NHC3 SERIES OF FACT SHEETS FOR PROFESSIONALS INVOLVED IN THE CONSTRUCTION BUSINESS:

- Key aspects of toxicity, circularity, climate neutrality in buildings
- Chemicals-health connections – how to interpret Safety Data Sheet
- Building process from the design to construction
- “Hot spots” in buildings
- Thermal insulation materials
- Ecolabels
- Ecocertification of buildings
- Product databases and platforms
- NonHazCity Building Material Catalogue for tox-free construction

NHC3 GOA1.3. DELIVERABLE D.1.3

THE NONHAZCITY DRAFT SET OF PRACTICAL GUIDES FOR SUSTAINABLE CONSTRUCTION AND CONSTRUCTION MATERIALS

DECEMBER 2023

Interreg Baltic Sea Region

Co-funded by the European Union

SUSTAINABLE WATERS NonHazCity 3

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KEY ASPECTS OF TOXICITY, CIRCULARITY, CLIMATE NEUTRALITY IN BUILDINGS

Striving for sustainable construction the aspects of toxicity, climate neutrality and circularity must be considered in a holistic approach and sustainability criteria incorporated in the construction sector practices. The NonHazCity3 is contributing to construction approaches for our health and the health of the environment.

THREE PILLAR APPROACH

The key focus of the NonHazCity3 is on the three pilar approach for tox free, circular and climate neutral construction:

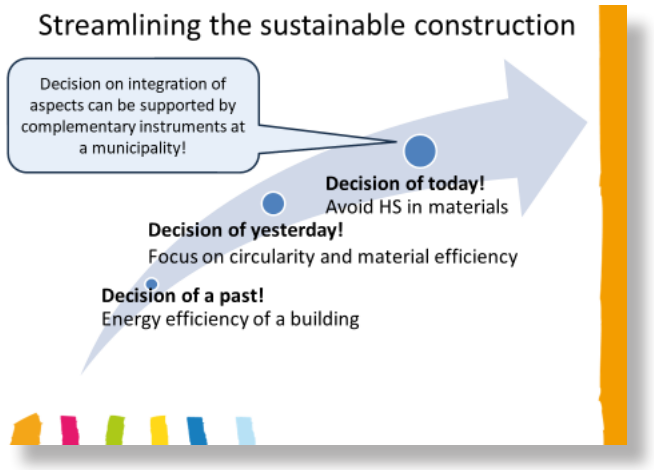
Tox free construction is a construction that avoids hazardous substances in materials or finishes and therefore reduces the impact buildings have on human health and environment, especially the aquatic environment.

Circularity concept of a closed-loop system for resources, materials, and products, which maintain the value and utility of resources and products for as long as possible, minimises waste and maximises resource efficiency. It promotes recycling, reusing, refurbishing, and sharing, while prioritizing easy repair, upgradability, and disassembly. It aims at removing hazardous substances (HS) from the material cycle to enable a circular economy that reduces environmental impact.

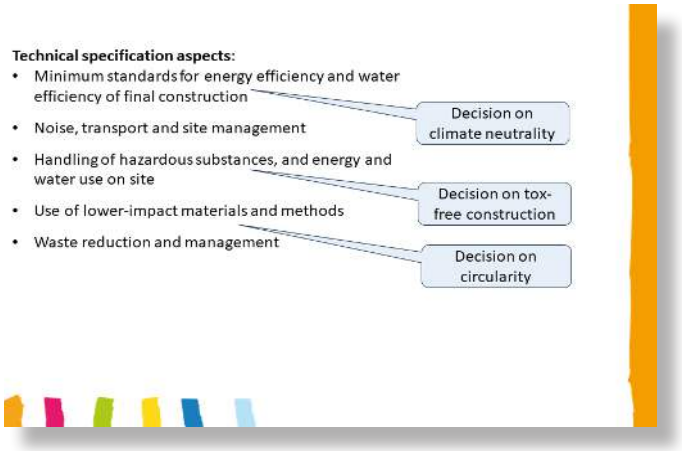
Climate neutrality concept of a state in which human activities result in no net effect on the climate system. Achieving such a state would require balancing of residual emissions with emission (carbon dioxide) removal as well as accounting for regional or local, biogeophysical effects of human activities that, for example, affect surface albedo or local climate.

STREAMLINING THE SUSTAINABLE CONSTRUCTION

Following the trends of the EU policy towards reaching the Sustainable Development Goals (SDGs) requirements towards the construction process have developed raising from the demand to increase the energy efficiency of buildings and continued with focus on circularity and material efficiency aspects. Requests for avoiding hazardous substances in materials can be considered as a decision of today.



Ensuring sustainable construction practices all three aspects of tox-free, circularity and climate neutrality shall be addressed in a holistic approach and included in requirements of technical specification in public procurements. The primary responsibility is to ensure compliance with the regulatory framework. Green public procurement (GPP) is a tool for public authorities to develop a set of more ambitious environmental criteria for construction based on a life-cycle approach and scientific evidence.



INTERACTION OF STAKEHOLDERS

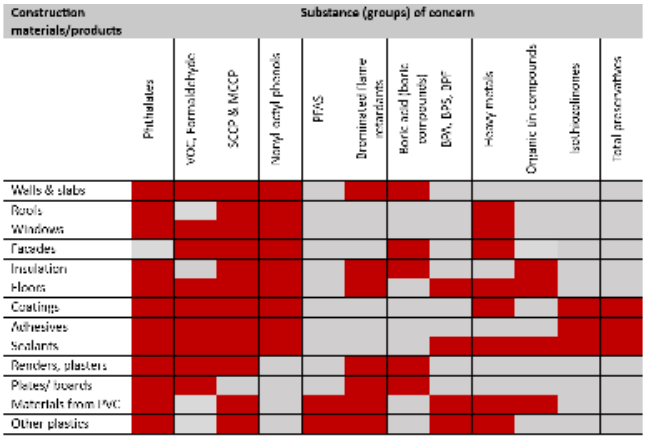
Construction process seeks for two-way interaction of wide range of actors. Municipalities act as clients setting the requirements based on their needs and the level of ambition.

Construction professionals (architects, engineers, manufacturers, suppliers) shall provide technical solutions and ensure supplies of construction materials within reasonable time frame and scale. By discussing the vision and getting feedback on opportunities and limitations in existing and projected technologies and materials, municipality gets an opportunity to refine their ambition and adjust their requirements. Construction professionals get acquainted with the long-term development plans of the public sector.

Tools suitable for maintaining communication and ensuring the feedback loop are increasingly applied by municipalities. Market dialogue is taking place at an early planning stage to exchange on the state of the art in the construction market. Market consultations are initiated close to opening the procurement process to adjust requirements in technical specification. Important aspect: participation in communication shall not provide any advantages during the procurement process.

TOX-FREE CONSTRUCTION

Avoiding HS in materials is underlaying the construction approach to meet circularity goals allowing to re-use and recycle the products and reduce exposure of construction workers during the construction process and of tenants during exploitation of a building. Toxicity considerations are high in focus in the Nordic countries where limits are set for range of substances. Nordic Swan Ecolabel of buildings limits the presence of certain substance groups of concern in various construction materials and products.



In majority of construction product groups limits are set for Phthalates, VOC, Formaldehyde, short and medium chain chlorinated paraffins, nonyl-octyl phenols.

Although hazardous substances can be added to construction materials to obtain certain properties, principle of sustainable construction calls for looking of safer alternatives. NonHazCity3 would like to suggest sources for inspiration: **Building Material Catalogue for tox-free construction and Byggvarubedömningen® database**

DO'S & DONT'S

- Keep update on technological developments and range of materials related to toxfree, circular and climate neutral construction.
- Actively use chance for communication with stakeholders on market readiness to provide sustainable solutions considering the three-pillar approach in construction.
- Considering alternatives for construction materials avoid silo evaluation approach.

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CHEMICALS-HEALTH CONNECTIONS – HOW TO INTERPRET SAFETY DATA SHEET

Many chemicals in mixtures (paints, varnishes, adhesives etc.) can be harmful to your health. Some substances can cause cancer, influence the hormone system, cause allergies and irritation. Individuals completing work in construction are often tasked with handling a variety of construction chemicals, some of which can be hazardous if improperly used. Safety Data Sheet (SDS) provides you the necessary information you need to know before you start to use chemical.

CONSTRUCTION CHEMICALS WITH SDSS

Legislation requires SDSs for hazardous chemicals or mixtures. The relevant mixtures in construction that have SDS are for example: adhesives, sealants, varnishes, paints, solvents, PU foams, wood preservatives, silicones, cement, concrete etc.

An SDS is not provided for construction materials (e.g. floor coverings, insulation plates etc) other than chemicals. You can get information about them from the EPD (Environmental Product Declaration).

WHAT INFORMATION IS IMPORTANT TO KNOW

SDS includes 16 sections with physical, health, and environmental hazards; safety precautions for handling, storing, and transporting, provides guidance for Personal Protective Equipment (PPE), first aid and spill clean-up procedures.

The most important sections are:

- Section 2. **Hazards identification**
- Section 3 **Composition/ information on ingredients**
- Section 8. **Exposure controls/personal protection**

➔ Check Sections **2, 3** and **8** of the SDS to find out about the hazards to your health and the safety precautions that need to be used.

SAFETY DATA SHEET

CleanIt

Date of Issue:

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier:

1.2 Relevant identified uses of the substance or mixture and uses advised against:

1.3 Details of the supplier of the safety data sheet:

1.4 Emergency telephone number

2. Hazards Identification

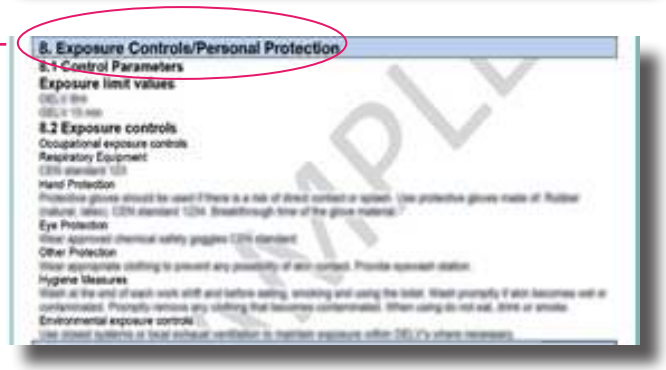
2.1 Classification of the mixture:

2.2 Label elements:

2.3 Other Hazards:

3. Composition/Information on Ingredients

Name	EC No.	CAS No.	Content	Classification
ABC			<1%	
XYZ			>99%	



8. Exposure Controls/Personal Protection

8.1 Control Parameters

Exposure limit values

8.2 Exposure controls

Occupational exposure controls

Respiratory Equipment

Hand Protection

Eye Protection

Other Protection

Hygene Measures

Environmental exposure controls

HOW YOU CAN JUDGE IF IT IS HAZARDOUS CONSTRUCTION CHEMICAL – SECTION 2

Section 2 of SDS is the most important section because it enables you to judge if it is a hazardous construction chemical. It contains the hazard classification and the hazard communication elements. Classification includes hazard categories, hazard classes and hazard statements. Pictograms alert users of the chemical hazards to which they may be exposed.

Pictograms for Health Hazards are:

 Acute toxicity (severe)	 Corrosive (Skin corrosion/burns, eye damage)
 Carcinogenic Mutagenic Reprotoxic Respiratory Sensitization Target Organ Toxicity Aspiration Toxicity	 Irritant Dermal Sensitizer Acute toxicity (harmful) Narcotic Effects Respiratory Tract Irritation

- In order to prevent the hazards to your health, try not to use such construction chemicals, which classified for example as Carcinogenic, Mutagenic, Reprotoxic, which have severe acute toxicity or target organ toxicity.
- If possible, use the alternatives, mixtures with the same function but with less classified hazards.

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HOW TO IDENTIFY "NOT NICE" CONSTRUCTION CHEMICALS

Certain concentrations of hazardous substances could be legally contained in different mixtures. Although each of the mixtures may be chemically safe, it is still important and good for your health if you use construction mixtures with a low content of hazardous chemicals.

Check the information about the ingredients and their classification from the table in Section 3.

Some examples of "not nice" ingredients:

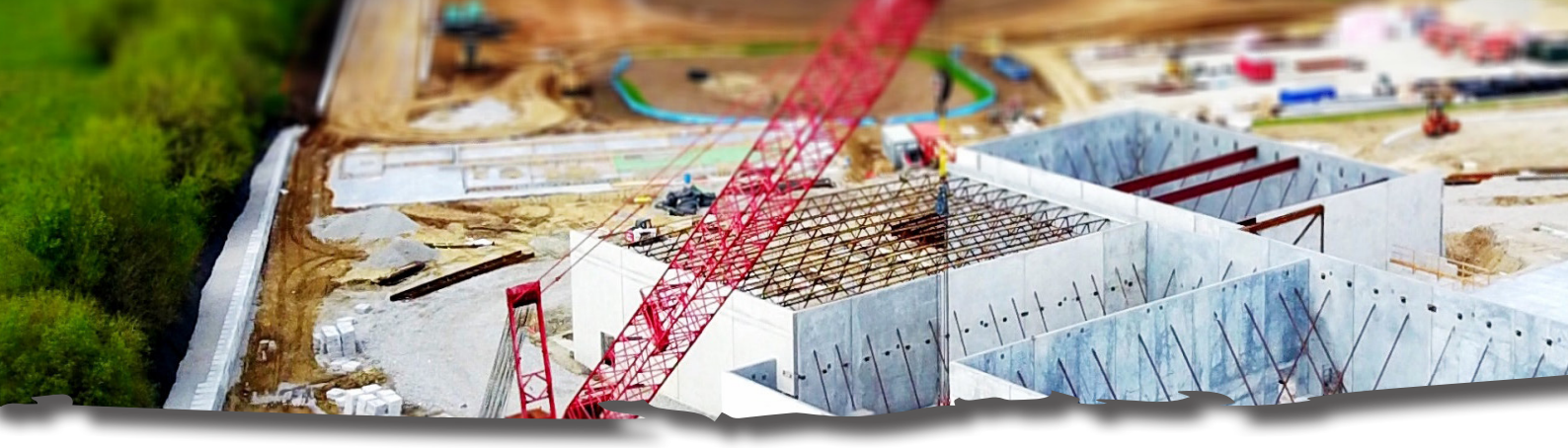
Volatile organic compounds (VOCs), used as solvents in paints or varnishes (acetone, toluene, benzene, xylene, ethane-1,2-dithiol, n-butyl acetate etc), are substances that evaporate during and after painting. When inhaling paint or varnish fumes health effects like nausea, fatigue, headaches, skin and eye irritation might occur.

Formaldehyde-releasing preservatives (quaternium-15, DMDM hydantoin, imidazolidinyl urea, diazolidinyl urea, polyoxymethylene urea etc) slowly release formaldehyde. Formaldehyde-releasers are added to prevent microbial growth and extend shelf life. Formaldehyde causes cancer, irritates the nose, eyes and throat. These irritations can happen even when exposed to low levels of formaldehyde.

Isocyanates (toluene diisocyanate, methylene diphenyl diisocyanate) are used in the production of foams, they also used in adhesives and sealants and coating products. Isocyanates classified as potential human carcinogens and known to cause cancer, skin irritation; they may cause an allergic skin reaction, may cause allergy or asthma symptoms or breathing difficulties if inhaled and may cause respiratory irritation.

DO'S & DON'TS

- Use water-based paints.
- Wear the necessary PPEs when using a hazardous construction chemical. Check from Section 8 in SDS about the necessary PPEs.
- Avoid VOCs, choose mixtures with low or no VOC (less than 10 g VOCs per Liter).
- No formaldehyde-releasing preservatives.
- No health-harming ingredients: isocyanates, isothiazolinones, ethylene glycol, formaldehyde, phthalates, bisphenol A, suspected endocrine disruptors (e.g. alkylphenol ethoxylates).



BUILDING PROCESS FROM THE DESIGN TO CONSTRUCTION

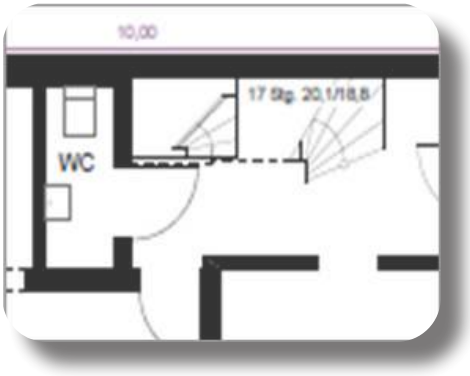
What to consider in which phase of construction to reach the goal of a building with the tox-free, circular and climate neutral standards? Climate neutral construction means more than a well-insulated building envelope. It also means an efficient use of the building and all materials. In a holistic sense, it is worth to think about the second use of the planned building (e.g., re-use of a kindergarten for elderly people, when demographic situation changed) or its demolishing. This goes hand in hand with the aspect of circularity. Circularity only truly makes sense when toxic substances are not dispersedly distributed from one product to the entire material stream. Circularity needs a tox free construction. At the other hand, all three aspects climate neutrality, circularity, tox free means more than a careful selection of materials. It is worth to consider all aspects as soon as possible in the process of planning and implementation. This fact sheet gives ideas for the decisions - what to consider in which phase of the building process from the design to construction. The aspects highlighted here are comparable to principles of soil saving, climate adaptation or other aspects of sustainability.

PHASE OF CONCEPTUAL PLANNING

"Starting as soon as possible" means to consider several aspects already at an early conceptual planning stage.

The following decisions shall be made on:

- possibilities to re-use an existing building;
- extend of renovation or demolition of old buildings based on LCA calculation of variants;
- size of the building for new construction and consideration of soil saving aspects;
- certification system, eco standard etc. or other external party verification;
- team of specialists to be involved to follow certain aspects;
- documentation type of the construction process and use of materials (log-book).



PHASE OF DESIGN

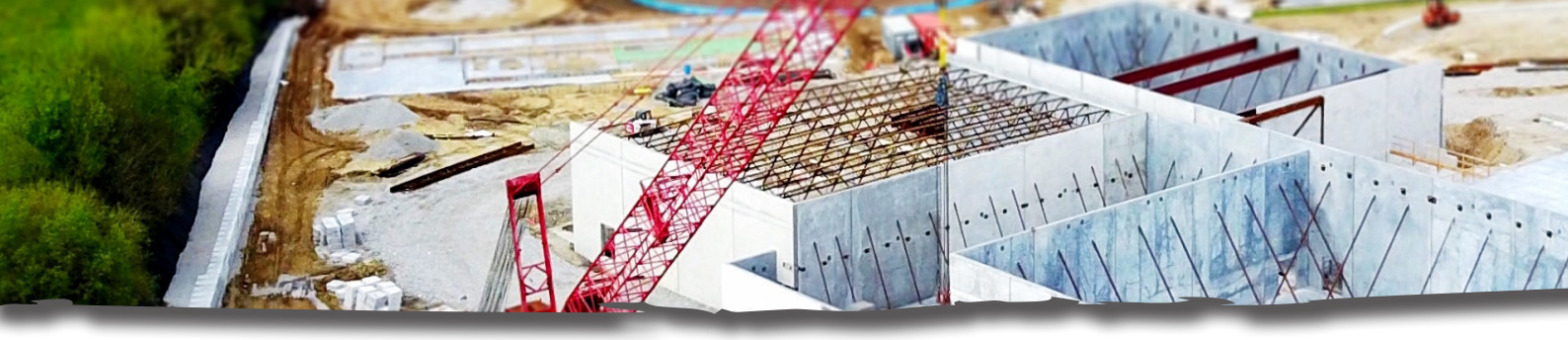
During the design phase decisions are to be made on shape of the building concerning compactness and good use of daylight, grouping of parts of the building, rooms and access areas considering soil and material saving aspects as much as possible. It must be checked if the rooms can be used flexible in case of the change of the original need. Decisions shall be taken on orientation of windows to ensure maximums solar gains, natural shading, cross ventilation.

Possibilities to prevent occurrence of "hot spots", e.g., insulation of a heated basement should be considered. Decision on shape of the roof shall be taken to prevent the outer walls against stormwater to reduce the need of use of biocides to prevent algae growth.

Decision on materials shall be taken considering regional/local aspects. It should be checked if:

- all building elements can be separated easily in case of demolition;
- ecological insulation materials could be used;
- characteristics of insulation material (thermal mass) ensures preventing also overheating in summer.

During the design stage, decision on heating, cooling, and ventilation concept (traditional heating system vs passive house concept/use of renewable sources) must be taken along with sustainable rainwater management considerations.



When deciding on roof structure, it should be checked if:

- all layers of the construction are “fitting” to building physics (vapor barrier etc.);
- green roof is a possible option;
- durability of roofing materials is appropriate;
- characteristics of insulation material (thermal mass) ensures preventing also overheating in summer.

Tasking decision on floor construction, it should be checked if:

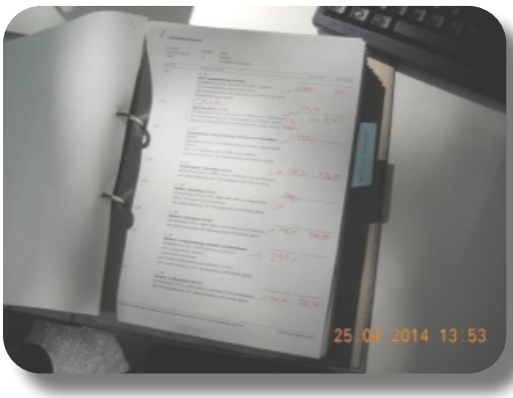
- glues /PVC containing materials can be avoided;
- natural or eco labelled materials for final coating can be applied.

Detail planning of all connecting points for prevention of thermal bridges shall be performed. Characteristics of all membranes and glues shall be checked.

Tendering specification requirements must be carefully checked e.g., requirements for materials that meet the standard of an ecolabel or certificated material (BVB/Nordic swan etc); fixation without glues; safe and sustainable site management.

PHASE OF CONSTRUCTION

During the construction/refurbishment/ extension processes it is important to spot the group of actors: who is responsible for which type of control and task implementation. Regular meetings with the involved actors should be organised. Beside the traditional journal on construction, filling of a logbook for a building should be considered. It is important to perform regular checks (e.g., by checking invoices) if all materials are delivered and installed according to requirements.



PHASE OF VERIFICATION

Verification phase can comprise implementation of additional tests for quality control e.g., blower door test. Procedures for monitoring of results e.g., energy efficiency shall be established.

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HOT SPOTS IN BUILDINGS

The so-called hot spots are critical areas within a building where risks related to toxicity, embodied emissions, heat losses, or circularity are heightened. These can vary between building types and different rooms; for instance, in wet rooms, the choice of materials and finishes may impact both toxicity and circularity. Identifying these hot spots is crucial for ensuring the health of occupants and the sustainability of the building itself. Preventive measures, such as selecting suitable materials and adopting proactive maintenance practices, play a vital role in mitigating these risks

TOXICITY HOT SPOTS

The toxicity hot spots indicate areas where the risk of exposure to harmful substances is heightened. Although individual pieces of furniture or building elements can be potentially hazardous, the main areas of concern are large mono-material surfaces or objects.

One critical area is the finishes and coatings of walls, ceilings and floors. Here products such as paints and varnishes can introduce volatile organic compounds (VOCs) into indoor environments. Opting for low-VOC or VOC-free alternatives is advisable to mitigate indoor air pollution. Similarly, careful consideration of adhesives and sealants is necessary, as certain products may emit harmful chemicals. Choosing options with low emissions or exploring non-toxic adhesive solutions contributes to a healthier indoor environment.

Flooring materials also represent a noteworthy toxicity hot spot. Carpets, for instance, which are made with synthetic materials can contain PFAS (Per- and polyfluoroalkyl substances) in the case of their treatment for stain, soil, water resistance. PFAS are persistent in the environment and cause toxic effects on people. Also, PVC linoleum is problematic, it can emit VOCs after installation.

No matter of the selected interior finishes and treatments, it is important to ensure sufficient air exchange rate. For this, replacement of ventilation system filters, according to the requirements of the system, is important.

Beware of the chemical cocktail effect. This is an exposure caused by interaction of several (hazardous) chemicals. Usually, cocktail effects are unknown or not well studied. This can include the emissions or off-gassing from different materials, finishes, or products used in construction or interior design. For instance, a toxic cocktail in a building might result from the combination of paints with high levels of volatile organic compounds (VOCs), adhesives releasing formaldehyde, and certain flooring materials emitting harmful chemicals. The synergy of these elements can potentially create an environment where the cumulative effect of various toxins becomes more significant than the individual impact of each.

EMBODIED EMISSION AND HEAT LOSS HOT SPOTS

Embodied emissions and heat loss hot spots in a building can vary depending on factors like building type, climate, and local regulations. These also contribute significantly to a building's environmental impact and energy efficiency.

As such, the primary hot spot of embodied emissions is the load-bearing structure of a building. To be exact, these contribute between 30 and 80% of the total embodied emissions of buildings [source]. To reduce this impact, LCA (life cycle assessment) and material flow analysis already in early design stages can be done, when selecting materials and manner of construction. LCA allows to compare various material alternatives and the respective CO2 footprint of these. While material flow analysis allows to find reusable materials in the proximity as well as potential for reuse or recycling after the building's end of life. This contributes to a more circular construction sector and allows to reduce other environmental impact such as resource depletion, when paying attention where the materials are sourced and do these locations support sustainable business models.

Overall, avoid unnecessary treatments of materials to reduce not only the toxicity but also enable reuse and recycling in future. This also includes prioritising mechanical connections that allow for easy disassembly.

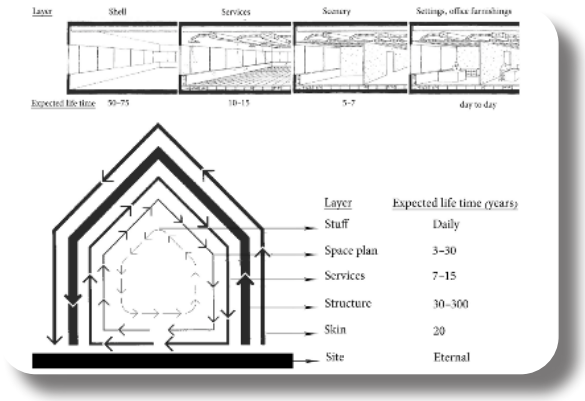
Poorly planned building envelope can be responsible for large heat losses. Attention must be paid to insulation, airtightness, windows and doors. However, hot spots might occur where various building elements are joined such as exterior wall corners, joinery between wall and a balcony etc. Here it is important to conduct three dimensional heat and moisture studies.

In case of cultural heritage, a very careful assessment must be done, to find solutions that do not compromise the value of the heritage and contribute towards the efficiency of the building.

CIRCULARITY HOT-SPOTS

In the realm of building design, circularity hot spots emerge as pivotal areas where the principles of a circular economy can be strategically applied, or conversely, where challenges to circularity may arise. These hot spots are influenced by factors such as building types, material use, and planning for adaptability.

Circularity is intricately tied to material selection and assembly methods. A fundamental hot spot is identified in areas where building layers are not separated, aligning with Duffy and Brand's shearing layers concept from the 1990s. This approach factors in the expected lifetime of different building layers, ensuring adaptability over the building's lifespan. [image source]



Another critical consideration is locating hot spots based on the largest material volume and/or weight. These materials demand careful scrutiny, focusing on established reuse or recycling infrastructure. Moreover, their assembly should facilitate disassembly without cross-contamination with other materials. For example, insulation boards glued to load-bearing construction can impede the circularity of the underlying construction materials.

CHECKLIST

- Identify the largest mono-material or surfaces per room and pay the highest attention to selecting non- or low-toxicity materials and treatments for those.
- Pick flooring, wall and ceiling finishes that do not require the use of adhesives for installation;
- Look for natural alternatives when possible;
- Look up material specifications and toxicity information in data sheets. If none provided, reach out to distributor or the producer with an inquiry;
- Ensure sufficient air-exchange rate for indoor spaces;
- Use LCA and material flow analysis to find the best solutions for low embodied emission and circular load-bearing structure;
- In building element connections that face exterior, use three dimensional thermal and moisture modelling;
- Avoid unnecessary treatments of materials and finishes;
- Prioritize mechanical connections between building elements and materials
- When planning, use Duffy and Brand's Shearing layer diagram to ensure building's and its materials circularity;
- When picking materials, clarify if these have established reuse and recycling options.

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THERMAL INSULATION MATERIALS

Many kinds of natural and synthetic materials are used as thermal insulation in modern construction that enable us to achieve good thermal properties of buildings. Several synthetic options like polystyrene, polyurethane foam are among the most popular choices, as well as their natural material-based counterparts like mineral wool and cellulose wool. Meanwhile materials such as wood fibre, expanded clay and other natural-based materials are gaining popularity as building sustainability is becoming increasingly more important topic in Europe. But which are the best choices from hazardous chemical and circularity perspective? In this factsheet we will discuss main insulation material types and their qualities from the 3 pillars perspective (Circularity, Climate, Chemicals). Engineering issues, however, are not a subject of this factsheet.

MAIN QUALITIES OF INSULATION MATERIALS

Insulation materials are rated by several of their key properties that define their insulation performance:

- **thermal conductivity (W / m . K)**. The smaller the value, the less heat a material conducts, and the better it insulates. Poorer thermal properties are compensated by a thicker layer of material;
- **thermal storage capacity.** The greater the thermal storage capacity, the more heat a material can absorb and release with a time delay, thus buffering temperature spikes;
- **vapour permeability.** As a general guidance synthetic insulation has non- to low vapour permeability, mineral insulation has low vapour permeability and natural organic materials have a good vapour permeability;
- **fire resistance**. Materials are classified according to their fire behaviour according to DIN 4102-1 standard. Materials are required to correspond to certain fire safety classes if they were to be used in construction.

SYNTHETIC INSULATION MATERIALS

Typical materials include: **Polystyrene (EPS and XPS)**, **Polyurethane (PU)**, **Poliisocyanourate (PIR)** insulation, **Phenolic** foam.

- Advantages:
- cost-effectiveness;
- good thermal insulation properties.

Disadvantages:

- based on petroleum, a finite non-renewable resource associated with detrimental environmental effects during extraction and processing, including habitat destruction, pollution, and greenhouse gas emissions;
- energy intensive production, high GWP;
- typically treated with hazardous chemicals, thus post-use recycling potential is impeded;
- synthetic (polymer) insulation materials can emit hazardous residual monomers, additives, such as flame retardants stabilizers, and plasticizers;
- in case of fire – toxic chemicals are produced;
- poor overall sustainability.

Polystyrene and **polyurethane** insulation is discussed in more details as they pose significant environmental and human health challenges:

Polystyrene (EPS and XPS) offers excellent insulation properties but poses significant environmental and health concerns. It is fossil fuel based and is manufactured using hazardous chemicals, including extremely harmful brominated or organophosphorus flame retardants. Polystyrene can break easily into small pieces and is further degraded by Sun's UV to form microplastic particles that are detrimental for biota. Due to these properties, meticulous construction site management is necessary to prevent pollution with PS particles. Polystyrene waste could theoretically be recycled, but almost never is due to challenges in collecting and disposing and due to hazardous chemical contamination.

Polyurethane (PU) insulation is available as rigid PU boards (open-cell or closed-cell), PU foam and PU spray foam. Typically, PU is formed by combining two chemicals: isocyanate and polyol – both petroleum-based. PU itself is chemically inert, but it's components pose serious health risks during the PU production and application of the spray foam. Thus, PPE for construction workers is necessary to avoid breathing hazardous fumes. Different PU formulations exist yielding PU with different properties. In most cases PU is treated with flame retardants that are hazardous to human health and the environment. PU is recyclable, PU boards are reusable, but in most they are disposed with the construction waste, as recycling is currently impractical. The circularity PU products needs to be advanced.

MINERAL-BASED INSULATION

Typical materials: **mineral wool** (glass and rock wool), **glass foam**, **expanded clay**.

Advantages:

- mineral resources for insulation production are more abundant compared to fossil fuels;
- less detrimental resource extraction;
- typically contain no or minimal amounts of hazardous additives;
- non-combustible (no flame retardants) and resistant to decay (no preservatives);
- mineral insulation materials hold significant circularity potential, they can be recycled and repurposed (reused).

Disadvantages:

- energy intensive production, significant GWP (lower than synthetic insulation materials);
- If PPE is lacking, handling can lead to skin, eye, and respiratory irritation and damage due to tiny fibres.

NATURAL ORGANIC MATERIAL BASED INSULATION

Typical materials: **cellulose** (wood or paper wool), **wood fibre**. Others: **flax**, **hemp**, **hempcrete**, **straw**. Key points are discussed below:

Advantages:

- based on renewable resources;
- high availability of natural materials (plants);
- plant growth captures CO_2 (carbon storage);
- demand less energy during production compared to synthetic or mineral insulation;
- efficient use of resources (can be made from waste (paper) or residue materials of some plants, for example, straw, shives from linen/ hemp fibre production, wood residues);
- with proper preparation, use and protection can be durable insulation materials;
- most of these insulation materials can be re-used, provided they are intact, not spoiled, and uncontaminated.

Disadvantages:

- hemp, flax or cotton raw materials will require cultivation areas, potentially competing with food crop production;
- depending on the region, plant type and conditions, raw material production may require water consumption, pesticide use, and fertilizer application;
- cellulose insulation may contain fungicides;
- most commercially available materials may contain chemical additives such as flame retardants and preservatives, thus materials should be selected on the case-by-case basis to avoid hazardous chemicals;
- at the end-of-life cellulose based materials or other chemically treated materials are not usually recycled or composted due to the content of chemicals additives;
- natural fibre-polymer composite insulation materials are sometimes produced for better mechanical properties, but these materials have associated circularity challenges.

OVERALL ASSESSMENTS AND CONCLUSIONS

- Hazardous chemical treated materials (e.g. with flame retardants, stabilisers, preservatives, etc.) pose significant health and environmental risks and should be avoided as much as possible. Untreated natural organic material-based insulation or mineral-based insulation are the safest options.
- Most materials can be reused, only a few can be recycled, that are not chemically treated and would not contaminate the recycling stream. A lot depends also on the best practices during the construction (determining if the material can be recovered).
- Natural organic material-based products have the lowest GHG footprint, followed by mineral-based insulation materials and synthetic materials that have the highest GHG footprint.

DO'S & DON'TS

- Materials should be checked on case-by-case basis regarding chemical additives. If there is doubt - opt for ecolabeled insulation product.

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ECOLABELS

In today's eco-conscious landscape, there are three key categories of ecolabels and certifications: Proprietary Ecolabels by Companies, Voluntary Ecolabel Schemes, and Environmental Product Declarations (EPDs). These labels provide essential guidance for consumers and companies seeking sustainable practices. Additionally, the CE marking is recognized within the European Union as a label ensuring conformity for construction products and the CE marking is compulsory for most construction products to sell them on the European Internal market.

ECOLABELS BY COMPANIES

In some cases, companies opt to create their own ecolabels or in-house sustainability certifications to communicate the environmental attributes of their products. These proprietary ecolabels are inherently tied to the company's interests and are distinct from standardized and externally regulated labels. While they may serve as effective tools for branding and product differentiation, it's important to exercise a degree of skepticism when relying on them for evaluating the quality and sustainability of a product. Since the criteria and claims of proprietary ecolabels are determined by the company itself, there may be concerns regarding impartiality and objectivity. Therefore, it is better to consider Voluntary Ecolabels and Environmental Product Declarations (EPDs), as they typically undergo rigorous independent verification processes and provide a more objective and impartial assessment of a product's sustainability.

VOLUNTARY ECOLABEL SCHEMES

Voluntary ecolabel schemes play a significant role in promoting environmentally responsible products and practices. These labels are not legally mandated but are adopted voluntarily by most countries, or regions (for example Nordic Countries) or the European Union to certify and communicate the environmental attributes of products. They cover a wide range of product categories and are designed to help consumers make informed choices about products with reduced environmental impacts. Examples of voluntary ecolabel schemes include the European Union Ecolabel (EU-flower), Nordic Swan, and National Ecolabels like the Blue Angel, M1, and Danish Indoor Climate Label. These labels are typically established and managed by governmental or industry organizations and can vary in criteria and scope. The following are some of the most important ecolabels in depth:

EU ECOLABEL

The EU Ecolabel, also known as the Flower Certification, was introduced by the European Union (EU). It covers 24 product and service groups across 11 categories that are eligible for the EU Ecolabel. Among these, there are three product categories: Indoor and outdoor paints, Wood- and bamboo-based floor coverings, and Hard covering products. The certification process evaluates various aspects, including the origin of the materials, their chemical and biological properties, quality and quality criteria, composition, recyclability, and disposability. Additionally, the assessment encompasses ingredient analysis and the inspection of emissions of hazardous substances or substances that may pose health risks, such as plasticizers.

M1

The emission classification of building materials has encouraged the development and use of low-emission building materials, interior design products, and furniture since 1996. Rakennustieto Oy (RTS), Finland, oversees the rating process. The main committee of RTS, comprising representatives from the building product industry, builders, designers, authorities, and experts, guides and supervises these activities. It is designed for classifying materials, fixtures, and furniture used in both living and working spaces. In terms of criteria, the M1 classification establishes limits for emissions of volatile organic compounds (VOCs), formaldehyde, and ammonia while also assessing the acceptability of the product's odor.

BLUE ANGEL

The Blue Angel, was launched by the German government in 1978. The Federal Environmental Agency (UBA) establishes the specialized criteria that products and services must meet to receive certification. The Blue Angel covers various product categories, including paints, varnishes, panel-shaped materials, sealants, thermal insulation materials, floor coverings, flooring underlays, panels and doors, plasters, concrete products for outdoor flooring, wallpapers, and woodchip wall coverings. The certification is based on three criteria: Chemicals, Climate, and Circularity.

NORDIC ECOLABELS

Nordic Ecolabels is an official ecolabel for the Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden), established by the Nordic Council of Ministers in 1989. Each country has its own eco-labeling secretariat responsible for its activities. The Nordic Ecolabels covers 56 product areas, encompassing over 200 product types. Within the construction sector, there are seven group categories: new buildings, Renovation, Chemical building products, Construction and facade panels, moldings, Floor coverings, Indoor paints and varnishes, and Windows and Exterior doors. The Nordic Ecolabel employs three criteria for its certified products: Chemicals, Climate, and Circularity.

EPD

Environmental Product Declarations (EPDs) are based on the life cycle assessment method according to ISO 14040/44 and the more specific standards ISO 14025 and EN 15804. EPDs can be understood as a kind of "fact sheet" of the declared product. They contain technical information, details of selected life cycle modules, corresponding environmental parameters, and, if applicable, test results for a detailed assessment. Environmental product declarations have a binding, generally valid basis; they are prepared by experts and independently verified - nevertheless, the manufacturer bears the responsibility for the EPDs. EPD International has developed or is still in the process of developing about 64 Product Category Rules (PCRs) for construction products. Product Category Rules (PCR) offer guidelines for life cycle assessments and EPD development in specific product categories. They determine the scope, functional unit, and environmental impact categories.

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ECOCERTIFICATION OF BUILDINGS

Ecocertification of buildings, or sustainable building certifications, are used to assess and recognise buildings that meet certain sustainability requirements or standards. There is currently a huge variety of certifications for built environment and their number is further increasing. Certification systems for buildings differ vastly in their scope, application, and criteria. They are called multiple attribute building certifications, meaning that they cover different sustainability aspects; but the attention to one or another aspect in different certification systems may be very different. This fact sheet deals with building certification systems that originated and/ or are widely used in the Baltic Sea region countries. In addition, the Nordic Swan ecolabel is added, which can be applied to new buildings or renovations.

INTERNATIONAL BUILDING CERTIFICATION SYSTEMS IN THE BALTIC SEA REGION

Origin: United Kingdom
Year: 1990
Applications:

- New construction
- Refurbishment & fit out
- In-use buildings;
- Communities (urban areas)
- Infrastructure

Focus areas: Energy; Waste; Water; Materials; Health and Wellbeing; Transportation (use phase); Pollution; Land Use & Ecology; and Management.

Origin: USA
Year: 1998
Applications:

- New construction
- Refurbishment and fit out
- In-use buildings
- Communities (urban areas)
- Infrastructure

Focus areas: sustainable sites; water efficiency; energy & atmosphere; materials & resources; indoor environmental quality; innovation in design; location and transportation; regional priority.

CERTIFICATION SYSTEMS OF THE BALTIC SEA REGION COUNTRIES

Origin: Germany
Year: 2007
Applications:

- New buildings
- Commercial interiors
- Renovations
- Existing buildings
- Urban areas

Focus areas: ecological quality, economic quality, socio-cultural and functional quality, technical quality, and process quality.

Origin: Sweden
Year: 2005
Applications:

- New buildings
- Renovations
- Existing buildings

Focus areas: Energy; Materials; Indoor environmental quality.
DGNB and Miljöbyggnad are the oldest and most widely used of the building certification systems developed in the countries of the Baltic Sea region. In recent years, new ones focusing on certain issues have been created, such as Noll CO2 (2020) and Citylab (2019) in Sweden. Noll CO2 is a certification focused on the climate impact of a building. The Citylab certification is for urban districts.
Building certification systems adapted to the conditions of these countries have been developed in Lithuania and Poland.

Origin: Lithuania
Year: 2018
Applications:

- New buildings

Focus areas: Health; Energy; Transport; Land use and ecology; Materials; Waste management and pollution; Project management; Water management.

Origin: Poland
Year: 2018
Applications:

- New buildings

Focus areas: Energy consumption; materials; rainwater management; tap water quality; indoor air quality; Facilities for seniors and disabled people; Close access to amenities.

ECOLABELLING OF BUILDINGS

Origin: Nordic countries
Year: 2005
Applications:

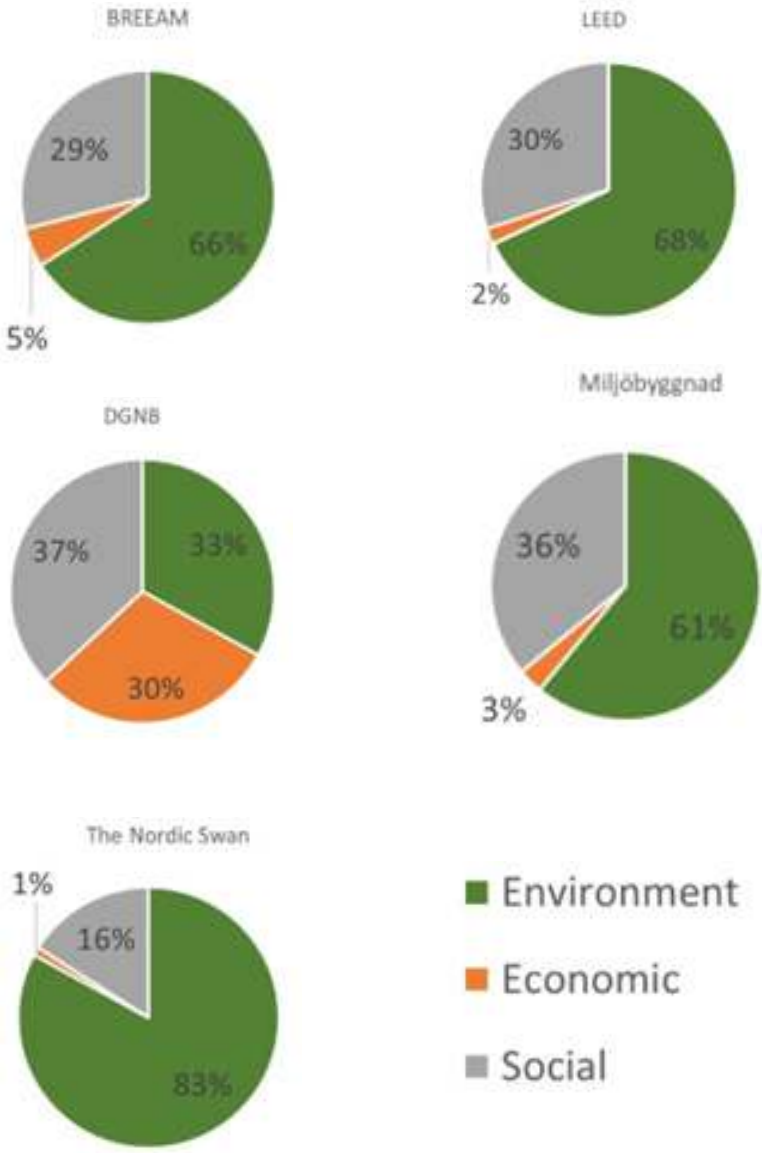
- New buildings;
- Renovation.

Focus areas: Energy and resources; Indoor environment; Materials and Chemicals.

A COMPARISON OF THE SYSTEMS

After making the decision to certify the building or at least comply with the criteria applied by the certification systems, it is important to properly choose which system is the most suitable in your case. Comparing certification systems is not a simple task due to the fact that the systems apply different evaluation principles, approaches, and criteria.

Guide to Sustainable Building certifications (2018) certifications made a comparison by recognising sustainability to based on the balance between environmental, economic and social dimensions. They defined a number of aspects across the three dimensions of sustainability following the European standards for sustainable buildings.



The comparison revealed that all dimensions of sustainability are assessed most evenly in the DGNB system. It is also the only one where more significant attention is paid to the economic dimension. However, according to the Guide, it can be argued that economic aspects can follow from many of the other aspects.

NonHazCity3 project emphasizes a three pillar approach: toxicity, climate impact and circularity. These aspects fall under the environmental dimension, which is central to all certification systems. Although the assessment has distinguished slightly different aspects, circularity can be associated with "Recycling", climate issues through energy use fall under "Resources", and toxicity has been directly distinguished as one of the aspects of the environmental dimension.

Certification	Toxicity	Resources	Recycling
BREEAM	0	33	7
LEED	1	43	6
DGNB	4	15	3
Miljöbyggnad	11	33	6
The Nordic Swan*	28		

*ecolabel

Although it is only about weighting of inclusion of aspects into the certification/labelling and not really about the ambition, it is obvious that resources are strongly represented in all systems. Toxicity aspect is very strong in Nordic systems, while the widely used international certification systems do not concentrate on it.

SUMMARY

Judging on chemicals, climate impact and circularity by existing building certificates is possible to an extent due to difference in the scope and criteria used in different systems. Still, certifying a building yields numerous benefits, including a better understanding of impacts and the potential for mitigation. Building certifications or at least following their criteria can be considered by municipalities within a bunch of instruments supporting sustainable construction practices.

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PRODUCT DATABASES AND PLATFORMS

Across the Baltic Sea Region, countries like Sweden, Denmark, Estonia, Finland, Germany, Latvia, and Lithuania are actively embracing sustainability in construction. **You want to simply find sustainable construction products for your purpose?** In this fact sheet, you will find various information resources, databases, and platforms dedicated to aiding different stakeholders in the construction sector.

In this section (labelled) product-databases in the BSR are described. These are easy-to-use databases with familiar products already assessed or labelled. Using this kind of resources requires little background knowledge about the construction materials or about the NHC 3-pillar approach aspects (Chemicals, Circularity, Climate). These resources are designed to guide purchasing decisions, making eco-friendly choices accessible to all.

CIRCULARITY PLATFORMS (SE)

In Sweden there are also some digital platforms that focus on circularity (reuse) in the construction sector. Loopfront and CCBuilds marketplace are two of them.

In Loopfront a company needs an account at a cost to register and search for products. In the system they can register products, search for products, show financial and environmental savings such as CO_2 and waste.

In CCBuilds marketplace sellers need an account to register products but anyone can search for products. You can find all sorts of second-hand construction materials such as windows, bricks, kitchens, radiators, flooring, lightning and much more. Regarding toxicity it can be hard to know the exact content of reused products. Also, overall information on material can vary between products.

- Webpage CCbuild
- Webpage loopfront

DGNB NAVIGATOR (DE)

The DGNB Navigator aims to promote sustainable building practices e.g. by offering a comprehensive product-database.

Manufacturers supply and maintain product data for assessment, which DGNB verifies for plausibility and completeness. It assesses products on sustainability, focusing on pollutant content, CO2 emissions, and recyclability. The Navigator product database excludes first and second level certifications, prioritizing installation context. It celebrates products with high transparency and data quality, making all related data and specific EPDs public if consented with the manufacturer. Users can search for products by material, cost, manufacturer, or generally. Product pages, varying in detail, show the connection to DGNB certification criteria, including chemical content if provided by manufacturers.

- Webpage

FINLAND'S ENVIRONMENTAL ADMINISTRATION YMPARISTO (FI)

This database provides details on old building materials, including their properties, usage, and potential harmfulness. You can search by material or product name, usage period, or application area. The database lists common products per material, including their market presence, typical uses in construction (like external walls or roofs), and main properties like composition and manufacturing. It also covers the material's harmfulness when dismantled, reuse or recovery options, and waste disposal methods if it can't be reused.

Webpage

THE BUILDING INFORMATION FOUNDATION RTS - M1 DATABASE

The M1 database lists construction materials with the M1 certification, focusing on low emissions, specifically VOCs and odours. If a product isn't in the database, it's not M1 certified. Companies can apply online to register products, followed by laboratory tests and committee assessments. Accessible for free, it's part of the RT-Tuotetieto database but functions independently. Users can search by material, product type, market name, or producer. It includes a range of construction materials but lacks information on circularity or climate neutrality. The database only lists products without clickable links, resulting in limited information on the exact chemical content of each product.

Webpage

SENTINEL HAUS

Sentinel Haus Institute, renowned for promoting healthy living, operates one of Europe's largest databases (Sentinel Portal) for health- and sustainability-tested products. This freely accessible platform serves professionals, craftsmen, and consumers, offering a DIY section with practical tips for tasks like painting and tiling. Its focus is on indoor air quality, ensuring materials don't emit hazardous substances like CMR substances above harmful levels, guided by Federal Environment Agency standards. Products are labeled as "tested for harmful substances" if they meet specific criteria, with a particular concern for substances above 0.01%. The Sentinel Portal rigorously checks all included labels for quality and relevance. Additional labels are available for companies, professionals, and buildings, with the "QNG ready" label aligning with DGNB Quality seal and KfW funding standards.

Webpage

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DATABASES AND PLATFORMS WITH MANAGEMENT FUNCTIONS (LOGBOOKS, PROJECTS, PRODUCT ASSESSMENTS, NETWORKING)

Across the Baltic Sea Region, countries like Sweden, Denmark, Estonia, Finland, Germany, Latvia, and Lithuania are actively embracing sustainability in construction. **You need to comply with sustainability requirements, but do not have extensive background knowledge on this topic?** In this fact sheet, you will find various information resources, databases, and platforms dedicated to aiding different stakeholders in the construction sector.

This section introduces you to databases and platforms with features such as interactive project-logbooks, project databases, networking and certification options. These platforms offer straightforward information and assist in meeting documentation standards.

BASTA

The BASTA system, run by the non-profit company owned by IVL and The Swedish Construction Federation, helps various stakeholders like property owners and architects make informed product choices aimed at eliminating harmful substances. BASTA offers six assessment levels, with Basta and Beta being the most common, where Basta aligns with BVB's "To be accepted" chemical content level, while Beta and others are less stringent. Suppliers self-declare products, maintaining their listings in the system, and are subject to audits to ensure competence and current information. BASTA provides free and paid training courses on logbooks, assessments, and criteria. Its criteria, developed by a scientific council of industry stakeholders, focus mainly on chemical content, with some optional lifecycle criteria. While anyone can search for products, creating a logbook requires an account. Product pages offer general information and criteria compliance, but supplier documentation on product content is often optional and not always provided.

Webpage

BYGGVARUBEDÖMNINGEN

Founded in the early 2000s to address health risks and decontamination challenges from hazardous substances like asbestos, BVB assists the industry in documenting built-in materials for sustainable choices. Its logbook tool, aims at tracking materials for future renovations or demolitions. The assessments carried out by BVB experts categorise products into three levels: "To be recommended" (green), "To be accepted" (yellow), and "To be avoided" (red), based on chemical content, lifecycle, and combined assessments. BVB's criteria, including optional ones for sustainable supply chains, align with EU legislation (REACH, CLP), PRIO, and other research and policies. It offers services like product assessments (requiring an account), free webinars, support for using the logbook tool and many more. Users can search products, view detailed product information, and track project materials. BVB addresses toxicity through chemical content and lifecycle criteria, focusing on health and environmental impacts. It promotes circularity with criteria for renewable or recycled materials, certified wood, and landfill avoidance, and integrates climate data from EPDs for climate declarations. BVB collaborates with Plant for climate calculations using BIM-model data, enhancing users' ability to make informed environmental decisions.

Webpage

CONCULAR

Concular, emerging from the circular marketplace "restado" in 2020, specializes in handling reusable construction materials. The company conducts circularity checks, including on-site visits, and manages the selling and procuring of these materials through its platform. They are developing digital building profiles and passports, useful for managing all stages of a building's life, some incorporating DGNB approaches and Life Cycle Assessment (LCA), though this is still in beta. Concular also offers consulting on material circulation, LCA, various scenarios, material selection, compliance, and value calculation. Materials in their shop are tested for functionality and hazardous substances, with the building owner bearing responsibility. Concular relies on documentation provided by sellers for these assessments.

Webpage

DANISH BUILDING RESEARCH INSTITUTE (SBI) BYG-ERFA DATABASE

The SBi, an independent research and consultancy organization linked with Aalborg University, specializes in sustainable construction and offers insights into climate neutrality and circularity of building materials through reports and resources. They develop guidelines and tools to support sustainable building practices. One such tool is the "BYG-ERFA database," which contains evaluations, experiences, and best practices in Danish construction. This database, free for professionals, facilitates knowledge sharing and aims to enhance sustainable construction in Denmark. It also integrates results from the BYGGE RATING tool for subscribed users. Overall, SBi's database and publications are key resources for construction professionals seeking to learn from past projects and make informed decisions for future sustainable construction.

Webpage

DGNB NAVIGATOR

The DGNB Navigator, provided by the German Sustainable Building Council, is an online platform designed to support sustainable building practices with a comprehensive product database. It targets manufacturers, architects, planners, and DGNB auditors, facilitating connections to DGNB certification. Auditors can add evaluated products to projects for certification purposes and are responsible for evaluating products not listed in the Navigator. The platform offers systematic product registration and assessment, making it easier to compare projects and products. It also provides detailed information on assessment and certification processes, mainly for professionals, though building owners can use it for initial product searches. Access to complete datasets and certifications requires a professional login.

GREEN BUILDING COUNCIL DENMARK (DGNB DENMARK)

The Green Building Council Denmark is a non-profit organisation and part of the DGNB System since 2011, that is also connected to the certification system of the DGNB for buildings.

In 2020 an international version of the DGNB was released. This version contains all criteria of the German 2018 version as well as updated fire safter rules. In Denmark the international version is adapted to Danish requirements and regulations.

Webpage & webpage

SUNDA HUS

Founded in 1990, Sunda Hus is a private company that assists organizations in improving indoor environments and making sustainable product choices in construction, documented via a logbook. The company's employees conduct product assessments, and it offers consultancy services focusing on product selection and documentation, used by clients like municipalities and construction companies. Access to product searches and logbook creation requires an account, with product information including names, suppliers, criteria compliance, and more. Sunda Hus runs paid courses covering their system, criteria, assessment process, and certifications, along with customized courses and a support page with FAQs.

Their criteria, graded from A to D, are based on EU legislation CLP and PRIO for chemical content, including health and environmental hazards. They also cover some lifecycle aspects like recycling. Sunda Hus's criteria address toxicity through classifications, concentration limits, and requirements for emissions, hazardous substances in production, and smog potential. The highest assessment level "A" requires circularity aspects like waste information, landfill avoidance, and long lifespans for some products. Additionally, they offer a tool for climate declarations and have criteria for greenhouse gas concentration limits.

Webpage

THE ESTONIAN REGISTER OF BUILDINGS

The building register is a database. The purpose of the building register is to store, provide and disclose information about planned, under construction and existing buildings and related procedures. The building register is freely usable for everyone and serves as a working environment for local governments when processing documents related to construction.

The technical data and documentation of the building are entered in the register (e.g. building data, location data, construction data, building audit data, building maintenance manual, data on building or construction-related applications and design conditions, notices, permits and prescriptions, state supervision data and energy label data).

Webpage & webpage

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NONHAZCITY CHOOSE PRODUCTS WITH LESS HAZARDOUS CHEMICALS

DATABASES AND OTHER INFORMATION SOURCES USING DATA(SETS) THAT REQUIRE COMPARISON AND INTERPRETATION BY THE READER

Across the Baltic Sea Region, countries like Sweden, Denmark, Estonia, Finland, Germany, Latvia, and Lithuania are actively embracing sustainability in construction. **You are deeply committed to understanding and implementing sustainable practices?** In this fact sheet, you will find various information resources, databases, and platforms dedicated to aiding different stakeholders in the construction sector.

In this section you find descriptions of resources that require advanced knowledge in the respective field. You are deeply committed to understanding and implementing sustainable practices? Then this is likely to be an interesting chapter for you, as these resources offer in-depth insights into sustainable building.

BOVERKET´S CLIMATE DATABASE AND TOOLS (SE)

Sweden also has several climate databases and tools since it is mandatory in EU since 2022 to calculate the climate impact of construction projects. One is operated by the authority The National Board of Housing, Building and Planning. They provide a database with conservatively set generic climate data about different building material to use when making a climate declaration for a construction project. However, they encourage projects to use product specific data from product specific EPDs (Environmental product declarations) to get a more accurate climate calculation. The database provides climate impact of material, it is not a tool to make climate declarations.

Three tools that can help projects make climate declarations is Plant, One Click LCA and BM (the Construction sectors Climate calculation tool). To use the tools an account is needed. To create an account at Plant or One Click LCA comes with a cost. BM has a free version where projects can write their climate data manually, but it comes with a cost to access more functions such as digitally data loading. Plant can make climate calculations using data from BIM-models and has a collaboration with Byggvarubedömningen.

Webpage climate database

Webpages tools

BUILDING INFORMATION FOUNDATION RTS (RAKENNUSTIETOSÄÄTIÖ) INCLUDING THE RTS EPD DATABASE (FI)

Building Information Foundation The Building Information Foundation RTS, a private entity, offers resources and expertise for Finland's construction sector. This includes publications, guidelines, and training on sustainable building, energy efficiency, and the circular economy. Key to their offerings is the Tuotetieto database, featuring over 150,000 products with extensive information like performance declarations, technical data, manuals, certifications, and Environmental Product Declarations (EPDs). The database allows detailed product searches with multiple filters, including company, trademarks, product lines, and various certifications.

Additionally, the RTS EPD database, a subset of the Rakennustieto material database and also free, can be used independently. It allows searches by material, product type, market name, or producer, offering insights on circularity, climate impact, and chemical content through downloadable EPDs. This database includes LCA indicators like climate change impact and energy resource depletion. While not mandatory, companies can list products in the RTS EPD database through an online application, subject to assessment by the RTS EPD committee.

Webpage

IBU (DE)

The Institute for Construction and Environment (IBU) is a German non-profit organization formed by construction product manufacturers to enhance sustainability in the sector. IBU specializes in creating and providing Environmental Product Declarations (EPDs) for construction products. This is facilitated through their EPD-database, ibu.data, where users can search for or download EPDs in different formats including XML and PDF. IBU also offers EPD editor software with tutorials, enabling suppliers to create EPDs in accordance with Product Category Rules (PCR). These EPDs, valid for five years, are verified by an independent third party for completeness, plausibility, and standard compliance before publication. Once published, they are accessible publicly via IBU's website, ÖKOBAUDAT, and ibu.data. IBU's platform provides detailed information on EPD creation, ensuring objective representation of a product's life cycle assessment, functional and technical properties, and circularity aspects.

Webpage

ÖKOBAUDAT (DE)

The platform ÖKOBAUDAT focusses on the assessment of construction material on the basis of life cycle assessments and environmental product declarations. While LCA datasets give an overview on the environmental and circularity aspects of a product throughout its lifetime, exact chemical content of the specific product is potentially found in EPDs. In order to make sophisticated choices regarding which construction material to use in a building, obtained information, however, must be compared and interpreted by the end-user.

Webpage:

WECOBIS (DE)

the information platform WECOBIS provides comprehensive information on various construction materials, their properties, function, and impact. It also links to many different articles, websites and other publications including template tendering texts and is meant for various professionals as well as broader public and scientists. The information is product-neutral but provides information on material composition (including chemical content), processes, environmental impacts, circularity in life cycle tabs. Information on certifications is also available.

Webpage

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CHOOSE PRODUCTS WITH LESS HAZARDOUS CHEMICALS

THE BUILDING MATERIAL CATALOGUE FOR TOX-FREE CONSTRUCTION

The Catalogue provides a collection of construction materials and their constituent hazardous substances to guide the planner, client, and building user in selecting better alternatives for a tox-free construction.

OUR VISION

Our vision of sustainable construction is both inspiring and essential for the future of our planet. To visually capture this concept, we can create an image that depicts a variety of sustainable construction materials being used in an eco-friendly building project. The image will showcase materials like hemp, straw or mycelium, recycled steel, and natural stone, emphasizing their renewable and environmentally friendly nature. The setting can be a construction site where these materials are being applied, with architects, contractors, and DIY enthusiasts actively engaged in the building process. This scene will reflect the commitment to a tox-free, circular, and climate-neutral living environment, symbolizing a harmonious balance between human development and nature's well-being.

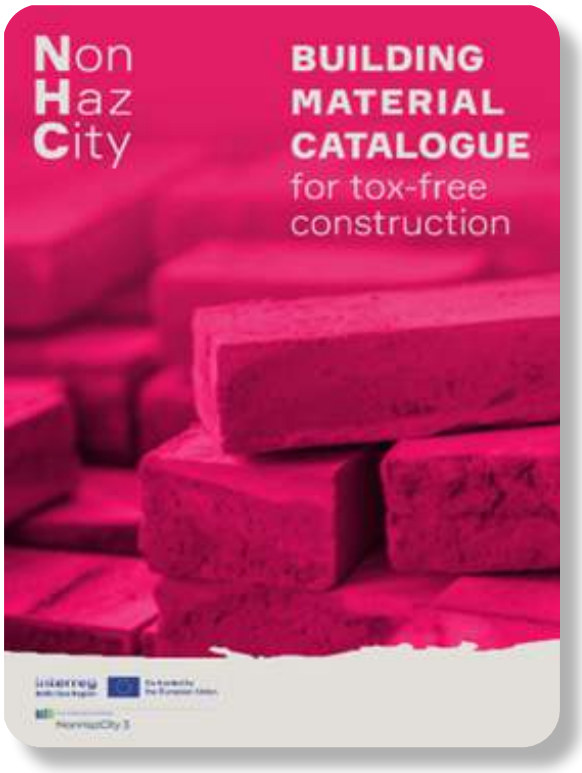
Let's bring this concept to life using our catalogue, that will help addressing some concerns:

...UNDERSTANDING THE CURRENT CHALLENGE

Embedded within many conventional construction materials, which are used e.g. in walls, foundations, insulations or floor coverings of our buildings, hazardous chemicals are found. These insidious substances find their way out of respective materials, polluting The Earth´s valuable resources: air, water and land. Lingering within ecosystems these substances may cause direct harm to countless organisms, including humans. This invisible menace is a great threat to the delicate balance of ecosystems, which our own health depends on.

Unfortunately, there is more to the story: the presence of these hazardous substances hinders efforts towards achieving circularity as recycling of hazardous substances is a hazard per se. Thus, they restrict the potential for reusing or recycling materials, thereby negatively affecting the reduction of greenhouse gas emissions. This impact is profound and far-reaching but not yet common knowledge. Still, it is challenging our quest for a sustainable and safe future.

The NonHazCity 3 project is a significant and timely initiative for the construction industry and all its stakeholders, focusing on the key aspect of eliminating hazardous substances from construction materials and promoting circularity and climate protection. Doing this, it is both innovative and vital for environmental sustainability. The development of practical resources like the catalogue, fact sheets for professionals and many others shall inspire an accelerating shift towards more sustainable and responsible construction.



... IDENTIFYING SUSTAINABLE CONSTRUCTION MATERIALS AND BUILDING ELEMENTS

The core chapters of the catalogue offer a crucial guide to sustainable construction materials and building elements, centred on the three pillars of sustainability: non-hazardous substances, circularity, and climate neutrality. The material chapter presents a curated range of materials across various categories, enabling informed, eco-friendly choices in construction. The material groups contain natural organic materials (natural untreated wood, seaweed, straw, cork, reed and many more), semi natural treated natural materials (wood fibres, paper/cellulose, treated wood amongst others), inorganic materials (e.g. limestone, lime, clay or gypsum plaster), intermediates like boards (including gypsum- and fibre cement board, MDF and OSB), metals/alloys (aluminium, anodized aluminium, copper, steel and others), plastics (such as Acryl, Epoxy, PS & EPS), composite materials (e.g. polymer concrete, tar paper and timber-plastic), miscellaneous (air foam and Vacuum and gas filled panels), natural raw material based products (oils, waxes), chemical products (cement, paint, varnishes, adhesives). The chapter on building elements adds to its previous chapter by focusing on the respective element which can be made from different materials or intermediates, but not the specific manufacturer´s products, highlighting challenges and things to think of when choosing a specific product.

... RETRIEVING INFORMATION ON CHEMICAL CONTENT OF COMMONLY USED BUILDING ELEMENTS

Another chapter of the catalogue provides easy access to information about the prevalence of various chemical groups in different building elements. It's particularly beneficial for projects focusing on eliminating or reducing certain hazardous substances, as it offers a comprehensive list of chemicals, that require careful consideration during procurement. Each chemical listed gives an overview on building elements it may be found in. This targeted approach aids in making informed decisions, promoting alignment with health and environmental safety goals.

... LEARNING ABOUT MANY OTHER USEFUL ASPECTS WITHIN CONSTRUCTION

In many other chapters information is aggregated and waiting to be applied in many projects, big or small. Topics include legislation; databases, platforms and other information sources; labelling and certification systems; insights into some construction processes and supplier and supplier chain information. The target area is the Baltic Region, but a lot of information provided will be useful outside of the BSR as well.

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