



Brochure

Assessment of the Environmental Performances of Constructions and Civil Engineering Works

Updated Version 2015

Index

1. Introduction	4
2. Assessment of the Environmental Performance of Constructions and Civil Engineering (GWW) Works	6
2.1. A clear language in construction	6
2.2. Application of the Assessment Method and National Environmental Database.....	7
2.3. Energy and materials considered in conjunction	7
3. How does the Assessment Method work?	8
3.1. The calculation rules.....	8
3.2. The National Environmental Database (NMD).....	8
3.3. Management and maintenance of the Assessment Method and the NMD.....	10
3.4. Supply environmental data to the NMD According to the SBK Review Protocol	11
3.5. Equivalence of environmental product data for the NMD	11
4. Clear language in construction	12
4.1. Performance is the main concern	12
4.2. Life cycle approach is the starting point.....	12
4.3. Collective base for instruments	12
4.4. Everyone speaks the same language.....	12
4.5. Where is the Assessment Method applied?	13
4.6. Guide for the input of the environmental performance calculations	13
4.7. Addendum for the environmental performance of constructions during renovation/transformation	13
4.8. Guidebook support construction-specific service life	14
5. Need for uniformity in Europe.....	15
5.1. European policy Sustainable Construction	15
5.2. European normalization and certification	15

6. The calculation instruments	17
6.1. Of general interest.....	17
6.2. Calculation instruments for the calculation of the environmental performance of constructions and civil engineering works.....	17
6.3. Environmental performance declarations (EPD) of construction products and construction materials.....	19
Appendix 1: The assessment of environmental impacts according to the life cycle analysis – LCA method	21

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1. Introduction

The environmental impacts of material use are becoming increasingly important with regard to the reduction of the total environmental impact of constructions and civil engineering construction works. This is especially true now that residential buildings and office/utility buildings are becoming increasingly sustainable. Today less environmental impact reduction (e.g. CO₂-reduction) can be realized by solely saving energy during heat and cold generation in buildings. By gaining insight into the environmental impacts of material use, further reduction of the environmental impact of constructions can be achieved. Besides important points of interest, such as the decrease of CO₂-emissions, the depletion of raw materials is becoming increasingly significant. Due to increased usage of raw materials (globally), raw materials are becoming scarcer or more difficult to extract. This drives up raw material prices. Consequently, the environment is affected and higher costs are incurred during the construction and management of buildings (residential and others).

Particularly, the commitment towards the reduction of CO₂-emissions and the use of raw materials resulted in European collaboration by the European Commission to develop new methods to increase the transparency concerning the environmental impact of construction products and construction works. In the Netherlands, the necessary experience has already been gained. Sustainable construction is no longer experimental, but rather a proven approach. This flyer elaborates on this.

In order to lower the environmental impact of the entire construction, we first have to define “material-related” impact. That is why, in the Netherlands, a single national Assessment Method is applied for the calculation of the environmental performance of constructions and civil engineering works over their entire service life. This method is based on the European Assessment Method for environmental declarations of construction products (EN 15804), and includes relevant scenarios for the Netherlands. The EN 15978 is also indirectly used for the assessment of the environmental performance of buildings. In this, it is described how environmental declarations of construction products are used for buildings evaluations. The EN 15978 also addresses the utilization phase of the building itself (heating, cooling, and such). These elements are excluded from consideration in the Dutch Assessment Method, because separate assessment methods and regulation exists. The Dutch Assessment Method is also applicable to civil engineering works.

The Dutch Assessment Method is inseparably connected to the National Environmental Database in which environmental data of generic materials and products are stored and producer and branch specific data that are reviewed according to a Verification Protocol. The “Stichting Bouwkwaliiteit (SBK)” (Institution for Construction Quality) manages and maintains the Assessment Method and environmental data. See www.milieudatabase.nl.

In “Bouwbesluit 2012” (Building Code 2012), a rule is included, in the chapter “Milieu” (Environment), relating to the environmental performance of residential and office buildings. In “Afdeling 5.2” (Department 5.2) of the “Bouwbesluit 2012” (Building Code 2012), it is stated that the construction of a building/construction work is such that the environmental impact of the materials, applied in the construction work, is limited. In article 5.9, it is determined that: the emission of green-house gasses and the depletion of raw materials relating to the composition of construction components is quantified according to the Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works. In MAT1 of BREEAM-nl, submodule “Materialen van GPR Gebouw en Duurzaam Inkopen” (Materials from GPR Construction and Sustainable Purchasing) for new office constructions, with regard to environmental performance, private law classifications of boundary values are included.

This publication answers questions like:

- How this system works?
- Where can I find the method?
- How do I assess the environmental performance of a construction or civil engineering work?
- Which environmental product data are used?
- Which instruments use this method?
- What is the relationship with European developments regarding the sustainability in construction?

The Assessment Method can be used to carefully, uniformly and reliably assess the environmental impacts of constructions and civil engineering works over their entire service life. This means that from now on, clients, developers, designers, builders and suppliers speak the same language. That works!

2. Assessment of the Environmental Performance of Constructions and Civil Engineering (GWW) Works

2.1. A clear language in construction

Due to an increase of raw material use and emissions to the atmosphere as result of human activities, the attention is growing for the future-focused solving of social, economic and environmental questions. Sustainability is becoming self-evident, due to, for example, the urgency to reduce the environmental impact to a minimum. This is the same for the construction, the maintenance and/or renovation/transformation of buildings and other construction works.

Sustainable buildings and civil engineering works, that are safe and sound (*people*), that have market and future value (*profit*), and that have minimal impact on the environment over their entire service life (*planet*) are becoming more and more the standard.

Every player in the construction sector has their own reasons and motivations to engage in sustainable construction. As an investor, client, builder producer or architect, you want to deliver sustainable quality that guarantees future value;

- achieve a higher return (market value);
- corporate social responsibility;
- differentiate oneself in the marketplace;
- demonstrate creativity with a design or materials that have less of an impact on the environment;
- determine your own sustainability goals;
- use government incentives, for example fiscal regulation;
- meet sustainability criteria for construction projects from the government. This means that new construction and renovation have to meet sustainability criteria, including environmentally responsible material use;
- meet mutual, national and international agreements and requirements with regard to sustainability;
- meet the demand of clients and users of constructions and construction works.

Within this context, it is important that the actors in construction come to mutual agreements with respect to the quality delivered. The ambitions (desired environmental performance) of a specific project are assessed. These ambitions are translated into quantifiable goals, which have to be developed in the program of construction requirements and specifications, in order to realize these goals in practice.

This Assessment Method can be used to assess these ambitions, make the environmental impacts more transparent and evaluate if the agreed-upon ambition (and goals) are realized.

2.2. Application of the Assessment Method and National Environmental Database

The Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works consists of an Assessment Method that is inseparably connected to the National Environmental Database [NMD]. In this Environmental Database, the (environment) specifications of the basic materials, processes and construction components are included. Without the combination assessment method – Environmental Database, there is no uniformity of results. Designers, suppliers and clients use the same information on the same level playing field. Consequently, they speak the same language.

Calculation instruments, such as DuboCalc (GWW), GPR Gebouw & GPR Bouwbesluit, MRPI-MPG and the DGBC-tool (for certification of sustainable real estate according to BREEAMNL), are based on the Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works and the NMD. These instruments can be used to calculate the environmental impact of a specific construction project. For more information about calculation instruments, see chapter 6.

You could directly include the results of a calculation with the stated calculation instruments in considerations and decisions. Besides that, you could use a broader assessment of the sustainability performance of the construction with one of the stated instruments. The most recent list of validated instruments can be found on www.milieudatabase.nl.

2.3. Energy and materials considered in conjunction

Up till now, the focus of sustainable construction has been on saving energy during heating, cooling, etc. In the Netherlands, this has led to energy savings with respect to new construction, including application of insulation arrangements for existing constructions and an increased production of sustainable energy. An environmentally friendly/sustainable construction, however, is more than only an energy efficient construction.

Environmentally friendly construction also means, for example, the finding of balance between the closing of material life cycles and the creation of healthy indoor environments.

The relative influence of material use on the total environmental impact of a construction is increasing. Constructions are becoming increasingly energy-efficient, which allows the focus on further environmental gains that can be made in other areas, such as material use. Also, energy savings and the generation of sustainable energy often result in extra usage of materials and installations that, in turn, become a bigger environmental burden. (Think about the application of a thick, isolated exterior cover, 3-4 layers of glass and supplementary installations, such as PV panels and balanced ventilation.) On the other hand, the quality of a construction work and its surroundings are also determining factors when it comes to the environmental impact of used materials.

That is why experts recommend more and more to express the energy use and material use in the same way. This way, the interrelationship can be clearly observed and the possible actions can be optimized. Currently, research is being done on this topic outside SBK.

3. How does the Assessment Method work?

3.1. The calculation rules

The Assessment Method includes calculation rules for the calculation of the environmental performance of a complete construction work based on the environmental performance of the products and components that comprise it. The Assessment Method and the instruments based on the Assessment Method work approximately the same as a cost calculation. You input the specifications of the construction work, such as dimensions and service life, into the instruments and you specify which construction products you use and in which quantities.

The environmental data

The NMD has data relating to the environmental impacts of all basic materials in eleven impact categories, such as depletion of raw materials, global warming and the deterioration of the ozone layer. Based on the environmental impact data regarding basic materials, the Assessment Method calculates:

- the specifications and environmental impacts of construction components (consisting of basic materials);
- the specifications and environmental impacts of the construction or construction work (consisting of components).

The calculation

The result of the calculation is an environmental profile. That profile, currently, includes eleven environmental impacts expressed in number values. The Assessment Method aggregates these impacts into two key environmental indicators emissions and raw materials and a 1-point score (Emissions and Raw Materials summed). The weighing is done using fictitious costs in order to negate the occurring environmental impacts.

The results of the Assessment Method can be used to make the environmental impacts more transparent and compare the performances of the different calculations; the method itself does not provide any boundary values or norms. In the beginning phase, the market players will have to come to agreements about the desired quality level. For example, which performance has to be realized within a specific project. Construction certificates, such as BreeamNL, have recently set quality requirements in the evaluation guideline. The government can also set a lower limit in order to be considered for a tender offer (EMVI, DuboCalc), fiscal arrangements, licenses, and such.

3.2. The National Environmental Database (NMD)

The Assessment Method is inseparably connected to the NMD in which environmental data regarding products and environmental impacts are stored:

- The basic processes are stored in a SimaPro database (SimaPro is LCA software commonly used in the Netherlands). The calculation of the basic processes results in base profiles of, for example, the production of basic materials, disposal of the material and transportation.
- Base profiles provide the environmental impacts regarding the production of a material, disposal of the material, transportation to the construction site, and such. The product cards (B&U) and item cards (GWW) include general product information (so no environmental information) relating to construction products and components. Examples are composition, construction

waste, service life maintenance scenarios and disposal scenarios. The material or process information on the product and item cards is connected to the related information in the base profiles.

The two aforementioned bullets demonstrate the structure of the NMD. Between the GWW-database and the B&U-database, differences can be pointed out with regard to details. These are to be expected given the nature of the application.

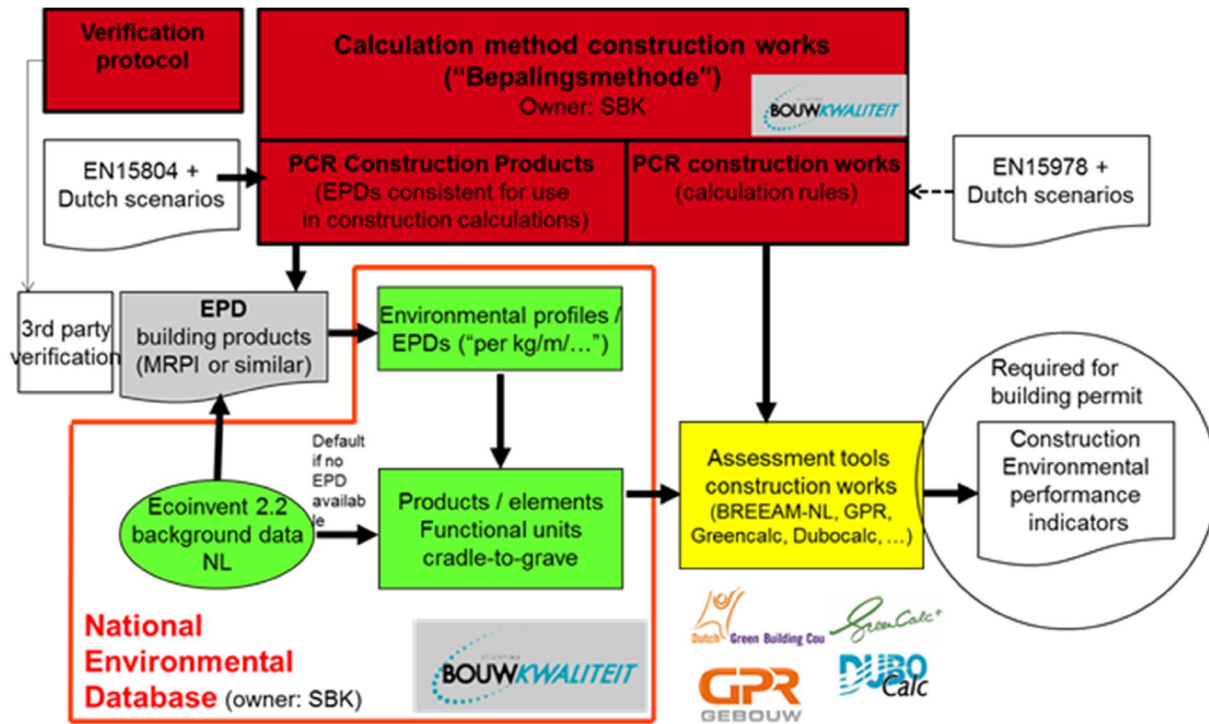
The “export file” of the NMD consists out of product and item cards, which are connected to base profiles (the so-called product profiles). This file is used as input for calculation instruments.

There are three product information categories in the NMD:

1. *Category 1*: brand data, verified by an independent, qualified third party according to the SBK Verification Protocol “Opname data in de Nationale Milieudatabase” (Inclusion Data in the National Environmental Database). The documents can be found on www.milieudatabase.nl.
 - Level of publicity: underlying data is not made public, environmental profiles are accessible through the producer or through instruments such as DuboCalc, DGBC-tool, MRPI-MPG and GPR.
 - For whom: manufacturers/producers, suppliers.
2. *Category 2*: generic data (brand-less), verified by an independent, qualified third party according to the SBK Verification Protocol, with a declaration of the representative (representing, for example, the Dutch market or a group of producers).
 - Level of publicity: underlying data is not made public, environmental profiles are accessible through the supplier/branch or through instruments such as DuboCalc, DGBC-tool, MRPI-MPG and GPR.
 - For whom: groups of manufacturers, suppliers, branches, governments, etc.
3. *Category 3*: generic data (brand-less), not verified according to the SBK Verification Protocol.
 - Level of publicity: underlying data and profile are made public through SBK.
 - For whom: branches, manufacturers, suppliers, and clients.

3.3. Management and maintenance of the Assessment Method and the NMD

“Stichting Bouwkwaliiteit (SBK)” (Institution for Construction Quality) has developed the technical infrastructure of the database (see the website: www.milieudatabase.nl). SBK keeps the Assessment Method updated and inspects the inputted data in the NMD of the branches and companies.



With this, the SBK ensures the quality of those data. Also, the SBK makes the data available to parties (license holders), that agree through a license agreement to apply the calculation rules along with the Assessment Method and the use of data from the Environmental Database. This is important because it guarantees, to the construction sector, that license holders have integrated the Assessment Method into their software and that they use the NMD. This way, misuse of the NMD can be prevented. An example would be comparing materials at the material level without integral consideration for the application of the product in the construction work, just like it is documented in the Assessment Method. The calculation instruments that are based on the Assessment Method and the NMD provide a single, comparable result for the environmental profile in impact categories, the key environmental indicators raw materials and the 1-point score. For the calculation instruments, see paragraph 6.

Additionally, they offer the calculation instruments supplementary results that express the environmental performance in, for example, indices, report grades for a construction in its entirety or per m^2 gross surface. SBK enables companies (suppliers) from the B&U and the GWW sector and the installation sector to supply up-to-date, new environmental information for specific product groups in the database.

Environmental effect categories	Equivalent unit	Weighing factors [€ / kg equivalent]	
Depletion of abiotic raw materials (excluding fossil energy carriers) – ADP	Sb eq	€ 0.16	Raw materials
Depletion fossil energy carriers – ADP	Sb eq ⁶	€ 0.16	
Climate change – GWP 100 j.	CO ₂ eq	€ 0.05	
Deterioration ozone layer – ODP	CFK-11 eq	€ 30	
Photochemical oxidant forming – POCP	C ₂ H ₄ eq	€ 2	
Acidification – AP	SO ₂ eq	€ 4	
Over-fertilization – EP	PO ₄ eq	€ 9	
Human toxicity – HTP	1,4-DCB eq	€ 0.09	Emissions
Fresh water aquatic ecotoxicity – FAETP	1,4-DCB eq	€ 0.03	
FAETP			
Marine aquatic ecotoxicity - MAETP	1,4-DCB eq	€ 0.0001	
Terrestrial ecotoxicity – TETP	1,4-DCB eq	€ 0.06	

1-points score

3.4. Supply environmental data to the NMD According to the SBK Verification Protocol

The SBK Verification Protocol (see www.milieudatabase.nl) indicates how to test whether supplied environmental information can be included in the NMD. The environmental information (data) has to meet requirement values that are stated in the Assessment Method. The SBK Verification Protocol is updated in 2014 and adapted to the Assessment Method of November 2014. The SBK Verification Protocol is adapted by the verifier, who is an LCA-expert, recognized by the SBK, responsible for performing the independent verification of environmental information. The SBK Verification Protocol also elaborates on the route for including environmental data in the NMD.

The route to include environmental data in the NMD has three steps:

- Step 1: The route starts with the establishment of a life cycle analysis (LCA) for the construction product. Both an individual producer and a branch can take the initiative on this. The LCA is performed by a LCA-expert (external or internal) based on the Assessment Method.
- Step 2: The LCA project file is then verified by an independent, SBK recognized LCA-expert. The testing is done according to the SBK Verification Protocol. The testing also includes the information in appropriate format for inclusion in the NMD.
- Step 3: The verified (and found sufficient) LCA report is supplied to the SBK. After this, the producer or branch is responsible for the input of product data into the NMD.

The producer or branch remains owner of the data and is responsible for the validity of the data.

3.5. Equivalence of environmental product data for the NMD

The SBK Verification Protocol (see paragraph 3.4) also includes a procedure for the equivalence-based inclusion of environmental information that is not produced according to the guidelines of the Assessment Method. For example, this can be the case with environmental information that is established in a foreign country.

4. Clear language in construction

4.1. Performance is the main concern

The Assessment Method enables you to calculate the material-related environmental impacts of constructions and civil engineering works in a uniform, controllable, and reproducible fashion. The Assessment Method is focused on performance, not on solutions. This means that no requirements are stated for the construction method and technique. Clients and suppliers can use this method to come to agreements regarding the realization of distinct, quantified quality levels for a project, with all freedom to design and develop innovative solutions, in order to arrive at the desired performance. The method is suitable for every design

4.2. Life cycle approach is the starting point

The Assessment Method provides, based on international standards (norms), practical directions for analyzing environmental performance. The Assessment Method is based on the environmentally-focused life cycle analysis – in short LCA. A LCA looks at all phases in the life cycle of products. The function that the product has to fulfil in a construction work is the main focus. A LCA evaluates the life cycle phases of a product, such as production, construction and disposal. The transportation that occurs in between and during these phases (for example transportation to the construction site) is included. See appendix 1: The assessment of environmental impacts according to the Life Cycle Analysis – LCA.

4.3. Collective base for instruments

You do not have to personally use the Assessment Method and the corresponding calculation rules. The aim is to make things easy by using the mentioned calculation instruments. Software tools are available in which the Assessment Method and the NMD are integrated. You only have to input the construction specifications, after which the environmental performance of the construction is calculated automatically. For a complete and up-to-date overview of available calculation instruments, see www.milieudatabase.nl.

4.4. Everyone speaks the same language

The benefit of using a single uniform calculation method and the NMD for the assessment of the environmental impacts of material use is that everyone in the sector speaks the 'same language'. The result of the calculation (the environmental performance of a construction or civil engineering work) is, thus, clear, controllable and reproducible. Also, the method is reliable and it is scalable within the sector. This ensures that the method is suitable for application by different players in the sector and for regulation. The management of data is efficient: the different instruments use the same data set. Producers and suppliers are only required to supply the product data once.

4.5. Where is the Assessment Method applied?

The Assessment Method, including the NMD, is referenced in:

- “Duurzaam inkopen van nieuwe kantoorgebouwen” (Sustainable procurement of new office buildings)¹
- “Duurzaam aanbesteden GWW-werken” (Tendering for sustainable civil engineering works)²
- MIA/VAMIL (fiscal financing arrangements)³
- “Certificering van duurzaam vastgoed volgen\ BREEAM-NL ^{4, 5} of GPR Gebouw⁶” (Follow the certifying of sustainable real estate\ BREEAM-NL , or GPR Gebouw)
- “Bouwbesluit 2012” (Building Code 2012)

From here on out, the NMD could be used for other instruments, such as the CO2 performance ladder.

4.6. Guide for the input of the environmental performance calculations

The SBK has published a ‘guide’ in order to provide help around the input of data into calculation programs. The information in this guide is meant to ensure that environmental performance calculations are done right. Hence, this also applies to the moment when the license is requested.

See https://www.milieudatabase.nl/imgcms/Gids_invoer_MPG_6_september_2013.pdf.

4.7. Addendum for the environmental performance of constructions during renovation/transformation

Besides sustainability aspects such as energy savings with respect to the utilization phase and the indoor climate, the environmental performance of renovation/transformation is important in order to make the right decisions. For such situations, the, on new construction focused, Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works is not entirely suitable. The method needs an adjustment in this regard. SBK has published an addendum on the Assessment Method, which allows the calculation of the environmental performance of renovation or transformation. The nature and content of the NMD does not have to change for this.

¹ <http://www.pianoo.nl/sites/default/files/documents/documents/volledigecriteriadocumentkantoorgebouwennieuwbouw.pdf>

² http://www.rijkswaterstaat.nl/zakelijk/duurzaam/duurzaam_inkopen

³ <http://www.rvo.nl/subsidies-regelingen/mia-en-vamil>

⁴ http://www.breeam.nl/breeam/certificeren_breeam

⁵ http://www.breeam.nl/breeam/certificeren_breeam

⁶ <http://www.gprgebouw.nl/gpr-gebouw-certificaat/>

4.8. Guidebook support construction-specific service life

In the Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works, no Assessment Method for the service life of a construction is provided; this can be determined using one's own insights. Many commonly used default values are stated however, such as 75 years for residential constructions and 50 years for utility construction. These default values are incorporated in most calculation instruments. The circumstances under which it is allowed to deviate from these default values are not stated in the Assessment Method and calculation instruments. It is also not discussed how this could happen. In the construction sector, this has resulted in a need for a standardized service life assessment as support for deviation from the default values. This is necessary in order to benchmark the environmental performances. Additionally, a push can be made in the design phase for a longer or shorter expected service life.

In commission by the Ministry of BZK (Interior Ministry), W/E advisors have established the report "Richtsnoer Specifieke gebouwlevensduur - aanvulling op de bepalingsmethode Milieuprestatie Gebouwen en GWW-werken" (Guideline Construction-Specific Service life – Supplement on the Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works) (See www.milieudatabase.nl). This report has a guideline for a voluntary use of such a standardized service life assessment. With sufficient support, this guideline can be included, as normative, in the Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works. If you would like to propose improvements or changes regarding the Guideline, please inform the SBK of these with corresponding support.

5. Need for uniformity in Europe

5.1. European policy Sustainable Construction

The Announcement of the European Commission about the possibilities for ancillary sources of efficiency is an important frame in which to view the Assessment Method and the environmental information from the NMD in the construction sector. See <http://ec.europa.eu/environment/eussd/buildings.htm>.

The most important goals of this announcement are: the promoting of more efficient use of construction substances, construction products and installations, that are incorporated in new and renovated constructions meant for commercial, residential and public use; stimulating the recycling and re-use of construction and demolition waste; the reduction of the total impact on the environment over the entire service life.

Despite the fact that there might be reasons why subtle differences in approximation exist between different national and commercial arrangements (for example specific materials or climatological considerations), the European Commission states that a collective frame of key indicators has to be established, which is focused on the most essential aspects of environmental impacts. This is a requirement from the Commission for comparability and provides easy accessibility to reliable and consistent information for consumers and policy makers.

The Commission, together with stakeholders, will develop a frame consisting of key indicators, which takes into account the underlying methods used to evaluate the environmental performance of constructions over their entire life cycle. This announcement provides shape and content to the European goals, based on existing policy and existing regulation and data at the European and national level, and without excluding the results of future activities.

5.2. European normalization and certification

The CEN-commission TC 350 “Sustainability of Construction Works” anticipates the European developments relating to sustainable constructions and products. That is why the commission is designing a series of (voluntary) European CEN Assessment Methods in which indicators are stated. The CEN/TC 350 Assessment Methods are meant to assess the sustainability of construction works through the environmental impacts of construction materials and products. Based on a CEN standard, producers can release environmentally relevant product statements (the Environmental Product Declarations – EPD). The use of an EPD, including the for the Netherlands applicable scenarios, serve as input for the assessment of the performance of a construction. For the assessment of planet (the environmental quality), this means a LCA-analysis.

The European CEN-standard for EPDs of construction products, the EN 15804, was published in 2012. For the assessment of the environmental performance of constructions, the EN 15978 was published.

The Assessment Method based on the European Assessment Methods EN 15804 and EN 15978 with the for the Netherlands applicable scenarios.

NEN is represented in the CEN standard commission and has established a Dutch shadow commission in order to agree on content input.

The SBK transforms the norms in the Dutch Assessment Method with the input of specific Dutch choices and aligns these with the Dutch players in different bodies. SBK adjusts the Assessment Method and the indicators whenever and wherever necessary.

According to the “Europese Verordening Bouwproducten” (Construction Products Regulation; CPR), market players, that want to market a construction product, have to establish a performance declaration including the corresponding product specifications (technical specifications) and the intended use. This rule enables the supply of environmental performance information using the EPDs. In performance declarations of producers, environmental data will be included in the near future, which are relevant to the application of the product and the recycling/re-use of the product. A mandate for the establishment of Assessment Methods that originate from the performance declarations is yet to be created by the European Commission.

An important task in this is to take the methods and instruments that are circulating in Europe and to bring them under a collective term. Not only does the Netherlands have methods and instruments for the assessment of the environmental quality or sustainability of a construction, construction work or products. Other countries, such as Germany, France and England, have comparable methods and instruments to assess the sustainability of constructions. Examples are the English BREEAM International (from which the Dutch BREEAM-NL is derived), the German DGNB, the French HQE and the American LEED.

6. The calculation instruments

6.1. Of general interest

The Assessment Method can be used to calculate the environmental performance of constructions and civil engineering works.

A calculation with the Assessment Method results in a set of environmental impacts, key environmental indicators and a 1-point score. The simplest way of doing this is to use the calculation instruments that are validated by the SBK. The calculation results, in turn, can be used to compare the environmental impact of constructions and construction works and check whether the agreed-upon goals, ambitions, performances or agreements are met. Also, the Assessment Method can be used to meet the rules in the “Bouwbesluit 2012” (Building Code 2012).

From here on out, the number of instruments (ancillary means), that is focused on a sustainable urban environment, is significant. It is a very broad set of offerings, with differences in:

- scaling (urban planning, construction, detail);
- target audience (architect, builder, client, public official);
- goal (inform, test, inspire, optimize, support process, label);
- content (global, detailed, single theme, broad sustainability);
- type (list of measures, performance requirement, calculation, point system).

A best or worst instrument does not exist. The instrument has to be appropriate for your goals. Which data are available? Will it be for your own use, for testing or for certification? Personal preference and familiarity among partners can also influence the decision.

After the Assessment Method and the NMD have become available, the instruments that work with these were updated. As of now, the calculations of the connected instruments give the same results at construction level when the same input is used.

The instrument owners have agreed upon a periodical adjustment of their instruments in order to keep them up-to-date with the latest versions of the Assessment Method and the latest releases of the databases.

6.2. Calculation instruments for the calculation of the environmental performance of constructions and civil engineering works

Validated calculation instruments for the calculation of the environmental performance of constructions and civil engineering works.

Civil Engineering Work (GWW) Sector:

- DuboCalc (Rijkswaterstaat).

B&U-sector:

- GPR Gebouw and GPR Bouwbesluit (W/E advisors);
- DGBC-tool;

- MRPI MPG-software (MRPI).

Software developers can come to a licensing agreement with SBK and bring new calculation instruments to market. In order to be deemed valid, the calculation instruments have to be tested according to the SBK-software validation guideline (now it only still applies to the B&U). This guideline, that includes an actual case, can be used by the software developer to prove that the Assessment Method and the NMD are implemented correctly into the software.

DuboCalc is still the only software for civil engineering works, released by Rijkswaterstaat, and available free of charge. The program calculates the environmental impacts of the material and energy use of infrastructural works. The environmental impacts of a project are translated to the “MileuKostenIndicator” (MKI) (Environmental Cost Indicator) using a calculation. DuboCalc is mostly applied during the tendering process in order to stimulate the competing parties to enroll with a higher sustainability performance. The MKI-values of different offerings can significantly help the evaluation of the “Economisch Meest Voordelige Inschrijving” (EMVI) (Most Economically Beneficial Tender).

GPR Gebouw is a web-based software packet that is released by W/E adviseurs. The municipality of Tilburg is co-owner. The program maps out the broad sustainability of a construction, which includes health, quality of use and future value, besides the energy and environment themes. For each theme, a report grade is given (1 to 10). The software is suitable for new construction and existing construction. With regard to existing construction, the current situation and the situation after the modifications are evaluated. The power of the software comes from its speed and the simplicity of the calculation. GPR Gebouw is both suitable as an ancillary instrument in early design phases and with respect to the detailed calculation necessary for a construction request. GPR Bouwbesluit can perform the latter as well, but does not include other sustainability themes, See www.gprgebouw.nl.

The **DGBC-materialen tool** evaluates a construction or neighborhood with regard to material use. The result of the calculation is expressed in a number, shadow price per m² BVO per year. The level of the input is high. Consequently, the results are accurate, but the required effort is substantial. The instrument has been available for many years and is mostly used for the calculation of office constructions. The DGBC-tool is a continuation of GreenCalc+ that has been originally developed by the “Stichting Sureac”, and is currently being exploited by the Dutch Green Building Council. BREEAM-NL uses the DGBC-tool for calculations surrounding materials. See <http://www.dgbc.nl/content/materialentool-0>.

MRPI MPG-software (MRPI) is a freetool that is developed by the suppliers of construction and is made available to the market. Extensive MRPI information is disclosed in the instrument. The program can be used to calculate simple designs at construction level including any possible alternatives that have to be considered. Based on the construction components from the Assessment Method, a construction can be inputted online. The results can be stored (possibly in between) and modified later. The instrument provides the results conforming to the requirements from the construction agreement. The results are also translated into a single MPG score in order to ensure that the instrument can be used within “duurzaam inkopen” (sustainable purchasing) from the government. The results can be used to analyze the environmental performance of the elements. See www.mrpi.nl.

6.3. Environmental performance declarations (EPD) of construction products and construction materials

MilieuRelevante Product Informatie (MRPI)

MRPI is a national EPD program for construction and civil engineering products and materials, founding member of the European ECO-platform. With a registered MRPI certificate, you can transparently publish and communicate environmental data in the Netherlands and in Europe. The MRPI-certificate completely meets the requirements of the Assessment Method and provides direct access to the National Environmental Database.

Since 1997, MRPI is working on an independent declaration of environmental data based on tested LCAs. MRPI, an initiative of the “Nederlandse bouwtoelevering (NVTB)” (Dutch association of suppliers of construction products and materials), has been at the foundation of the NEN 8006 and the first version of the national Assessment Method Environmental Performance Constructions and Civil Engineering (GWW) Works. Since the appearance of the European Standard EN 15.804, MRPI has been very involved in the synchronization of environmental data at the European level. The establishment of the ECO-platform with the most important European partners and the shaping of a mutual recognition for environmental data within these countries have been extremely important. The MRPI quality standards complement the standards of the ECO-platform and the national Assessment Method.

Request a MRPI certificate?

Contact us directly:

Telephone: 06-46380802 or 06-22972056 mail: info@mrpi.nl

More information about MRPI: www.mrpi.nl

More information about ECO-platform: <http://www.eco-platform.org>

Greenworks

Greenworks is the collective term for an assortment of sustainable products from Saint-Gobain Building Distribution, including Raab Karcher in the Netherlands, and has come into existence after agreement between several parties, under which the “rijksoverheid” (national government). Greenworks creates the pragmatic transition from regulation, Assessment Methods and such to a usable information model for the entire construction column. Information about both sustainable and technical product information can be found in the Greenworks product magazines. Additionally, product quality marks are included, such as, for example, Dubokeur, C2C, FSC and PEFC. The figure “ranking binnen rekeninstrumenten” (ranking within calculation instruments) provides insight in the 1-point score (shadow price) of products derived from LCAs included in the National Environmental Database and visible in the calculation instruments. Greenworks products always have a score ranging from average to best score within the relevant field of application.

The Greenworks score is even more involved. Based on 10 sustainable materials and product specifications, derived from the life cycle analysis (LCA), insight is given into the sustainable characteristics of the product. This can be used to better fulfil the ambitions of clients with regard to circular economy or bio based construction.

In the Greenworks Academy, training is provided with regard to sustainable construction for the entire construction column. This is done in cooperation with the connected producers as an extension of the theme “leren, zien en doen” (learning, seeing and doing).

More information about Greenworks: <http://raabkarchergreenworks.nl>.

DUBOkeur®

The DUBOkeur® is a quality label that demonstrates that a specific construction product belongs to the most environmentally friendly products. For the DUBOkeur®, the specific field of application is evaluated. Within each product group, only the products with a very low environmental impact are being considered for the DUBOkeur®. In order to assess the environmental impact of a product, the life cycle analysis (LCA) method is employed. This way, DUBOkeur® is compatible with the Assessment Method and the National Environmental Database and the required calculation in the “Bouwbesluit 2012” (Building Code 2012).

The goal of the DUBOkeur® is to qualify and certify the top segment of the products within a field of application in order to make them recognizable. Additional clarification about the evaluation technique and all products from the DUBOkeur® family, can be found on: www.nibe.info.

Appendix 1: The assessment of environmental impacts according to the life cycle analysis – LCA method

Every LCA consists of four steps:

1. goal & scope;
2. inventory;
3. characterization (impact assessment);
4. interpretation.

Step 1: goal & scope

In this step, the functional unit is determined, the supplied performance. Oftentimes, this is not a product quantity. That quantity per product alternative can vary, because, for example, the quality and service life are different. That is why we use the function as a starting point and then determine the product quantity needed to meet that function.

Step 2: inventory

First, the life cycle is drawn up including the raw materials and production steps necessary to produce the product, to maintain the product during utilization and eventually to dispose of the product.

For each process from the process tree, quantities are collected:

- Purchasing, for example electricity and material use and the usage of recycled materials.
- Selling of products and any possible by-products, such as electricity production.
- Material production, waste that is processed somewhere else and the supply of recycled materials.
- Withdrawals from nature such as crude oil, orts and trees.
- Emissions to nature – air, water and soil, such as CO₂, phenol and heavy metals.

Eventually, only environmental interventions remain, withdrawals from nature and emissions into nature. For much-used standard processes, such as electricity production and transportation per truck, and for basic materials these process data are available in databases. The inventory assessment comes to an end with the summation of comparable withdrawals. Often, the result is a list with more than a thousand substances.

Step 3: characterization

The withdrawals and emissions are translated into potential environmental impacts, separated out over diverse impact categories. Different substances carry different contributions to a particular impact. For example, an emission of 1 kg methane for climate change has an effect that is 23 times stronger than that for 1 kg CO₂ and an emission of 1 kg laughing gas has an effect that is 296 times as strong. The factors with which calculations are made for all impact categories are constructed by the “Centrum voor Milieukunde” (Centre for Environmental Science) in Leiden in 2001: *the CML 2 method*.

Step 4: interpretation

The result of the impact evaluation is an *environmental profile*, a series of numbers: one for every impact category. Such an environmental profile is hard to understand and hard to base choices on, because it consists of 11 numbers and since it is unclear what the relative gravity is. That is why weighing happens: the 11 numbers from the environmental profile are made compatible with a collective term and then summed. In the Assessment Method, it is stated that 1-point scores are used for this. The 1-point score is

the, for the government, highest allowable cost level per unit emission repression. The result, the one-point-score, is called the shadow price. In general, the LCA steps 2 and 3 are executed with special LCA-applications such as SimaPro. The Ecoinvent database is oftentimes supplied alongside SimaPro. Many basic processes from the national database come from Ecoinvent.