FRAMEWORK FOR CIRCULAR EXISTING BUILDINGS

CIRCULAR INDICATORS FOR BREEAM(-NL) IN-USE

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CONTENTS

1. INTRODUCTION

In our current economy, we consume mostly non-renewable energy sources and materials. The linear way we mine, consume and dispose of materials has devastating effects on our climate and environment. That must not be allowed to continue. Global warming, scarcity of resources, ocean acidification and disruption of ecosystems are just a few consequences of our current behaviour. Consequences that increasingly threaten our economy as well.

The built environment plays a key role

The built environment plays a key role in reducing negative environmental impact. There are significant gains to be made in this sector. After all, it is the place where energy transition and the circular economy meet. The construction industry accounts for about 50% of total raw material consumption. In addition, the built environment is responsible for 40% of CO_2 emissions and 36% of energy consumption. Making an impact by designing and building in a circular and climate-neutral way is therefore crucial. Therefore, it is important for the construction industry to take responsibility and work towards a circular construction economy, where the buildings of today are the raw materials of tomorrow.

Towards a circular construction economy

The road to a circular construction economy has begun, with targets and milestones for 2030 and 2050. Now is the time to concretize these goals, make them measurable and increasingly apply them in practice, integrate and implement them in policy, public and private. In 2018, the Framework for Circular Buildings sought to contribute to this, setting a framework for a circular building, and providing tools to make it measurable - linked to the BREEAM New Construction system.

Broadening the focus from new construction to existing construction

Circularity in construction is now typically easily measurable for new construction, but what about in existing construction? 80% of the buildings that are now there will still be there in 2050. How can that 80% be managed and used in a circular way? And for existing construction, what should be prioritized now? The goal is to pursue circular use and management of an existing building. This report addresses the need of many parties to concretize circularity (and a circular building) for existing construction as well.

This framework is a continuation of the first framework, with a more in-depth look at existing construction. Therefore, the link is now made with BREEAM(-NL) In-Use, rather than BREEAM(-NL) New Construction.

2. OBJECTIVES

In 2018, the Dutch Green Building Council (DGBC) published the 'Framework for Circular Buildings'. The objective of this framework was to create a definition of a circular building (New Construction) and to develop indicators for possible inclusion in BREEAM(-NL) New Construction and Renovation.

We are now noticing the same need to develop a framework and indicators for existing buildings: for building performance, management and use. Buildings continuously consume resources, such as energy, materials and water, but also have the function of contributing to the well-being of people and to the biosphere.

This almost automatically raises the question: can the degree of circularity of an existing building be measured? And is that possible with BREEAM? To answer these questions, how an existing circular building is defined and which indicators exist to measure a building for circularity must be clear. You can then juxtapose these findings with the existing sustainability guideline BREEAM(-NL) In-Use to discover where it can be improved. This framework has two objectives:

1. Developing a framework for a circular existing building

The first objective is to develop a broad framework for the circular management and use of existing buildings. Therefore, this framework is not only applicable to BREEAM, but also to building owners, policy makers and consultants, who can use it to get a focused picture of circularity for existing construction. The framework is also intended as an inspirational document for the development of circular strategies in other projects and programs to make the existing built environment circular. To achieve this objective, the following approach was taken:

- To define circular use and management of an existing building.
- To identify different circular principles and circular (sub)strategies
- To gain inspiration from existing guidelines, standards and new developments

2. Proposing circular strategies and indicators to be included in BREEAM(-NL) In-Use

The second objective is to develop strategies and indicators that can be included in BREEAM In-Use International, and then also to adopt them in the Dutch versions of these guidelines. This framework is also of assistance to the BRE in terms of translating the Dutch expertise on the circular (building) economy into the international BREEAM In-Use standard. BREEAM In-Use consists of three parts: for Part 1 (Asset performance) and Part 2 (Management performance) the international 2020 version is followed, for Part 3 (Occupier management) a specific Dutch revision has been issued.
To achieve this objective, the following approach was taken:

- Based on the circular strategies, developing attention points for the three parts (Asset performance, Management performance and Occupier management) of BREEAM(-NL) In-Use.
- Conducting a gap analysis between the BREEAM(-NL) In-Use Non-residential Construction (Commercial) guidelines and the elaborated attention points, to investigate which circular indicators fully, partially, or do not overlap with existing indicators in BREEAM(-NL) In-Use.
- Prioritizing circular sub-strategies and developing them into supplements to the existing indicators in BREEAM(-NL) In-Use.
- Identifying which indicators are key in determining the circularity of an existing building and developing these indicators into draft BREEAM credits for Part 3 occupier management, and into points for improvement for Parts 1 + 2 (Asset and Management performance).

3. EXISTING BUILDINGS STRATEGY FRAMEWORK

This chapter aims to work toward a framework for the circular management and use of existing buildings. First, we will introduce the definitions of the circular economy, circular new construction and circular existing construction. We then introduce the circular framework for existing buildings. We will explain this in detail, including the application of the different strategies to achieve maximum circularity in an existing building.

3.1. Definitions

The circular economy

The concept of a circular economy arose in response to the negative effects of our current linear economy.

The linear economy is based on exponential economic growth according to the 'take, make and dispose' principle: raw material resources are depleted to make products, then after use these products are largely dumped or burned as unusable waste.

In a circular economy, we avoid using new raw materials and design products so that they can be completely dismantled after the use phase. In addition, we must be able to reuse products, components and materials to a high degree, so that no material is lost. The value of raw materials is optimized for both the Earth and humanity, with the goal of producing and consuming within the limits of our planet. This requires a totally different approach and design of our economy.

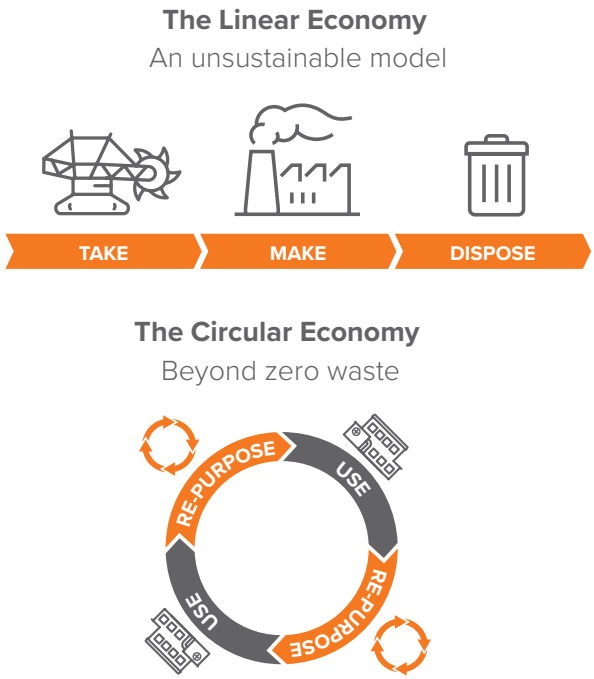

Figure 1: Linear vs. Circular Economy

The definition of the circular economy from the Ellen MacArthur Foundation knowledge platform is:
'A circular economy is one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles. This new economic model seeks to ultimately decouple global economic development from finite resource consumption.'

Raw materials can be divided into biological nutrients (such as wood, food crops and other organic material) and technical nutrients (such as minerals, metals and fossil fuels). Biological nutrients are also called renewable resources because you can apply them inexhaustibly within human time scales and because they are also biodegradable.

Technical nutrients do not have these properties and therefore we consider them non-renewable. By keeping biological and technical nutrients in separate cycles, you can ensure the biodegradability of biological nutrients and the optimal reusability of technical nutrients.

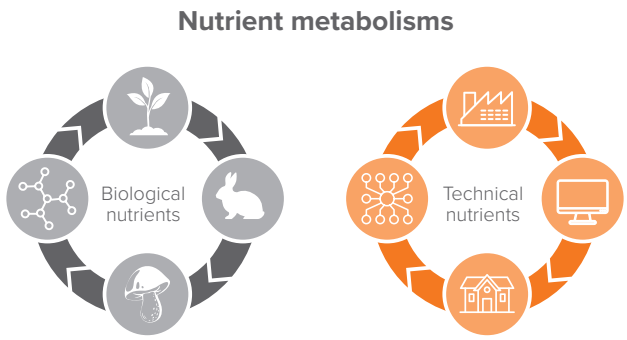

Figure 2: Biological and technical materials and nutrients

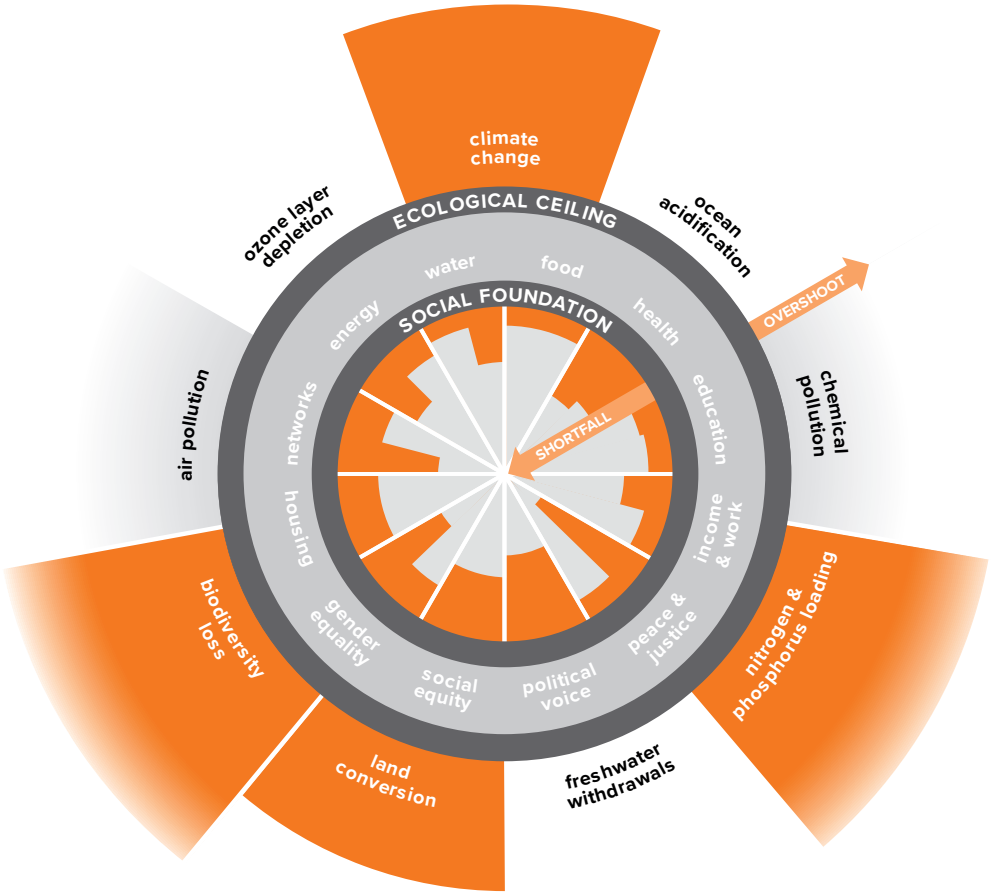

Figure 3: Doughnut Economics model

A now widely-used addition to the definition of a circular economy comes from Kate Raworth's (2017) Doughnut Economics model, which defines an ecological "upper boundary" (the planetary boundaries) and a social "lower boundary" (the social foundation) for the economy. By this addition, we define the goal of the circular economy as 'realizing the needs of everyone within the carrying capacity of our planet.

Definition of a circular building

The Framework for Circular Buildings and Circular Indicators for BREEAM (2018), based on the definitions of the Ellen MacArthur Foundation and the Circular Building Economy Transition Agenda, arrives at the following definition of a circular building:

'A building that is developed, used and reused without unnecessary resource depletion, environmental pollution and ecosystem degradation. It is constructed in an economically responsible way and contributes to the well-being of people and the biosphere. Here and there, now and later. Technical elements are detachable and reusable, and biological elements can also be brought back into the biological cycle.'

We preserve the value of buildings and building components by optimizing their use and reuse cycles. The definition emphasizes the importance of both technical and biological cycles and takes into account human needs and a healthy biosphere.

Planetary boundaries

The concept of planetary limits is based on the idea that the planet is not inexhaustible, but is definitely limited when the environment is stressed. The concept of planetary boundaries was proposed by researchers at the Stockholm Resilience Centre in Sweden and later integrated Kate Raworth's Doughnut Economics model. It serves as a framework for better overall management of the planet and the resources it provides to make human existence possible.

The boundary or limit can be described as a tipping point or threshold: The value at which a very small increase in a given variable (e.g., a small increase in CO_2 concentration) causes a larger, potentially irreversible, catastrophic change in the "response variable" (e.g., global warming).

The boundary defines the point at which the planet cannot eliminate the change unnoticed, without undergoing massive change. There are nine measurable planetary limits within which humanity and its progeny can continue to develop:

- Climate change (the human caused emissions of greenhouse gasses, in CO_2 in parts per million)
- Biodiversity loss (number of species per million per year)
- Nitrogen and phosphorus loading (nitrogen drawn from the atmosphere, and phosphorus going into the oceans, in million tons per year)
- Ocean acidification (measured by the saturation level of calcium carbonate)
- Land conversion (percentage of land area converted to cropland)
- Freshwater withdrawals (water scarcity by human consumption, in cubic kilometres per year)
- Ozone layer depletion (ozone concentration in the stratosphere)
- Air pollution (the emissions of aerosols, in patricle concrentration)
- Chemical pollution (concentration of toxic substances, plastics, endocrine disruptors, heavy metals and radioactive substances)

Today, we are at a safe level in only five of the nine processes. For the others, the line has already been crossed. The goal is to return to safe boundaries for all processes.

Definition of the circular use of an existing building
Derived from the definition of a circular building and enriched with the elements of management, maintenance and use, we arrived at the following definition of the circular use of an existing building:

> ***'A building that is managed, maintained and used without resource depletion, environmental pollution and ecosystem degradation that exceeds planetary limits. In this way, the building creates optimal value for its stakeholders and contributes to the well-being and health of people and animals and the strengthening of ecosystems.***
> ***During interventions in the use phase, it is made possible that during dismantling, at the end of (an extended) life span, technical elements are dismantled and reused to the highest possible quality, and biological elements can also be returned to their biological cycle.'***

With this definition, we aim to maximize the circular use of an existing building. The building itself is therefore not necessarily also circular, but its use must contribute to this.

3.2. Circular framework for existing buildings

Building on the *Framework for Circular Buildings and Circular Indicators for BREEAM* (2018) and based on the model used therein, the framework for circular existing buildings (see Figure 4) consists of **seven main themes**.

These are divided into **four physical flows** (material, energy, water, mobility) and **three types of values** (ecosystems & biodiversity, health & well-being, culture & society). The framework is designed to assess and monitor the performance of the management, maintenance and use of an existing building in all relevant aspects.

A dichotomy of flows and values was chosen. In doing so, the proper use of physical flows secures two crucial values: 1) That we stay within the ecological "upper boundary" (the planetary boundaries) and 2) That we respect the social "lower boundary" (the social foundation).

The flows and values each have their own approaches and methods. The themes that are among the flows are concretely, tangibly and objectively measurable. They literally flow to, through and from the building. The themes that represent value are sometimes abstractly, elusively and subjectively measurable. They often have less of a physical manifestation. Both types of themes therefore have their own strategies that you can measure through a certification, such as BREEAM(-NL) In-Use. The framework is designed to systematically review, assess and address each issue. This is how you can achieve the highest possible level of circularity for existing buildings. The flows and values respectively have five and four strategies with sequential use.

Building- and use-related activities

In and around the building, we distinguish building-related and use-related activities that influence whether the building is circular or not. The 'circular' challenges for these two types of activities are often different. By making this dichotomy, you can link activities to the roles, tasks and responsibilities of the owner, manager and user more easily.
Building-related activities are all activities related to the functioning of the building: maintenance, repair, replacement, modification of building parts, components or products etc. The use-related activities are all activities that facilitate the use of the building. They are divided into primary business activities (all activities that contribute directly to the outcome for the customer) and secondary, support business activities (all activities necessary to facilitate the primary process). Within the framework, the emphasis is on building-related and support business activities.

The **five flow strategies** are:

1. **Preservation**: Maximize the useful life of existing flows and stocks as long as it is safe, responsible, and results in optimal performance.
2. **Reduce demand**: Avoid a new influx, by intensifying the use of current flows, eliminating or minimizing the need.
3. **Circular inflow**: Provide inflows that are used or renewable, have no negative impact on humans, and remain within the limits of the restorative ability of the Earth.
4. **Secure future reuse**: Ensure understanding of the flows. Only use flows that can be reused to a high degree after the use phase or returned to nature completely without negative consequences. Anticipate future trends and innovations and provide incentives for reuse.
5. **Utilize the outflow**: Ensure the optimal utilization of released flows, maximizing the value of these flows.

The **four value strategies** are:

1. **Protect**: Protect and cherish the current value, maintain it and prevent (further) deterioration.
2. **Strengthen**: Strengthen and enhance value, including by anticipating current and future needs and developments.
3. **Connect**: Connect objectives by seeking synergy, collaboration, connection and exchange from and with the environment, society and other sectors. Look for the 'one plus one equals three'.
4. **Value**: Value natural, social and cultural capital and health as part of an economic system, so that you can include them in considerations surrounding costs, benefits and investments.

The seven themes and their associated strategies are shown schematically in the framework on the next page.

Flow types in a building

A building and its business processes in the use phase cause a number of physical flows that are important from a circular point of view. These can be broadly classified into the categories:

- Inflow of materials, energy and water. Examples include catering, cleaning and office supplies, ICT and furniture for the users, building materials for maintenance and the energy and water demand for the processes in the building.
- Stocks of materials. In the form of products and structures with specific functions, such as building systems, the vehicle fleet and all items recorded as inventory in the building.
- Outflow of materials, water and heat. Consider, for example, business waste, excess rainwater, wastewater, the products supplied, and emissions from fuels.

Each of these flows has unique characteristics and thus attention points for circularity and forms the basis of the circular strategies. For example, conservation is relevant to stocks, reducing demand, making inflows sustainable, and securing future reuse pertain to inflows, and utilizing outflows is about the outflow of materials, water, and heat.

A categorization of a specific flow is not permanent, for example, a printer may be an inflow when purchased, count as stock during its use, and be discarded as an outflow after its useful life. It is important to identify which category specific physical flows fall into at the time of evaluation or monitoring in order to understand which strategies are relevant to this flow.

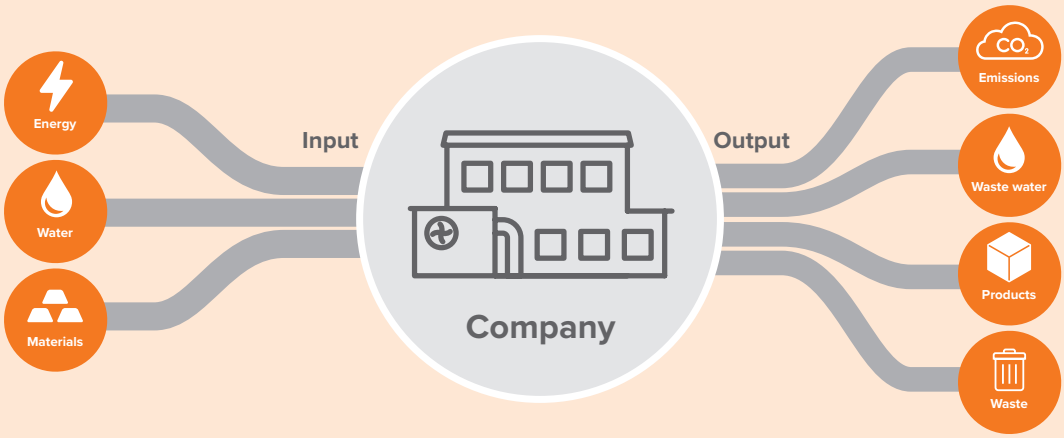

Figure 4: Framework for circular existing buildings

3.3. Sub-strategies

We further developed the themes described in the framework into sub-strategies based on the relevant strategies. They describe the intended performance of a circular building in the use phase and can be found below.

Material

Materials are applied in the economy in such a way that they can be continuously recycled in a high-quality manner. This means that they do not enter the environment in irretrievable form, or in a form that is unusable within natural systems. Material covers all products, components or materials necessary for the use of the building itself and the use-related activities.

The development of strategies for the materials theme has resulted in the following sub-strategies:

Material	Sub-strategy
Preservation	1. Preserve existing materials and products.
Reduce demand	2. Intensify use of materials and products. 3. Reject preventable material and product flows. 4. Reduce material intensity of incoming materials and products over the functional life cycle. 5. Future-proof design.
Circular inflow	6. Increase the proportion of secondary raw materials in incoming materials and products. 7. Increase the share of renewable resources in incoming materials and products. 8. Reduce dependence on critical raw materials. 9. Reduce the environmental impact of incoming materials and products or interventions. 10. Avoid negative embedded social impacts of materials and products.
Secure future reuse	11. Increase the potential value retention of incoming materials and products. 12. Provide insight into materials and products.
Utilize the outflow	13. Ensure value retention of outgoing materials and products.

Scale levels of a building

A building has different scale levels to which you can apply circular strategies and solutions.

Structure	A structure is another term for a building. It consists of a structural arrangement of elements, building products and materials and always serves a specific function.
Element	Part of a structure with a particular combination of (building) products. An element is made up of (one or more) building products.
(Building) product	An item manufactured or processed for inclusion in building products. A building product consists of (one or more) materials. Another term for building product is “Component”.
Material	Material is a natural or artificially produced substance intended to be processed into useful products. A material is thus a tangible thing, which you select on the basis of properties with a view to a particular application. The term ‘material’ is usually used only when you can still designate the processed substance into parts of the finished product. Otherwise, you are more likely referring to a raw material or ingredient So the material is an (aggregation of) raw material(s) that you want to apply specifically in a building product.
Raw material	Basic material that you use in a process to make goods, energy, (building) products or semi-finished products.

Among others in the Guides of Platform CB’23, these scale levels and terms are used.

Energy

Energy includes all energy for the use of the building itself and for all (support) activities in and around the building. Strive to use as little energy as possible, to lose no energy, and to use only energy from renewable sources.

The development of strategies for the energy theme has resulted in the following sub-strategies:

Energy	Sub-strategy
Preservation	1. Ensure optimal performance of energy systems.
Reduce demand	2. Reduce the use- and building-related energy demand. 3. Reduce the energy demand from maintenance, interventions and building inflows.
Circular inflow	4. Increase the share of renewable in the use- and building-related energy demand.
Secure future reuse	5. Balance the supply and demand of energy and heat.
Utilize the outflow	6. Reuse energy from waste flows and the environment.

Water

Water includes all the water you need to manage, maintain and use the building and for all (support) activities in and around the building. Strive to use as little water as possible, not lose water (including rainwater) and use water for the right purposes (drinking water not for a toilet, for example). Finally, if possible, ensure sustainable and efficient (local) treatment and reuse, and the recovery of raw materials/nutrients from the water.

The development of strategies for the water theme has resulted in the following sub-strategies:

Water	Sub-strategy
Preservation	1. Ensure optimal performance of water systems.
Reduce demand	2. Reduce the use- and building-related water demand. 3. Reduce the water demand from maintenance, interventions and building inflows.
Circular inflow	4. Increase the proportion of locally collected and utilized rainwater in the use- and building-related water demand.
Secure future reuse	5. Balance the supply, demand, and discharge of (rain) water.
Utilize the outflow	6. Reuse of wastewater. 7. Reuse of raw materials and nutrients from waste(water).

Mobility

With respect to the Framework for Circular Buildings and Circular Indicators for BREEAM (2018), mobility is a new theme. The theme stems from the flow of people physically to, through and from the building. Given the impact that people have on the use of the building, the government's focus on sustainable mobility, the major changes in working at the office versus at home triggered by the COVID-19 pandemic, and the fact that BREEAM has a transportation category, it was decided to give special attention to mobility. This looks at both commuting, business-related travel, and people's own travel in and around the workplace.

The development of strategies for the mobility theme has resulted in the following sub-strategies:

Mobility	Sub-strategy
Preservation	1. Secure functional work and living spaces and facilities. 2. Preservation of existing modes of transportation.
Reduce demand	3. Refuse preventable mobility movements. 4. Intensify use of transport resources. 5. Reduce resource-intensity transport movements (modal shift). 6. Reduce pressure on mobility infrastructure.
Circular inflow	7. Sustainable raw materials and fuels for transport movements.
Secure future reuse	8. Increase the potential value retention of means of transport.
Utilize the outflow	9. Value preservation of outgoing modes of transportation.

Biodiversity & ecosystems

Biodiversity conservation is one of the highest goals within a circular economy. We cannot live without functioning ecosystems: we depend on them for oxygen, water, food, energy and raw materials. Human survival requires these ecosystems to be unaffected by our activities. Ecological diversity is the source of resilience on Earth and should therefore be preserved and promoted.

This theme covers both the direct impact of (the use of) the building on the surrounding ecosystems and biodiversity, and the indirect impact on ecosystems worldwide of all materials and products used and consumed during the use and maintenance of the building.

Biodiv./Ecosyst	Sub-strategy
Protect	1. Reduce the loss of biodiversity from use- and building-related activities to within planetary limits. 2. Reduce greenhouse gas emissions (embedded CO_2) from use- and building-related activities to within planetary limits. 3. Reduce nitrogen and phosphate emissions from use- and building-related activities to within planetary limits. 4. Reduce the ozone-depleting emissions from use- and building-related activities to within planetary limits. 5. Reduce the chemical emissions from use- and building-related activities to within planetary limits. 6. Reduce the aerosol-causing emissions from use- and building-related activities to within planetary limits. 7. Reduce the freshwater extraction from use- and building-related activities to within planetary limits. 8. Reduce change in land use from use- and building-related activities to within planetary limits.
Strengthen	9. Strengthen local habitats, biodiversity and ecosystems.
Connect	10. Connect habitat elements to native and migrating species.
Value	11. Value the added value of ecosystem services.

Biodiversity or ecosystem?

Biodiversity or biological diversity is a degree of variety of life forms within a given ecosystem, geographic area, or the entire planet. An ecosystem is not only the society of organisms (plants, animals and microorganisms) within a given habitat, but also the exchange of matter and energy among the organisms and between life and its environment: soil, water and air.
Thus, an efficient and high-quality ecosystem is necessary to achieve high biodiversity.

Health & well-being

The health and well-being of humans and other species are structurally supported by the activities during the use phase of the building. In a circular economy, economic activities pose no threat to health or well-being. In the transition phase towards a circular economy, toxic, harmful and hazardous substances are phased out or minimized and stored in highly-controlled cycles. Avoiding the use and reuse of toxic and polluting materials are important aspects that impact the health of the users, as well as the comfort, well-being and experience of the place.

The development of strategies for the health & well-being theme has resulted in the following sub-strategies:

Health/Well-being	Sub-strategy
Protect	1. Avoid the use of toxic materials. 2. Prevent toxic emissions and nuisance from use- and building-related activities.
Strengthen	3. Reinforce a healthy indoor environment and pleasant experience for users.
Connect	4. Provide access to rest, recreation and exercise. 5. Provide access to healthy food.
Value	6. Value the added value of health and well-being.

Culture & society

Culture and social cohesion are important values in the built environment. Buildings can help foster that culture and its diversity. You must take these values into account in the construction phase, in the procurement and delivery of materials, and in the use phase. A good building strengthens social and societal values and provides space for meeting and encourages self-organization by users.

The development of strategies for the culture & society theme has resulted in the following sub-strategies:

Culture&Society	Sub-strategy
Protect	1. Protect unique cultural and architectural elements and aesthetics.
Strengthen	2. Strengthen the co-determination and participation of relevant stakeholders. 3. Strengthen the adaptive capacity of building users and managers.
Connect	4. Facilitate social cohesion and collective facilities. 5. Ensure the accessibility and inclusiveness of the functions offered by the building.
Value	6. Value added social and societal value. 7. Value added cultural and historical value. 8. Value local knowledge and skills and contribute to the local economy.

4. ELABORATION, GAP ANALYSIS AND PRIORITIZATION

4.1. Elaboration by Asset, Management and Occupier

The sub-strategies have been developed into attention points, and specified for the different parts of BREEAM In-Use (Asset, Management and Occupier). In this process of elaborating circular strategies, sometimes duplications occurred, because for Asset a different interpretation was assumed than for Management. The latest international version of BREEAM In-Use Commercial (V6) for Asset and Management has actually minimized the number of credits, to create less overlap between the two parts. Annex III concerns the overview of the attention points.

4.2. Gap analysis

Based on the attention points and the strategic framework described in the previous section, a gap analysis was performed for the international guidelines of BREEAM In-Use Commercial v6.0.0. Figure 5 shows which strategies partially or completely overlap with this standard and which do not. The analysis carried out at the level of the attention point is set out in Annex III. The outcomes of the gap analysis are:

- The Energy and Water impact streams are thoroughly covered by BREEAM In-Use (dark orange in Figure 5).
- The Materials and Mobility flows and the Health and Ecosystems values are partially covered by the current indicators in BREEAM (mid orange). While there is room for improvement of the current indicators and opportunities for adding new indicators, the analysis shows that many sub-strategies are (partially) covered by the current guideline.
- The sub-strategies from the Culture and Society value are covered to a lesser extent in BREEAM In-Use (light orange).

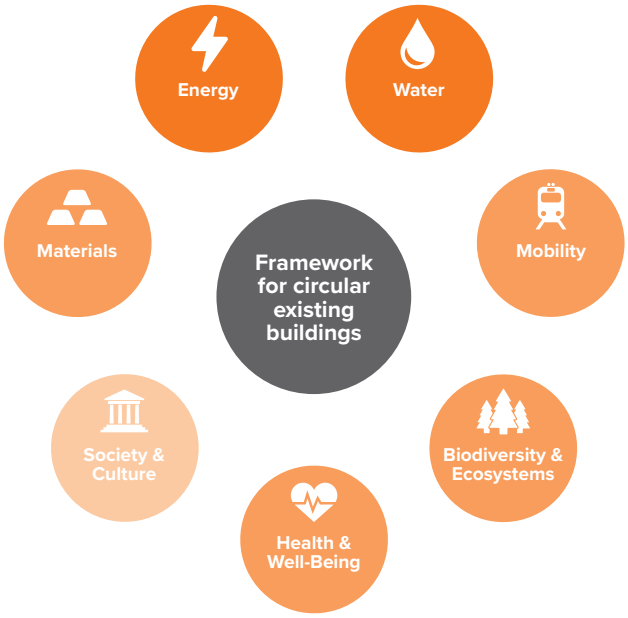

Figure 5: gap analysis

Asset, Management and Occupier

BREEAM-NL In-Use consists of three parts:

Part 1 Asset Performance

Assessment of the inherent properties of the building based on its geometry, structure, installations, fixtures and finishes (Part 1 Asset performance in BREEAM In-Use International).

Part 2 Management Performance

Assessment of the management, policies, procedures and practices for the operation of the building, consumption of key resources, such as water and other resources, and environmental impact, such as CO_2. (Part 2 Management performance in BREEAM In-Use International).

Part 3 Occupier Management

Assessment of understanding and implementation of policies, procedures and practices; staffing and delivery of key user output data (Part 3 Occupier Management in BREEAM In-Use International).

Part 1 Asset Performance and Part 2 Management Performance are updated from 'International in version 6.0.0' and made applicable to the Dutch market. Part 3 Occupier Management is developed by DGBC, and is applicable for users of Offices, Retail, Museums. The revision of BREEAM-NL In-Use BREEAM(-NL) In-Use Non-residential Construction aims to broaden this scope (for example, for education, industry, lodging, etc.).

The parts are not divided by responsible organization. Asset Performance and Management Performance and Occupier Management can only be sustainable with good cooperation between the owner, manager and occupier. This is reflected in the criteria of the different parts.

4.3. Prioritization of sub-strategies

To supplement the gap analysis, the experts prioritized the sub-strategies to determine which essential sub-strategies you should follow as a minimum when using an existing building in a circular manner. In Figure 6, the designated strategies are prioritized based on detailed prioritization by sub-strategy. It can be found in Annex III: Sub-strategies elaboration.

Impact as a basis of prioritization of sub-strategies

The experts prioritized the sub-strategies by looking at their contribution to a circular existing building. For this purpose, the definition of a circular existing building is first outlined in twelve focus areas that are mentioned or implied in this definition. These range from 'preventing the depletion of primary materials' to 'ensuring human well-being and health and strengthening ecosystems'. These focus areas were then ranked according to their importance within the definition, with this importance expressed as a percentage of the whole.

Then, on a scale from 0 to 3, the extent to which each sub-strategy contributes to the achievement of the twelve attention points from the definition was indicated. Where 0 stands for no contribution, 1 for a relevant contribution, 2 for a significant contribution and 3 for a similarity in sub-strategy and the attention point from the definition. Several sources on material flows and the impacts of buildings were consulted for this score. By weighting this score according to the importance of the concerns they contribute to, a weighted total score was calculated. This shows the contribution of each sub-strategy to achieving the definition.

Figure 6: Framework strategies scores

5. ANALYSIS AND POSSIBLE ADDITIONS

Based on the prioritization of the circular strategies and by performing a gap analysis, we made a selection of sub-strategies that we further developed as additions to the BREEAM In-Use guidelines.

5.1. Asset Performance and Management Performance (Parts 1 and 2)

For Asset Performance and Management Performance, we specifically looked at what has already been elaborated in the new international v6. This new version already contains circular strategies that have also been identified by the experts. The table below gives an overview of the observations of indicators already in BREEAM ('SUPPLEMENT') and of the new indicators that can be added ('NEW'). Annex II contains the further analysis and observations of the indicators.

Flow/value	Part	Title credit	Object
1. Materials	Management	Circular MMP	Drawing up a circular MMP (multi-year maintenance plan). *(SUPPLEMENTARY)*
2. Materials	Management	Circular procurement policies	Appreciate and encourage procurement policies that promote the sourcing of circular materials and products. *(SUPPLEMENTARY)*
3. Materials	Management	Circular inflow	Maximizing the circular origin of incoming (building-related) products and materials. *(NEW)*
4. Materials	Asset	Building passport	Keeping a building passport up to date. *(SUPPLEMENTARY)*
5. Materials	Asset	Detachability	Encouraging 'detachability' of the elements and products used, so that at the end of the building's life you can disassemble them more easily and reuse them in another project. *(SUPPLEMENTARY)*
6. Materials	Asset	Disassembly plan	Drawing up and/or updating a disassembly plan. Enabling effective and efficient future disassembly and disposal of the applied elements and products. So that at the end of the life of the building product or building, you can disassemble and reuse it in another project with optimal value retention and without unnecessary environmental impact (energy consumption/nuisance). *(SUPPLEMENTARY)*
7. Materials	Management	Circular business models	Increasing potential value retention of incoming materials and products by applying circular business models. *(SUPPLEMENTARY)*
8. Materials	Asset	Residual value	Understanding the financial residual value of building materials and products in a building. *(SUPPLEMENTARY)*
9. Health	Management	Toxicity	Avoidance of toxic substances in materials or toxic-containing elements and (construction) products. *(NEW)*
10. Ecosystems	Management	CO_2-driven (Whole Life Carbon) Asset Management	Reducing total greenhouse gas emissions for building-related activities by implementing CO_2-driven asset management. *(SUPPLEMENTARY)*

Table: Proposed Indicators for Part 1 Asset Performance and Part 2 Management Performance

5.2. Occupier Management (Part 3)

In response to the recommendations and gap analysis, a set of indicators was developed. These indicators are assumed to be insufficiently reflected in Part 3 Occupier Management of BREEAM-NL In-Use. We have developed proposals on how to include the indicators in a future version of Part 3 Use. Table XX shows a summary of these indicators. Annex I contains the detailed description of the indicators expressed in credits.

Flow/value	Title credit	
Materials	Circular procurement policies	Appreciate and encourage procurement policies that promote the sourcing of circular materials and products.
Materials	Circular inflow	Maximizing the circular origin of incoming products and materials.
Materials	Detachability	Encouraging product-level detachabilityfor interiors and furniture.
Materials	Circular business models	Increasing potential value retention of incoming materials and products by applying circular business models.
Materials	Preservation	Extending the life and value retention of the existing interior, furniture and relevant facility products.
Materials	Intensify	Reducing the number of square meters of building required through efficient, effective and optimal (multifunctional) use of those square meters.
Materials	Flexibility, customizability and adaptivity	The user's finishing, layout, user systems and furnishings can be adjusted in such a way that things can easily be changed, without material-intensive adjustments.
Materials	Material passport	Enable users to identify, recognize, maintain and preserve the value of products and materials applied in/as interiors, furniture and relevant facility products. With the ultimate goal of reducing the use of new raw materials and encouraging and future reuse of products and recycling of materials.
Health	Toxicity	Avoiding toxic substances in interior and furniture materials or products.
Ecosystems	Biodiversity footprint of consumer products	Taking into account biodiversity loss due to user-related activities.
Ecosystems	Greenhouse gas / CO_2-driven procurement policy	Insight into and reduction of (embedded) greenhouse gas emissions through user-related activities.

Table: Proposed Indicators for Part 3 Occupier Management

Planetary boundaries and environmental impacts (EPD/MPG)

Environmental impacts resulting from energy use and the application of building products and materials can be measured in several ways. For example, EPDs (Environmental Product Declarations) can provide insight into the environmental impacts of building products, and calculating the MPG (Dutch "Milieu Prestatie Gebouw": Environmental Performance of Buildings) is already mandatory for the new construction of homes and offices. The MPG is based on the Environmental Cost Indicator Methodology (ECI). It currently factors in the following environmental impacts:

- Climate change
- Ozone depletion
- Acidification of soil and water
- Eutrophication
- Depletion of abiotic factors
- Depletion of fossil fuels
- Human toxicity
- Freshwater ecotoxicity
- Marine ecotoxicity
- Terrestrial ecotoxicity
- Photochemical oxidant formation (smog)

Some of these environmental impacts are also part of the planetary boundaries. For example, climate change and ozone depletion correspond well in both frameworks, and you can argue the relationships between eutrophication and the boundary around biogeochemical cycles, ecotoxicity and the boundary around chemical pollution, and photochemical oxidant formation and the boundary around aerosols.

However, important boundaries around biodiversity loss, land use and water scarcity are not yet taken into account in any way in ECI methodology at the time of writing.

ECI methodology weighs environmental impacts through social shadow prices and then aggregates them into a single environmental cost indicator. This weighting is not based on the remaining budget within planetary boundaries. The aggregation into a single indicator also makes it difficult to estimate performance relative to individual planetary boundaries. This makes it difficult to estimate, for example, whether interventions to a building fit within a 1.5°C climate change scenario.
On the other hand, the remaining budget for all planetary boundaries is not yet known or whether methods are available to determine the impact of a building on all the different planetary boundaries. It is therefore important that we continue to develop indicators for the environmental impact of buildings, in order to do justice to all planetary boundaries and the budget within them in the future.
Within this framework, we have therefore chosen to explicitly include all planetary boundaries as a sub-strategy in addition to the environmental cost indicator. We have based these limits on the best available measurement method at the time of writing (e.g., the Science-Based Targets for climate change / embodied carbon). In doing so, we hope to further agenda the planetary boundaries for buildings and that appropriate measurement methods become available in the future.

5.3. Next steps

DGBC is currently working on the new version of BREEAM-NL In-Use, based on the international V6 of BREEAM-NL In-Use Commercial. To expand the BREEAM guideline to include circular indicators, we recommend the following steps to them as a follow-up to this report:

1. Assessing the extent to which you can incorporate proposed criteria (recommendations and analyses) into the new Dutch BREEAM-NL In-Use Non-residential Construction V6, for Parts 1 (Asset performance) and 2 (Management performance), taking into account International BREEAM In-Use Commercial V6.
2. Assessing the extent to which you can include the proposed additions to the new Dutch version (2016 V2.0) for Part 3 (Occupier management).
3. Discussing the report and the 'circular indicators' with the relevant technical experts of the BRE. The BRE was also included in the process in the creation of this report. They will also incorporate the recommendations and gap analysis into the new developments of BREEAM In-Use.
4. Discussing the report and the concept of 'circular indicators' with the DGBC advisory group members for In-Use.
5. Testing and improving the practical relevance of the indicators using pilot projects.

In addition to embedding in the systematics of BREEAM-NL, DGBC and others can also look more broadly at applying the knowledge and proposals gained. For some themes, we also see a knowledge gap or a requisite step from theory to practical applicability. This applies among others to:

- Applying indicators linked to planetary boundaries, and making the impact of existing buildings on planetary boundaries measurable. Now these are largely woven into LCAs and EPDs as environmental indicators.
- Avoiding toxic substances in materials, products, or elements.
- Understanding, and using, the insights of circularity and environmental indicators. The available data (in databases) to make circularity measurable and applicable will need to be increased. But also applying these criteria in business operations.

ACKNOWLEDGEMENTS

For this framework for circular existing buildings, the DGBC and the authors are very grateful to the Laudes Foundation, Bouwinvest and Schiphol for their support. They would also like to thank the members of the BREEAM-NL In-Use consultative group and user group for their valuable input in the development of this report.

Laudes Foundation

Laudes Foundation is an independent foundation joining the growing movement to accelerate the transition to a climate-positive and inclusive global economy. Responding to the dual crises of climate breakdown and inequality, Laudes supports brave action that inspires and challenges industry to harness its power for good. Part of the Brenninkmeijer family enterprise, Laudes builds on six generations of entrepreneurship and philanthropy, working collaboratively to both influence finance and capital markets and transform industry with a focus on the built environment and fashion.

www.laudesfoundation.org

Bouwinvest

Bouwinvest Real Estate Investors invests the assets of mainly pension funds and insurers in real estate. We invest for the long term and manage €13.4 billion (YE 2020) in various real estate sectors. Together, we are defining the city of the future and influencing its design. Our asset management contributes to a sustainable, liveable, accessible urban environment and to improving pension benefits. In this way we create social and financial returns. In short: we create real value for life.

www.bouwinvest.nl

Schiphol

Schiphol Airport is a unique top location that connects the Netherlands to the rest of the world and vice versa. For more than 100 years, this area has been a vibrant and dynamic hub for people and businesses. Unlike other real estate organizations, Schiphol Real Estate is not only a lessor of commercial buildings and offices, but also a dedicated area director with a long-term vision. As part of Schiphol Group, we are thus also contributing to Schiphol's broad sustainability ambitions by integrally testing our activities against the pillars of ENERGY, CIRCULARITY and HEALTH. Within the pillars, goals have been set that will allow us to make an impact as a real estate organization.

www.schiphol.nl/nl/real-estate/

DGBC

The Dutch Green Building Council (DGBC) Foundation is the national civil society organization dedicated to making the built environment future-proof at a rapid pace. We do this based on the idea that climate change is happening faster than imagined and that the urgency to become more sustainable is growing every day. Using four central themes, we develop high-impact programs in the areas of CO_2 reduction (Paris Proof), circularity, health and climate adaptation. DGBC also organizes training courses and events on current sustainability topics. And we develop and manage BREEAM-NL, the most widely used hallmark in Europe to assess and measure the sustainability performance of buildings and areas. The foundation with the status of a public benefit organization (ANBI) was established in 2008 at the initiative of the market and has almost 400 partners. DGBC is part of the World Green Building Council.

www.dgbc.nl

Alba Concepts

Alba Concepts is a young, sustainable company that focuses on three activities: consultancy, management and project development. Central to all activities is that we act where real estate, sustainability, strategy and finance meet in the early planning stages. In our issues, sustainability is not the final piece, but the basis of the approach. Alba Concepts is 100% driven and always original. Alba Concepts dares to take risks and go just over the edge. Sometimes you have to dare to look further and think out-of-the-box, to come up with that idea that no one has thought of yet. We take ideas in real estate further.

www.albaconcepts.nl

Circle Economy

As a social enterprise, we accelerate the transition to a circular economy with practical and scalable solutions. Our tools and programs are designed to support businesses and governments in making decisions and making plans.

Circle Economy and Brokkenmákers have developed the Framework in co-creation.

www.circle-economy.com

www.brokkenmakers.nl

Metabolic

Metabolic is a consulting firm and venture developer that uses systems thinking to address major sustainability challenges. Our overarching mission is to transform the economy into a fundamentally sustainable - and circular - state. At our headquarters in Amsterdam, we work with an international and interdisciplinary team, providing strategic advice and software tools with a data-driven perspective. Our approach evolves in response to the sustainability challenges we are addressing and has been recognized by governments, corporations and non-profit organizations from around the world.

www.metabolic.com

SGS Search

SGS inspects, analyses and advises the built environment. To do this, SGS uses intelligent fact-finding, offers practical and applicable advice and ensures the implementation of this advice through project management. We help organizations think and act sustainably and share our knowledge through training. We specialize in building and safety inspections, asbestos, soil and energy surveys, management of (sustainable) construction, demolition and remediation projects, sustainable organizational consulting, making products more sustainable with Life Cycle Analyses and Cradle to Cradle, as well as digital and classroom training in all our areas of expertise.

www.sgssearch.nl

Valstar Simonis

Valstar Simonis is an independent consulting and engineering firm in the fields of sustainability, circularity, comfort and safety in buildings. We advise and design the necessary technical installations from the disciplines of electrical engineering, mechanical engineering and measurement and control technology. Supplemented by expertise in fire safety, transport, management and maintenance, ICT and energy and sustainable development.

www.valstar-simonis.nl

ANNEX I: DETAILED DESCRIPTION OF CREDITS FOR BREEAM-NL IN-USE PART 3 OCCUPIER MANAGEMENT

ANNEX II: POSSIBLE ADDITIONS FOR BREEAM IN-USE PARTS 1 AND 2 ASSET PERFORMANCE AND MANAGEMENT PERFORMANCE

ANNEX III: SUB-STRATEGIES ELABORATION

ANNEX IV: FRAMEWORK FOR CIRCULAR EXISTING BUILDINGS FOR BREEAM (EXCEL ATTACHMENT/LINK)

ANNEX I

DETAILED DESCRIPTION OF CREDITS FOR BREEAM-NL IN-USE PART 3 OCCUPIER MANAGEMENT

OCCUPIER MANAGEMENT - MATERIALS
CIRCULAR PROCUREMENT POLICIES

This credit is elaborated below as a new credit, but may eventually be integrated into MAT 15 Material procurement issues.

Objective:
Appreciate and encourage procurement policies that promote the sourcing of circular materials and products.

Question

Does the organization have a sustainable procurement policy that includes requirements and incentives for the circularity of materials and products?

Credits	Answer	Selection
0	A.	There is no procurement policy in place.
-	B.	There are no circular procurement criteria included in the current procurement policy.
-	C.	At least 5 of 9 circular procurement criteria are included in current procurement policies and implemented.
-	D.	All circular procurement criteria are included in the current procurement policy and implemented.
-	E.	When procuring, one or more circular procurement criteria has received a weighting of >30% on the qualitative criteria OR if nothing has been purchased this requirement does not apply.

Criteria description

Criterion	Criteria description	Answer option
1.	The following qualitative circular procurement criteria are included in the procurement policy: a. Criteria regarding the share of renewable raw materials b. Criteria regarding the proportion of secondary materials c. Criteria regarding the proportion of reused products d. Criteria regarding the environmental performance of products and materials e. Criteria regarding the detachability of products f. Criteria regarding critical and scarce resources g. Criteria regarding toxic substances h. Criteria regarding extending the life of products i. Criteria regarding the value retention of materials after use	B-D
2.	The circular procurement policy focuses at a minimum on: a. Office supplies b. Facility procurement c. Cleaning agents d. Furniture and fixtures	B-D
3.	The circular procurement policy has been implemented in the organizational strategy and is reported on in the annual report, sustainability report, or the equivalent.	B-D
4.	The circular procurement policy is in place and in practice.	B-D

Evidence

1. A copy of the sustainable (or circular) procurement policy.
2. Documentation showing that the circular procurement policy is in place and has been put into practice. Evidence that the procurement policy is also being applied, e.g., a summary of recent purchases showing that purchasing has been taking place in accordance with the procurement policy.
3. Evidence showing that in all purchases made in the past year, one or more circular procurement criteria received a weighting of >30% in the assessment.
4. Any vendor agreements or statements demonstrating your selected response options (i.e., program of requirements).
5. Photographs of on-site inspection of applied products/materials.

Definitions

Renewable raw materials

Raw material from a source that is grown, naturally replenished or naturally cleansed on a human time scale (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Secondary materials

Material recovered from previous use or from residual flows from another product system which substitutes primary materials or other secondary materials (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Reused products

Reused building products or building components/elements in the same function, whether after processing or not (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Environmental impact

Unfavourable or favourable change in the environment fully or partly resulting from an organization's activities or products (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2 juli 2020).

Environmental performance

Performance related to environmental impacts and environmental aspects (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Detachability

Detachability is the degree to which objects are demountable at all scales without compromising the function of the object or surrounding objects. With the aim of protecting the existing value. (Source: Meetmethodiek voor Losmaakbaarheid 2.0, 2021).

Scarce materials

Available to a limited extent, based on the size of the stock of a resource, raw material or material, its extractability and security of supply if any geopolitical or social changes occur (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Critical materials

material of major economic importance and low security of supply (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Explanation

Theme and strategy: Materials, circular inflow

Sub-strategies:

1. Increase the proportion of secondary raw materials in incoming materials and products.
2. Increase the share of renewable resources in incoming materials and products.
3. Reduce dependence on critical raw materials.
4. Reduce the environmental impact of incoming materials and products or interventions.
5. Avoid negative embedded social impacts of materials and products.

References

- Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).
- DGBC, Een meetmethode voor Losmaakbaarheid 2.0, 2021

OCCUPIER MANAGEMENT - MATERIALS
CIRCULAR INFLOW

Objective:
Maximizing the circular origin of incoming products and materials.

Question

Is there insight into the circular origin of purchased products and materials?

Credits	Answer	Selection
	A.	There is no insight into the circular origin of purchased products and materials.
-	B.	20% (in kg) of incoming products and materials of furniture and fixtures have a circular origin OR there are no incoming products and materials for furniture and fixtures.
-	C.	40% (in kg) of incoming products and materials of furniture and fixtures have a circular origin OR there are no incoming products and materials for furniture and fixtures.

Criteria description

Criterion	Criteria description	Answer option
1.	The user has provided insight into how the information was obtained.	B-C
2.	The assessment is made on the basis of the past year.	B-C
3.	Circular origin is defined as: a. Renewable raw materials (biobased) b. Secondary materials c. Reused products	B-C

Methodology

You need to make a Bill of Materials ('parts list'), or have one made, or similar, for each product, which will be registered in a digital online environment. This registration can also serve as a product passport (also see CB'23).

Evidence

1. Documentation of the purchase of the furniture and furnishings bought.
2. A Bill of Materials or similar of the product (in line with CB'23 - Leidraad Paspoorten voor de Bouw)).
3. Substantiation of responsible sourcing based on EPDs, LCA calculations, C2C certificates or similar, e.g., through an INSIDE/INSIDE platform.

Definities

Renewable raw materials

Raw material from a source that is grown, naturally replenished or naturally cleansed on a human time scale (Source: Lexicon Circular Construction - Unambiguous terms and definitions, July 2, 2020, July 2, 2020).

Secondary materials

Material recovered from previous use or from residual flows from another product system which substitutes primary materials or other secondary materials (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Reused products

Reused building products or building components/elements in the same function, whether after processing or not (Source: Lexicon Circulaire Bouw – Eenduidige termen en definities, 2020).

Explanation

Theme and strategy: Materials, circular inflow

Sub-strategies:

1. Increase the proportion of secondary raw materials in incoming materials and products.
2. Increase the share of renewable resources in incoming materials and products.

USE - MATERIALS
DETACHABILITY

Objective:
Encouraging product-level detachability for interiors and furniture.

Question

What is the product-level detachability of the interior and furniture?

Credits	Answer	Selection
0	A.	Do not know OR not demonstrated
-	B.	The detachability at the product level (or detachability within the product) has been clarified for the five most common products of furniture and fixtures.
-	C.	For the incoming products (interior or furniture), a comparison between three products was made and assessed for detachability.

Criteria description

Criterion	Criteria description	Answer option
1.	You should at least understand the following for the five most common products: a. Connection type (TV) b. Connection accessibility (ToV)	B-C
2.	The assessment took place in the previous calendar year.	C

Methodology

Further elaboration of a detachability index at the product level is required.

Checklist and tables

Connection type (TV)		Score
Dry connection	a. Loose (no fixing material) b. Snap connection c. Velcro connection d. Magnetic connection	1,00
Connection with added elements	a. Bolt and nut connection b. Ferry connection c. Corner connections d. Screw connection e. Connections with added connection elements	0,80
Direct integral connection	a. Pin connections b. Nail connection	0,60
Soft chemical connection	a. Sealant connection b. Foam connection (PUR)	0,20

Hard chemical connection	a. Adhesive connection b. Fill connection c. Welding connection d. Cementitious connection e. Chemical anchors f. Hard chemical connection	0,10

Connection accessibility (ToV)	Score
Freely accessible without additional actions	1,00
Accessible with additional actions that do not cause damage	0,80
Accessible with additional actions with fully repairable damage	0,60
Accessible with additional actions with partially repairable damage (more than 20% of the value)	0,40
Not accessible - irreparable damage to the product or surrounding products	0,10

Evidence

Providing a detachability report for the most common products.

Definitions

Detachability

Detachability is the degree to which objects are demountable at all scales without compromising the function of the object or surrounding objects. With the aim of protecting the existing value. (Source: Circular Buildings – een meetmethodiek voor losmaakbaarheid: A measurement method for Detachability 2.0, 2021).

Connection type

Objects are connected by various types of connections. For detachability, dry compounds, compounds with added elements and direct integral compounds are preferred, rather than soft and hard chemical compounds (Source: Circular Buildings – een meetmethodiek voor losmaakbaarheid: A measurement method for Detachability 2.0, 2021).

Accessibility

The accessibility of connections addresses the (physical) ability to reach connecting elements and the extent to which damage to surrounding objects occurs in the process. If the accessibility is good, i.e. you can easily reach the connecting element without causing damage to the surrounding object, then this has a positive effect on the detachability (Source: Circular Buildings – een meetmethodiek voor losmaakbaarheid: A measurement method for Detachability 2.0, 2021).

Explanation

Theme and strategy: Materials, Secure future reuse

Sub-strategy: Increase the potential value retention of incoming materials and products.

Sub-strategy objective: Material flows that enter a circular building should be put to the highest possible use in a new function elsewhere, as soon as they are released from the building again at the end of their functional life cycle (through demolition, replacement, or falling into disuse). In doing so, you prioritize reuse, refurbish, remanufacture, repurpose and recycle, respectively, and avoid incineration and landfill as much as possible. You must also be able to return organic raw materials to organic cycles (for example, through composting or cascading). To increase the potential of this highest-quality reuse, consider the following factors, among others, in the procurement and design of incoming streams: detachability, technical service life, quality, standardized and modular sizing, and prevention of toxicity. You also include incentives surrounding future reuse, such as ownership, disassembly plans and any agreements regarding process or financial assurance.

OCCUPIER MANAGEMENT – MATERIALS
CIRCULAR BUSINESS MODELS

Objective:
Increasing potential value retention of incoming materials and products by applying circular business models.

Question

To how many products and/or materials have a circular business model been applied?

Credits	Answer	Selection
0	A.	No circular business models have been applied.
-	B.	A circular business model has been applied to 3 of the products and/or materials in the furniture and fixtures.
-	C.	A circular business model has been applied to 5 of the products and/or materials in the furniture and fixtures.

Criteria description

Criterion	Criteria description	Answer option
1.	The user has made contractual agreements within the circular business model. It is established that upon return, the product and/or material will be recycled or reused.	B. and C.

Evidence

A copy of the contractual agreements that include the take-back guarantee.
The supplier demonstrates that when the element or product is taken back, it is actually recycled or reused.

Explanation

Theme and strategy: Materials, Secure future reuse
Sub-strategy: Increase the potential value retention of incoming materials and products.
Sub-strategy objective: Material flows that enter a circular building should be put to the highest possible use in a new function elsewhere, as soon as they are released from the building again at the end of their functional life cycle (through demolition, replacement, or falling into disuse). In doing so, you prioritize reuse, refurbish, remanufacture, repurpose and recycle, respectively, and avoid incineration and landfill as much as possible. You must also be able to return organic raw materials to organic cycles (for example, through composting or cascading). To increase the potential of this highest-quality reuse, consider the following factors, among others, in the procurement and design of incoming streams: detachability, technical service life, quality, standardized and modular sizing, and prevention of toxicity. You also include incentives surrounding future reuse, such as ownership, disassembly plans and any agreements regarding process or financial assurance.

OCCUPIER MANAGEMENT – MATERIALS

PRESERVE EXISTING PRODUCTS AND MATERIALS

Objective:

Extending the life and value retention of the existing interior, furniture and relevant facility products.

Question

Does the user adequately maintain and/or sustain the quality and performance of existing products and materials, paying attention to potential environmental impacts?

Credits	Antwoord	Selectie
0	A.	Question not answered
0	B.	No
..	C.	Yes, there is a current product overview that provides insight into the need for maintenance and protection against damage to the product.
..	D.	Yes, in addition to or as part of the product overview, each relevant product also shows what is required for preservation and procedures are in place for the process.
Exemplary	E.	Yes, there is an up-to-date product overview, insight into the (value) preservation of products, procedures for the process and a working instruction for considering environmental impact when deciding whether or not to replace products.

Criteria description

Criterion	Criteria description	Answer option
1.	There is current insight into the user's products present, for example in the form of a Materials Passport, inventory and product lists, or similar digital or written overviews. This contains (at least) the items listed under "checklist and tables" under "product information".	C.
2.	Based on the product overview you can see which products are vulnerable due to use or actions of the user. As a result, products that are prone to damage are shown in the overview.	C.
3.	The retention of products (definition: see under "definitions") is implemented based on the product overview and procedures are in place for this. In addition, someone has been made responsible for supervising and directing the process, keeping the product listings up to date and recording the preservation of products.	C and D
4.	Work instructions have been introduced that outline the decisions you can make for whether or not to replace products (in the event of damage or inferior performance). In doing so, a link was made to the environmental impact (Environmental impact of new products/raw materials (upon replacement) versus the environmental gain achieved due to the improved performance of the replaced product.	E.

Methodology

Examples of procedures and measures for assessment are:

1. Insight into warranty periods + renewal
2. Insight into + agreements on maintenance and repair (and user manuals)
3. Upgradeable products
4. Designed for a longer life span
5. Easy to repair and maintain
6. Modular and customizable
7. Aiming for good use/use optimization

Checklist and tables

Product information

For products that are included in a material passport or on inventory lists (see: Building Passport credit), you can refer to or use the relevant information. If those overviews are not present, then at least the following current information must be present/maintained for this credit on the products present:

1. Serial number/product number/Code
2. Product name
3. Quantity and location in the building

"Current information". The definition "current" depends on the (expected) lifetime and the moments when replacements of the products concerned take place or have taken place.

Evidence

1. Copy of the product overview
2. Copy of the overview of measures and activities for "product preservation"
3. Copy of established procedures for product preservation, including confirmation from the designated person in charge
4. Copy of work instruction for considering environmental impact when making decisions about preserving and/or replacing products

These documents must contain - where applicable - at least the contents as described under "Checklist and tables".

Definitions

Products

For this credit, we are referring to interiors, furniture and relevant facility products.

For all of these products, with no or poor management and maintenance, quality reduction can occur, causing products to function less well, pollute, damage, spoil, or otherwise degrade in quality, shortening their lifespan, or requiring earlier or more intensive corrective action (possibly with higher environmental costs).

Preservation of products

For this credit, product preservation means: all measures, activities, and work that you can take/perform to promote product preservation = to counteract the reduction of product performance or quality.

Explanation

Theme and strategy: Materials, Preservation

Sub-strategy: Preserve existing materials and products

Sub-strategy objective: In a circular building, you preserve enough functioning products and elements for as long as possible to avoid depleting any raw materials for replacement products and elements within the same function. You must aim for maximum preservation of materials through preventive maintenance, repair, refurbish and remanufacture. When considering not retaining (parts of) products, consider the environmental impact of the newly required raw materials versus the additional value (or harm) created within the function of these raw materials.

OCCUPIER MANAGEMENT – MATERIALS
INTENSIFYING THE USE OF THE BUILDING

Objective:
Reducing the number of square meters of building required through efficient, effective and optimal (multifunctional) use of those square meters.

Question

To what extent has the efficient, effective and optimal (multifunctional) use of space been taken into account in the design and execution of the (primary) business processes?

Credits	Answer	Selection
0	A.	Question not answered
0	B.	Not taken into account
	C.	Optimization/reduction of the number of square meters of building required by the user has been investigated.
	D.	Optimization/reduction of the number of square meters of building required by the user has been investigated. This has led to policy and operational measures that have demonstrably led to less m² for the same (primary) business processes or to more intensive use of the m².

Criteria description

Criterion	Criteria description	Answer option
1.	There was an investigation into how the primary business processes could be designed and carried out, in order to limit the required number of square meters of building as much as possible, taking into account the minimum legal (health and safety) requirements. In doing so, at a minimum, the following was considered: a. Do all facilities have to be present in the building (part), or can use be made of nearby (joint) facilities? b. In what way can general areas, such as meeting rooms, kitchens, pantries, etc. be used in an optimal, multifunctional and/or communal way? c. What organizational optimizations can you implement through workplace concepts, flex and home working with the associated ICT facilities? d. What optimizations can be made to intensify use of the available m², through multifunctional use, and/or use for third parties?	C.
2.	The measures as proposed in the study resulted in policy and operational measures. These have demonstrably resulted in less use of square footage or intensification of use.	C. D.

Evidence

1. Copy of business process optimization study, for example with occupancy rate study.
2. Copy of policy documents and operational plans showing that measures have resulted in reduction in m²/FTE.
3. Insight into agreements to share user surface area with third parties.

Explanation

Theme and strategy: Materials, Preservation

Sub-strategy: Intensify use of materials and products

Sub-strategy objective: By creating greater functional value with the same amount of a product's materials, for example by sharing them, the relative material intensity of the building's functions decreases, and you avoid resource depletion.

References

- https://www.dearbocatalogus.nl/handreiking-kantooromgeving/b-117-oppervlakte-van-kantoorwerkplekken
- https://wetten.overheid.nl/BWBR0008498/2021-01-01#Hoofdstuk3
  - Article 3.19 arbeidsomstandighedenbesluit

OCCUPIER MANAGEMENT – MATERIALS

FLEXIBILITY, CUSTOMIZABILITY, AND ADAPTABILITY OF EXISTING PRODUCTS AND MATERIALS

Objective:
The user's finishing, layout, user systems and furnishings can be adjusted in such a way that things can easily be changed, without material-intensive adjustments.

Question

Has future customizability, flexibility and adaptability been taken into account?

Credits	Answer	Selection
0	A.	Question not answered
0	B.	No
	C.	Yes

Criteria description

Criterion	Criteria description	Answer option
1.	The criteria as stated in the "flexibility and customizability" checklist are met and substantiated with evidence.	C.
2.	There is a vision of the possible functions/desire for flexibility on the basis of which you can plot the above-mentioned substantiation.	C.

Checklist and tables

Flexibility and customizability checklist

1. Multiple layout variants are possible with the chosen fixtures, user systems and furnishings.
2. The chosen infrastructure is calculated to accommodate possible changes in classification, shifts in intensity and capacity of use, and possible expansions (excess).
3. Any partitions, fixed furniture and counters, can be easily dismantled and moved without causing damage (e.g., to the (floor) finish).

Evidence

1. Floor plan drawings showing alternative layouts with furniture and upholstery present.
2. Technical data system infrastructure with capacity and expandability.
3. Technical data disassemblability and relocatability of furnishing elements (without damage to adjacent/ surrounding elements).

Explanation

Theme and strategy: Materials, Reduce demand

Sub-strategy: Future-proof design

Sub-strategy objective: In a circular building, the flexibility and adaptive capacity is as high as possible, to withstand future changes without having to make material-intensive adjustments. Future changes against which the building, its elements and products must be resistant, include increases and decreases in intensity of use, change in functions and the effects of climate change.

References

- BREEAM-NL-2014, MAT 8 calculator (New construction and renovation)

OCCUPIER MANAGEMENT – MATERIALS
MATERIAL PASSPORT

Objective:
Enable users to identify, recognize, maintain and preserve the value of products and materials applied in/as interiors, furniture and relevant facility products. With the ultimate goal of reducing the use of new raw materials and encouraging and future reuse of products and recycling of materials.

Question

Is a materials passport in place, and is it maintained?

Credits	Answer	Selection
0	A.	Question not answered
0	B.	No
	C.	Yes, a basic materials passport
	D.	Yes, an inventory list of relevant facility products
	E.	Yes, a basic materials passport and an inventory list of facility products
	F.	Yes, mutations and changes are tracked
	G.	Yes, a professional materials passport
	H.	Yes, a professional materials passport and mutations and changes are tracked

Criteria description

Criterion	Criteria description	Answer option
1.	There is a basic materials passport of the interior, and the furniture that is the responsibility of the user.	C and E
2.	There is an inventory list present of the relevant facility products of the user.	D and E
3.	Procedures are in place to keep materials passports and inventory lists up to date with mutations and changes and a designated responsible person is in place. The procedures include at least the items listed under “checklist and tables”, and those procedures also address flow tracking when products are discarded.	F and H
4.	There is a professional materials passport present of at least 50% of the interior and/or the furniture that is the responsibility of the user.	G and H

Checklist and tables

Interior and Furniture Basic Materials Passport

At the minimum, document the following information on interior components and furniture for each product (type) in a Materials Passport:

1. Product name
2. Composition/product materialization (broad outline/main components)
3. Year/date of purchase of product
4. Origin/supplier product
5. Numbers/global dimensions/location in the building
6. Warranty and maintenance data

Interior and Furniture Professional Materials Passport

In addition to the simple version of the materials passport, the following information per product (type) is included in the extensive Materials Passport:

1. Product composition details (components/materials/BoM/EPD)
2. (Any) certificates and/or quality declarations
3. Detachability and the degree of disassembly of the product into its individual components
4. Intended usage end date
5. End of life scrapping scenario
6. Reuse possibilities (possible application)/reuse value and 2nd life options
7. Recyclability

Submit procedure for keeping the materials passport up to date and tracking flows at product disposal

1. A person responsible for record keeping has been designated. This is recorded via a statement (in writing with the documents or digitally in/with the file folder).
2. The way you collect data (physically and/or digitally) and keep track of it is defined.
3. When buying/procuring products, take into account as much as possible the information needed for the materials passport. This information will be requested from the supplier. The form or format in which a supplier provides this information must be coordinated with the form or format in which you manage the materials passport.
4. Record the data with the products supplied and present in the asset as completely as possible, under “simple” or “extensive”, in the materials passport.
5. In case of mutations and changes, you will update this in the materials passport. You keep track of adjustments; you add data of new products and you delete (or place in a separate folder) data of products to be discarded after the lead time of the scrapping scenario has been completed. The scrapping scenario is followed, whereby one strives by definition for the highest possible reuse or value retention of products and components.

Evidence

1. Copy of the Materials Passport (basic or professional, depending on which points are being pursued).
2. Copy of the procedures for keeping the materials passport up to date and inventory lists and tracking flows at product disposal.

These documents must contain at least the contents as described under “Checklist and tables”.

Definitions

For relevant facility products, think of vacuum cleaners, waste bins, ladders.

Explanation

Theme and strategy: Materials, Secure future reuse

Sub-strategy: Provide insight into materials and products

Sub-strategy objective: In a circular building, you have sufficient insight into all incoming materials and material stocks to facilitate value retention in current and future life cycles. These insights include material composition, remaining useful life, provenance, possible future functions and ownership. Keep these insights current as well.

OCCUPIER MANAGEMENT - HEALTH

TOXICITY

Objective:
Avoiding toxic substances in interior and furniture materials or products.

Question

To what extent has the presence of toxic substances been understood and are you proactively avoiding these toxic substances in incoming materials and products?

Credits	Answer	Selection
0	A.	Don't know
	B.	For at least 10 of the most common products, it has been made clear whether they contain toxic substances.

Criteria description

Criterion	Criteria description	Answer option
1.	The most common products can be denoted in numbers, weight, environmental impact, health, or volume.	B.
2.	The assessment is made on the basis of the past year.	B.
3.	Product evaluation is based on one of these lists, or their equivalent: - The products do not contain substances as included in the C2C Restricted Substances List. - The products are free of substances as listed in the Living Building Challenge's Red List V4.0.	B.

Methodology

In the methodology, you can connect to credit HEA02.3 - BREEAM New Construction: Emissions from building products.

Checklist and tables

N/A

Evidence

Evidence

1. A Bill of Materials per product, for example recorded in a Materials Passport
2. Substantiation based on C2C certificates or similar
3. Substantiation of product information, provided by and requested from the supplier or producer.
4. The results of a proactive (eco)toxicological screening of materials in a product, in accordance with a protocol developed for this purpose (such as, for example, Cradle to Cradle Certified).

At the moment we have few concrete lists that you can use immediately in practice. It is possible that this could be further concretized in the near future, with data on raw materials and materials linked to the products in the buildings.
In addition to the search for applicable lists of products (instead of raw materials), it may be necessary to work with limit values in products, in addition to excluding toxic substances.

Definitions

Toxic materials

A raw material with a hazard characteristic that is (partially) released during the life of a construction product or material and/or is released during the process of reuse or recycling (Source: Circular Buildings - Exploring clean and spotless material flows, 2020).

Explanation

Theme and strategy: Health and well-being, Protect

Sub-strategy: Avoid the use of toxic materials

Sub-strategy objective: In a circular building, you avoid the presence of toxic materials that can affect the health and well-being of the user.

Sub-strategy: Prevent toxic emissions and nuisance from use- and building-related activities.

Sub-strategy objective: In a circular building, you avoid direct and indirect toxic emissions and nuisances from building and use-related activities, which can affect the well-being of the user. These include particulate matter from transportation, litter, and noise pollution from maintenance activities.

References

DGBC, Circular Buildings - Exploring clean and spotless material flows, 2020

OCCUPIER MANAGEMENT

UNDERSTANDING THE BIODIVERSITY FOOTPRINT OF PURCHASED CONSUMER PRODUCTS

This credit is elaborated below as a new credit, but may eventually be integrated into Man15 Environmental management issues

Objective:
Taking into account biodiversity loss due to user-related activities.

Question

Do you consider the biodiversity footprint of consumer products when purchasing them? And in what ways do you strive to get this footprint as low as possible?

Credits	Answer	Selection
0	A.	There are no criteria included in the current procurement policy for biodiversity.
	B.	Yes, when purchasing consumer products, the environmental indicator of biodiversity is taken into account as a criterion.
	C.	Yes, a biodiversity footprint is requested from the supplier for at least 20% of the purchased consumer products.
	D.	Yes, a biodiversity footprint is requested from the supplier for at least 50% of the purchased consumer products.
	E.	Yes, a biodiversity footprint is requested from the supplier for at least 100% of the purchased consumer products.

Criteria description

Criterion	Criteria description	Answer option
1.	The organization has a (sustainable) procurement policy that explicitly states that you consider the embedded biodiversity loss of purchased consumer products when acquiring these products.	C.
2.	The organization actively communicates to (potential) suppliers that the embedded biodiversity loss of consumer products is a selection criterion when purchasing consumer products.	D.
3.	The organization calls on suppliers to provide a biodiversity footprint of their products.	E - G
4.	These consumer products include in any case: a. Office supplies; b. Facility procurement; c. Cleaning agents; d. Furniture and fixtures.	B - F

Methodology

- Biodiversity footprint calculator of Plansup (http://biodiversity-footprint.herokuapp.com/#/home)
- ReCiPe method
- Global biodiversity model for policy support – GLOBIO model https://www.globio.info/

Evidence

1. A copy of the sustainable procurement policy.
2. Confirmation of procurement documents showing that biodiversity loss was included as a criterion in the selection of products/suppliers.
3. Confirmation from suppliers that they have provided a biodiversity footprint for the consumer products they have supplied.

Definitions

Biodiversity is the variety of life and the areas in which this life occurs (ecosystems). Biodiversity is essential to our welfare. It provides valuable economic products, such as food crops (agriculture, fish), natural fibres (wood, cotton) and medicines. But also for services, such as oxygen production, water purification, water storage and natural pest control. In addition, biodiversity contributes to our well-being as we enjoy nature. In other words, biodiversity is a condition of life for humans: it is at the root of everything that keeps us and our society alive.

Explanation

Theme and strategy: Ecosystems and biodiversity, Protect
Sub-strategy: Reduce the loss of biodiversity from use- and building-related activities to within planetary limits.
Sub-strategy objective: A circular building actively engages in reducing biodiversity loss in and around the asset during the use phase, with the goal of staying within the planetary boundary. To take into account the diversity and density of different types of ecosystems and biodiversity in the environment, and the embedded biodiversity loss in materials and products used in the use phase.

OCCUPIER MANAGEMENT

RECORDING EMBEDDED GHG EMISSIONS IN THE PROCUREMENT

The credit below is elaborated as new, but may eventually be integrated into Man15 Environmental management issues.

Objective:
Understanding and reducing (embedded) greenhouse gas emissions from use-based activities.

Question

Do you take into account the embedded greenhouse gas emissions of products and materials when purchasing these products? And how do you strive to get these emissions as low as possible?

Credits	Answer	Selection
0	A.	Question not answered
	B.	There are no criteria for embedded greenhouse gas emissions included in the current procurement policy.
	C.	Yes, embedded greenhouse gas emissions are considered as a selection criterion in procurement.
	D.	Yes, at least 20% of incoming products and materials include embedded GHG emissions as a selection criterion.
	E.	Yes, at least 50% of incoming products and materials include embedded GHG emissions as a selection criterion.
	F.	Yes, 100% of incoming products and materials include embedded GHG emissions as a selection criterion.

Criteria description

Criteria	Criteria omschrijving	Antwoord optie
1.	The organization has a (sustainable) procurement policy that explicitly states that you consider the embedded greenhouse gas emissions of purchased consumer products when acquiring these products.	C.
2.	The organization actively communicates to (potential) suppliers that the embedded greenhouse gas emissions of the consumer products are a selection criterion, when purchasing consumer products	D.
3.	The organization requests suppliers to disclose embedded greenhouse gas emissions in the procurement process by providing the results of a life cycle assessment (LCA) of their products.	E - G
4.	Incoming goods and materials include in any case: a. Office supplies b. Facility procurement c. Cleaning agents d. Furniture and fixtures	B - F

Methodology

- Life Cycle Assessment (LCA) prepared according to ISO standards 14040 and 14044, insight into embedded greenhouse gas emissions.

Evidence

1. A copy of the sustainable procurement policy.
2. Confirmation of procurement documents showing that greenhouse gas emissions were included as a criterion in the selection of products/suppliers.
3. Confirmation from suppliers that they have provided the results of a Life Cycle Analysis (LCA) for the consumer products they have supplied.

Definitions

Embedded greenhouse gas emissions (embodied carbon) are the sum of all CO_2 emissions required to produce goods or services. Part of the LCA methodology is the understanding of all environmental indicators. CO_2 is one of these environmental indicators.
In addition to embedded CO_2, you have operational greenhouse gas emissions (operational carbon) which can be related to the use of goods, services, or buildings.

Explanation

Theme and strategy: Ecosystems and biodiversity, Protect
Sub-strategy: Reduce greenhouse gas emissions through use- and building-related activities to within planetary limits.
Sub-strategy objective: In a circular building, you actively commit to reducing scope 1, 2 and 3 greenhouse gas emissions during the use phase. This includes direct emissions from use and indirect emissions embedded in goods and services. Make sure that emissions and targets (with matching measures) are at least in line with a 2-degree scenario, and preferably with the 1.5-degree scenario (for example, by designing targets and monitoring in line with the guidelines of the Science-Based Targets initiative).

References

- https://www.dgbc.nl/buildinglife-206
- https://www.worldgbc.org/embodied-carbon

ANNEX II

POSSIBLE ADDITIONS FOR BREEAM IN-USE PARTS 1 AND 2 ASSET PERFORMANCE AND MANAGEMENT PERFORMANCE

MANAGEMENT PERFORMANCE - MATERIALS

CIRCULAR MULTI-YEAR MAINTENANCE PLAN (CMMP)

Objective:

Maintain existing elements and (building) products in a structured and planned way and replace them with a circular alternative if necessary. This is to preserve what already exists, reduce environmental impact and increase the proportion of secondary and/or renewable materials and products.

You can think of the CMMP as complementary to the credit MAN 03 (Maintenance Policies and Procedures), or you can link it to the credit RSC 01 (Condition Survey) where the CMMP acts as an annually recurring cycle.

Verification:

Question

Is there a maintenance plan for the elements and products belonging to the building, in which you can find out what the status of the element or product is, what the regular replacement period is and what circular alternatives there are for the incoming elements or products should you have to replace them? And for each outgoing element or product, is the way in which it is processed included?

Verification method

1. Of the building-related elements and products, it is clear what the current status is based on the NEN2767, what the remaining theoretical life span is and with what maintenance or use you can extend it. This can be done with a reference to the maintenance regulations, and in line with RSC 03).
2. Policies or procedures are in place to weigh whether to actually replace a product or element in the event of failure or an intended replacement time, or whether that element or product can be repaired.
3. Each element or (building) product is clear:
   a. What do you do with outgoing flow (based on R strategy)?
   b. What do you do with new incoming flow (based on environmental impact, and/or R strategy)?
   c. Whether and how to deal with detachability for the new incoming flow.
4. There are policies and procedures necessary to weigh to what alternative is there to reduce the environmental impact.
5. The plan is reviewed annually.
6. A ‘Basic’ and ‘Comprehensive’ CMMP can be prepared in the elaboration.
7. Under ‘Basic’, the R strategy is made transparent per element or building product.
8. Under ‘Professional’ this has been enriched with insight into environmental impact (for incoming flows).

MANAGEMENT PERFORMANCE - MATERIALS
CIRCULAR PROCUREMENT POLICIES

Objective:
Appreciate and encourage procurement policies that promote the sourcing of circular materials and products.

This is in addition to credit RSC 05 (Sustainable Procurement). This identifies (at criterion 3.h.) the purchase of reused and recycled materials. This can be supplemented with the following credit.

Verification:

Question

Does the organization have a sustainable procurement policy that includes the circularity of materials?

1. There are no circular procurement criteria included in the current procurement policy.
2. At least 5 of 9 circular procurement criteria are included in current procurement policies.
3. All circular procurement criteria are included in the current procurement policy.
4. When procuring, one or more circular procurement criteria has received a weighting of > 30% on the qualitative criteria
   OR
   if nothing has been procured this requirement does not apply.

This includes the following circular procurement criteria:

1. Criteria regarding the share of renewable raw materials
2. Criteria regarding the proportion of secondary materials
3. Criteria regarding the proportion of reused products
4. Criteria regarding the environmental performance (including the CO_2 footprint) of products and materials
5. Criteria regarding the detachability of products
6. Criteria regarding critical and scarce resources
7. Criteria regarding toxic substances
8. Criteria regarding extending the life of products
9. Criteria regarding the value retention of materials after use

Verification method

1. A copy of the sustainable purchasing policy (cf RSC 05).
2. Evidence showing that the procurement policy is being applied, e.g. a summary of recent (building-related) purchases, showing that procurement has occurred in accordance with the procurement policy (cf RSC 05).
3. Evidence showing that one or more circular procurement criteria received a weighting of > 30% in the assessment, across all purchases in the past year.

MANAGEMENT PERFORMANCE - MATERIALS
CIRCULAR INFLOW

Objective:
Maximizing the circular origin of incoming (building-related) products and materials.

You could include this as a new credit under Management.

Verification:

There is insight into the circular origin of purchased (building-related) products and materials.

Question

What percentage of incoming products and materials have a circular origin?

1. 20% (in kg) of incoming products and materials has a circular origin
   OR
   there are no incoming products and materials.
2. 30% (in kg) of the incoming products and materials has a circular origin.
3. 40% (in kg) of the incoming products and materials has a circular origin.

Circular origin is defined as*:

1. Renewable raw materials (biobased)
2. Secondary materials
3. Reused products

* These definitions are listed in Annex I.

Verification method

1. Understanding of incoming product and material flows (by kg or turnover), documentation of the procurement.
2. A Bill of Materials or similar belonging to the product. Substantiation of responsible sourcing based on EPDs, LCA calculations, C2C certificates or similar.
3. The assessment is made on the basis of the past year.

ASSET PERFORMANCE - MATERIALS

UPDATING A BUILDING PASSPORT

Objective:
Keeping a building passport up to date.

The credit RSC 03 identifies the presence of a current (< 5 years old) building passport.
The recommendation is that in the credit below, the building passport is kept current.

Verification:

If a building passport is present, then this credit addresses keeping it current and/or renewing it and agreements/ procedures present in this regard.

Questions

Is there an up-to-date building passport (either "basic" or "professional", see credit RSC 03) present of the elements and products/components in/on/around the building and are mutations due to maintenance, renovations, modifications and the like tracked?

Verification method

1. Procedures are in place to keep building passports up to date with mutations and changes and a responsible person has been designated for keeping track of the data.
2. When buying/procuring products, the person responsible takes into account as much as possible the information needed for the building passport and requests it from the supplier. The form or format in which a supplier provides this information must be coordinated with the form or format in which you manage the building passport.
3. Record the data with the products supplied and present in the asset as completely as possible, under "simple" or "professional", in the building passport.
4. In case of mutations and changes, this will be updated in the building passport. The responsible person keeps track of adjustments, adds data of new products and deletes (or places in a separate folder) data of products to be discarded after the lead time of the scrapping scenario has been completed.
5. A link is made between the Circular Multi-Year Maintenance Plan, the Condition Survey (RSC 01) and the Building Passport (RSC 03).

ASSET PERFORMANCE - MATERIALS
DETACHABILITY

Objective:
Encouraging 'detachability' of the elements and products used, so that at the end of the building's life you can disassemble them more easily and reuse them in another project.

The credit RSC 04 (Future adaptation) already ensures flexible future use. Detachability can be an addition as a broadening of "Accessibility" in Table 24.
It is recommended that you ensure detachability precisely when making adjustments in the building. Linked to MMP, but also to other changes in or to the building.

Verification:

Start with the understanding of detachability of the current building. And in the case of changes and mutations, Detachability is integrally taken into account and substantiated. Detachability is made transparent and, if possible, improved for the next Layers of Brand:

1. Space Plan
2. Services
3. Skin and Structure

Questions

Assessment can take place at three levels:

- Detachability is made transparent for one or more of the 3 Layers of Brand
- The detachability index is:
    1. At least 45% for the Layer of Brand - Space Plan ("Interior design" in Table 24)
    2. At least 75% for the Layer of Brand - Services ("Core and local services" in Table 24)
    3. At least 35% for the Layers of Brand - Skin and Structure ("Fabric and structure" in Table 24)
- The detachability index is:
    1. At least 55% for the Layer of Brand - Space Plan ("Interior design" in Table 24)
    2. At least 85% for the Layer of Brand - Services ("Core and local services" in Table 24)
    3. At least 45% for the Layers of Brand - Skin and Structure ("Fabric and structure" in Table 24)

Verification method

1. To determine the degree of detachability, you must use the Detachability Tool which calculates the detachability index - LI project (Lip).
2. Provide evidence in applying detachability to building mutations and modifications.

ASSET PERFORMANCE – MATERIALS

DRAWING UP AND/OR UPDATING A DISASSEMBLY PLAN

Objective:

Drawing up and/or updating a disassembly plan. Enabling effective and efficient future disassembly and disposal of the applied elements and products. So that at the end of the life of the building product or building, you can disassemble and reuse it in another project with optimal value retention and without unnecessary environmental impact (energy consumption/nuisance).
The dismantling plan may be a specification on building passport credit RSC 03, criterion 4.g. Guidance on maintaining value and demolition works).

Verification:

The way elements and products are disassembled in the future is elaborated in a disassembly plan (guideline). Put the focus in this plan on as much value retention of the elements and products as possible, combined with the lowest possible environmental impact of the dismantling/demolition activities.

Questions

Is there an up-to-date disassembly plan linked to the elements and products present in the building? And does it state how they were processed and assembled, as recorded in the building passport?

Verification method

1. The disassembly plan is preferably an integral part of the building passport. Is this the case? Then you also have to update it when there are changes in the building passport.
   a. A disassembly plan linked to the building products present in the building has been established. This is tailored to how these building products are processed and assembled.
   b. The plan focuses on the disassembly of whole elements (composition of building products) and/or the disassembly of components/building products (parts of elements).
   c. Procedures are in place to keep the disassembly plan up to date with mutations and changes and a responsible person has been designated to maintain records.

d. The way you collect data (physically and/or digitally) and keep track of it is defined.

e. In case of mutations and changes, the person responsible will update this in the disassembly plan. He or she keeps track of modifications, adds data of new elements and products (assembly method and disassembly guideline) and deletes data of elements and products to be discarded (disassembled) (or places them in a separate folder).

MANAGEMENT PERFORMANCE - MATERIALS
CIRCULAR BUSINESS MODELS

Objective:
Increasing potential value retention of elements and products by applying circular business models.

The credit RSC 05 (Sustainable procurement) criterion 3.i. identifies circular principles, including take-back. The purpose of this additional credit is to value assurance and performance in addition to the linkage to the procurement policy.

Verification:

Questions

A take-back guarantee has been established for the following quantity of elements or products:

1. A circular business model has been applied for 3 elements and/or products. It has also been established that upon return, the product and/or material will be recycled or reused.
2. A circular business model has been applied for 5 elements and/or products. It has also been established that upon return, the product and/or material will be recycled or reused.

Verification method

A copy (file) of the contractual agreements that include the take-back guarantee.

ASSET PERFORMANCE - MATERIALS

RESIDUAL VALUE OF MATERIALS AND PRODUCTS

Objective:

Understanding the financial residual value of building materials and products in a building.

You can use this insight to supplement the building passport, credit RSC 03, criterion 4.e. (Guidance on current financial value).

Verification:

Questions

What is the financial residual value* of building materials and products in a building?

1. The capitalized financial residual value of the current building was made clear during a review period of up to 40 years and divided into construction, façade and roof (1), facilities (2) and installation package (3).
2. The financial residual value (as defined above) can be expressed as a percentage (in %) of the market value*.
   In addition, the following lower boundary will be used per component:
   a. Structure, façade and roof: X%
   b. Systems: X%
   c. Installation package: X%
3. The capitalized financial residual value of the building is included in the operating costs by depreciating differently (different term, not to €0), or by including it as a negative cost in the maintenance costs.

* Definitions of market value and financial residual value: to be determined and established in methodologies.

Verification method

1. The understanding of the financial residual value can be based on the already inventoried under credit RSC 03 (resources inventoryt).
2. The financial residual value is made transparent by a substantiation of costs (such as dismantling, etc.) and revenues (raw material or product).
3. There is an appraisal report (validated) with insight into financial residual value.
4. There is a collection of guaranteed financial take-back agreements with suppliers.

MANAGEMENT PERFORMANCE - HEALTH
TOXICITY

Objective:
Avoidance of toxic substances in materials or toxic-containing elements and (construction) products.

The goal is to understand toxicity over the entire life cycle of the product, i.e. beyond just use.
The credit HEA 16 (Indoor air quality management) provides frameworks for this.

Question:

Question

To what extent is toxicity understood and proactively avoided in incoming flows?

1. For a minimum of 10 of the most common products, the assessment is based on one of these lists (or equivalent):
   a. The products do not contain substances as included in the C2C Restricted Substances List.
   b. The products are free of substances as listed in the Living Building Challenge's Red List 4V.0.
2. For incoming elements and (building) products, the following substances do not occur:
   a. To be determined

Verification method

At the moment we have few concrete lists that you can use immediately in practice. It is possible that this could be further concretized in the near future, with data on raw materials and materials linked to the products in the buildings.
In addition to the search for applicable lists of products (instead of raw materials), it may be necessary to work with limit values in products, in addition to excluding toxic substances.

MANAGEMENT PERFORMANCE - ECOLOGY

CO_2-DRIVEN (WHOLE LIFE CARBON) ASSET MANAGEMENT

Objective:

Reducing total greenhouse gas emissions for building-related activities by implementing CO_2-driven asset management.

This objective may be in addition to the credit MAN 04 (Environmental Policies and Procedures).

Verification:

Make it clear that you have a system or methodology in place that demonstrates that you take embedded CO_2 emissions (embodied carbon) into account. This, in combination with operational energy reduction (operational carbon).
This CO_2-driven policy may be in addition to the credit MAN 04 (Environmental Policies and Procedures).

Potential performance requirement:

1. A maximum carbon footprint per square meter of floor space.
2. The application of the whole life carbon approach or a calculation for larger (CO_2-intensive) projects or decisions.
3. CO_2 emissions (embodied and operational) were managed for 3 products and/or elements or projects/changes.

ANNEX III

SUB-STRATEGIES ELABORATION

MATERIAL	no.	Sub-strategy	Sub-strategy objective	Score
Preservation	1	Preserve existing materials and products	In a circular building, you preserve enough functioning products and elements for as long as possible to avoid depleting any raw materials for replacement products and elements within the same function. You must aim for maximum preservation of materials through preventive maintenance, repair, refurbish and remanufacture. When considering not retaining (parts of) products, consider the environmental impact of the newly required raw materials versus the additional value (or harm) created within the function of these raw materials.	**2**
Reduce demand	2	Intensify use of materials and products	By creating greater functional value with the same amount of a product's materials, for example by sharing them, the relative material intensity of the building's functions decreases, and you avoid resource depletion.	**2**
	3	Reject preventable material and product flows	Unnecessary material flows (e.g., packaging and construction waste from over-ordering products) are avoided as much as possible in a circular building.	**2**
	4	Reduce material intensity of incoming materials and products over the functional life cycle	In a circular building, you reduce the material intensity of the incoming products as far as possible within their functional lifetime in the building. This is how you reduce the demand for (primary) raw materials. The reduction of materials should not compromise the optimal functioning of the required functions. Within the reduction of material intensity, you have to look at the number of incoming materials, the upstream material use and required additions due to maintenance and replacements. This is done with respect to the period in which they perform their duties.	**2**
	5	Future-proof design	In a circular building, the flexibility and adaptive capacity is as high as possible, to withstand future changes without having to make material-intensive adjustments. Future changes against which the building, its elements and products must be resistant, include increases and decreases in intensity of use, change in functions and the effects of climate change.	**2**

Circular inflow	6	Increase the proportion of secondary raw materials in incoming materials and products	Materials that enter a circular building should contribute as little as possible to the depletion of primary resources. The use of secondary raw materials must be optimized in this regard, in order to maximize high-quality utilization of available secondary flows. This involves prioritizing reuse, refurbish, remanufacture, repurpose and recycle from the previous life cycle of the materials to the new function within the circular building.	**2**
	7	Increase the share of renewable resources in incoming materials and products	Materials that enter a circular building should contribute as little as possible to the depletion of primary resources. This requires optimizing the use of renewable resources. If you use renewable raw materials, also weigh the sustainability of the production chain.	**2**
	8	Reduce dependence on critical raw materials	In a circular building, you reduce the amount of critical raw materials as much as possible. Also, the capture time of these critical raw materials is as low as possible and the reusability (including detachability and lifetime) is as high as possible. This is how you enable meaningful future applications (in possibly other functions) in the economy, within time scales relevant to humans.	**2**
	9	Reduce the environmental impact of incoming materials and products or interventions	In a circular building, all incoming (material) flows cause minimal environmental impact, in order to keep the building within planetary limits as best as possible. Include scope 1, 2 and 3 impacts here. Are incoming material flows related to interventions that improve the environmental impact of building use and management? Then you have to weigh the environmental impact of these incoming materials against the reduced environmental impact caused by the intervention in question.	**2**
	10	Avoid negative embedded social impacts of materials and products	A circular building provides the preconditions of the social foundation (Doughnut Economics) for the users, as well as in the chain of products and services purchased by the building and its users.	**1**

Secure future reuse	11	Increase the potential value retention of incoming materials and products	Material flows that enter a circular building should be put to the highest possible use in a new function elsewhere, as soon as they are released from the building again at the end of their functional life cycle (through demolition, replacement, or falling into disuse). In doing so, reuse, refurbish, remanufacture, repurpose and recycle are prioritized, respectively, and incineration and landfill are avoided as much as possible. In addition, you must also be able to return organic raw materials to organic cycles (for example, through cascading or composting). To increase the potential of this highest-quality reuse, the following factors, among others, in the procurement and design of incoming streams: detachability, technical service life, quality, standardized and modular sizing, and prevention of toxicity must be taken into account. You also include incentives surrounding future reuse, such as ownership, disassembly plans and any agreements regarding process or financial assurance.	**2**
	12	Provide insight into materials and products	In a circular building, you have sufficient insight into all incoming materials and material stocks to facilitate value retention in current and future life cycles. These insights include material composition, remaining useful life, provenance, possible future functions and ownership. Keep these insights current as well.	**2**
Utilize outflow	13	Ensure value retention of outgoing materials and products	Material streams released from a circular building are put to the highest possible use at the time of release, in a new function elsewhere. In doing so, reuse, refurbish, remanufacture, repurpose and recycle are prioritized, respectively, and incineration and landfill are avoided as much as possible. Also, consider the environmental benefits of repurposing.	**2**

ENERGY	Nr.	Sub-strategy	Sub-strategy objective	Score
Preservation	1	Ensure optimal performance of energy systems	In a circular building, the demand for energy is reduced by the building itself and by its users. In addition, renewable sources and waste flows provide for this demand and optimally match supply and demand. The basis for this optimal performance is that you make it transparent, in order to create awareness and ensure that the performance of building and building-related systems remains at least at the same level (or improves).	1
Reduce demand	2	Reduce the use- and building-related energy demand	In a circular building, the demand for energy is reduced by the building itself and its users in order to reduce unnecessary energy consumption. Trade-offs in maintaining, improving, or replacing facilities to improve performance are included within this sub-strategy.	1
	3	Reduce the energy demand from maintenance, interventions and building inflows	In a circular building, you reduce the demand for energy for maintenance and interventions on the building in order to reduce unnecessary energy consumption. Consider additional energy consumption due to inefficient schedules, energy consumption of maintenance equipment, and the embed-ded impact of materials used in maintenance. Also, the energy consumption of facility operations and inflows (such as products for the catering or cleaning equipment) are minimized, in which you take both the power consumption of the operation as the embedded energy consumption of imported materials.	1
Circular inflow	4	Increase the share of renewable in the use- and building-related energy demand	In a circular building, you avoid the depletion of non-renewable energy sources and the additional environmental impacts for supplying the use- and building-related energy demand as much as possible. To achieve this, you look both at interventions to produce renewable energy locally within the asset's planning area and at the procurement of renewable energy.	1

Secure future reuse	5	Balance the supply and demand of energy and heat	The demand for use- and building-related energy and available capacity from renewable energy sources do not always coincide. This can result in suboptimal utilization of available energy, network overload and demand for additional non-intermittent (and often fossil) sources. In a circular building, the demand for and supply of renewable energy are balanced as best as possible with, for example, storage, exchange and demand side response of both heat and electricity. Here you need to look at both the internal balancing of the plot (for example, temporary electricity storage and demand side response through smart charging for electric cars or seasonal storage of heat through a ground-coupled heat exchanger), and the external balancing with the environment (for example, by building a microgrid in which buildings with different functions smooth out peaks in production and consumption). When choosing the solution and scale of balancing, you must consider the environmental impact of the alternatives, including the alternatives that the grid operator can offer from the existing grid. Trade-offs in maintaining, improving, or replacing facilities to improve performance are included within this sub-strategy.	**0**
Utilize the outflow	6	Reuse energy from waste flows and the environment	A circular building uses energy and heat from waste flows and the environment as efficiently as possible. Initially, you use the energy available internally in the building or on the lot from waste flows (for example, heat from your own grey wastewater, or biogas from the fermentation of blackwater). Then, the opportunities for harnessing energy from the environment can be explored (for example, industrial waste heat, thermal energy from surface water, or sewage from local sewage systems). When considering whether to use these sources, consider the environmental impact and avoid lock-ins in unsustainable and circular systems (e.g., dependence on biomass heat networks or waste incineration).	**0**

WATER	Nr.	Sub-strategy	Sub-strategy objective	Score
Preservation	1	Ensure optimal performance of water systems	In a circular building, the demand for water is reduced by the building itself and by its users. You meet this demand from renewable sources (such as rainwater) and waste flows (such as wastewater) and optimally connect demand, supply and discharge. The basis for this optimal performance is that you make it transparent. In this way you create awareness and ensure that the performance of building and building-related systems remain at least at the same level (or are improved) through targeted maintenance.	1
Reduce demand	2	Reduce the use- and building-related water demand	In a circular building, you reduce the use- and building-related demand for water as much as possible. Also include trade-offs in maintaining, improving, or replacing facilities to improve performance within this sub-strategy.	1
	3	Reduce the water demand from maintenance, interventions and building inflows	In a circular building, you reduce the embedded demand for potable water to reduce unnecessary water use. Consider the water demand for cleaning and maintenance, but also the water use embedded in the import of material flows, for example catering (water use for food production) and maintenance (water use for production of replacement products).	1
Circular inflow	4	Increase the proportion of locally collected and utilized rainwater in the use- and building-related water demand	By collecting rainwater locally and using it for appropriate functions, such as flushing toilets, washing machines or watering plants, you can significantly reduce the demand for drinking water. Also, using local sources and flows is a key pillar of a circular building.	1

Secure future reuse	5	Balance the supply, demand, and discharge of (rain)water	The demand for use- and building-related water, the available supply from rainfall, and the capacity of the sewer system and the environment to dispose of excess rainwater do not always coincide. This can result in suboptimal utilization of available rainwater, sewer overload and flooding in the surrounding area. In a circular building, you ensure the best possible balance in the demand, supply and discharge of water, for example through temporary storage, buffering on roofs and local infiltration. By collecting rainwater and returning it to the environment (or using it yourself) in phases, you can avoid overloading the sewers (and possibly causing flooding). Also include trade-offs in maintaining, improving, or replacing facilities to improve performance within this sub-strategy.	**0**
Utilize outflow	6	Reuse of wastewater	By reusing wastewater in the building, you can reduce the demand for 'new' drinking water. In doing so, you prioritize direct wastewater reuse (e.g., greywater reuse), local treatment followed by reuse (e.g., a helophyte filter with effluent reuse), and discharge to a central treatment plant.	**1**
		Reuse of raw materials and nutrients from waste(water)	There are many valuable nutrients in our wastewater and organic waste flows that can be locally processed. For example, nitrogen and phosphate from blackwater that can be used as fertilizer after recovery, or fruit and vegetable waste from catering that can be used as a nutrient for one's own plants after composting. In a circular building, you put the maximum effort into the recovery and reuse of these raw materials and nutrients. Consider the environmental impact and efficiency relative to the water board's and waste processor's existing treatment systems when choosing to recover and utilize nutrients and raw materials locally.	**1**

MOBILITY	Nr.	Sub-strategy	Sub-strategy objective	Score
Preservation	1	Secure functional work and living spaces and facilities	Maintain a work environment and places to stay that optimally contributes to productivity, activity and contact with others. Always consider the value of preservation in relation to the physical interconnectivity of these work and living spaces and the alternatives (e.g., the right balance between quality and safe workplaces in the office and facilitating working from home).	1
	2	Preservation of existing modes of transportation	Properly maintaining and repairing one's fleet can ensure that vehicles last longer on average. This reduces the demand for new vehicles. Also, vehicles are easier to sell for a higher residual value if they are well maintained during their use. When considering not retaining (parts of) modes of transportation, consider the environmental impact of the newly required raw materials versus the additional value (or harm) created within the function of these raw materials.	0
Reduce demand	3	Refuse preventable mobility movements	Refuse mobility movements related to commuting or business activities that are not strictly necessary and/or can be replaced with another way to make a connection. For example, a video conference instead of a physical meeting.	2
	4	Intensify use of transport resources	Reducing the number of vehicles needed to transport employees to a given location by encouraging car sharing/ridesharing, for example. This lowers the number of cars needed and also reduces the number of 'empty seats' on the road, which in turn makes for more efficient fuel use and less inconvenience (risk of congestion) in public spaces.	1
	5	Reduce resource-intensity transport movements	Ensure that the demand for mobility is met by modes of transport with the lowest possible material and energy intensity over the life cycle. In this, the means of transport with the lowest amount of mass per kilometre travelled is preferred, where you include in the mass both the fuels and the mass of the vehicles depreciated over the life cycle.	2

	6	Reduce pressure on mobility infrastructure	Provide mobility demand with types of transport modes and times of transport that cause the least amount of pressure on mobility infrastructure. For example, avoiding automobility in regions with high congestion or travelling by public transport at times outside the rush hour.	0
Circular inflow	7	Sustainable raw materials and fuels for transport movements	Provide mobility with means of transport that contribute as little as possible to the depletion of resources (by focusing on secondary and renewable materials and avoiding critical materials) and avoid embedded negative impacts on people and the environment as much as possible. In the case of means of transport, also include the additional infrastructure in your own management (e.g., charging stations). Also ensure that provision for mobility takes place with means of transport that use fuels with the lowest possible negative impact on people and the environment. So, fill in the total land and fuel consumption over the life cycle as sustainably as possible.	1
Secure future reuse	8	Increase the potential value retention of means of transport	Put materials in transport vehicles to the highest possible use for a new function elsewhere once they are released at the end of their functional life cycle. Prioritize reuse, refurbish, remanufacture, repurpose and recycle, respectively, and avoid incineration and landfill as much as possible. To increase the potential of this highest-quality reuse, the following factors, among others: detachability, technical service life, quality, standardized and modular sizing, and the prevention of toxicity must be taken into account.	1
Utilize the outflow	9	Value preservation of outgoing modes of transportation	Modes of transport released from a circular building (including the additional infrastructure in your own management) are put to the highest possible use at the time of release, in a new function elsewhere. Prioritize reuse, refurbish, remanufacture, repurpose and recycle, respectively, and avoid incineration and landfill as much as possible. Also, consider the environmental benefits of repurposing.	1

ECOSYSTEMS AND BIODIVERSITY	Nr.	Sub-strategy	Sub-strategy objective	Score
Protect	1	Reduce the loss of biodiversity from use- and building-related activities to within planetary limits	A circular building actively engages in reducing biodiversity loss in and around the asset during the use phase, with the goal of staying within the planetary boundary. Take into account the diversity and density of different types of ecosystems and biodiversity in the environment, and the embedded biodiversity loss in materials and products used in the use phase.	**2**
	2	Reduce greenhouse gas emissi-ons through use- and building-re-lated activities to within planetary limits	In a circular building, you actively commit to reducing scope 1, 2 and 3 greenhouse gas emissions during the use phase. This includes direct emissions from use and indirect emissions embedded in goods and services. Make sure that emissions and targets (with matching measures) are at least in line with a 2-degree scenario, and preferably with the 1.5-degree scenario (for example, by designing targets and monitoring in line with the guidelines of the Science-Based Targets initiative).	**2**
	3	Reduce nitrogen and phosphate emissions from use- and buil-ding-related activities to within planetary limits	A circular building actively engages in reducing direct and indirect nitrogen and phosphate emissions, with the goal of staying within the planetary boundary. In doing so, nitrogen and phosphate emissions must not impair the restorative capacity of the ecosystems into which they enter. In doing so, take into account the direct and indirect removal of nitrogen from the atmosphere (e.g., through fertilizer production for catering food or combustion engines of the vehicle fleet) and the direct and indirect leaching of phosphate into oceans (e.g., due to leaching during the cultivation of catering food or losses from wastewater treatment).	**0**

Protect	4	Reduce the ozone-depleting emissions from use- and building-related activities to within planetary limits	A circular building actively engages in reducing direct and indirect emissions of ozone-depleting substances, with the goal of staying within the planetary boundary. For example, direct (from coolants, for example) and embedded emissions from products and services.	0
	5	Reduce the chemical emissions from use- and building-related activities to within planetary limits	A circular building actively engages in reducing direct and indirect emissions of toxic materials, with the goal of staying within the planetary boundary in which chemical emissions do not cause disturbance to ecosystems. These include wear and tear and evaporation of products during use, the use of plastics that end up in the environment after use, or the purchase of products that produce toxic emissions during production.	1
	6	Reduce the aerosol-causing emissions from use- and building-related activities to within planetary limits	A circular building actively engages in reducing aerosol-causing emissions, with the goal of staying within the planetary boundary. An aerosol is a mixture of dust particles or liquid droplets in a gas. Aerosols have a direct and indirect effect on climate change and health.	0
	7	Reduce the freshwater extraction from use- and building-related activities to within planetary limits	In a circular building, you actively commit to reducing the extraction of freshwater, with the goal of staying within the planetary limit. In doing so, the extraction is in balance with the natural carrying capacity of the relevant aquifers (aquifers in the subsurface) or bodies of water. In this way, freshwater resources can sustainably meet the demands of both the humans and the local ecosystems that depend on them. To achieve this, this sustainable water balance must be secured for both the direct building- and use-related activities, and for the indirect withdrawals for the production of the required products.	0
	8	Reduce change in land use from use- and building-related activities to within planetary limits	In a circular building, you actively commit to reducing land use change from natural vegetation, to less biodiverse uses Again, with the goal of staying within the planetary boundary. Land use change is mainly caused by increasing urbanization and the growing demand for agriculture. So, among other things, the use of space and the catering of a circular building take this into account.	1

Strengthen	9	Strengthen local habitats, biodiversity and ecosystems	A circular building not only counters biodiversity loss, but also actively contributes to supporting the ecosystems and biodiversity in and around the asset. This includes the diversity and density of different types of ecosystems and biodiversity that are added and maintained.	**2**
Connect	10	Connect habitat elements to native and migrating species	To enhance the quality and resilience of locally present ecosystems, in a circular building, ensure that the habitat elements (and thus available niches) present match native species and routes of migrating species.	**0**
Value	11	Value the added value of ecosystem services	In a circular building, you recognize the added value of ecosystem services and internalize it in its value proposition. These include the cooling of green roofs, particulate matter capture by plants on the lot, water buffering in wadis, the calming effect of greenery in the building and CO_2 storage in trees. This understanding and appreciation provides incentives for exploring synergies and optimizing the added value of biodiversity.	**0**

HEALTH AND WELL-BEING	Nr.	Sub-strategy	Sub-strategy objective	Score
Protect	1	Avoid the use of toxic materials	In a circular building, you avoid the presence of toxic materials that can affect the health and well-being of the user.	**2**
	2	Prevent toxic emissions and nuisance from use- and building-related activities	In a circular building, you avoid direct and indirect toxic emissions and nuisances from building and use-related activities, which can affect the well-being of the user. These include particulate matter from transportation, litter, and noise pollution from maintenance activities.	**2**
Strengthen	3	Reinforce a healthy indoor environment and pleasant experience for users	In a circular building, you do not only provide a healthy indoor climate (through mechanical and electrical systems aspects), but you also include the empirical experience of the users. This includes daylighting, air quality, thermal comfort, acoustic comfort and other issues that help determine the experience value for the users.	**0**
Connect	4	Provide access to rest, recreation and exercise	In a circular building, you provide access to rest, recreation and exercise for users and visitors. You can either flesh this out internally, or with routes and connections to external facilities.	**0**
	5	Provide access to healthy food	In a circular building, you provide access to healthy food for users and visitors. Involve at least the catering and hot and cold beverage facilities.	**0**
Value	6	Value the added value of health and well-being.	In a circular building, you recognize the added value of health and well-being and internalize it in its value proposition. This means understanding the health, well-being and satisfaction of the building's occupants. As a value in itself, but also in relation to employee productivity. This understanding and appreciation provides incentives for exploring synergies and optimizing the added value of health and well-being.	**0**

CULTURE & SOCIETY	Nr.	Sub-strategy	Sub-strategy objective	Score
Protect	1	Protect unique cultural and architectural elements and aesthetics	With a circular building, you can help protect historic, cultural and aesthetic value by preserving unique elements that represent a valuable experiential value to the community.	1
Strengthen	2	Strengthen the co-determination and participation of relevant stakeholders	In a circular building, you actively commit to transparent and participatory decision-making with all relevant stakeholders, in decisions that have implications for the use and management of the asset.	0
	3	Strengthen the adaptive capacity of building users and managers	In a circular building, you are able to anticipate potentially fluctuating wants and needs within the community in that building and of the environment. For example, the impact of (local) political changes or trends and fluctuations in the economy, for the optimization of the asset itself and how you use and manage it. Adaptive capabilities of building users and managers include, for example: having a mix of functions, so that not all tenants fall away when a specific sector shrinks, or the ability to collectivize or outsource functions when there is major growth of an organization within the building.	2
Connect	4	Facilitate social cohesion and collective facilities	In a circular building, you deploy shared and collective facilities and services to reduce material use, but also to increase connection and social cohesion among users and visitors.	1
	5	Ensure the accessibility and inclusiveness of the functions offered by the building	A circular building offers a diverse set of users and the environment access to its functions. By doing so, you ensure that your asset's social role for the local community is enhanced.	0

Value	6	Value added social and societal value	Recognize the added social and societal value of a circular building and internalize it into its value proposition. Examples include appreciation of its offered positions and contribution to employment in specific sectors (e.g., the Social Return on Investment). This understanding and appreciation provides incentives for exploring synergies and optimizing the added social and societal value.	**0**
	7	Value added cultural and historical value	Recognize the added cultural and historical value of a circular building and internalize it into its value proposition. This includes the unique aesthetics or cultural initiatives that are given space in the building or stimulated by its activities. This understanding and appreciation provides incentives for exploring synergies and optimizing the added cultural and historical value.	**0**
	8	Value local knowledge and skills and contribute to the local economy	Recognize the value of the use of local knowledge, expertise and businesses for a circular building and internalize it in its value proposition. Take, for example, collaborations with local knowledge institutions for specific issues or purchasing circular goods from local entrepreneurs. This understanding and appreciation provides incentives for exploring synergies and optimizing the added value for the local (circular) economy.	**0**

ANNEX IV

FRAMEWORK FOR CIRCULAR EXISTING BUILDINGS

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