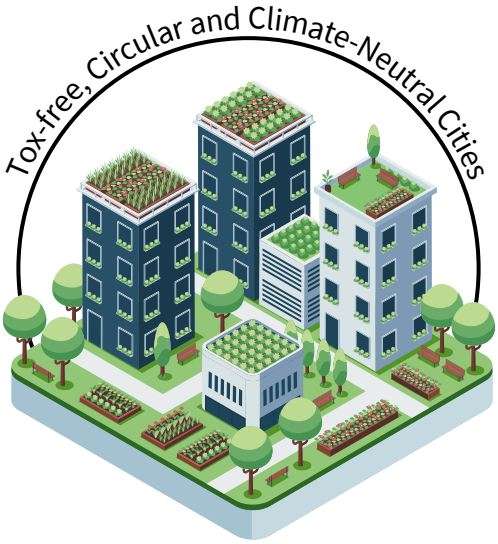
Policy Brief
for EU Policymakers



Tox-free, Circular and Climate-Friendly: The Next Steps for Europe's Buildings

Lessons learned from the NonHazCity3 project for smarter EU construction policies

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NONHAZCITY

State of the art

People spend around 90 % of their lives indoors and inhale 11,000-12,000 litres of air per day. That air should be healthy. But screenings of indoor dust from two Baltic cities under the NonHazCity3 project[1] ("Reducing hazardous substances in construction to safeguard the aquatic environment, protect human health and achieve more sustainable buildings") showed that significant amounts of organic pollutants, such as plasticisers, PFAS, and chlorinated paraffins are present in indoor air and dust[2].

While these emissions directly affect human health, stormwater acts as a protractor between buildings and the natural environment. Rain mobilises substances from exterior materials such as roofs, facades or pavements, transporting them via runoff and drainage systems into soil, rivers and the sea. Analysis of stormwater have detected a wide spectrum of contaminants, including biocides, organophosphate esters, metals and PFAS[2].

Hazardous substances in building materials and their release during deconstruction and aspired second product life cycle can hinder high-quality recycling. As Europe moves towards a circular economy, this becomes a critical barrier: about 50 % of all extracted materials and over 35 % of the total waste generation are linked to the built environment[3], making the construction sector a key player in the Circular Economy Act.

Summary

- Indoor dust reflects what we build - PFAS and plasticisers are released from construction materials into indoor air and the nature.
- Pilots have shown that tox-free, circular and climate-friendly construction is possible today.
- To scale up, Europe needs transparent, easy-to-understand information on chemical content.
- Harmonised standards and strong public procurement are keys to market innovation and mainstreaming best practice.

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Awareness of these issues has grown, particularly in the Nordic countries, where emission control and sustainable building policies are well established. Yet across Europe, regulatory approaches remain fragmented and hazardous substances continue to leak into the environment over time, ultimately reaching sensitive ecosystems such as the Baltic Sea.

To address this shared challenge, all eight EU countries bordering the Baltic Sea joined the NonHazCity3 (NHC3) project to develop strategic and practical solutions for making construction materials and sites climate neutral, circular and tox-free (three-pillar approach). Seven pilot studies in nine cities across eight countries of the Baltic Sea region tested the solutions, assessed feasibility and identified regulatory and market barriers. Their lessons form the basis for this brief and its four EU-level policy recommendations.

The evidence base

To map hazardous substances in buildings, the NHC3 project conducted a regional analysis across five Baltic cities: Tallinn (EE); Helsinki (FI), Turku (FI), Västerås (SE) and Stockholm (SE). The study screened the hazardous substances in construction materials, indoor dust and air, and stormwater to identify how pollutants move from products to people and the environment (findings are presented in the project publication "Occurrence of substances of concern in Baltic Sea Region buildings, construction materials and sites").

Construction materials: The source of pollutants

In the material screening, the NHC3 project found that numerous construction products contained hazardous substances such as

NonHazCity3 (Interreg BSR Project, 2023–2025) unites 21 partners from all EU Baltic Sea countries to cut hazardous substances in construction and advance tox-free, circular and climate-friendly building practices.

- Biocides (such as iodocarb and diuron from roof felt, paints for exterior use, or wooden panels)
- Plasticizers (found in flooring materials; known to cause endocrine disruption)
- PFAS ('forever chemicals'; highly persistent in the environment and associated with immune effects and cancer risks)
- Metals (such as chromium, posing environmental and health risks)

Indoor environment mirrors materials in use

Indoor dust analyses revealed a complex mix of contaminants, reflecting the materials present inside buildings. PFAS were detected in almost all samples. Additionally, indoor air revealed plasticizers, bisphenols (used in plastic materials, affecting hormone function), chlorinated paraffins (persistent flame retardants and plasticisers, likely carcinogenic), and organophosphate esters (persistent flame retardants and plasticisers, associated with harmful health effects).

Dust serves as a carrier for a diverse number of hazardous substances, combined into a chemical cocktail in indoor air.

While each of these substances is problematic on its own, the combined exposure risks remain largely unknown. In reality, people are rarely exposed to a single

substance in indoor air but rather to a chemical cocktail originating from multiple sources.

Stormwater and Exterior Leaching

Outdoor sampling confirmed that rain mobilises hazardous substances from construction materials. Stormwater analyses showed chemical leaching from facades, roofs, and exterior paints with pollutants such as biocides, flame retardants, PFAS and metals. Biocides were found in all urban sampling areas, with higher levels in areas with new wooden buildings, likely sourced from wooden cladding, paints and varnishes used for extending the wood lifespan.

From Evidence to Practice: the NHC3 Solutions

Building on the evidence of widespread hazardous substances in construction materials, the NHC3 project translated the scientific findings into strategic[4] and practical solutions for a tox-free, circular and climate-friendly construction sector. These solutions were tested within seven pilot studies, showing best practice cases and lessons learned[5]. A short summary of the pilots is shown in Figure 1.

The Strategic Solutions:

- Integrate tox-free, circular and climate-friendly principles into public procurement
- Use Green Building Certificates and ecolabels
- Enhance supply chain communication and market dialogue

Stockholm: "Miljöbyggnad certification turned political commitments into actionable specifications that even skeptical project partners could implement."

Practical solutions turning strategy into hands-on guides:

- Step-by-step guide
- Construction product assessment data-base (BVB)
- Fact sheets for professionals
- Do-it-yourself guide
- Consumer app "Check(ED)"

Lessons Learned: Insights from the NHC3 Pilots

The strategic and practical solutions tested by the seven pilots under real conditions revealed three key lessons:

1. Data is the Bottleneck

Effective implementation of tox-free and circular construction depends on robust data management systems and transparent product information. Pilots repeatedly noted difficulties in obtaining complete chemical content information, which made it challenging to identify materials that are both environmentally safe and economically viable.

Västerås: "We log all products by weight in BVB[6], and aim towards 20% products assessed as Recommended in BVB and not more than 5% products assessed as To be avoided. With these goals we can reduce hazardous substances in our buildings."

2. Verification Matters

Certification schemes and material databases proved to be effective tools for reducing hazardous substances. They serve as an effective communication tool among project partners and with the market.

Figure 1. Overview of the pilot studies implementing the NHC3 solutions. For more information, visit: interreg-nonhazcity3

Stockholm, Sweden: The municipal builder Familjebostäder is building 87 new apartments, achieving Miljöbyggnad Gold certification by using procurement and design choices that prioritise indoor air quality and best available techniques.

Västerås, Sweden is building a non-toxic, climate neutral preschool using a collaborative contract model. One target is that 20% of the products are assessed as 'Recommended' according to the BVB[5] criteria.

Holbæk, Denmark: A kindergarten that received DGNB Gold certification and prioritised life-cycle assessment, ecological quality and resource efficiency. Facades were made of salt-impregnated wood to avoid toxic wood preservative treatments.

Helsinki, Finland is updating the city's construction instructions so that hazardous substances are systematically considered in both new buildings and renovations.

Tallinn, Estonia built a kindergarten that emphasised the focus on tox-free materials, energy efficiency and circular construction. Using wood improved indoor conditions for children and reduced the CO_2 footprint.

Hamburg, Germany: Renovation of the parish house Maria Magdalena, with focus on updating meeting rooms and resolving issues with the roof. Parishioners were regularly informed and had the opportunity to participate in the planning process.

Riga, Latvia focused on tox-free, circular and climate-neutral renovation of Soviet-era housing and a social apartment. They prioritised eco-friendly materials, energy efficient windows, and waste sorting.

Most pilots used the Byggvarubedömningen (BVB[6]) system, which provides extensive product information and rates materials via a traffic-light system based on toxicity, circularity and climate impact.

3. Green Public Procurement is a Powerful Tool

Pilots confirmed that the three-pillar approach in public procurement is socially accepted, transferable and a powerful driver for market transformation. When sustainability criteria are clearly formulated, suppliers engage proactively, especially when future procurement opportunities are visible. However, several barriers remain:

- The lack of mandatory requirements for the reduction of hazardous substances means that municipalities depend on individual expertise.
- Financial constraints and lowest-bidder rules can act as a barrier to stricter sustainability criteria, as initial costs can appear higher.
- Uneven GPP frameworks across EU Member States create an unequal playing field, reducing suppliers' motivation to provide sustainable materials or transparent data.

To make Europe's built environment tox-free, circular and climate-friendly, transparent chemical content information is essential. Non-toxic materials must become the norm through clear limits, phase-outs of substances of concern and recognition of trusted ecolabels. Harmonised and mandatory Green Public Procurement can lead by example and drive market innovation.

Policy Recommendations

Building on the results of the NHC3 project and its pilot studies, four key policy actions can accelerate the transition toward a tox-free, circular and climate-friendly construction sector in Europe.

Full Chemical Declaration and Traceability

Transparent information on chemical content is a precondition for non-toxic and circular construction. Therefore, an EU-wide building product database, equivalent to the Swedish BVB[6] system, should be developed, covering all construction products and ensuring that detailed chemical content information is available and easily accessible. A traffic-light system that rates products by their toxicity, circularity and climate impact would further simplify decisions for designers and procurers while stimulating market transparency and innovation.

1. Policy Recommendation

Key actions for policymakers:

- Expand harmonised standards under the Construction Products Regulation (CPR) to require information on all substances of concern contained in the Declaration of Performance and Conformity.
- Integrate hazardous-substance information (e.g., PFAS, biocides, substances of very high concern and substances of equivalent concern) into the upcoming Digital Product Passport and Environmental Product Declarations.

Stringent Requirements for Non-Toxic Construction Materials

Circularity may only works if construction materials are predominantly free of hazardous substances and remaining products containing hazardous substances can be easily recognised. The NHC3 findings show that some 'replacement' substances still pose health and environmental risks, turning today's new products into tomorrow's waste rather than reusable resources.

An EU tox-free environment requirements framework should therefore: (i) exclude all substances of very high concern above 0.1 % from construction products, (ii) ensure that exterior materials (e.g., facades, roofs, paved areas) are biocide and PFAS free, and (iii) set emission limits for volatile organic compounds (VOCs, e.g., M1 certification). To ensure practical uptake by market actors and procurers, expand recognised ecolabels (e.g., EU Ecolabel, Blauer Engel, Nordic Swan) across the main building product groups.

2. Policy Recommendation

Key actions for policymakers:

- Establish an EU-wide declaration format for VOCs in indoor construction products under CPR and set VOC emission limits in harmonised GPP rules under the CPR.
- Establish an EU-wide declaration format for substances of concern under CPR and set Zero Pollution Ambition criteria for all construction products within harmonised GPP rules under the CPR.
- Further promote recognised ecolabels to support GPP and EU Taxonomy rules.

3. Policy Recommendation

Mandatory and Harmonised Green Public Procurement Criteria (GPP)

GPP is one of the most powerful instruments for transforming markets and operationalising the EU Green Deal, the Circular Economy Action Plan, and the Zero Pollution Action Plan. The NHC3 pilots found that non-harmonised GPP criteria across Member States reduce market innovation and suppliers' willingness to provide detailed product information. A harmonised and mandatory EU GPP framework would create a level playing field across Member States and speed up innovation.

Key actions for policymakers:

- Mandatory minimum GPP criteria within the CPR.
- Ensure that the information needed for GPP is available in the Declaration of Performance and Conformity and the Digital Product Passport.

4. Policy Recommendation

Circularity Targets

Recycling and reuse targets are an important step toward circularity. However, stringent end-of-waste criteria must ensure that hazardous substances in construction materials are identified, removed, and kept out of secondary flows. Mandatory pre-demolition audits should therefore list hazardous substances before any reuse. To make this workable, the EU should promote interoperable data systems (e.g. BVB[5]-style material logbooks) that give easy access to chemical content and reuse potential at the end of a building's life.

Key actions for policymakers:

- Support pre-demolition audits and platforms for the exchange of reusable construction products.
- Define end-of-waste criteria for pollutant content in recycled building materials under Circular Economy Act.
- Promote a standardised declaration of recycled content in construction products under CPR.
- Promote standardised information on future reusability and recyclability of construction products under CPR.

The NHC3 project has shown that safe, circular and climate-friendly construction is achievable today. Harmonised standards, transparent data and green public procurement with ambitious criteria will enable Europe to turn today's pilots into tomorrow's norm.

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References & Additional Information:

[1]NonHazCity3 Project Page

[2]Occurrence of substances of concern in Baltic Sea Region buildings, construction materials and sites Download here

[3]Buildings and construction (11.11.25; 1 pm)

[4]Strategic solutions for managing procedures for construction materials and sites Download here

[5]Best practices of NonHazCity pilots on tox-free, circular and climate friendly buildings in BSR cities Download here

[6]BVB: Byggvarubedömningen® is a simple toolset that helps to choose safer and more sustainable products

NonHazCity3 Building Material Catalogue for tox-free construction Download here