Het
Nieuwe
Normaal

1.0

The New Normal for Buildings

A shared language for circular construction
in the Dutch construction sector.

Het Nieuwe Normaal

Version

This is a translated version of *Het Nieuwe Normaal* (HNN, or The New Normal) meant for an international audience in the construction sector to learn from each other and further accelerate circular construction.

Initiative

The drafting of HNN stems from the *Samen Versnellen* (Accelerate Together) programme in the Netherlands. The aim is to achieve a shared standard and language for circular construction.

Partners

HNN was started as an initiative of *Cirkelstad* and the Dutch Ministry of the Interior and Kingdom Relations. From the start of the programme, a cooperation between six major clients and six major contractors was established with:

Clients: *Rijksvastgoedbedrijf* (the Dutch central government's real estate agency), *Rijkswaterstaat* (the executive agency of the Dutch Ministry of Infrastructure and Water Management) as well as the municipalities of Amsterdam, The Hague, Rotterdam, and Utrecht.

Contractors: Royal BAM Group, Dura Vermeer, Heijmans, Synchroon, Van Wijnen & VolkerWessels, all of those being major players in the Dutch construction industry.

Credits translation

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Het Nieuwe Normaal

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Foreword

In the Netherlands, we have made considerable strides towards circular construction in recent years. In the process, many different definitions, guiding principles, and design principles have emerged. With the intention of creating an unambiguous language to describe circular construction, six large clients and six large contractors have worked on **Het Nieuwe Normaal** (HNN, or The New Normal).

With HNN, we have created a shared and unambiguous language for circular construction. Circular construction is expressed in nine indicators, with corresponding measurement and assessment methods. Thanks to this shared language, parties involved in the building process can make agreements on their performance in circularity.

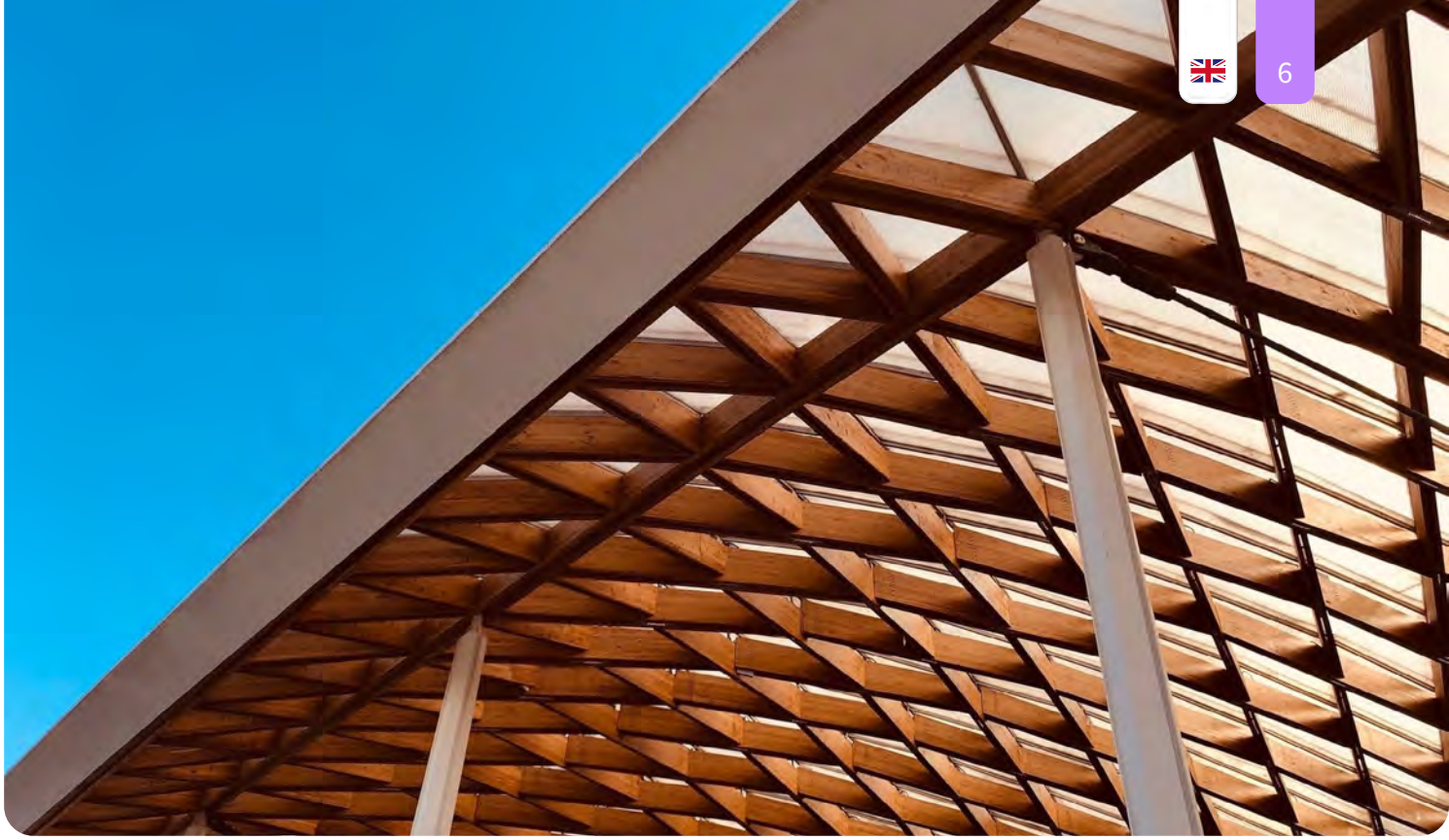
We notice that our Dutch experiences generate a great demand from abroad. With the help of this translation of the HNN for Buildings guideline, we share our knowledge with a larger and international group of practitioners. We invite everyone to apply it to their own projects, to learn from it, and hence develop it further.

By sharing our knowledge, we want to further accelerate the transition to a circular economy in the construction industry. Ideas, questions, and lessons learned are most welcome: we too will learn from them. Together towards a circular construction industry!

Rutger Büch
Programme Leader Het Nieuwe Normaal

Part I
Introduction HNN

Part I explains how HNN and *Cirkelstad* came into being, provides the (legislative) Dutch and European context and introduces the *Cirkelstad Internationaal* network.



Introduction

In the Netherlands, both clients and contractors want to get started with circular construction. Due to the many different definitions that were used, *Het Nieuwe Normaal* (The New Normal, hereafter: HNN) has been developed in the Netherlands to provide a common language with a framework composed of nine indicators and corresponding performance levels. These can be used by clients and contractors to make agreements on the required performance in circular construction.

Here, we briefly present the framework and how it came about. Its purpose is to facilitate the exchange of knowledge among clients, contractors, professionals, policymakers and other stakeholders in Europe and beyond. HNN currently consists of three guidelines for different subsectors in construction: HNN for Buildings for residential and non-residential general construction, HNN Infrastructure for civil engineering and HNN Area Development for integral area development.

This translation presents the HNN for Buildings guideline. The guidelines for HNN Infrastructure and HNN Area Development are currently only available in Dutch. In essence, the three guidelines are based on the same circular principles and only differ in how they are applied to a specific industry or development. Therefore, for the most part, the conceptual frame is also applicable to the topics infrastructure and area developments.

Website (in Dutch)
Further information and original in-depth documents are available on the website:
hetnieuwenormaal.nl

Part I of this translation introduces *Cirkelstad*, HNN, and the Dutch & European (legislative) context. Part II presents the principles and framework of HNN for Buildings. Part III elaborates on the nine indicators of the framework.

Cirkelstad & Het Nieuwe Normaal

About *Cirkelstad*

The *Cirkelstad* network was founded by both public and private entrepreneurs. They aimed to address challenges faced by society, particularly in the building sector with its significant material and energy impact. Key questions included: How do we reintegrate residual material flows into the cycle, and how do we utilize all resources and talent in the neighborhood?

By connecting public administrators and practitioners, the network enables frontrunners in the public and private sector within the Netherlands to coordinate periodically and act together. Thus, the *Cirkelstad Academy* was created as a platform for an open dialogue to share knowledge and experience on the subject. From new views emerged impactful new solutions.

Now, after 10 years, the foundation of knowledge and experience has been laid out. We are on the verge of scaling up. The *Cirkelstad* programme for 2024-2026 is all about construction within the planetary boundaries. Together, we go from inspiration through activation to implementation!

Cirkelstad
GEEN AFVAL GEEN UITVAL

Het Nieuwe Normaal

About *Het Nieuwe Normaal*

n 2019, Cirkelstad and 12 major parties in the Dutch construction industry —clients and contractors — took the initiative to collect experiences from a large number of circular projects in building and infrastructure construction through project evaluations, based on their own projects as well as projects from other parties. Their objective was the creation of a common language on circular construction. They partnered with consultants from the Dutch engineering and consultancy agencies Alba Concepts, Copper8, Metabolic, and Witteveen+Bos as well as with scientists from Delft University of Technology. Together, based on their own practical experiences and relevant literature, they established the HNN indicators and methods of measurement and determination.

On 7 December 2023, version 1.0 of HNN was released in the Netherlands. At the time of the launch, 70+ parties signed a manifesto, intending to apply HNN to their projects and integrate the framework in their company management processes. With HNN version 1.0, we created a solid basis for continuous further development of circular construction in the Netherlands.

This new and broadly supported standard contributes to accelerating the transition to a circular construction economy in two ways. It provides:

- A consistent language on circular construction: when we talk about ‘circular construction’, we talk about a well-defined and integral combination of indicators;
- An ambitious yet achievable performance level for these indicators.

Dutch legislative context

The Netherlands has its own laws and regulations, just like any other European country. In the field of sustainable and circular construction, it is mandatory in the Netherlands for new construction projects of residential and office buildings to conform to a specified maximum value of the environmental impact of a building or *Milieuprestatie Gebouw* (MPG). The MPG is therefore also HNN's first indicator in the framework. Other indicators are applied at project level or are used in tender procedures. However, these are not part of legislation or regulations.

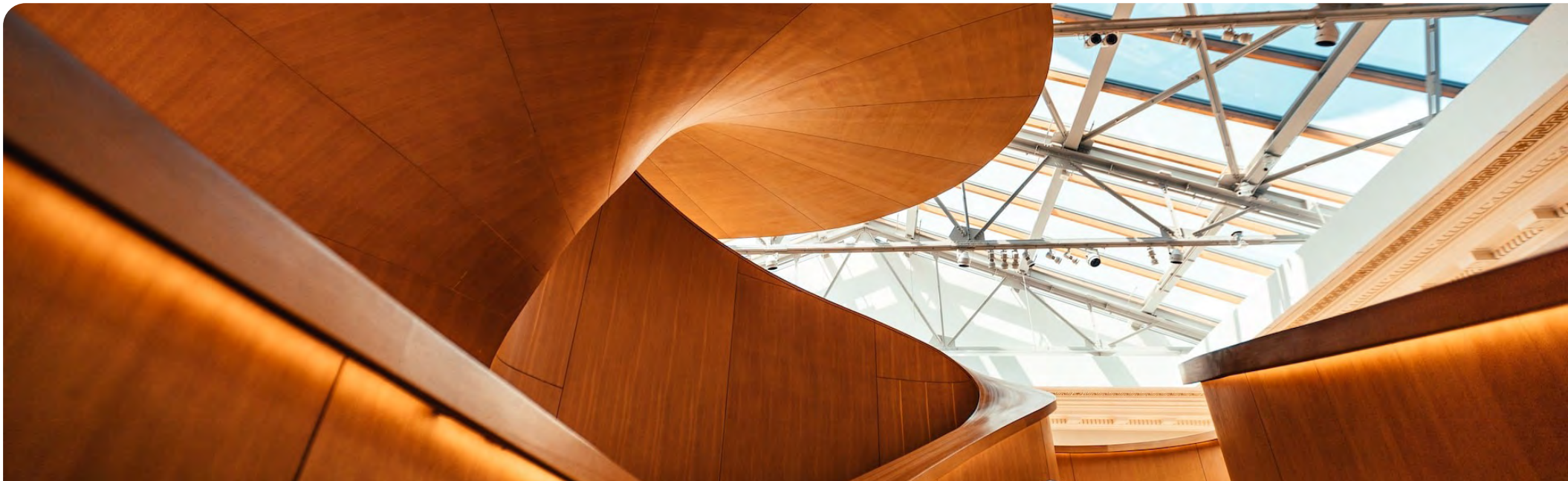
About *Milieuprestatie Gebouw*

The *Milieuprestatie Gebouw* (MPG) is an environmental cost indicator (ECI) of the environmental damage caused by the construction of a building. It is expressed in € / m^2 gross floor area / lifespan of the building. This lifespan is by default 50 years for offices and 75 years for residential buildings. The environmental damage is determined on the basis of a Life Cycle Assessment (LCA) over the building's entire life cycle, in accordance with European standard NEN-EN 15978:2011. This environmental damage is converted into a monetary value (in €) based on the environmental costs determined in the Netherlands for the various environmental impact categories (in accordance with European standard NEN-EN 15804).

In the Netherlands, when applying for a building permit on newly built projects (residential and office buildings), an MPG score is requested that has to be below the legal maximum for the permit to be granted.

About the other indicators

Other indicators in the field of circular construction are not yet part of legislation and regulations, but are applied in practice at project level. The national government is currently working -partly based on HNN- on a set of additional indicators for future legislation.



European context

At the European level, there are many developments in the field of sustainability and sustainable construction. In relation to HNN, the Level(s) framework and the Corporate Sustainability Reporting Directive (CSRD) are particularly relevant.

Level(s) framework

The Level(s) framework was developed by order from the European Commission to determine the level of sustainability of residential and office buildings. It defines six macro-objectives, from reducing greenhouse gas emissions through the impact of a building on its occupants' health to climate resilience. In addition to this, the Level(s) framework includes the environmental impact over the entire life cycle on the basis of an LCA. The HNN framework aligns with both the LCA environmental impact and the first two macro-objectives:

- **Macro-objective 1:** Greenhouse gases and air pollutant emissions along a building's life cycle
- **Macro-objective 2:** Resource efficient and circular material life cycles

Because of this alignment with the Level(s) framework, projects or buildings designed and evaluated based on HNN can be reported relatively easily in conformance with these Level(s) objectives.

Corporate Sustainability Reporting Directive (CSRD)

The HNN framework is also useful for reporting in accordance with the CSRD. For reporting on sustainability in the annual report and assessing business activities as sustainable/non-sustainable, the CSRD uses two reference points:

The **European Sustainability Reporting Standards (ESRS)** have been developed for companies to report on sustainability in their annual report. There are several themes that should be reported on, including the topic Environment - ESRS E5 Resource use and circular economy. The standard reporting requirements in the construction sector for this theme are currently limited to materials and waste streams. Additionally, companies are encouraged to use existing frameworks and indicators that are appropriate for use within the sector. The HNN framework is especially well suited for reporting on this topic.

The **European Taxonomy for sustainable activities (EU Taxonomy)** has been developed to classify business activities and investments as sustainable. For the EU Taxonomy, technical criteria have been defined within the theme Circularity for construction- related activities, including new construction. In order to demonstrate the contribution to the topic of circularity, these technical criteria refer to specific indicators included in the Level(s) framework, as described above.

Where to go from here?

Within *Cirkelstad*, there are several communities working hard on the program *Steden zonder afval, zonder uitval* (Cities without waste, without dropout). This programme captures circularity both from a material (without waste) and a social (without dropout) perspective. These communities operate on a regional and/or a theme-based level.

Cirkelstad International focuses on the international construction economy from different perspectives. Primarily, within the European context, we build a bridge to anchor the principles of HNN. Driven by the needs of our *Cirkelstad* partners, connections are made across the border in the field of the circular construction economy. In addition, we learn and work together with other countries how they safeguard and accelerate the circular construction economy through policy, projects and networks.

Specifically, *Cirkelstad International* focuses on three components in its line-up:

1) Setting up an international network for and by *Cirkelstad* partners;
2) Connecting *Cirkelstad* and *Het Nieuwe Normaal* to an international context;
3) Learning from others to further develop *Het Nieuwe Normaal* and contribute to the transition to a circular construction economy.

Curious about what *Cirkelstad International* can do for your organisation? Contact our *Cirkelstad International* spinner Bas van de Westerlo (**b.vandewesterlo@volantis.nl** / 0031 (0)6 55 18 19 46).

Part II
Framework
HNN for Buildings

Part II explains which guiding principles are applied, which project types are distinguished and how the framework is set up.

1. Development of the HNN for Buildings framework

In HNN for Buildings, a framework of nine indicators has been defined to determine the degree of sustainability of material use in a building, divided into three objectives of sustainable construction.

Guiding principles

The following guiding principles are used in developing the HNN framework.

- **No total score:** the performances apply to individual indicators and therefore cannot be combined into one (total) score, as they concern different aspects with different units.
- **No ranking:** the indicators have no ranking in relation to each other; instead, each project can make its own prioritisation based on what is relevant to its specific context and situation.
- **Performance on individual indicators:** the performance levels for individual indicators are achievable for a project and it is up to the project organisation to choose to aim for excellent scores on specific indicators.
- **Building on existing methodologies and frameworks:** no new measuring methodologies have been developed for HNN indicators; rather, reference is made to already established methodologies. HNN also cross-references existing (international) frameworks, such as BREEAM and the Level(s) framework.
- **National basis:** HNN was started from the Netherlands, based on mostly Dutch measurement and determination methods. For further development to subsequent versions, harmonisation with internationally applied methods is being worked on.
- **Further development of HNN:** the common language, indicators and performance levels are still in development. A version 1.0 has been published in 2023 to serve as a first version, but this will be further developed in the coming years.

2. Project types

The HNN framework applies to different types of projects. As an unambiguous language it is suitable for projects including various types of buildings and infrastructure. Performance levels are established for a few sub-types. This translated guideline covers HNN for Buildings - new construction.

HNN for Buildings

Within HNN for Buildings, we distinguish the following types of projects:

- Residential building | Ground-level housing
- Residential building | Multi-storey housing
- Non-residential building | Offices
- Non-residential building | Other (e.g. schools, sports facilities, etc.)

HNN Infrastructure

Within HNN Infrastructure, we distinguish the following types of projects:

- Roads | Main and arterial roads
- Roads | Distributor roads
- Public space | Design
- Civil engineering works | Movable bridges
- Civil engineering works | Fixed bridges
- Civil engineering works | Tunnels

HNN Area Development

Supplementary to HNN for Buildings and HNN Infrastructure, HNN Area Development has been developed. This guideline provides a basis for determining comprehensive ambitions for developments on an area level.

Building		**Residential building**	*Ground-level housing*
			Multi-storey housing
		Non-residential building	*Offices*
			Other
Infrastructure		**Roads**	*Major and arterial roads*
			Distributor roads
		Public spaces	*Design*
		Civil engineering works	*Movable bridges*
			Fixed bridges
			Tunnels
HNN Area Development		**Residential area**	
		Industrial estate	
		Mixed living/working zone	

1.0

Note

This translated version presents the HNN for Buildings framework. The substantive background of the indicators is virtually the same for all three of these frameworks: the background information in this abbreviated version is also largely applicable to HNN Infrastructure and HNN Area Development.

3. Framework

HNN focuses on the materials and raw materials transition, for which nine indicators have been identified. Circularity does not just function in isolation, but takes place in a broader sustainable context. HNN maps it around the themes of energy, water and nitrogen. Finally, there are both social and management measures that can act as accelerators towards circular practices towards circular practices: the accelerators. The complete framework consists of these three components: *Het Nieuwe Normaal*, sustainable context and accelerators. In this translation, only the HNN framework is presented.

Het Nieuwe Normaal (HNN)

Within the materials transition we distinguish three goals:

- Environmental protection;
- Protection of material supplies and prevention of depletion;
- Value retention of what we build now, which will ensure that quality and functionality are preserved.

Each goal has been converted into a theme in HNN. Each theme is expressed in three indicators, making for a total of nine indicators in HNN, namely:

1. The ***Milieuprestatie Gebouw*** **(MPG)** provides insight into the total environmental impact over the entire life cycle of the building. The MPG is also part of the Dutch Building Decree *(Bouwbesluit)*.
2. The **embodied carbon** emissions provide insight into the CO_2 impact of the production of building materials and components, including the construction process.
3. The **construction stored carbon** is the amount of CO_2 that is stored in (biobased) building materials and therefore withdrawn from the atmosphere.
4. The **origin of materials** from responsible sources addresses the total amount of circular materials: biobased, reused or recycled;
5. The share of **healthy materials** refers to the number of materials used in a building that are demonstrably non-toxic;
6. Dealing with **residual materials from construction** processes provides insight into the extent to which residual materials are avoided during the construction phase and how any residual materials are reused or recycled.
7. The **adaptability** (at building level) determines the degree of adjustability of a building during its lifespan, e.g. to new functions;
8. The **disassembly potential** (at product level) provides insight into the extent to which products, components and materials are separable from one another;
9. The **reuse potential** provides insight into the extent to which products, components or materials can be reused at the end of their lifecycle.

Sustainability context

With the Sustainability context, we provide insight into the context surrounding the performance levels at HNN. After all, circular construction alone is insufficient for the major sustainability challenges we face. A building project requires an all-encompassing approach in both design and realisation and is broader than just a perspective on materials. Consider, for instance, climate adaptation, boosting biodiversity and ensuring quality in the spatial domain.

To bring focus to the transition, HNN currently does not focus on improving performance in these topics. However, a number of complementary subjects are addressed to determine the context in which circular performance is achieved:

- **Energy,** where we look at energy performance.
- **Water,** where we look at water cycles within the project.
- **Nitrogen emissions,** where we look at preventing nitrogen emissions and deposition on the project.

Accelerators

With the Accelerators, we want to better understand which qualitative aspects lead to an acceleration of the transition to circular construction. In doing so, we address two themes:

- **Social,** where we look at optimal use and engagement of buildings and people through the themes of participation and reintegration.
- **Management,** where we explore in depth the management and collaboration dynamics within the tender, design and construction process.

This translated version presents the framework of HNN, without the Sustainability Context and the Accelerators.

Het Nieuwe Normaal						1.0
1	Environmental impact	1.1 *Milieuprestatie Gebouw* (MPG)	1.2 Embodied carbon	1.3 Construction stored carbon		
	Material use	1.4 Origin of materials	1.5 Healthy materials	1.6 Residual materials from construction		
	Value retention	1.7 Adaptability	1.8 Disassembly potential	1.9 Reuse potential		
Sustainability context						
2	Energy	2.1 Maximum energy demand (BENG-1)	2.2 Primary fossil energy usage (BENG-2)	2.3 Share of renewable energy (BENG-3)		
3	Water	3.1 Total water consumption	3.2 Grey or rainwater usage			
4	Nitrogen emissions	4.1 Construction logistics	4.2 Construction methods			
Accelerators						
5	Social	5.1 Participation	5.2 Reintegration			
6	Management	6.1 Tender request	6.2 Contractual terms	6.3 Collaboration dynamics	6.4 Internal organisation	

Part III
Indicators
HNN for Buildings

Part III presents the circular design and construction principles, provides inspiration for the performance levels as applied in the Netherlands, and goes into more detail about the individual indicators.

4. Circular design and construction principles

To accelerate the transition to a circular construction economy, it is important to translate performance levels into actual choices in the design and construction process. Nine circular design and construction principles have therefore been developed within the framework. These principles can be applied directly by designers and construction contractors.

Applying the circular design and construction principles contributes to a more circular building. In line with the framework, the degree of circularity is determined by the combination of the different circular principles.

Dilemmas and mutual reinforcement

In steering towards circular construction, most principles reinforce each other: for instance, more timber construction contributes to both a higher share of circular materials, lower embodied carbon, and higher construction stored carbon. However, dilemmas can also arise: for instance, a higher degree of adaptability can lead to an increased use of materials.

Therefore it is important to set priorities at project level within the framework and between the indicators. This prioritisation depends on the current and future wishes of the building owner, general area requirements, and local or municipal policies.

Focus on materials and detailed design per building layer

According to Steward Brand's layers model, a building is divided into 6 S-layers: *site, structure, skin, services, space plan,* and *stuff*. Each S-layer has a specific lifespan. For instance, a building's space plan changes every 10 years on average, while its structure remains intact for about 100 years. The interior building layers with a shorter lifespan typically score higher on disassembly potential in the structure.

By designing these building layers separate from each other, no unnecessary damage is done to any elements that are not yet due for replacement or maintenance. As a result, materials, products or building elements can be disassembled cleanly and in one piece. Detailed design for disassembly across building layers thus increases the chances of high-quality reuse.

It is worthwhile to provide insight into the performance of different building layers in order to target the right materials and detailed design per building layer. In HNN 1.0, we establish performance levels at the building level. To request performance levels for separate building layers, more research is required to determine whether this allows for sufficient freedom for different ways of design and construction.

Thema	Circular design and construction principles 1.0
Environmental impact	Design and construct with the lowest possible **environmental cost**, as expressed in the *Milieuprestatie Gebouw* (MPG)
	Design and construct with the lowest possible **embodied carbon**
	Design and construct with the highest possible **construction stored carbon**
Material usage	Design and construct using **materials** sourced responsibly, prioritizing biobased, reused, or recycled materials wherever feasible.
	Design and construct with as many **healthy materials** as possible
	Design and construct with as little **residual materials from construction** as possible
Value preservation	Design and construct with the highest possible degree of **adaptability**
	Design and construct with the highest possible **disassembly potential**
	Design and construct with the highest possible **reuse potential**

5. Performance levels

Within *Het Nieuwe Normaal* (HNN), we aim to establish performance levels on the various indicators. These indicators can be categorised as standard, indicative or conceptual. We determine these performance levels based on project evaluations and additional data sources.

Categories of indicators

The framework includes three categories of indicators:

- **Standard** (S), for which a performance level is established, the measurement or determination method is clear and widely accepted and sufficient data from practice is available;
- **Indicative** (I), for which an indicative performance level is established, where the measuring or determination method is not yet widely accepted or is still under development and sufficient data from practice is not available;
- **Conceptual** (B, from the Dutch term *Begrip*), for which quantitative or qualitative insights into performance are gathered and currently no broadly accepted measurement or determination method exists. Here, learning and becoming familiar with the subject are key.

An indicator can develop over time. For example, when a measuring or determination method matures and becomes more widely accepted on the market, additional project data can be gathered. As a result, an indicator may evolve from conceptual (B) to indicative (I) or from indicative (I) to standard (S).

Performance levels: three building types

The performance levels in HNN for Buildings version 1.0 relate to newly built projects. This version establishes performance levels for three types of construction project:

- Residential building: Ground-level housing;
- Residential building: Multi-storey housing;
- Non-residential building: Offices.

Establishing performance levels

HNN's performance levels were established based on the quantitative results of project evaluations. These results were refined and further reinforced using additional data sources from clients, contractors, and other parties in the construction industry. For indicators for which insufficient or no quantitative data were available, expert judgments were applied.

The performance levels as presented in this table are specific to the Dutch context and building practice. They are included in this translated version for inspiration and are not meant to be adopted in other countries.

1.0

Indicator	Category	Performance levels: HNN for Buildings 1.0 Newly-built			Unit	Method
		Residential ground-level	Residential multi-storey	Non-residential: Offices		
Environmental impact						
Milieuprestatie Gebouw (MPG)[1,2]	Standard	≤0,45	≤0,50	≤0,70	€ECI / m² GFA / year	Determination method *Milieuprestatie Gebouw* (MPG)
Embodied carbon[3]	Standard	≤200	≤240	-	kg CO_2-eq / m² GFA	Calculation method Paris Proof
Construction stored carbon	Indicative	-	-	-	metric tonne CO_2-eq	Assessment method carbon storage bio-based materials
Materials use						
Origin of materials	Standard	≥25%	≥20%	≥25%	% mass biobased, reused, recycled	CB'23 guideline Measuring Circularity (v3.0)
Healthy materials	Conceptual	-	-	-	Number of certified products	Certificates (e.g. Material Health Certificate, Natureplus)
Residual materials from construction	Conceptual	-	-	-	-	Inventory of material flows & binding agreements
Value retention						
Adaptability	Indicative	-	-	≥40%	%	Adaptability Method for Buildings
Disassembly potential	Standard	≥55%	≥50%	≥55%	%	Circular Buildings - a measurement methodology for demountability (v2.0)
Reuse potential	Indicative	-	-	-	% mass recycling, reuse	End-of-life scenario (EPD, phase C3 - C4)

1. The MPG performance levels are based on the determination method version 1.1 and the monetary weightset is in accordance with standard EN 15804+A1;
2. For smaller residential buildings (< 80 m² GFA), it is more difficult to comply with the MPG performance level in the HNN framework. For these houses, an indicative performance level of ≤0,55 applies;
3. For embodied carbon, the 'Calculation methodology Paris Proof' applies. The HNN performance level is based on experiences from evaluations and additional data sources ('What is currently feasible and ambitious?'). The actual required CO_2 threshold value in accordance with Paris Proof is lower. The goal is to converge this limit value and the HNN performance level..

1.1 - *Milieuprestatie Gebouw* (MPG)

S I B

The construction, maintenance and deconstruction of buildings leads to environmental impact throughout their entire life cycle. This environmental impact is expressed in the *Milieuprestatie Gebouwen* or MPG: the environmental performance of a building. The MPG is the Dutch legal instrument in building legislation for steering on sustainability.

Summary	
Principle	Design and construct with the lowest possible *Milieuprestatie Gebouw* (MPG)
Category	Standard
Measurement/Assessment method	Method for assessing environmental performance of buildings
Unit	€ECI/m² GFA/yr

Rationale

The MPG gives an indication of the environmental impact of the materials and the construction processes involved in the construction of a building. For each material, this impact is captured in an Environmental Cost Indicator (ECI) in euros. The ECIs of building materials and products can be found in the Dutch national environmental database: the *Nationale Milieudatabase* (NMD).

The environmental impact at building level consists of adding up the ECIs of all materials used in the building. Dividing the total ECI by the gross floor area (GFA, in square metres) and the life span of the building (in years) results in the MPG score expressed in €ECI / m² GFA / yr.

Explanation

1. We determine the MPG on the basis of the Dutch national determination method for environmental performance of buildings: the *Bepalingsmethode Milieuprestatie Gebouwen*. This has a number of drawbacks, including the limited availability of environmental profiles of building products and materials in the NMD database and the varying quality of these environmental profiles;
2. Due to a more favourable floor-to-wall ratio, the MPG value of a large building is lower than that of a smaller building (< 80 m²). This is an important consideration, because for smaller houses the overall environmental impact is actually lower;
3. For apartments, in addition to the surface area of a dwelling, the size of the apartment building and the number of floors also play a role. To effectively steer on environmental impact, it is important to set separate maximum values for different building sizes and geometries in the future. Within HNN, we use a different performance level for multi-storey housing (average smaller GFA) than for ground-level housing (average larger GFA);
4. To create additional insights for a shorter projection period of the CO_2 impact until 2030, we choose to show the embodied carbon in the production and construction phase of the MPG separately in indicator 1.2 Embodied carbon. The amount of CO_2 storage is also shown separately in indicator 1.3 Construction stored carbon.

Explanation from an international perspective

The Dutch way of expressing environmental impact via the ECI and the MPG is prescribed in Dutch legislation and stems from the widely applied Life Cycle Assessment (LCA) methodology. The basis for this is the idea of 'environmental prices' with which externalities are priced. In this, the environmental price required to compensate for the negative consequences is determined for various forms of (negative) environmental impact, such as CO_2 emissions. That is why the MPG is expressed in euros.

The basis of this system is a specific Dutch assessment method with calculation rules. This method conforms to the European standard EN15804. The environmental profiles of construction products that have been determined with the determination method are collected in the national environment database.

The Dutch MPG methodology adds up the impacts over the whole life cycle, expressed in euros. This provides a figure that is easy to interpret, but it does not give any insight into the impact at the different stages.

Link

Bepalingsmethode Milieuprestatie Gebouwen (MPG Assessment method, only available in Dutch)

1.2 - Embodied carbon

S I B

For embodied carbon, the focus is on the initial phases of the life cycle: the production and construction phases.
This emphasis provides insight into CO_2-equivalent emissions from raw material extraction up to the construction phase.

Summary	
Principle	Design and construct with the lowest possible embodied carbon
Category	Standard
Measurement/Assessment method	*Calculation protocol Paris Proof Material-related Emissions*
Unit	kg CO_2-eq / m^2 GFA

Rationale

In making construction more sustainable, the focus is increasingly placed on the short-term reduction of CO_2-equivalent emissions which contributes to limiting global warming. In line with the Paris Climate Agreement, we see the CO_2 budgets towards 2030 decrease every year in order to stay below the 1.5-degree warming mark. For clients, contractors and developers, CO_2 emissions from the *production phase* (of building materials) and the *construction phase* (of buildings) are the easiest to influence. CO_2 emissions for the construction and production phase are made transparent using the calculation protocol *Paris Proof Materiaalgebonden Emissies*, developed by the Dutch Green Building Council (DGBC) and the Dutch Institute for Building Biology and Ecology (NIBE).

Explanation

1. We are following the Dutch trend of controlling CO_2 emissions in the production and construction phases. In order to avoid this leading to additional environmental impact in other areas, it is important to combine the process with the regular MPG assessment;

2. Due to a more favourable floor-to-wall ratio, the embodied carbon of a large building is lower than those of a smaller building (< 80 m^2 GFA). This is an important consideration because for total CO_2 emissions, smaller houses are actually positive;

3. For residential units, the size of the unit and the number of floors are also important factors. In order to control CO_2 emissions, it is important that different thresholds are set for different building sizes in the future. Within HNN, we use a different performance level for multi-storey residential buildings (smaller average gross floor area) and single-storey residential buildings (larger average gross floor area).

Explanation from an international perspective

The concept of embodied carbon is widely supported internationally and focuses on CO_2 emissions during the production and construction phase in accordance with the Life Cycle Assessment (LCA) methodology. These emissions are now equal to or (much) greater than the emissions during the use phase of buildings due to innovations in sustainable installations and sustainability of the energy mix. To limit climate change as much as possible, it is essential to focus on reducing CO_2 emissions in the short term, which is why this is made transparent separately in HNN.

Link

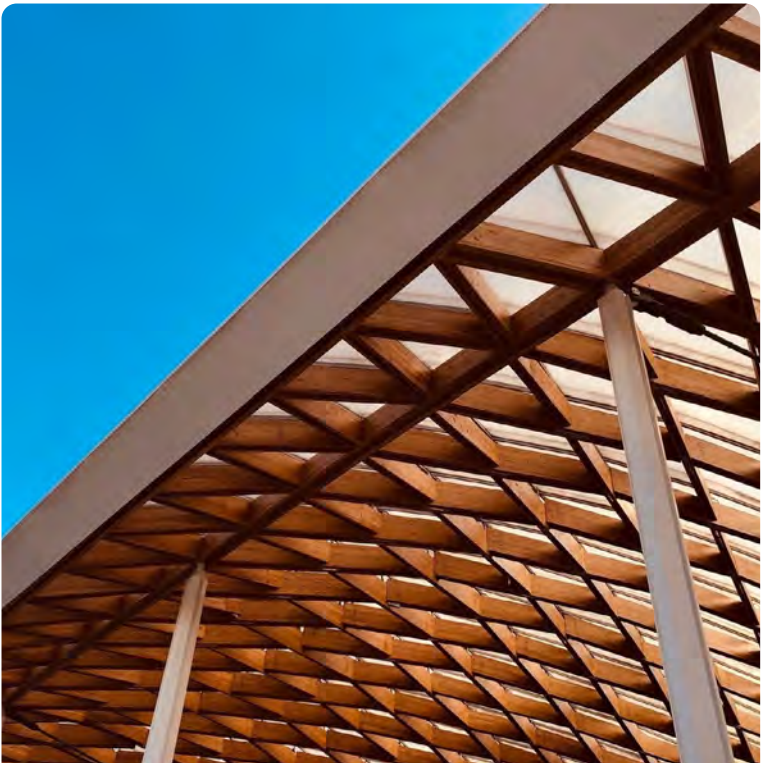
Calculation protocol Paris Proof *materiaalgebonden emissies* (Paris Proof embodied carbon, only available in Dutch)

1.3 - Construction stored carbon

S I B

To combat climate change, CO_2 absorption from the atmosphere is crucial. The concept of construction stored carbon refers to the amount of CO_2 absorbed by biobased materials during their growth, effectively storing it in the building throughout its lifetime.

Summary	
Principle	Design and construct with the highest possible construction stored carbon
Category	Indicative
Measurement/Assessment method	*Carbon sequestration bio-based building materials assessment method*
Unit	metric tonne CO_2-eq



Rationale

CO_2 storage is extremely important to prevent the aggravation of the climate crisis, and the long-term storage of CO_2 in buildings through the use of bio-based building materials (such as wood and fiber crops) contributes to this objective. In the short term, construction stored carbon is a way to offset remaining emissions; in the longer run, it is a way to remove net CO_2 from the atmosphere.

Explanation

1. Calculating the degree of construction stored carbon in buildings is relatively new. The measurement and assessment methods for this are still evolving.

Explanation from an international perspective

The concept of valuing CO_2 captured in biobased building materials is currently still experimental and emerging. Large amounts of CO_2 can potentially be captured and this can also be valued financially, making building with biobased materials more attractive. A point of attention is not to use more biobased materials than strictly necessary. It is always better to to avoid using materials where they are not needed.

In the Netherlands, the national government is currently committed to increasing the use of locally produced biobased building materials, such as fiber crops that can be used as insulation materials.

Link

Bepalingsmethode koolstofvastlegging biobased bouwmaterialen (Assessment method for carbon sequestration of bio-based building materials, only in Dutch)

1.4 - Origin of materials

S I B

The choice of materials is an important part of circular construction. The application of reused parts or recycled (secondary) materials avoids the use of virgin materials. Also, the use of biobased materials replaces the need for non-biobased materials. Responsibly sourced materials therefore originate from reused or recycled sources, or are made from biobased materials.

Summary	
Principle	Design and construct using materials sourced responsibly, prioritizing biobased, reused, or recycled materials wherever feasible.
Category	Standard
Measurement/Assessment method	CB '23 Guideline on measuring circularity, version 3.0
Unit	% mass of biobased, reused, recycled

Rationale

The indicator origin of materials contributes to decreasing the environmental impact by using materials with a circular origin. The origin of materials is expressed as a mass percentage, distinguishing between:

- **Biobased:** the term biobased exclusively covers biotic material, namely material of natural, non-fossil and non-geological origin. The methodology for determining the biobased content in materials and products is defined in the standards EN-16575, EN-16785 and EN-16640;
- **Re-used:** material that is part of a composite building component, product or element that is re-used as a whole for the same function after a previous use;
- **Recycled:** material that has undergone a recycling process after use and is reapplied in a building component, product or element;
- **New:** material produced from primary raw materials.

The indicator origin of materials is the sum of the percentages of reused, recycled, and biobased materials. For materials that are not fully biobased, only the biobased content is counted. The origin of materials is part of a Life Cycle Assessment (LCA). Also, it is reflected in, among others, the EllenMacArthur Foundation's *Material Circularity Indicator* (MCI).

Explanation

1. Within HNN, the indicator is expressed as a percentage in mass (kg). In doing so, the indicator is in line with CB'23 and the European Level(s) framework, which is also the basis for the European Taxonomy for Sustainable Investment. In practice, calculating the indicator differs between different types of materials:
    - Recycled and reused materials and products tend to be easy to express in mass, as these flows vary in material composition and are collectively expressed in mass;
    - Biobased materials are often a mono-flow (one material), so volume and mass are relatively easy converted into each other.

Explanation from an international perspective

Managing the origin of materials in buildings is a widely supported concept. As described above, this is part of the Life Cycle Assessment (LCA), the Material Circularity Indicator (MCI) and the Level(s) framework. In HNN, this is expressed as a single percentage, which includes reuse, recycling and biobased materials. This gives designers and builders the space to apply different forms of circularity in a building.

1.5 - Healthy materials

S I B

In a circular economy, resources are (re-)used infinitely. To ensure that materials and substances can be safely recycled and reused, the proportion of healthy materials is important. These are materials that have been proven not to contain toxic substances.

Summary	
Principle	Design and construct with as many healthy materials as possible
Category	Conceptual
Measurement/Assessment method	Number of products with certificates based on various methods
Unit	Number of products

Rationale

Healthy materials are defined as 'materials without toxic substances or where the share of toxic substances does not exceed harmful limits'. Toxicity is defined as 'the extent to which a substance or a given environment can be harmful to humans, animals and plants'.

A distinction is made between human and ecological toxicity:

- **Human toxicity** is the ability of a substance or product to be harmful to human health. The degree of human toxicity depends on several factors, including dose, duration of exposure, mode of exposure and individual sensitivity;
- **Ecological toxicity** is the ability of a substance or product to damage the environment. Ecological toxicity also depends on several factors, e.g. the substances' (bio)degradeability, the degree of diffusion into the surrounding environment, the effects on various organisms, and the long-term ecological impact.

Both forms of toxicity are often interrelated and influence each other as a result. Determining whether a product contains toxic substances requires an understanding of its chemical composition. There are several product passports that provide this information, such as the *Product Circularity Data Sheet* (PCDS), *Material Safety Data Sheets* (MSDS), LCAs, and EPDs.

Explanation

1. The extent to which healthy materials are used is still difficult to express with precision.. However, the field is rapidly developing. With HNN, we aim to include an appropriate practical calculation method in the future;
2. In the absence of a suitable calculation methodology, we create insights based on certificates for human and ecological toxicity, such as the Material Health Certificate (based on the Cradle2Cradle concept), Natureplus, the Declare certification, ECOLOGO and the M1 certification (Finnish);
3. Different lists describe toxic effects on the environmental and human health at raw material level: Restricted Substances C2C, Living Building Challenge's Red, REACH, LEVELs, RoHS, SVHC, EPA toxics. As none of these lists is complete, we choose to not exclude specific materials or raw materials based on these lists within HNN;
4. There are national and international labels for VOC-emission-free products, such as Indoor Air Comfort Gold/Eurofins (European), AgBB scheme (German) and Greenguard certification (US). In the project evaluations, we draw insights from these.

Explanation from an international perspective

The concept of using healthy materials, thereby avoiding toxic substances, has garnered attention both at the European level, within national frameworks across different countries, and through various assessment and certification systems. At the European level, it is integrated into the Level(s) framework. Concurrently, it is evident that this subject necessitates additional research, which is why the indicator has been classified as conceptual (B) in HNN. Further development in the years ahead is to be expected.

Link

Circular buildings: *Verkenning Schone en smet(te) lose materiaalstromen* (exploration of clean and taint-free material flows, only in Dutch)

1.6 - Residual materials from construction

S I B

The construction of buildings generates residual material. On building sites, this is often split between rubble and other waste. Upon separation, these materials are often down-cycled, for instance as foundations for newly constructed roads. This indicator shows the measures taken to prevent the creation of residual material during construction and the extent to which residual material is prepared for reuse.

Summary	
Principle	Design and construct with as little residual materials from construction as possible
Category	Conceptual
Measurement/Assessment method	Qualitative insights
Unit	*Not applicable*

Rationale

Prevention is better than cure when it comes to residual materials. However, what is prevented before it is generated is not visible. Neither on the construction site, nor in the calculation methods - and therefore not in the data either. For this reason, this indicator lacks measurements, assessment methods, and performance levels.

HNN focuses on the prevention of residual materials by promoting this aspect early on in the process. Both in design and material choices as well as in the efficient procurement and use of materials and products.

When such preventive measures are taken, HNN conforms to *BREEAM-NL Nieuwbouw* (New construction) 2020 v1.0. This means promoting resource efficiency through effective waste management and stimulating recycling and reuse on the construction site.

Examples from *BREEAM-NL Nieuwbouw* 2020 v1.0 are:

- Formulating **targets and measures** for reducing the amount of residual material (indicated in tons and/or m^3);
- Interim **monitoring of the amount of residual material** released, combined with an evaluation of the measures taken to optimise the effective use of materials;
- Setting up an **environmental waste disposal line** at the construction site for at least 5 to 7 main categories of materials to be destined for reuse or recycling.

Explanation

Documenting the amount of residual material during construction is difficult. We therefore (for now) only ask for evidence of re-use based on agreements made with the contractor or other parties. Here, the criterion is whether there is a destination for the material to be reused.

Explanation from an international perspective

The concept of dealing with residual material during the construction phase is receiving attention in many places, for example at the European level under the Level(s) framework. At the same time, here as well further research on this topic, its practical implementation and on the focus on 'prevention rather than cure' is needed. This is why the indicator has also been classified as conceptual (B) in HNN.

Link

BREEAM-NL Nieuwbouw 2020 (BREEAM-NL New construction, only in Dutch)

1.7 - Adaptability

S I B

The adaptability defines a building's ability to adapt to future needs and change in functions. It involves the strategic design of buildings and analysis and valuation of the existing inventory. The aim is for buildings to respond easily to changes in functional requirements, both within their original use and for possible future repurposing. The potential lifespan of a building is thereby extended.

Summary	
Principle	Design and construct with the highest possible degree of adaptability
Category	Indicative
Measurement/Assessment method	Adaptive Capacity Buildings Methods (version 2.0)
Unit	%

Rationale

Adaptability focuses on a building's ability to respond flexibly to new demands. This capacity of a building is determined by two dynamics:

- **Usage dynamics:** this involves changing requirements within the current function of use;
- **Repurposing dynamics:** this involves the requirements for a building to accommodate other designated (future) use functions as well.

The adaptability indicator is expressed as a total score of these two sets of dynamics.

Explanation

1. We use the calculation method *Methode Adaptief Vermogen Gebouwen* (Buildings Adaptability Method). This method applies to non-residential and multi-storey residential buildings;

Explanation from an international perspective

The concept of adaptability in buildings has been studied from a scientific point of view in the Netherlands, especially for office buildings. This has recently been expanded to multi-level housing construction and has been made suitable for practical application, resulting in the current Buildings Adaptability Method.

The concept of adaptability for buildings is applied in an international context as well. For instance, the degree of adaptability is part of the European Level(s) framework for sustainable buildings where it is captured in Indicator 2.3 (level 2) Design for Adaptability and renovation.

Link

Methode Adaptief Vermogen Gebouwen
(Buildings Adaptability Method, only in Dutch)

1.8 - Disassembly potential

The disassembly potential of components is important for the interim adaptation of a building to simplify maintenance and to enable future reuse. Steering on disassembly is therefore an important part of HNN.

Summary	
Principle	Design and construct with the highest possible disassembly potential
Category	Standard
Measurement/Assessment method	*Circular Buildings - a measurement method for disassembly potential v2.0*
Unit	%

Rationale

The disassembly potential of a building is the extent to which objects are demountable at all possible building levels, without compromising the function of the object (or surrounding objects) in order to protect the existing value. The potential to disassemble is a precondition for making circular construction possible: after all, an object that cannot be disassembled cannot be harvested and thus cannot be reused (in a high-quality manner).

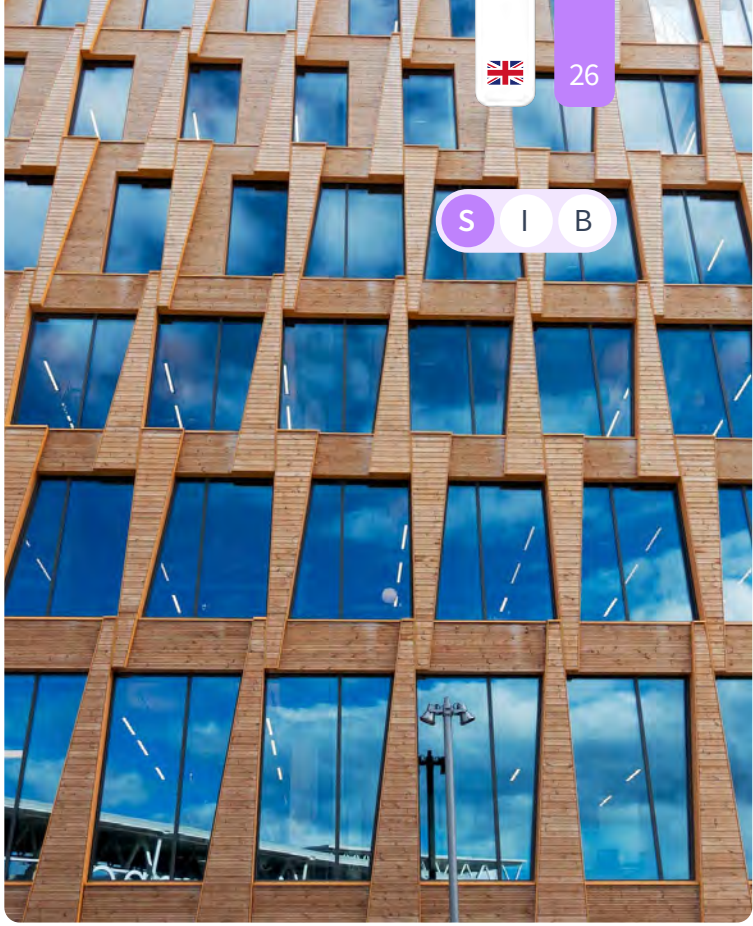
The measurement method for the disassembly index is detailed in the report Circular buildings: *Een meetmethodiek voor losmaakbaarheid* v2.0 (A measurement method for disassembly potential). The disassembly index of each product is calculated by assessing the disassembly factors 'Connection type', 'Connection accessibility', 'Geometry of product edge' and 'Intersections'.

The disassembly index illustrates how easy a product or element is to disassemble, with the lowest score being 0.10 (not possible to disassemble) and the highest score being 1.00 (very easy to disassemble).

Explanation

1. Disassembly potential at the building level is a weighted average (based on the environmental impact in MPG of the building layers) of the disassembly potential of different building layers. Therefore, it is important to focus on disassembly per building layer;

2. The disassembly index version 2.0 is based on on Elma Durmisevic's research on Transformable Building Structures (2006). The original method has been simplified to focus on the most relevant factors for a building's disassembly potential.



Explanation from an international perspective

In the Netherlands, Elma Durmisevic's research on design for disassembly has been developed into a method that has been devised from these scientific insights and adapted for practical application. The concept of design for disassembly is closely related to the concept of reuse potential. These concepts are combined in the Level(s) framework. In HNN, these concepts are captured in separate indicators.

Link

Een meetmethodiek voor losmaakbaarheid v2.0 (A measurement method for disassembly potential, only in Dutch)

1.9 - Re-use potential

The reuse and recycling of products and materials is essential in a circular economy. Therefore, high-quality reuse should be possible when buildings reach the end of their lifespan. This is the only way to achieve future construction with minimal environmental impact.

Summary	
Principle	Design and construct with the highest possible reuse potential
Category	Indicative
Measurement/Assessment method	End-of-life scenarios (EPD, phase C3 - C4)
Unit	% mass recycling, reuse

Rationale

The reuse potential reflects the end-of-life scenario of products as a mass percentage. The end-of-life scenario is expressed in:

- **Reuse:** material for which the reuse of the building components, products or elements is the most realistic scenario.
- **Recycle:** material for which recycling is the most realistic scenario.
- **Incineration:** material for which processing in an incinerator for energy recovery is the most realistic scenario.
- **Landfill:** material for which disposal to landfill is the most realistic scenario.

The reuse potential indicator in HNN is the sum of the mass percentage with a reuse and recycling scenario.

Explanation

1. The reuse potential is calculated using default values for the end-of-life scenario as determined in Life Cycle Assessment (LCA) and declared in Environmental Product Declarations (EPDs);

2. It is impossible to determine the actual end-of-life scenario for individual building products and materials in buildings. This is beyond the direct influence of the designing and constructing party; after all, it is not possible to say with certainty what will happen decades from now and what (new) technologies will be used then. This value therefore remains an approximation.

Explanation from an international perspective

The concept of reuse potential is applied widely and intenationally and is par and is part of EPDs that are determined in accordance with the LCA methodology. At the same time, reuse potential remains based on the current handling of residual materials and it is challenging to predict exactly how these materials will be handled in the future.

The concept of reuse potential is strongly related to the concept of design for disassembly. These concepts are combined in the Level(s) framework. In HNN, these concepts are captured in separate indicators.

Het Nieuwe Normaal

The New Normal (HNN, *Het Nieuwe Normaal*) is a new, widely supported standard in the Netherlands with feasible and ambitious performance levels for circular construction.

www.**hetnieuwenormaal**.nl