

NORDIC NETWORKS FOR CIRCULAR CONSTRUCTION

Policy Pathways for Fostering
Circular Transition in Construction
in the Nordic Region



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PREFACE

Launched in 2021, the Nordic Networks for Circular Construction (NNCC) was a strategic multi-annual initiative funded by the Nordic Council of Ministers. Its aim was to spearhead the adoption of circular economy principles within the construction sectors of Nordic countries, aimed to make the region a leader in sustainable and competitive construction and housing by 2030 with minimised environmental and climate impact.

The project was coordinated by the Ministry of Environment in Finland and ran from 2021-2024. Other partners involved in the project were the Swedish National Board of Housing, Building and Planning; the Ministry of Economic Affairs and Employment in Finland, the Ministry of Education and Culture in Finland; the Norwegian Building Authority; the Housing and Construction Authority of Iceland.

The project was structured based on the following focus areas:

1. Barriers and Opportunities
2. Metrics for Circularity
3. Cultural Change
4. Dissemination
5. National Fora for Circular Construction
6. Green Public Procurement as a Lever for Circular Economy

This Executive Report seeks to synthesise the essential findings from these themes and distil them into actionable insights and strategic recommendations to further advance circular construction practices across the Nordic region. Additionally, it aims to align these initiatives with other relevant projects funded by the Nordic Council of Ministers, such as the Nordic Sustainable Construction and the Nordic Carbon Neutral Bauhaus, ensuring coherent integration into the broader NCM decision-making framework.

1. INTRODUCTION

Circular construction is about making better use of the existing building stock and its individual components and designing new buildings to be easier to adapt and reuse.

A circular construction sector is one in which every part of the process of deciding, designing, and constructing new buildings is rethought to include exploiting the value of the materials already present in the built environment and ensure that the buildings designed and built today can maintain their value in the future, either as buildings, or in their constituent components.

1.1. CIRCULAR CONSTRUCTION IN THE NORDIC REGION

Adopting circular construction principles offers significant advantages, helping to limit the input of virgin materials required and greenhouse gas emissions generated, both now and in the future.

The construction sector accounts for a substantial portion of raw material use and waste generation in the Nordic countries. Throughout its entire value chain – from extraction, manufacturing, transport, and construction to end-of-life – the construction sector is responsible for half of all raw material extraction, 40 percent of energy use, and 35 percent of CO₂ emissions (One Planet Network, 2020). Approximately 45 percent of total waste generation in the Nordic region comes from construction and demolition activities (Eurostat, 2023).

As the energy efficiency of new buildings has improved in recent years, minimising emissions during the use-phase of a building's life cycle, the greenhouse gas emissions embodied in construction materials have become increasingly relevant. A circular transformation offers a pathway to lower additional carbon emissions and resource use within the sector while limiting the negative environmental impact of construction and demolition waste.

1.2. APPROACHES TO CIRCULAR CONSTRUCTION

Traditionally, the circular economy in construction was synonymous with the management of construction and demolition (C&D) waste. Although much of the C&D waste in the Nordic countries is categorised as "recycled," this often includes low-value uses such as backfilling or use in landscaping and civil engineering works. There is now a growing desire to enhance the value extracted from these materials, aiming for minimal waste generation and high-value reuse when waste does occur.

Current policies promote circular construction through several specific actions: pre-demolition audits, encouragement of reuse, life cycle analyses of buildings, design for disassembly and reusability, and the utilisation of waste in new construction. Despite these initiatives, the construction industry has largely operated on a linear model, with activities like renovation, repair, and maintenance not fully embracing circular principles. Additionally, waste prevention has recently focused on the role of contractors and builders in managing waste on-site and avoiding over-procurement of materials. Economic incentives and tight construction deadlines often lead to the procurement of excess materials as a buffer against potential delays, highlighting the need for a shift in industry practices to truly embrace circular construction methodologies.

The Nordic countries are renowned for successful societal transformations that have improved the quality of life for their citizens, and the built environment has reflected these transformations. However, as we have entered an era of multiple crises, our perception of the built environment must once again be transformed, requiring a cultural shift. The built environment is a physical manifestation of the values and collective identity of the Nordic people. Yet, contemporary construction practices do not always reflect the values of openness, collaboration, welfare for all, and connection to nature that the region is known for.

The transition to circular construction practices presents a unique opportunity for the Nordic countries to reconsider and align their approach to the built environment with their collective identity and values. By embracing circular principles, the Nordic construction sector can lead the way in minimising environmental impacts, promoting sustainability, and fostering a built environment that truly reflects the aspirations of the Nordic societies.

2. KEY FINDINGS

Achieving a circular construction model requires a holistic and multidimensional approach. It is not merely a matter of increasing recycling rates or adopting specific technologies; it demands a fundamental rethinking of the entire construction value chain, addressing systemic challenges, enabling accurate progress monitoring, fostering cultural shifts, and empowering local stakeholders.

The Nordic Networks for Circular Construction project has generated a wealth of insights and actionable knowledge to guide the transition towards circular construction practices across the Nordic region. Through its multifaceted work packages, the project has comprehensively examined the current state, barriers, opportunities, and pathways for embedding circularity within the Nordic construction sector.

2.1. BARRIERS AND OPPORTUNITIES

A report by the Swedish National Board of Housing (Boverket) and WSP Sweden "[Nordic Network for Circular Construction: Analysis of barriers and possibilities](#)" presents a landscape study of the state of the art in the circular construction in the Nordics and highlights the main barriers and opportunities.

2.1.1. Current state of circular construction practices

The current state of circular construction in the Nordic countries is marked by a nascent but growing momentum towards integrating circular economy principles into the construction sector. Circular construction is being progressively seen not just as a waste management initiative but as a comprehensive approach encompassing the redesign, operation, and reuse of building materials and structures. Despite these advances, the practice is still heavily oriented towards recycling rather than higher-value reuse or reduction strategies.

2.1.2. Major barriers and opportunities to advancing circularity

Despite these recent advancements in the regulatory framework for circular construction, there are still significant barriers facing actors along the construction value chain. Be they developers and building owners, or architects, engineers and consultants, contractors and builders, product manufacturers and demolition companies and recyclers, they all face a range of different technical, regulatory, cultural, and economic barriers that hinder progress and block transformative actions. These can be found within the strategic planning process, within building regulations themselves, in the culture that pervades the

industry and the broader society, economic framework conditions for the sector, the mechanisms by which markets can form and blossom, the logistics associated with reuse and recycling, the knowledge and experience within the industry at all steps in the value chain, the complexity of allocating (legal) responsibility outside of normal industry practice, documenting and data provision for reused products and buildings, and sharing that data beyond traditional silos within the industry.

A main takeaway from the analysis of these barriers is that they are heavily interlinked. For example, lack of experience and knowledge within the sector stems from a lack of opportunity to gain that experience and knowledge, while that same lack of experience and knowledge means that it is difficult to commission projects with a circular focus. Lack of experience and knowledge also leads to longer project time frames and therefore higher expenses.

The study included interviews, a literature review and a survey targeted for relevant actors within circular construction primarily in the Nordic countries. The following table presents the most pressing barriers as identified along with the challenges of integrating circular construction into strategy and planning processes. It pairs these challenges with forward-looking opportunities.

BARRIER	OPPORTUNITIES
1 LACK OF KNOWLEDGE AND EXPERIENCE Actors throughout the value chain do not have sufficient knowledge of or experience with the methods, processes, or routines required for circular construction, many of which do not yet exist.	PILOT PROJECTS Enable new actors to enter the circular construction market under favourable conditions, build experience, and develop and test new methods for all phases of circular construction. NETWORKS Provide a meeting place for interested actors to expand their network and learn new competencies. KNOWLEDGE CENTRES Provide central hubs that collect, collate, and communicate knowledge, experience, and best practices on circular construction. EDUCATIONAL MATERIALS Provide standardised learning within the sector, both through tertiary education and training, as well as apprenticeship training and education. CASE STUDIES Collect Nordic case studies of tangible and successful examples of circular construction done well, detailing not only the final product, but also the processes involved, and the challenges overcome, the solutions developed, and a contact reference for each of the responsible actors. PUBLIC PROCUREMENT Drive the propagation of knowledge about circular construction in the industry through projects for public works. CLOSER COOPERATION THROUGHOUT THE VALUE CHAIN Build new relationships throughout the value chain with partners who work in circular construction. Communicate quality demands and negotiate responsibilities.

2

BUILDING REGULATIONS

The implementation of building regulations is geared toward building with new products and materials. The current system is ill-equipped to encompass reused products and does not actively support circular design principles.

GUIDELINES FOR BOTH AUTHORITIES AND CONTRACTORS

Make it easier for authorities and contractors to navigate the existing building regulations to enable and facilitate circular construction.

REVISION OF BUILDING REGULATIONS TO BETTER ACCOMMODATE REUSE

Facilitate and standardise the use of reused products in new settings while ensuring that existing safety and health standards are maintained.

MANDATORY PRE-DEMOLITION MATERIAL MAPPING

Create a reliable and catalogued flow of reusable materials from end-of-life buildings, thus fostering a more stable marketplace for reused and recycled materials

STANDARDISED AND OPEN DATA FORMATS FOR BOTH PRE-DEMOLITION AND MATERIAL MAPPING

Consistency in material mapping and openness with the results will help establish a reliable and robust market for reused building products.

3

PRODUCT DOCUMENTATION

Reused products and materials lack the robust documentation demanded by the construction industry (CE marking, EPDs etc.)

DEVELOP RECERTIFICATION ROUTINES

Enable reused products to inspire the same level of confidence as new products through standardised recertification processes.

WORK WITH EU TO INTEGRATE REUSE INTO EXISTING PRODUCT CERTIFICATION PROCESSES

Expand the scope of the demanded standard product information to include reuse-relevant parameters. This will make reusing products easier when they reach end-of-life.

TRANSFERABLE WARRANTY/GUARANTEES

Standardised legal process for transferring warranty/guarantees (with or without modification) from original manufacturer to recovery agent of other party

DIGITAL PRODUCT PASSPORTS

Increase the transparency of and access to information about a product for current and prospective users, thus facilitating easier maintenance during lifetime and more streamlined path to reuse at end of life.

NON-CRITICAL APPLICATION

Increase reuse of elements by allowing and designing for reuse in non-critical elements, where the reused item lacks documentation (but passes the necessary screening for hazardous materials).

4

ALLOCATION OF RISK AND RESPONSIBILITY

Existing allocation of risk and responsibility is ill-suited to the circular use of building products.

NEGOTIATED RESPONSIBILITY

New forms of cooperation and dialogue throughout the value chain facilitate a common understanding of where responsibility for reuse products and final buildings lie. Allows all actors to react with confidence throughout the value chain.

NEW ROLES IN PRODUCT SOURCING

A broader approach to sourcing construction materials and products facilitates easier entry into circular construction for building and construction companies.

STANDARD CONTRACTS THAT REFLECT THESE NEW NORMS

Transforming new norms into standardised contracts stabilises circular processes within the construction industry broadly.

PUBLIC PROCUREMENT

Public tenders help pave the way to developing many of these forms of collaboration, norms and standardised contracts, and allows for quicker propagation of these within the industry and along the value chain.

5

ECONOMY

Circular construction is more expensive than construction with new products and materials. This is primarily because of the additional time required to engage in circular processes along the value chain.

LOWERING/REMOVING VAT ON CIRCULAR PROCESSES/ PRODUCTS

Rendering the price of reused products more competitive with products made with virgin materials. Incentivising actors throughout the value chain to adopt reuse processes, particularly dismantling and preparing for reuse.

ENFORCING EXISTING WASTE REGULATIONS

Full compliance with separate collection and disposal demands increases the total costs associated with waste generation and raises the baseline costs for demolition, making disassembly and reuse more competitive.

CARBON TAX

An economy-wide or industry-specific carbon tax increases the costs of virgin products and helps make reuse (and recycling) more competitive.

TARGETED FINANCIAL SUPPORT

Direct injection of capital into the construction industry tied to circular construction projects. Needs to be targeted at projects that develop new knowledge or skills for best return.

TAXES/FEEs ON VIRGIN PRODUCTS/MATERIALS

Increases the total costs associated with new products and virgin materials, making reuse and recycling more financially competitive.

FOCUS ON INDUCED BENEFITS

Incorporate the induced benefits (for example, increased employment) of circular approaches to construction into the total cost-benefit analyses and strategic decision making. Particularly relevant to projects for public authorities.

PUBLIC PROCUREMENT

Specifying circular construction criteria in all public tenders for construction works provides a gateway for the industry to build capacities in new circular methods while maintaining economic viability.

6

CULTURE

The construction industry is institutionally (and perhaps understandably) risk averse, and circular construction represents an undesired risk.

NATIONAL PROGRAMME FOR CIRCULAR CONSTRUCTION

Provides a clear declaration of intention for the construction industry that indicates not only the direction to take, but also the methods and milestones for transition and the underlying drivers making it necessary.

FIT CIRCULAR CONSTRUCTION PRACTICES INTO EXISTING PRACTICES AND ROUTINES

Stepwise integration of circular construction practices into existing processes to enable actors throughout the construction value chain to acclimatise to the concepts and tools associated with circular construction.

INTEGRATE CIRCULAR CONSTRUCTION MORE DEEPLY INTO EXISTING (ENVIRONMENTAL) CERTIFICATION SYSTEMS

Promote circular transition among the sector's most ambitious actors, thus allowing concepts and methods to propagate from certification practitioners.

EDUCATION, NETWORKING, AND KNOWLEDGE CENTRES

Develop, collect, and disseminate knowledge, best practices, standards, and norms through industry networks to ensure that circularity as a concept takes root in the industry.

PILOT PROJECTS WITH A BROAD RANGE OF ACTORS

Integrating new actors into pilot projects to broaden the reach and knowledge of circular construction within the industry.

2.2. METRICS FOR CIRCULARITY

The Ministry of Economic Affairs and Employment in Finland was in charge of the development work for metrics for circular construction. The work was done by Norion Consulting together with NORSUS, Ethica, Chalmers University, and TRE Rådgivende Ingeniører og Biologer. Findings from screening potential indicators, a systematic literature study of the impact of circularity strategies, a Nordic policy review, and stakeholder engagement activities have suggested eleven new voluntary indicators to measure circularity in the Nordic building sector. The findings are compiled in the report "[Nordic Networks for Circularity: Metrics for Circularity](#)".

2.2.1. Challenges in developing new metrics

Implementing new indicators involves academic, political and technical challenges. Academically, the many definitions of circularity make it difficult to choose measurable criteria. Politically, as metrics are also simplified, new metrics may also simplify ambitious policy targets. Technically, the collection and assurance of high-quality comparable data across national borders remain significant hurdles. The dispersed monitoring and diverse strategies across the Nordic countries add to the complexity, demanding a more unified approach to measurement and evaluation. Common metrics for the Nordic countries gives an opportunity for comparison between the countries.

2.2.2. Importance of indicators and monitoring

Effective monitoring of circular construction is vital for assessing progress and aligning with strategic goals. Indicators serve as essential tools for gauging the implementation of circular principles in the construction sector. They provide critical data that can influence policy decisions, identify gaps, and highlight areas of success. The interplay between policy targets and indicators ensures that each supports the other, enhancing the overall effectiveness of policies aimed at fostering a circular construction economy.

2.2.3. Prioritised indicators for circular construction

The NNCC project recognized the need to move beyond simplistic metrics like recycling rates to comprehensively measure progress towards circular construction. A set of 11 indicators were proposed:

1. Utilisation rate of existing building stock.
2. Total renovations vs demolition and new buildings.
3. Circularity properties of buildings and rehabilitation projects.
4. Land use change
5. Number of EPDs with "circular" properties
6. Share of certified building projects
7. Number of EU Taxonomy-aligned buildings
8. Resource productivity in construction
9. Construction and demolition waste
10. Recycling rates
11. Carbon footprint in the construction sector

2.2.4. Strategy for implementation of the new monitoring framework

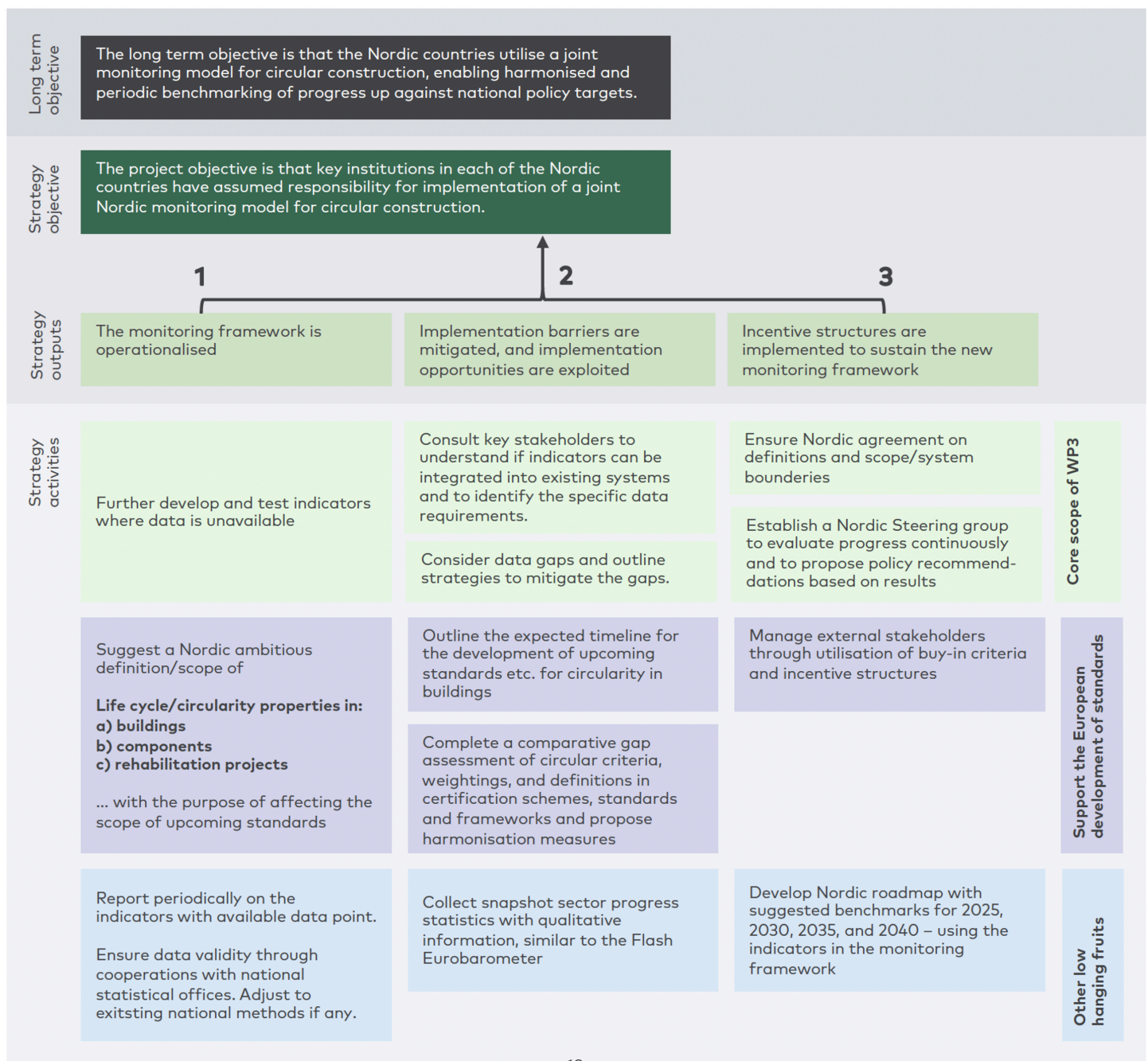
In addition to the indicators, the NNCC project outlined a comprehensive strategy to operationalize and embed a joint Nordic framework for measuring circular construction progress. This strategy establishes a long-term vision while providing a pragmatic roadmap to ensure effective implementation and sustained impact.

The long-term objective envisions the Nordic countries utilising a unified monitoring model that enables periodic benchmarking against national policy targets for circular construction. By aligning methodologies and definitions, this model can facilitate robust comparisons and foster a shared understanding of the region's collective advancement. Crucially, the strategy aims to institutionalise this framework by ensuring key national bodies across the Nordics assume responsibility for its implementation, tailored to their unique contexts and policy landscapes.

To achieve this overarching goal, the strategy delineates three primary outputs:

- Operationalization of the monitoring framework through extensive collaboration with national stakeholders, piloting innovative indicators, and leveraging readily available data sources.
- Tackling implementation barriers head-on, mitigating data gaps, harmonising certification schemes, and conducting comparative assessments to identify opportunities for alignment.
- Ensuring long-term sustainability by implementing incentive structures, establishing a Nordic steering group for continuous evaluation, and developing a comprehensive roadmap with benchmarks extending to 2040.

The image below provides a visual representation of the strategic framework for implementing a new monitoring model for circular construction across the Nordic countries. It is from the report [Nordic Networks for Circularity: Metrics for Circularity](#).



2.3. A NARRATIVE FOR THE NORDIC BAUKULTUR

The concept of Baukultur, translating to "building culture", has emerged as a holistic approach that emphasises quality, sustainability, and social inclusivity across all aspects of the built environment. The Ministry of Education and Culture in Finland led the exploration of this notion through the distinctly Nordic lens. Demos Helsinki crafted a narrative for the Nordic Baukultur that envisions a transformative future for architecture, urban planning, and construction practices in the region. The results were compiled in a report "[An Invitation to Be Exceptional: A Narrative for the Nordic Baukultur](#)".

Several cross-cutting themes emerged from the analysis of Nordic architectural policies, each carrying profound implications. Preserving cultural heritage, upholding uncompromising quality benchmarks, and centralising environmental, social, and economic sustainability stood out as foundational tenets of this reimagined Nordic Baukultur. Employing resourceful material management strategies, balancing immediate needs with long-range future perspectives through systemic, holistic thinking – these too surfaced as essential imperatives.

These insights were the key building blocks for narrating a Nordic expression of Baukultur. At its essence, this new narrative posits the built environment as an existential determinant of societal welfare and planetary impacts – a tangible manifestation of collective identity and values. It confronts prevailing realities of unaffordable housing accessibility, opaque development processes, and the construction industry's disproportionate ecological degradation, underscoring an urgent mandate for transformational change.

The narrative builds on the Nordic tradition of universalism, proposing a regenerative approach that actively restores ecological damage while providing quality housing for all. This vision calls for embedding local contexts through regional sustainable materials and traditional construction methods, while empowering communities to partake in participatory development processes.

Ultimately, the Nordic Baukultur narrative advocates for the "end of construction as we know it", ushering a new ethos centred on maximising the use of existing structures, careful deconstruction practices, and the circular reuse of materials. It envisions an equitable transition rooted in democratic tenets of trust and cooperation – a future where citizens are empowered as shapers of the built environment through participatory design models, innovative ownership/financing constructs and technical solutions enabling circularity.

Building upon the foundation of shared regional values, the Nordic Baukultur seeks to foster a future where our constructed spaces are regenerative by design, where each building is an affirmation of quality that contributes to the well-being of all. By merging tradition with innovation, the Nordic Baukultur stands not only as a testament to our time-honoured principles but also as an exemplar of exceptionalism, inviting us to reimagine the built environment as an enabler of societal and ecological prosperity.

2.4. INDICATORS FOR CIRCULAR CONSTRUCTION: THE ROLE OF PUBLIC PROCUREMENT

A study on "[Indicators for Circular Construction: The role of Public Procurement](#)" was conducted by Norion Consult. The study continues the indicator development by delving into the role of public procurement in fostering circular construction practices at the municipal level. The overall objective was to support the inclusion of circular construction criteria in public procurement. By examining the strategies employed by municipalities known for their leadership in this area – Bergen, Copenhagen, Gothenburg, Helsinki, and Reykjavik –, it explores how local authorities are integrating circular economy principles into their procurement processes.

One critical indicator for circular construction is the utilisation rate of existing building stock. Municipalities like Helsinki and Gothenburg are taking steps to monitor and optimise the use of existing buildings, prioritising renovation and repurposing over new construction. In tandem with this emphasis on utilising existing structures, some of the analysed municipalities are also shifting their focus towards renovation rather than demolition. The environmental benefits of preserving buildings, combined with considerations of cost, time, and functionality, are guiding decision-making processes. For instance, Copenhagen's recent life cycle analysis of a renovation project highlighted a potential 20 percent reduction in CO₂ emissions compared to new construction, underscoring the importance of such strategic choices. However, the economic implications remain a factor, as renovation projects often incur higher costs compared to new builds.

Certification schemes also play a pivotal role in ensuring high standards of sustainability and circularity in construction projects. Municipalities such as Bergen, Helsinki, and Reykjavik have adopted schemes like BREEAM, DGNB, and the Nordic Swan Ecolabel to benchmark their projects against rigorous environmental criteria. These certifications not only provide a framework for sustainable construction but also drive the industry towards higher performance standards, demonstrating municipal leadership in the transition to a circular economy.

Despite stringent regulations and the inclusion of waste handling requirements in certification schemes, effective management of construction and demolition waste remains a challenge. Pilot projects and development initiatives, such as those led by municipalities like Helsinki and Copenhagen, are crucial in testing and refining these practices.

Looking at the examples of these cities is important because they illustrate how innovative public procurement strategies can drive the adoption of circular economy principles in construction. The approaches taken by Bergen, Copenhagen, Gothenburg, Helsinki, and Reykjavik showcase how municipalities can lead by example, integrating sustainability into their procurement processes and setting new standards for the industry. By prioritising the renovation and repurposing of existing buildings, implementing rigorous certification schemes, and actively managing construction and demolition waste, these cities demonstrate the tangible benefits of circular construction. Their efforts highlight the potential for significant environmental impact reductions,

improved resource efficiency, and the advancement of sustainable building practices. Learning from these pioneering municipalities can inspire other cities to adopt similar strategies, fostering a broader movement towards a more sustainable and resilient built environment.

2.5. NATIONAL FORA FOR CIRCULAR CONSTRUCTION

Under the leadership of the Housing and Construction Authority of Iceland and the Green Building Council Iceland, Work Package 6 focused on reinforcing national networks for circular construction. In Iceland, the initiative took tangible form with the creation of the Icelandic Network on Circular Construction – [Hringvangur](#), a dedicated forum aimed at propelling circular economy principles into the mainstream of the Icelandic construction sector. Officially launched in December 2023, *Hringvangur* currently has over 30 members and this number is expected to grow significantly over 2024 and beyond. The goals of *Hringvangur* are as follows:

1. Promote circular economy in the construction sector by, among others:
 - a. producing and publishing various types of materials related to circular construction in Iceland or abroad; and
 - b. participating and organising events related to circular construction.
2. Lobby authorities to pass legislation that will direct the Icelandic construction market in a more circular direction.
3. Educate and motivate stakeholders involved in the construction sector to include circular practices in their work.
4. Connect stakeholders in the construction sector to facilitate implementing circular activities in practice throughout the value chain.

This Work Package also included a series of 3 workshops aimed to deepen the analysis of the obstacles to implementing circular solutions in the Nordic construction sector as well as identify solutions addressing these barriers and solving some of the prioritised bottlenecks. These solution-oriented workshops, facilitated in cooperation with Demos Helsinki and the Green Building Council Finland, successfully convened a wide array of stakeholders, from industry leaders to policymakers.

The first workshop was held on June 1, 2023, as a side event of the World Circular Economy Forum in Helsinki. This session brought together stakeholders to discuss barriers to circular construction and explore potential solutions. A second workshop took place on September 13, 2023, aligned with the Nordic Climate Forum for Construction, where participants further examined the challenges and opportunities within circular construction methods. The final workshop occurred online during the Nordic Circular Summit on October 11, 2023. It connected participants from various sectors to discuss and strategize on advancing the adoption of circular principles in construction.

All in all, these gatherings articulated a clear vision: circular construction is not an isolated endeavour but a communal effort that requires persistent collaboration, innovative thinking, and adaptive frameworks. The collective knowledge gained from three workshops is presented in detail in the next section of this report, as it directly informs the recommendations for the Nordic Council of Ministers.

3. POLICY RECOMMENDATIONS

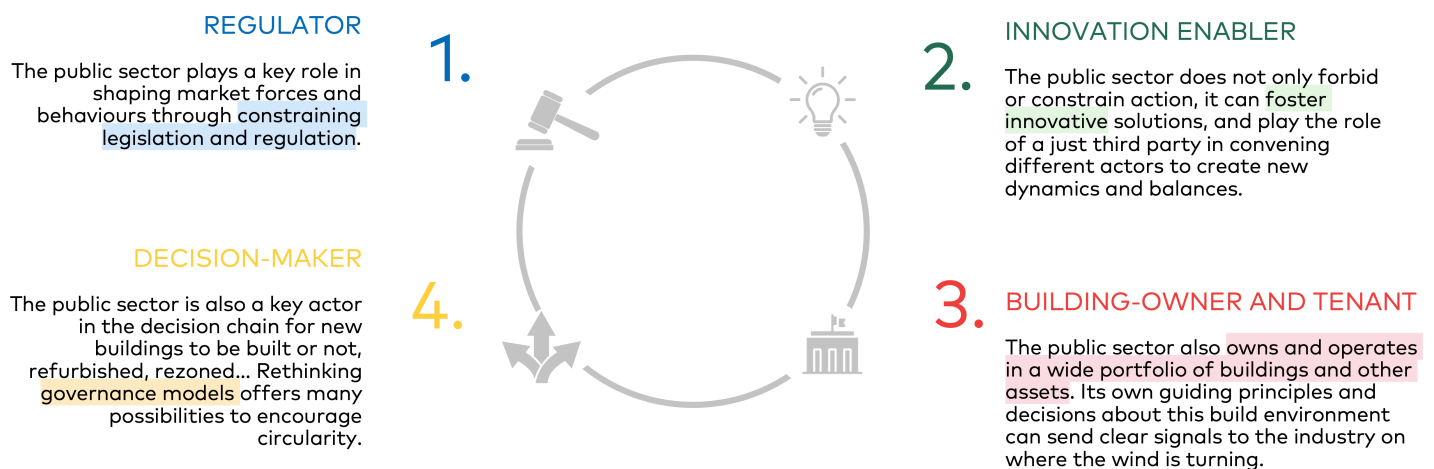
The Nordic Networks for Circular Construction project has worked intensively around the topic of circular construction for three years. Based on that work, research, studies, and various engagement activities, we have identified multiple ways with which the circular transition in the construction sector could be further advanced in the Nordics.

3.1. THE PUBLIC SECTOR'S CRUCIAL ROLE IN TRANSFORMING CONSTRUCTION FOR A CIRCULAR FUTURE

3.1.1. A New Blueprint for Building

Circular construction is not just about using recycled materials; it's about rethinking the entire lifecycle of buildings to create a sustainable, waste-minimising ecosystem. The public sector, wielding its influence as regulator, decision-maker, innovation enabler, and property manager, is pivotal in steering this monumental shift. A sub-project, [Nordic Circularity Accelerator](#) led by the Green Building Councils of Finland and Iceland, investigated these roles and identified policy recommendations in cooperation with stakeholders from each Nordic country.

FOUR ROLES OF THE PUBLIC SECTOR



ROLE 1. THE PUBLIC SECTOR AS REGULATOR

Effective regulation is the cornerstone of widespread adoption of circular construction. In this context, the public sector's role extends beyond mere enforcement to shaping market forces and behaviours through insightful legislation that guarantees safety, reliability, and sustainability.

Quality Control through Certification

Imagine a world where every reused beam or panel in a building comes with a guarantee of safety and performance. Nordic countries are pioneering efforts to certify the quality of reused materials. Such certifications are more than just stamps of approval; they're crucial in building trust among consumers and investors, making the idea of living or working in a structure made of recycled components as normal as traditional construction.

Mandating Material Reuse

In an ambitious push, some Nordic countries are setting mandatory reuse targets for specific materials in major refurbishments and demolitions. These regulatory mandates are transforming the demolition landscape from waste-heavy operations into meticulous deconstruction missions aimed at salvaging materials for future use.

POLICY RECOMMENDATIONS

1. Introduce a resource tax on raw materials to include their environmental price.
2. Introduce CO₂ emissions limits for new construction and harmonise the method of calculating emissions among Nordics. Such harmonisation will allow designers and construction companies to extend their market to all Nordic countries.
3. Implement requirements on circular design to the building code and ensure that they are being followed.

ROLE 2. THE PUBLIC SECTOR AS AN INNOVATION ENABLER

Beyond regulating and deciding, the public sector also thrives as a catalyst for innovation. By convening diverse stakeholders and facilitating the development of new technologies and practices, governments can spark significant advancements in circular construction.

Setting Standards for Reuse Insurance

One approach involves defining new standards for insuring reused materials. These standards help mitigate risks associated with recycled components, encouraging more builders and developers to choose them over new materials.

Auditing Tools for the Future

Another forward-thinking initiative is the development of advanced auditing tools that enhance the documentation and assessment of reusable materials. By standardising these tools, the public sector ensures that critical information is consistently collected and shared, making reuse practices more reliable and widespread.

POLICY RECOMMENDATIONS

1. Facilitate creating and managing a database with data from material passports and pre-demolition audits to improve the flow of information on available materials among stakeholders.
2. Facilitate the preparation of guidelines on improving building design and navigating existing building codes when implementing circular practices.

ROLE 3. THE PUBLIC SECTOR AS TENANT AND OWNER

Perhaps the most direct influence the public sector can exert in promoting circular construction is through its role as a property owner. By applying circular principles to its building projects, the public sector not only sets standards but also demonstrates the practical benefits and feasibility of these practices.

Documenting Today for Tomorrow

A proactive approach involves requiring that all new materials used in public construction projects come with comprehensive documentation to facilitate future reuse. This practice ensures that when buildings reach the end of their current use phase, they can be easily and effectively integrated back into the construction cycle.

Learning by Doing: Piloting the Future

The Nordic public sector is also pioneering pilot projects that use recycled and reused materials. These projects are crucial for testing, refining, and ultimately proving the concepts of circular construction in real-world applications. Each project provides valuable lessons and data that can guide industry-wide practices and policies.

POLICY RECOMMENDATIONS

1. Introduce obligatory criteria on circularity in the procurement processes to lead and drive the transition to circular construction.
2. Public authorities own and manage a considerable share of existing building stock. Therefore, focus on proper maintenance, efficient use, and adaptation to new needs of the existing building assets.

ROLE 4. THE PUBLIC SECTOR AS DECISION-MAKER

Public sector decision-makers are in a unique position to influence which buildings go up, come down, or get a green makeover. By embedding circular economy principles into governance models, they're not just encouraging but mandating a shift toward sustainability.

Revolutionising Demolition Permits

In the Nordics, the process of obtaining a demolition permit now often comes with a significant catch: a mandatory audit to assess the potential for material reuse. This isn't bureaucracy for the sake of it; it's about ensuring that every material is considered for reuse before the wrecking ball swings.

POLICY RECOMMENDATIONS

1. Introduce circular construction elements, emphasising practical aspects, into national curricula at different levels (e.g., vocational schools, universities).
2. Introduce requirements on pre-demolition audits and material passports for all demolition projects and new buildings, respectively.
3. Positive incentives are needed to enhance the expansion of circular practices. Lower VAT on reuse and recycling. Lower operational costs of circular buildings by lowering property and utility taxes.

3.2. RECOMMENDATIONS FOR THE NORDIC COUNCIL OF MINISTERS

This section offers insights and initial inputs designed to inform the Nordic Council of Ministers (NCM) Strategy Process. It underscores the importance of adopting a holistic approach to circular construction, emphasising the need for a paradigm shift towards sustainable practices across the Nordic region. The recommendations outlined herein focus on strategic areas essential for facilitating this transition:

1. [Research and Development Projects and Processes](#) – We advocate for ongoing support of pioneering research and development projects that challenge traditional construction norms and promote sustainable, circular practices. These efforts are not only crucial for innovation but also for the integration of circular economy principles into the very fabric of the construction sector. Projects should not only address technological advancements but also explore economic incentives, the potential of public procurement, and effective collaboration models that can distribute risks and responsibilities equitably.
2. [Funding: From Research to Action](#) – We emphasise the pivotal role of transforming innovative research into practical, scalable solutions. There are already plenty of excellent practices, which to emphasize and scale. But, despite the wealth of knowledge generated by initiatives like NNCC and Nordic Sustainable Construction, the real challenge lies in transitioning from theoretical insights to actionable practices that propel the circular construction movement forward. The Nordic Council of Ministers can catalyse this shift through targeted funding schemes that support both physical and policy-oriented pilot projects. These projects should involve a diverse array of stakeholders from both the private and public sectors, extending beyond conventional approaches to include elements such as insurance policies and value chains. Furthermore, enhancing national networks for knowledge exchange and developing comprehensive learning materials and programs are essential steps in equipping industry actors with the necessary skills for this transition.
3. [Pan-Nordic Collaboration](#) – The strength of the Nordic region lies in its ability to collaborate across borders, pooling resources, knowledge, and expertise to tackle shared challenges. By standardising circularity indicators and harmonising methods and definitions, the Nordic countries can lead by example, setting the stage for EU-wide adoption of sustainable construction practices. This collaboration extends to the academic realm as well, encouraging pan-Nordic educational initiatives that prepare the next generation of industry leaders.
4. [Integration of Circularity Indicators](#) – The development and integration of comprehensive circularity indicators are paramount for assessing progress and guiding future strategies. Through a meticulous process of reviewing and prioritising over 200 metrics, a set of essential indicators has been identified. Engaging key stakeholders, addressing data gaps, and harmonising circular criteria are critical steps in ensuring these indicators effectively capture the nuances of circular construction and support the ongoing development of standards and certification frameworks. One opportunity to integrate the circularity indicators is public procurement, especially at the local level.

5. [Sustaining the Monitoring Framework through Incentive Structures](#) – To maintain the momentum of circular construction initiatives, it is imperative to establish a durable monitoring framework. By standardising definitions and creating a Nordic-wide agreement on circularity indicators, we can promote sustainability while adapting to the evolving needs of communities and industries. The establishment of a Nordic Steering Group would ensure continuous evaluation and policy recommendation, aligning closely with other harmonisation efforts, such as building codes. Engaging external stakeholders and developing a Nordic roadmap with clear benchmarks will further ensure the relevance and effectiveness of the monitoring framework, guiding the region towards its circular construction goals.

3.2.1. Research and development

Even though the NNCC project (and other previous projects) have produced a lot of knowledge and information, there is still more to discover. Based on the work done in NNCC we have identified at least the following topics for research and development.

Topics for research:

- Economic incentives for circular construction: How to build incentive systems, which are effective and equal.
- Possibilities of public procurement: Which kind of procurement policies are most effective to support circular construction.
- Collaboration and risk and responsibility allocations: How actors can increase collaboration and how they can define and share risks. Which actors are required to be involved in risk management.
- Vacancy rate and use of existing buildings: It is often forgotten that the primary focus in circular construction should be in utilising and preserving the existing building stock. There should be more research to identify the reasons for low vacancy rates and how to increase those.

Development projects:

- To foster the reuse of building materials, their availability should be ensured. Their collection and distribution practices require further development:
 - Implement and define process and open data standards for pre-demolition material mapping.
 - Databases and markets for reused construction products.
 - Enhance knowledge of materials in existing buildings:
 - E.g. There has been [research on predicting hazardous substances in existing buildings using machine learning](#). Maybe these tools might be interesting to implement in other countries.

3.2.2. Funding: From research to action

Ongoing projects, such as NNCC and Nordic Sustainable Construction, have produced a lot of knowledge about circular construction. This information contains e.g. various barriers and possibilities in circular construction, metrics for circularity and various policy actions. Projects have also emphasised the urgency for circular transition in construction, so now it is time to foster the adaptation of circular practices. We believe Nordic Council of Ministers could have an important role in the transition and it could foster it with various funding schemes (also through Nordic Innovation).

This could mean e.g.

- Pilot projects: Funding both physical and policy pilots, which would include a wide range of actors from the private and public sectors.
 - Piloting should extend the traditional piloting and cover e.g. insurance policies, value chains etc.
 - Projects should produce publicly available practical guidelines on circular construction.
- Support national networks in knowledge exchange: Transitions require a lot of new knowledge and skills. It is very important that different actors move rather simultaneously to the rather similar direction, which increases the importance of knowledge exchange across the industry. Knowledge exchange also increases collaboration opportunities.
- Learning materials and programs: Transitions require re-skilling, which requires available learning materials and programs. Some materials are already being produced by e.g. the NEB academy and Nordic Sustainable Construction project. These give good examples of how materials could be.
 - Materials could be even quite case-specific, e.g., how to reuse precast concrete slabs.

3.2.3. Pan-nordic collaboration

A key strength of Nordic collaboration has been in the aligning approaches in e.g. criteria and calculations. It is a way to make Nordics bigger than sum of each country alone. It is possible e.g. increase the size of markets and influence EU policies with common Nordic viewpoints. This could further strengthen in the context of circular construction.

- Strengthen the Nordic sector through harmonisation of methods and definitions. In order to collaborate efficiently between Nordic countries, there needs to be a collective understanding and language of the topic at hand. In circular construction, at least one of the key concepts, reuse, has not a clear definition
- Harmonisation in the field of qualification criteria of reused building products (different product categories)
- Standardise a circularity index.
- Support the integration of CC into existing certification frameworks.
 - E.g. Including circular construction aspects in the Swan certification scheme.

Nordic collaboration can also take other forms. For example all kinds of pan-nordic collaboration for university students (design competitions, common courses, exchange) are very welcomed.

3.2.4. Integration of Circularity Indicators

The WP3 in the NNCC project has developed indicators for circular construction, mentioned already earlier. Besides the metrics, also a process of how to actualize and integrate the measures has been created:

- Consult Key Stakeholders: Engage with statistical officers, building permit officers, and other relevant stakeholders to ensure that new circularity indicators can be smoothly integrated into existing data collection systems.
- Address Data Gaps: Identify and strategize to mitigate data gaps, particularly for less widespread indicators like building utilisation rates.
- Develop Standards Timeline: Establish a timeline that aligns with the ongoing development of new circularity criteria and standards.
- Harmonise Circular Criteria: Perform a comparative assessment of circular criteria within certification schemes, standards, and frameworks to identify potential areas for harmonisation.
- Collect Sector Progress Statistics: Adopt alternative reporting approaches, such as conducting regional surveys at the organisational level, to provide in-depth sector progress snapshots.

It is good to notice that the metrics creation project consisted of reviewing over 200 metrics and prioritising them. As a result, 5 core indicators were chosen. It is good to note that each one is relatively extensive and might require some more research to support the description and identify the most suitable measurements and specific requirements. The suitability of the metrics could be tested first in one country and then be translated into other countries.

3.2.5. Sustaining the Monitoring Framework through Incentive Structures

In order to make the Monitoring Framework a living practice, it requires continuous work. WP3 suggests the following process:

- Standardise Definitions and Boundaries: Work towards Nordic-wide agreement on the definitions and scope/system boundaries of circularity indicators. Specifically, incorporating a common definition of reuse is crucial to harmonise efforts in reducing waste and promoting sustainability. Additionally, defining key terms related to the flexibility and multi-usability of spaces would further support innovative approaches, catering to the evolving needs of communities and industries.
- Establish a Nordic Steering Group: Create a steering group to continuously evaluate progress and propose policy recommendations. To ensure synergy with existing efforts, the steering group's formation and operation should be strategically linked to other Nordic initiatives, e.g. the steering group on harmonisation of building codes. Consideration of the appropriate level of

integration — whether it be advisory, operational, or strategic — will be crucial to maximising impact and efficiency.

- Engage External Stakeholders: Utilise buy-in criteria and incentive structures to manage external stakeholder engagement, ensuring the monitoring framework remains relevant and responsive to sector needs.
- Develop a Nordic Roadmap: Outline ambitious yet voluntary benchmarks for 2025, 2030, 2035, and 2040, using the framework's indicators as a guide.

4. COORDINATION WITH OTHER RELEVANT PROJECTS

The NNCC initiative operates in tandem with several complementary efforts. Among these, the Nordic Sustainable Construction initiative stands out as a sister project, crucial in the regional strategy to fortify the sustainability of the Nordic construction and housing sector. Another initiative, the Nordic Carbon Neutral Bauhaus, strives to integrate aesthetic and cultural dimensions with circular construction principles. This chapter outlines the coordination efforts between the NNCC and these efforts, elucidating how these collaborations contribute to a cohesive regional approach towards sustainable development.

4.1. THE NORDIC SUSTAINABLE CONSTRUCTION PROGRAM

The [Nordic Sustainable Construction](#) program, orchestrated by the Danish Housing and Planning Authority, focuses on five strategic work packages. These packages aim to address key areas such as the harmonisation of life cycle assessments, the promotion of sustainable construction materials and architecture, the achievement of emission-free construction sites, and capacity building for the reuse of construction materials along with bolstering international collaborations. Furthermore, a fifth package led by Nordic Innovation concentrates on evolving circular business models and enhancing procurement processes. Together, these efforts represent a robust framework for advancing sustainable construction across the Nordic countries.

The Nordic Sustainable Construction program's emphasis on harmonising life cycle assessments directly complements the NNCC project's efforts under Work Package 3 to develop holistic indicators and metrics for measuring circular construction progress. By aligning life cycle assessment methodologies across the Nordics, both initiatives can leverage consistent data to benchmark environmental impacts and material flows – critical for tracking the transition to circular and sustainable practices.

Furthermore, the Nordic Sustainable Construction program's stream on promoting sustainable materials and architecture shows considerable overlap with the material circularity principles at the core of the NNCC's vision. Advancing sustainable product sourcing, design for longevity, ease of maintenance and renovation align with circular strategies to maximise the utilisation and value retention of buildings and components over their lifecycle.

The push for emission-free construction sites clearly reinforces the NNCC's ambitions to minimise the environmental footprint across all construction activities and value chain stages. Adopting circular processes like increased material reuse and recycling will be essential to curbing emissions at construction sites.

Importantly, both the Nordic Sustainable Construction initiative's focus on building capacity for construction material reuse, as well as the NNCC's national fora and dissemination efforts under Work Packages 5 and 6, represent complementary pathways for equipping the industry with skills and knowledge to drive this transition. Cross-pollination between these workstreams can multiply their impact.

Finally, the emphasis within Nordic Sustainable Construction on fostering circular business models and sustainable procurement serves as a critical economic enabler. The NNCC's policy recommendations and measurement frameworks provide the strategic guardrails, which can mobilise investments in circular business innovations and align procurement with circularity principles – vital for incentivizing this systemic industry shift.

The project has published two reports, which are especially relevant from the perspective of circular construction.

1. [Policies Enabling the Reuse of Construction Products in the Nordics](#)
2. [Reuse, recycling and recovery of construction and demolition waste in the Nordic countries](#)

As such, the Nordic Sustainable Construction programmes at different policy levels can also act as a pivotal implementation vehicle for realising the NNCC's circular construction visions and recommendations in a tangible, coordinated manner across the Nordics. Ensuring strategic alignment and collaborative integration between these efforts is paramount to amplify their mutual impact while avoiding duplicative inefficiencies.

Moving forward, establishing governance structures and shared resources for cross-programme coordination can ensure seamless exchange of insights, learnings, and best practices. Joint working groups, harmonised data repositories, and co-sponsored capacity-building initiatives represent potential avenues. Regular alignment between programme leadership can also identify emerging gaps and synergistic opportunities to be capitalised upon through concerted actions.

4.2. NORDIC CARBON NEUTRAL BAUHAUS

The [Nordic Carbon Neutral Bauhaus](#) is another effort echoing the themes explored in this NNCC report. In 2021, the Finnish rotating presidency of the Nordic Council of Ministers organised a series of co-design webinars to provide the New European Bauhaus with Nordic ideas. The outcomes of these events have been summarised in the report "[New European Bauhaus: Reflections from the Nordic co-design](#)".

The Nordic Carbon Neutral Bauhaus aims to connect relevant actors across the Nordics and beyond to imagine sustainable futures and the role of architecture, design and art in making it reality. The initiative has organised various events around the Nordics and Europe, produced a podcast series and activated students in a design competition. Various inspirational materials, videos, podcasts and reports are available at the website.

The Nordic Carbon Neutral Bauhaus is yet another example of the Nordic commitment to advancing sustainable and circular construction practices also in the context of the broader goals of the New European Bauhaus.

The experience of the Nordic Carbon Neutral Bauhaus shows that the New European Bauhaus would benefit from prioritising further cross-regional knowledge exchange and championing pilot projects that showcase innovative circular construction principles, setting a new standard for sustainable and circular urban development across Europe.

5. SYNTHESIS AND WAY FORWARD

Achieving a circular construction model requires a holistic and multidimensional approach. It is not merely a matter of increasing recycling rates or adopting specific technologies; it demands a fundamental rethinking of the entire construction value chain, addressing systemic challenges, enabling accurate progress monitoring, fostering cultural shifts, and empowering local stakeholders.

The Nordic Networks for Circular Construction initiative represents a pioneering effort to catalyse the transformation towards circular and sustainable practices across the Nordic construction sector. Through its comprehensive work packages, the NNCC project has generated critical insights, policy recommendations, and actionable strategies to propel this transition forward.

Spanning analysis of current practices, barrier assessments, progress measurement frameworks, cultural visioning, and local capacity building, the project's findings highlight both the imperative for circularity and the multidimensional complexities involved. The urgency is clear – construction activities account for immense material extraction, waste generation, emissions, and ecological degradation across Nordic nations. Yet institutional inertia, data inconsistencies, fragmented knowledge sharing, and entrenched linear business models perpetuate unsustainable trajectories.

The NNCC project directly confronted these challenges through tangible outputs such as:

- mapping 86 existing circular construction policies and synthesising strategic recommendations for fortifying them;
- proposing 12 prioritised indicators spanning building utilisation, renovation rates, material criteria and more to holistically monitor progress;
- crafting a cultural narrative reimagining "Nordic Baukultur" principles aligned with circularity, democratised processes and environmental regeneration; and
- fostering national stakeholder networks and knowledge dissemination mechanisms in each Nordic country.

Collectively, these work streams provide a substantive policy arsenal and conceptual framework for operationalizing circular construction practices from cultural ideation through to standardised measurement and local implementation.

5.1. OVERARCHING RECOMMENDATIONS

While the specific recommendations across NNCC's work packages are elaborated in-depth, several overarching thematic priorities for Nordic policymakers emerge:

1. Harmonisation of definitions, standards and data sources to enable normalised benchmarking and institutional alignments across nations;
2. Developing incentive structures and regulations that discourage linear practices while fostering circular innovation in areas like construction material banks, digitization, building adaptability and deconstruction capabilities;
3. Democratising construction development processes through participatory urban planning models, public engagement, and community stewardship of the built environment;
4. Capacity building through educational outreach and workforce training focused on imparting technical, business and governance competencies required for circular construction delivery; and
5. Bridging policy-industry disconnects through collaborative public-private initiatives that inject practical, sector-backed insights into policymaking while aligning market incentives.

Crucially, this holistic approach necessitates transcending construction's traditional economic silos through inter-sectoral, inter-regional and inter-generational solidarities. These interventions span the remits of environment, housing, economic affairs, education and democratic governance ministries – underscoring the need for centralised circular construction policy orchestration.

Ultimately, the Nordic region stands at a critical crossroads. Passively abiding by convention ushers a bleak descent – depleted environments, deteriorating quality of life, and forfeiture of a global sustainability leadership role. But by actively choosing the transformative circular construction path, the Nordics can renaissance their pioneering heritage.

This destiny will demand reimagining industry operating norms, institutional alignments, community dynamics and cultural mores. It necessitates audacious innovation across policy, financing, business models, material sourcing, construction techniques and design modalities. Above all, it requires societal solidarity – a shared commitment to leverage construction itself as the scaffolding for transcendent human welfare, environmental regeneration and values-encoded built legacies spanning generations.

The NNCC project has charted the course, providing a clarion call and comprehensive guiding vision. Now, sustained political fortitude and societal mobilisation must manifest this call into reality. For it is only through such charge-leading ambition that the Circular Nordic Dream can catalyse a flourishing future for all.

ABOUT THIS PUBLICATION

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Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and the Faroe Islands, Greenland and Åland.

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