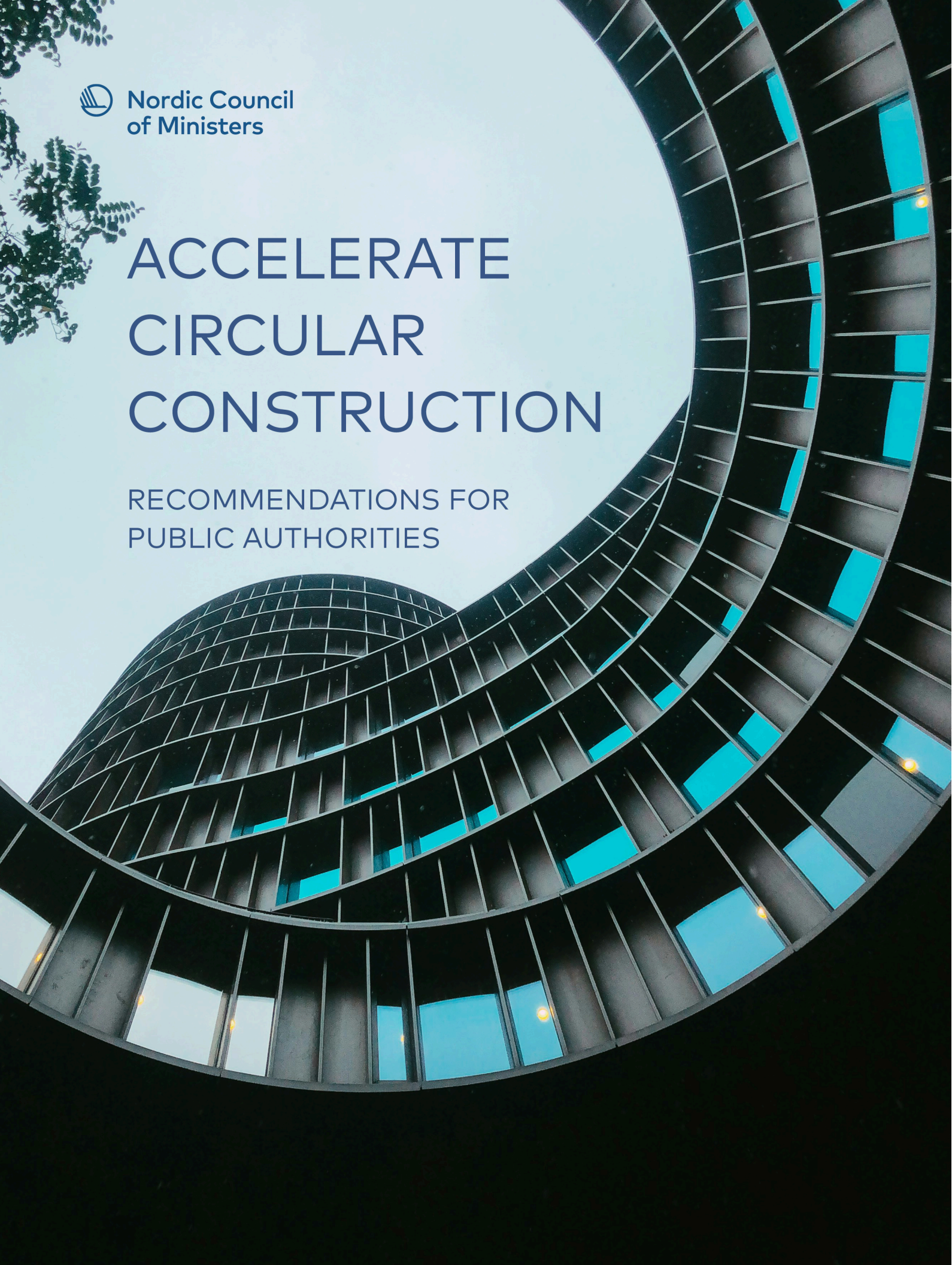




Nordic Council
of Ministers

ACCELERATE CIRCULAR CONSTRUCTION

RECOMMENDATIONS FOR
PUBLIC AUTHORITIES



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PREFACE

The Nordic Circularity Accelerator (NCA) project is a part of the Nordic Networks for Circular Construction (NNCC) project, funded by the Nordic Council of Ministers. The NNCC project aims to increase cohesion and cooperation relating to circularity in the Nordic construction sectors. The NCA project sets its eyes on life beyond the NNCC's scope to produce recommendations for further pursuing the project targets. This report concludes the work carried out by the Green Building Council Finland and Green Building Council Iceland within the NCA project. The Finnish Ministry of Environment has supervised the project and ensured compatibility with the overall NNCC project's scope. Finally, invaluable feedback on the report was received from the NNCC Steering group and organizers of the workshops.

The report describes the steps to produce the final recommendations on enhancing circularity in construction at national, Nordic, and European levels. The research was structured to build upon already existing knowledge and dig deeper into identified specifics. After formulating the specific research questions and identifying knowledge gaps (further described in [Chapter 2](#)), the latter were put up for discussion at a series of workshops with almost 150 market representatives from five Nordic countries. In Denmark, the workshop was organized by the Danish Technological Institute, in Finland by Green Building Council Finland, in Iceland by Green Building Council Iceland, in Norway by the Norwegian Green Building Council and Sirkulær Ressurssentral, and in Sweden by CCBuild and IVL Sustainable Building AB.

At the workshops, the discussions revealed a substantial amount of information specific to each Nordic country. These findings were described separately for each Nordic country in [Chapter 3](#). The same chapter synthesises all the data gathered at all workshops. Eventually, in [Chapter 4](#), all research questions are considered jointly, and the final recommendations are presented.

SUMMARY

As a part of a transition to more sustainable, circularity is gaining more and more attention from the Nordic construction sectors. It requires, however, a redefinition of current working practices, thereby becoming a multifaceted challenge for the stakeholders throughout the whole value chain.

Public authorities at the local, national, and Nordic levels are well-positioned to support and lead the transition to circular construction through their broad spectrum of areas of responsibility. To aid that, this research aimed to produce a set of recommendations on how local and national public authorities and the Nordic Council of Ministers can impact circularity in the construction field through advocacy, guidance, and financing.

To comprehensively present a Nordic market perspective on circularity, the differences and similarities between Nordic countries had to be addressed. Therefore, this report provides individual perspectives from five Nordic countries and, eventually, synthesizes these findings in the form of recommendations presented below. The recommendations considered three levels: local/national level, Nordic cooperation, and Nordic advocacy in the EU.

Recommendations for public officials at local and national levels

ROLE: REGULATOR

1. Introduce a resource tax on raw materials to include their environmental price.
2. Introduce CO₂ emissions limits for new construction and harmonize the method of calculating emissions among Nordics. Such harmonization 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: INNOVATION ENABLER

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

ROLE: BUILDING OWNER AND TENANT

6. Introduce obligatory criteria on circularity in the procurement processes to lead and drive the transition to circular construction.
7. 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: DECISION-MAKER

8. Introduce circular construction elements, emphasizing practical aspects, into national curricula at different levels (e.g., vocational schools, universities).
 9. Introduce requirements on pre-demolition audits and material passports for all demolition projects and new buildings, respectively.
 10. 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.
-

Recommendations for Nordic cooperation

1. Facilitate the creation of a joint Nordic method for assessing secondary materials' quality, ensuring their healthiness and safety in future projects. As part of that, harmonize definitions for circular building practices to facilitate common understanding.
 2. Provide financial support for the pilot projects with distinguished circularity features in exchange for publicly available practical guidelines on circular construction.
 3. Advocate for stronger emission limits for new construction and refurbishment projects. Ensure that in the methods used for calculating emissions, the use of secondary materials is awarded.
-

Recommendations for EU policy work

1. Without data on available materials, planning for reuse is impossible. Support digitalization efforts by mandating material passports in all construction projects. Material passports should be produced uniformly and in set data formats.
 2. Without standardized processes, recertifying products for use is impossible. Create a standardized re-certification process for reused construction products to enable products to be recirculated into the marketplace.
 3. Without information on available materials, planning for reuse is impossible. Make pre-demolition audits mandatory in all member states.
-

1. Introduction

1.1. Objectives

This research aims to give recommendations on how local public authorities and the Nordic Council of Ministers can impact circularity in the construction field through advocacy, guidance, and financing.

The specific research questions were as follows:

- What measures should the public sector take to accelerate circularity in the markets?
- What was of Nordic-level interest, and what should be considered at a local/national level?
- How could the Nordics influence EU decision-making processes?
- How could contributions from the Nordic Council of Ministers to the development of circular construction at Nordic and local levels be facilitated, and what aspects should it be prioritized?

2. Background and methodology

The research structure was built around the assumption that the research questions mentioned above had been considered on a general level and that there was a need to dig deeper into identified specifics. Consequently, several reports and working documents on circular construction produced within the Nordic Network for Circular Construction and Nordic Sustainable Construction projects became the foundation of the research performed within this project. Based on these, each research question was split into three categories: what has been studied, what could be assumed from combining previous findings, and what is yet to be determined ([Table 1](#)). The latter was discussed at a series of workshops organized with a cross-section of Nordic construction sectors. Two rounds of workshops were held. The first was to validate the collected data and harvest missing data from five Nordic countries. The second was to validate the newly harvested data. Finally, the research questions were answered in this report.

TABLE 1 The Research Questions Split into Three Categories

Research Questions	What measures should be taken by the public sector to accelerate circularity in the markets?	What was of Nordic-level interest, and what should be considered at a local level?	How could the Nordics influence EU decision-making processes?	How could contributions from the Nordic Council of Ministers to the development of circular construction at Nordic and local levels be facilitated, and what aspects of it should be prioritized?
What do we know?	<ol style="list-style-type: none"> 1. Barriers and opportunities related to circular construction. 2. Four roles public authorities have. 3. Four key enablers and four additional enablers of reuse. 4. Some measures related to circularity have been tested in Nordic markets. 	<ol style="list-style-type: none"> 1. What Nordics want to harmonize? 2. Harmonization work is on-going (e.g., on LCA methodology). 	<ol style="list-style-type: none"> 1. Nordics have common interests, goals and cultures which enables cooperation in advocacy. 2. EU Policy recommendations created by Nordic Sustainable Construction project. 3. Recommendations presented In Nordic Networks for Circular Construction WP2 analysis of barriers and possibilities – Report, 2023^[1]. 	<ol style="list-style-type: none"> 1. Lists of actions to be taken by the Nordic Council of Ministers gathered in previous workshops organised within the NNCC project.
What could we assume?	<ol style="list-style-type: none"> 1. How can public actors advance the four enablers in their four roles? 	<ol style="list-style-type: none"> 1. Is Nordic-collaboration the way to go? Are the metrics applicable in all states? 	<ol style="list-style-type: none"> 1. A combination of the policy recommendations for review. 	<ol style="list-style-type: none"> 1. A brief version of the actions gathered in previous workshops organized within the NNCC project. 2. Nordic Council of Ministers should be facilitating Nordic cooperation.
What don't we know?	<ol style="list-style-type: none"> 1. Are all actions possible in all markets? 2. How impactful the already-tested measures have been, and are they repeatable? 		<ol style="list-style-type: none"> 1. How the market would react to listed policy recommendations and if there are any additional ideas the market might have. 2. Examples of applicable policy that could be copied to other member states or beyond borders 	<ol style="list-style-type: none"> 1. Which actions should be prioritized and why?

1. [Policies Enabling the Reuse of Construction Products in the Nordics – Report, 2023.](#)

2.1 Research questions

2.1.1 What measures should be taken by the public sector to accelerate circularity in the markets?

Barriers to implementing circularity in construction have been researched and discussed by many. In the Nordic context, they were comprehensively summarized in the *WP2 analysis of barriers and possibilities* report^[2]. The identified barriers are related to the public and private sectors; however, through its regulations and actions, the public sector plays an imperative role in enhancing the transition to circular construction as it is well-positioned to support and steer it^[3]. This is why the public sector became a primary focus of the research.

The range of functions of the public sector is wide; nevertheless, its four main roles can be distinguished and are as follows^[4]:

1. **REGULATOR** (e.g., political actors, governments, national/regional planning agencies), which shape the market by legislation and other regulations;
2. **INNOVATION ENABLER** (e.g., innovation hubs, universities), which foster innovative solutions by, among others, educating stakeholders and supporting pioneering solutions;
3. **BUILDING OWNER AND TENANT**, as the public sector owns and operates a considerable share of the existing building stock, so using its procurement processes can guide the market in a more circular direction;
4. **DECISION-MAKER** (e.g., building permit authorities), as it decides if a new construction/refurbishment project will start or not.

To address several recognized barriers, the *Policies Enabling the Reuse of Construction Products* report^[5] identified a set of four key policy enablers and additional relevant indicators. Considering the identified barriers and enablers, together with the four roles for the public sector, a series of workshops with Nordic stakeholders was organized in 2023 within the Nordic Circular Construction project to identify the feasible measures addressing the identified barriers.

Eventually, for this research, a matrix of proposed measures to enhance circular construction was prepared to systematize the results of the literature review and previous workshops. The matrix consisted of tasks to be completed by all four roles of the public sector divided into three categories:

2. [Nordic Networks for Circular Construction WP2 analysis of barriers and possibilities – Report, 2023.](#)
3. [M. R. Munaro and S. F. Tavares, A review on barriers, drivers, and stakeholders towards the circular economy: The construction sector perspective, Cleaner and Responsible Consumption, 8, 2023.](#)
4. [Demos Helsinki, Building a Circular Environment - WCEF2023 Accelerator Session Synthesis – Working document, 2023.](#)
5. [Policies Enabling the Reuse of Construction Products in the Nordics – Report, 2023.](#)

- requirements for improved building design;
- proper documentation of the environmental impact of construction products/materials;
- reducing risk and improving the economic feasibility of circular projects.

The list of these measures can be found in Appendix A-C. The validity of this task matrix was later tested in the Nordic workshops organized within this project.

2.1.2 What was of Nordic-level interest, and what should be considered at a local/national level?

Following the Nordic Vision 2030 on Nordic integrity and sustainability^[6], the Nordic Ministers responsible for housing and construction declared in 2018 that Nordics should be the most integrated market for construction^[7], and, in 2019, they declared a shared commitment to fighting climate change^[8]. Consequently, the Nordic authorities started cooperating more closely within, among others, the Nordic Sustainable Construction project and published the *Roadmap on Harmonising Nordic Building Regulations Concerning Climate Emissions*^[9]. The roadmap contains three strategic aims:

1. **HARMONIZATION AND IMPLEMENTATION OF CLIMATE DECLARATIONS** by, among others, joining forces in developing the LCA methodology and the limit values of carbon emissions;
2. **EUROPEAN COLLABORATION**, which aims at preparing the Nordics to contribute to the EU's climate-related policies by advocating for solutions at the European level;
3. **STRENGTHENED AUTHORITY COOPERATION**, which concerns sharing knowledge and coordinating future works to enhance synergy between various public stakeholders (e.g., housing and construction-related authorities, universities).

The harmonization of the LCA methodology is supported by a broad range of stakeholders in the construction industry, mainly because:

- such harmonization increases the feasibility of expanding the business across borders, which stimulates the market by increasing the competition and thereby enhances innovation and cost-effectiveness;
- collaboration between various stakeholders broadens the knowledge base and, consequently, accelerates the transition to a more sustainable sector;

6. [Our Vision 2030 – Declaration](#), 2019.

7. [Declaration from the Nordic Ministerial meeting concerning buildings and construction on the 29th of May 2018, Stockholm](#), 2018.

8. [Nordic Declaration on Low Carbon Construction and Circular Principles in the Construction Sector](#), 2019.

9. [Roadmap: Harmonising Nordic Building Regulations concerning Climate Emissions](#), 2023.

- collaboration between authorities responsible for legislation and regulations increases their decision-making and problem-solving capacities (for instance, by learning from others' "mistakes");
- harmonization and close cooperation between both national and regional authorities provide a solid base for future work; in this way, the market is assured that the strategies will be realized and authorities will follow up on requirements related to sustainability;
- being front runners among other European countries can benefit the Nordic construction industry towards the European market.

The roadmap is aligned with Nordic Vision 2030, so its horizon is 2030. For this reason, the work on harmonization is still in progress; however, its effects are already visible. For instance, Iceland recently published the regulation on LCA for buildings^[10] based on the methodologies and experiences of other Nordic countries. There is also an extensive collaboration between Nordic housing and construction authorities related to circularity metrics, summarized in the upcoming report from work package 3 in the Nordic Networks for Circular Construction project^[11].

Based on previous work done on that matter, it is evident that not all Nordic countries are the same regarding circularity. Some have completed several ambitious pilot projects, while others are still building capacity. Additionally, several key differences exist in the governance and permitting of circular products and projects. The suitability of listed actions for the specific market was validated using the matrix of actions (Appendix A-C) at the Nordic workshops organized within the project.

2.1.3 How could the Nordics influence EU decision-making processes?

The Nordics have a history of successful cooperation in international advocacy. Working together to advocate for shared interests is typically more efficient, which is why working on a decarbonized circular construction sector in the EU should be a common goal. The topic has been discussed in the *WP2 analysis of barriers and possibilities*^[12] and the *Policies Enabling the Reuse of Construction Products*^[13] reports. The latter found that there were not one but several policies and cultural barriers hindering circularity in the construction space. The challenge comprises complex systems created by conflicting interests combined with cultural, market-based, and technical obstacles. The report further indicates that a window of opportunity is opened by legislative progress under the EU Green Deal that the Nordics would best benefit from through joint advocacy. Furthermore, the report emphasizes the importance of Nordic harmonization as a key method for expanding Nordic influence in the single market^[14].

10. [REGLUGERÐ um breytingu á byggingarreglugerð, nr. 112/2012 \(Regulation on the implementation of provisions on the life cycle analysis of structures in building regulations\)](#), 2024. (in Icelandic)

11. [Nordic Networks for Circular Construction WP3: METRICS FOR CIRCULARITY – Report, 2024.](#) (under publication)

12. [Nordic Networks for Circular Construction WP2 analysis of barriers and possibilities – Report, 2023.](#)

13. [Policies Enabling the Reuse of Construction Products in the Nordics – Report, 2023.](#)

14. [Policies Enabling the Reuse of Construction Products in the Nordics – Report, 2023.](#)

One of the main EU policies on the topic, the Construction Product Regulation (CPR), has been further developed since this report's publication, and it is currently not as simple to impact. However, the recommendations laid out in the report for the CPR provide a solid basis for creating future recommendations.

The *WP2 analysis of barriers and possibilities*^[15] identified dozens of recommendations for removing barriers and strengthening possibilities in local markets and on an EU level. Recommendations were discovered on an economic, cultural, regulatory, and technical level. A main takeaway of the report was that many of the issues were deeply interlinked, meaning fixing one would aid in fixing others. In the report, the recommendations have been split into categories according to the actor responsible for the change, such as contractor, city planner or regulator.

By combining these recommendations, a list of nine possibilities for increasing Nordic influence to increase circularity in the EU was created (Appendix D). However, some of the recommendations were beyond the scope of influence of the EU, so these had to be discarded at this stage. The recommendations naturally overlap, but as the points of view of the reports differ slightly, their combined recommendations provide a holistic point of view, which can be separated into three categories: regulation, information, and incentives.

In the following workshops, the participants were asked to rank the recommendations to find the most suitable ones, differentiate between the markets, and discover any missing points of view.

2.1.4 How could contributions from the Nordic Council of Ministers to the development of circular construction at Nordic and local levels be facilitated, and what aspects of it should be prioritized?

The last research question turns back to the Nordics and considers how the Nordic Council of Ministers could aid local and national administrations in facilitating a more circular construction market. The question has been discussed in workshops hosted by the Nordic Network for Circular Construction in 2023, which provided the research project with plenty of material to work with.

The material collected at previous workshops was gathered and prioritized to create nine possible recommendations (Appendix D). Many of them are often discussed in the markets, and some have even been implemented. However, little data is available on this work's real impact or the recommendations' transferability.

In the following workshops, the participants were asked to rank the recommendations to find the most suitable ones, differentiate between the markets, and discover any missing points of view.

15. [*Nordic Networks for Circular Construction WP2 analysis of barriers and possibilities – Report, 2023.*](#)

2.2 The Nordic workshops

To enrich, enhance, and validate the findings of the literary review, a series of workshops were hosted in five Nordic countries ([Table 2](#)). A common template and reporting method were used to ensure data consistency and facilitate further data integration, but each workshop was conducted independently by a local partner.

TABLE 2 The summary of the Nordic workshops

	FINLAND	ICELAND	NORWAY	SWEDEN	DENMARK
Local partner	Green Building Council Finland	Green Building Council Iceland	Green Building Council Norway and Sirkulær Ressurssentral	CCBuild, IVL Sustainable Building AB	Danish Technological Institute, Videncenter for Cirkulær Økonomi (VCØB)
Date and location of the workshop	05/03/2024	28/02/2024	07/03/2024	05/03/2024	15/03/2024
Number of participants	37	28	35	30	17

The workshops were open to anybody to access. However, as the project targeted a professional audience, the workshops were conducted in the middle of the working day. The advertising of the workshops was designed to attract a variety of industry experts from academia, private practice, and the public sector who are well-versed in circular construction and willing to go deeper than usual into the topic. As seen in [Table 3](#), this goal was reached, and the quality of participants was deemed as "highly competent" and having "a lot to contribute" by the workshop hosts.

TABLE 3 The profile of the Nordic workshop participants

COUNTRY	PARTICIPANTS PROFILE
Finland	Industry NGOs, industry representatives, public authorities representatives (city/municipality and national level), researchers, trade associations
Iceland	Industry representatives (architects, consultants, material producers and sellers, real estate companies), public authorities representatives (city/municipality and national level),
Norway	Industry representatives (architects, consultants, contractors, interior designers, real estate companies), insurance companies, public authorities representatives (city/municipality and national level), researchers
Sweden	Industry NGOs, industry representatives (architects, consultants, contractors, material suppliers), public authorities representatives (city/municipality and national level), researchers, trade associations
Denmark	Engineers, public authorities representatives (city/municipality and national level), students, trade associations

The hosts could conduct workshops in person, online (using Miro), or in a hybrid format. The hosts were provided with the material (canvas – Appendix A-D) to facilitate and narrow the discussions, further described in [section 2.2.1](#). Canvas were originally created in English and later translated into each local language by the workshop hosts. Then, the gathered data was translated into English by the workshop hosts for further analysis. Additionally, the workshop hosts were to answer a set of reflectional questions to aid in analyzing the workshop results, such as, for instance, “Were the questions challenging to the participants?”.

The workshop results are presented in [section 3](#).

2.2.1 Workshop design

The workshop format was designed to validate the research team's assumptions and harvest additional data on all four research questions presented previously in [Table 1](#).

The workshop format consisted of two parts ([Figure 2](#)). The first part focused on the first two research questions on the role of local authorities in pushing for circularity and Nordic cooperation. Three aspects of circularity were analysed separately:

- requirements for improved building design;
- proper documentation of the environmental impact of construction products/materials;
- reducing risk and improving the economic feasibility of circular projects.

Participants were split into three groups to work on three aspects in the first part of the workshops. If workshops had a large number of participants, several smaller groups were created to work on the same aspect simultaneously. For each aspect, the participants were presented with a collection of actions that local or national public authorities could take to improve circularity (Appendix A-C). These actions were sorted into categories according to the role the public authority would have to take to complete said action. The participants were given the possibility of adding any missing actions. The participants were then asked to provide information on whether the actions had been piloted or implemented in their markets previously and also reflect on their effectiveness. After this, the participants were asked to rank all actions according to the potential or experienced impactfulness and required effort. Lastly, participants were asked to select which actions should be prioritized and de-prioritized and to explain their choices.

The second part focused on the Nordic's role in the EU decision-making process and the Nordic Council of Ministers' role in facilitating Nordic collaboration. In the second part of the workshop, all participants performed the same exercises in smaller groups. The participants were given two lists of actions to be performed by the Nordic Council of Ministers (Appendix D) and asked to select the three most impactful actions from their perspectives. The first list consisted of actions towards the different Nordic markets, and the second consisted of actions the Nordics could jointly pursue in the EU space.

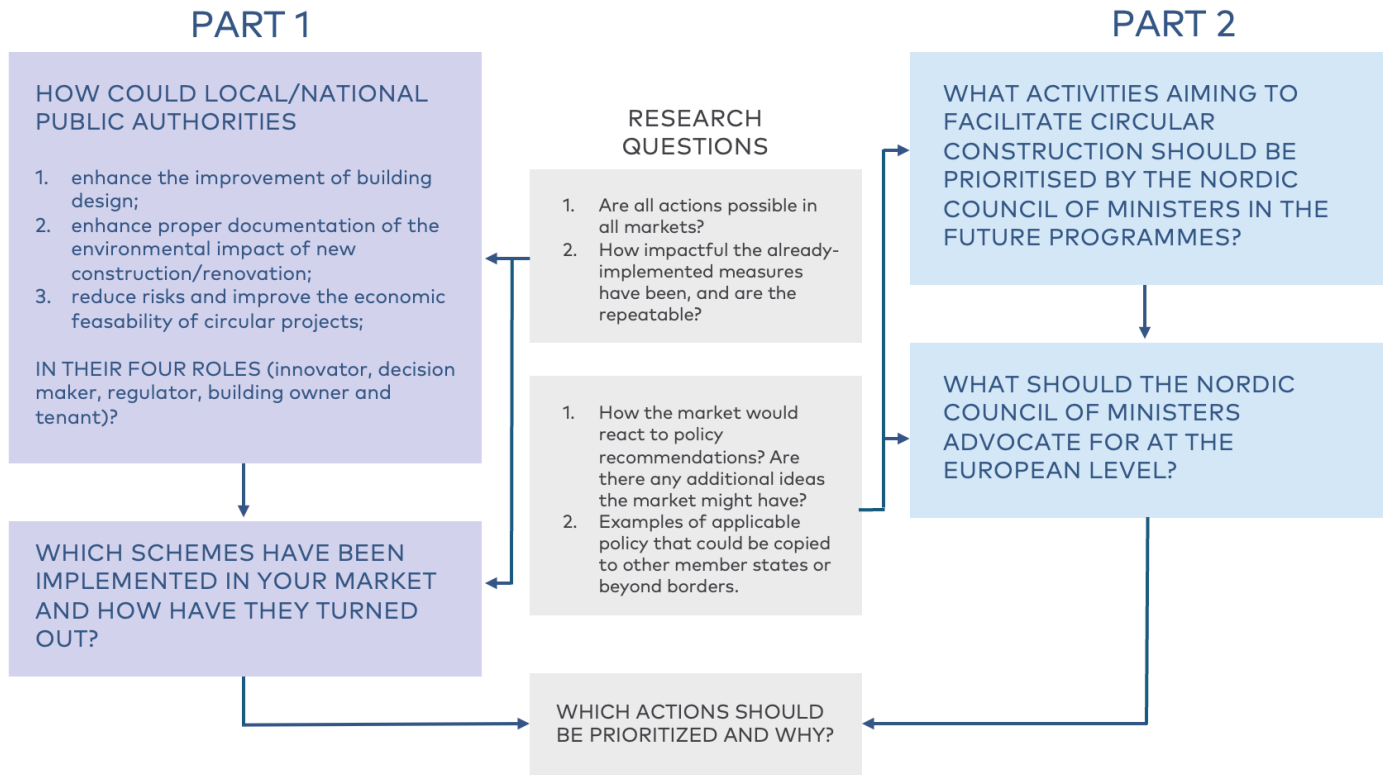


FIGURE 2 The Nordic workshops format

2.3 Synthesis workshop

A synthesis workshop was hosted after the five Nordic workshops to refine their findings. It was hosted online on the 4th of April to facilitate pan-nordic cooperation. Invitees included the local partners responsible for arranging the Nordic Workshops and the Steering Group members of the Nordic Network for Circular Construction. The ten participants of the synthesis workshop were spread out around the Nordics rather evenly ([Figure 3](#)).



FIGURE 3 The profile of synthesis workshop participants

In the workshop, participants were presented with three types of assignments: to prioritize among the top actions selected by the Nordic workshops, to reflect on the actions that split the participants of the Nordic workshops, and to comment on direct quotes from participants of the Nordic workshops.

The first assignment was based on the sets of top actions selected at the Nordic workshops. These were synthesized based on the lists of prioritized actions prepared by the Nordic participants and their analysis of the actions' impact and required effort. The selected methodology of data harmonization allowed for the selection of actions; however, these actions were characterized by the same relative frequency, so prioritizing them was not possible. Therefore, the prioritization was done at the synthesis workshop. It was conducted by providing participants of the synthesis workshop with five to seven actions and asking them to split one hundred points between them. To avoid bias, the participants were not informed about any other findings from the Nordic workshops' except the list of actions given (in a random order).

After each question, the participants had the opportunity to reflect on it. This allowed for comparing between the workshops, eliminating less popular alternatives, and discovering inconsistencies. Reflection was conducted with open-ended questions. These aided in evaluating if the initial analysis of Nordic workshop data was accurate by providing qualitative data to add to the quantitative data collected in the Nordic workshops.

2.4 Data Harmonization

As mentioned before, a series of workshops was organized in five Nordic countries. Each workshop was organized separately by different organizations; therefore, a reporting template was used as a data collection base to ensure data consistency and facilitate further data integration. The report templates were divided into two parts, following the workshop organization. While filling the report templates, the workshop organizers and facilitators processed the raw data obtained from the workshop participants by 1) synthesizing the obtained information and 2) integrating answers from smaller groups working on the same aspect in the first part of the workshop. This constituted the initial data integration and processing; its outcome is discussed individually for each country in [Chapter 3](#).

The following (final) data integration, aiming at identifying the common points between all five Nordic countries, was performed individually for each discussed aspect within the first part and collectively for the second part. No data point was removed, and no data was filled in during the integration.

In the first part of the workshop, participants were asked to list 1–3 actions that should be prioritized to enhance circular construction on the local/national scale and an additional 1–3 actions that have the lowest impact on that matter. These lists of actions were the foundation for the final data integration. Furthermore, the supplementary data from the graphs correlating actions' impact with the effort necessary to realize them was included in the first part. The relevant frequency distribution was analyzed to identify the actions reoccurring in the dataset. This method was chosen due to its simplicity, as it reduces the risk of data misinterpretation due to over-assumptions.

In the second part of the workshop, all groups of participants answered the same two questions (focusing on Nordic cooperation and Nordic advocacy in the EU), which resulted in several datasets for each country. For that reason, a two-step data integration was necessary. Firstly, the datasets from each country were merged into one considered further in the analysis. Secondly, the merged sets for each country were analyzed to identify the common points between countries. The relevant frequency distribution analysis was applied in both steps.

Eventually, the outcome of the data integration was validated at the synthesis workshop ([section 2.3](#)) with a group of experts from the steering group of the NNCC project and facilitators of the workshops.

3. Workshop Findings

The main findings, divided into two parts, from each Nordic workshop can be found below. The first part focused on the role of public authorities in enhancing circular construction at a local/national scale, and the discussion was focused on three main aspects (i.e., improved building design, documenting the environmental impact of construction products/materials, and economic feasibility and reducing risks). The second part focused on facilitating Nordic cooperation and Nordic advocacy in the EU regarding circularity in construction.

At the end of this section, the combination of these findings and the results of the synthesis workshop are also presented.

3.1 Denmark

The Danish Technological Institute and Videncenter for Cirkulær Økonomi (VCØB) organized the Danish workshop. They gathered representatives from the public and private sectors, including also employees of trade associations and students. At this workshop, the first aspect (building design) was not discussed as participants preferred to focus on the two other aspects (documenting environmental impact and economic feasibility and risk).

3.1.1 Part I

At the beginning of the workshop, participants analyzed the actions listed and added a few missing ones. Then, they assessed the success rate of already implemented solutions and picked a few that should be prioritized in future work on facilitating circular construction ([Table 4–5](#)).

The common point between the two discussed aspects is supporting various projects, which results in a general increase of knowledge on circular solutions throughout the whole value chain. A more detailed summary of the discussions is presented in the following sections.

Aspect 2. Documenting the environmental impact of construction products/materials

In the second aspect, added actions focused on providing guidelines for preparing EPDs for reused materials and supporting projects, enriching the knowledge pool on circular construction. As in Denmark, much is going on to facilitate circular construction, and participants listed many successful solutions that have already been implemented. For example, a well-developed tool to document and assess the

emissions from new constructions/refurbishment ([LCAByg](#)) was mentioned, followed by limits on CO₂ emissions and rewarding reuse in the LCA methodology. However, the discussion also concentrated on the Consequential Life Cycle Analysis (C-LCA) and its benefits compared to commonly used Attributional LCA (A-LCA). It was highlighted that C-LCA could be more accurate in describing the consequences of a given action/decision on the whole system and could positively contribute to the decision-making process, as A-LCA might overlook some aspects considered in C-LCA.

The database with data on waste generated was also mentioned as one of the successful solutions. However, the validity of creating the database with data from material passports and pre-demolition audits was questioned.

TABLE 4 The findings from the Danish workshop – Part I Aspect 2. Documenting the environmental impact of construction products/materials

ACTIONS ADDED BY THE PARTICIPANTS	REASONING
Guidelines on the preparation of EPDs for reused materials.	The standardized method of preparing EPDs for reused materials could enhance circular construction by allowing the environmental impact of reused materials vs new ones and reused materials between themselves.
The Danish Authority of Social Services and Housing supporting projects generating publicly available new knowledge.	Generating knowledge on circular construction stimulates innovation and facilitates change in current work practices.
PRIORITIZED ACTIONS	REASONING
1.4. Fill-in answer: Introducing (NEW) C-LCA.	Consequential Life Cycle Assessments would better express the final consequences of the given activity/decision on the whole system.
LOWEST IMPACT ACTIONS	REASONING
2.4. Creating and maintaining the database with data from material passports and pre-demolition audits.	There is a discussion in Denmark on the legitimacy of such a database and who should bear the costs of its creation and maintenance.

Aspect 3. Economic feasibility and reducing risks

The discussion on economic feasibility and risks revolved around new regulations, various types of incentives, and increasing stakeholders' knowledge of circular solutions by, among others, supporting projects that contribute to it (with, for instance, publicly available guidelines) and strengthening education on this topic.

Regarding regulations, the focus was on requirements for selective demolition, design-for-disassembly, and extended producers' responsibility. The current limits on CO₂ emissions were also mentioned, but it was stressed that they did not have the necessary impact so far. Therefore, adjusting regulations to the market's maturity was also emphasized.

In the context of incentives, lowering taxes (i.e., VAT, property, and utility taxes) is seen as a strong encouragement for entrepreneurs to make more circular decisions. The importance of creating a compensation fund was also highlighted. Such a fund would cover the potential risks of using innovative materials or reusing existing ones (as both types often lack technical documentation compared to new and conventional products) on insurance-like terms. For such a fund to exist, a method of calculating, classifying, and comparing risks between using innovative/reused materials and new ones has to be developed. There is ongoing work to establish such a fund in Denmark.

Last but not least, platforms presenting available materials for reuse were discussed. Danish public authorities are working towards establishing such a platform; however, they seem to be a bit behind the private market in that area.

TABLE 5 The findings from the Danish workshop – Part I Aspect 3. Economic feasibility and reducing risks

ACTIONS ADDED BY THE PARTICIPANTS	REASONING
Introducing legal requirements on selective demolition and design-for-disassembly.	Such regulations would obligate stakeholders to change their current working practices.
Introducing climate demands (CO ₂ emission limits).	The limits were implemented in Denmark already.
Implement manufacturer responsibility.	Implementing regulations on extended producer responsibility to prolong material/product lifespan and facilitate remanufacturing.
Educate and train stakeholders in circular construction.	Education and courses will help the next generation understand the importance of building circularly and why the (usually) more complex working methods are necessary.
Public authorities offering a platform for reused material from their projects.	Such platforms are necessary to provide information on available materials for reuse.
Establish a compensation building fund for risks related to reuse.	Such a fund would cover potential risks related to circularity in an insurance-like manner, thus enhancing stakeholders' ability to experiment and test new solutions.
PRIORITIZED ACTIONS	REASONING
1.2. Lowering VAT on reuse and recycling. 1.3 Lowering property and utility taxes for circular buildings (thus lowering operational costs).	To incentivize/push businesses to make more sustainable and circular decisions.
2.4. Support programmes dedicated to circular construction within industry organizations.	Economic support of circular projects enriches the pool of knowledge with valuable insights and experiences relevant to various stakeholders.
4.4 Fill-in answer: Educate and train stakeholders in circular construction.	Education and courses will help the next generation understand the importance of building circularly and why the (usually) more complex working methods are necessary.
LOWEST IMPACT ACTIONS	REASONING
1.1 Implementing a resource tax (to make raw materials more expensive by including their environmental price).	As the industry still lacks the necessary methods and technologies, implementing a resource tax will not be effective. The industry will have to develop further, and circular practices will have to become a part of business-as-usual to make this action fully effective.
1.4 Implementing a carbon tax	Taxing is not enough; it should be accompanied by incentives for companies to transition.

3.1.2 Part II

In part two of the workshop, participants were asked to prioritize from a given list of actions for the Nordic Council of Ministers to push for Nordic circularity and similarly for the Nordics, in general, to push for an EU-wide change.

Participants were rather clear about their preference for actions. Incentives and information seemed to be the preferred way to push the market forward. [Table 6](#) presents the actions that received two votes. The participants also emphasized the need to utilize public procurement with a fill-in action.

TABLE 6 The findings from the Danish workshop – Part II Prioritized actions

PRIORITIZED ACTIONS RELATED TO NORDIC WORK	PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
1. Standardized methods to assess secondary materials' quality.	5. Inform: Support digitalisation through mandating Material Passports in set data formats.
2. Financial support for the pilot projects, which results in publicly-available practical guidelines on circular construction.	6. Inform: Fund education, networking and knowledge centers to allow networking, standardize procedures and facilitate knowledge sharing
4. Teaching materials and instructions for professionals (case-specific, e.g., how to reuse precast concrete slabs).	7. Incentivise: Include reuse and recycling incentives into the European Emission Trading Scheme ETS.
5. Including circular construction aspects in the Swan certification scheme to a significant degree.	8. Incentivize: Fund research and development to create standardized processes for dealing with responsibility, warranty and guarantees.

[Table 7](#) shows actions that remained without support. Unlike other workshops, the Danes had opted to de-prioritize regulatory action from the EU and the local market. Given reasoning included actions “already happening”. For instance, Denmark currently has carbon limits for new construction, which could be a reason to dismiss the need for additional regulation.

TABLE 7 The findings from the Danish workshop – Part II Non-prioritized actions

NON-PRIORITIZED ACTIONS RELATED TO NORDIC WORK	NON-PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
3. Digital database on available circular materials in standardized form.	1. Regulate: Ensure existing waste regulation is enforced through sanctioning or other measures.
6. Regulations on min. amount of reused materials/products.	2. Regulate: Create a standardized recertification process for reused construction products.
7. Stricter carbon emissions limits.	3. Regulate: Develop Construction Product Regulation to include reused products (currently aimed at linear products).
8. Backing the loans for private companies involved in circular projects.	4. Regulate: Make pre-demolition audits mandatory in all member states.
9. Providing a „building fund“ to compensate the company if it goes bankrupt due to inconsistency of the procedures related to materials reuse.	9. Incentivize: Improve Public Procurement to allow induced benefits such as increased employment into the total cost-benefit analysis.

3.2 Finland

The workshop was hosted in Helsinki and online by the Green Building Council Finland. The participant profiles were split rather evenly between public sector actors, private sector actors, industry NGOs, and academia. The participants found the workshop enjoyable, though would have benefitted from some additional time.

3.2.1 Part I

Aspect 1. Improved building design

Participants disagreed on several topics but the conversations remained very fruitful. As can be seen from the answers ([Table 8](#)), some workshop participants opted to prioritize actions others thought to de-prioritize. Participants' analysis of the effort to be put behind different actions was likewise scattered. The participants themselves reflected that effort is indeed a subjective matter: creating legislation might sound like the obvious action for a politician when an industry expert finds the effort daunting. In general, participants found that all four different public sector roles can and should take impactful actions.

TABLE 8 The findings from the Finnish workshop – Part I Aspect 1. Improved building design

ACTIONS ADDED BY THE PARTICIPANTS	REASONING
Creating logistical centers for materials and products locally	
Creating general circularity targets for projects	
PRIORITIZED ACTIONS	REASONING
3.3. Focus on efficient use of existing building stock and adapting to new needs.	To increase the lifespan of buildings
3.1. Awarding contracts to companies which incorporate circular design in their projects.	
1.1. Introducing requirements for circular design in the building code.	
2.4. Support pilot projects with elements of circular design, resulting in publicly available guidelines.	
2.5. Fill-in answer: Regional logistical centers for circularity	
LOWEST IMPACT ACTIONS	REASONING
2.4. Support pilot projects with elements of circular design, resulting in publicly available guidelines.	No-one will read it
4.4. Developing a common terminology around circular construction (e.g., reuse, recycling, circular design aspects) with practical examples and clear guidance.	Already implemented
4.1. Giving priority in assessing building permit applications for projects, which include elements of circular design.	Probably illegal
4.2. Improving cooperation between different public departments (e.g., clear decision-making procedures, avoiding contradictory decisions).	

Aspect 2. Documenting the environmental impact of construction products/materials

Participants agreed more on the second aspect than those discussing the first aspect but found the provided lists of actions incomplete (Table 9). Several fill-in answers were provided, ranging from topics such as reinforcing existing legislation and providing enough resources for the design stages of projects. In general, participants found, again, that impactful actions can and should be taken by all four different public sector roles. A low-hanging fruit was identified: as a building owner, public actors should focus on awarding contracts to companies that aim to use circular materials or products in their projects. On the other hand, it was found that the regulation is not followed up on, and it is ineffective and redundant.

TABLE 9 The findings from the Finnish workshop – Part I Aspect 2. Documenting the environmental impact of construction products/materials

ADDITIONAL ACTIONS	REASONING
Follow up on regulation, whistle-blowing.	
Standardization of information modeling	
Connecting minimum design resources to occupational safety and health initiatives	
Harmonizing standardized product information	
Opening up innovation work through agile principles and process ownership	
Other incentives	
Using circular products and services	
Indicating the needed level of information to apply circularity principles	
Procurement directions	
Enough resources for design	
Component passport as well as material passport	
Increasing education and cooperation	

PRIORITIZED ACTIONS	REASONING
2.1. Managing publicly-available databases with data on emissions from new constructions/renovations.	The key to unlocking all targets
3.1. Awarding contracts to companies, which aim to use circular materials/products in their projects.	
3.7. Procurement directions (building owner and tenant).	
1.4. Follow up on regulation, whistle-blowing.	
2.3. Supporting circular pilot projects and spreading knowledge gained within them.	
LOWEST IMPACT ACTIONS	REASONING
1.1. Regulations on products durability, reusability, upgradability and reparability.	
2.4. Creating and maintaining the database with data from material passports and pre-demolition audits.	
1.3. Introducing harmonized limits (e.g., carbon limits) in the Nordics.	

Aspect 3. Economic feasibility and reducing risks

Participants were more uniform on economic topics ([Table 10](#)). Especially regulators were identified to have a strong impact in pushing circularity if resource taxes or lowered VATs for circular products were implemented. Then again increasing waste management costs were seen as possibly slowing down circularity efforts. Product recertification methods were seen as a must-have in order to allow for circular projects and it was seen to be a task for regulatory public officials.

TABLE 10 The findings from the Finnish workshop – Part I Aspect 3. Economic feasibility and reducing risks

ADDITIONAL ACTIONS	REASONING
Product recertification methods, current project specific processes are unscalable.	
Boosting industry cooperation groups and operators.	
Financially supporting secondary materials. Primary materials tend to be cheaper. (Innovation enabler) Improving clarity and conformity of decision-making processes (for example product declarations).	
PRIORITIZED ACTIONS	REASONING
1.1. Implementing a resource tax (to make raw materials more expensive by including their environmental price).	
1.2. Lowering VAT on reuse and recycling.	
2.5. Boosting industry cooperation groups and operators.	
4.4. Improving clarity and conformity of decision-making processes (for example product declarations).	
1.5. Product recertification methods, current project specific processes are unscalable.	If this doesn't work, nothing works.
LOWEST IMPACT ACTIONS	REASONING
4.1. Increase waste management costs.	It might even slow down efforts.

3.2.2 Part II

In part two of the workshop, participants were asked to prioritize from a given list of actions for the Nordic Council of Ministers to push for Nordic circularity and similarly for the Nordics, in general, to push for an EU-wide change.

Workshop participants were rather split on the assignment. From the nine respective alternatives provided, all save two were selected for prioritization by one or two groups. Table 10 presents the actions that received two votes. The eight prioritized actions varied in type: the participants called for economic aid, capacity building, tighter regulation, and standardization. The results indicate that the

possibility for circularity must be improved across the board, and there is no single solution to unlocking the puzzle. The results also indicate that the participants from Finland felt that the gathered lists of actions were balanced, as there was no obvious favoritism of some solutions over others.

TABLE 11 The findings from the Finnish workshop – Part II Prioritized actions

PRIORITIZED ACTIONS RELATED TO NORDIC WORK	PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
1. Standardized methods to assess secondary materials' quality.	1. Regulate: Ensure existing waste regulation is enforced through sanctioning or other measures.
2. Financial support for the pilot projects, which results in publicly-available practical guidelines on circular construction.	2. Regulate: Create a standardized recertification process for reused construction products.
3. Digital database on available circular materials in standardized form.	5. Inform: Support digitalisation through mandating Material Passports in set data formats.
4. Teaching materials and instructions for professionals (case-specific, e.g., how to reuse precast concrete slabs).	8. Incentivize: Fund research and development to create standardized processes for dealing with responsibility, warranty and guarantees.

The actions which remained without support are shown in [Table 12](#). Related to the Swan certification, participants didn't find the action very impactful. The "Building Fund" was seen to be impossible to create in practice. Related to Nordic work, the non-prioritized actions were identical in the Iceland and Finland workshops.

TABLE 12 The findings from the Finnish workshop – Part II Non-prioritized actions

NON-PRIORITIZED ACTIONS RELATED TO NORDIC WORK	NON-PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
5. Including circular construction aspects in the Swan certification scheme to a significant degree.	-
9. Providing a „building fund" to compensate the company if it goes bankrupt due to inconsistency of the procedures related to materials reuse.	-

3.3 Iceland

Green Building Council Iceland organized the Icelandic workshop and gathered a good representation of the private and public sectors due to a high interest among stakeholders in this topic. This interest is predominantly related to the relatively high share of embodied carbon in the whole building's carbon footprint in Iceland, which shifts the stakeholders' focus on reducing emissions related to materials and products.

3.3.1 Part I

There were several common points between the discussion groups. One of the main ones was the need for more education (at various education levels) and building up competencies among stakeholders. Also, monitoring the achievement of targets/goals of national plans or regulations (e.g., on waste management) and penalties if these are not followed were stressed as crucial to pushing circularity forward. Lastly, all groups saw public authorities as leaders in the transition to circular construction. Therefore, efficient management of their building stock (including its appropriate maintenance) and proper documentation of performed work were emphasized. A more detailed summary of the discussions is presented in the following sections.

Aspect 1. Improved building design

Iceland has embarked on a sustainable construction path relatively recently, as in 2022, the Icelandic Sustainable Construction Roadmap ([Byggjum grænni framtíð](#)) to 2030 was published. However, several actions related to circular design have been initiated, as mentioned by the participants. These actions included implementing requirements for circular design in building code, simplifying decision-making procedures (regarding building permits), lowering taxes/fees for circular buildings, and awarding contracts to companies that incorporate circular design in their projects. Nevertheless, the participants also mentioned several other solutions necessary to push circularity forward.

Lack of knowledge on circular construction is one of the most significant barriers to implementing it on a broader scale in Iceland. Therefore, the participants emphasized the importance of implementing elements of circular and sustainable construction into national curricula at different levels (i.e., vocational schools, universities, etc.). To enhance competencies among stakeholders, the need for other types of support (e.g., guidelines on improved building designs or reports from pilot projects sharing the experience, challenges, and solutions) was also mentioned. Moreover, participants acknowledged the importance of supporting the national and regional knowledge centers and programs dedicated to circular design within industry organizations, as such actions were very successful in other Nordic countries.

To enhance any form of support and regulations on circular construction, the participants highlighted the need to develop a common and precise circular construction terminology to push it forward. It was also highlighted that more emphasis should be placed on the disassembly design in general (in regulations, education, and support programs).

Lastly, the participants suggested that the circularity of the sector should be measured not only at the micro-level (individual project) but also at the macro-scale to support decision-making processes and setting targets at the municipality or national level. However, in this case, when implementing national/regional targets or strategies, it was stressed that stricter rules and supervision for reaching the targets are fundamental.

TABLE 13 The findings from the Icelandic workshop – Part I Aspect 1. Improved building design

ACTIONS ADDED BY PARTICIPANTS	REASONING
No actions were added.	-
PRIORITIZED ACTIONS	REASONING
1.1 Introducing requirements for circular design in the building code.	The regulatory actions are a forceful driver toward change in the market.
3.3 Focus on efficient use of existing building stock and adapting to new needs.	Public authorities could be leaders in changing to more circular, and their projects could be the source of relevant information and experiences for other stakeholders.
4.3 Integrating elements of circular design into national school curricula.	In Iceland, one of the biggest barriers to implementing circular construction is a lack of knowledge among stakeholders. Therefore, changing that is necessary to push circularity forward.
2.1 Preparing guidelines on improving building design and navigating existing building codes when implementing circular practices.	Such guidelines are necessary to enhance competencies among stakeholders.
4.4 Developing a common terminology around circular construction (e.g., reuse, recycling, circular design aspects) with practical examples and clear guidance.	Standard definitions are crucial to further work on legal requirements (for instance, in the building code or procurement process) and funding criteria related to circularity.

LOWEST IMPACT ACTIONS	REASONING
3.2 Offering more flexible contracts (e.g., in terms of flexibility of interim deadlines, financial flow, risk management).	These actions are not feasible in Icelandic conditions.
4.1 Giving priority in assessing building permit applications for projects, which include elements of circular design.	

Aspect 2. Documenting the environmental impact of construction products/materials

Regarding documenting the environmental impact of construction, participants feel that not much has been done in Iceland, but there are many opportunities for progress (Table 14). Nevertheless, similarly to the first group, several initiated actions were listed within this aspect. These included introducing CO₂ emission limits (getting into force in 2027), supporting pilot projects with circular elements emphasizing spreading the knowledge gained within them, and introducing mandatory pre-demolition audits (in Reykjavík). On the topic of mandatory pre-demolition audits, the participants stressed their importance. However, in their opinion, public authorities should lead this way, and such obligation should be implemented in their project first.

From the impactful actions that haven't yet been implemented in Iceland, the participants mentioned a requirement for a reuse guide as a part of the standardized product description. Moreover, supporting the tool for documenting and assessing the emissions from construction was discussed. Such a tool and reuse guides for products are prerequisites to gathering and publicly sharing data on existing buildings and available materials/products within them. Lastly, the importance of financial incentives to stimulate the market's innovation and cover risks related to novel solutions was stressed.

Similarly to the first group, prioritizing building permit applications for circular projects did not receive a good reception.

TABLE 14 The findings from the Icelandic workshop – Part I Aspect 2. Documenting the environmental impact of construction products/materials

ADDITIONAL ACTIONS	REASONING
Corporate sustainability reporting will push companies and stakeholders to analyze the entire value chain regarding its carbon footprint.	It will provide transparency on the company's activities and facilitate changing their work practices to be more sustainable and circular.
Provide financial incentives for developers and entrepreneurs.	The incentives are necessary for change to cover, for instance, risks related to circular practices.
PRIORITIZED ACTIONS	REASONING
2.1 Managing publicly-available database with data on emissions from new constructions/renovations.	It encourages innovation.
2.4 Creating and maintaining the database with data from material passports and pre-demolition audits.	It provides transparency and a better flow of information.
4.1 Introducing requirements on pre-demolition audits and material passports for all new buildings.	It creates trust and transparency towards companies and public authorities.
LOWEST IMPACT ACTIONS	REASONING
1.3 Introducing harmonized limits (e.g., carbon limits) in the Nordics.	A lot had to happen and be done to realize that, so this action is not realistic now in Iceland.

Aspect 3. Economic feasibility and reducing risks

There were two main points of the discussion on the economic aspects of circular construction and its risks ([Table 15](#)). First, there is a need for more education on circular solutions and work practices, particularly emphasizing its practical aspects. In this context, other approaches, like biomimicry, were also mentioned. Supporting projects resulting in guidelines on reuse and other circular practices (such as in the [RB blöð](#) database) was also listed as a necessary part of broadening the knowledge pool of Icelandic stakeholders. In general, participants stressed that there is pressure from public authorities to implement circular practices, but, predominantly due to a lack of know-how among stakeholders, the market is not ready.

The second topic discussed concerned various types of incentives. The most significant aspect of this was the necessity of monitoring and penalties for stakeholders who did not follow the regulations (e.g., on waste management), as stated by the participants. Otherwise, laws are ineffective, impact the competitiveness of stakeholders who follow them, and create general dissatisfaction. Also, positive incentives, such as lowering tax/fees for circular projects or direct economic incentives for material passport creation, were mentioned.

As mentioned by other groups, the participants see public authorities as drivers of the transition to circular construction. This is why the public sector is expected to lead by, for instance, paying more attention to properly maintaining their building assets (including appropriate registration of works), implementing circular criteria in the procurement process, and opening tenders to address needs more than chosen solutions.

Lastly, the participants questioned the viability of one of the actions listed on a so-called building fund compensating the company if it goes bankrupt due to inconsistent administrative procedures related to material reuse. This action was seen as unclear and unrealistic.

TABLE 15 The findings from the Icelandic workshop – Part I Aspect 3. Economic feasibility and reducing risks

ADDITIONAL ACTIONS	REASONING
Support programmes dedicated to circular construction (with its practical aspects) in national curricula at different levels (e.g., vocational schools, universities).	There is a lack of know-how on circularity among stakeholders in Iceland. More education focused on practical aspects is needed to push it forward.
Include criteria on sustainability and circularity in the procurement process (e.g., following ISO 20887 standard).	Implementing such criteria in the procurement process would stimulate innovation in the market.
Focus tenders on the need rather than on a chosen solution.	Such tenders enhance the development of new ideas and solutions.
Increase monitoring and control of violations of the regulations (related to waste management).	More control is needed to make the regulations effective.
Introduce incentives for, for instance, creating material passports or for domestic building materials manufacturers to introduce circular solutions.	It is a straightforward incentive to improve the economic feasibility of circular projects.

PRIORITIZED ACTIONS	REASONING
4.1 Increase waste management costs.	It creates incentives, but more control is needed.
4.5 Fill-in answer: Increase monitoring and control of violations of the regulations (related to waste management).	It forces people to follow regulations.
2.1 Backing the loans for private companies involved in circular projects.	It extends the possibility of receiving various types of financing for circular projects. Such projects are typically related to higher risk than conventional projects and, consequently, have fewer chances to receive funding or loans.
4.6 Fill-in answer: Support programmes dedicated to circular construction (with its practical aspects) in national curricula at different levels (e.g., vocational schools, universities).	There is a lack of know-how on circularity among stakeholders in Iceland. More education focused on practical aspects is needed to push it forward.
1.3 Lowering property and utility taxes for circular buildings (thus lowering operational costs).	It is a straightforward incentive to improve the economic feasibility of circular projects.
LOWEST IMPACT ACTIONS	REASONING
1.1 Implementing a resource tax (to make raw materials more expensive by including their environmental price).	These measures are not seen as effective incentives for circularity.
1.4 Implementing a carbon tax.	

3.3.2 Part II

In part two of the workshop, participants were asked to prioritize from given lists of actions for the Nordic Council of Ministers to facilitate circularity at a Nordic level and push for an EU-wide change.

Workshop participants were rather split on the assignment. From the nine alternatives provided, all, save three, were selected for prioritization by one or more groups – [Table 16](#) presents the actions that received two or more votes. There were no fill-in actions added.

The most popular actions related to Nordic work, gaining three votes in total, were standardized methods to assess secondary materials' quality and applying

stronger carbon emission limits for building projects. In Iceland, these two aspects take up much space in the dialogue among stakeholders as these are needed to push forward circularity.

Regarding the EU advocacy, similarly to Sweden, workshop participants highly preferred regulatory actions from the EU. In this context, mandatory pre-demolition audits in all EU states were the most frequent answer, gaining three votes in total. This can be linked to the previously stressed importance of pre-demolition audits by participants in the first part of the workshop. Last but not least, participants in Iceland noted that enforcement is key in addition to regulation.

TABLE 16 The findings from the Icelandic workshop – Part II Prioritized actions

PRIORITIZED ACTIONS RELATED TO NORDIC WORK	PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
1. Standardized methods to assess secondary materials' quality.	1. Regulate: Ensure existing waste regulation is enforced through sanctioning or other measures.
2. Financial support for the pilot projects, which results in publicly-available practical guidelines on circular construction.	2. Regulate: Create a standardized recertification process for reused construction products.
3. Digital database on available circular materials in standardized form.	3. Regulate: Develop Construction Product Regulation to include reused products (currently aimed at linear products).
6. Regulations on min. amount of reused materials/products.	4. Regulate: Make pre-demolition audits mandatory in all member states.
7. Stricter carbon emissions limits.	-

The actions which remained without support are shown in [Table 17](#). The “building fund” was deprioritized due to its lack of clarity and feasibility in real-life operations. Related to Nordic work, the non-prioritized actions were identical in the Iceland and Finland workshops.

TABLE 17 The findings from the Icelandic workshop – Part II Non-prioritized actions

NON-PRIORITIZED ACTIONS RELATED TO NORDIC WORK	NON-PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
5. Including circular construction aspects in the Swan certification scheme to a significant degree.	7. Incentivise: Include reuse and recycling incentives into the European Emission Trading Scheme ETS.
9. Providing a „building fund“ to compensate the company if it goes bankrupt due to inconsistency of the procedures related to materials reuse.	-

3.4 Norway

Green Building Council Norway and Sirkulær Ressursentral organized the Norwegian workshop. A fine representation of the experts from the Norwegian construction sector was gathered at the event. A big part of the discussion was the need to change the current mindset/habits and unlearn old building practices, for instance, over-dimensioning or lack of acceptance towards different aesthetics of reused products than the new ones. Also, risk mitigation in circular projects was debated extensively.

3.4.1 Part I

There were two main common points between the discussion groups. The need to remove the so-called document tax hindering refurbishment was the first common point. The second point was the need to introduce requirements for documenting emissions related to material loss and site preparation (to assess the climate benefits of preservation over demolition and new construction). A more detailed summary of the discussions is presented in the following sections.

Aspect 1. Improved building design

The participants thoroughly discussed the listed actions and added the missing ones ([Table 18](#)). The discussion mainly concerned regulations, public procurement, and incentives.

Regarding regulations, the so-called document tax (Dokumentavgift) was mentioned as one of the significant obstacles against refurbishment. This fee (currently 2.5% of the value of the building) makes refurbishment more expensive than demolition and new construction; consequently, often, the purchase focuses only on land, and existing buildings are either being demolished before the purchase or their value is set very low or almost zero (to make their demolition more feasible).

The requirements for circular design in the building code ([TEK17](#)) were also extensively discussed. The need for introducing a circularity index and stricter regulations for pre-demolition audits was stressed. Additionally, a common and clear terminology around circular construction was emphasized as an essential aspect of regulations. Also, the need for more comprehensive CO₂ accounting, including loss of material resources and the preparation of the building site, was mentioned. In this regard, it was also said that the standards for construction and demolition waste (C&DW) should be raised (aiming at, among others, high sorting rates, limits for the amount of C&DW generated, and elimination of backfilling). Additionally, the requirements for reused and dismantlable components in a project (referring to [FutureBuilt's circularity index](#)) should be implemented. It was also noted that achieving 90% of the C&DW sorting rate is possible. However, stakeholders lack knowledge on how to do that (indicating the need for more education on circular construction).

The participants also stressed that new types of contracts are necessary for circular projects. Industrial stakeholders invest much time and effort into developing such; however, such innovative agreements might result in risks for developers and entrepreneurs, which somewhat hinders the work. Therefore, many actors consider the public sector a suitable leader in developing standardized forms of such contracts. It worked in the case of tenant standard agreements that address circularity, where the Norwegian Green Building Council, in collaboration with the brokers association [NEF, Enova](#), and the Norwegian Directorate of Public Construction and Property ([Statsbygg](#)), developed a resource kit for building owners and brokers for commercial real estate (also public buildings).

Regarding public procurement, it was mentioned that incorporating circular design requirements would be beneficial. Similarly, it is considered valuable to incorporate circular design principles into architectural, design, and landscape planning and focus on efficiently using existing building stock (by, for instance, adapting it to new needs). Fast-track building permit assessment for circular projects, burdened with risks associated with reuse, was also listed as having significant value (now this is being done only in municipalities participating in the [FutureBuilt](#) program). Lastly, the need for improving public agencies' collaboration, expertise, and communication was stressed.

Regarding incentives, additional accessible funding for investments with fewer barriers and a broader scope to stimulate innovation was mentioned, for instance, from the Norwegian support program [Enova](#). Also, increasing waste generation fees was given as potentially effective. In the context of different types of support for circularity development, a few already implemented and successful mechanisms were listed (i.e., [Innovation Norway](#) and [FutureBuilt](#)).

TABLE 18 The findings from the Norwegian workshop – Part I Aspect 1. Improved building design

ADDITIONAL ACTIONS	REASONING
Remove document tax on refurbishments.	Many developers have reported that this fee (tax) makes it more expensive to refurbish rather than demolish and build a new building. Hence, removing this tax is seen as a major leap forward to incentivize refurbishments.
Including CO ₂ emissions associated with the loss of material resources and the preparation of the building site if the project involves demolishing an existing building.	Such CO ₂ accounting might discourage stakeholders from demolition.
Enhance support for the knowledge center.	This action would empower existing initiatives, improve coordination between them, and enhance stakeholder competency development.
Introducing standardized contracts, including responsibility and risk allocation concerning reuse and addressing uncertainty and risk factors in circular projects.	Circularity pushes innovation not only in working practices but also in contract types. The consensus in the Norwegian industry is that new and different contracts are needed when working with circular buildings. However, such new agreement types might be related to risks for developers and entrepreneurs. Therefore, many consider that the public sector could lead the way by developing standard contracts for circular construction projects.
Incorporating circular design principles into architectural, design, and landscape planning.	Public authorities could lead the transition to circularity by incorporating circular elements in their projects.

PRIORITIZED ACTIONS	REASONING
3.3 Focus on efficient use of existing building stock and adapting to new needs.	We need to focus on existing buildings and make sure that these are refurbished to enable prolonged lifespan and improved quality.
2.1 Preparing guidelines on improving building design and navigating existing building codes when implementing circular practices.	Support developers and builders in navigating the innovation spaces to go from ideals to implementation of circular construction.
1.1 Introducing requirements for circular design in the building code.	Introduce more ambitious regulations to ensure circularity across the sector, not only in the case of the most ambitious.
1.2 Lowering property and utility taxes for circular buildings (thus lowering operational costs).	Remove the fees, particularly the so-called "document tax" on refurbishments, which currently adds unfavorable costs to refurbishments.
4.1 Giving priority in assessing building permit applications for projects, which include elements of circular design.	There is a need for more incentives to make it more attractive to go circular. This is an example of an incentive that has worked with pilot projects in the FutureBuilt program.
LOWEST IMPACT ACTIONS	REASONING
2.2 Develop, support and maintain national and regional knowledge centres related to circular design.	There is a need for very hands-on programs and centers for capacity building. National and regional programmes can be great, but more details are needed to foresee possible impacts.
1.3 Development of national targets and strategy, which include waste reduction and reuse rates.	So far, Norwegian stakeholders have not had a good experience with the development of national strategies and targets. The idea is good - but it needs to be properly enforced. The current government is seen as not showing either ability or will to deliver on this.

Aspect 2. Documenting the environmental impact of construction products/materials

The extensively discussed topic within this aspect was pre-demolition audits. The need for a standardized approach to conducting such audits, specifying their format and the data they include, was emphasized. Also, introducing sanction mechanisms for projects not meeting the requirements was mentioned. Stricter and more structured pre-demolition audits would support another issue discussed by the participants – requirements for reuse and waste reduction, but considering waste fractions individually, not collectively. The participants also stated that all products should come with both assembly and disassembly instructions, which might reduce waste generated considerably.

Regarding circular design, the participants expressed a need to make it more challenging to document exemptions from requirements on such design based on economic unprofitability.

The need to introduce CO₂ emission limits in Norway and a standardized method for calculating and allocating reuse-related carbon emissions was also stressed. It was also suggested that the existing regulations should incorporate requirements to document and assess the climate benefits of preservation over demolition and new construction. These requirements should also address smaller-scale refurbishment works in the existing buildings. Lastly, the participants stated that the public authorities (as building owners) should calculate CO₂ emissions associated with all refurbishment forms and provide this information to tenants before making any unnecessary modifications to the building.

The workshop participants expressed their satisfaction with support (financial and other forms, like facilitation) for the circular project and creating a tool for documenting and assessing new construction/refurbishment emissions. However, it was also stated that more support is needed to accelerate the transition to circular construction. The need to create a structured and digital database with data from pre-demolition audits and material passports was emphasized; the data is currently scattered among stakeholders in different formats, which hinders its use.

In Norway, the participants see the work on standards for re-certification and re-documentation of secondary materials/products as successful. An example of this [Norwegian Standard for hollow core slabs for reuse NS 3682:2022](#) was given. Participants stated that work should build on that experience and develop standards for other building materials.

Similarly to the group discussing the first aspect, this group highlighted the need to fast-track building permit assessment for circular projects in the whole country (not only in the municipalities connected to the FutureBuilt program).

TABLE 19 The findings from the Norwegian workshop – Part I Aspect 2. Documenting the environmental impact of construction products/materials

ADDITIONAL ACTIONS	REASONING
Introduce reuse and waste reduction requirements on a fraction level, not overall waste.	Such requirements can considerably reduce the waste generated in a more controlled manner, stimulating recycling and reuse of specific fractions.
Incorporate requirements to document and assess the climate benefits of preservation over demolition and new construction. This should also include smaller refurbishment projects in existing buildings.	
Circular design - Remove the possibility or make it significantly more difficult to document exemptions from requirements based on economic unprofitability.	Currently, there is a risk that the exemptions might be overused.
In the case of public authority buildings, calculate the CO ₂ emissions associated with all forms of refurbishment and provide this information to tenants before making any unnecessary modifications to the building.	
PRIORITIZED ACTIONS	REASONING
4.1. Introducing requirements on pre-demolition audits and material passports for all new buildings.	Standardization of reuse mapping and corresponding documentation would enhance circular construction.
2.4. Creating and maintaining the database with data from material passports and pre-demolition audits. 3.3 Publicly sharing data on existing buildings and available materials/products to enhance their reuse.	Requirements for data sharing, emphasizing sensible formatting and quality.
3.1 Awarding contracts to companies, which aim to use circular materials/products in their projects. 3.2 Green Public Procurement including obligatory requirements on using circular materials/products.	Requirements for considering climate and environmental factors, including the private sector.
LOWEST IMPACT ACTIONS	REASONING
The group had difficulties with sorting out initiatives with low impact.	N/A

Aspect 3. Economic feasibility and reducing risks

The discussion in the third group revolved around, among others, various support methods facilitating circular construction. Participants acknowledged the success of so-far performed activities on supporting circular projects and programs dedicated to circular construction. However, they also expressed the need for large sector-specific programs, including funding for testing innovative solutions and supporting the extra logistics costs in circular projects. Also, participants suggested that application and reporting should be simplified in the funding projects as it is currently time-consuming and demanding, discouraging some stakeholders from applying.

Similarly, as for the first aspect, participants in this group highlighted that the so-called document tax (Dokumentavgift) for refurbishing buildings must be removed as it prioritizes demolitions and new constructions. Moreover, the need to introduce requirements on a circular degree in projects was stressed. Participants also suggested adopting the European Circular Economy Monitoring Framework in Norway to aid in monitoring progress towards a circular economy using available statistical data.

The crucial role of municipalities in enhancing circular construction was also highlighted. Several measures to do so were listed, such as implementing circular criteria in the procurement process, integrating circularity into climate targets at the municipality level, and systematic review of municipal zoning plans (to enable changing the function of existing buildings).

TABLE 20 The findings from the Norwegian workshop – Part I Aspect 3. Economic feasibility and reducing risks

ADDITIONAL ACTIONS	REASONING
Setting requirements for the degree of circularity in projects in the building code	Regulations are forceful measures driving the market in a more circular direction.
Require that banks place greater emphasis on rewarding circularity.	There is a need for more available funding for circular projects.
Adopting the EU's circularity framework in Norway.	Implementing the European Circular Economy Monitoring Framework in Norway would aid in monitoring progress towards a circular economy using available statistical data.
Using the newly established Norwegian export offices to promote circularity.	Norway has recently decided to establish new export offices; however, circularity is not mentioned in their mandates and strategies. At this moment, Norway aims to export the same old linear products instead of rewarding and promoting circular products for export.

Create a national website for circular requirements and best practices in the construction industry.	Gathering knowledge in one place might improve its accessibility and result in building competencies among stakeholders.
Initiating regional or national collective procurement requirements, for instance, enhancing retaining or renovating existing buildings. Integrating circularity into climate targets at the municipal level (for instance, within municipal councils). Developing expertise and promoting attitude change within the municipality regarding preservation	Municipalities are crucial actors in the transition to circular construction.
Framsikt (municipal management tool) should include circular aspects.	Introducing circular aspects in the holistic management tool used by Norwegian municipalities would help municipalities facilitate circularity.
Perform a systematic review of existing municipal zoning plans.	Inflexible planning and zoning often hinder the refurbishment of existing buildings.
Implementing National Circular Economy Goals with Scope 3 Consideration.	The Norwegian National Strategy for Green, Circular Economy needs to be strengthened in measures related to the construction sector.
Share the data from pre-demolition audits in a digital form.	Pre-demolition audits are mandatory in Norway; however, there are no specific requirements for sharing them with other stakeholders. Sharing this data allows the materials/products to be reused in different projects.
PRIORITIZED ACTIONS	REASONING
4.2. Provide a "building fund" to compensate the company if it goes bankrupt due to inconsistency of the procedures related to materials reuse.	Such a fund would encourage developers and entrepreneurs to experiment more with circular solutions.
1.1 Implementing a resource tax (to make raw materials more expensive by including their environmental price).	Both negative and positive incentives need to be implemented to motivate stakeholders to implement more circular work practices.
1.2 Lowering VAT on reuse and recycling.	
LOWEST IMPACT ACTIONS	REASONING
The group had difficulties with sorting out initiatives with low impact.	N/A

3.4.2 Part II

In part two of the workshop, participants were asked to prioritize from a given list of actions for the Nordic Council of Ministers to push for Nordic circularity and similarly for the Nordics, in general, to push for an EU-wide change.

Workshop participants felt they agreed on the topics, though answers show a spread of alternatives selected. In [Table 21](#), you will find the actions that received two or more votes. The most popular action, which gained three votes, was a digital database on available circular materials in standardized form at the Nordic level. The seven prioritized actions varied in type: the participants called for standardized methods, digital databases, tighter regulation, and capacity building. A few fill-in answers were provided, which aligned with prioritized actions: stricter regulation, consensus on methods, incentives, support, and public procurement were called for.

TABLE 21 The findings from the Norwegian workshop – Part II Prioritized actions

PRIORITIZED ACTIONS RELATED TO NORDIC WORK	PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
1. Standardized methods to assess secondary materials' quality.	2. Regulate: Create a standardized recertification process for reused construction products.
2. Financial support for the pilot projects, which results in publicly-available practical guidelines on circular construction.	3. Regulate: Develop Construction Product Regulation to include reused products (currently aimed at linear products).
3. Digital database on available circular materials in standardized form.	6. Inform: Fund education, networking and knowledge centers to allow networking, standardize procedures and facilitate knowledge sharing.
6. Regulations on min. amount of reused materials/products.	-

The actions which remained without support are presented in [Table 22](#).

TABLE 22 The findings from the Norwegian workshop – Part II Non-prioritized actions

NON-PRIORITIZED ACTIONS RELATED TO NORDIC WORK	NON-PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
4. Teaching materials and instructions for professionals (case-specific, e.g., how to reuse precast concrete slabs).	1. Regulate: Ensure existing waste regulation is enforced through sanctioning or other measures.
5. Including circular construction aspects in the Swan certification scheme to a significant degree.	4. Regulate: Make pre-demolition audits mandatory in all member states.
8. Backing the loans for private companies involved in circular projects.	9. Incentivize: Improve Public Procurement to allow induced benefits such as increased employment into the total cost-benefit analysis.
9. Providing a „building fund“ to compensate the company if it goes bankrupt due to inconsistency of the procedures related to materials reuse.	

3.5 Sweden

The Swedish workshop was organized by CCBuild and IVL Sustainable Building AB and gathered a good representation of both the private and public sectors. While discussing, participants highlighted the need to distribute the effort among more actions than those prioritized at the workshop and to focus on promoting on-site reuse.

3.5.1 Part I

In the first part of the workshop, participants went through the listed actions, added a few missing ones, discussed already implemented actions (considering their success rate), and, eventually, chose the actions that should be prioritized ([Table 23](#), [Table 24](#), [Table 25](#)).

The common points between the three aspects (groups) were reinforcing existing regulations, introducing various types of incentives (both economic and non-economic), and incorporating circular criteria into public procurement. A more detailed summary of the discussions is presented in the following sections.

Aspect 1. Improved building design

In the first aspect, the added actions focused predominantly on strengthening existing regulations and sustainability of the current procurement process by, for instance, setting a baseline for climate budgeting. When discussing the regulations, the participants highlighted the need to prioritize requirements for circular design in the building code to build up on the visible success of EU taxonomy and other voluntary certification schemes (i.e., [Milljöbyggnad](#)) as drivers of circularity in construction.

Supporting pilot projects with publicly available guidelines as an outcome was also listed to be prioritized. Many such projects have already received financial support in Sweden (e.g., the [Hoppet project](#) in Gothenburg); however, it was emphasized that there is a need to take a step further and put pressure on turning the gathered knowledge into general working procedures/practices. Regarding financing, other successful support programs, such as the [Omställningslyftet program](#) (which included expert coaching sessions for SME companies in circular aspects) or national competence centers (e.g., [CCBuild](#), [Klimatarena Stockholm](#), [Lokal färdplan Malmö](#)), were also acknowledged. However, the need to secure long-term financing or create a business model for such initiatives was stressed to avoid them falling into the void.

Last but not least, participants expressed their approval of the initiatives of several regional/local authorities to introduce reuse rates (i.e., rates of reused material – a percentage of the building material that should be reused), as, for instance, in Gothenburg. However, the need to improve cooperation between different public departments, broaden their perspective and eliminate conflicts of interest was also stressed.

TABLE 23 The findings from the Swedish workshop – Part I Aspect 1. Improved building design

ADDITIONAL ACTIONS	REASONING
<p>Strengthening the regulations on mandatory pre-demolition audits (material inventories and plans) in the Swedish Planning and Building Act.</p>	<p>Since August 2022, the Swedish Planning and Building Act has required assessing which construction products (fractions) can be reused and how these should be handled. However, it does not put any pressure on the actual reuse. Therefore, it was suggested to strengthen this requirement and put more pressure on actual reuse.</p>
<p>Implement requirements for climate budget (Building owner and tenant)</p>	<p>Setting a baseline for climate budget in public projects is thought to be a forceful driver towards circular construction.</p>
PRIORITIZED ACTIONS	REASONING
<p>1.1. Introducing requirements for circular design in the building code.</p>	<p>Regulations setting a baseline for circular design are seen as an effective tool in enhancing circular construction; however, they should be supported by economic incentives.</p>
<p>2.4. Support pilot projects with elements of circular design, resulting in publicly available guidelines.</p>	<p>Financial support of circular projects can be the source of valuable insights and experiences for various stakeholders; it is crucial, however, to include in the guidelines an analysis of how the shared insights and experiences can be implemented in ordinary projects.</p>
<p>3.5 Fill-in answer: Implement requirements for climate budget</p>	<p>Setting a baseline for climate budget in public projects is thought to be a forceful driver towards circular construction.</p>
LOWEST IMPACT ACTIONS	REASONING
<p>The group had difficulties with sorting out initiatives with low impact.</p>	<p>N/A</p>

Aspect 2. Documenting the environmental impact of construction products/materials

Similarly to the first aspect, the discussion focused largely on reinforcing the existing regulations and economic incentives. Introducing limits for CO₂ emissions, use of space, or parking space were extensively discussed. Introducing the [Act on Climate Declaration for Buildings \(2021:787\)](#) (i.e., the requirement on climate declarations) is seen as a good step towards sustainable (and circular) construction; however, in its current form, it predominantly generates paperwork. It is thought that to facilitate change truly, the regulations must be sharpened with the limit values of various types.

Additionally, the mandatory pre-demolition audits (material inventories) were mentioned as a step in the right direction. However, to fully use their potential, these audits should be performed at an earlier stage of projects, and regulatory pressure should be put on following up the audits by actual reuse. Aligning the audits with standardized detailed guidelines was mentioned as one of the ways to increase their impact. On the topic of standardized procedures, participants expressed their satisfaction with work on standards for recertification and re-documentation of products, giving the [Handbook for Steel Reuse in Load-bearing Structures \(BS04:2021\)](#) as an example. Last but not least, introducing regulations on take-back models of construction products was mentioned as another mechanism facilitating circularity in construction.

Economic incentives favoring circularity were also extensively discussed. Increasing waste management fees for reusable/recyclable fractions was given as an example of a negative incentive. Also, many pilot projects that received funding were mentioned, including several land allocations by public authorities for circular projects. However, it was stressed that the mandatory requirements on sustainability (including circularity) should become a part of the procurement process and that the so-far gathered knowledge from the pilot project should be used as general working practices.

Part of the discussion concerned data gathering and management. Publicly releasing climate data for construction products by the Swedish National Board of Housing, Building and Planning (Boverket) was seen as a relevant and successful action. What can also be mentioned is that Boverket released a [website that gathers knowledge on circular construction in the Swedish context](#). Following, a need for data on the circularity of, among others, products and various projects (new construction, refurbishment, demolition) was expressed. The necessity of creating materials passports for assets owned/managed by public authorities was also highlighted. Regarding data gathering, managing, and distributing, several successful solutions were mentioned (e.g., [CCBuild product bank – Värdeanalys](#)).

TABLE 24 The findings from the Swedish workshop – Part I Aspect 2. Documenting the environmental impact of construction products/materials

ADDITIONAL ACTIONS	REASONING
<p>Establish limits on CO₂ emissions per person, use of space/area per person, and parking spaces per person.</p>	<p>The limits are seen as an effective way to enhance the reuse of materials/products and reduce the amount used. Limits on parking spaces per person are seen as a way of reducing building unnecessary car parks.</p>
<p>Establish higher fees for waste management of products that could have been reused or recycled.</p>	<p>Higher waste management fees are a negative incentive which enhances waste generation reduction.</p>
<p>Strengthening the regulations on mandatory pre-demolition audits (material inventories and plans) in the Swedish Planning and Building Act.</p>	<p>Since August 2022, the Swedish Planning and Building Act has required assessing which construction products (fractions) can be reused and how these should be handled. It was suggested that this requirement be reinforced by making it more detailed (i.e., aligning them with detailed guidelines).</p>
<p>Introducing regulations for take-back models for producers of building products.</p>	<p>Regulating take-back models might standardize and, consequently, popularize these schemes.</p>
<p>Investigate and publicly publish:</p> <ul style="list-style-type: none"> – the national potential for reuse and recycling at the aggregated level and for different buildings and product types; – data on the circular degree of different project types (new buildings, refurbishments, demolition). 	<p>Publicizing this data can increase stakeholders' knowledge of possible circularity at different levels of the construction value chain.</p>
<p>Establish working practices aligning with circular principles (e.g., principles published by CCBuild) for all public real estate owners/managers. These working practices should include, among others, creating material passports for existing and new buildings, increasing internal reuse within the organization by, for instance, introducing hierarchical procedure on purchases (i.e., before purchasing a new product, evaluate the need for the product, the possibility of harvesting it internally, etc.).</p>	<p>The public sector owns/manages a considerable share of the existing building stock. Introducing circular working practices at this scale would popularize them and facilitate further development of circular construction.</p>

PRIORITIZED ACTIONS	REASONING
1.3 Introducing harmonized limits (e.g., carbon limits) in the Nordics.	Introducing a limit value for greenhouse gas emissions for construction projects in Sweden is thought to be forceful and relatively easy to implement. The regulation on climate declarations is already in place and should be further strengthened by introducing the limits.
3.2 Green Public Procurement including obligatory requirements on using circular materials/products.	Green public procurement (with a clear mandatory baseline for sustainable and circular requirements) is seen as forceful if implemented.
3.3 Publicly sharing data on existing buildings and available materials/products to enhance their reuse.	Complement the law on pre-demolition audits (reuse inventory) with a requirement to make reuse inventories publicly available so that finding available materials/products will be easier for other stakeholders.
LOWEST IMPACT ACTIONS	REASONING
The group had difficulties with sorting out initiatives with low impact.	N/A

Aspect 3. Economic feasibility and reducing risks

The third group of participants strongly emphasized the importance of on-site reuse and prolonging the lifespan of existing building stock by proper maintenance. Mandatory maintenance audits were proposed as a regulatory solution for the latter.

The need for various incentives to facilitate circular construction was also highlighted. Among them, financial mechanisms, such as subsidies, lower taxes for circular services, or compensation funds for risks related to reuse, were stressed. However, other forms of support, such as coaching sessions or help promoting proposed circular solutions, were also mentioned.

In the regulatory context, the discussion focused on circular criteria when assessing the building permit applications at the municipality level and stricter product ownership criteria in projects owned by public authorities.

Last but not least, the necessity of education and training of stakeholders, especially carpenters or small or medium-sized entrepreneurs, was stressed.

TABLE 25 The findings from the Swedish workshop – Part I Aspect 3. Economic feasibility and reducing risks

ADDITIONAL ACTIONS	REASONING
Introduce requirements on circularity at the municipality level as a part of the building permit process.	The municipalities' influence on land allocation is potentially significant. Circularity as a condition or evaluation criterion would possibly make a substantial change.
Introduce mandatory maintenance audits.	Such audits would extend the lifespan of existing buildings.
Support new circular business models/practices focusing on, for instance, reuse on-site or on upscaling, developing and testing solutions that upgrade the technical performance of existing building products so that they will receive equal technical performance as new products.	Such support could be done through, for instance, different financial mechanisms (e.g., subsidies or lower tax for circular services, such as repair, upgrading, quality tests, etc.), coaching sessions, or the promotion of the proposed circular solutions. It would enhance innovation within the circular construction field, prolong the lifespan of existing buildings, and make keeping and maintaining existing buildings/materials/products more cost-effective than replacing them with new ones.
Introduce stricter product ownership criteria in projects for the public sector throughout the whole lifecycle of buildings and building products.	This action would potentially enhance proper building/product maintenance, thus prolonging their lifespan.
Educate and train stakeholders (especially small- and medium-sized companies and carpenters) in reusing/upgrading products on-site.	Emphasis should be put on keeping materials/products on-site and avoiding dismantling, moving, and replacing, thus prolonging their lifespan.
Establish a compensation building fund for risks related to reuse (related to their technical performance and warranty issues).	Such a fund would potentially encourage stakeholders to try and test more circular solutions.
PRIORITIZED ACTIONS	REASONING
4.4 Fill-in answer: Introduce economic incentives for reuse on-site.	To promote circular construction, such incentives would make a change; they would encourage maintenance, reconditioning, and upgrading of existing buildings and building products.
4.5 Fill-in answer: Educate and train stakeholders (especially small- and medium-sized companies and carpenters) in reusing/upgrading products on-site.	Introduce/support education and training so the actors with expertise in reuse on site (such as service providers in upgrading, maintenance, and reconditioning of existing material) will increase in numbers. As it is now, these actors are often small- or medium-sized companies with problems taking on large-scale projects.
4.6 Fill-in answer: Establish a compensation building fund for risks related to reuse (related to their technical performance and warranty issues).	Such a fund would potentially encourage stakeholders to try and test more circular solutions.
LOWEST IMPACT ACTIONS	REASONING
The group had difficulties with sorting out initiatives with low impact.	N/A

3.5.2 Part II

In part two of the workshop, participants were asked to prioritize from a given list of actions for the Nordic Council of Ministers to push for Nordic circularity and similarly for the Nordics, in general, to push for an EU-wide change.

Workshop participants were very uniform in their answers, and clear prioritizations were made. [Table 28](#) shows the actions that received two or more votes. The prioritized actions at the Nordic level are more varied, including incentives and regulation, whereas the actions at the European level are strictly regulation-based. However, the Swedes were not alone in this view - all save Denmark seemed to prioritize regulatory actions from the EU.

There were also some fill-in options that were similar in thought to some of the provided actions: establishing guidelines, a circular competence center, and investigating potential reuse in planned demolition projects. Due to the workshop format, the popularity of these options could not be determined. It could be said that the workshop participants had a rather clear view on the current challenges for circularity, leading to a uniform set of recommendations for the future.

TABLE 26 The findings from the Swedish workshop – Part II Prioritized actions

PRIORITIZED ACTIONS RELATED TO NORDIC WORK	PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
2. Financial support for the pilot projects, which results in publicly-available practical guidelines on circular construction.	2. Regulate: Create a standardized recertification process for reused construction products.
3. Digital database on available circular materials in standardized form.	3. Regulate: Develop Construction Product Regulation to include reused products (currently aimed at linear products).
7. Stricter carbon emissions limits.	4. Regulate: Make pre-demolition audits mandatory in all member states.

The non-prioritized actions were plenty, indicating a clear preference for clear-cut solutions ([Table 27](#)).

TABLE 27 The findings from the Swedish workshop – Part II Non-prioritized actions

NON-PRIORITIZED ACTIONS RELATED TO NORDIC WORK	NON-PRIORITIZED ACTIONS RELATED TO EU ADVOCACY
4. Teaching materials and instructions for professionals (case-specific, e.g., how to reuse precast concrete slabs).	1. Regulate: Ensure existing waste regulation is enforced through sanctioning or other measures.
5. Including circular construction aspects in the Swan certification scheme to a significant degree.	5. Inform: Support digitalisation through mandating Material Passports in set data formats.
6. Regulations on min. amount of reused materials/products.	6. Inform: Fund education, networking and knowledge centers to allow networking, standardize procedures and facilitate knowledge sharing
8. Backing the loans for private companies involved in circular projects.	7. Incentivise: Include reuse and recycling incentives into the European Emission Trading Scheme ETS.
-	8. Incentivize: Fund research and development to create standardized processes for dealing with responsibility, warranty and guarantees.
-	9. Incentivize: Improve Public Procurement to allow induced benefits such as increased employment into the total cost-benefit analysis

3.6. Synthesis workshop

A synthesis workshop was hosted to refine the findings of the Nordic workshop. The participants were presented with a synthesis of findings from the Nordic workshops and were asked to assess and reflect upon these findings. The summary of the discussion can be found below.

3.6.1 Part I

The first part of the synthesis workshop focused on the national perspectives. The synthesis workshop participants were given three lists of actions (one for each aspect considered) that were prioritized at Nordic workshops. They were asked to prioritise them by splitting one hundred points between them (presented as score in Tables [28](#), [29](#) and [30](#)). The participants were unaware of the Nordic workshops' preference in prioritizing said actions to avoid confirmation bias in the results.

Aspect 1. Improved building design

In the first aspect, five common actions from the Nordic workshops were presented at the synthesis workshop ([Table 28](#)).

The participants of the Nordic workshops and participants of the synthesis workshop agreed on the order of the actions. The main focus was regulations (requirements on circular design in the building code), supporting pilot projects and sharing experiences and know-how from them to enhance competencies in the sector, and focusing on efficient use of existing building stock.

At the Nordic workshops, a discrepancy was identified for one of the listed actions: prioritizing building permit applications for circular projects. In some countries, such a solution was seen as a helpful and positive incentive for the market, whereas in others, its sense and validity were questioned. The synthesis workshop participants saw this action positively, in general. However, they pointed out that its implementation is impossible for two reasons. The first reason is whether the project meets the conditions to be prioritized. Evaluating the application before the actual building permit assessment is difficult and would require a set of clear definitions/criteria of circular design and indicators on reused/recycled content. The second reason is related to the limited resources of public authorities. Here, two questions were asked: How fast would this fast track be? How long would a regular queue last?

TABLE 28 The results of the synthesis workshop – Part I Aspect 1. Improved building design

ACTION	SYNTHESIS WORKSHOP		NORDIC WORKSHOPS
	SCORE, %	POSITION	POSITION
Introducing requirements for circular design in the building code.	28.0	1	1
Focus on efficient use of existing building stock and adapting to new needs.	26.0	2	2
Preparing guidelines on improving building design and navigating existing building codes when implementing circular practices.	20.0	3	3
Support pilot projects with elements of circular design, resulting in publicly available guidelines.	16.0	4	4
Awarding contracts (by public authorities) to companies which incorporate circular design in their projects.	10.0	5	5

Aspect 2. Documenting the environmental impact of construction products/materials

In the second aspect, there was a considerable discrepancy between answers from the synthesis and Nordic workshops ([Table 29](#)).

At all of the Nordic workshops, limits of carbon emissions were discussed and seen as important. In many countries, they were or are soon to be implemented, and their harmonization did not seem crucial for the Nordic participants, so they have not gotten to the top position of solutions to prioritize. The importance of these limits and their harmonization among Nordic countries was stressed at the synthesis workshop by assigning the highest score to them. However, it was specified that when thinking about harmonization, the participants meant the calculation method of carbon emissions, not the limits per se, and that work on it is ongoing within [work package 1 in the Nordic Sustainable Construction project](#). Harmonizing limits was said to be less important than having effective limits in place.

Another difference was related to the database, which includes data on emissions from new construction/refurbishment and on available materials in the existing buildings (from, for instance, pre-demolition audits and material passports). From Nordic workshops, such a database was seen as essential in facilitating circular construction by providing transparency and aiding information flow on available materials. Similarly, at the synthesis workshop, the importance of such a database was acknowledged. Nevertheless, it was also mentioned that such an initiative is expensive, and there is no clarification on who should bear the costs (of creating and maintaining the database). Overall, the conclusion was that other actions, such as coherent regulations on product documentation, are of higher importance.

TABLE 29 The results of the synthesis workshop – Part I. Aspect 2. Documenting the environmental impact of construction products/materials *

ACTION	SYNTHESIS WORKSHOP		NORDIC WORKSHOPS
	SCORE, %	POSITION	POSITION
Introducing harmonized limits (e.g., carbon limits) in the Nordics.	30.0	1	4
Introducing requirements on pre-demolition audits and material passports for all new buildings.	22.0	2	2
Creating and maintaining the database with data from material passports and pre-demolition audits.	13.0	3	3
Green Public Procurement including obligatory requirements on using circular materials/products.	12.0	4	3
Awarding contracts to companies, which aim to use circular materials/products in their projects.	8.5	5	1
Publicly sharing data on existing buildings and available materials/products to enhance their reuse.	8.5	5	2
Managing publicly-available database with data on emissions from new constructions/renovations.	6.0	6	1

* Note: Due to the adopted methodology, some actions have the same position for the Nordic workshops, which means their relative frequency values were the same

Aspect 3. Economic feasibility and reducing risks

Similarly to the second aspect, there was a considerable discrepancy between the Nordic and synthesis workshops in the third one (Table 30). However, both groups acknowledged the importance of education and enhancing competencies among stakeholders.

Lowering VAT on reuse was one of the actions prioritized the most at the Nordic workshops; however, at the synthesis workshop, participants stressed that, even though it seems like a highly effective tool to facilitate reuse, it is currently impossible due to various political and administrative aspects. This is why participants emphasized the role of resource and carbon taxes more.

Another significant discrepancy was related to various incentives (e.g., financial ones or a „building fund“ compensating the company for going bankrupt due to inconsistencies in procedures on material reuse). At the Nordic workshops, incentives were seen as crucial instruments to enhance circularity in construction. On the contrary, these actions were placed in the last positions at the synthesis workshop, with a significant score difference between them and the previous action. It might be related to the difference in the participant profile at the workshops (i.e., higher representation of the private sector at the Nordic workshops and the public sector at the synthesis workshop).

TABLE 30 The results of the synthesis workshop – Part I. Aspect 3. Economic feasibility and reducing risks*

ACTION	SYNTHESIS WORKSHOP		NORDIC WORKSHOPS
	SCORE, %	POSITION	POSITION
Implementing a resource tax (to make raw materials more expensive by including their environmental price).	30.0	1	3
Education and courses (building new competencies)	29.0	2	3
Lowering VAT on reuse and recycling	17.5	3	1
Lowering property and utility taxes for circular buildings (thus lowering operational costs).	16.0	4	1
Providing additional incentives	5.0	5	3
Provide a „building fund“ to compensate the company if it goes bankrupt due to inconsistency of the procedures related to materials reuse.	2.5	6	2

* Note: Due to the adopted methodology, some actions have the same position for the Nordic workshops, which means their relative frequency values were the same.

3.6.2 Part II

In part two of the synthesis workshop, participants were provided with the top selection of actions for Nordic cooperation and EU Policy as indicated by the Nordic workshops. The participants were not aware of the Nordic workshops' preference in prioritizing said actions to avoid confirmation bias in the results. Participants were each provided 100 points to spread out between the alternative actions and a possibility to reflect on each section.

For Nordic cooperation, five options were provided to be prioritized. The sixth action selected by the Nordic workshops was disregarded in the validation workshop, as plenty of work is currently being done in the field, and it was selected as a low priority in the Nordic workshops. As can be seen from the table below, the synthesis workshop resulted in clear favoritism for three actions:

TABLE 31 The results of the synthesis workshop – Part II. Nordic cooperation

ACTIONS	SYNTHESIS WORKSHOP SCORE	POSITION FROM NORDIC WORKSHOPS
1. Standardized methods to assess secondary materials' quality.	26.0	2.
2. Financial support for the pilot projects, which results in publicly available practical guidelines on circular construction.	25.5	1.
7. Stricter carbon emissions limits.	23.5	3.
3. Digital database on available circular materials in standardized form.	13.0	2.
6. Regulations on min. amount of reused materials/products.	12.0	3.
4. Teaching materials and instructions for professionals (case-specific, e.g., how to reuse precast concrete slabs).	N/A	3.

As can be seen from the synthesis workshop score, participants were rather uniform with their preferences. There is a stark drop between the scores received by the three most popular actions and those that follow. Additionally, when asked about digital databases, workshop participants felt that databases should either be created on a national level or by a private company. In some countries, such a database already exists. For these reasons, the top three actions were selected as the final recommendations.

Next, the participants were given the same directions for evaluating six EU policy recommendations selected by the Nordic workshops. In this case, one of the actions was also disqualified from analysis ([Table 32](#)). The disqualified action was heavily discussed in the Nordic workshops and is of obvious benefit, as regulation that's not followed through on tends to be less effective. However, this issue seemed more general and not only applicable to circularity efforts, so it was left out of the policy recommendations produced in this project.

The participants of the synthesis workshop clearly indicated a preference for four actions, as seen in the table below.

TABLE 32 The results of the synthesis workshop – Part II. EU advocacy

ACTIONS	SYNTHESIS WORKSHOP SCORE	POSITION FROM NORDIC WORKSHOPS
5. Support digitalization through mandating Material Passports in set data formats.	34.0	3.
2. Create a standardized re-certification process for reused construction products.	20.0	1.
3. Develop Construction Product Regulation to include reused products (currently aimed at linear products).	17.0	2.
4. Make pre-demolition audits mandatory in all member states.	16.0	3.
8. Fund research and development to create standardized processes for dealing with responsibility, warranty and guarantees.	7.0	3.
6. Fund education, networking and knowledge centers to allow networking, standardize procedures and facilitate knowledge sharing.	6.0	3.
1. Ensure existing waste regulation is enforced through sanctioning or other measures.	N/A	3.

Similarly as with the Nordic recommendations, the most popular actions were selected as the final recommendations. In the case of the EU Policy recommendations, this meant the four most popular actions. The call for funding for education, research, and development did not quite qualify for the final recommendations, but this does not signal that it is not important. Workshop participants felt funding alone would not tilt the scales in favor of circularity, and other actions were to be prioritized.

In general, the participants of the Synthesis workshop felt all recommendations portrayed in two workshop parts were useful, even though some actions were criticized for their anticipated difficult execution. It is important to note that all recommendations selected by the Nordic workshops could be useful to some extent and selecting actions is always dependent on the party taking said action – for instance, new regulation could be easy for a regulator, whereas producing industry guidelines is easy for an industry group. The study does not mean to advise against taking any possible action to pursue circularity. The selected actions have been reformulated into recommendations in the following chapter.

4. Discussion and recommendations

This research was built on previous work on circular construction but was characterized by a different approach. Many actions provided to participants for discussion were based on the opportunities listed in the *WP2 analysis of barriers and possibilities*^[16] and the *Policies Enabling the Reuse of Construction Products*^[17] reports and the aim was to narrow these down to a list of actions seen as most impactful (at the moment) by Nordic stakeholders. This is how this research added another layer of understanding to the identified barriers and possible solutions and, as a result, formulated three lists of recommended actions to implement. The first list addressed the solutions local/national public authorities could focus on to facilitate circularity in construction, whereas the latter focused on solutions at a Nordic level and Nordic advocacy in the EU. The lists can be seen in [Tables 33–35](#).

In the first part of the research, which focused on actions at the local/national level, several feasible actions in all Nordic countries were identified. During the discussions, it could also be seen that participants from different Nordic countries discussed the same obstacles to circular construction but proposed different approaches to solve them. For example, the need to regulate methods of assessing the quality of secondary materials was mentioned at all workshops. In Finland, a standardized re-certification methodology was proposed as the answer. In Denmark, participants focused on regulating EPD preparation for reused materials. In Norway, the need for requirements on instructions for assembly and disassembly for each product was mentioned, and in Iceland, adding a reuse guide to product documentation was mentioned.

Nevertheless, several discrepancies in the participant's answers were identified as well. These have their source in, among others, differences in market maturity regarding circular construction among Nordic countries, which caused the participants to focus on different aspects during discussions. The first main difference concerns increased waste management fees, which were seen as ineffective in Finland, contrary to Iceland, Norway, and Sweden. Also, fast-track building permit assessment for circular projects, seen as effective in Norway, did not receive a good reception in Finland and Iceland. Lastly, the compensation fund covering risks related to reuse and other circular practices was seen as relevant by Danish, Norwegian, and Swedish stakeholders to encourage stakeholders. In

16. [Nordic Networks for Circular Construction WP2 analysis of barriers and possibilities – Report, 2023.](#)

17. [Policies Enabling the Reuse of Construction Products in the Nordics – Report, 2023.](#)

Denmark and Sweden, such a fund was seen as a support for experimenting with circular solutions. In Norway, such a fund was seen mainly as a "safety net" against the risks of company bankruptcy due to inconsistent procedures related to materials reuse. In contrast, Icelandic stakeholders found such a fund unfeasible.

In the second part of the workshop, Nordic participants agreed more than in the first part. Also, the results of the synthesis workshop aligned with the prioritization at Nordic workshops. Several comments on the lobby against reuse and reuse on-site were made at Nordic workshops and discussed at the synthesis workshop. In general, participants somewhat agree that there is skepticism among some stakeholders towards reuse; however, opinions on calling it lobbying are divided. Similarly, opinions vary regarding reuse on-site as the main priority when it comes to reuse in general, as many stakeholders highlighted the importance of good logistics, which results in ordering less material.

To address the differences and similarities between Nordic countries, this report provides individual perspectives from each Nordic country and, eventually, synthesizes findings from all Nordic countries in the form of recommendations presented in the following section.

4.1 Recommendations

Based on the summary of prioritized actions from Nordic workshops and their verification at the synthesis workshop, three sets of recommendations for public authorities at national and local levels, Nordic cooperation, and EU policy work are proposed below in alphabetical order.

TABLE 33 Recommendations for public officials at local and national levels

ROLE: REGULATOR	
1.	Introduce a resource tax on raw materials to include their environmental price.
2.	Introduce CO ₂ emissions limits for new construction and harmonize the method of calculating emissions among Nordics. Such harmonization 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: INNOVATION ENABLER

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

ROLE: BUILDING OWNER AND TENANT

6. Introduce obligatory criteria on circularity in the procurement processes to lead and drive the transition to circular construction.
7. 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: DECISION-MAKER

8. Introduce circular construction elements, emphasizing practical aspects, into national curricula at different levels (e.g., vocational schools, universities).
9. Introduce requirements on pre-demolition audits and material passports for all demolition projects and new buildings, respectively.
10. 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.

TABLE 34 Recommendations for Nordic cooperation

-
1. Facilitate the creation of a joint Nordic method for assessing secondary materials' quality, ensuring their healthiness and safety in future projects. As part of that, harmonize definitions for circular building practices to facilitate common understanding.
 2. Provide financial support for the pilot projects with distinguished circularity features in exchange for publicly available practical guidelines on circular construction.
 3. Advocate for stronger emission limits for new construction and refurbishment projects. Ensure that in the methods used for calculating emissions, the use of secondary materials is awarded.
-

TABLE 35 Recommendations for EU policy work

1.	Without data on available materials, planning for reuse is impossible. Support digitalization efforts by mandating material passports in all construction projects. Material passports should be produced uniformly and in set data formats.
2.	Without standardized processes, recertifying products for use is impossible. Create a standardized re-certification process for reused construction products to enable products to be recirculated into the marketplace.
3.	Without information on available materials, planning for reuse is impossible. Make pre-demolition audits mandatory in all member states.

4.2 Recommendations for future research

Circular construction is still evolving in the Nordic construction sector and, like many emerging concepts, requires further investigation and development. Therefore, there are numerous possible directions for future work. However, two main directions could be listed to be considered for further investigations:

- Deeper analysis of impact and effort, combined with economic analysis, of proposed recommendations;
- Impact analysis of implemented solutions after a few years and another round of prioritization to adjust the recommendations to the current market state.

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Appendix A-D: Canvas part I and II

[Appendix A](#)

[Appendix B](#)

[Appendix C](#)

[Appendix D](#)

About this publication

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