  
 Modified lumber  
 PVC roofing/slabs  
 Ethylene tetrafluoroethylene-foil (ETFE)

**Beams, pillars and studs**

Structural steel  
 Glulam beam  
 Construction work  
 Steel rails and studs  
 Reinforcing steel  
 Prefabricated concrete beam  
 Prefabricated concrete column  
 Aluminium profiles

**Exterior cladding**

Untreated wood  
 Brick  
 Zink  
 Steel and aluminum slabs  
 Puss façade system  
 Polycarbonate (PC)  
 Natural stone  
 Ceramic tile  
 Modified wood  
 Composite Panels  
 Copper  
 Glass/Aluminum  
 Fiber cement  
 Treated wood  
 Glass  
 PE foil  
 Tyvek  
 Asphalt Cardboard  
 Asphalt Slabs  
 Plasterboard

**Wind and vapor barrier**

PE foil  
 Felt cloth of polyethylene fibers  
 Asphalt cardboard  
 Asphalt board  
 Plasterboard

**Windows**

Aluminum window  
 Timber window  
 PVC-window  
 Skylight

**Decking**

Decking of treated wood  
 External Natural stone  
 Frost resistant ceramic tiles  
 Expanded metal aluminum  
 Paving stones

**Fittings, door openers and locks**

Automatic door opener

## 2 Method structure

The ECOproduct method enables to aggregate information from parameter level up to theme area as shown in Figure 1. There are six categories; hazardous substances, indoor climate, global warming, resources, energy and suitability for recycling. The latter category is particularly connected to circular economy. The following subsections describe how the Level 1 assessment (which is built on Level 2) should be carried out.

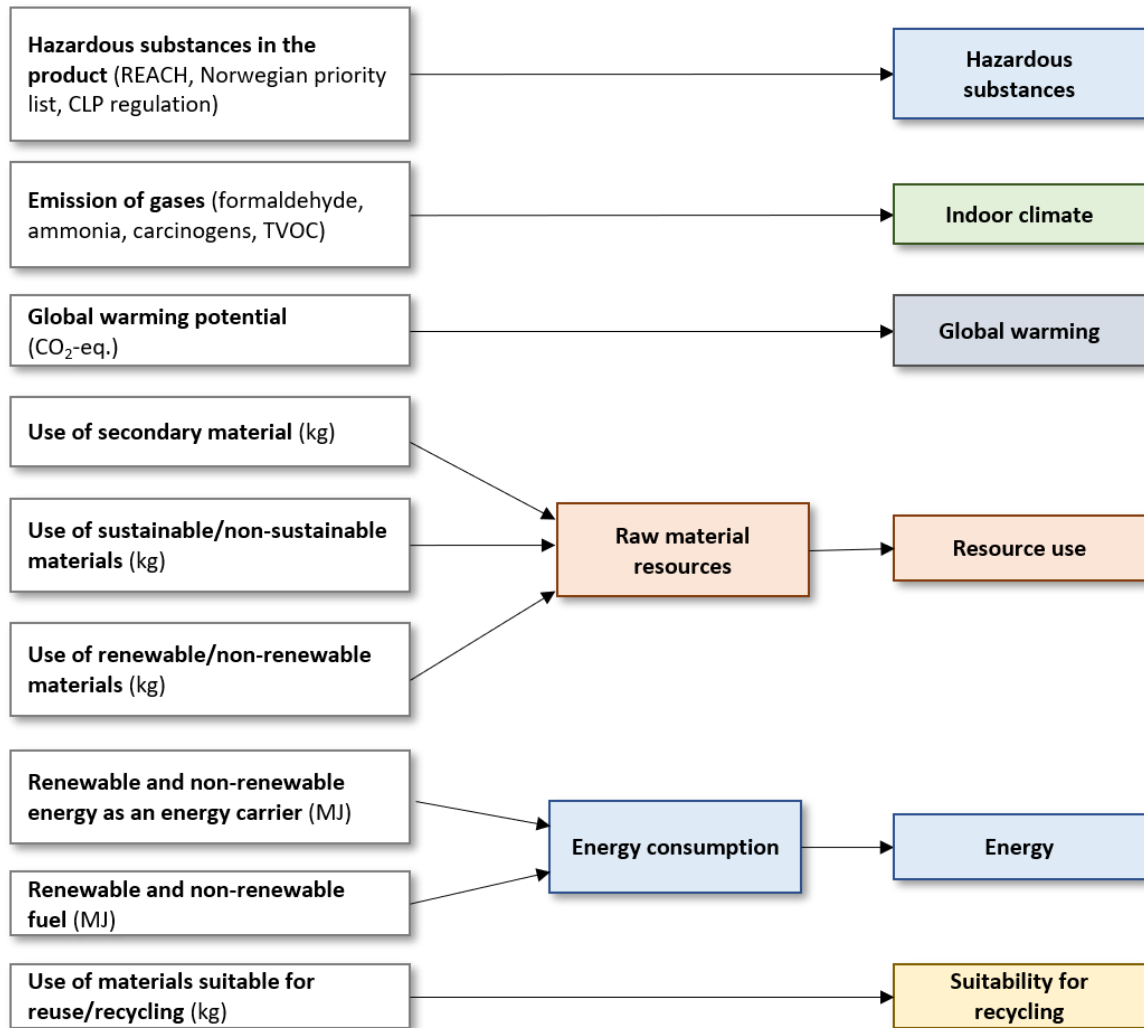


Figure 1. Flowchart method

## 2.1 Hazardous substances

Health and environmentally hazardous substances are assessed through Table 1, which in turn refers to Table 2 where the amounts are given in weight percent.

The Norwegian priority list, REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) Substances of Very High Concern (Candidate list), REACH Annex XIV (Authorisation List) and REACH Annex XVII (Restriction list). The database is revised and updated at least once a year, preferably 01.01.

To obtain a score, documentation must be provided in the form of part 1 of the form “Hazardous substances and emissions to indoor environment”, if this is relevant to the product. Concrete and concrete elements, untreated wood, glass, untreated steel, aluminum, stone materials, ceramic tiles, etc. is exempt from this documentation.

In earlier versions of the method, lead and lead compounds, mercury and mercury compounds, arsenic and arsenic compounds, tin organic compounds, biocidal products, cadmium or cadmium compounds, human hormone disrupting cat. 1, hormone-disrupting animals, cat. 1, hormone-disrupting cat. 2 and endocrine disrupting cat. 3 of the EU’s database as well as polycyclic aromatic hydrocarbons (PAH) specified specifically in the declaration form, but these substances are included in both the Norwegian priority list and/or relevant REACH lists so that this is perceived as double registration. This also applies to PBT/vPvB substances, which are also included in the REACH Candidate List, and will be subject to Priority and Appendix XIV to the REACH Regulation (Authorisation List).

Nanoparticles have also previously been included in the self-declaration form, but were then a voluntary information. As of January 1<sup>st</sup> 2020, explicit legal requirements under REACH apply to companies that manufacture or import nanoforms, and are then taken care of by the registration under REACH and CLP.

It is emphasized that the limit values for health and environmentally hazardous substances apply to the finished building product in any cured condition, not incoming substances.

Criteria	Assessment	Score
See limit values for score 1 in Table 2	Excellent	1
-	Good	2
See limit values for score 3 in Table 2	Average to good	3
See limit values for score 4 in Table 2	Average	4
-	Acceptable	5
See limit values for score 6 in Table 2	Below average	6
-	Poor	7
See limit values for score 8 in Table 2	Very poor (or incomplete)	8

Table 1. Assessment for hazardous substances.

Category	Code	Score 1	Score 3	Score 4	Score 6	Score 8
Acute Tox. 1	H300	≤ 0.0005	≤ 0.005	≤ 0.03	≤ 0.2	> 0.2
	H310	≤ 0.005	≤ 0.02	≤ 0.1	≤ 0.2	> 0.2
Acute Tox. 2	H300	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
	H330	≤ 0.05	≤ 0.25	≤ 2	≤ 5	> 5
	H301	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
	H310	≤ 0.02	≤ 0.1	≤ 0.2	≤ 0.5	> 0.5
Acute Tox. 3	H311	≤ 0.1	≤ 0.2	≤ 0.5	≤ 1	> 1
	H331	≤ 0.25	≤ 2	≤ 5	≤ 8	> 8
Acute Tox. 4	H302	≤ 0.2	≤ 0.5	≤ 1	≤ 1.5	> 1.5
	H312	≤ 0.2	≤ 0.5	≤ 1	≤ 1.5	> 1.5
	H332	≤ 2	≤ 5	≤ 8	≤ 10	> 10
Skin Corr. 1A Skin Corr. 1B Skin Corr. 1C	H314	≤ 0.005	≤ 0.02	≤ 0.1	≤ 0.2	> 0.2
		≤ 0.005	≤ 0.02	≤ 0.1	≤ 0.2	> 0.2
		≤ 0.005	≤ 0.02	≤ 0.1	≤ 0.2	> 0.2
Skin Irrit. 2	H315	≤ 0.2	≤ 0.5	≤ 1	≤ 1.5	> 1.5
Eye Dam. 1	H318	≤ 0.1	≤ 0.2	≤ 0.5	≤ 1	> 1
Eye Irrit. 2	H319	≤ 0.2	≤ 0.5	≤ 1	≤ 1.5	> 1.5
Resp. Sens. 1/1A/1B	H334	≤ 0.01	≤ 0.05	≤ 0.25	≤ 2	> 2
Skin Sens. 1/1A/1B	H317	≤ 2	≤ 2.5	≤ 3	≤ 3.5	> 3.5
Muta. 1A Muta. 1B	H340	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
Muta. 2	H341	≤ 0.2	≤ 0.5	≤ 1	≤ 1.5	> 1.5
Carc. 1A	H350	≤ 0.0005	≤ 0.005	≤ 0.03	≤ 0.2	> 0.2
Carc. 1B	H350i	≤ 0.01	≤ 0.05	≤ 0.25	≤ 2	> 2
Carc. 2	H351	≤ 0.03	≤ 0.2	≤ 0.5	≤ 1	> 1
Repr. 1A	H360	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
	H360F	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
	H360D	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
Repr. 1B	H360FD	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
	H360Fd	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
	H360Df -	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
Repr. 2	H361	≤ 0.03	≤ 0.2	≤ 0.5	≤ 1	> 1
	H361f	≤ 0.03	≤ 0.2	≤ 0.5	≤ 1	> 1
	H361d	≤ 0.03	≤ 0.2	≤ 0.5	≤ 1	> 1
	H361fd	≤ 0.03	≤ 0.2	≤ 0.5	≤ 1	> 1
Lact.	H362	≤ 0.5	≤ 1	≤ 1.5	≤ 2	> 2
STOT SE 1	H370	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
STOT SE 2	H371	≤ 0.03	≤ 0.2	≤ 0.5	≤ 1	> 1
STOT SE 3	H335	≤ 0.25	≤ 2	≤ 5	≤ 8	> 8
	H336	≤ 2	≤ 5	≤ 8	≤ 10	> 10
STOT RE 1	H372	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
STOT RE 2	H373	≤ 0.03	≤ 0.2	≤ 0.5	≤ 1	> 1
Asp. Tox. 1	H304	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5

Category	Code	Score 1	Score 3	Score 4	Score 6	Score 8
Aquatic Acute 1	H400	≤ 0.5	≤ 1	≤ 1.5	≤ 2	> 2
Aquatic Chronic 1	H410	≤ 0.2	≤ 0.5	≤ 1	≤ 1.5	> 1.5
Aquatic Chronic 2	H411	≤ 1	≤ 1.5	≤ 2	≤ 2.5	> 2.5
Aquatic Chronic 3	H412	≤ 1.5	≤ 2	≤ 2.5	≤ 3	> 3
Aquatic Chronic 4	H413	≤ 2	≤ 2.5	≤ 3	≤ 3.5	> 3.5
Ozone	H420	≤ 0.005	≤ 0.03	≤ 0.2	≤ 0.5	> 0.5
Chemicals listed on the Norwegian priority list		≤ 0.001	≤ 0.01	≤ 0.02	≤ 0.1	> 0.1
Chemicals listed on REACH SVHC		≤ 0.001	≤ 0.01	≤ 0.02	≤ 0.1	> 0.1
Chemicals listed on REACH Annex XIV		≤ 0.001	≤ 0.01	≤ 0.02	≤ 0.1	> 0.1
Chemicals listed on REACH Annex XVII		≤ 0.0005	≤ 0.005	≤ 0.003	≤ 0.01	> 0.01

*Table 2. Criterias for hazardous substances.*

## 2.2 Indoor climate

Products that affect the indoor climate are characterized as products used within the vapor barrier against living rooms or as part of the vapor barrier/vapor barrier system. The "Indoor climate" category considers emissions of gases and odors. For products that have not performed odor tests, there will be N/A in the category "odor" in ECOproduct (the score of a product is not affected by the product not having odor test). Norwegian EPDs generally follow the M1 Emission classification of Building Materials system created by The Finnish Society of Indoor Air Quality and Climate (FISIAQ)<sup>3</sup> in 1995 [M1 criteria, 2014] and refer to the criteria here, which coincide with criteria I ECOproduct method. However, various schemes are accepted as documentation that the criteria are satisfied, provided that the criteria in these correspond to the levels of score in ECOproduct.

No emission tests are required on glass, natural stone, ceramic tiles, untreated steel, aluminum and similar products defined as "Very low emitting" according to EN 15251 and EN 16798. In addition, untreated concrete is also considered "Very low emitting", as these are mainly stone materials.

According to the Building Information Foundation RTS, untreated wood is considered as "Low-emitting" referring to this, corresponding to M1. For surface treated wood, a separate emission test of the surface treatment on dead surface is required. Emissions from untreated wood should not be taken into account. For glued products, emissions from the glue, or the product as such, must be documented.

Stone materials intended for indoor use, a report confirming the building product does not contain radon is mandatory.

Table 3 shows the criteria for "Very low emitting" and "Low emitting" (M1) measured after 28 days in accordance with EN 15251. This standard is accepted as documentation for EPDs and test reports prepared before 01.08.2019.

Table 4 shows the criteria for "Very low emitting" and "Low emitting" (M1) measured after 28 days according to EN 16798 (with reference to standard EN 16516). This standard is used in cases where it is presented. Only "Very Low Emitting" and "Low Emitting" are accepted.

Table 5 shows how the systems should be evaluated in the ECOproduct method.

Other indoor climate certification systems can be used if the information covers the M1 criteria and the M1 criteria are functional requirements (as in BREEAM-NOR). If the indoor climate assessments do not cover all the M1 criteria, the missing assessments must be provided or the ECOproduct assessment must show that the product does not have sufficient documentation.

If the emission requirements are not relevant to a product, it is accepted that no test is performed for this requirement. The ECOproduct assessment will show that the product has not been tested as the requirement is not relevant.

If there is a laboratory report in addition to/instead of a certificate, the laboratory results will be decisive for the score if the result satisfies "Very low emitting".

Substance	Very low-emitting	Low-emitting (M1)	M2	M3
TVOC (mg/m <sup>2</sup> h)	< 0.1	< 0.2	< 0,4	≥ 0,4
Formaldehyde, H <sub>2</sub> CO (mg/m <sup>2</sup> h)	< 0.02	< 0.05	< 0,125	≥ 0,125
Ammonia, NH <sub>3</sub> (mg/m <sup>2</sup> h)	<0.01	< 0.03	< 0,06	≥ 0,06
Carcinogens (mg/m <sup>2</sup> h)	< 0.002	< 0.005	< 0,005	
Odour (PD)	< 10 %	< 15 %	≥ 15 %	

Table 3. Criteria for emission of gases (EN 15251).

<sup>3</sup> <https://www.rakennustieto.fi/index/english.html>



Source	Very low emitting products for very low polluted buildings	Low emitting products at low polluted buildings
Total VOCs TVOC (as in EN 16516)	< 300 µg/m <sup>3</sup>	< 1000 µg/m <sup>3</sup>
Formaldehyde	< 30 µg/m <sup>3</sup>	< 100 µg/m <sup>3</sup>
Any C1A or C1b classified carcinogenic VOC	< 5 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
R value (as in EN 16516)	< 1.0	< 1.0

Table 4. Criteria for emission of gases (EN 16798).

Criteria	Assessment	Score
a) Very low-emitting in accordance with EN 15251/EN 16798 b) Untreated concrete	Excellent	1
a) Low-emitting in accordance with EN 15251/EN 16798 b) M1 classification	Good	2
-	Average to good	3
-	Average	4
-	Acceptable	5
-	Below average	6
M2	Poor	7
M3	Very poor (or incomplete)	8

Table 5. Assessment table for emissions of gases.

### 2.3 Global warming potential (GWP)

Global warming consists of only one parameter; emissions measured in CO<sub>2</sub> equivalents, which are assessed according to the criteria set out in Table 6. The assessment is made in relation to a reference value. This reference value is the average of products with approximately the same function/use.

The reference values are based on values from the ECOproduct database to Norwegian Building Center, as well as registered values from valid, third-party verified EPDs. The weighting ratio is 75/25, as values registered in the database have undergone a quality check in connection with assessment and therefore has a higher credibility. Reference value is only calculated if there are 10 or more products in the database to ensure representability. In addition, the EPDs with the 5% lowest and highest values are removed from the collected data.

The GWP reference data is calculated according to criteria given in Table 6, regardless of the declared unit specified in the EPD.

Reference values in the database are based on valid EPDs for external data and averages of valid EPDs as well as the last three years values from discontinued EPDs in the database, and can be adjusted by New Year (01.01.xx) each year depending on whether changes in the reference values for products for the relevant building part have been registered in the ECOproduct database.

An updated list of reference values is publicly available for self-assessment and to ensure transparency of the method. The Database to Norwegian Building Center uses this list as their basis for their assessments. Reference values for the different product groups can be found at: <https://byggeportalen-bt.azurewebsites.net/ReferenceValues/GlobalWarmingPotential>.

Initially, Global Warming was assessed using the unit kg for all products regardless of category. This was changed to m<sup>2</sup> 01.07.17 for most categories. Area is considered a better reference for emissions than weight. Weight is hereafter used only for fittings, door openers and locks.

Table 7 shows an overview of product groups and selected units that are recommended for use. These are used when assessing Global Warming after 01.01.2021 in the Norwegian Building Center's database. For those EPDs that are not listed with the entities in the table, a conversion is done in the database, based on information presented in the EPD.

Criteria (% of reference value x)	Assessment	Score
≤ 10%	Excellent	1
10% > – ≤ 40%	Good	2
40% > – ≤ 70%	Average to good	3
70% > – ≤ 100%	Average	4
70% > – ≤ 100%	Acceptable	5
130% > – ≤ 160%	Below average	6
160% > – ≤ 190%	Poor	7
> 190%	Very poor (or incomplete)	8

Table 6. Assessment table for Global Warming (kg CO<sub>2</sub>-ekv).

<b>Product group</b>	<b>Unit</b>
Building boards	m <sup>2</sup>
Doors and gates	m <sup>2</sup>
Façade elements	m <sup>2</sup>
Flooring	m <sup>2</sup>
Interior cladding	m <sup>2</sup>
Insulation materials	m <sup>2</sup> with a thickness where R=1 m <sup>2</sup> K/W
Construction materials	m <sup>3</sup>
Membranes and mesh	m <sup>2</sup>
Surface treatment	m <sup>2</sup>
System suspended ceilings	m <sup>2</sup>
System walls	m <sup>2</sup>
Roofing	m <sup>2</sup>
Exterior cladding	m <sup>2</sup>
Wind and vapor barrier	m <sup>2</sup>
Windows	m <sup>2</sup>
Beams, pillars and studs	m <sup>3</sup>
Decking	m <sup>2</sup>
Fittings, door openers and locks	kg

*Table 7. Overview of product groups and units used when assessing global warming.*

## 2.4 Resource use

The use of sustainable/non-sustainable materials, renewable/non-renewable materials is considered as a percentage of the total mass of the product, ref. table 8. This is done based on the table of contents that is usually included in Norwegian and international environmental declarations, as well as in use of the effect category "SM" (use of secondary materials). Since EPDs do not disclose the distribution between sustainable and non-sustainable materials for secondary materials, the percentage will be distributed as a percentage of these.

Resources that are considered renewable are primarily biomass (non-tropical wood/plants). In the table, the word "sustainable" refers to resources that have been produced in a sustainable way (wood from sustainable forestry) or natural resources for which there is little scarcity such as stone, clay, sand and the like. Non-sustainable resources are e.g. plastics, metals that are scarce, oil and the like. For example, natural stones, clay and sand are considered non-renewable, but sustainable. When assessing which materials are considered to be scarce, the EU's Critical Raw Material list is used:

<https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical>

The use of certified or non-certified tropical wood is also considered in this table.

Criteria % of total mass (kg)	Assessment	Score
Secondary renewable, sustainable raw material	Excellent	1
a) Virginally renewable, sustainable raw material b) Secondary non-renewable, sustainable raw material	Good	2
a) Virgin non-renewable, sustainable raw material b) Secondary non-renewable, unsustainable raw material	Average to good	3
Virginally non-renewable, unsustainable raw material – but where there is no scarcity.	Average	4
Certified tropical wood (FSC or PEFC)	Acceptable	5
Virgin non-renewable, unsustainable raw material, ref. EU' Critical raw material' list (see tabell 9)	Below average	6
-	Poor	7
Non-certified tropical wood or wood from unsustainable forestry	Very poor (or incomplete)	8

Table 8. Assessment table for use of raw material resources.

Antimony	Fluoride pair	LREEs	Phosphorus
Baryte	Gallium	Magnesium	Scandium
Beryllium	Germanium	Natural graphite	Silicon metal
Bismuth	Hafnium	Natural rubber	Tantalum
Borate	Helium	Niobium	Tungsten
Cobalt	HREEs	PGMs	Vanadium
Coking coal	Indium	Phosphate rock	

Table 9. The EU's list of critical raw materials for the EU as per 2017.

## 2.5 Energy

The product's energy use is assessed based on the total energy use.

Criteria	Assessment	Score
Use of renewable secondary fuel (FSB)	Excellent	1
-	Good	2
Renewable primary energy used as an energy carrier (FPEE)	Average to good	3
-	Average	4
Use of non-renewable secondary fuels (IFSB)	Acceptable	5
-	Below average	6
Non-renewable primary energy used as an energy carrier (IFPE)	Poor	7
-	Very poor (or incomplete)	8

Table 10. Assessment table for energy (MJ).

## 2.6 Suitability for recycling

(new in version 5.0)

The only reuse potential that has been assessed up to version 4.0 is the use of secondary material in new construction products. The term "circular economy" aims to reuse a product so that resources remain in the economy for as long as possible. This means that products must be designed so that the materials can be more easily reused or recycled. Now that manufacturers are establishing ever-better recycling routines and systems, the time is right to introduce the suitability of the building product for recycling as a new environmental area in ECOproduct, in order to clarify the future climate and environmental impact.

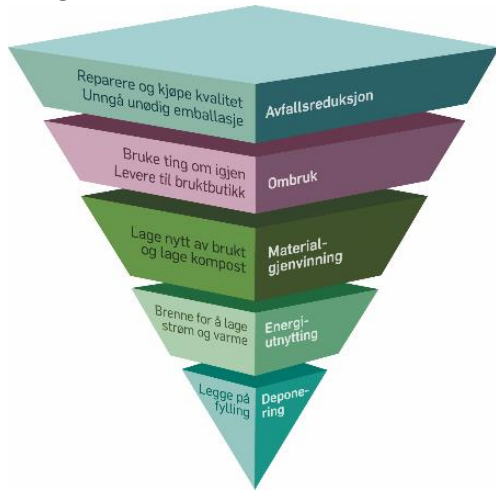


Figure 2. Waste hierarchy

The waste hierarchy is a concept in Norwegian waste policy and the EU Waste Framework Directive, and describes priorities in waste policy. This is used as a starting point in grading. In Norwegian EPDs, terms that are not identical to the waste hierarchy are used, and in order to avoid any misunderstandings, the concepts of the waste hierarchy are used, with the terms in Norwegian EPDs in brackets. The meanings are the same.

Building materials that are not declared suitable for reuse or recycling, or where this environmental area is excluded from the EPD, are considered to go to landfill. In this way, manufacturers are encouraged to think about how their building products can best have a long life even after disposal.

EPDs issued in accordance with EN 15804: 2019 this information is mandatory, but for EPDs prepared in accordance with EN 15804: 2012, it will be possible to submit a self-declaration based on Table 11 where this information is missing.

Criteria	Assessment	Score
Components for reuse (CR)	Excellent	1
-	Good	2
Materials for recycling (MR)	Average to good	3
-	Average	4
Materials for energy recovery (MER)	Acceptable	5
-	Below average	6
a) Hazardous waste disposed (HW) b) Non hazardous waste disposed (NHW)	Poor	7
Radioactive waste disposed (RW)	Very poor (or incomplete)	8

Table 11. Assessment table for suitability for recycling.