Nationale MILIEUDATABASE

THE DUTCH ENVIRONMENTAL DATABASE

Version 1.0 (February 2025)

Clarification: recycling and detachability in the Assessment Method

STICHTING NATIONALE MILIEUDATABASE / www.milieudatabase.nl

Clarification: recycling and detachability in the Assessment Method

Executive summary

Reusability plays an important role in reducing the environmental impact of building materials. The Dutch Environmental Database Foundation (NMD Foundation) distinguishes two forms of reuse in the Environmental Performance of Buildings Assessment Method (Assessment Method): unintented reuse, in which products are reused without a previously established plan, and inentended reuse, which is aimed at planned reuse with a focus on quality and design. Unintented reuse is valued using the reuse factor H (standardly set at 0.2), while intented reuse uses the quality factor K, which reflects the remaining quality of a product after the first phase of use as a percentage from 1 to 100.

The processing of materials at the end of their lifespan is described in processing scenarios, in which the degree of reusability plays a central role. Detachability is included in these scenarios. Detachability ensures that components can be disassembled without damage, which is a condition for future reuse. This is made clear in the Assessment Method by declaring end-of-life scenarios that take detachable designs into account.

In addition, the Assessment Method offers scope for new business models and initiatives, such as a take-back guarantee, with which manufacturers can demonstrably take responsibility for taking back and reusing products after their use phase. With this approach, the NMD Foundation offers clear guidelines for stimulating circular strategies and promoting reuse in the construction sector.

Lotte Verheul (NMD Foundation) has written this clarification in cooperation with:

Pieter Lieffering - Stichting NMD
Peter Kuindersma - Ingenii Bouwinnovatie
Jeannette Levels - LBP|Sight

Table of contents

1. Reuse in the Dutch Environmental database 4

1.1 Unintended and intended reuse 6

1.1.1 Unintended Reuse (Reuse Factor H) 6

1.1.2 Intended Reuse (Quality Factor K) 7

2. Detachability 8

2.1 Declaring Detachability in the Assessment Method 8

3. Example Environmental Declarations 11

1. Reuse in the Dutch Environmental database

Reuse is the one-to-one reuse of products and elements – whether or not after refurbishment – in the same function. The Assessment Method uses the following definition:

Reuse building products or structures/elements in the same function, whether or not after processing. Examples include reusing an insulating material as insulation, a door as a door, a roof as a roof.

[Assessment Method Appendix 1, Terms, definitions and abbrevations, P52]

Within the Assessment Method, the environmental effects of reusing and recycling construction products are investigated and described in Module D of a life cycle assessment (LCA). On the other hand, when reuse and recycling relate to supplying a recycled or reused product to the market, the environmental effects are recorded in Module A. Both are explained below.

Reuse is valued based on processing scenarios for the end of the (first) life span of construction products. Within the Assessment Method, there are fixed end-of-life processing scenarios that describe how materials will be processed after their use phase if no additional measures are taken. A percentage for reuse is included in a limited number of processing scenarios where this is already common practice. Subject to certain conditions, a producer or industry sector can draw up a customized end-of-life processing scenario based on its own data and/or collection system, for example.

The processing scenarios can elaborate on the degree of reusability of the product at the end of its lifespan. The NMD distinguishes three main categories:

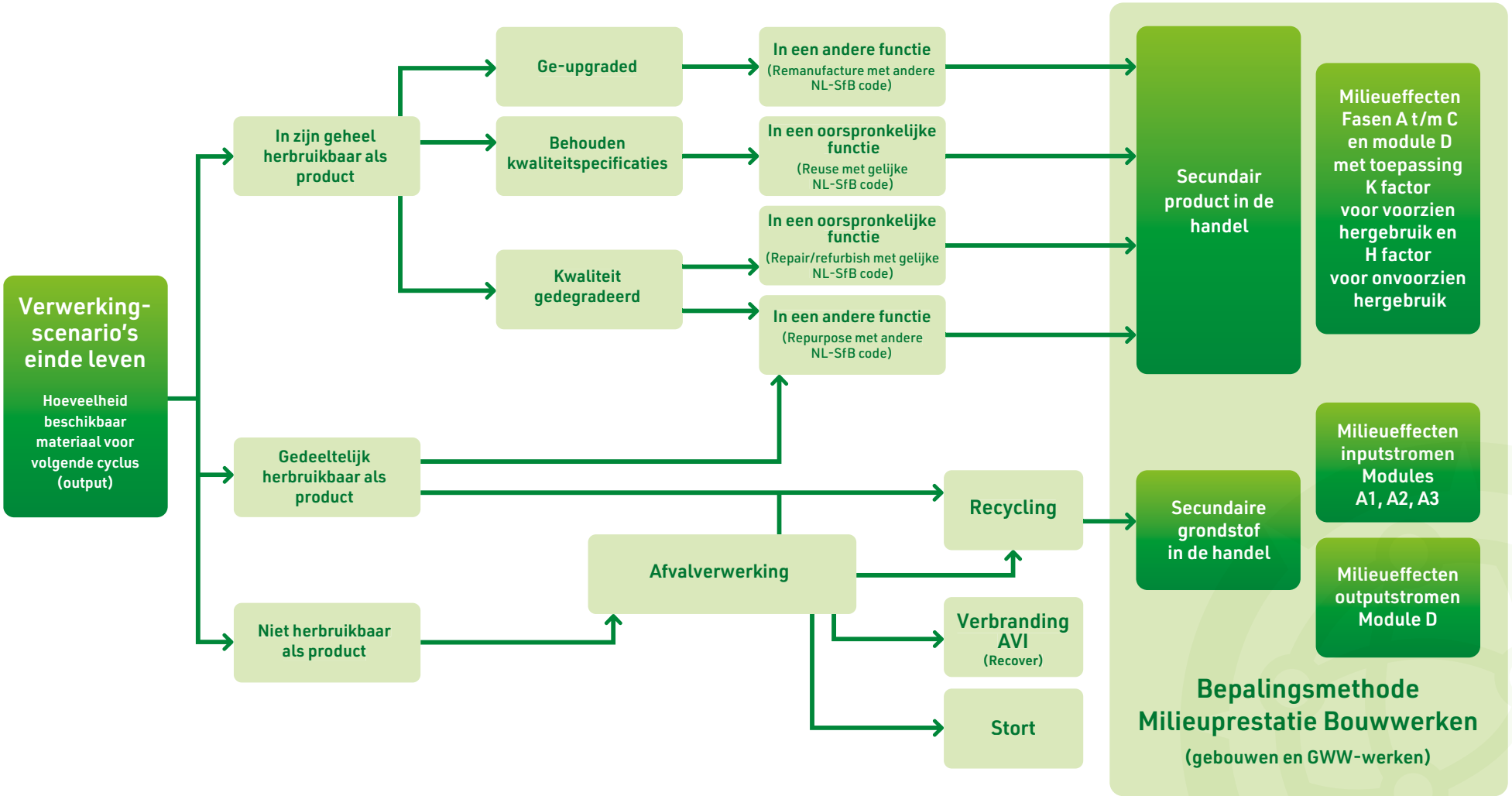
- ***Fully reusable as a product***
  This concerns products that can be reused in their original form and function without major processing. Examples include reusable roof panels or floor elements that can be reused in construction. These products can be reused without loss of quality and therefore contribute to a lower environmental impact.

- ***Partially reusable as a product***
  This concerns products of which only certain parts or components are reusable. The remaining parts are processed as waste. Examples include composite building products of which only the metal or wooden parts are reusable. These products are partially reusable and part of the material is recycled, which can also reduce environmental costs, depending on the recycling process.

- ***Not reusable as a product***
  Products that cannot be reused in their original function and are completely processed through waste disposal. This can be through recycling, incineration (with or without energy recovery), or in some cases even landfill. The environmental impact of these disposal options is generally higher because the materials cannot be returned to the construction cycle.

Figure 1 shows the various processing scenarios.

Figure 1. Fixed end-of-life processing scenarios



1.1 Unintended and intended reuse

Reuse can be divided into two forms: unintended reuse – the reuse of products or elements currently released from dismantling and demolition; and intended reuse – reuse that will take place in the future. Both forms of reuse are included in the Assessment Method, which serves as a guideline for conducting a life cycle assessment (LCA).

Below is a brief description of the two forms of reuse, as presented in the Assessment Method:

1.1.1 Unintended Reuse (Reuse Factor H)

Unintended reuse refers to products that are (now) reused after their first phase of use, but for which no explicit reuse plan was drawn up. With this functionality, the NMD facilitates the practice of being able to calculate with reuse now.

Various initiatives support the reuse of building products. Madaster offers material passports to provide insight into reusability, while marketplaces such as INSERT and Oogstkaart make used building materials from demolition projects directly available for new applications. In addition, circular hubs and materials depots make it possible to temporarily store materials and reuse them later in other projects.

Design approaches such as 'design for reuse' ensure that products can be disassembled and reused without loss of quality. Take-back guarantees from manufacturers ensure that products are taken back at the end of their lifespan for reuse.

Unintended reuse is applied at the level of an environmental declaration in which the product is used in the same functional application. The calculation rule has been worked out in a generic reuse factor: reuse factor H.
This factor has been determined based on the following principles:

- Simple and transparent
- Acceptable approximation of the actual environmental impact (so not 0)
- On average, reused products will not yet have "written off" all of the original environmental burden, but a substantial part will have. On this basis, the principle of "free of burden"[1] has not been applied at the product level in the case of unforeseen reuse.

Unforeseen reuse in the future will decrease further due to the facilitation of environmental declarations for reuse based on anticipated reuse and the facilitation of tested environmental declarations of products from reuse.

In the case of unintended reuse, the reuse factor H is set at 0.2 by default. This means that the ECI is multiplied by 0.2, applied to the following modules within the life cycle of the initial construction product: A1-A3; C3, C4 and D. Other modules, A4, A5, B, C1 and C2 are calculated in the usual way. Even a product made from recycled materials will have to be transported, installed and, at the end of its life, dismantled and processed again. The lifespan of the product is equated to the reference lifespan of the original product. For the application of unforeseen reuse, you use the existing environmental declarations in the NMD by choosing the most representative available product.

The NMD Foundation provides the above calculation method to calculation tools and in this way the reuse factor H is implemented in the online calculation tools. It usually appears in the form of a check mark that indicates whether or not the data may be used for unforeseen reuse. Checking this box is only permitted when a product has actually been reused. This must be verifiable.

---

1 *Free of burden means that a reused product does not carry any environmental burden or impact from the previous usage phase; it is considered completely "burden-free," without the environmental effects of the original production being taken into account.*

Various initiatives support the reuse of construction products. Madaster provides material passports to offer insight into reusability, while marketplaces such as INSERT and Oogstkaart make used construction materials from demolition projects directly available for new applications. In addition, circular hubs and material depots make it possible to temporarily store materials for reuse in future projects.

Design approaches such as design for reuse ensure that products are demountable and can be reused without loss of quality. Take-back guarantees from manufacturers ensure that products are retrieved at the end of their life cycle for reuse.

1.1.2 Intended Reuse (Quality Factor K)

Intended reuse is the planned, deliberate reuse of construction products or materials, taking into account the quality of the product after the first phase of use. Intended reuse is expressed in the Assessment Method as a quality factor K. This factor reflects the remaining quality of a reused construction product in relation to the quality of the original product. The K-factor is used to calculate module D and is only applied to new products that are specifically designed for future reuse and is recorded in the LCA report.

The quality factor K is expressed as a percentage between 1 and 100 and can be determined by the LCA expert (and manufacturer) by:

1. Substantiation of technical quality after first use;
2. Expected remaining lifespan of the second use; or
3. Market value of the product for reuse in relation to the market value of the new product.

The above options are listed in order of preference for determining the quality factor K, which can be expressed as follows:

$$\text{Environmental impact module D} = \text{vew (\%)} \times (\text{mbD} \times \text{K}) + \text{MID}$$

Vew (%) = percentage reuse from end-of-life processiong scenario
mbD = environmental benefits outside product system
mID = environmental costs outside product system
K = quality factor K

The K-factor only applies to the benefits (and not the costs) outside the product system and is particularly important for building products that are specifically designed for reuse. This includes products that, due to their modular and demountable nature, can easily be reused several times in other construction projects. Examples include applications such as modular wall systems, heavy steel structures, prefab concrete panels and facade systems. For these products, the K factor is essential to accurately calculate the remaining quality and environmental gains of reuse and to assess them in the environmental performance analysis.

2. Detachability

To encourage reuse in the future, it is important that building products and components are detachable. Detachability means that products and components can be disassembled without major demolition work. This ensures that building products can be reused with minimal damage and thus a higher K factor [2] [3].

A consortium of Alba Concepts, the Dutch Green Building Council (DGBC), the Netherlands Enterprise Agency (RVO) and W/E Adviseurs has developed a specific measurement method to quantify the detachability of a building, expressed in a detachability index. This index provides a score for the dismantlability of a building or building component, allowing designers to compare different designs in terms of detachability. This promotes circular design by providing designers with clear insight into the best options.

2.1 Declaring Detachability in the Assessment Method

Detachability is a design strategy that capitalizes on the reuse of building materials, adaptive building and the possibility of repair and replacement. The effect of this can be made transparent with the environmental performance score (ECI/EPB). In the Assessment method of the National Environmental Database (NMD), detachability is not directly evaluated using a detachability index, as detachability requires specific connections or products that are suitable for detachable application.

In order to assess this design strategy in environmental performance, the possibility has been offered to declare specific end-of-life scenarios, including on the basis of detachability. This makes it possible to work with reusable, modular and detachable products in environmental performance calculations. The manufacturer can describe different scenarios based on the specific way in which the product can be disassembled and reused.
This is described in section 2.6.3.9. of the 1.2 assessment method.

If a product is modular or detachable and can be used in different ways, the LCA preparer must explicitly state the conditions under which these applications are possible in the LCA report. This means that the manufacturer must provide detailed information about mounting methods, disassembly instructions and the technical requirements for making the product detachable and reusable.

This documentation serves as assessment material for the verifiability of detachability, so that LCA reviewers can check whether the specified reuse scenarios are feasible in practice. For example, in the case of construction applications, a substantiation and statement from a constructor is often requested to confirm the applicability and dismantlability of the product.

In addition to detachability, other initiatives and new business models also play an important role in circular construction. One of these initiatives is the take-back guarantee. This guarantees that products will actually be taken back after use and must therefore be suitable for reuse or high-quality recycling.

---

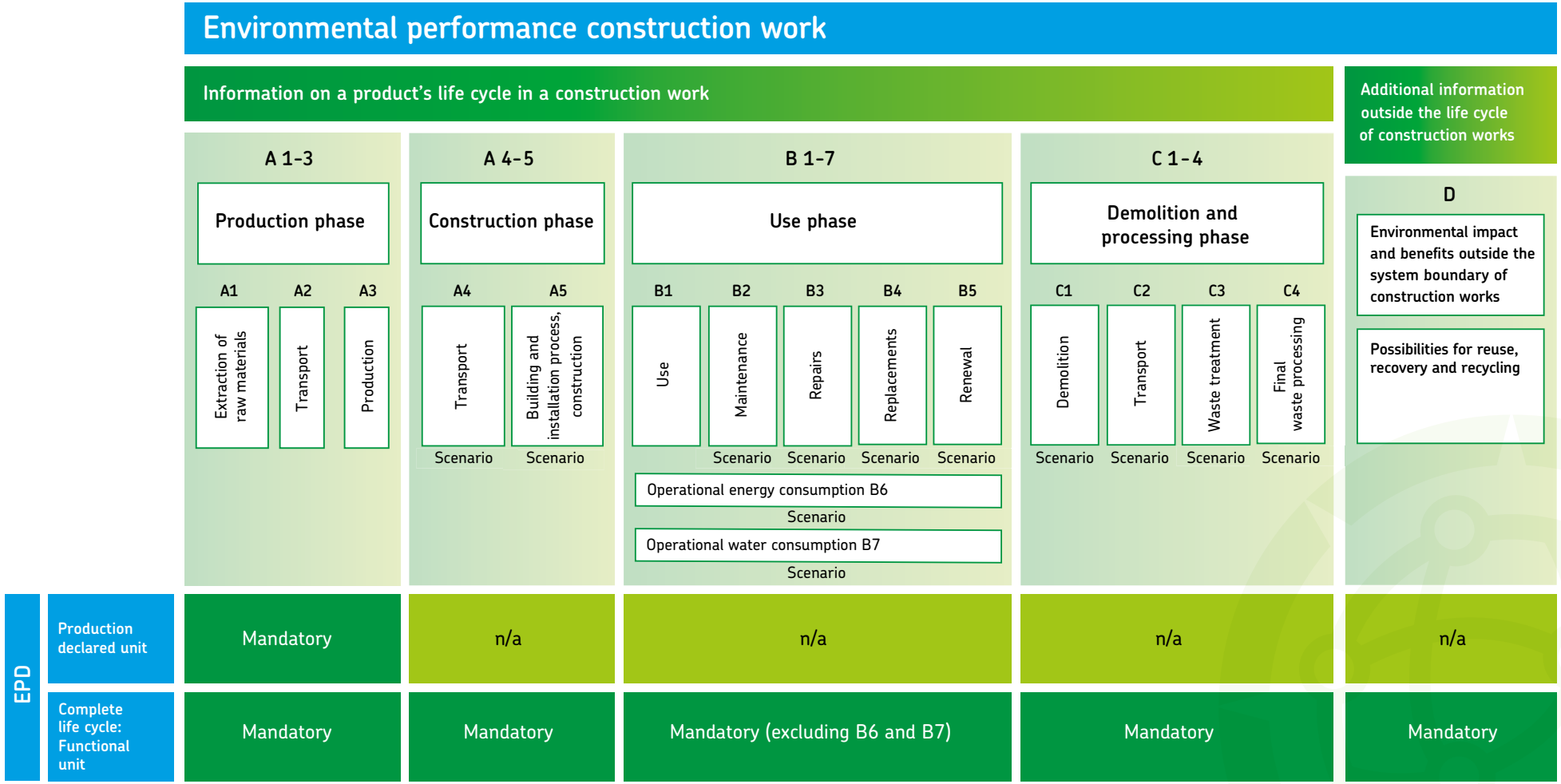
2 ***CB'23 Platform: Guideline for Detachable Detailing*** *- a tool for designers and construction professionals to apply detachable connections and constructions.*

3 ***Spring Agreement: Detachable Detailing*** *- Working on a Future-Proof Building Stock - an overview of strategies and practical examples that promote detachability in the built environment.*

In the Assessment Method, in paragraph 2.6.3.9, this take-back guarantee is described as a scheme in which a manufacturer or supplier commits to take back a product after its usage phase. This means that when the product reaches the end of its lifespan, it goes back to the producer for processing, reuse or recycling.

The take-back guarantee aims to place demonstrable responsibility for the reuse or environmentally friendly processing of the product with the manufacturer, which contributes to the circular economy and the reduction of waste.Detachability and the take-back guarantee are closely related. The take-back guarantee can only be implemented in practice if the product can be disassembled without significant damage or demolition work. This means that products with a take-back guarantee must be designed with detachability in mind.

Figure 3. Various stages of the life cycle of a product or service



3. Example Environmental Declarations

To provide a better understanding of the correct method for valuing reuse in the NMD, here are some examples of materials as seen in the NMD Viewer, with clear justification provided in the notes. The relevant environmental declarations can easily be found in the NMD Viewer

Heavy structure steel – Bouwen met Staal

In the case of the heavy structural steel from Bouwen met Staal, there are various types of environmental declarations, categorized by method of use: regular use, design for reuse and recycling. Each declaration contains the technical details and preconditions that clarify the reusability and environmental impact, allowing assessors to easily verify the suitability and dismantlability of the steel in each scenario.

By recording these environmental declarations for every possible scenario, the appreciation of reuse and design for reuse in the NMD is accurately documented.

Wooden boards made from European softwood – Vereniging van Sloopaannemers

These environmental declarations for wooden boards made from European softwood consist of wooden boards that are sourced from manual disassembly. This is clearly stated in the explanation.

Bosch Beton standard retaing wall – Bosch Betonindustrie

A separate environmental declaration is available for Bosch Beton's standard retaining walls, which focuses on fully reused and repaired retaining walls. By establishing a separate environmental declaration for reuse in addition to the regular environmental declaration, the appreciation of reuse and circular design in the NMD is carefully documented.

Nationale
MILIEUDATABASE

THE DUTCH ENVIRONMENTAL DATABASE