

greenbuilding

Sustainable planning, building and operation

Environmental Product Declarations –
a key component of sustainable building

It all starts with the building material



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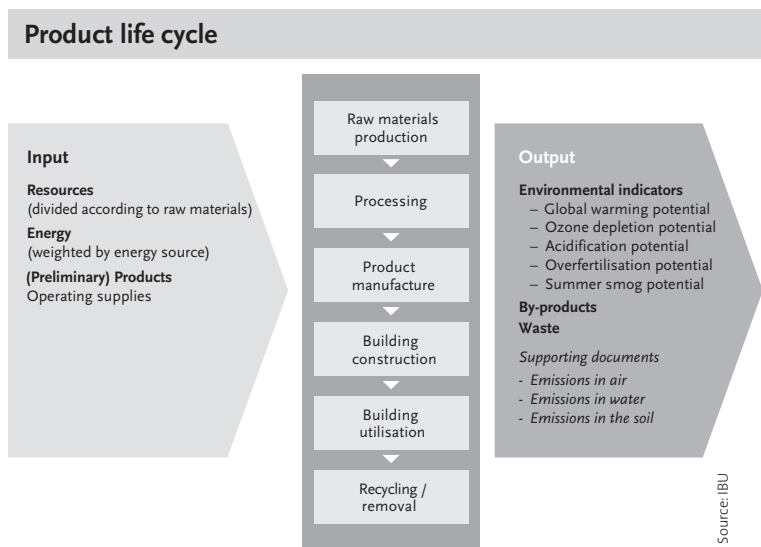
It all starts with the building material

Sustainable building is the order of the day. The quality and sustainability of buildings is largely dependent on the components used and their individual integration situation. The appropriate categorisation of building materials and components is thus a fundamental element of sustainable building. Environmental Product Declarations (EPDs) convey informative, neutral and comprehensive details regarding the environmental performance of building materials and products while also providing information on their functional efficiency.

Text: Hans Peters

Sustainable development is based on the generally formulated fundamental idea of “meeting the needs of the present without compromising the ability of future generations to meet their own needs”. This guiding principle from the Brundtland Report of 1987, a groundbreaking paper from the World Commission on Environment and Development, shaped the first Earth Summit in Rio. But how should this aspiration be interpreted with regard to building?

The realisation of social and private needs in buildings has a lasting effect on our environment – and for this reason alone it must be approached sustainably and responsibly in the planning phase. Thus, for example, in our industrial society the construction of wastewater treatment plants is an absolute prerequisite for an environmentally friendly and sustainable way of life. An adequate infrastructure and appropriate living space are necessary guarantees for our sociocultural quality. On the other hand, buildings are intensive in terms of materials and energy – and therefore represent substantial intervention in the environment by man.



Source: IBU

1 From the cradle to the grave: for the environmental declaration of a product its entire life cycle must be taken into account

What does “Sustainable Building” mean?

Without a doubt, the most sustainable constructions created by man include the pyramids of Giza, the Great Wall of China or the numerous representatives of social structures such as the Kremlin, the White House or the Reichstag in Berlin. Well known engineering works such as the Eiffel Tower, the Golden Gate Bridge or the Gotthard Tunnel can also be included. They all have one thing in common: not one of these buildings has a sustainability certificate, they will never receive one either, and cannot be forced into any sustainability programme. This shows: a certificate is not the only indication of sustainable building or sustainable buildings.

In Germany there is a social consensus for sustainable development. After the Meseberg resolutions, with the notion of sustainability in mind, considerably more attention was paid to buildings. Together with the German Sustainable Building Council (DGNB), the Federal Ministry of Transport, Building and Urban Affairs



2 Reliable and informative information about the functional and environmental efficiency of the building products used are an important basis for the certification of buildings. In the case of the new Regionshaus building in Hanover as well, the DGNB looked into this key question, ultimately awarding it the quality certificate in gold

(BMVBS) has developed a certification system that puts the desire of the real estate and finance industries for the assessment and commendation of sustainable buildings into practice. In order for this to work, the manufacturers of building materials and building products must provide all relevant data in an appropriate information system, a so-called Environmental Product Declaration or EPD.

Lifetime performance

Because of the monofunctional and reduced approach, assessing the sustainability of a building purely from an ecological point of view is not enough – factors such as building utilisation and costs are no less important. In the final analysis, the “harmony” between economy, ecology, technical efficiency and sociocultural aspects, responsible treatment of resources and energy and considering business and human needs are key. The focus is therefore not on the construction phase of a building, but on its performance during its lifetime.

The degree of functionality of a building is ultimately determined by the sum of its individual parts. The fact that, depending on the type and the utilisation of a building, different requirements are placed on components that are otherwise the same, makes it clear that as a rule the consideration of the whole building and its utilisation must form the basis for its assessment. The assessment must also cover the entire life cycle of a building. This means both the lifespan of the materials and components, taking environmental influences and wear and tear into account, as well as the

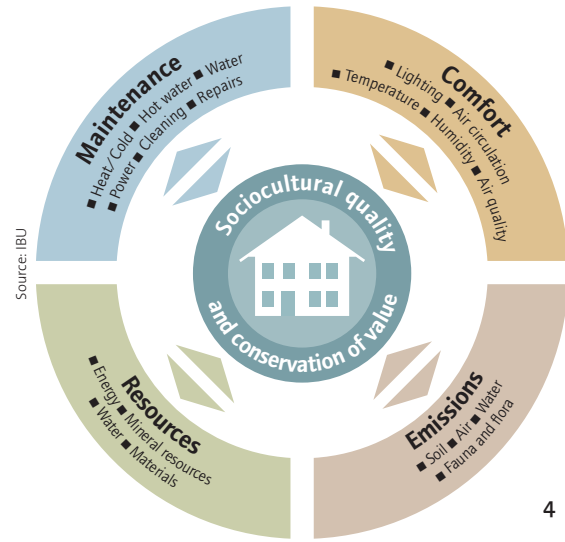
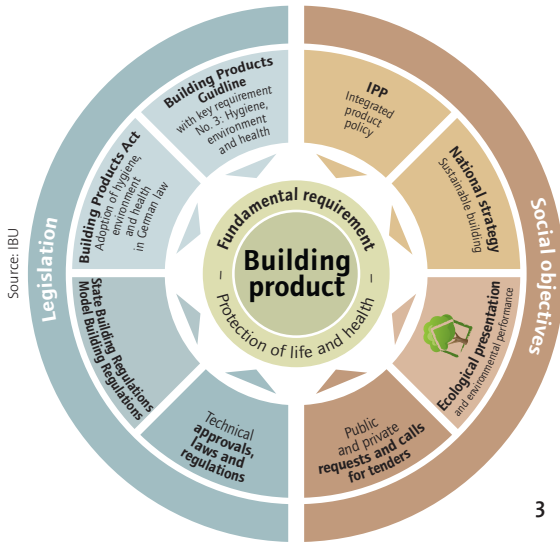
maintenance expenditure and the possibilities for demolition and recycling need to be considered.

Generally binding information

A building material assessment alone is not enough to certify sustainable building. Rather, a comprehensive product statement about the building material is needed – i.e. a generally binding environmental information system that in particular defines the same ancillary conditions, cut-off criteria, background information etc. as well as environmental and usage indicators. This is exactly what Environmental Product Declarations do.

Building products play a key role in ascertaining the environmental quality of a building. The products used in a building are also important for health and comfort. The quality of a building is defined by the properties of the products, and in particular, how and where they are integrated into it. If the dimensions and uses of the building have been documented, many of its properties can be deduced from the product properties.

A similar approach is used to ascertain the environmental properties of a building: first, with the help of a life cycle assessment, the objective is to ascertain the material and energy flows of the products used that were initiated by their manufacture. Then the environmental impact of these material flows is assessed. These environmental impacts are documented as consensus-based indicators in an Environmental Product Declaration for building products (EPD) for the building assessment. In



In addition to the environmental impact of manufacture, technical and material properties of the products important for modelling the utilisation of the building are also provided, such as e.g. thermal or sound insulation properties or to what degree a product installed inside the building can change the air quality in a room. This data flows into the assessment of the building as information modules.

At building level, in the course of planning, differently detailed material characteristics arise, which can be associated with the relevant environmental impacts and integrated into planning with appropriate computer programs. According to the BMVBS, product manufacturers who provide this information with an EPD will be given preference in purchasing.

An EPD provides a life cycle assessment of environmental impacts

EPDs – standardised according to ISO 14025 and the TC 350 European standardisation process currently in development – provide information about the environmental performance of building materials and products in combination with their functional efficiency. EPDs contain a globally agreed and defined basic data set that shows the share of building material production's contribution to significant environmental impacts such as resource consumption, global warming or the acidification of bodies of water and soils. With the life cycle approach “from the cradle to the grave”, not only the consumption of energy and raw materials occurring directly in the building material manufacturer's factory is taken into consideration. The focus is also on the resource consumption for the manufacture of primary products, for transport or for power generation. The same applies to the environmental impact of emissions and the waste to be disposed of. An EPD thus presents a comprehensive life cycle analysis of the

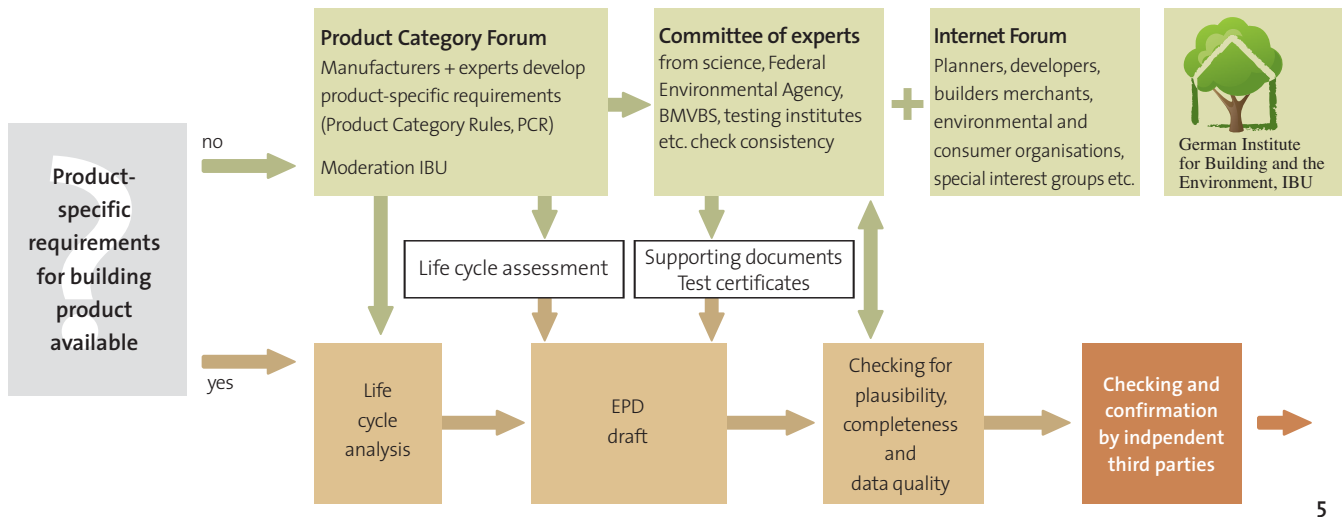
environmental impacts associated with product manufacture as a whole. The following key environmental information has been agreed internationally:

- Primary energy, non-renewable,
- Primary energy, renewable,
- Global warming potential,
- Ozone depletion potential,
- Acidification potential,
- Overfertilisation potential,
- Summer smog potential.

EPDs are thus a generally accepted environmental information system for building materials and building products that in particular define the same ancillary and general conditions, competitive criteria and environmental and usage indicators. They are therefore a generally binding prerequisite for assessing buildings with regard to their sustainability. They are not suitable, however, for making a direct preliminary selection of building materials and building products taking monofunctional aspects into account. Thus, for example, the production of thermally insulating double glazing is much more resource and energy intensive than that of single glazing. Over its lifetime, however, thermally insulating double glazing saves many times the energy used in its production. If a detailed building physics calculation is carried out it will even be found that under certain conditions, despite the even greater energy and resource requirements, over its lifetime triple glazing is both more economical and more ecological.

Qualitative and quantitative environmental information

EPDs for building materials and building products are thus a key prerequisite for the ability to qualitatively and quantitatively assess buildings, i.e. their construction and their life cycle, with



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regard to sustainability. In addition to product quality, the environmental quality of a building is equally dependent on the quality of execution and the use of the building products involved.

The information from EPDs serves initially as a component for the description of the environmental influences resulting from the building's construction. In addition to the details on building product manufacture, transportation steps and expenses for the building site

3 The fundamental requirements of a building product result from social aspects and legislation

4 The sociocultural quality and the value conservation of a product stem from the four key factors maintenance, comfort, resources and emissions.

5 Procedure for the preparation of an EPD including verification at IBU

IBU is the programme operator for EPD in the building industry

Institutions such as IBU, the German Institute for Building and the Environment, assist with the preparation of EPDs and the collection of data for manufacturers or their organisations. EPDs for building products are prepared in accordance with international standards (ISO 14025 and ISO 21930). These standards concretise the general information of the life cycle assessment standards ISO 14040ff. For the details to be included in the building assessment as independent information modules they must first be consistent. For details relating to a particular building product to also serve for a product comparison, they must be prepared according to neutral rules e.g. for different materials. These rules are currently defined throughout Europe in CEN TC 350, "Sustainability of construction works". The standard "PrEN 15804 : Sustainability of construction works – Environmental declarations for products – Rules for product categories" is the standard in the series of standards that contains the product-related rules.

In the first survey the draft, which 77 contributors from 15 countries were actively involved in, was recently confirmed by a large majority of the national member institutions of European standardisation. By late 2009 this standard should be completed, the political will is there. In a framework document the indicators at product level were harmonised with the information requirements at building level.

The German Institute for Building and the Environment IBU offers its members the entire organisation for the preparation of the declarations.



Source: IBU

6 Cover of an Environmental Product Declaration according to 14025



Hans Peters

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are included. The utilisation phase of a building, in which the environment is affected much more than during the construction phase, is decisive for the degree of environmental impact. In this respect, aspects such as heat consumption and maintenance costs are key points. These are taken into consideration in the planning phase already by means of utilisation scenarios, such as e.g. the German Energy Saving Ordinance. Demolition and recycling of the building must always be taken into consideration as well. Details and general conditions relating to these are mentioned in the EPDs, to the extent that they are foreseeable or required for the individual building product.

The first step is thus an assessment of the environmental performance of a building. Furthermore, economic and sociocultural aspects are equally important for the sustainability assessment of buildings. In addition to the construction costs of a building, the utilisation and maintenance costs are also included in the life cycle costs. Sociocultural aspects pertain to e.g. questions of comfort but also accessibility. Technical features and functions of a building, such as sound insulation, room acoustics or flexibility and convertibility during use are also important criteria regarding which EPDs contribute significant information. Both international standardisation and the European standardisation being developed in this field explicitly place the information from EPDs in this overall framework of sustainability.

General conditions and normative prerequisites

The fundamental procedures for preparing an EPD as well as its key contents are regulated in international standards – such as ISO 14025 for all products and ISO 21930 for building products. Because of the significant differences in the functionality and manner of use of building materials and building products, however, there is a need for clarification in detail. Currently standards are being developed at European level, for example the draft prEN 15804, for which required details for building materials and building products are being defined, so that EPD programmes are created that are consistent throughout Europe.

Environmental Product Declarations are specifically prepared according to EPD programmes that specify the detailed procedure and a certification system. In Germany there is already an internationally recognised system in accordance with the above-mentioned standardisation, namely the EPD programme of the German Institute for Building and the Environment, IBU.

To make it possible to comprehensibly record the specifics of building materials and building products with regard to their manufacture (e.g. solid wood or wood-based material) or their functionality (timber girder or parquet), for related product categories specific rules for data collection are laid down (cut-off criteria, required verification). These so-called Product Category Rules (PCR) concretise and explain the normative guidelines and draw on the specialised knowledge of experts and manufacturers.

A life cycle assessment of the building material or the manufacture of the building material is the core of every EPD. On this basis the key data – the environmental indicators – are determined: resource consumption, the environmental impact of emissions such as the contribution to global warming, waste created etc. Supporting documents, if relevant, such as e.g. on emissions indoors or eluates, round off the information in an EPD.

Up-to-dateness

An EPD is only as credible and usable as its data are up to date. For this reason, in accordance with the EPD programme rules (which are usually specifically defined in the PCR documents), changes in the manufacture of building materials and building products must result in the updating of the life cycle assessment. Normatively (prEN 15804) a five-year cycle is assumed; the IBU programme, for example, specifies a three-year cycle.

Summary

Sustainable building is a new and significant requirement of society but also of private initiatives such as the German Sustainable Building Council. The consequence will be that buildings are assessed over their entire life cycle, taking into consideration the factors of ecology, economy and technical and sociocultural functionality. For manufacturers of building components and materials this means they must provide information about the functional and environmental efficiency of their products. Environmental Product Declarations (EPDs) are a generally accepted and internationally recognised information system for these facts. The EPDs of the IBU already cover a large number of declarations in line with market conditions (www.bau-umwelt.com). ■

NACHHALTIGES BAUEN.

Die Nachhaltigkeit von Gebäuden wird maßgeblich beeinflusst durch seine Baustoffe und -produkte.

Die international abgestimmte Grundlage sind Umwelt-Produktdeklarationen (EPD). Das **IBU – Institut Bauen und Umwelt e.V.** zertifiziert als einzige Organisation in Deutschland EPDs auf Basis internationaler Standards (Öko-Label Typ III).



UNSERE MITGLIEDER STEHEN FÜR NACHHALTIGES BAUEN:



So wird gedämmt



ENTSCHEIDEN SIE SICH FÜR NACHHALTIGE BAUMATERIALIEN UND FRAGEN SIE NACH EPDs!
FÜR EINE BESSERE WOHNQUALITÄT JETZT UND IN ZUKUNFT!

IBU – Institut Bauen und Umwelt e.V.

(vormals AUB – Arbeitsgemeinschaft Umweltverträgliches Bauprodukt)

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