

DRAFT STRATEGIC SOLUTIONS FOR MANAGING PROCEDURES FOR CONSTRUCTION MATERIALS AND SITES

NHC3: Deliverable D.1.2

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SUSTAINABLE WATERS

NonHazCity 3



NONHAZCITY

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Introduction

The “Draft strategic solutions for managing procedures for construction materials and sites” has been developed within the frame of the NonHazCity3 (NHC3) project “Reducing hazardous substances in construction to safeguard the aquatic environment, protect human health and achieve more sustainable buildings” (Project Nr. C014), with financial support from the INTERREG Baltic Sea program of the European Union. The main aim of this material is to provide recommendations to the strategic solutions and make them available at municipalities to unfold the efficiency of managing procedures for construction materials and sites at municipalities.

The NHC3 approach to sustainable construction and the aspects of toxicity, climate neutrality and circularity calls for effective managing compliance with sustainability criteria in the construction sector at the municipality. The underlying NHC3 context is built on consideration for an **increased level of ambition** defined by the degree of setting higher demands than required by the national legislation at the municipal construction practices. The well-defined framework at the strategic planning phase underlying the strategic solution is of support to back-up initiatives for going beyond the conventional construction practices. The strategic planning phase is complemented with amplified opportunities from the sub-solutions directed to setting of vision and ambitions and promoting the communication with the construction stakeholders.

Outline of the solution

Municipalities wield significant influence in steering construction practices toward sustainability and minimizing hazardous substances in building materials. Today the partner municipalities of NHC3 have strongly varying approaches for steering, limiting, and controlling the use of hazardous substances, climate-friendly and circular construction materials, and construction processes. Here we aim to formulate a framework by amalgamating various existing approaches.

The partner cities are taking regulatory and control approaches at various points in municipal construction, from demand assessment to planning, approval, implementation, and final inspection. All these approaches come with specific strengths and weaknesses. Possibly combining different approaches might be conflicting. However, at this point we aim for sketching a vision of a comprehensive and very ambitious strategy. This vision should not be interpreted as a final and test-proven method.

The NHC3 approach to sustainable construction and the aspects of toxicity, climate neutrality and circularity calls for effective managing compliance with sustainability criteria in the construction sector at the municipality. They can play an important role in setting the good example and give an extra weight to the urgency for taking sustainability measures.

Municipalities can have a strong influence by taking the decision to invest in sustainable construction. The solution shall build on possibilities offered by complementary instruments that are at hands of a municipality to promote the NHC3 three-pillar approach¹:

- **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 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, bio geophysical effects of human activities that, for example, affect surface albedo or local climate.

The underlying NHC3 context is built on consideration for an increased level of ambition compared to the conventional approach at the **municipal construction practices**.

Very often **higher level of ambition** calls for a change in conventional daily routine and searching for new products, process, organization of work or approaches to a market. Here the **innovation** would involve successfully incorporating new ideas to **generate changes** that

¹ NonHazCity Building material catalogue for tox-free construction (2023) - draft version.

help to solve the needs for sustainable construction and the three aspects of toxicity, climate, and circularity considerations.

Innovation can occur at any stage in the design and construction process and involves several mechanisms²:

- By production technology, e.g., companies to optimize their production processes, use highly technological and automation-based production systems.
- By modularity, e.g., using open and changeable modular designs.
- By performance, e.g., increasing complexity of buildings have an impact on the whole value chain and are likely to transform building structures, construction technologies and business models.
- By transformation, e.g., through incremental adaptation and improvement of an established technique to improve efficiency and/or performance.
- Through customer collaboration, e.g., learning, evaluation, feedback from customers to the project team and companies.

Promoting the innovation in construction calls for new approaches in organizing the work at municipalities. The optimal strategy for municipalities is to establish a robust **framework** to promote sustainable construction and the three aspects of toxicity, climate, and circularity considerations.

The solution:

Framework for implementation of strategic planning phase in sustainable construction at municipalities

Well-defined framework will be of support to back-up on initiatives for going beyond the EU and national requirements and demonstrating the sustainable construction approaches at municipalities.

This framework primarily covers the strategic planning phase (somewhat like the innovation procurement approach³), where the main building blocks are needs investigation, setting of vision and ambitions, market analysis and the market dialogue leading to initial specifications on technical requirements. From the NHC3 perspective, the strategic planning phase is complemented with amplified opportunities from the envisaged sub-solutions.

Sub-solutions promoting setting of vision and ambitions:

The NHC3 pillar approach to GPP including criteria for avoidance of hazardous substances in product groups and services related to construction in the public procurement rules of project (and other) municipalities.

Sustainable building certification systems by benchmarking with existing building standards and adding hazardous substance aspects more explicit to it.

² Procuring Innovation in Construction a review of models, processes, and practices (2017) BC Construction Association by Brantwood Consulting

³ Innovation procurement happens when public buyers acquire the development or deployment of pioneering innovative solutions to address specific mid-to-long-term public-sector needs.

<https://eafip.eu/events/webinars/webinar-introduction-to-innovation-procurement/>

Sub-solutions promoting the Market dialogue:

Guidelines for proper supply chain communication (specific for construction related issues) by advancing information requests to potential suppliers, manufacturers, or service providers.

A market dialogue strategy for communication with the construction stakeholders, solving the issue of economic disadvantage of sustainable versus regular choice for building projects/materials.

Taking into notice that NHC3 focus on strategic and technical solutions, here the interrelation of the strategic and technical phases in construction are shown.

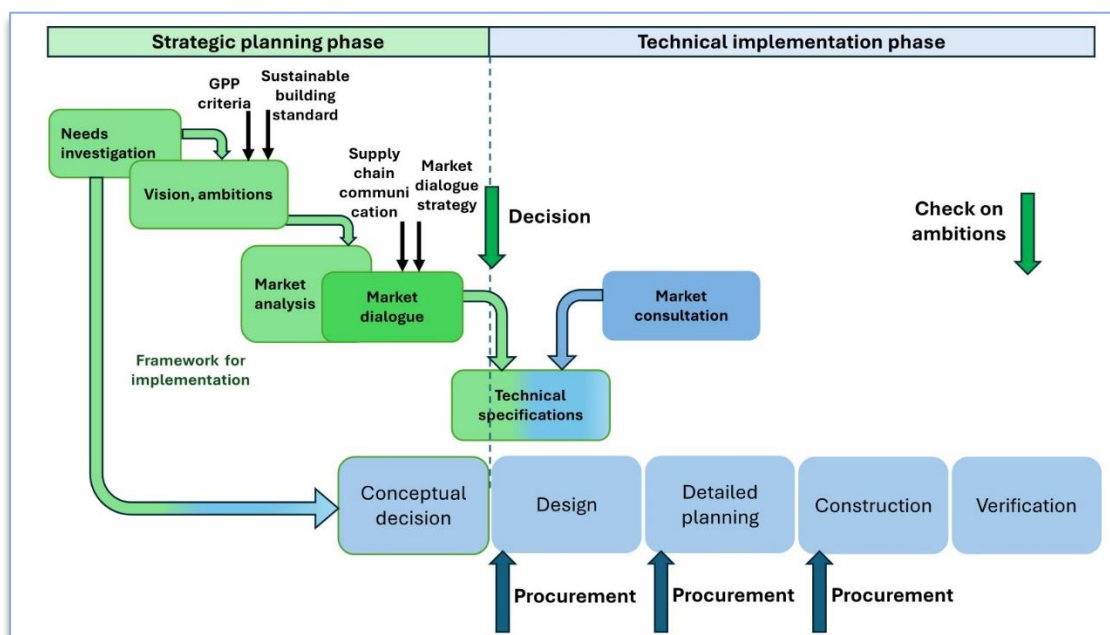


Figure 1. Interrelation of the strategic planning and technical implementation phases to the steps in construction.

Strategic planning phase precedes the actual construction project where the needs investigation, setting the level of ambition on materials and on buildings to the tox-free, circular and climate neutral construction is exercised. This phase comprises also an early market analysis and a supply chain communication on their preparedness to comply with the material and solution requests.

While the outcomes are contributing to the setting of technical specifications, the strategic planning activities are not a part of the actual tender for construction design.

Decisions from the planning phase are then taken up at the technical implementation phase where the technical specifications are further sharpened, and tendering procedures applied in the subsequent steps in construction⁴. The construction activities predominantly are belonging to the technical implementation, except for the conceptual decision step where the

⁴ Step-by-step guide for the process management of Toxfree, circular and climate-neutral construction at municipalities (December 2023) NHC3 Deliverable D.1.3.

idea for construction is shaped and flexibility is high for making also strategic decisions. Therefore, blending of strategic and technical aspects are commonly occurring there.

Technical aspects at the strategic planning phase are not elaborated up to detail and are kept on the approach level.

Implementation of strategic planning phase can be **finalized with several options:**

- **Continuing to the technical implementation** phase - procurement (tender) process in case of already selected individual construction project intended to start the construction process.
- **Stopping at the endpoint of the strategic planning** phase implementation with decision on technical requirements. Outcomes from the strategic planning are saved, but the actual building construction process is placed on hold.
- There are strategic solutions needed for the **uptake of piloted project practices** on sustainable construction focusing on toxicity, circularity, and climate neutrality. The **strategic planning, particularly the market dialogue**, is useful to prepare for large scale implementation by assessing the market readiness for supplies.

Enabling framework for uptake and management landscape

By setting the framework for implementation of the strategic planning phase, the intention is to augment the operational management landscape and working practices already at place in municipalities. The solution is built on possibilities offered by complementary instruments that are at hands of a municipality. It incorporates 4 strands to cover the strategic landscape related to construction at the municipality, cooperation and communication, technical aspects, knowledge, and capacity building.

The solution:

Framework for implementation of strategic planning phase in sustainable construction at municipalities



The framework **builds strongly on cooperation and communication** approaches.

Applicability of the framework for implementation of the strategic planning is suitable for exercising through the construction preparation process for individual construction project as well as to the strategic planning for construction of larger group of buildings of same type.

The framework focuses on support for setting of chemicals aspects as equal besides circularity and climate-neutrality. Examples from some NHC3 partner municipalities, particularly in Sweden and Finland, shows that addressing embodied carbon and circularity aspects alongside **minimizing use of hazardous materials in buildings** is steadily getting in focus. However, others are still to prepare for decisions on such political commitments at the municipality. Stronger emphasis on toxicity aspects (along with the circularity and climate neutrality) in municipal planning approaches is incorporated.

Exercising through the strategic planning phase within the framework settings will produce **outcomes, like strategical documents, action plans, guidelines, or other documents related to municipal policies**. Long term strategic documents for implementation of EU strategies and municipal policies were accepted as the most prominent complementary instruments at hands of a municipality to promote the NHC3 three-pillar approach. Showing at municipalities own strategies the link of non-toxicity, circularity, climate, and how the NHC3 approach serves them to reach the policy goals would serve as a driver to make ambitious decisions⁵.

Landscape for pilot construction at municipality

The Framework for implementation of strategic planning phase includes some assessment of landscape for construction at municipality, including the needs, priorities and objectives, the level of ambition, and preparation of the need's investigation summary.

The needs, priorities, and objectives for pilots

From the strategic perspective needs of the **municipality related to the construction pilots** shall be identified. For example, new policy developments on circularity, climate neutrality and toxicity, calling for more sustainable construction approaches and practices. Here the construction may be approached in a wide perspective by linking it to the other areas of municipality concern (social, health, well-being etc.) to create possible synergies and gain better insights on context conditions. In addition, new needs in construction may arise also from the policy objectives, standards and regulations municipalities are obliged to comply concerning the building stock and composition of the building materials.

Collaboration and communication of different departments of the city administration, as well with representatives of key end-user groups is advisable. Series of meetings shall lead to the need's definition. There are several methods available for use:

- Focus group discussions (with participation of external experts, key stakeholders)
- Senior management workshops at municipality
- Interviews with key service users (e.g., house managers, heads of education establishments)

⁵ NonHazCity 3: 2nd Partners Meeting Green Governance Week in Tallinn, Estonia, November 14-15, 2023, WP1 session results.

The user needs mapping practice can be extended to investigation of **public perception** on, e.g., hazardous materials, building material types, health aspects, use of recyclable building materials. This approach is advisable, because the need to addressing rather sensitive issue on avoiding toxic materials in construction may be largely driven by **the end-user needs**. Consulting with public may increase the level of acceptance of local political commitments and targets. Taking this step, the implementation team can select approaching the professional company for carrying out the survey and/or interviews, e.g., large scale survey of inhabitants as an end-user (tenants) of buildings, interviews with end-users to define their needs.

Once wide range of needs from the municipality entities and the end-users is identified, the **prioritization and verification** step become operational. The focus is on understanding the essence to define the priority directions municipality would elaborate further. Several methods are usable for the process:

- Obtaining the experts opinion,
- Using the discussion fora, e.g., stakeholder meetings, focus groups, workshops. Several rounds of discussions may be needed for arriving to a list of priorities.

From the management perspective, municipality strategies will align with the priority investments. Prioritize the need in the municipality and create a plan for a development process and **integration of new development concepts**.

The level of ambition by GPP criteria and sustainable building standard

By the sequence of decisions at a municipality there is a sequential order where choices often are seen because of preceding decisions. Application of other complementary instruments, e.g., supporting planning documents, economic incentives and information instruments can promote decisions in favour of more ambitious targets at municipal construction. The level of ambition is accounted as one of the new development concepts at a municipality:

- **The level of ambition** is defined by the degree on setting higher demands than required in the national legislation. In the NHC3 context this refers to both, loose building materials which are used in construction and the entire building. In response to the end-user needs, municipalities have several options for choice.

Ambitious initial vision of the solution can possibly develop during the needs assessment and prioritization process. This can be enhanced by wish to be a front-runner municipality in some competition with other municipalities.

Requirements of the Green public procurement (GPP) criteria and sustainable building standard can somehow illustrate the possible level of ambition.

The basic concept of GPP relies on having clear, verifiable, justifiable, and ambitious environmental criteria for products and services, based on a life-cycle approach and scientific evidence base⁶. While the primary responsibility is to ensure compliance with the regulatory framework, the GPP shall be addressed from the holistic approach perspective. The technical specification aspects require for decisions on climate neutrality, circularity, and a tox-free construction. 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.

⁶ What is Green Public Procurement? https://green-business.ec.europa.eu/green-public-procurement_en

Municipalities can use the GPP tool to drive the innovation from the demand side and promote adoption of innovative solutions. GPP is generally seen as a powerful means of steering the construction sector towards sustainability. In some countries, there are mandatory guidelines for sustainable or GPP procurement related to buildings. Promoting and using GPP for buildings, public authorities can provide industry with real incentives for developing green technologies and products. GPP is well suited to achieving the aim of replacing hazardous chemicals with safer alternatives. Labels can play a particular role in developing technical specifications and award criteria, and in verifying compliance helping public buyers to save time⁷. NHC3 recommend using Type I ecolabels, e.g., Nordic Swan, the EU Ecolabel, and the Blue Angel⁸.

Table 1: Product categories for points of Nordic Swan for various construction material categories⁹

| Construction material per category | Nordic Swan eco-labelled product category and points award | | |
|---|--|---|--|
| | Higher | Medium | Lower |
| Load Bearing materials: | | *) Construction panels, wall covers, mouldings and panels for indoor use *) Construction and facade panels for outdoor use | |
| Walls & slabs | | *) Durable wood | |
| Exterior non-load bearing materials: | | | |
| Windows | *) Windows | | |
| Facades | | | *) Exterior doors |
| Other | | *) Outdoor paint *) Playground and park equipment | |
| Interior non-load materials: | | *) Indoor doors | |
| Other | *) Kitchens (front, frames, countertops) | | *) Stove/ fireplace *) Bathroom fittings (front, frames, and countertops) |
| Finishing materials: | | | |
| Flooring | *) Visible layer, excluding tiles | | *) Tiles |
| Walls | | | *) Tiles |
| Coatings (indoor paints, pigments, varnishes) | *) Indoor paint | | *) Other chemical building products |
| Adhesives | | *) Adhesives for glass felt and micro dispenser | |
| Sealants | | *) Sealants *) Indoor fillers | |
| Plates/ boards | | *) wardrobes including coat racks/hat shelves and similar *) Outdoor furniture | *) Bathroom fittings, kitchens (countertops) |

⁷ In accordance with Art.43 of Directive 2014/24/EU: https://green-business.ec.europa.eu/green-public-procurement_en

⁸ Building and renovating with ecolabels: tools to reduce environmental pollution through Green Public Procurement (07 October 2023): <https://interreg-baltic.eu/project-posts/building-and-renovating-with-ecolabels-tools-to-reduce-environmental-pollution-through-green-public-procurement/>

⁹ Own compilation based on Nordic Ecolabelling for New Buildings (15 February 2023) 089 New Buildings, version 4.0.

A Nordic Swan Ecolabel building is a better choice for the environment, the climate and for the occupants. It meets strict obligatory requirements for the whole life cycle of the building, including extraction and production of materials, the construction process, the use phase as well as the recycling and waste stages. The requirements promote resource efficiency, reduced climate impact, a non-toxic circular economy and conservation of biodiversity, as well as buildings with good indoor climate and high quality¹⁰.

A Nordic Swan Ecolabel building covers well the NHC3 pillar approach considerations, as it has a low energy demand (use stage) that is at least 10% better than “nearly zero-energy buildings”, meets strict chemical requirements for substances harmful to health and the environment -in building materials and chemical building products. This applies to everything from paints and sealants to insulation, vapour barriers, and floors. In addition, it meets requirements that promote circular economy: a material logbook ensures the traceability of the building components – and requirements for construction waste promote reuse, recycling, and other material recovery. Toxicity aspects are strongly represented in the Nordic Swan Ecolabel building to minimize and avoid use of problematic and specified chemical products in the building¹¹. Nordic Swan Ecolabel of buildings limits the presence of certain substance groups of concern in various construction materials and products.

Table 2: Overview on limited substances/ groups of concern by the Nordic Swan Ecolabel buildings¹²

| Construction materials/products | Substance (groups) of concern | | | | | | | | | | | |
|---------------------------------|-------------------------------|-------------------|-------------|---------------------|------|-----------------------------|------------------------------|---------------|--------------|-----------------------|------------------|---------------------|
| | Phthalates | VOC, Formaldehyde | SCCP & MCPP | Nonyl-octyl phenols | PFAS | Brominated flame retardants | Boric acid (boric compounds) | BPA, BPS, BPF | Heavy metals | Organic tin compounds | Isothiazolinones | Total preservatives |
| Walls & slabs | | | | | | | | | | | | |
| Roofs | | | | | | | | | | | | |
| Windows | | | | | | | | | | | | |
| Facades | | | | | | | | | | | | |
| Insulation | | | | | | | | | | | | |
| Floors | | | | | | | | | | | | |
| Coatings * | | | | | | | | | | | | |
| Adhesives | | | | | | | | | | | | |
| Sealants | | | | | | | | | | | | |
| Renders, plasters | | | | | | | | | | | | |
| Plates/ boards | | | | | | | | | | | | |
| Materials from PVC | | | | | | | | | | | | |
| Other plastics | | | | | | | | | | | | |

*) indoor paints, pigments, varnishes

¹⁰ Nordic Ecolabelling for New Buildings (15 February 2023) 089 New Buildings, version 4.0

¹¹ What exactly do different existing building certificates certify? Can they be an instrument to judge the integrated chemicals, climate, and circularity aspects of a building?) Presentation at the Green Governance Conference Driving change: empowering sustainability through Green Governance, 16 November 2023, Tallinn.

¹² Own compilation based on Nordic Ecolabelling for New Buildings (15 February 2023) 089 New Buildings, version 4.0.

From another hand, critical view on the project's ambition is often emerging due to precaution of **limited funding to more ambitious projects** (tox-free, circular and climate neutral buildings). Funding and budget availability is the most prominent source of challenges indicated by municipalities to promote sustainable construction¹³. Financing is often a key decision factor for starting innovation procurement, especially when the level of ambition is high in terms of innovation¹⁴. Outcomes from benchmarking of the current management landscape at the NHC3 municipalities somehow confirm the need for allocated funds in the budget agreement to ensure the building projects with integrated sustainable solutions, because by the conventional approach no additional costs allowed when using environmentally safer construction materials.

Long term budget strategies that promote the three-pillar approach to achieve strategical goals are needed at municipalities. In general, tools to control economic aspects are quite developed at municipalities, it would be just to adjust them to all three pillars.

Financing shall be secured by the **legal prescription**, e.g., mandatory GPP requirements for construction, mandatory certificate for environmental construction.

Financing secured by a **political decision** at the municipality, e.g., decision on application for the Nordic Swan label as a wish of the top management at the municipality.

Financing through the **participation in projects** promoting sustainable construction, e.g., NHC3.

Financial incentives to engage in sustainable construction and in innovation procurement, e.g., for those committed to minimize use of hazardous materials in buildings. Economic incentives, e.g. Reduction of Property tax, fast-track of building permit, etc., if the project meets certain criteria.

Another important aspect that influences setting of the level of ambition is a **political decision**. This aspect has been emphasized by municipalities during the discussion on strategic solution outline¹⁵.

The **strong political commitment** from the top-level management at the municipality is a key factor for the success of the strategy.

Political views and election platform promises, e.g., wish to build a healthy and sustainable city.

Political process to have a **decision on price!** Especially if the price is a challenge.

Needs investigation summary.

As part of the framework for implementation of strategic planning phase in sustainable construction at municipalities, it is advisable to summarize outcomes from the initial steps carried out. An early needs assessment summary report, prepared by the project

¹³ NonHazCity 3: 2nd Partners Meeting Green Governance Week in Tallinn, Estonia, November 14-15, 2023, WP1 session results.

¹⁴ Guidance on Innovation Procurement. Commission Notice C(2018) 3051 final, Brussels, 15.5.2018

¹⁵ NonHazCity 3: 2nd Partners Meeting Green Governance Week in Tallinn, Estonia, November 14-15, 2023, WP1 session results.

implementation team will provide good background on the status to be taken to next implementation steps. The summary report can serve as a supplementary source for the supply chain communication and a market dialogue.

Suggested Contents of an early needs' investigation summary document to the innovative construction project:

Background describing the selected individual construction project (e.g., pilot-project house) or a group of buildings of same type (e.g., pre-schools at municipality which are planned to construct in a foreseen future). If the technical pre-feasibility study has been carried out, then it is advisable to summarize the results in the needs investigation summary.

An overview of needs from the key groups of stakeholders, e.g., municipalities, end-users, house/property managers, including the justification and motivation.

The level of ambition – targets on the toxicity, circularity and climate aspects related to the construction project.

Cooperation and communication

The Framework for implementation of strategic planning phase leading to efficient strategic decisions in sustainable construction relies largely on successful cooperation and communication throughout the whole implementation process. Emphasis is built on **staff availability** to ensure that achieving the higher level of ambition is supported by the well-aligned cross-functional **project implementation team**, that supports the implementation of strategic planning phase and focus on aspects of toxicity, climate, and circularity at the municipality. Cooperation and communication aspects are of high importance for success in the supply chain communication and implementation of the market dialogue.

Cross functional project implementation team

Implementation of an innovative construction project where the increased level of ambition is desired must be supported by collaborative involvement of the entire design team from an early stage¹⁶. The objective is to utilize every participant's knowledge through all the project implementation phases. Bringing all the key participants together in the early stages of the strategic planning allows them to develop a better understanding of the project and promote successful change process.

The project implementation team is placed at a very core of the construction project strategic planning phase and beyond because operation of the team is essential also for the technical implementation of the project.

For the benefit of operation, the project implementation team shall create a good working environment to guide through the whole planning process. That would involve safe and inclusive team atmosphere, enabling discussions on conflicting views without creating conflicts, and varying viewpoints to discuss openly in the team. The members showing high mutual trust by sharing their knowledge and acknowledging each other's views and

¹⁶ Procuring Innovation in Construction a review of models, processes, and practices (2017) BC Construction Association by Brantwood Consulting.

knowledge related to different types of requirements. The team members are highly engaged and successfully united in the sharpening of the vision¹⁷.

The implementation team is composed from the members with cross-functional complementary competencies to the innovative construction project:

Top level management aimed to support the team with their decisions and commitments to implementation of the solution(s).

Medium level management representing, e.g., the project owner, head(s) of the respective department(s) related to the envisaged construction project.

Experts from the municipality departments that are related to the envisaged construction project. An employee with knowledge and education in sustainability, who can assist all building projects.

End-user level can be represented by respective construction project end-user organization or department.

A technology [architect, construction] expert(s) with deep knowledge of the technological state of the art in the innovative construction project.

A chemicals/ environmental expert with knowledge on the toxicity, circularity and climate aspects related to the construction project.

A procurement expert who understands the process and legal requirements of the procurement at the municipality. Involvement of the procurement expert from an early implementation step will give an inside overview of the construction project. This will be useful for organizing a procurement at the technical implementation phase.

Project manager with expertise in innovation and knowledge management.

Successful operation if the project implementation team would direct to successfully incorporating new ideas to generate changes that help to solve the needs for sustainable construction and the three aspects in core of the NHC3 project - toxicity, climate, and circularity considerations.

Market dialogue and communication with the supply chain

The Framework for implementation of the strategic planning phase addresses supply chain management **from the demand forecasting perspective** (as opposite to the tracking and controlling actual supplies in the technical implementation phase). This involves estimating future material and equipment requirements based on project schedules, construction supply management data and market trends. Current housing market trends show that construction supply chains, specially building material supply chains, will likely continue to become more complex¹⁸.

The importance of supply chain communication should not be underestimated. It is the method to carry the requirements to the suppliers and thus to control the supply. It is also a kind of control mechanism that prevents unachievable criteria from being defined. The

¹⁷ Brataas G., et.al. (2022) Requirements Engineering in the Market Dialogue Phase of Public Procurement: A Case Study of an Innovation Partnership for Medical Technology. REFSQ 2022: Requirements Engineering: Foundation for Software Quality, pp.159-174.

¹⁸ Construction supply chain: Everything to know in 2023:
<https://buildertrend.com/blog/construction-supply-chain/>

transformation towards a Toxfree, climate-neutral and circular building stock must be driven forward by the demand side and the supply side together and as a team. The supply chain communication is a crucial part for that.

Key stakeholders participating in the supply chain communication would include **municipalities, municipal companies, material suppliers, construction companies**. Involvement of **architects** will be of benefit because they have an important part in the construction project design stage.

From the municipalities perspective it would be necessary to communicate their long-term ambition and convey on developments they would like to see from material suppliers, and to obtain the market's views about the state-of-the art and their possibilities, availability of construction materials on the market. Material suppliers and architects would be expected to support decisions with expert opinions and knowledge, to communicate on developments and how to address and reach the criteria on technical requirements¹⁹.

Feedback loops are very important to create and maintain in communication with supply chains.

Market dialogue is an excellent way to interact with suppliers and inform the market about forthcoming needs²⁰. Market dialogue is aimed to understand and shape the dialogue phase that clarify and focus needs and technical requirements to be taken up by the procurement instrument at the technical implementation phase. Specification of needs and requirements is one of the main challenges in the public procurement of innovation.

A Market dialogue is part of the market analysis, and it is a two-way interaction to communicate on needs and improve the requirements specifications to the more realistic and realizable vision within time and budget limits. By discussing the vision and getting feedback on opportunities and limitations in existing and projected approaches, the project implementation team has an opportunity to refine their ambition and to improve the requirements specifications. By carrying out the Market dialogue, the project implementation team aims to get advice on design of specifications and selection of standards²¹.

Important to note, that a Market dialogue and advice given should not lead to distorting competition and should not breach the principles of non-discrimination and transparency!

Inclusive market dialogue phase takes time to implement the process, e.g., needs assessment, preparation to discussions, setting the program to market dialogue meetings, and ensuring the event logistics. It is advisable to include various forms of communication in the programme to the dialogue meetings, as keynote speech, plenary presentations, and work in smaller groups to facilitate discussions among participants. However, it is a vital learning process enabling the project implementation team to refine and focus on the vision and clarify and justify

¹⁹ NonHazCity 3: 2nd Partners Meeting Green Governance Week in Tallinn, Estonia, November 14-15, 2023, WP1 session results.

²⁰ Brataas G., et.al. (2022) Requirements Engineering in the Market Dialogue Phase of Public Procurement: A Case Study of an Innovation Partnership for Medical Technology. REFSQ 2022: Requirements Engineering: Foundation for Software Quality, pp.159-174.

²¹ Dekker C., Format for a market dialogue session for Procurement of Bio-Based Products and Services, presentation 28 February 2018: <https://www.slideserve.com/phillipy/format-for-a-market-dialogue-session-powerpoint-ppt-presentation>

requirements. Dialogue during this period will help to deliver information on the forthcoming needs and encouraged the suppliers to come up with new ideas²².

In-depth discussion is aimed to cover range of issues with a critical view on the project's ambition:

Are the initially developed technical requirements **feasible** to ensure the sustainable construction with toxicity, climate neutrality and circularity aspects incorporated?

Is the market **capable** to achieve the ambitious technical requirements?

Is the market sufficiently **mature** and whether there are enough suppliers to ensure supplies of materials up to requirements?

Has the market sufficient **capacity** to ensure requested supplies within the reasonable time frame and/or on a large scale by coverage?

Can the desired materials be procured at a reasonable **cost** and incorporated in the construction project within the budget limit?

Technical aspects

The Framework for implementation of strategic planning phase includes the step for decision on technical requirements. However, at this phase the technical aspects are addressed to an extent of the approach level.

Decision on technical requirements

Conducting the strategic planning phase shall develop decisions to serve as inputs to be incorporated at the conceptual stage of construction process when considering the three-pillar approach related to tox-free, circular and climate neutral construction.

Decisions from the **strategic planning phase** to be brought into the construction within the NHC3 three pillar context:

- ✓ Adjusted level of ambition²³ – defined vision and requirement for eco-certification or use of (certain) eco certification standards (e.g., Nordic Swan, DGNB), or incorporating the GPP requirements (e.g., Type I ecolabels from Nordic Swan, the EU Ecolabel, the Blue Angel)
- ✓ Requirement for environmentally friendly (local) materials avoiding (certain) hazardous substances.
- ✓ Requirement for use of eco-certified materials.
- ✓ Requirement for reusable, easy to repair construction elements.
- ✓ Requirement for use of recycled/ recyclable materials.
- ✓ Requirements for energy performance of buildings.
- ✓ Requirement for application of renewable energy technologies.

Technical requirements are further shaped at the technical implementation phase.

²² Alhola K., et.al (2017) Promoting Public Procurement of Sustainable Innovations: Approaches for Effective Market Dialogue. In a book Global Public Procurement Theories and Practices, pp.59-82.

²³ Refers to more realistic and realizable vision as an outcome from the Market dialogue activity, when compared to the ambitious initial vision of the solution set at an early step.

The Market Consultation is an applicable tool for communication with suppliers at the technical implementation phase. Market Consultation means an open invitation to the market actors to submit comments on a draft Invitation to Tender prior to Tendering, conducted to improve the quality of Terms of Reference. The purpose is to better align with the market availability, but also to increase the opportunity of receiving innovative Tenders²⁴. Market consultation is not a part of the Tender, however, the procedure for implementation is formalized.

Knowledge and capacity building

Outcomes from discussions with the project partners indicate that there is lack of knowledge and capacity to the sustainable construction aspects at municipalities, e.g., to verify challenging and ambitious decisions, to implement the innovation procurement process., lack of tools, and experienced personnel with sufficient qualities. Employees involved in tasks on sustainable construction require the relevant knowledge to be able to fulfil their related tasks²⁵. The Framework for implementation of strategic planning phase includes approach to set the **training and information programme at place**. It is thus anticipated that the (management) head of the relevant municipality department (unit) sees the need for knowledge and information and allocates relevant resources for the capacity building support. Advisable option would also be to hire an employee with knowledge and education in sustainability, who can assist all building projects.

Training programme needs.

The training programme needs were assessed within course of elaboration to the strategic planning and technical implementation phases in construction projects at municipalities.

Municipality employees need **Basic information** with the general introduction on chemicals in building materials, including aspects to consider for alternative and environmentally safer construction materials, overview on availability of alternative building materials, including costs. From the practical application, the presentation of real cases with reference to projects with good examples is needed. The NHC3 materials, as *Building material catalogue for tox-free construction* and a DIY guide called *Toxfree, circular and climate-friendly renovation of my home* are possible information sources.

Explanation is needed on NonHazCity **Three pillar approach** in construction by explaining the **tox free construction** that avoids hazardous substances in materials or finishes, **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, and **climate neutrality** concept of a state in which human activities result in no net effect on the climate system. Understanding needs to be enhanced of effects from **Hot spots in buildings** as critical areas where risks related to toxicity, embodied emissions, heat losses, or circularity are heightened. The NHC3 materials: *Building material catalogue for tox-free construction* and the fact sheet on *Hot spots in buildings* are possible information source.

²⁴ <https://www.lawinsider.com/dictionary/market-consultation>

²⁵ NonHazCity 3: 2nd Partners Meeting Green Governance Week in Tallinn, Estonia, November 14-15, 2023, WP1 session results

Training needs extend to concepts for high **level of ambition** in municipal construction projects. More detailed explanation and clarification is required for assessing options in approaching the Nordic Swan label requirements from the practical implementation perspective. Organization *Ecolabelling Finland* may be approached for possible presentation and consultation. Comprehensive background information on toxicity, circularity and climate aspects covered by Type I ecolabels (Nordic Swan, the EU Ecolabel, the Blue Angel) for construction materials is needed. The NHC3 Capacity building concept can be applicable.

Training is needed **on application of tools and documentation of materials** by introducing possibilities offered by systems as BVB (logbook, assessments of (i) chemical content, (ii) life-cycle assessment, information on climate impacts). Practical demonstration on operational aspects: **How to use for municipality needs and applications** in construction projects, Logbook and other building material inventory tools must be covered. Organization *BVB Service AB* is organizing regular webinars on these aspects.

Boosting capacity of municipality employees is needed to perform the efficient **Conformity check** of construction products within the supply chain. Here the lists of products grouped by the harmful substances they contain and documentation of chemicals in building materials must be assessed. Basic literacy to obtain the information from Safety Data Sheets (SDS), Construction product declarations, and Declaration from the manufacturer of the chemical product shall be addressed. Understanding of measurement methods and measurement results from on-site checks shall be obtained. The NHC3 Capacity building concept can be applicable.

Training on application of methods for **Communication** and **Needs assessment**, including prioritization methods, mind-mapping, visualization, joint visioning is necessary. Advice on organization of meeting and discussion session throughout the implementation of strategic planning and technical implementation phases. NHC3 consortium partners from NGOs having knowledge and experience in capacity building on communication can be approached.

The NHC3 pillar approach to GPP related to construction.

In sustainable construction practices aspects of tox-free, circularity and climate neutrality shall be addressed in a holistic approach. While the procurement process itself is taking place in technical implementation phase, **the criteria** for construction products **are set at the strategic planning phase** (Figure 1.). The technical specification aspects require for decisions on climate neutrality, circularity, and a tox-free construction. The NHC3 focus is on handling of hazardous substances and criteria for chemical substances.

The Checklist

Checklist for incorporation of GPP criteria related to construction.

| | |
|---|--|
| Framework conditions at place | Needs, priorities and objectives for the pilot are defined |
| | Cross-functional implementation team is operational |
| | Capacity on Basic information, Three pillar approach, Concepts for level of ambition |
| | NHC3 tools for use: <i>Building material catalogue for tox-free construction</i> , set of Fact sheets, e.g., Ecolabels |
| Summary of needs | Background for the construction project type described |
| | An overview of needs reflected (e.g., by end-user groups, by type of buildings) |
| | The level of ambition* - targets highlighted (e.g., minimize use of certain HS, substances of concern) |
| Benchmark GPP criteria to the tool Nordic Swan Ecolabel buildings | Clarify the status of GPP - voluntary/mandatory |
| | Check the legal requirements to GPP criteria, particularly on selection of materials |
| | Review and compare criteria requirements in sections: Chemical products and Construction products |
| | Compare to the eco-labelled products criteria (e.g., award criteria in GPP) |
| Incorporate criteria in procurement rules | Select the draft set of advanced GPP criteria |
| | Perform the market analysis for eco-labelled products |
| | Calculate the costs and compare to available budget |
| | Search for acceptance from the top-management to extend criteria |

*) The level of ambition is defined by the degree of setting higher demands when compared to those required by the national legislation.


Supply chain communication (specific for construction related issues)

Supply chain communication will be essential both, from the demand forecasting perspective and to perform the conformity check of construction products for on-going construction projects. Number of stakeholders, such as municipalities, municipal companies, material suppliers and construction companies, as well as architects will take part in communication with the supply chain. Procedures for ensuring communication to enquiries along the supply chain shall be at place.

The Checklist

Checklist for advancing information requests in supply chain management (for construction related issues).

| | |
|----------------------------------|---|
| Framework conditions at place | Needs and objectives are defined, the level of ambition* agreed (GPP criteria, sustainable building standard) |
| | Cross-functional implementation team is operational |
| | Capacity on Basic information, Three pillar approach, Tools and documentation of materials, Conformity check NHC3 tools for use: <i>Building material catalogue for tox-free construction</i> , set of Fact sheets, BVB database |
| Set-up for information exchange | Reflect on supply demand (forecast, actual supplies) by scope of chemicals, construction materials |
| | Key stakeholders (municipalities, municipal companies, material suppliers, construction companies) and roles clear |
| | Involvement of architects to support decisions |
| Enquiries along the supply chain | Set procedure for product information requests from potential suppliers (forecast) or main contractor (actual) |
| | Define the details for product composition reflection (main components, small share, traces), related to HS tracking |
| | Range of requests for supporting documents - SDS, material declaration, laboratory reports, supplier declaration |
| | Set procedure for Feedback loops |
| Tools and documentation | Ensure a digital logbook is created that will include all the construction products |
| | Procedure for updating the logbook is at place, division of responsibilities for the material requirements in construction |
| | Instructions for subcontractors (agreements, control plans) elaborated and communicated |
| | Upon needs, consult the third party tools to select the material requirements |

*) The level of ambition is defined by the degree of setting higher demands when compared to those required by the national legislation. 

Sustainable building certification systems

Sustainable building certification as a tool offer possibility to measure and compare the sustainable performance of buildings. A set of quantifiable indicators is applied. Evolving certification tools forces stakeholders to raise green building standards in response to new factors, knowledge, and pressure. Stronger integration of toxicity aspects to minimize and avoid use of problematic and specified chemical products in the building is addressed.

The Checklist

Checklist for adding HS aspects to existing building standards for sustainable construction.

| | |
|---|---|
| Framework conditions at place | Needs, priorities and objectives are defined for the pilot |
| | Cross-functional implementation team is operational |
| | Capacity on Three pillar approach, Concepts for level of ambition, Application of tools, Conformity check |
| Summary of needs | Background for the construction project type described, e.g., new construction, existing buildings |
| | An overview of needs from key groups of end-users reflected |
| | The level of ambition+: building certification systems to compare (e.g., BREEAM, LEED, DGNB, Nordic Swan Ecolabel) |
| Benchmark** (compare) aspects on sustainability | On resources: lower use of resources (energy, materials, fuels, water); avoid use of limited or non-renewable resources |
| | On recycling: building components to separation & recycling, design for disassembly, use of recycled material, waste |
| | On toxicity: reduce and avoid the use of toxic materials, account the use of HS, and where they are in the building |
| | On life cycle costing of the building, including construction cost and operational costs |
| Advance standard by HS reduction aspects (proposal for a chapter) | Select the priority chemical substances of concern and groups of construction products |
| | Access the product information and perform conformity check (SDS, product declaration, declaration from manufacturer) |
| | Select strategy and analysis methods for testing, get information from analysis reports, applicability |
| | Make decision to extend the currently used standard, test feeding into, e.g., the Lithuanian LPTBS standard |

*) The level of ambition is defined by the degree of setting higher demands when compared to those required by the national legislation.

**) use the approach by *Guide to Sustainable Building certifications (2018)*

<https://realdania.dk/publikationer/faglige-publikationer/guide-to-sustainable-building-certifications>

A market dialogue strategy for communication

The NHC3 strategic solution on Market dialogue is aimed to understand and shape the dialogue phase that clarify and focus needs and requirements to be taken up by the procurement instrument.

The Checklist

Checklist for a market dialogue strategy for communication with the construction stakeholders.

| | |
|-----------------------------------|--|
| Framework conditions at place | Needs mapped, priorities and objectives defined, focus on key SH groups, i.e., municipalities, emd-users, house managers |
| | Cross-functional implementation team is operational, involved managerial, expert and end-user level |
| | Capacity on Basic information, Three pillar approach, Level of ambition*, Conformity check, Communication methods |
| | NHC3 tools for use: <i>Building material catalogue for tox-free construction</i> , set of Fact sheets |
| Market mapping | Summarize findings from a needs investigation, prepare summary document to be used as an input for dialogue events |
| | Map the market SHs: suppliers, material manufacturers, architects, reflect on their activity profile |
| | Prepare lists of potential invitees to the market dialogue events: market SHs, end-users, experts, relevant NGOs |
| Market dialogue events | Prepare and post announcement online (wide coverage), after send dedicated mails, invite to register (4-6 weeks prior event) |
| | Prepare the Agenda for the event, plan sessions of presentations and group discussions, consider moderation |
| | Send reminders to participate (2-3 weeks prior the event), communicate details on the meeting (1-2 days prior the event) |
| | Set the feedback strategy, e.g., directly after the meeting, online questionnaire, sharing of the report from the event |
| Using the market dialogue results | Prepare report from the event, reflect on coverage of ambitions, needs, solutions, ourcomes from group discussions |
| | Reflect on the outcomes from the market dialogue event with the project implementation team |
| | Decide if the repeated dialogue with the market is needed to mature ambitions and the decision on requirements |
| | Prepare the document related to municipal policy on stratgic vision, requirements |

*) The level of ambition is defined by the degree of setting higher demands when compared to those required by the national legislation.

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