

# Circularity for climate:

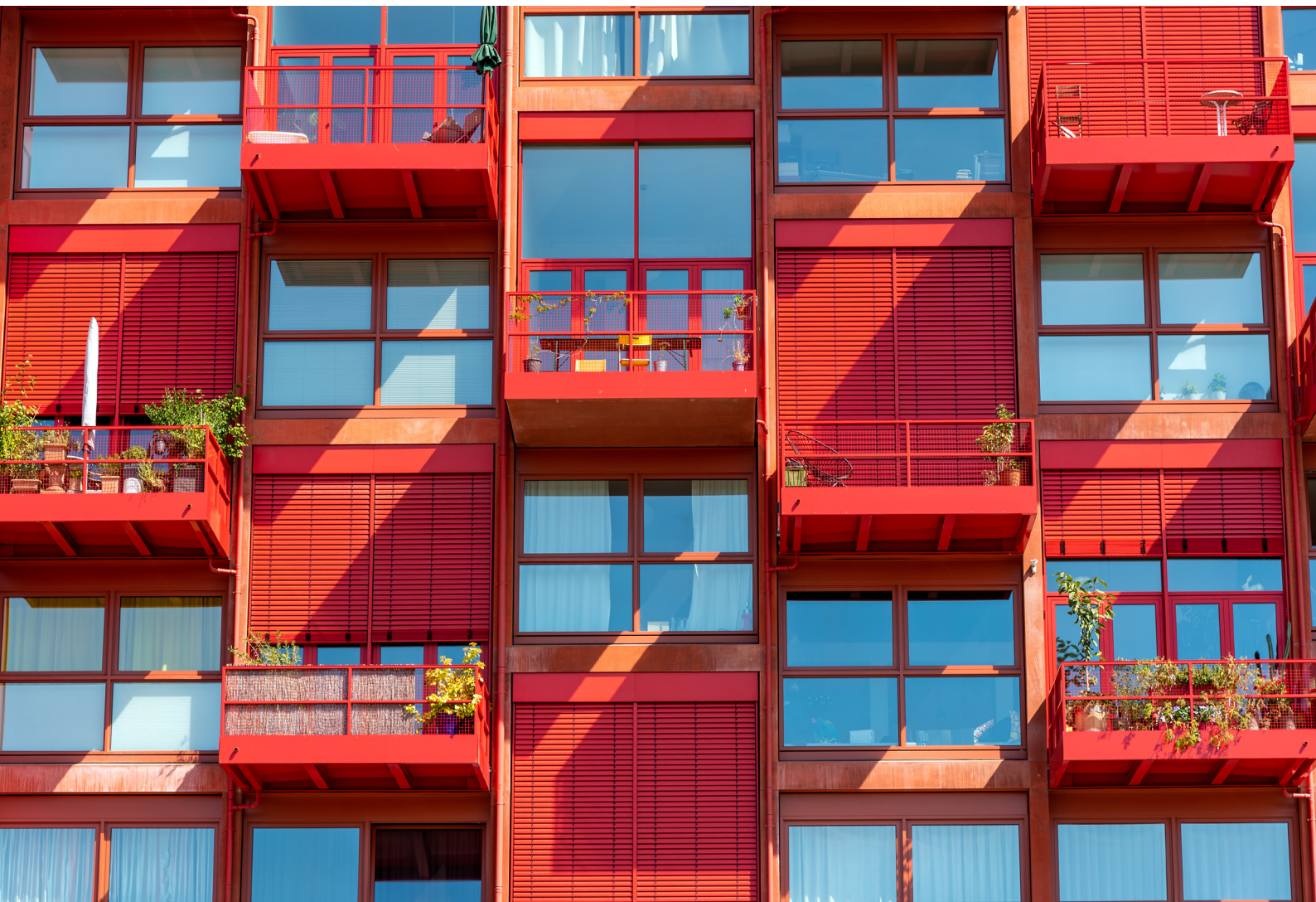
## decarbonising the building and construction material sector in Denmark, Poland and Ukraine

Warsaw 2025

**REFORM**

 **CONCITO**  
DENMARK'S GREEN THINK TANK

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#### **About the project:**

DECON project aims to address this gap between CE and strategies related to decarbonisation aspects and sector-specific needs by assessing the disparity between climate and circular economy policies, identifying challenges, barriers, and both good and bad practices at the national level within the building and construction materials sector. The project involves assessing the different levels of implementation of selected CE and climate strategies along the entire value chain, providing insights into the various practices and approaches. Its main impact lies in bridging the gap between linear and circular economy practices while effectively aligning energy and climate policies to significantly influence the achievement of net-zero emission targets in the building and construction materials sector of Poland, Ukraine, and Denmark.



**Nordic Council  
of Ministers**

DECON is part of the Prosperous Future Program for Civil Society Cooperation in the Region, funded by the Nordic Council of Ministers.

#### **About CONCITO:**

CONCITO is Denmark's green think tank, dedicated to accelerating the green transition by transforming knowledge into climate action. The organisation supports decision-makers across society through science-based analyses and solutions, promoting inclusive and effective climate policies in Denmark and internationally. Find out more at CONCITO – Denmark's green think tank.

#### **About Rethink:**

ReThink is the think & do tank, fully committed to leveraging our expertise and the most advanced global practices, in the circular reconstruction of Ukraine. We support Ukrainian cities, municipalities, and businesses adopting systemic and advanced circular strategies for a greener, more resilient Ukraine.

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#### **About Reform Institute**

The Reform Institute is an independent think tank based in Poland. It supports the continuous improvement of formulation, implementation, monitoring and evaluation of public policies in Poland, Europe and globally.

Find out more at Reform Institute.

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## 1. Introduction

The building and construction sector accounts for approximately 50% of all extracted materials and 35% of total waste generation in the EU. The construction industry focuses on a life cycle perspective, considering every stage of the value chain—from material extraction and production to the end-of-life stage—while maintaining the built environment<sup>1</sup> across building, infrastructure, and industrial sectors.<sup>2</sup> From a circularity perspective, this sector aims better to manage the use and evaluation of natural resources while minimising construction and demolition waste.<sup>3,4</sup>

However, current policies often fail to account for circular economy (CE) as an integral component of general decarbonisation and climate and energy strategies. On the demand side, actions include embracing circular economy principles, promoting material efficiency, and exploring low-carbon substitutes for emission-intensive basic materials. Simultaneously, the supply side emphasises the development of new industrial processes and enhancing energy efficiency, which reduces the carbon footprint of construction materials.

While countries often formulate their national strategies for transforming the buildings and construction materials sector, the need for harmonisation within the single market for a circular approach affects the long-term effectiveness beyond climate considerations. Achieving a more holistic approach across countries is crucial to maximise the impact of sustainability measures in the building and construction sectors.

Currently, there is no comprehensive strategy that addresses both demand- and supply-side challenges while integrating climate and energy policies with CE at both the EU and national levels. Decarbonisation strategies, National Climate and Energy Plans (NECPs), and CE transition roadmaps often cannot reflect the specific needs of the construction sector. Therefore, the DECON project aims to address the gap between CE and strategies related to decarbonisation aspects and sector-specific needs by assessing the disparity between climate and circular economy policies, identifying challenges, barriers, and both challenges at the national level within the building and construction materials sector. The project involves assessing the different levels of implementation of selected CE and climate strategies along the entire value chain, providing insights into the various practices and approaches. The DECON project defines the building and construction sector:

- Holistic activities related to the construction and maintenance of residential, commercial, heavy civil, industrial, and environmental buildings and infrastructure.<sup>5</sup>

<sup>1</sup> Ruddock, L. and Ruddock, S., (2008), *The scope of the construction sector: determining its value*, *In Economics for the modern built environment*, Routledge, pp. 99-113.

<sup>2</sup> European Environment Agency (2024), *Addressing the environmental and climate footprint of buildings*.

<sup>3</sup> Norouzi, M., Chàfer, M., Cabeza, L.F., Jiménez, L. and Boer, D., (2021), *Circular economy in the building and construction sector: A scientific evolution analysis*, *Journal of Building Engineering*, 44, pp.102-704.

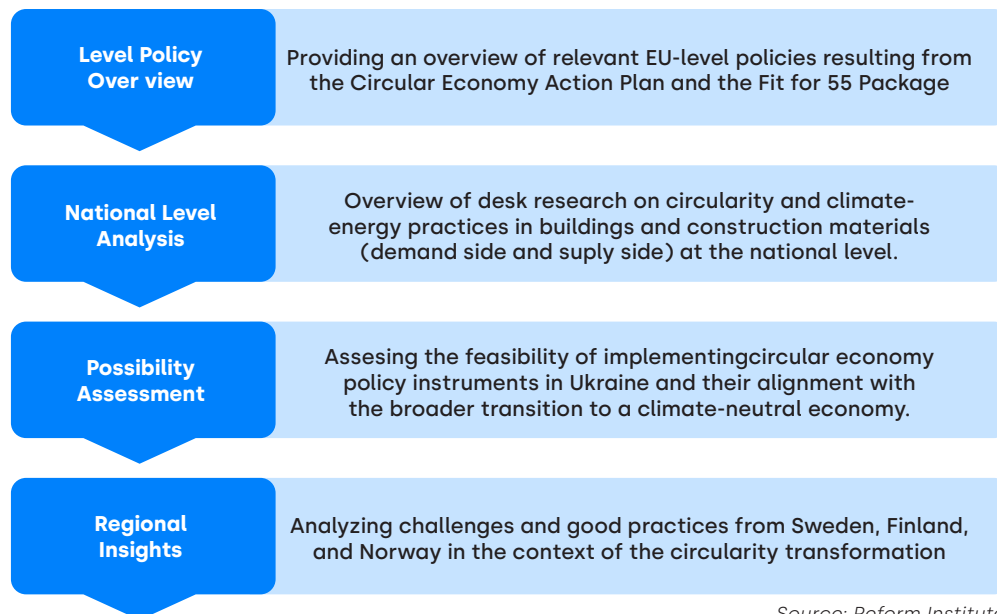
<sup>4</sup> Kylili, A. and Fokaides, P.A., (2017), *Policy trends for the sustainability assessment of construction materials: A review*, *Sustainable Cities and Society*, 35, pp.280-288.

<sup>5</sup> United Nations Environment Programme (2023), *Building Materials and the Climate: Constructing a New Future*.

- Production and consumption activities throughout the life cycle of buildings.
- In need of a focus on addressing climate change, resource efficiency, and circularity in all stages of the construction process.

The methodological steps used to develop this report are presented in Figure 1, outlining the combined use of desk research and stakeholder interviews conducted to generate findings and recommendations.

**Figure 1. An analytical framework for the DECON project.**



*Source: Reform Institute.*

Building on these activities, the report aims to assess how bridging the gap between linear and circular practices while aligning energy and climate policies can support the achievement of net-zero emissions in the building and construction materials sectors of Poland, Ukraine, and Denmark.

## 2. Decarbonisation Framework for a Circular and Climate-Energy Aligned Built Environment

### 2.1. Circularity Framework for Building and Construction Materials in the European Union

The first Circular Economy Action Plan (CEAP), published by the European Commission in 2015, was introduced to speed up the transition from a linear to a circular economy. It focused on legislative and non-legislative measures, such as sustainable consumption, production, and waste management. The second Circular Economy Action Plan (CEAP 2.0), published in March 2020 as part of the European Green Deal, aims to pursue Europe's new agenda for sustainable growth and continues to implement actions that support the decoupling of economic growth from resource consumption and waste generation.

The first CEAP introduced new frameworks for adopting the circularity approach but failed to address specific areas at the level of instruments and sectors, which are discussed in CEAP 2.0. The updated approach to circularity focuses primarily on several key actions, including setting recycling targets, enhancing the reuse of products, raw materials, and materials, raising consumer awareness, and implementing circular economy business models.

The key value chains that are defined as strategic for the circularity agenda are:

- electronics and ICT,
- batteries and vehicles,
- packaging, plastics, textiles,
- **construction and buildings,**
- food, water, and nutrients.

The primary aim of the CEAP 2.0 is for the EU to "*reduce its consumption footprint and double its circular material use rate over the next decade*".<sup>6</sup> The outlook to achieve that goal is challenging, but it has been steadily improving over the years.<sup>7</sup> One of the main sectors relevant for the circular economy—the building and construction material sector - is also one of the most resource- and energy-intensive parts of the economy, considering the entire value chain. Throughout its entire lifecycle, the building sector, which represents a key component of the construction industry, is responsible for half of the extracted materials, half of the total energy consumption, one-third of water consumption, and one-third of waste generation in the EU.<sup>8</sup>

<sup>6</sup> European Commission (2020), *Communication from the Commission: Circular economy action plan for a cleaner and more competitive Europe* (COM no. 98).

<sup>7</sup> European Environment Agency (2023), *Accelerating the circular economy in Europe — State and outlook 2024* (EEA Report 13/2023).

<sup>8</sup> Lindblom, J. (2022), *The whole life carbon roadmap*. Nordic Climate Forum for Construction.

The Circular Economy Action Plan 2.0, in the building and construction materials sector, primarily focuses on enhancing material efficiency throughout the entire lifecycle. In its initial phase, the **Eco-design for Sustainable Products Regulation** establishes the framework for digital product passports, aiming to provide both internal and external stakeholders with detailed information regarding product sustainability.

The specific requirements for the digital passport of construction products, including key information related to performance declarations, conformity, and technical specifications, will be developed under the proposed **Construction Product Regulation (CPR)**. The most significant proposed amendments to the CPR harmonise the market through various tools and instruments. These amendments introduce additional environmental obligations for manufacturers, such as the provision of product lifecycle environmental data and an emphasis on the sustainability of both information and actions. Measures will support those efforts and plans, such as green public procurement and introducing the digital passport for construction products.

The indirect alignment of the building and construction material are also connected within other legislation, such as:

- **Industrial Emission Directive 2.0**, which covers materials and energy-intensive industries from the building and construction material sector related to steel, cement, glass, and lime production. The revised directive aims, among other changes, to modify permit requirements and develop new strategies for promoting industry transformation through innovation.
- **Revised Waste Shipment Regulation**, which establishes procedure and monitoring framework for waste shipment to EU Member States, OECD countries, and non-OECD countries. The revised regulation primarily aims to lift the ban on the shipment of illegal waste and facilitate the transportation of waste for recycling and reuse, particularly for iron and steel scrap. Additionally, the ban on exporting plastic waste to non-OECD countries will significantly affect the building and construction sector, the second-largest producer of such waste.

Another important aspect of the end-of-life stage concerns the key indicator set by the **Waste Framework Directive** (2008/98/EC), which requires Member States to ensure that the preparation for reuse, recycling, and other material recovery of non-hazardous construction and demolition waste reaches 70% by weight by 2020. However, a significant issue with this target is that Member States have varying definitions of what constitutes construction and demolition waste. While most Member States have met this goal, it has often been through low-quality recovery practices,<sup>9</sup> which are not clearly defined at the EU level, particularly concerning the insufficiently defined concept of back-filling activities.<sup>10</sup> Despite these challenges, the European Commission should, based on the Renovation Wave Initiative, conduct a review in 2024 regarding the material recovery levels specified in EU legislation on construction and demolition waste.

The European Commission has published resources to support the achievement of its goals and also issued non-binding EU-level guidelines to promote best practices in construction and demolition waste management. These include the **Construction and Demolition Waste Management Protocol** and the **Guidelines for Audits Before Demolition of a Building**.

The main impacts that CEAP should have on the building and construction material sector are the following:

<sup>9</sup> European Environment Agency (2020), *Construction and demolition waste: Challenges*.

<sup>10</sup> Moschen-Schimek, J., Kasper, T., & Huber-Humer, M. (2023), *Critical review of the recovery rates of construction and demolition waste in the European Union—An analysis of influencing factors in selected EU countries*, Waste Management, 167, pp.150-164.

### 2.1.1. Ecodesign for Sustainable Products Regulation

**Status:** The regulation was published in the Official Journal of the EU on 18 July 2024.

**State of play before the reform:** The Ecodesign Directive 2009/125/EC is only related to energy-related products, prioritising the improvement of energy efficiency and reduction of energy consumption by end-users. The main issue with the Directive is its limited scope, as it only applies to energy-related construction products within the sector and does not adequately address environmental affects across the entire life cycle.

The key changes introduced by the reform:

- Implementation of the legal status change from a **Directive to a Regulation**, which is directly legally binding without requiring introduction by EU Member States.
- Prioritisation of **eco-design requirements for iron, steel, and aluminium** through a working plan, which shall be adapted by 19 April 2025.
- The setting of **eco-design requirements for cement** if the CPR does not provide effective decarbonisation mechanisms, with a delegated act to be published by the EC no earlier than 31 December 2028 and no later than 1 January 2030.
- Continuation of established **sustainability requirements for energy-related products**, including construction products such as heaters, boilers, heat pumps, water and space heating appliances, fans, cooling and ventilating systems, and photovoltaic products (excluding building-integrated photovoltaic panels).
- Implementation of the requirement for the **Digital Product Passport**.

### 2.1.2. Revised Construction Product Regulation

**Status:** The regulation was published in the Official Journal of the EU on 18 December 2024.

**State of play before the reform:** There are two main barriers to implementing the CPR. First, the standardisation process is ineffective, as highlighted by the fact that out of: *"444 existing harmonised standards for construction products, only 12 new standards were issued after the adoption of the CPR"*.<sup>11</sup> Second, there is a lack of environmental obligations throughout the entire value chain, which leads to inefficiencies in the use of raw materials.

<sup>11</sup> European Parliament (2021), *Implementation of the Construction Products Regulation*.

**The key changes introduced by the revision:**

- Development of **mandatory calculations of the environmental sustainability of construction products** based on Environmental Product Declarations (EPDs) or future applicable standards, with the EC to publish software within 1 year from the regulation's entry into force.
- Establishment of mandatory **minimum environmental sustainability requirements for public procurement of construction products**, to be launched by the European Commission from 31 December 2026.
- Establishment of **construction of a digital product passport system**, extending the digital product passport established through the Eco-design for Sustainable Products Regulation via delegated acts.
- Setting up specific **environmental sustainability labelling requirements** for product families and categories through delegated acts by the EC.

- Inclusion of **used and remanufactured products** in the regulation's definitions, potentially boosting recycling and reuse practices.
- Inclusion of **3D-printed products** in the definition of construction materials
- Implementation of a harmonised zone, which, for most construction materials, prevents the imposition of additional requirements beyond standardised norms at the EU Member States level.
- The inclusion of **additional sustainability requirements** is primarily related to resource efficiency, waste minimisation, and life cycle extension in the combined version of the **declaration of performance and conformity**.
- Provision a **fallback option** in case the European Standardisation Organisations do not deliver standards on time or at the required quality level, allowing the EC to draft harmonised standards in certain exceptional cases.
- Launch of an expert group ('the CPR Acquis Expert Group') to support the EC in the development of harmonised technical specifications.

### 2.1.3. Revised Industrial Emissions Directive

**Status:** The regulation was published in the Official Journal of the EU on 15 July 2024.

**State of play before the reform:** The Industrial Emissions Directive failed to fully address critical requirements related to resource efficiency and climate impact. The emission limit values were not set at the strictest levels, often resulting in installations that do not significantly minimise environmental harm. Furthermore, key aspects, such as decarbonisation, zero pollution, and a circular economy, were inadequately addressed in the IED, particularly in relation to permitting and installation development. For co-incineration plants, including cement plants, the regulation does not sufficiently cover emissions of PCDD/F and dioxin-like PCBs, especially during the start-up and shut-down phases, resulting in inconsistent controls.

**The key changes introduced by the revision:**

- **Development transformation plans for installation** related to steel, cement, glass, and lime production, targeting the years 2030 to 2050, aim to meet environmental policy objectives by 2050. The European Commission is required to publish the delegated act outlining the content of the plan by 30 June 2026, allowing economic operators to complete their plans by 30 June 2030 and integrate them into Environmental Management Systems.
- **Enhancement of the Environmental Management Systems** with additional requirements focusing on resource management, water, and waste while addressing risks associated with hazardous substances.
- Provision for **extensions of permit reviews** when necessary to accommodate **deep industrial transformations**, including the implementation of emerging techniques or best available technologies related to installations or technology, which lead to a reduction in greenhouse gas emissions.
- Extension of **monitoring the combustion plants** that are part of a small isolated system by the Member States until 31 December 2029 for pollutants like **sulphur dioxide, nitrogen oxides, and dust, or for desulphuration rates where applicable**.
- Enforcement by the competent authority of the most ambitious standards for emission limit values, ensuring alignment with the Emission levels associated

with **Best Available Techniques**, with the possibility of derogations under specific circumstances.

- Establishment of additional requirements to **protect drinking water resources**, including transboundary resources, and safeguard wastewater infrastructure.
- Inclusion of the Directive's scope to **include mining activities** related to bauxite, chromium, cobalt, copper, gold, iron, lead, lithium, manganese, nickel, palladium, platinum, tin, tungsten, and zinc.
- Inclusion of provisions for derogations from **emission limits and environmental performance** values during exceptional crises related to energy supply and access to resources, materials, and equipment.
- The establishment of a **European Innovation Centre for Industrial Transformation and Emissions** aims to speed up the adoption of clean technologies by assessing market demand, evaluating the maturity and environmental performance of these technologies, and removing barriers for both private and public investors.

#### 2.1.4. Revised Waste Shipment Regulation

**Status:** The regulation was published in the Official Journal of the EU on 30 April 2024

**State of play before the reform:** The regulation does not effectively manage the shipment of waste in an environmentally sustainable or circular manner. Three primary issues persist: waste shipments between EU Member States are often not directed towards recycling, waste exports from the EU to other countries frequently do not align with environmental standards, and illegal waste shipment practices remain prevalent.

**The key changes introduced by the revision:**

- **Simplification of waste shipments between EU Member States** through the digitalisation of procedures starting in May 2026, an easier process for granting pre-consented status to recovery facilities in Member States, and the harmonisation of waste classification by the EC through delegated acts.
- **Ban the export of plastic waste** to non-OECD countries starting in November 2026, with the possibility of exemptions five years after the regulation enters force.
- **Improvement of monitoring of waste exports** from the EU to other countries by requiring the party responsible for exporting the waste to verify that recovery facilities have undergone a third-party audit and enforce stricter oversight to ensure waste exports are managed in an environmentally sound manner
- Implementation of measures for **better monitoring of illegal waste shipments**, including the establishment of a Waste Shipment Enforcement Group and stronger alignment between the EC and national authorities to assess illegal shipments.

The success factor within the EU political framework lies in the establishment of mandatory legislative requirements for building and construction materials. However, a whole-life-cycle approach is the key to significantly enhancing circularity. Current priorities primarily focus on creating a more effective standardisation system, setting minimum environmental obligations for construction materials, improving support for innovation in the construction materials sector, and increasing the recycling of these materials.

The CPR is the primary legislation driving the circularity agenda in the construction sector. It implements minimum environmental obligations for construction products and aims to establish a sustainable ecosystem while eliminating technical barriers to the free movement of these products within the EU market. However, EU Member States are at different stages concerning mandatory and voluntary standards related to green public procurement, environmental product declarations, labelling systems, and harmonisation of national rules. This presents challenges in applying these rules consistently across the EU.

Moreover, economic operators often face difficulties in fully complying with the current requirements of the CPR.<sup>12</sup> As a result, it is essential to plan, implement, and monitor actions, as well as develop infrastructure that supports the future development of the system.

At the operational level, the CEAP 2.0 introduces new requirements that directly and indirectly impact construction products. For instance, the revision of the IED promotes better resource efficiency, aligning with climate and circularity objectives. Long-term transformation plans for sectors such as steel, cement, glass, and lime production, targeting the period from 2030 to 2050, are expected to align with the goals of the Fit for 55 package.

At the end-of-life stage, following the revision of the Waste Shipment Regulation, iron and steel scraps offer significant potential for reuse and recycling in construction products, which could have a positive impact on the sector. Additionally, the ban on exporting plastic waste to non-OECD countries presents a significant challenge for the building and construction materials sector. In 2022, the EU exported approximately 1 million tonnes of plastic waste,<sup>13</sup> with the construction industry being a major contributor to this export volume.

## 2.2. Climate and Energy Package for Building and Construction Materials in the European Union

"Fit for 55" is a legislative package that updates and introduces several climate and energy policies of the European Union. It aims to reduce greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. This plan is part of the European Green Deal, a comprehensive set of initiatives aimed at achieving climate neutrality by 2050, alongside initiatives such as the Circular Economy Action Plan and the Renovation Wave Strategy.

Fit for 55 measures regulate renewable energy and fuels, energy efficiency, cleaner buildings and transport, and carbon pricing. The idea is to shift Europe towards a low-carbon economy while maintaining its competitiveness and supporting a just transition for businesses and workers. Fit for 55 reforms relevant to the project include:

- An extension of the **Emissions Trading System (ETS)** is planned, along with the creation of a second ETS (ETS2) for the transport and building sectors.
- **The creation of a Carbon Border Adjustment Mechanism** will put a price on the embedded emissions of imports of concrete, iron and steel, aluminium, and several other commodities.
- **Revised Renewable Energy Directive:** increasing overall renewable share targets, introducing sectoral targets for RES, hydrogen and alternative fuels, and tightening of sourcing rules for biomass use in energy.
- **Revised Energy Efficiency Directive:** further decrease in energy consumption targets, renovation targets for buildings, tightening of large companies' report-

<sup>12</sup> European Commission (2020), *Refined indicative options for the review of the Construction Products Regulation*.

<sup>13</sup> European Environment Agency (2024), *Drivers of EU plastic waste exports* (ETC/CE Report 2/2024).

ing, and energy management rules.

- **Revised Energy Performance of Buildings Directive:** energy performance targets for 2030 and 2035, new energy standards for EU's existing and newly built building stock.
- **Introduction of new and reinforcement of existing funding instruments supporting new goals:** Innovation Fund, Modernisation Fund, Social Climate Fund and Just Transition Fund.

Fit for 55 represents a significant step forward in the EU's green transition compared to previous goals. For 2020, the EU proposed the target of "three twenties":

- 20% reduction in GHG emissions
- 20% share of renewables
- 20% increase in energy efficiency

Emissions reduction and RES share targets were achieved (31% reduction and 22.1%). Still, energy efficiency targets fell short of the goal by approximately 5% in both primary and final energy consumption despite the economic slowdown caused by the COVID-19 pandemic. Before the Fit for 55 package was adopted, the European Union had set the following targets for 2030:

- Emission reduction: 40% compared to 1990 levels.
- Energy efficiency: 32.5% compared to the 2007 reference scenario.
- Renewable energy: 32% share of renewable energy in the energy mix.

Fit for 55, updated in 2022 by REPowerEU emergency response to the full-scale Russian invasion of Ukraine, increases these targets to, respectively:

- Emission reduction: 55% compared to 1990 levels.
- Energy efficiency: 39% (primary consumption) and 36% (final consumption) compared to the 2020 reference scenario.
- Renewable energy: 42.5% (45% as indicative target) share of renewable energy in the energy mix.

The main impacts that Fit for 55 should have on the construction material sector are:

### 2.2.1. ETS reinforcement and extension

**Status:** The final acts were published in the Official Journal on 16 May 2023.

**State of play before the reform:** Emission-intensive industrial plants currently receive 80% of free allowances for installations (the rest allocated mostly to district heating) under the carbon leakage protection provisions. However, already in 2021, the total amount of free allowances allocated for cement producers was lower than the total emissions from the sector.<sup>14</sup> At the same time, these industries generate approximately 21% of EU total GHG emissions.<sup>15</sup> With emission values for materials such as steel and cement oscillating, respectively, around 1.8-3 tonnes and 0.8-1.3 tonnes of CO<sub>2</sub> eq/ton of product,<sup>16</sup> construction material industries are vulnerable to changes in the supply of free allowances.

Before Fit for 55, subsequent phases of the ETS gradually tightened the system by decreasing the total allowance cap and increasing the linear factor of the annual reduction in the cap. Phase 4 of the ETS set the linear factor at 2.2% per year, extended the ETS to the aviation sector (with a generous free allocation mechanism), and introduced

<sup>14</sup> Climate Bonds Initiative (2023), *Concrete policies to underpin the cement transition*.

<sup>15</sup> Eurostat (2023), *EU construction industry statistics*.

<sup>16</sup> Joint Research Centre (2023), *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners* (JRC Technical Report No. JRC134682).

a benchmark for free allocation based on the average performance of the 10% best installations, sectoral risk of carbon leakage, and the installation's historical performance.

#### The key changes introduced by the revision:

- Inclusion of an **increased emission reduction target** for the covered sectors—from **43% to 62% compared to 2005 levels**. This target is accompanied by an adjusted trajectory of the linear factor -annual reduction in the overall cap of emission allowances on the market—from **2.2% to 4.3% from 2024 to 2027 and to 4.4% from 2028 to 2030**.
- A gradual phaseout of free allowances allocations is enacted for covered industries. This will occur from 2026 to 2034, with free allowances being replaced by the CBAM. Thus, energy-intensive industries, including producers of construction materials, will face increased costs of their carbon emissions, with less allowances available on the market and prices accordingly rising.
- The inclusion of the **extension of ETS to maritime transport** (2024-2026) to eventually cover 100% of the sector's emissions will most likely affect the costs of shipping produce, especially on long distances
- Continuation of prevention of uncontrolled price spikes on allowances, a market stability reserve of no more than 400 mln allowances.

### 2.2.2. ETS 2—buildings, road transport and small industry

**Status:** The final acts were published in the Official Journal on 16 May 2023.

**State of play before the reform:** The 30% of heating-related building emissions are included in the EU ETS because of the inclusion of district heating and electric heating.<sup>17</sup> Before the introduction of ETS2, direct use of fossil fuels in buildings was not covered by any EU-wide carbon pricing mechanism. Similarly, small industrial facilities were also excluded from EU ETS.

From 2027, ETS2 shall cover all fuel suppliers to the sector and thus—even if indirectly—eventually include 100% of the sector's emissions.

#### The key changes introduced by the reform:

- Implementation of **ETS2 for road transport**, which will increase decarbonisation pressure on covered businesses, requiring them to modernise their machine parks. Increased road transport costs, at least initially, could indirectly affect construction material producers that are dependent on road transport.
- Inclusion of fuel-related emissions from small industries will lead to small-scale producers of construction materials and other participants in construction value chains facing increased operating costs and, consequently—increased pressure to decarbonise, which might be difficult for companies with small capacity for investment and R&D (it should be noted that emissions from industrial processes of such entities are not to be covered under existing ETS2 rules)
- Support large-scale renovation efforts, initially focused primarily on heating and cooling. However, in the long term, building design, specifications, and materials are likely to change to minimise emissions.

<sup>17</sup> European Commission (2020), *Renovation wave for Europe – Greening buildings, creating jobs, improving lives* (COM no. 662).

### 2.2.3. Carbon Border Adjustment Mechanism

**Status:** The final acts were published in the Official Journal on 16 May 2023.

**Currently:** Most of steel and cement imports to the EU are not covered by any carbon pricing schemes in their countries of origin.

With steel product emissions of 1.8-3 tonnes of CO<sub>2</sub> eq/ton of product, the EU steel industry is well-positioned to benefit from CBAM phase-in, as most importers exceed this range (with notable and competitive exceptions, such as the US). In the cement industry, such differences are significantly smaller between the EU and importers, with most countries falling within the EU emissions range (0.8-1.3 tonnes of CO<sub>2</sub> eq/ton of product).

In 2022, imports of finished steel products to the EU stood at 28.9 million tonnes of, with non-EU European states (Russia, Ukraine), Turkey and Asia as leading suppliers. Total exports from the EU reached 16.6 million tonnes, with non-EU Europe and North and Central America as top destinations.<sup>18</sup> Production of crude steel was 136 mln tonnes, and of hot rolled steel—125 million tonnes. Real consumption reached 147 million tonnes.<sup>19</sup>

In 2022, cement and clinker imports to the EU exceeded 10 mln tonnes after a period of significant (approximately 300%) growth from 2016,<sup>20</sup> while its exports decreased significantly to around 12 mln tonnes compared to nearly 25 mln tonnes in 2016. Currently, Turkey, Algeria and Ukraine are the three largest importers, with Turkey and Ukraine declaring the intent to align with CBAM. The UK and US were the primary recipients of EU exports. EU27 production stood at around 176 million tonnes, and consumption – at 163.4 million tonnes.<sup>21</sup>

There is more mobility in the EU's international trade in steel than in cement, which is easily explained by the respective nature of these goods, making steel transport a logistically easier task compared to cement, which is easier consumed locally.

#### The key assumptions:

- Increase in **emissions reporting** duties and **emission costs** imposed by **CBAM on cement, steel, and aluminium importers to the EU**
- Inclusion of **the energy and hydrogen imports**, which might affect the increase of the energy bill for companies that rely on (or plan to switch to) the imported carbon-intensive electricity and hydrogen
- The introduction of CBAM, combined with a tightening of the EU ETS, will create a simultaneous price signal for both the supply and demand sides. Producers of high-emission goods will see their operating costs increasing and will be incentivised either to decarbonise or to transfer the additional costs to the buyers. The latter, however, will lose the opportunity to avoid such increased costs by switching to imported materials due to CBAM. In the long run, this shall mean that there would be no easy escape from the cost of GHG emissions other than to decarbonise, including via demand-side solutions (e.g. increased circularity, less resource-intensive designs, material substitution).

By introducing emissions reporting duties and—effectively—a carbon tax on cement, steel and aluminium importers to the EU, CBAM shall level the playing field for EU's domestic producers of said commodities and mitigate to some extent the impact of reinforced ETS. Still, to fully leverage the benefits of CBAM, EU producers should strive to offer greener construction materials than their competitors outside the single market.

<sup>18</sup> European Steel Association (2023), *European steel in figures 2023*.

<sup>19</sup> Ibidem.

<sup>20</sup> Cembureau (2022), *EU cement industry trade statistics 2022*.

<sup>21</sup> Cembureau (2023), *Activity report 2023*.

### 2.2.4. Revised Renewable Energy Directive

**Status:** The final acts were published in the Official Journal on 31 October 2023.

**State of play before the reform:** Renewable energy share in heating and cooling stood at around 24.8% in 2022 (EU average).<sup>22</sup> The exact numbers for the industrial sector are harder to access, but it is assumed at no more than the 23% average total share of RES and likely much smaller in some EU-28 countries (the global average for the industry was at 16.8% in 2021).<sup>23</sup>

<sup>22</sup> Eurostat (2024), *EU energy efficiency targets*.

<sup>23</sup> REN21 (2023), *Global status report: Energy demand*.

Before Fit for 55, there were no industry-specific targets in RED (then, so-called RED II). The overall target for a renewable share in energy use was at 32%. Regulation of hydrogen was limited mostly to defining its place within the concept of Renewable Fuels of Non-Biological Origin (RFNBOs).

**The key changes introduced by the revision:**

- The overall target under RED III is for the EU to achieve a 42.5% share of energy from renewable sources by 2030, with an additional 2.5% indicative top-up. In industry specifically, it sets an **indicative target of a 1.6 percentage point annual increase in the share of renewable energy used by the industry by 2030**. This should encourage Member States to devise policies that incentivise industry to switch to renewable sources for power generation and fuel their industrial processes. On the other hand, the Directive requires Member States to streamline their permitting procedures for renewable investments, which should facilitate the deployment of new-generation facilities.
- Inclusion of a target for industry to achieve **at least 42% of its hydrogen use from renewable sources by 2030 and at least 60% by 2035**. This target is particularly relevant for sectors that rely on hydrogen for high-temperature processes, such as steel, cement, and chemical industries. It pushes industries to switch from fossil-fuel-derived hydrogen (often called "grey hydrogen") to renewable hydrogen (also known as green hydrogen) produced from water electrolysis powered by renewable energy or to "pink" and "purple" hydrogen-powered by nuclear energy, which can be considered "low-carbon" under Hydrogen Delegated Acts.
- Introduction of the **cascading principle of biomass** use, i.e. prioritising the highest-value uses (construction, production of durable goods and materials), recycle and reuse, and only as a last resort - energy production. This will require any companies reliant on biomass for their energy generation to review their practices and supply sources, likely leading to a decrease of biomass role in decarbonising energy generation. The principle should increase the role of lumber as a construction material and render it more competitive than before, at least in some applications.
- Provisions for **facilitation of energy system integration**—in particular in the area of data gathering and management

### 2.2.5. Revised Energy Efficiency Directive

**Status:** The final acts were published in the Official Journal on 20 September 2023.

**State of play before the reform:** Energy-intensive industries are believed to have exhausted most of the easily accessible energy efficiency-related means of reducing GHG emissions. Further progress will require the modernisation of fundamental industrial processes, significant investments, the modernisation of both process design and relevant facilities and machinery, as well as technological innovations.

In the cement industry, the key area for increasing efficiency and reducing emissions is thermal energy. Up to 80% of the total energy consumed in the production plant is thermal energy.<sup>24</sup> Consequently, most of the progress has been achieved by fuel substitution in heat generation. The co-processing of waste, using biomass and alternative fuels, has increased over the last 30 years, especially in clinker production. 40% of the heat used in the process is sourced from biomass (though the cascading principle of RED will probably require the review of sourcing practices), the consumption of alternative fuels in the EU rose from 1 million tonnes in 1990 to 11 million tonnes in 2015, and up to 65% of combustible matter used comes from waste.<sup>25</sup>

Before Fit for 55, the overall energy savings target stood at 32.5% by 2030 compared to the 2007 reference scenario, with an annual target of final energy consumption savings at 0.8% for the period 2021-2030.<sup>26</sup>

#### The key changes introduced by the revision:

- Inclusion of the binding requirement for Member States to collectively reach an 11.7% reduction in energy consumption by 2030 (compared to the 2020 Reference Scenario), which means a total EU consumption of 992.5 million tonnes of oil equivalent (Mtoe) for primary energy and 763 Mtoe for final energy by 2030. An annual energy savings trajectory is also established, with a target of 1.9% per year for the 2028-2030 period. Energy-intensive industries will need to take part in these efforts.
- Inclusion of the requirement for Member States to renovate 3% of the floor area of all public buildings annually. Combined with the EPBD and Renovation Wave Strategy, this will increase demand for construction materials across the continent, particularly for low-carbon and energy-efficient materials.
- Introduction of the principle of "energy efficiency first" or "energy efficiency as the first fuel". This means that in every investment, energy efficiency measures should take priority before other options, such as increasing energy production or building new energy infrastructure. This logic will also need to apply to industrial plans and investments.
- Inclusion of the requirement for large companies (including those in the construction materials industry) to conduct energy audits at least every four years or implement an energy management system.

#### 2.2.6. Revised Energy Performance of Buildings Directive

**Status:** The final acts were published in the Official Journal on 8 May 2024.

**State of play before the reform:** According to the assessment of the Commission, approximately 75% of the EU's building stock is lacking in energy efficiency. The Renovation Wave Strategy estimates the potential scale of necessary renovation efforts at 35 million buildings across the EU by 2030.

Before Fit for 55, the EPBD lacked strong mandatory renovation targets and a clear commitment to zero-emission building standards by 2030, as well as a duty to and guidance on how to establish Minimum Energy Performance Standards and instruments to track and report the state of the building stock.

#### The key changes introduced by the reform:

- Inclusion of the requirement for Member States to decrease the average energy performance of the national residential building stock by 16% by 2030 (in comparison to 2020), and by up to 22% by 2035, with the priority to renovate the least efficient buildings

<sup>24</sup> European Environment Agency (2023), *Waste export analysis*.

<sup>25</sup> Cembureau (2023), *Energy efficiency in the cement sector*.

<sup>26</sup> Directive (EU) 2023/1791, available [here](#).

- Introduction of similar targets, alongside **Minimum Energy Performance Standards** for non-residential building stock
- The requirement is that all new buildings in the EU comply with the **standard of a Zero Emission Building** (primarily, zero on-site emissions from fossil fuels), starting from 2028 for public buildings and from 2030 for all other new buildings.
- An increased focus on **lifecycle analysis of the carbon footprint** of buildings via tools like Digital Building Logbooks can pave the way for more systematic tracking of emissions related to the construction itself in the long term. Combination of EED with the Renovation Wave Strategy, which shall increase demand for construction materials across the continent, in particular for low-carbon and optimised for energy efficiency.

### 2.2.7. Additional funding for decarbonisation

- **Innovation Fund (IF)** – was already an instrument for reinvesting ETS revenue in projects that reduce carbon emissions. IF funds can be used to i.e., deploy renewable energy sources, carbon capture, usage and storage facilities (CCUS), innovative low-carbon technologies, and energy storage measures. Funding will be increased by an additional 125 million euros of allowances from extended ETS and ETS2, which should result in a total of EUR 40 billion available for the 2020-2030 period. However, it should be noted that with new sectors included in ETS (maritime, aviation) and the principle of competitive bidding being reinforced, the allocation of IF funds might become more competitive.
- **Modernisation Fund** – established in accordance with the ETS Directive and funded with EUR 57 billion from the ETS for 2021-2030, it will support investments in renewable energy, energy efficiency, energy storage, energy networks, and a just transition in carbon-dependent regions. MF's territorial scope will be limited to 13 Member States – Portugal, Greece, and the countries of the 2004, 2007, and 2013 enlargements (except Cyprus and Malta), with Poland being the single largest beneficiary.
- **Social Climate Fund and Just Transition Fund** – both these funds aim to address and mitigate the socio-economic side effects of green transition, though they target different issues (with SCF focusing on vulnerable households and microenterprises and JTF–on vulnerable territories). Large companies can benefit from these to some extent where the transformation of existing carbon-intensive installations can lead to substantial emission cuts and job protection, especially (under JTF) in regions reliant on energy-intensive industries, – provided that regional authorities direct the funding towards industrial projects.
- Additional revenues from ETS and ETS2, which Member States should direct towards decarbonisation efforts

## 2.3. Pathways Toward a Circular and Climate-Energy Aligned Built Environment

Fit for 55 significantly accelerates the rate of green transition to achieve the updated 2030 goals. It provides financial support to compensate for the increased effort; however, achieving its targets will require the Member States to overhaul their respective policies in the areas of energy, industry, and housing and to transition towards a more integrated and circular energy system model. Incorporating the visions outlined in the Circular Economy Action Plan and the EU strategy on energy system integration will be essential to building cohesive, sustainable systems of energy generation, transmission, and use.

Fit for 55 revolutionises the industry, impacting both construction materials producers and the building sector. It causes changes in manufacturing processes, as well as in building design and specifications. Thus, the construction industry, including material producers, needs to prepare not only for increased intake of RES and greening of their industrial processes but also to focus on changes on the demand side.

The Fit for 55 package and CEAP 2.0 are key policy milestones in fulfilling the objectives of the European Green Deal in the fight against climate change. While CEAP 2.0 establishes rules for key value chains to extend the lifetime of products, materials, and raw materials while minimising waste, Fit for 55 focuses more on creating a framework that reduces emissions and supports energy transition (Table 1). In the case of CEAP, the primary goal of its implementation is twofold: on the one hand, it seeks to increase production costs associated with the linear economy (e.g., restrictions on waste exports outside the EU and recycling and waste recovery targets). On the other hand, it aims to lower non-financial barriers to the circular economy (e.g., implementing low-emission standards, developing new business models, and increasing consumer awareness). The shift towards a circular economy model can significantly influence the climate agenda by shaping demand for high-quality recycled and reused materials. At the same time, on the supply side, it imposes organisational and production restrictions on the linear production model. This could influence the climate-energy area mainly by reducing greenhouse gas emissions from material production, i.e., in the case of steel, plastics, aluminium, and cement, a circular approach might reduce those emissions by 56%.<sup>27</sup> Currently, the construction sector accounts for 30% of the European carbon footprint,<sup>28</sup> therefore, it is a primary focus for the climate-energy and circularity agenda.

The CEAP 2.0 initiates the first phase of implementing climate and energy policies by addressing resource scarcity and laying the foundation for the future operation of buildings (Table 1). It introduces tools designed to manage both primary production and end-of-life stages, with a key focus on enhancing data transparency and establishing a unified system for environmental assessment. These efforts extend to the operation and renovation of buildings, where the Fit for 55 package introduces measures to enhance energy efficiency and promote sustainable renovation practices.

<sup>27</sup> Material Economics (2018), *The circular economy: A powerful force for climate mitigation*.

<sup>28</sup> European Commission (2022), *The reference document for the construction sector*.

**Table 1. A Comparison of the Circular Economy Action Plan 2.0 and Fit for 55.**

Aspect	Circular Economy Action Plan	Fit for 55
<b>Main Goal</b>	Reduce the consumption footprint and double the circular material use rate within the next decade.	Reduce greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.
<b>Decoupling Economic Growth From</b>	Resource consumption and waste generation.	Greenhouse gas emissions.
<b>Key Areas</b>	Electronics and ICT, batteries and vehicles, packaging, plastics, textiles, construction and buildings, vehicles, food, water, and nutrients.	Renewable energy and fuels, energy efficiency, buildings and transport.
<b>Primary Goal in the Building and Construction Sector</b>	Improve the sustainability performance of construction products.	Increase energy efficiency and promote building renovations, as well as the development of zero-emission energy carriers.
<b>Main Policy Instruments in the Building and Construction Sector</b>	Digital product passport, green public procurement, mandatory targets for construction and demolition waste.	Carbon pricing and revenue recycling, mandatory energy efficiency targets, whole-life carbon emissions tracking.

Source: Reform Institute

The synergies between the CEAP 2.0 and the Fit for 55 package aim to establish a sustainable framework for construction products and reduce carbon emissions from buildings. However, their success depends on future legislative actions, the adoption of delegated acts, and the active engagement of key stakeholders, particularly policymakers, as well as representatives from administrative and business sectors. Based on an overview of these two environmental agendas, the main synergies include:

- **Harmonisation of market rules**, especially regarding the calculation of the environmental performance of construction materials, which supports the future standards needed for implementing the EED and the EPBD.
- **Promotion of low-carbon construction materials** through a carbon pricing regime, aimed at enhancing the efficiency of material use by encouraging high-quality recycling and reuse practices.

### Whole life cycle perspective

The new approach to assessing the environmental footprint of construction and buildings aims to address the holistic flow of materials and energy within the sector. In the first stage, the digital product passport introduced by the Ecodesign for Sustainable Products Regulation aims to increase transparency related to the product and display information from material extraction and production through to the end-of-life stage. In the second stage, the Construction Product Regulation will establish a system that connects to display data regarding declarations of performance and conformity, as well as technical specifications, which will include assessments of the environmental sustainability of construction products. Those assessments will be calculated based on software published by the European Commission, which will be based on EPDs or future applicable standards. However, the approach to developing life cycle assessments for construction products is diverse on the EU level. Some countries have already developed regulations and introduced mandatory declarations; however, in others, it is voluntary, and there are no databases that provide a baseline for the life cycle assessment of construction products.

Data accuracy affects reporting schemes and indicators for whole-life carbon emissions, as mandated by EPBD. The European Commission should publish the calculation framework for whole-life carbon by the end of 2025. The EU's approach to measuring embodied and operational emissions throughout the building life cycle will significantly influence how construction materials are considered within the calculation. One of the most crucial factors is embodied emissions, which account for 50–75% of the total annual carbon emissions in the building sector. These emissions are associated with the extraction, manufacturing, and production of building materials, as well as transportation and construction activities.<sup>29</sup> The materials used in buildings have a significant impact on embodied carbon emissions.<sup>30</sup>

Additionally, the whole-life cycle perspective of construction materials and buildings will also impact the renovation activities. Based on the first stage, this will influence circularity, resource efficiency, and climate and energy indicators during construction implementation, as well as in the second stage, during the building's lifecycle. This is particularly crucial from the perspective of the Renovation Wave initiative, which aims to at least double the annual energy renovation rate by 2030.

### Promotion of low-carbon construction materials

The mechanisms introduced by the Fit for 55 Package, based on the EU carbon pricing regime, are expected to increase the costs of producing and using primary high-emission

<sup>29</sup> Su, S., Zang, Z., Yuan, J., Pan, X. and Shan, M., 2024, *Considering critical building materials for embodied carbon emissions in buildings: A machine learning-based prediction model and tool*, Case Studies in Construction Materials, 20, e02887.

<sup>30</sup> Ibidem.

construction materials for end-users. This could support recycling and reuse practices, as well as the avoidance of incineration, landfills, and the production of primary materials. At both the product and operational levels, the focus extends beyond different life cycle stages to the impact these measures have on the adoption of decarbonisation strategies for construction materials.

From the demand-side perspective, these strategies may increase material efficiency through the use of alternative materials, recycling and recovery mechanisms, eco-design principles, and the expansion of material sharing within the construction sector, as well as growth in the sharing economy and related services. From a supply-side perspective, these actions may lead to the decarbonisation of production across the life cycle through measures such as CCU/CCS, life cycle assessment, the application of low-emission production technologies, and the verification of environmental technologies.

Additionally, the carbon pricing mechanism may accelerate the adoption of circular economy business models, particularly those based on industrial symbiosis, product-as-a-service models, and extending product lifetimes.

At the end-of-life stage for construction and demolition waste, carbon pricing mechanisms could influence the implementation of high-quality reuse and recycling operations. The EU largely relies on backfilling operations,<sup>31</sup> which do not contribute to the recovery of high-value resources.

Furthermore, for construction materials based on a linear approach, the CBAM will increase the costs of high-carbon imports from outside the EU. This should help level the playing field for more sustainable materials produced within the EU. The implementation of environmental footprint requirements will also play a critical role in ensuring the effectiveness of these instruments, helping the EU market avoid misleading practices related to environmental labelling.

<sup>31</sup> European Environment Agency (2020), *Construction and demolition waste: challenges and opportunities in a circular economy*.

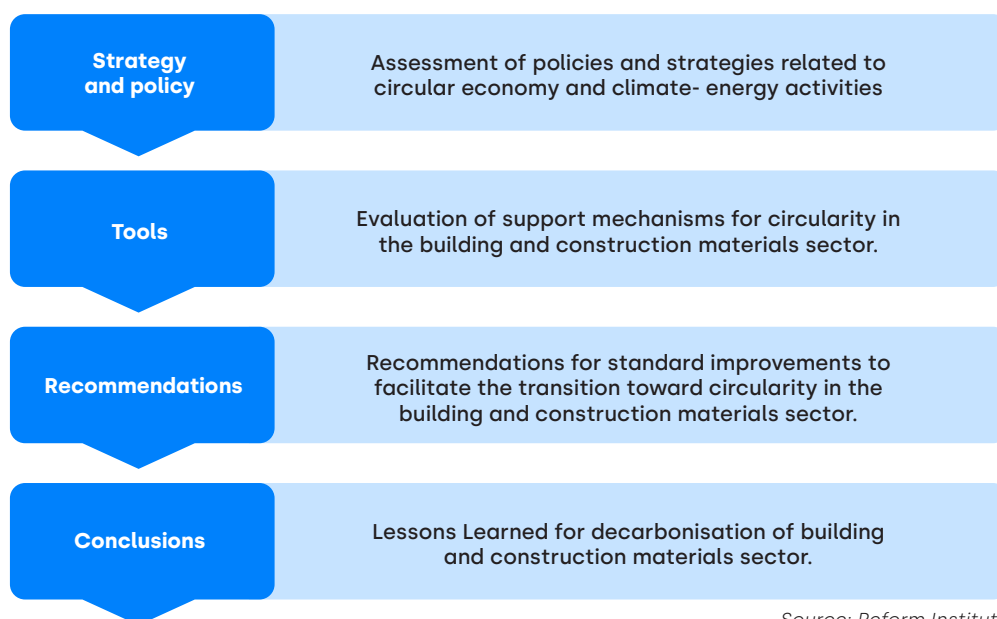
### 3. Framework conditions for decarbonisation of the building and construction materials sector

The number of legislative requirements stemming from climate-energy and circularity policies that EU Member States, including Denmark and Poland, must adopt is steadily increasing. Nevertheless, these countries also develop their own legislative and non-legislative instruments to establish frameworks for the building and construction materials sector. Despite these efforts, significant challenges introduced by the CEAP 2.0 and the Fit for 55 package remain a challenge for both Denmark and Poland.

In contrast, Ukraine is not directly bound by these EU requirements. However, it is proactively implementing similar obligations by developing national frameworks that align with EU standards.

The methodological approach behind this research combined desk research and interviews to evaluate circularity actions at the national level, as well as climate and energy initiatives, in order to assess the decarbonisation potential of the countries studied in the building and construction materials sector (Figure 2).

**Figure 2. Methodological Framework for Assessing Circularity and Decarbonisation in the Building and Construction Materials Sector**



Source: Reform Institute

As a result of the research, improvements to the tools and lessons learned were proposed to help accelerate the sector's transformation.

### 3.1. Denmark

#### 3.1.1. Strategy & Policy

There are no concrete goals for the circular economy in the building and construction sector in Denmark. Circular economy policies in Denmark primarily focus on waste reduction. Launched in 2021, the Action Plan for Circular Economy (APCE) is the political document guiding the circular economy. The Action Plan is anchored in the Ministry of Environment and has three areas of focus for a circular economy in Denmark: biomass, construction and plastic. The three main targets of the action plan are:

1. The waste sector must be climate neutral by 2030.
2. Less garbage, less waste and more resource efficiency.
3. 80% reduction in incinerated plastic in Denmark.

The aim of the APCE is to provide a plan for the prevention and management of waste for 2020-2032. The plan will be updated every six years, and the implementation period will be extended accordingly. The targets in the current action plan vary in specificity and commitment. The plan includes some concrete targets, such as the first one. Other targets are broad and qualitative, i.e. outline a general vision but provide no concrete details on how to achieve it.

An example of this is the second target. The political focus in the action plan does not have concrete targets that measure resource efficiency or focus on reducing resource consumption. Several of the targets, such as increasing the recycling of municipal waste, come from Denmark's commitment to EU targets. In the context of buildings and construction, the action plan aims to reduce the environmental impact from buildings and their demolition. This will be done by addressing material consumption in the building sector, building design, renovation and maintenance, as well as better waste management. Since the announcement of this action plan, there has been few formal implementations of concrete political goals for the reduction in waste.

In 2022, there was a spin off to the Danish APCE called **Climate Plan for a Green Waste Sector and Circular Economy** as an agreement between the government and supporting parties, with the addition of 3 new targets:

- I. Fixing of the deadline for the collection of textile waste
- II. Strengthened waste supervision and streamlined practices
- III. Robust regulation of the waste fee

However, the implementation of the targets has yet to be put into new regulations.

As an EU member state, Denmark is committed to the **EU CEAP** and must work to implement its policies through national legislation and funding. Denmark is currently preparing for upcoming EU circular economy rules such as Ecodesign for Sustainable products, digital product passports, and stricter waste prevention targets. The construction sector will also have to prepare for other EU regulations on the pipeline that will supplement the EU CEAP, such as the revision of the Construction Products Regulation, as well as the **Taxonomy for Sustainable Activities**.

The Danish **Waste Framework (Affaldsbekendtgørelsen)** lays out detailed rules on the sorting and management of waste and is tied to the **EU Waste Directive**. The frame-

work establishes a waste hierarchy for Denmark, taken from the directive. Currently, this framework has strict requirements for classifying waste as a valuable and potential new building material. Part of these requirements is that there "exists a market or demand after such a substance or such an object." The EU directive establishes **End-of-Waste criteria** for specific materials, including iron, steel, etc. However, for materials without defined criteria, member countries are responsible for setting their own, which Denmark has not yet done.

A new **Law on Selective Demolition** that addresses a circular economy has entered into force and will have full effect from July 1, 2025. Selective demolition refers to the process of carefully dismantling buildings in a way that allows for the reuse, recycling or repurposing of materials, rather than demolishing everything and sending waste to landfills. The aim of this law is to minimize waste and maximize the amount of reusable and recyclable materials that are recovered. The main requirements of this law are:

1. A standardized demolition plan must be carried out when buildings over 250 m<sup>2</sup> are to be completely demolished. This plan must include environmental and resource mapping.
2. An environmental and resource coordinator must be attached to the project to ensure proper handling of materials and waste.
3. Demolition firms that conduct demolitions of buildings over 250 m<sup>2</sup> must be authorized by the Danish Environmental Protection Agency. Private actors are not allowed to demolish buildings of this size without authorization.

While this is a significant step towards facilitating the circular economy in the sector, certain actors believe that the law should be extended to cover buildings of all sizes. The law also does not cover partial demolitions.

In addition to the law above, Denmark follows the **ISO standard "design for disassembly and adaptation"**, which lays out guidelines for how buildings should be designed and constructed so the value of materials is maintained. The standards include 10 design principles meant to facilitate the separation, reuse, and recycling of building components.

In contrast to circular economy policies, the Danish climate and energy efforts are comprehensive and show a high level of commitment, with tangible targets and explicit regulation. Historically, this inclination towards energy savings and energy transition has its roots in the 1970s, where Denmark was affected greatly by the oil crisis and, as a result, attempted to reduce dependency on oil. In the 1990s, there was a focus on reducing energy consumption and handling greenhouse gases through international cooperation, followed by an increased focus on renewable energy and climate in the 2000 and 2010s. The focus on efficient resource use and green transition of society – a more circular interest - has increased in recent years.

The main document guiding recent climate efforts is the **Climate Act** enacted in 2020. This law implemented two national climate goals:

- 70% CO<sub>2</sub>e reduction by 2030 (from 1990 levels)
- Climate neutrality by 2050

The path to meeting the 2030 and 2050 goals includes a plan of quadrupling renewable energy capacity by 2030, and the introduction of carbon taxes for industry and agriculture, among other things. The current Danish government has announced a target of becoming climate neutral in 2045, which is a further tightening of the climate neutrality target by 2050 of the Climate Act. However, this has not formally been implemented in the Climate Act or other binding documents yet.

The building and construction sectors are subject to comprehensive regulation and targets to drive their decarbonisation to meet the national climate targets. These policies focus on minimizing energy consumption, improving energy efficiency, and reducing CO<sub>2</sub> emissions. The primary drivers for this are the **Building Code Regulation (BR18)**, and the **National Strategy for Sustainable Construction**. The strategy sets goals for sustainability in the sector, and BR18 translates these goals to concrete requirements and regulations.

**BR18** includes **LCA-requirements** (expanded on in the next section) and sets high **standards for the building's overall climate impact and energy efficiency requirements**. This includes, among other things, mandates for heating, insulation, and ventilation, ensuring a sustainable energy supply, limits for CO<sub>2</sub> Emissions per square meter in new buildings, waste management, as well as strict requirements for energy consumption in new buildings. An aspect of circular economy in the **BR18** stipulates that reused and recycled materials must live up to the same requirements as new materials to ensure the quality, sustainability, and safety of a building. The regulations also set forth material requirements that support sustainability, health and more.

The **National Strategy for Sustainable Construction** is a broader document that establishes 21 initiatives that provide a holistic approach to achieving long-term sustainability in construction. The strategy consists of five focus areas:

1. More climate friendly building and construction sector
2. Buildings of high quality and long lifetime
3. Resource efficient buildings and construction
4. Energy efficient buildings
5. Digitally supported construction

The strategy also contains other circular economy-related initiatives that have yet to be implemented through regulations but could help transition the sector. This includes the initiative to promote the use of "climate-friendly" building materials. The strategy includes an initiative of ensuring safe and healthy reuse in buildings by introducing a digital material passport.

Beyond BR18, there are other laws that add to the comprehensive framework regulating the energy efficiency of buildings that either are implemented or will be implemented soon.

In 2020, the Danish government launched 14 **Climate Partnerships**, which were public-private partnerships created as part of the political process leading to the Climate Act. The Climate Partnerships established initiatives and actions for the private sector with the aim of reducing their CO<sub>2</sub>e emissions and strengthening their competitiveness in green business models. The relevant partnerships are:

- The **Construction Partnership** focuses on making the sector greener. This partnership proposed recommendations which could result in an annual reduction of 5,800,000 tons net reduction in CO<sub>2</sub>e emissions per year by 2030, were they implemented into regulation. The recommendations include:
  1. Intelligent energy management and energy renovations
  2. Transitioning from fossil fuels to green heating
  3. CO<sub>2</sub>e accounts for buildings
  4. Fossil-free construction sites
  5. Energy labelling for all buildings

- The **Waste, Water and Circular Economy Partnership** which focuses on waste reduction and resource efficiency. The proposed recommendations from this partnership could result in 7-9 million tons CO<sub>2</sub>e reductions by 2030 globally, if they were implemented with regulation. The recommendations on the circular economy include:
  1. Increased use of recycled materials.
  2. Longer product life and increased reuse
  3. Business models that are circular
  4. Change to new materials
  5. Reduced wastage

The circular economy in Denmark is not explicitly connected to climate and energy agendas. Most alignment between the agendas are not explicitly intended, and climate and energy agendas always seem to trump circular economy efforts. This is also true for the building and construction sector. However, Denmark is aligned with, and often further ahead, than EU requirements thanks to the comprehensive requirements in BR18. What is needed is tangible goals for resource effectiveness and revision of the key regulations laid out in this section to reflect circular economy targets.

### 3.1.2. The State of Support for Circularity in the Building and Construction Materials Sector

#### Whole Life Carbon

Denmark has formally implemented whole life carbon/life cycle assessment requirements (**LCA-requirements**) for all new buildings, which promote the use of less CO<sub>2</sub>-intensive materials. The legal regulation was implemented through the Building Code Regulation (BR18) as part of the strategy laid out in the National Strategy for Sustainable Construction. These require that all new buildings larger than 50 m<sup>2</sup> must perform a life-cycle assessment calculation to document the total climate impact of the new building. The Danish Authority of Social Services and Housing, who are in charge of implementing and monitoring BR18, has published a standardized format for the documentation of buildings climate impact to increase transparency, but the format is voluntary.

In extension of the calculation requirements, the regulation also imposes a progressively restrictive upper limit on CO<sub>2</sub>e-emissions based on the LCA calculations for new buildings. Today, the limit is set to 7,1 kg CO<sub>2</sub>e per year, with differences according to building type, and will continue to decrease biennially until it falls to 5,8 kg CO<sub>2</sub>e by 2029.

While the LCA-requirements were established to address a building's climate impact, they indirectly promote the use of circular economy materials. In the current LCA calculation method, recycled materials are assigned a value of zero. This is an instance where climate and circularity policies align in a Danish context, as the use of circular materials does not affect a building's overall climate impact in the LCA-calculations.

#### Ecodesign Rules

The EU Ecodesign Directive and the Energy Efficiency Directive mainly guide ecodesign requirements in Denmark. The newly implemented **Ecodesign for Sustainable Products Regulation** expands the Ecodesign regulatory framework by including almost all physical products in the European market, as well as expanding the scope beyond energy use. It will also be adopted in Denmark in due time. The ESPR regulation will reflect

the new ecodesign criteria, the creation of an EU-digital product passport, mandatory GPP criteria, and a framework to ensure that non-purchased products are not destroyed.

### Energy labelling for products and buildings

Energy labelling requirements in Denmark are based on the **EU Energy Labelling Directive** and **Energy Efficiency Directive**. These requirements are aimed at end-users of energy-consuming products. Energy labelling shows the energy efficiency of a product in order to highlight the most energy efficient products in the market to help consumers make energy-efficient purchases. Products must live up to certain requirements to live up to the energy efficiency directive.

**Energy labelling for buildings** is supposed to promote transparency and efficiency, and all buildings must have an **Energy Performance Certificate** before being sold. Additionally, **BR18** sets strict energy performance standards, which are meant to lead the pathway for nearly zero-energy buildings.

### Green Public Procurement

The EU's GPP voluntary criteria develop legislative requirements for Green Public Procurement (GPP) in Denmark. The requirements are also based on a national Danish strategy for GPP. The **Green Public Procurement (GPP) Strategy**, "Green Procurement for a Green Future - Strategy for green public procurement", from 2021 presented how the Danish public sector could lower their carbon footprint in procurement to align with the national climate target of reducing CO<sub>2</sub> emissions by 70% by 2030. The strategy intends to leverage GPP to be a driver for the transition towards a circular economy and achieving national climate goals. Key components of the strategy include implementing immediate green action by incorporating climate concerns in GPP-processes, long-term sustainable development through green GPP-practices, and enhancing knowledge and tools that effectively address climate concerns into procurement decisions.

The strategy has not established definitive CO<sub>2</sub> reduction targets or pathways that public procurements must follow to achieve lower CO<sub>2</sub>-emissions and lower resource consumption. The strategy has not been followed up with regulation or a framework for achieving the targets.

### Construction product standardisation

The primary guides for product standardization are **the EU Construction Product Regulation (CPR)** and the national rules from **BR18**. BR18, in particular, has high standards for products and provides national additions to harmonized European standards where necessary. It establishes comprehensive standards for building construction regarding safety, health, environmental impact and energy performance. In BR18, there are mandatory standards to live up to, as well as voluntary recognized standards that are meant to ensure the quality of a product. It is mandatory to document compliance with BR18.

### Industrial strategy for decarbonisation

Although there is no single strategy for industrial decarbonisation, the industry is subject to several regulations and requirements that should lead the path towards the national climate goals laid out in the Climate Act.

The Carbon Tax introduced in the **Green Tax Reform for Industries** and implemented in 2025 charges companies a CO<sub>2</sub> tax on their emissions to carbon neutrality. When the CO<sub>2</sub> tax is fully phased in by 2030, the tax rate will be 750 DKK per ton of emitted CO<sub>2</sub> for

the companies that are not covered by the EU's quota trading system and 375 DKK for the companies that are covered by the EU's quota trading system.

In addition to the carbon tax, Denmark intends to quadruple the capacity of renewable energy, which would supply industrial operations with clean energy. Furthermore, Denmark is investing in carbon capture and storage (CSS) projects to help facilitate a reduction in industrial emissions.

### Waste Framework

As for waste management, there is a comprehensive **Waste Regulations** legislation aligned with the EU **Waste Framework Directive**. The regulation sets requirements for waste management, including building and construction waste. These requirements cover waste streams, collection, treatment, disposal and recycling in Denmark.

Approximately 33% of building and construction waste is recycled today. Earlier, these levels were higher; however, the 2018 update of the EU framework changed the definition of recycling; therefore, backfilling is no longer counted as recycling. This caused overall recycling levels in Denmark to fall from 85% in 2016 to 37% in 2018.

### Material Efficiency Obligations

There are several measures to enhance material efficiency in the sector. Some of these are found in **BR18**, including the LCA-requirements, and the upcoming requirements on **Life Cycle Costing (LCC), resource use at construction sites, and documentation of hazardous substances** that will be implemented through BR18. With the future introduction of an LCC requirement, total economic analyses evaluating the cost-effectiveness of building materials and processes over the total lifespan will be mandatory.

Additionally, the Danish waste framework requires that municipalities ensure waste from construction sites and demolition sites are sorted into separate waste categories, e.g. concrete, metal, etc, to make sure that the waste is reused, recycled, or recovered in another manner. Uncontaminated materials are eligible to be reused without prior authorization if they are stored on site for no more than 12 months. This is applicable to materials like bricks and tiles.

### Voluntary Certification

Denmark has several voluntary labelling schemes in the building and construction sector that support sustainability and environmental responsibility. These schemes help developers, builders, and consumers make informed choices that align with Denmark's climate goals and circular economy principles.

One such voluntary scheme is the **DGNB Certification (Deutsche Gesellschaft für Nachhaltiges Bauen)**, which has been made to fit Danish construction. DGNB evaluates a buildings' environmental impact, economic performance, and social responsibility, promoting sustainability across the entire buildings' operations. It is used in Denmark widely.

The **Voluntary Sustainability Class** is a government initiative designed to test and promote sustainable construction. It included assessing life cycle assessment (LCA), indoor climate, and resource efficiency, to shape building regulations by gathering data on best practices.

In addition, **Environmental Product Declarations (EPDs)** are standardized documentation on the environmental impact of construction materials. Although they are not

a certification, the use of EPD's is becoming more widespread in Denmark to ensure transparency and informed decision-making.

## Grants

The **Sustainable Construction Fund (Pulje til Bæredygtigt Byggeri)** was established through Denmark's Finance Act of 2021. The funding has supported the development of LCA methods for building projects, the promotion of EPD's, and the improvement of the LCA-by calculation tool. Moreover, the fund has financed research on the reuse of load-bearing structures, thereby integrating circular economy principles into construction. These efforts align with Denmark's sustainability ambitions of the building sector, reducing its environmental impact and transitions to low-carbon construction.

**SMV: Grøn** is an EU-funded grant that assists small and medium-sized enterprises (SMEs) in Denmark with their green transition. The program offers financial support for investments and counselling to reduce resource consumption and waste.

The **Business Pool** is a grant that supports private businesses in projects to reduce their energy consumption or reduce their CO<sub>2</sub> emissions.

Other initiatives exist to support the climate improvement of private buildings (buildings grant – now divided into heat pump grants and energy renovation grants).

Additionally, two philanthropic foundations play a major role in providing grants to improve the sustainability of the buildings and the building sector in Denmark, **Realdania and Grundejernes Investeringsfond, GI**.

**Realdania** focus their support on the built environment, i.e. large and small towns and cities, villages, as well as urban spaces, parks, buildings and heritage. The built environment also includes all the related activities and change processes in, e.g. construction. Overall, Realdania aims to promote sustainable development, and specifically related to construction, they support projects that aim to develop, demonstrate, and communicate innovative solutions within construction in order to create a more efficient and sustainable construction industry. Since 2000, Realdania has supported philanthropic projects with EUR 3,1 billion.

Another – similar – foundation that also support numerous projects, is **Grundejernes Investeringsfond – GI** – (The Landowners' Investment Foundation). GI spends considerable amounts on research and development work. Including green transition of existing buildings, for example, optimizing energy use, circularity of building materials and waste minimizing and handling projects.

## Tax exemptions and reductions

**Green tax exemptions to companies (grønne fradrag til virksomheder)** are a number of tax exemptions that seek to support green, climate friendly transition in the industry, including the construction industry, and are introduced regularly, often for a limited time.

An example could be: producers of construction materials could be exempt from fees if they agree to deliver their excess heat to the district heat network as a way of promotion of symbioses. For data centres, it is a requirement that excess heat is used in the newly revised EED, which is yet to be implemented.

## Loans

**Bank loans** in Denmark currently favour demolition and reconstruction rather than renovation. This is mainly because new buildings are seen as less risky, since their costs, timelines and energy efficiency are easier to predict. Banks can, therefore, more easily assess the potential return on investment. Meanwhile, renovation may involve unexpected costs. However, the Danish government has acknowledged that renovating existing buildings is better for facilitating the national climate goals.

## Audit programs

**EU's Energy Efficiency Directive** requires that covered companies do an audit of the energy use through implementing energy management or conducting energy audits every four years. The energy audit and climate audit are for companies with an annual energy consumption of over 10 TJ in the previous three years. The aim of this is to maintain an overview and continuous focus of a company's energy matters to ensure energy efficiency and identify possible energy savings.

In Denmark, a climate module has supplemented this requirement. The climate audits are based on requirements from the **Green Tax Reform for Industry of 2022**. It entered into force on July 1, 2024.

### 3.1.3. Recommendations for Standard Improvements for Transition Towards Circularity

At the national level, there is a large number of instruments and a comprehensive legislative framework that supports the decarbonisation towards sustainability in the building and construction sector. However, circular economy elements, while present in a lot of the regulations, is not always explicitly intended, and a holistic approach that deals with circular economy in the building and construction sector is lacking, although we are starting to see some very positive developments in that direction. It is also relevant to note that the circular economy in Denmark is often seen as a means to a climate end.

Experts point to the fact that Denmark has no concrete CE targets or goals in Danish building sector policies, and that this shows a lack of ambition in terms of circular economy. They call for a comprehensive and supportive political framework to mobilize the sector in that direction.

However, the interviews with the experts across the board point to the **LCA-requirements** as a move in the right direction in regard to promoting a circular economy, particularly the fact that reused materials are assigned the value zero. There is also broad consensus around the new **law on selective demolition**, being a beneficial regulation for both the circular economy agenda and the climate. They also see that the actors within the sector are willing to transition towards circularity provided with the right incentives.

The stakeholder interviews have highlighted that a necessary step for improving circular economy practices in the sector, is **to address the price differences between new virgin materials and reused or recycled materials**. There is a mismatch between the manhours required to disassemble and dismantle structures for reuse, versus the workforce available. Furthermore, the negative externalities associated with virgin materials are not necessarily reflected in the price, which by comparison, makes circular materials seem less attractive.

They also point to the fact that documentation requirements for reused materials, set in BR18, are difficult to comply with, and documentation expenses are quite high. Sev-

eral of the experts wish for the **BR18 standards to be revisited to make approval of reusable materials less rigid in general.**

Finally, there is also agreement on the fact that a circular economy in Denmark is not always the preferred solution. In Denmark there are a few, but impactful factors that make it easier to demolish a building and start from scratch rather than renovating, such as the property value taxes, which mean that you have to pay taxes during renovation, but not during demolition and reconstruction, the cost and time associated with disassembly with the purpose of reusing materials, or the fact that it is easier to get a bank loan to construct new structures rather than renovating.

**Table 3. The recommendation for the CE standards improvement**

Standard	Recommendation for transformation towards circularity
<b>Tax relief</b>	Taxing virgin materials and subsidizing (or VAT exemption) recovered materials to address the pricing differences and encourage the sector to use more circular economy materials. This could address the increased workforce that increased CE would require as well.
<b>LCA-requirements</b>	Future reuse and recycling must be taken into account from the get-go in new buildings. The way that things are assembled in today's building practices is very complex and makes disassembly difficult. Furthermore, when public buildings are planned, there ought to be formal requirements for the share of circular materials.
<b>Product standards</b>	Less rigid product standards in BR18, in order to make the use of reused materials more appealing. Working with reused materials is often more time-consuming and expensive due to the price of the material itself, the cost of disassembly, preparation, transport and documentation requirements. New materials are often mass produced and easier to standardize. Producers also need to face certain requirements. Producers should consider the waste of their products and think reuse into the product from the onset.
<b>Certification schemes</b>	We should also certify the methods of building and certify the good practices that promote increased CE.
<b>Budgetting requirements</b>	The high cost of circular materials needs to be budgeted in from the start.
<b>Waste framework</b>	It needs to be less expensive and complicated to sort and store reusable materials. A market for reusable materials should be created that could off-load logistics and storage difficulties. Builders need to think from the onset of a new project of where to include more space on the construction site for infrastructure that allows them to store reusable materials.
<b>Bidding processes / Public Procurement</b>	In public projects, builders should be encouraged to prioritize circular economy in their proposals.
<b>Property value tax</b>	Should be revisited to make renovation exempt from property value taxes, the same way that demolition and reconstruction is exempt from property value taxes.

Source: CONCITO

### 3.1.4. Lessons Learned

- **Better and more intentional alignment between circular economy and the climate and energy agenda.** A comprehensive circular economy framework must be implemented in order to address the challenges holistically. Addressing the challenges simultaneously could help achieve the national climate goals much faster.
- For Denmark, the transition towards a circular economy in the construction sector requires wide, ambitious strategies as well as **clear targets and roadmaps** to ensure the principles are properly implemented in practice. While Denmark is recognized globally for its climate ambitions and efforts, the lack of clear, legally binding targets and roadmaps circular economy poses a challenge in address-

ing resource scarcity. The transition requires more than just broad, high-level goals. Effective strategies, policies, and financial incentives will be necessary, and the Circular Economy Action Plan should address this.

- The sector **focus should be directed towards renovation** rather than tearing down and building new structures, as there are not enough reusable materials for the amount and speed that we are constructing new buildings in. In theory, there already exist enough buildings for our needs in Denmark, therefore the priority should be to improve them rather than demolishing.
- BR18's existing product standards pose a challenge for implementing circular processes in the Danish building and construction sector. The **requirements in BR18 were originally set to address energy efficiency and safety and were not designed with circular economy processes in mind**, which creates a barrier to circular economy construction principles. The regulations focus primarily on linear construction processes and favour the use of new materials. However, by revisiting the regulations, circular economic construction could be integrated into BR18, where the standards should be expanded to include recycled materials and sustainable building practices.
- The storage infrastructure poses a significant challenge for circular construction in Denmark, but it could also present an opportunity for investment. **Creating centralized markets and storage facilities** could increase collaboration between businesses, which are important to creating a circular construction industry.
- **Education needs to be scaled up** in institutions that should be teaching and learning about a circular economy. Almost all stakeholders point to the lack of workers across the sector that can address the circular economy properly. Currently, a circular economy is only learned when necessary, and not as a foundational part of the education of the workforce.

## 3.2. Poland

### 3.2.1. Strategy & Policy

Poland has not set specific targets for achieving a circular economy. The primary document guiding this effort is the **Roadmap Towards the Circular Economy**, adopted by the Council of Ministers in 2019. The roadmap outlines five main areas: sustainable industrial production, sustainable consumption, new business models, implementation, and monitoring and financing of the circular economy. However, these areas do not fully align with the EU's Circular Economy Action Plan. The roadmap particularly emphasizes the need to increase the economic utilization of by-products of solid fuels combustion in the building and construction sector. Other activities, such as developing local value chains, creating a raw material base, and conducting life cycle assessments, also indirectly impact this sector.

The **CPR** serves as the primary legislative framework for construction materials. However, its current version lacks provisions to support the recycling and reuse of materials, such as minimum requirements for green public procurement, standardized definitions for reusable materials, and guidelines for promoting circularity in the sector.

In terms of waste management in the construction sector, two key legislative measures shape Poland's transposition of EU requirements:

- **Construction and demolition waste sorting system** – Effective from January 1, 2025, construction and demolition waste must be sorted into at least six fractions, including wood, mineral fractions (concrete, bricks, tiles, ceramics, and stones), metal, glass, plastics, and gypsum.<sup>32</sup>
- **Recycling and recovery targets for construction and demolition waste** – By 2020, municipalities were required to achieve a minimum 70% by weight for reuse, recycling, and recovery of construction and demolition waste. However, following the amendment of the **Act of November 17, 2021, on waste management and other related acts**,<sup>33</sup> construction and demolition waste is no longer classified as municipal waste. While municipalities remain responsible for collecting and reporting data on the mass of construction and demolition waste, they are no longer required to meet specific recycling targets.<sup>34</sup>

Due to recent revisions of the EU-level CPR and the EPBD, Poland will need to develop holistic national mechanisms soon that consider the entire life cycle of buildings and construction materials.

On the contrary, the **NECPs** are mandatory for all Member States under the Regulation on the Governance of the Energy Union and Climate Action (EU) 2018/1999. In these plans, countries must address five key areas: decarbonisation, energy efficiency, energy security, the internal energy market, and research, innovation, and competitiveness, which underline the plan to achieve climate neutrality. In the context of the building and construction sector, low-emission construction is a priority subject of the plan. Within this area, two primary goals are defined:

1. Objective 2.2.1: Reduction of energy demand in existing buildings.
2. Objective 2.2.2: Zero-emission new construction.

As part of the updated draft of the NECP (published in October 2024), actions focus on developing financial instruments, audits, and energy management systems, improving energy efficiency, and tightening legislative requirements. These actions aim to support the achievement of the two main goals, consistent with other strategic documents, namely:

- *"The goal for reducing the energy demand of existing building is to ensure that by 2035, all buildings with a primary energy consumption index above 230 kWh/(m<sup>2</sup>/year) are modernized, with priority given to eliminating coal use in residential buildings.*
- *The goal for energy demand in new buildings is to ensure that, from January 1, 2030, all new buildings in Poland are zero-emission, and for buildings occupied by public authorities, from January 1, 2028".*<sup>35</sup>

Another document that discusses the assumptions of climate and energy policy is the **Energy Policy of Poland** until 2040 (published in February 2021). However, it requires an update to meet current political and economic demands, including the implementation of the Fit for 55 package in Poland. In the building sector, particularly, improving energy efficiency through energy renovation is crucial. This initiative is a key component of the Long-Term Building Renovation Strategy, which aims to conduct:

- 236,000 renovations annually from 2020 to 2030,
- 271,000 per year from 2030 to 2040,
- 244,000 per year from 2040 to 2050,

<sup>32</sup> The Act of December 6, 2024, amending the Act on Waste and certain other acts (Journal of Laws 2024, item 1914), available [here](#).

<sup>33</sup> The Act of December 17, 2020, amending the Act on Maintaining Cleanliness and Order in Municipalities and certain other acts (Journal of Laws of 2020, item 2361), available [here](#).

<sup>34</sup> Explanations of the Ministry of Climate and Environment regarding the submission of data under municipal reporting for 2021, available [here](#).

<sup>35</sup> National Climate and Energy Plan (draft version 18.10.2024)

Resulting in a total of 7.5 million renovations by 2050. The **National Building Renovation Plan** is currently being developed in compliance with the revised Energy Performance of Buildings Directive. The version of the Plan published for pre-consultation in December 2024 does not include specific new measures focused on reducing life-cycle carbon footprint via increased circularity measures.

At the end-of-life stage, key measures are outlined in the **National Waste Management Plan**. For waste generated from the construction, renovation, and demolition of buildings and road infrastructure, two main goals have been established:

- Raising awareness among investors and waste producers regarding the importance of selective waste collection.
- Maintaining a preparation level for reuse, recycling, and recovery at a minimum of 70% by weight.

Currently, there is no explicit link between the circular economy and climate and energy targets. While the updated version of the Polish NECP includes a dedicated chapter on circularity actions, it fails to address new requirements introduced by Fit for 55 and the New Circular Economy Action Plan, including those related to the built environment.<sup>36</sup>

The **Polish Roadmap Towards the Circular Economy** document does not specify any relation to other strategic documents, such as the Energy Policy of Poland until 2040 or the NECP.

In the context of the building and construction sectors, there is no direct link between circularity and climate and energy targets. However, some actions attempt to combine circularity with climate and energy perspectives. For instance, in the revised proposal of Poland's Recovery and Resilience Plan,<sup>37</sup> the action "B1.1.2 Replacement of heat sources and improvement of energy efficiency in single-family residential buildings," supported by the Clean Air Priority Programme and the Thermo-Modernisation and Renovation Fund, should require that renovation activities ensure at least 70% of the building waste generated is reused or recycled.

As part of its climate and energy initiatives, Poland's key actions are primarily shaped by the transposition of EU legislation, particularly in the areas of energy efficiency across the entire life cycle and building renovation.

From the perspective of climate and energy policies, the key legislative acts relevant to buildings include:

- Energy Efficiency:
  - The Building Law Act of July 7, 1994 (Journal of Laws 2024, item 725).
  - Regulation of the Minister of Infrastructure on technical conditions that buildings and their location must meet, consolidated text as of April 15, 2022 (Journal of Laws 2022, item 1225).
- Inspection of Heating and Air Conditioning Systems in Buildings:
  - The Act on the Energy Performance of Buildings, consolidated text as of October 7, 2022 (Journal of Laws 2022, item 2206).
  - Regulation of the Minister of Infrastructure and Development of February 27, 2015, on the methodology for determining the energy performance of a building or part of a building, as well as energy performance certificates (Journal of Laws 2015, item 376).

<sup>36</sup> Czaplicka-Kotas A. (2025), *Climate for CE: the Role of Circularity in the Polish NECP*, Reform Institute, Warsaw.

<sup>37</sup> Council of the European Union. (2022). *Proposal for a Council Implementing Decision amending Implementing Decision (EU) (ST 9728/22 INIT; ST 9728/22 ADD 1) of 17 June 2022 on the approval of the assessment of the recovery and resilience plan for Poland*.

### 3.2.2. The State of Support for Circularity in the Building and Construction Materials Sector

#### Whole Life Carbon

Poland lacks legal regulations for calculating, defining, and maintaining a database to assess the whole-life carbon impact of buildings. The only CO<sub>2</sub> emissions requirement relates to operational emissions, specifically in energy performance certificates.<sup>38</sup>

The **Long-Term Strategy for the Renovation of Buildings** (Appendix to Resolution No. 23/2022 of the Council of Ministers, dated February 9, 2022) includes an initiative to introduce life-cycle assessments in buildings as part of National Smart Specialisation 5: Smart and Energy-Efficient Construction.

#### Eco-Design Rules

Eco-design rules in Poland are currently tied to energy labelling requirements, which influence some aspects of buildings and construction materials. No additional national-level legislative requirements are in place. However, Poland will need to adopt new obligations following the revision of the Eco-design Directive, particularly in preparation for implementing the digital product passport requirement.

#### Green Public Procurement

A Green Public Procurement (GPP) strategy exists at the national level, but it consists mainly of recommendations rather than enforceable obligations for government administrative units, making it ineffective. However, the introduction of new mandatory minimum environmental sustainability standards under the CPR revision may lead to a more effective system in Poland.

In April 2024, the Prime Minister established an Interministerial Team for Green Public Procurement to strengthen its implementation. Additionally, in 2021, guidelines were published on incorporating environmentally friendly solutions in public procurement for construction projects. However, these guidelines did not focus on promoting secondary raw materials.

#### Product standardisation

The primary standard in this area is the CPR, which applies to the EU Member States, including Poland. However, certain challenges regarding harmonization have been noted – “of the 444 existing harmonized standards for construction products, only 12 new standards have been issued since the adoption of the CPR”.<sup>39</sup>

#### Industrial strategy for decarbonisation

Poland lacks a comprehensive industrial decarbonisation strategy, which also affects the building and construction materials sector. As a result, there is no coherent approach to integrating circular economy models, extending product life cycles, or reducing waste through legislative and non-legislative measures that support businesses.

#### Waste Framework

The **National Waste Management Plan** presents data for Group 17 (waste from construction, repair, and demolition of buildings and road infrastructure, including contaminated soil), but the figures are outdated (2014-2018), ranging between 18.0 and

<sup>38</sup> Steinmann, J., Röck, M., Lützkendorf, T., Allacker, K., & Le Den, X (2022), *Policies to implement life-cycle carbon footprint regulations for buildings in the EU27 to reduce embedded carbon emissions in new buildings*.

<sup>39</sup> European Parliament (2021), *Implementation of the Construction Products Regulation*.

23.7 million tons. Forecasts suggest that the total mass of construction waste could reach 31.0 million tons by 2028; however, there is no reference to current data or best practices.

Poland's construction and demolition waste segregation infrastructure is weak, with 100% of mixed waste not being selectively collected. The recycling rate is also low compared to EU benchmarks, with backfilling remaining the dominant recovery method. However, starting from January 1, 2025, extended producer responsibility will be introduced for this type of waste, aiming to improve segregation and recycling performance. To reinforce proper waste sorting, penalties for failing to selectively collect or sort waste range from 1,000 PLN to 1,000,000 PLN (c.a. 240 EUR to 240,000 EUR).<sup>40</sup>

### Material Efficiency Obligations

The primary material efficiency requirement arises from the **Waste Framework Directive**, which mandates that at least 70% (by weight) of construction and demolition waste must be prepared for reuse, recycling, or other material recovery. According to the National Waste Management Plan 2028, Poland reported a material recovery rate of 74.4% in 2017 and 75.1% in 2018, suggesting compliance with EU directives.

However, EU-wide statistics indicate that Poland's recycling performance remains low compared to the broader EU market, with backfilling still being the dominant form of recovery rather than higher-value recycling processes (European Union (2020): recycling 82.8%, backfilling 5.6%, landfill and other 11%; Poland (2020): recycling 69.5%, backfilling 21.4%, landfill and other 9%).<sup>41</sup>

### Voluntary Certification

There are currently no mandatory certification requirements in Poland. In international schemes, BREEAM<sup>42</sup> is the most common in the Polish building sector, but the number of certified buildings remains low.<sup>43</sup> National voluntary certifications include:

- Green House Certificate – 68 certified buildings (2023-2024).<sup>44</sup> Assesses sustainability across multiple factors, including the use and reuse of existing materials and the adaptation of existing buildings. Additional points are awarded for incorporating construction products with EPDs.
- Planet Friendly – 7 certified projects.<sup>45</sup> Focuses on user well-being, fair trade principles, carbon footprint assessment, supply chain management, energy efficiency, and life cycle evaluation.

In the construction materials sector, the EPD is the most widely used certification. However, there are no legal obligations or a comprehensive national database for EPDs.

### Grants

From a climate perspective, most programs from the **National Regional Fund for Environmental Protection** and Water Management focus on energy renovation of buildings (e.g., Clean Air, TERMO, Stop Smog, Warm Home). However, until now, these programs have not included provisions related to circularity. Nevertheless, according to **Poland's Recovery and Resilience Plan**, future iterations will incorporate provisions related to building waste generated from construction for reuse, recycling, and other material recovery.

Within the framework for the 2021-2027 period, the primary funding sources supporting circular economy solutions include:

- European Funds for Infrastructure, Climate, and Environment (2021-2027),

<sup>40</sup> The Act on Waste of 14 December 2012 (Journal of Laws, 2023, item 1587, as amended), available [here](#).

<sup>41</sup> European Environmental Agency, *Construction and demolition waste: challenges and opportunities in a circular economy*, (Published 16.01.2020, Last modified 13.02.2023).

<sup>42</sup> PLGBC report: *Sustainable certified buildings 2024*.

<sup>43</sup> Statista (2024). *Number of BREEAM certified building projects worldwide in 2023, by country*.

<sup>44</sup> PLGBC (2024), *Sustainable certified buildings 2024*.

<sup>45</sup> More information is available from the *Ośrodek Badań i Rozwoju. Save the planet*.

- Just Transition Fund,
- European Funds for Eastern Poland,
- National Fund for Environmental Protection and Water Management,
- LIFE Program<sup>46</sup>.

Additionally, the National Recovery and Resilience Plan also includes investments related to the circular economy under Investment Point A2.2.1. These investments focus on implementing environmental technologies and innovations, including those related to the circular economy.

### Tax exemptions and reductions

The key tax incentive related to climate transformation is the energy renovation tax relief, which has benefited 1.2 million individuals by 2021.<sup>47</sup> However, this tax relief does not include incentives for circularity.

A recent draft bill proposes changes to the definitions of "structures" and "buildings", leading to the taxation of energy devices. However, the bill does not address resource life cycle extensions or improvements in waste management.

### Loans

Loans in Poland primarily support climate initiatives, with little focus on circularity. Most loans target building thermos-modernization, managed by the Polish Development Bank. Additionally, under **the National Recovery and Resilience Plan**, a loan system was launched as part of the "Investments for the Comprehensive Green Transformation of Cities" initiative, which includes funding for waste management activities.

### Audit programs

The Act of May 20, 2016, on **Energy Efficiency** (consolidated text: Journal of Laws of 2021, item 2166) imposes an obligation on large enterprises to conduct an energy audit every four years. One area of energy consumption that warrants analysis is waste heat recovery, a key component of the circular economy, which aims to improve energy efficiency.

### Information campaigns

Information campaigns on construction materials are primarily linked to EU requirements under the Construction Products Regulation (CPR). Other campaigns, conducted by public and private entities, primarily focus on climate-related issues rather than circularity in construction.

### 3.2.3. Recommendations for Standards Improvements for Transition Towards Circularity

Currently, at the national level, there is a lack of effective legislative and non-legislative instruments supporting the transition towards a CE in the building and construction materials sector. A holistic approach that considers the entire life cycle—from the design phase through usage to end-of-life management—is missing.

Expert interviews have highlighted that a key opportunity for harmonizing CE principles in the context of construction materials lies in the revision of the CPR. This revision introduces definitions for reused products, promotes the repair and conservation of

<sup>46</sup> Dominik Bąk, *Gospodarka o obiegu zamkniętym w ofercie NFOŚiGW*, 23.06.2021 r..

<sup>47</sup> Wiesława Moczydłowska, *Popularność ulgi termomodernizacyjnej rośnie, ale rozbudowa domu prawa do odliczenia nie daje*, Prawo.pl, 31.03.2023.

materials, supports regeneration processes, and implements other mechanisms that can serve as the foundation for effective support measures. The ongoing preparation of the National Buildings Renovation Plan presents an opportunity to incorporate circularity requirements, taking into account a whole life cycle perspective.

Additionally, building regulations should integrate eco-design principles and facilitate the reuse of materials. The legislation should encourage modernization and easy adaptation of building products to extend their life-cycle and reduce waste.

At the end-of-life stage, the development of legislative frameworks for reintegrating waste into the circular economy should involve all relevant stakeholders across the whole value chain. This collaborative approach would ensure the efficiency of management mechanisms throughout the product's life cycle.

**Table 4. The recommendation for the CE standards improvement**

Standard	Recommendation for transformation towards circularity
<b>Whole life carbon</b>	Future standards should incorporate circular practices, including the waste hierarchy and circular economy business models.
<b>Audit programs</b>	A standardized framework for compulsory pre-demolition audits should be established to guide relevant stakeholders.
<b>Digitalization</b>	Digital systems for tracking material flows in buildings should be implemented as a standard to facilitate the reuse and recycling of materials.
<b>Energy Labeling of products</b>	Energy labels should include information on resource consumption, as well as the potential for reuse and recycling.
<b>Energy renovation tax relief</b>	The instrument should include additional requirements for handling raw materials in alignment with the waste management hierarchy.
<b>Green public procurement</b>	Public procurement policies should incentivize the use of secondary raw materials.
<b>Eco-design rules</b>	Building regulations should promote design practices that enable easy adaptation, modernization, and material reuse
<b>Grants</b>	Financial support mechanisms should prioritize renovation projects that enhance the durability and lifespan of construction materials.
<b>Information campaigns</b>	Awareness campaigns should educate manufacturers and recyclers on the implementation of material reuse and recycling.

*Source: Reform Institute.*

### 3.2.4. Lessons Learned

- **Better alignment is needed between the circular economy and climate/energy agendas.** Stakeholders emphasised the need for more substantial alignment between circular economy policies and the climate and energy agenda, particularly in financial, operational, and standardisation aspects. Currently, these areas are addressed separately, lacking a holistic, life-cycle perspective that is essential for achieving decarbonisation, climate neutrality, and circularity goals in the construction sector.
- **Need for a mandatory labelling system.** Experts emphasised the need for a mandatory labelling system for construction materials. The harmonized standards stemming from EU legislation will drive the standardisation of life cycle assessment in the sector. Without proactive measures, Poland may face challenges when transposing these EU requirements into national legislation.
- **Need for effective implementation of strategic frameworks.** The current strategic documents, including the circular economy roadmap and the NECP, do not adequately address the specific needs of the construction sector. Although

new obligations arising from the Circular Economy Action Plan 2.0 and the Fit for 55 package are environmentally ambitious, stakeholders stressed that without clear, detailed roadmaps encompassing technical, social, and environmental measures, both legislative and non-legislative efforts risk ineffective implementation.

- **Lack of support for circular economy business models.** Stakeholders identified a lack of support structures for circular economy business models in the sector. While some projects and studies exist, they tend to focus on general practices and overlook Poland's specific national conditions. A comprehensive database of good practices tailored to local needs is missing.
- **Deficiencies in recovery and recycling infrastructure.** The absence of an effective selective waste collection system, due for implementation by 2025, was cited as a significant barrier to managing construction and demolition waste according to the waste hierarchy. Additionally, stakeholders raised concerns about the low quality of recovered materials and the lack of up-to-date data for assessing recycling and reuse efforts, which hampers the development of a robust circular construction industry.

### 3.3. Ukraine

#### 3.3.1. Strategy & Policy

There are no concrete national goals exclusively targeting the circular economy in the building and construction sector in Ukraine. While CE-related initiatives exist, they are fragmented and often broad, lacking measurable targets specific to the sector. Ukraine's CE policy developments are primarily driven by the alignment with **EU directives** and the broader climate-neutral transition, as outlined in documents such as **the Waste Management Law No. 2320-IX** and strategic efforts to implement the **CEAP 2.0**.

Although the **Waste Management Law** introduces Extended Producer Responsibility (EPR), it does not currently cover construction waste. Ukraine's Ministry of Environmental Protection has launched a pilot Extended Producer Responsibility (EPR) project; however, legislative progress remains limited to packaging and electronic waste streams. Construction materials are not yet included in binding CE obligations.

In the context of buildings and construction, Ukraine is working toward partial regulatory alignment through:

- Adoption of the second version of **Eurocodes**,
- Development of national annexes for local parameters,
- Ongoing harmonization with the **CPR**,
- Voluntary implementation of **EPDs**,
- Initiation of discussions around **DPPs**,
- ISO-aligned standards for recycled content in materials (e.g., DSTU ISO 14021:2016).

However, there is no unified classification or codification system for construction materials, nor a centralized LCA database. These gaps hinder standardized evaluation of resource efficiency and environmental impact. While EPDs are available on the Ukrainian market (e.g., ISOVER insulation), their use remains non-mandatory and inconsistent.

Current policies encourage the reuse and recycling of construction materials, such as concrete and steel, and define recycled content requirements for some materials. Nevertheless, secondary materials are not price-competitive due to the low extraction costs of primary raw materials. Moreover, Ukraine lacks formal methodologies for the reuse of waste resulting from war-related demolition.

The environmental focus in construction is indirectly supported by broader policies such as the **Law on Energy Efficiency** and the **Strategy for Thermal Modernisation of Buildings**. Yet, as of now, there is no political document with sector-specific CE targets. While Ukraine's trajectory includes aligning with EU sustainability goals, there have been few formal implementations of concrete political goals specifically addressing circularity in the construction sector.

The **NECP** is in development, and its preliminary content highlights construction sector decarbonisation as a key pathway. Two strategic goals are expected to define the building sector's decarbonisation efforts:

1. Reduction of energy demand in the existing building stock through large-scale renovation.
2. Establishment of zero-emission standards for new construction, especially public buildings.

At the end-of-life stage, Ukraine mandates a 70% preparation for reuse, recycling, or other material recovery of CDW, in line with the EU Waste Framework Directive. However, selective dismantling and sorting practices are not yet widely implemented due to a lack of infrastructure and funding mechanisms. The updated **Waste Management Law** establishes extended producer responsibility (EPR) but does not yet fully cover construction materials.

Ukraine's draft **NECP** (and related strategic documents) have begun to bridge the gap between climate and energy strategies through alignment with Eurocodes, voluntary EPDs, and thermal modernization strategies. Further steps are needed to embed circularity metrics across the building and material sectors.

While the **Waste Management Law No. 2320-IX** mandates a 70% recovery target for construction and demolition waste (CDW), practical implementation of selective dismantling and sorting practices remains limited due to a lack of infrastructure, funding mechanisms, and technical guidance. Ukraine does not currently require standardized demolition plans or mandatory environmental audits prior to demolition, as the Circular Economy Protocol suggests.

There are no legal obligations for appointing environmental coordinators or accredited demolition firms. CE-specific permitting schemes in Ukraine do not regulate partial or full demolition activities, and the recovery of secondary materials largely depends on voluntary practices and pilot initiatives rather than enforceable regulations.

Ukraine lacks national End-of-Waste criteria for construction materials. Although the country references **ISO 14021:2016** for defining the recycled content in construction products, the practical application of these standards is inconsistent, and there is no national certification or recognition of recovered waste as a secondary raw material with defined market pathways. For many material streams, such as concrete and brick, no standardized criteria or assessment methodologies are in place to determine suitability for reuse.

As for design for disassembly, Ukraine has not yet adopted ISO-based frameworks or national standards that promote modular or circular design principles in buildings. Al-

though energy efficiency laws address building envelopes and retrofitting, they do not include specific guidelines to ensure the future disassembly, reusability, or traceability of components.

In summary, Ukraine remains in the preparatory phase, with emerging alignment through standards; however, it lacks operational and regulatory frameworks to support CE-specific demolition, reuse, or disassembly practices in the construction sector.

Ukraine's climate and energy transition efforts are guided by a combination of strategies and sectoral laws rather than a single binding framework. Necessary steps have been taken to define national targets through documents such as the **Strategy for State Policy on Climate Change**, which extends until 2035, and the **National Energy and Climate Plan**, approved in June 2024 for the period 2025–2030.

Ukraine has committed to reducing greenhouse gas emissions by no more than 35% of 1990 levels and achieving an 85% reduction in emissions from heat and electricity production, as part of its updated nationally determined contribution (NDC) under the Paris Agreement. The government also approved the Law on the Basic Principles of Climate Policy in October 2024, which introduces provisions for a national ETS and aims to support convergence with the EU ETS.

In the building and construction sector, decarbonisation efforts are primarily tied to energy efficiency policies. **The Strategy for Thermal Modernisation of Buildings** until 2050, approved in December 2023, plays a central role. It mandates the annual modernization of at least 1% of the building stock beginning in 2025, increasing to 3% by 2030, and a complete transition to NZEB by 2050. Additionally, requirements for NZEB were formally established in 2024, aligning Ukraine's construction sector with EU energy performance expectations.

To support these goals, the **Decarbonisation and Energy Efficient Transformation Fund** was established in January 2024, and financed through environmental taxes. The Fund supports thermal renovations and the integration of renewable technologies, such as photovoltaics and heat pumps, into housing projects. Ukraine's Law on Energy Efficiency (2021) complements these efforts by aligning national energy standards with EU directives, particularly through the adoption of DSTU standards based on European codes.

Ukraine does not yet impose mandatory LCA or embodied carbon limits for buildings. While LCA methodologies based on ISO 14040 and ISO 14044 are recognized, their application remains voluntary and underdeveloped. A centralized LCA database does not exist, limiting the ability to integrate life-cycle thinking into regulatory frameworks or construction practices. Additionally, no legislation mandates equal treatment of reused or recycled materials with new materials in terms of performance and safety.

While individual collaborations between ministries, local governments, and industry actors occur, there is no national initiative focused on mobilizing the private sector to reduce CO<sub>2</sub> emissions or adopt circular business models in construction or materials management.

### 3.3.2. The State of Support for Circularity in the Building and Construction Materials Sector

#### Whole Life Carbon

Ukraine has not yet implemented mandatory WLC or LCA requirements for new buildings. While the use of LCA methodologies based on ISO 14040 and ISO 14044 is acknowl-

edged, their application is voluntary and not embedded in building codes or national construction regulations. The absence of mandatory LCA calculations in building permitting or certification processes means that whole-life carbon remains outside mainstream regulatory practice.

Ukraine does not maintain a national LCA database or a centralized registry of building-related carbon data.

While there is interest in the DPP system and its potential to trace material carbon footprints, DPPs are still in the early conceptual and pilot stage, with no binding rules in place.

## Eco-Design Rules

There is currently no national eco-design regulation for construction materials; however, draft legislation aligned with the EU Eco-design for Sustainable Products Regulation is under review. Low-carbon concrete, clinker substitution, and the use of recycled aggregates are promoted through voluntary green certification and state reconstruction guidelines (e.g., the Ministry of Hromadas, Territories, and Infrastructure Development 2023 guide).

In Ukraine, energy labelling for products is regulated through the Law of Ukraine "On Energy Efficiency" (2021), which partially aligns with the EU Energy Labelling Directive and Energy Efficiency Directive. The law establishes general principles for energy-related products and enables the application of state DSTU standards, such as DSTU EN 60335, which covers household appliances and specifies energy efficiency criteria. However, Ukraine does not yet have a comprehensive energy labelling framework that applies uniformly across all product categories.

Energy labelling for buildings is gradually advancing. The Law "On Energy Efficiency of Buildings" (in force since 2019) introduced mandatory energy certification for specific building types. Certification is required for:

1. newly constructed, reconstructed, or capital repair projects in medium and significant consequence classes (CC2 and CC3),
2. public buildings over 250 m<sup>2</sup>,
3. buildings financed through public funds for energy efficiency upgrades.

**Energy performance certificates (EPCs)** must be obtained by these categories, although there is no requirement to present an EPC during the sale or lease of buildings. Some local authorities have implemented voluntary EPC systems, particularly for residential complexes, schools, and hospitals, echoing the European Display Campaign.

In terms of standards, the **National Technical Standardisation Committee TK 82** has developed Ukraine's first standard for energy-efficient green public buildings, which has been approved and is expected to support the future expansion of building certification.

Ukraine has also begun building a **National Database of Operational and Energy Characteristics of Buildings**, a platform that will serve as a tool for performance tracking and support the roll-out of more systematic labelling and certification procedures. However, as of now, there is no unified national platform for energy labelling across all building types.

**Minimum Energy Performance Standards (MEPS)** are embedded in **State Building Standards (DBN)** and are mandatory for permitting. All new buildings must undergo an examination by an energy efficiency expert before obtaining construction approval.

Nonetheless, enforcement gaps and reliance on outdated design practices remain barriers to the widespread adoption of advanced energy labelling schemes in Ukraine.

### **Green Public Procurement**

In Ukraine, Green Public Procurement (GPP) is permitted under Law No. 922-VIII "**On Public Procurement**", which allows procuring entities to apply non-price criteria, including environmental characteristics, in the evaluation of bids. However, there is no mandatory requirement for including environmental or circular economy criteria in public tenders.

While Ukraine has made progress in aligning with EU principles, it has yet to develop a national strategy for Green Public Procurement. GPP in Ukraine remains optional and inconsistently applied. Environmental Product Declarations (EPDs), although increasingly used voluntarily by manufacturers, are not required in public procurement processes, even for public construction projects.

Green criteria are being integrated into public procurement, particularly for reconstruction projects financed by international donors. GPP is being piloted with environmental clauses that require the use of EPDs, the reuse of salvaged materials, and a preference for local, low-carbon products. However, no national mandate yet enforces GPP.

### **Product standardisation**

DSTU standards are gradually aligning with EN norms, especially for concrete, steel, and insulation. Ukraine is working toward harmonization under the Construction Products Regulation (CPR). However, a codification system for reused materials is missing.

### **Industrial strategy for decarbonisation**

While a national industrial decarbonisation strategy is lacking, sector-specific actions have been initiated. Ukraine's National Decarbonisation Roadmap for Cement and the Ukrainian Steel Industry Action Plan (developed with support from UNIDO and EBRD) include targets for energy efficiency, fuel switching, and material circularity.

### **Waste Framework**

The 2021 Waste Law enforces CDW separation into basic material streams (for the key categories of CDW). Yet, the implementation of selective dismantling and reuse remains weak. Ukraine has no national CDW tracking system.

Reuse practices are rare, and NGOs have proposed national guidelines for material salvage or on-site reuse, but these guidelines are not codified into law. Additionally, no official statistics are available on the current recycling rates of CDW in Ukraine, and backfilling remains a common practice.

### **Material Efficiency Obligations**

Ukraine's target of 70% CDW preparation for reuse, recycling, and other material recovery reflects EU requirements; however, the lack of reliable data limits tracking. National guidelines for reuse and on-site material salvage have been proposed by civil society organizations and NGOs but are not yet codified into law.

### **Voluntary Certification**

Ukraine recognizes BREEAM, LEED, and DGNB certifications. Local pilot certifications include the Green Recovery Standard developed by Ukrainian NGOs and international

partners. Some buildings incorporate EPDs voluntarily, especially in donor-funded construction. There is no centralized national EPD database.

### Grants

Funds from the EU, EBRD, and the Ukraine Facility are directed toward rebuilding, with an emphasis on energy and resource efficiency. Circularity is being piloted through the EU4Environment and Horizon Europe projects, as well as through guidance produced by the Ministry of Restoration in 2023.

### Tax exemptions and reductions

There are VAT exemptions on energy-efficient appliances and renovations. Discussions are underway to extend tax benefits to reused and recycled construction materials, especially under the Clean Energy Transition Support Mechanism (CETSM).

### Loans

There is no formal policy or financial mechanism that prioritizes renovation over demolition and new construction, and bank lending practices do not currently favour circular economy objectives. The construction sector continues to operate under a least-cost model, where traditional designs and materials are preferred, and environmental performance is often overlooked in investment decisions.

### Audit programs

The Law of Ukraine "On Energy Efficiency of Buildings" No. 2118-VIII (latest adjustments as of October 2024) establishes the legal and organizational principles for conducting energy audits of buildings and serves as the basis for implementing energy audits in Ukraine.

### 3.3.3. Recommendations for Standards Improvements for Transition Towards Circularity

Ukraine has introduced a set of legislative and strategic instruments that support the decarbonisation of the building and construction sector. However, while elements of the CE are present in some laws and initiatives—such as the Waste Management Law, the Law on Energy Efficiency, and the Strategy for Thermal Modernisation—there is no comprehensive policy framework that explicitly addresses circularity in construction. The integration of CE principles into building regulation is fragmented, and no national targets or binding obligations for CE in construction have been established.

This lack of explicit circular targets is a key barrier to mobilizing the sector. Existing laws tend to reflect CE indirectly through climate or energy efficiency objectives, rather than treating circularity as a distinct goal. This limits the ability to systematically scale reuse, design for disassembly, and secondary material markets. Nevertheless, some positive developments are emerging. For example:

- Recycled content is defined in DSTU ISO 14021:2016, and voluntary Environmental Product Declarations (EPDs) are available on the market.
- The adoption of Eurocodes and national annexes has created an opportunity to integrate circularity metrics into future technical specifications.
- Discussions are underway regarding DPPs and the establishment of national LCA methodologies.

Stakeholder input reflected highlights several barriers and opportunities. Experts point to price disparities between primary and secondary materials as a critical issue. Reused materials are not cost-competitive, in part due to the low cost of primary raw material extraction in Ukraine and the lack of internalized environmental costs. The labour-intensive nature of selective dismantling and reuse is also identified as a barrier, particularly given the limited availability of trained personnel and the lack of operational guidance.

In addition, there is no centralized classification system or codification for materials, which complicates standardization and compliance for reused products. Stakeholders also note the absence of technical approvals or fast-track mechanisms for reintroduced materials, which creates uncertainty and risk for designers and contractors.

While there is interest from actors in the sector, the lack of incentives, both fiscal and regulatory, hinders broader uptake. Donor-funded reconstruction projects and voluntary pilot initiatives are helping to build experience with circular practices, but these remain isolated examples rather than systemic change.

Overall, Ukraine has laid a legal and strategic foundation; however, a comprehensive, enforceable, and economically supported circular economy policy for the construction sector is still lacking. To enable a more circular building sector, it is needed:

1. To revise technical standards to ease the approval of reused materials,
2. To establish methodologies for selective demolition together with prior auditing,
3. To develop a national LCA database and more straightforward product documentation guidelines,
4. Introduce mandatory WLC metrics in public tenders and construction permits.
5. Establish national protocols for pre-demolition audits and material reuse in urban demolition, aligning with the EU Waste Management Protocol.
6. Develop DPPs for key materials (concrete, brick, steel, insulation).
7. Enforce CPR and EPBD updates with Ukrainian DSTU revisions and digital traceability.
8. Launch a CE Innovation Grant Program for SMEs producing reused and low-carbon materials.
9. Include adaptability, reuse, and design-for-disassembly principles in DBNs and spatial planning laws.

**Table 5. The recommendation for the CE standards improvement**

Standard	Recommendation for transformation towards circularity
<b>Tax relief</b>	Secondary materials are not price-competitive due to low-cost virgin extraction. Although no tax-based incentives or exemptions currently exist, fiscal instruments are recommended to address the cost imbalance between reused and primary materials.
<b>LCA-requirements</b>	Ukraine has voluntary LCA tools but lacks mandatory whole-life carbon requirements or thresholds. Developing national LCA methodologies, a centralized LCA database, and formal public procurement requirements for embodied carbon to support material reuse is needed.
<b>Product standards</b>	Ukraine lacks a unified classification system for construction materials and does not provide clear guidance on reused components. It is important to develop standardized codification, updating technical requirements to account for secondary use, and reducing the uncertainty and costs of compliance for reused products.
<b>Certification schemes</b>	While voluntary EPDs, BREEAM, LEED, and DGNB are recognized, it is important to expand national certification systems that integrate CE principles, including reuse criteria, and create incentives for their broader adoption.

Standard	Recommendation for transformation towards circularity
<b>Budgeting requirements</b>	CE practices (e.g., selective demolition, material preparation) are labour- and resource-intensive. Early inclusion of circularity costs in project budgeting, especially for public and donor-funded reconstruction projects is needed.
<b>Waste framework</b>	Ukraine's Waste Law requires CDW separation but lacks selective dismantling regulation or reuse obligations. Selective demolition methodologies, reuse protocols, and creating market mechanisms for secondary materials must be developed
<b>Bidding processes / Public procurement</b>	GPP remains optional and inconsistent. EPDs must become mandatory in procurement, integrating reuse and local low-carbon criteria into reconstruction tenders, and providing clear procurement guidelines to support CE
<b>Property value tax</b>	Revisiting regulatory and financial barriers that make new construction more attractive than renovation

Source: Rethink

### 3.3.4. Lessons Learned

- **Better alignment is needed between the circular economy and climate/energy agendas.** Stakeholders confirm that the circular economy (CE) in Ukraine is currently embedded indirectly within broader energy and climate legislation. There is no unified CE policy for the construction sector, and the existing legal instruments—while often aligned with EU directives—focus more on energy efficiency and decarbonisation than on resource circularity. Experts call for a more coherent and intentional alignment of CE, energy, and climate objectives, especially as reconstruction accelerates.
- **Lack of circular targets and implementation roadmap.** Experts emphasized that Ukraine does not yet have a policy dedicated to circular economy in construction, although work is underway to develop such a framework. The transition requires clear targets, roadmaps, and legal obligations—not just strategy documents. A stronger political mandate and a longer-term planning horizon are needed to transition from pilot practices to systemic change.
- **Market forces continue to favour demolition and new construction.** Interviews with NGO and public sector experts noted that economic logic continues to dominate construction decisions, with reuse occurring only when it is immediately profitable (e.g., crushed concrete for backfill). Current property and fiscal regimes make it more attractive to demolish and rebuild than to renovate. There is a need to rebalance fiscal incentives and procurement practices to promote reuse and selective dismantling.
- **Technical standards and certification are not yet enabling circularity.** Current Ukrainian standards and procedures do not recognize reused materials on equal footing with new materials. High documentation and testing costs act as a disincentive. Experts have noted that the transition to CPR 3110 will require significant updates to laws and standards, including the implementation of mandatory product passports with embedded CE criteria. She emphasized the need for green public procurement (GPP) as a lever for driving market transformation.
- **Digital leadership offers opportunities for leapfrogging.** Ukraine has already implemented digital declarations for construction products, a step ahead of the EU in some respects. Experts see this as a foundation for digital product passports and traceability of reused materials. This digital advantage can help Ukraine build CE infrastructure more efficiently, provided regulatory and enforcement systems catch up.

- **Storage infrastructure and supply chains remain underdeveloped.** Centralized storage, sorting, or logistics systems for reusable materials are absent. There is a need for investment in reuse marketplaces and storage infrastructure to enable the circulation of secondary resources, especially vital for managing wartime rubble and accelerating green recovery.
- **Knowledge and workforce gaps are slowing implementation.** Circular construction is not embedded in education, engineering, or vocational training. Highlighted the role of institutions like theirs in experimenting and sharing knowledge but noted that system-wide change requires formal curriculum reform, support for experimentation, and a skilled CE workforce pipeline.
- **Public procurement is seen as the most effective driver.** According to the interview expert, reform of the public procurement law is essential for embedding CE requirements (e.g., EPDs, reused content, product passports) and unlocking industrial investment. Without it, manufacturers are unlikely to adjust due to the costs of testing and process modification. The reconstruction process creates a unique opportunity to institutionalize circularity through procurement reform.

## 4. Feasibility of Circular Economy Policy Instruments in Ukraine: Aligning with the Transition to Decarbonisation

Ukraine's legislative and non-legislative efforts are focused on aligning its regulatory framework with key EU initiatives, such as the CEAP 2.0 and the Fit for 55 package, addressing similar priority areas. However, current circular economy legislation is primarily centred on Extended Producer Responsibility (EPR) schemes, which are more closely aligned with the objectives of the first Circular Economy Action Plan and waste management reforms.

This focus is primarily driven by Ukraine's Waste Management Law No. 2320-IX, which entered into force in 2023. The law outlines two options for fulfilling EPR requirements: collective compliance through a collective scheme or individual compliance through a particular scheme. It also establishes obligations related to waste collection and management, defines financial and informational responsibilities, and introduces specific product design requirements to promote sustainability. Notably, the law mandates that producers are responsible for the entire life cycle of their products, including the management of post-consumer waste.

In the construction sector, several initiatives have been implemented, including the law on providing construction products to the market, which has facilitated the adaptation of over 500 standards aligned with EU construction product regulations.<sup>48</sup> However, a comprehensive national circularity strategy for the construction sector is still lacking. Such a strategy would be essential for ensuring reliable data collection and minimising land-filling, thereby supporting a more sustainable and circular approach within the industry.

Additionally, considering the future requirements identified through the comparison of the CEAP and the Fit for 55 package, it will be necessary to improve alignment, particularly in terms of harmonising market rules and promoting low-carbon construction, where some initial steps have already been taken (see Table 6). However, implementation within the building and construction materials sector remains hindered by financial constraints, regulatory delays, and gaps in technical capacity.

<sup>48</sup> United Nations Industrial Development Organization (2024), *Baseline Analysis of Circular Economy in Ukraine: Final Report*.

**Table 6. Comparison of Key CEAP 2.0 and Fit for 55 Policies: EU and Ukraine Perspectives**

Similarities	Difference		Policies to implement in Ukraine
	Ukraine	EU	
Adopted Waste Management Law No. 2320-IX, aligning with EPR schemes.	Lacks centralised Life Cycle LCA database for systematic impact analysis.	EU is developing LCA systems and has introduced legislative references, but a fully robust system is not yet in place.	Establish a centralised LCA database with EU support to integrate life-cycle thinking and align with EU directives.
Aligning with EU's Emission Trading System (ETS) with plans for phased implementation by 2033.	Limited implementation of DPPs; no clear timeline for rollout.	EU has proposed regulations and directives mentioning DPPs, but implementation is still pending, and detailed guidelines are not yet available	Pilot DPPs in key sectors (construction, electronics) with support from funding programs.
Adopted many Eurocodes for construction materials, ensuring partial alignment with the EU's CPR.	Adaptation of the second version of the Eurocodes to meet the requirements of Regulation 305	EU has a unified classification system for construction materials.	Develop a codification system for construction materials aligned with CPR and international standards to enhance trade compatibility and transparency.
Developing NZEB standards under the EPBD framework.	Slow adoption of renewable energy integration policies despite potential.	EU mandates strict NZEB compliance and high renewable energy targets.	Increase funding for NZEB and renewable energy integration, utilising models such as the Energy Efficiency Fund and Decarbonisation Fund.
Exploring options to adopt Carbon Border Adjustment Mechanism under its Association Agreement with the EU.	Faces challenges with CBAM due to war-related industrial losses and decarbonisation costs.	EU is in the transitional phase of implementing CBAM, which will apply from 2026	Advocate for partial CBAM exemptions during the recovery period and push for financial support for decarbonisation technologies from EU-backed programs.
EPDs for voluntary use, aligned with ISO 14025 and EN 15804.	Lack of mandatory EPD regulations and weak adoption across industries.	EPDs, based on LCA, are promoted in the EU for transparency and sustainability but are not yet mandatory for public construction projects.	Mandate EPDs for public procurement projects, supported by training for Ukrainian manufacturers and harmonisation with international EPD standards.

Source: Rethink

The construction sector is central to Ukraine's CE strategy. Aligning with the EU's CPR and adopting a life cycle approach can enhance sustainability and improve EU market compatibility. While promising, efforts to implement Digital Product Passports (DPPs) and energy efficiency standards require significant infrastructure upgrades and improved standardisation.

Energy efficiency is another cornerstone of Ukraine's CE transition. Policies like the Strategy for Thermal Modernisation of Buildings and the Decarbonisation Fund demonstrate progress toward sustainability, complementing EU directives such as the EPBD. These initiatives promote NZEBs and long-term deep renovation plans. Despite this progress, challenges persist, including the absence of a centralised LCA database, insufficient waste management methodologies, and limited public-private collaboration. Addressing these requires strategic investments, capacity-building, and international support.

In general, implementing CE policies in Ukraine is both feasible and vital. By aligning with EU standards and fostering innovation, Ukraine can accelerate its sustainable re-

covery and strengthen its integration into the European community, thereby demonstrating a resilient and resource-efficient economy.

## 4.1. Circularity Framework for Building and Construction Materials in the Ukraine

### 4.1.1. Ecodesign for Sustainable Products Regulation

Ukraine is working to align its construction material standards with EU sustainability regulations, addressing gaps in life-cycle assessment and ensuring compatibility with EU legislation. One key step in this process was the adoption of the Law of Ukraine "On Energy Efficiency" (2021), which was designed to meet sustainable product regulations, establish general principles for energy-related products, and ensure alignment with EU Ecodesign requirements.

Additionally, state standards DSTU have been implemented, with a focus on energy efficiency. Ukraine's legislative and non-legislative frameworks are closely tied to construction materials in the following aspects:

#### 1. Thermal modernisation requirements:

- The Law No. 1818-IX "On energy efficiency" emphasises the use of energy-efficient materials, such as high-performance insulation, windows, and roofing, to improve the energy performance of buildings during construction and renovation. These align with standards set by the Energy Performance of Buildings Directive (EPBD) in the EU.

Example: Insulation materials, such as those certified by Environmental Product Declarations (EPDs), reduce thermal energy loss and are actively encouraged under the modernisation strategy.

#### 2. Alignment with sustainable product regulations:

- The adoption of state standards (e.g., DSTU EN 60335) includes energy-efficient systems used in building envelopes, HVAC systems, and structural components.

For instance, the use of materials such as low-carbon concrete or recycled aggregates is being promoted as part of the construction sector's shift toward sustainability.

#### 3. Digital Product Passports (DPPs):

- The future integration of DPPs will enable the detailed tracking and traceability of construction materials, ensuring compliance with EU standards and promoting circularity in the construction sector.

To bridge the gap between current practices and EU standards, Ukraine should prioritise policies that promote low-carbon production technologies. Additionally, it is essential to encourage the use of secondary raw materials and to implement a life cycle approach at the level of building and construction materials.

### Digital Product Passports (DPPs)

For Ukraine, aligning with the Digital Product Passport regulation offers an opportunity to integrate into the European market while fostering sustainable practices domestically. Discussions are underway to develop a framework for digital product passports in the country, with a focus on high-impact industries, including construction and electronics.

DPPs are designed to comply with global standards, specifically following ISO/IEC 15459:2015, to ensure consistency, quality, and global interoperability. The standard is not yet adopted in Ukraine, requiring a national roadmap and coordination by UkrNDNC, according to "**Catalogue of Normative Documents (NG) of Ukraine online**".<sup>49</sup> Therefore, a national roadmap for implementing DPPs should be developed, including clear timelines and milestones for key industries, as well as the adoption of this standard. Such efforts should typically be managed by national standardisation bodies, and in Ukraine, this responsibility falls to the **Ukrainian Research and Training Center for Standardization, Certification, and Quality (UkrNDNC)**.

<sup>49</sup> More information is available on the [State Enterprise 'Ukrmetrteststandart'](#) website.

The significant challenges for implementing Digital Product Passports (DPPs) in Ukraine are rooted in several systemic and sector-specific gaps. First, digital infrastructure remains fragmented: Ukraine lacks interoperable platforms for material traceability and the exchange of environmental data, and there is no national LCA database or registry of certified construction products. Regulatory alignment with EU legislation, including the proposed Ecodesign for Sustainable Products Regulation (ESPR), is progressing at a slow pace. The war has delayed the adoption of critical laws and hindered the capacity of key institutions such as UkrNDNC to coordinate national standards, including ISO 14040 and ISO/IEC 15459.

Financial barriers remain high, particularly for small and medium-sized construction firms. The previous ReThink research indicates that most SMEs lack access to capital or incentives to invest in digital material tracking or environmental reporting systems. In addition, Ukraine lacks trained LCA and EPD specialists: as of 2024, only a handful of consultants are certified to prepare product declarations under EN 15804, and academic curricula rarely cover life-cycle analysis or circular product frameworks.

To successfully implement Digital Product Passports, Ukraine must address its current infrastructure, regulatory, and institutional gaps through coordinated national efforts. While aligning with EU standards and ISO 15459 presents a clear pathway toward European market integration and sustainable growth, this requires investment, capacity-building, and effective stakeholder engagement.

#### 4.1.2. Construction Product Regulation

With new obligations under the revised CPR, there is a need for strategic alignment among internal and external stakeholders to harmonise with market standards.

Over the past two years, Ukraine has adopted the second version of the Eurocodes to meet the requirements of Regulation 305 for construction products placed on the market. These standards are already in effect, with ongoing translation efforts, and are anticipated to receive full approval in 2025. National annexes that account for local parameters are in development. The application of these standards in Ukraine is progressing, with regulations covering conformity, testing, certification, marking, and declarations for construction products. This also includes secondary products, ensuring they meet established requirements.<sup>50</sup>

<sup>50</sup> Iryna Luhanova, Standards for circular construction, Zoom, 11.04.2024.

In 2022, the **National Standardisation Body** adopted over 20,000 European standards, significantly aligning Ukraine's regulatory framework with the EU. Earlier documents, adopted before 2020, were also harmonised. An accessible online catalogue of regulatory documents, accompanied by a searchable database, provides detailed information about specific standards and their adoption dates.<sup>51</sup>

<sup>51</sup> Ibidem.

Implementation of ISO standards for construction remains limited. While European and ISO standards exist, the lack of a comprehensive framework limits their application. Furthermore, the scale of destruction and the diversity of waste in Ukraine present signif-

icant challenges, with no established methodologies or approaches for treatment and reuse currently in place.

Finally, integrating sustainability principles into **State Building Standards (DBN)** marks another critical step in aligning with modern practices.

Establishing a national codification system for construction materials is another key requirement for Ukraine's integration into the European Union in this sector, but it has yet to be implemented. Ukraine's national codification system for construction materials is expected to fully align with the CPR, reducing trade barriers and ensuring compliance with European standards.<sup>52</sup>

Currently, Ukraine lacks a unified classification system and shared directory for construction materials, making accurate cost comparisons challenging due to the unique properties and variations of each material.<sup>53</sup>

Several rules are in place to stimulate the reuse and remanufacturing of construction products in Ukraine. For instance, through the adoption of ISO standards, specifically, **DTSU ISO 14021:2016**, which define the content of recycled materials in construction products for pre- and post-consumer materials.

The producers have several directions on how they can have their materials certified:<sup>54</sup>

1. The manufacturer's self-declaration can be prepared in accordance with Clause 7.8 of DSTU ISO 14021.
2. An independent competent authority may issue the conclusion drawn up in accordance with clause 7.8 of DSTU ISO 14021.
3. This applies if the recycled content is at least 60%. Compliance can be demonstrated through a certificate or protocol assessing suitability for reprocessing.

Ukraine has adopted the ISO 14024 standard, and some products, including construction materials, can already be certified under it. However, the certification process is not yet mainstream, and awareness among producers and public authorities remains limited.

It is important to note that secondary materials are currently not competitive in Ukraine due to the low cost of raw materials (crushed stone, sand, etc.). Primary building materials in Ukraine are presently significantly cheaper than secondary ones due to low rental rates for mineral extraction. Therefore, reforming the pricing of natural resources and ensuring the competitive advantage of recycled materials in the market is crucial to stimulate the reuse and remanufacturing of construction products. In Ukraine, the Law "On Public Procurement" (Law No. 922-VIII) permits contracting authorities to consider non-price criteria when evaluating tenders, including the environmental characteristics of goods or services. This means that suppliers offering environmentally friendly products or those that comply with environmental standards may receive additional points when their offers are evaluated.

### National Life Cycle Assessment (LCA)

Ukraine actively references **ISO 14040** to align with LCA requirements, focusing on environmental management across the product life cycle. The standard provides a globally recognised framework for assessing environmental impacts at each stage of a product's life, from production to waste management.<sup>55</sup>

<sup>52</sup> Valeriia Ivanova, *Pricing Ukrainian Reconstruction. A Blueprint for Accountability and Progress*, German Marshal Fund, Series on the Governance of a Marshall Plan for Ukraine, 18.10.2024.

<sup>53</sup> Ibidem.

<sup>54</sup> EU4Environment (2021), *Analytical report on the eco-labelling practices in Ukraine*, United Nations Environment Programme.

<sup>55</sup> More information is available in *ISO 14044:2006*.

## Environmental Product Declarations

Environmental Product Declarations are voluntary for construction products in Ukraine. While the revised CPR requires calculating the environmental footprint using EPDs or forthcoming standards, the EU policy is not yet robust enough to serve as a clear model. Additionally, products such as ISOVER insulation materials, Roto roof windows, and Marco building materials have EPDs available on the Ukrainian market. With stakeholder consultations underway, the government is exploring the possibility of making EPDs mandatory for specific construction products.

In Ukraine, EPDs can be obtained for products across various categories. They are typically valid for five years and must be developed, approved, and registered in an international database by an independent competent party following the requirements of ISO 14025, ISO 14040, and ISO 14044. In the construction sector, EPDs are based on the EN 15804 standard, which is recognised in Ukraine as DSTU ISO 14025:2008 (Environmental labels and declarations. Environmental declarations type III. Principles and procedures).

What this sector in Ukraine lacks is robust standardisation and certification schemes, resulting in inconsistencies in construction quality and sustainability. The absence of comprehensive life-cycle assessments further complicates efforts to ensure environmental compliance and sustainability in construction practices.

### 4.1.3. Industrial Emissions Directive

Ukraine's alignment with the revised IED is an ongoing process. The IED, which sets stricter emission limits and focuses on reducing pollution from large industrial installations, presents both challenges and opportunities for Ukraine, particularly in energy-intensive sectors such as steel, cement, glass, and lime production.

The construction sector, particularly the production of steel, cement, glass, and lime, will face significant changes as Ukraine aligns with the revised IED:

1. Industries will need to invest in BAT to meet stricter emission limits for pollutants such as NO<sub>x</sub>, SO<sub>2</sub>, dust, and heavy metals. This includes upgrading equipment, implementing emission control technologies, and adopting energy-efficient production methods.
2. The financial burden of transitioning to cleaner technologies could lead to higher production costs in the short term.
3. At the same time, the IED encourages resource efficiency, waste reduction, and the reuse of materials, which could potentially promote the use of recycled materials (e.g., steel from scrap, cement from demolition waste) and reduce reliance on virgin resources.

## Emission Limit Values

Ukraine has committed to implementing ELVs as part of its obligations under the Energy Community Treaty, aligning with European Union environmental standards. These commitments are primarily addressed through the **National Emission Reduction Plan (NERP)**, which outlines a phased approach to reducing emissions from large combustion plants.

Compliance with ELVs will also require significant upgrades to existing facilities, including the installation of advanced emission control technologies, such as selective catalytic reduction (SCR) and energy-efficient systems. These measures will inevitably increase production costs but are necessary to meet the phased targets outlined in the NERP.

Sector-specific ELVs are being developed in Ukraine. The NERP outlines a phased approach to reducing emissions from large combustion plants, targeting pollutants such as SO<sub>2</sub>, NO<sub>x</sub>, and particulate matter. The plan includes timelines for retrofitting existing plants and decommissioning non-compliant ones to meet ELVs by 2033. Efforts are underway to harmonise national legislation with the IED, which sets stringent ELVs for various pollutants. Still, the primary constraints are financial capabilities, modernising industrial facilities, technical expertise, and regulatory enforcement (ensuring consistent enforcement of ELVs across all sectors).

### **Integrated permitting system**

The permitting process is partially digitised. Efforts are underway to create a unified on-line platform for environmental permits, with the goal of full integration by 2025.

## **4.2. Climate and Energy Package for Building and Construction Materials in Ukraine**

In the context of active European integration processes and Ukraine's path to full EU membership, adopting Fit for 55 is an obligation for the EU Member States and Ukraine, in particular. The legal basis for assuming these obligations by Ukraine, not being a member of the EU, is the ratification by the Verkhovna Rada of Ukraine of the Association Agreement between Ukraine and the European Union and the European Atomic Energy Community and their Member States.

The legal basis that regulates the policy implementing climate protection measures within the framework of the "Fit to 55" package document are the following regulatory and legal acts:

- Basic principles ("Principles") of the state environmental policy of Ukraine for the period until 2030;
- The strategy for the formation and implementation of the state policy in the field of climate change for the period until 2035;
- The corresponding operational plan outlines measures for its implementation from 2024 to 2026.

However, the principles are of a rather general, non-detailed and declarative nature. The main emphasis of the norms in the above-mentioned legal acts is on Ukraine's need to fulfil its international obligations following the 2015 Paris Agreement.

The Strategy establishes several strategic goals in the specified area, including quantitative indicators for reducing and/or limiting greenhouse gas emissions: no more than 35% of greenhouse gas emissions compared to the 1990 baseline, thereby setting the goal of achieving Ukraine's Updated Nationally Determined Contribution to the Paris Agreement; – an 85% reduction in greenhouse gas emissions from activities related to heat and electricity production, compared to the 1990 baseline; etc.

As a result of the implementation of the CBAM within the framework of the legislative initiatives, "Fit for 55" may cause obstacles to accessing the European market (for carbon-containing products), which additionally indicates the urgent need for Ukraine to implement climate means practically way following international obligations and EU standards.

### 4.2.1. EU ETS

On October 8, 2024, the Ukrainian Parliament adopted the "**Law on the Basic Principles of Climate Policy**," which includes provisions for establishing an ETS as a key tool to achieve the country's climate policy goals. In May 2024, the Ukrainian government submitted a draft law to Parliament while initiating a public consultation to gather input on a strategy outlining the timeline and roadmap for implementing a national ETS (Table 7).<sup>56</sup>

**Table 7. A Comparison of the EU ETS and Ukraine's ETS**

Aspect	EU ETS	Ukraine ETS
<b>Scope</b>	Broad (power, industry, aviation).	Narrower (initial focus: large emitters).
<b>Allocation</b>	Mostly auctioning, some free allocations.	Dominantly free allocations in early phases.
<b>Trading Mechanisms</b>	Fully operational cap-and-trade system.	Trading is not yet operational.
<b>Allowance Reduction</b>	Linear reduction trajectory (4.2% annually).	There is no formal trajectory yet; it is under discussion.
<b>Revenue Allocation</b>	Climate funds, innovation modernisation on.	Likely green recovery and reconstruction.

Source: Rethink

<sup>56</sup> More information is available on the [International Carbon Action Partnership](#) website.

### 4.2.2. EU ETS 2

One of the EU ETS's main achievements is the introduction of a MRV system. In its report "*Impact Assessment: Policy Options Related to the Guidelines of Standards and Technical Regulations for the Green Reconstruction of Ukraine*", UNIDO recommends that Ukraine introduce a MRV system—initially voluntarily—for the building materials industry. This would help to highlight environmental indicators related to GHG emissions. It could later be used during the reconstruction phase to prioritise greener industries.

### 4.2.3. Carbon Border Adjustment Mechanism

CBAM is an instrument that links international trade with the "green" agenda, pressuring countries and companies to review their climate goals. It is planned to be fully launched in Ukraine in 2026.

The construction materials sector, particularly iron and steel, is expected to be among the most significantly affected by CBAM due to their high carbon intensity and their crucial role in Ukraine's reconstruction. Without adequate support measures, Ukrainian producers may face increased costs and reduced competitiveness in the EU market.<sup>57</sup> Integrating circular practices and low-carbon technologies in this sector is, therefore, essential to mitigate CBAM-related risks. The potential waiver structure, though, will likely depend on progress toward implementing an emissions trading system and CBAM-compatible mechanisms at Ukraine's external borders.<sup>58</sup>

<sup>57</sup> Chepeliev, M., Sicheneder, A., Yevstihnieiva, O., & Zachmann, G. (2025), *CBAM's effects on Ukraine's economy & its decarbonisation efforts*.

<sup>58</sup> Taras Kachka, *Ukraine is already negotiating an exemption from the CBAM*, GMK Center, 24.10.2024.

### 4.2.4. Revised Renewable Energy Directive

Ukraine has taken initial steps to implement RED III. In June 2024, the government adopted its NECP for 2025–2030, which sets a target for renewables to constitute 27% of total final energy consumption by 2030. Sector-specific targets include 35% for heating and cooling, 25.4% for electricity, and 14% for transport.

## Biomass, biogas, and RES III development

Several policies are defined through the EU-Ukraine partnership, including biomass (utilising the cascading principle), biogas, and accelerated development of renewable energy sources (RES). Ukraine has committed to fostering a renewable gas partnership with the EU to align with this vision, as outlined in the Biomethane Action Plan. This collaboration was formalised through the Memorandum of Understanding on Strategic Partnership in Biomethane, Hydrogen, and Other Synthetic Gases, signed on February 2, 2023, ahead of the Ukraine-EU summit.

The partnership focuses on enhancing Ukraine's capabilities across the entire biomethane value chain, from production to end-use, with efforts directed at strengthening its regulatory framework, building essential infrastructure, and attracting investments for renewable gas projects. Ukrainian policies also align with broader European initiatives aimed at ensuring seamless integration into cross-border markets. Within this framework, the European Biomethane Industrial Partnership has established Working Group No. 6, dedicated to advancing biomethane collaboration with Ukraine. The group supports Ukrainian efforts to remove trade barriers, harmonise certification procedures, develop biomethane supply infrastructure, and promote cross-border renewable gas markets.

### 4.2.5. Energy Efficiency Directive

Ukraine's energy efficiency legislation aligns substantially with the EU Energy Efficiency Directive (EED). By 2023, over 30 implementing acts had been adopted to strengthen the application of this framework. In December 2023, Ukraine approved two key strategic documents: the **Strategy for Thermal Modernisation of Buildings until 2050**<sup>59</sup> and the **State Targeted Economic Programme**<sup>60</sup> to support building modernisation through 2030.

Efforts are ongoing to establish a national building database and develop certification procedures for energy efficiency professionals. Additionally, Ukraine has introduced sectoral concepts within state programs to enhance energy efficiency in district heating, water supply, and sanitation systems. However, significant gaps remain, such as the need to adopt measures to improve the efficiency of the district heating sector. Progress is also lacking in implementing mandatory energy efficiency criteria in public procurement.<sup>61</sup>

As of November 2024, the total amount of damages caused to Ukraine's infrastructure due to the war is \$170 billion.<sup>62</sup> Among the most affected sectors is the building stock, where initial estimates point to the following needs and costs:

#### 1. Within energy performance data

- Ukraine's multi-family buildings were constructed before 1991, during the Soviet era (80%+), with poor thermal insulation and high energy consumption (average: 194 kWh/m<sup>2</sup>/year, exceeding EU averages by 30–50%).<sup>63</sup>

#### 2. For the building categorisation on

- A significant portion of buildings fall into low energy performance tiers, and this poor performance exacerbates energy inefficiency and energy poverty.
- Over 25% of these buildings are classified in the worst-performing tier, necessitating complete reconstruction to meet modern energy efficiency standards.<sup>64</sup>

<sup>59</sup> Ministry for Communities, Territories and Infrastructure Development of Ukraine, *Strategy for thermal modernisation of buildings in Ukraine until 2050 approved*, 5.01.2024.

<sup>60</sup> More information is available on the website of the *Cabinet of Ministers of Ukraine*.

<sup>61</sup> European Commission (2024), *Ukraine 2024 Report*, (COM no. 699).

<sup>62</sup> Andrienko, D., Goriunov, D., Grudova, V., Markuts, J., Marshalok, T., Neyter, R., Piddubnyi, I., Studennikova, I., & Topolskov, D. (2024), *Russia will pay: The updated assessment of damages caused to Ukraine by Russia's war*, Kyiv School of Economics.

<sup>63</sup> Buildings Performance Institute Europe (2024), *Building back better: 6 investment criteria to drive a sustainable reconstruction of Ukraine's built environment*.

<sup>64</sup> Ibidem.

### 3. Indicative total costs of modernisation

- The indicative cost of reconstruction in Ukraine underscores the scale of modernisation needed across the built environment. For housing alone, estimates reach USD 80.3 billion, with infrastructure damage accounting for an additional USD 55.9 billion.<sup>65</sup>

<sup>65</sup> Ibidem.

Given the country's extensive reconstruction needs, achieving complete alignment with the 2018 **Energy Performance of Buildings Directive** and enforcing minimum energy performance requirements are particularly critical for Ukraine. The **Energy Efficiency Fund (EEF)** continues facilitating investments in thermal renovations for multi-apartment buildings. A new program under the EEF promotes the integration of renewable energy solutions, such as photovoltaics and efficient heat pumps, into housing projects. However, the EEF requires additional state budget funding to sustain its operations.<sup>66</sup>

<sup>66</sup> European Commission (2024), *Ukraine 2024 Report*, (COM no. 699).

Additionally, the 'State Fund for Decarbonisation and Energy Efficiency Transformation', launched in 2024, aims to improve the energy efficiency of "households, utilities, public buildings, and micro, small, and medium-sized businesses".<sup>67</sup>

<sup>67</sup> Ministry for Communities, Territories and Infrastructure Development of Ukraine, *An important step on the path to EU: Ukraine adopts full base of European standards*, 11.04.2023.

The Energy Efficiency Fund (EEF), established in 2018 to support energy efficiency initiatives, does not have a specified budget allocation in the 2024 State Budget. Its funding is primarily derived from international donors and financial institutions. For instance, the Ukraine Energy Support Fund, managed by the Energy Community Secretariat, has received significant contributions, including a recent grant of EUR 77.6 million from Germany in November 2024.

These funds are instrumental in financing energy efficiency projects, renewable energy development, and decarbonisation efforts across various sectors in Ukraine. The DF's establishment reflects Ukraine's commitment to the "polluter pays" principle, directing environmental tax revenues toward sustainable energy initiatives.

#### 4.2.6. Energy Performance of Buildings Directive

##### Nearly Zero-Energy Buildings

The requirements for NZEB were expected to be adopted in 2024; as of 2025, the implementation is ongoing. On November 4, 2024, the Development of Communities and Territories shared on social media that the requirements for buildings to comply with the NZEB standard had been established.<sup>68</sup> These energy efficiency requirements for buildings in Ukraine are similar to the European standards for nearly zero-energy buildings. The main emphasis lies in "high-quality insulation," which has become the standard for construction companies and designers.<sup>69</sup> To support NZEB implementation, several initiatives have been introduced, including the National Plan for the Gradual Increase in the Number of Nearly Zero-Energy Buildings (2023), the Decarbonization and Energy Efficiency Transformation Fund (2024), and the Strategy for Thermal Modernisation of Buildings (2023).

<sup>68</sup> Ukrainian Energy, *Requirements for NZEB Buildings Have Been Developed in Ukraine*, 20.10.2024.

<sup>69</sup> "В Україні розробили вимоги до будівництва споруд з низьким споживанням енергії," LIGA, November 4, 2024,

On February 6, 2025, Ukraine officially introduced NZEB requirements through **Order No. 168**, registered with the Ministry of Justice on February 21, 2025, which defines voluntary standards for energy efficiency, renewable energy use, and building performance.<sup>70</sup>

<sup>70</sup> More information can be found on the website of the State Agency on Energy Efficiency and Energy Saving of Ukraine.

### Minimum Energy Performance Standards

The **State Building Standards of Ukraine** have introduced binding energy performance requirements for all buildings. These standards include recommendations for reducing CO<sub>2</sub> emissions, mandatory energy efficiency expert reviews for new buildings, and defined energy efficiency targets.<sup>71</sup>

### The European Union's Hydrogen and Decarbonised Gas Market Package

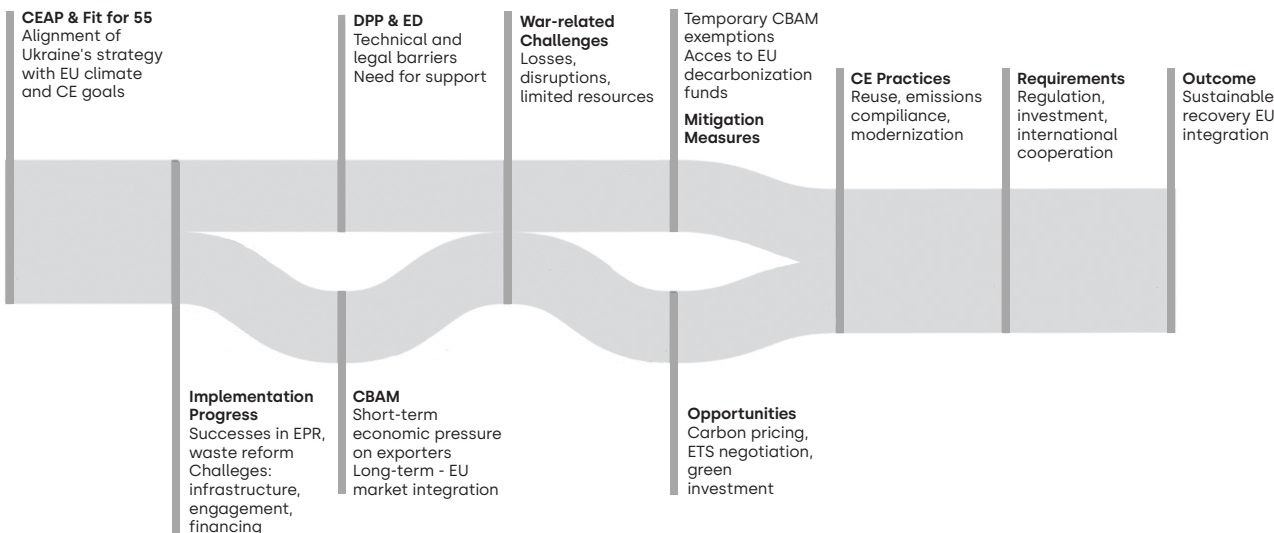
The hydrogen economy holds potential for Ukraine's post-war recovery, especially decarbonising the building sector. With strong renewable energy capacity and existing infrastructure for EU export, Ukraine can develop cost-effective green hydrogen solutions for heating and construction needs, drawing interest from international stakeholders.

Ukraine is at the initial stage of formulating its hydrogen policy. Plans for building a comprehensive framework for the hydrogen economy in Ukraine include the ongoing development of a Hydrogen Strategy and Roadmap that emphasises integration into the EU hydrogen economy. These documents outline steps for regulatory alignment with European standards, infrastructure development, and the creation of export markets. The Hydrogen Strategy outlines short-term (2022-2025), medium-term (2026-2030), and long-term (2031-2050) objectives, including establishing a legal framework, scaling up production to 12-15 GW, and transitioning to a hydrogen-based gas transport system.

### 4.3. Conclusions

The CEAP offers a systematic framework for enhancing resource efficiency, while the Fit for 55 initiative advances climate objectives by prioritising emissions reduction and energy efficiency. Together, these initiatives exemplify best practices that could inform Ukraine's policy development (Fig. 3).

Figure 3. CE policy transition pathway



Source: Rethink.

Implementing the circular economy action in Ukraine shows promise, particularly in areas such as waste management reforms and EPR schemes. However, challenges persist, including a lack of comprehensive infrastructure, limited stakeholder engagement, and financial barriers. Ukraine's efforts to adopt DPP and EPDs align with CEAP principles but require significant technical and legislative support to become fully operational.

<sup>71</sup> United Nations Industrial Development Organization. (2024), *Impact assessment of policy options related to the Guiding Framework of Standards and Technical Regulations on the Green Reconstruction of Ukraine*.

Aligning with European standards could enhance market access, particularly through mechanisms like the Carbon Border Adjustment Mechanism (CBAM), fostering competitiveness in industries such as construction, steel, and cement. While CBAM aligns with the EU's green agenda and provides long-term opportunities for integrating Ukraine into the EU market, its short-term implications raise significant concerns. Interviewed experts are concerned about the increased economic pressures on Ukrainian exporters, particularly in sectors such as steel and iron, which account for the majority of CBAM-applicable exports.

The immediate challenges stem from war-related losses, industrial disruptions, and limited resources for a green transition, which may lead to reduced trade volumes with the EU. Critics highlight the risk that CBAM could act as a "new carbon tax," disproportionately affecting countries like Ukraine, which lack sufficient financial backing or access to EU decarbonisation funds. To mitigate these challenges, temporary exemptions or partial relief tied to climate and industrial policies have been suggested, along with access to EU funding mechanisms for green modernisation.

Nonetheless, CBAM holds potential for Ukraine's long-term alignment with EU climate frameworks. By adopting a predictable carbon pricing strategy, conducting energy system analyses, and negotiating special regimes within the EU Emissions Trading System (ETS), Ukraine can leverage CBAM to foster green investments and enhance its economic resilience. Efforts to integrate CBAM into Ukraine's recovery strategy must strike a balance between short-term economic pressures and the overarching goal of sustainable development and EU integration.

Circular economy practices, such as the reuse of construction materials and compliance with industrial emissions standards, will modernise Ukraine's industries while reducing environmental impact. These transitions are further bolstered by international partnerships and funding mechanisms, enabling innovation and infrastructure upgrades.

Ultimately, the successful implementation of CEAP and Fit for 55 in Ukraine will require a combination of regulatory reforms, financial investments, and enhanced international partnerships. These efforts will support Ukraine's sustainable recovery and strengthen its integration into the European Union, setting a foundation for resilience and leadership in addressing global climate challenges.

## 5. Assessment of Best Practices and Challenges in the Building and Construction Materials Sector in the Nordic Countries

The primary strategy for creating an outlook in the Nordic Region is "The Nordic Vision 2030", which is divided into three sub-sections: a green Nordic Region, a competitive Nordic Region, and a socially sustainable Nordic Region. One of the areas of the activity is the creation of a sustainable built environment, where the Nordic Council of Ministers launched several programs related to the transformation in the built environment, such as:

- **Nordic Sustainable Construction Programme 2021-2024,**
- **The Nordic Network for Circular Construction 2021-2024,**
- **The Nordic Carbon Neutral Bauhaus 2023-2024.**

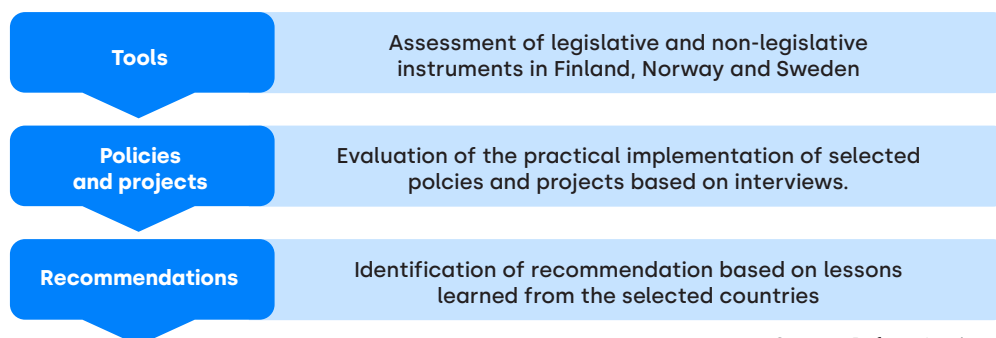
In 2024, the Nordic Ministers of Housing and Construction expressed that the Nordic Sustainable Construction Programme would run from 2025 to 2027.

For this research, the primary focus was on the Nordic Sustainable Construction Programme (2021–2024), which served as the foundation for assessing the programme's key activities. Based on the findings, three specific aspects were evaluated:

- Overview of wood construction materials in Norway,
- Overview of the reuse of construction and demolition products in Finland,
- Overview of sustainable skills development for the built environment in Sweden.

Following the methodological approach presented in Figure 4, data was collected through desk research and interviews conducted on these topics.

**Figure 4. Methodological Framework for Assessing Circularity Policies and Practices in the Nordic Countries**



Source: Reform Institute.

## 5.1. Overview of wood construction materials in Norway

"Norwegian National Strategy for a Green, Circular Economy" sets out at least three goals relevant to the construction industry:

- Sustainable production and product design
- Sustainable ways to consume and use materials, products, and services
- Circular economy as the driver of innovation, value creation, and workplaces

The governmental policy in Norway aims to achieve more circular buildings through regulation, emphasising the role of the state as a property manager, strengthening the product framework for more sustainable solutions and tapping into the potential of the waste sector as a source of materials, as well as provision of digitised information on product and secondary material properties. It also calls for the use of climate-friendly materials and low-energy design in city buildings and facilities, as well as the creation of fossil-free construction sites.

The regulatory framework at the central level is still in development, and local authorities and businesses remain the key drivers of transition and innovation in the construction sector, utilising the broad regulations provided by the government.

The key regulations to current circular solutions in the construction sector include:

1. Pollution Control Act
2. Planning and Building Act with accompanying regulations
3. Forestry Act 2005

The Pollution Control Act (PCA) lays down a general prohibition against pollution, with exceptions provided only by specific permissions of law or competent authority. The Pollution Control Act covers GHG emissions, although it is not a principal tool of emission reduction (compared to emission trading and carbon tax).

The Planning and Building Act (PBA), along with its accompanying regulations and standards, establishes the overall framework for construction efforts, particularly in relation to low-emission buildings, spatial planning, and optimising land use and transport to reduce emissions from construction and urban development.

PBA's accompanying regulations and standards include:

- Regulations on technical requirements for construction works (TEK)
- Regulations relating to building applications (SAK)
- Regulations on sales and documentation of products for construction works (DOK)

The construction sector generates around 40% of the overall resource use and 20% of waste in the Norwegian economy<sup>72</sup>. Because of the high national share of renewable energy (with hydropower as the primary source of electricity), most emissions from construction come directly from activities at construction sites (machinery, heating/cooling, etc.) as well as the production of materials and transport. At the same time, 97% of the used materials are not being recycled back into the Norwegian economy, with the construction sector accounting for the second largest annual resource footprint in the economy after the food industry, at 43 million tons<sup>73</sup>.

Norwegian construction benefits from the high share of wood as a building material. Around 90% of housing constructed in Norway is built with a significant share of wood<sup>74</sup>.

<sup>72</sup> Netherlands Enterprise Agency (2021), *Norway: Sustainable building market study 2021*.

<sup>73</sup> Ibidem.

<sup>74</sup> Zahiri, S. (2019), *Wood high-rises in Nordic countries: An overview*, Council on Tall Buildings and Urban Habitat.

As such, the country is in a good position to capitalise on the already high wood share by ensuring the sustainable sourcing of the material (via proper forest management and treatment of wood for construction) and adequate framework for its use beyond residential construction, in particular, high-level multi-story buildings. Expert interviews show that an important feature of the Norwegian sourcing system for wood is the role of harvesting cooperatives co-owned collectively by forest owners and their organisations (at least four of such cooperatives control most sourcing operations in the country). Such cooperatives handle most of the activities related to harvesting wood for construction, interacting with buyers, and conducting transactions. The collective nature of cooperatives' management and the large number of co-owners limit the owners' role in the sourcing process and their ability to oversee sourcing operations.

Norway seeks to increase environmental gains by utilising circular and decarbonisation solutions to reduce the footprint of other materials, including decarbonising the cement industry and enhancing the reuse of waste. Expert interviews have showed that, for the circular use of wood and other materials in the sector, integration of circular value chains into general value chains for materials is essential. NGOs and municipalities (e.g. Oslo) create pilot resource hubs and material banks that serve as both logistical hubs for gathering, storage and distribution of recovered materials and as centres of excellence for gathering and disseminating good practices (including by providing relevant on-site workforce training). However, experts managing these hubs suggest that creating parallel supply chains for only recovered materials should be a transitional stage; in the long term, this approach is counterproductive, as contractors and buyers should eventually source recovered materials from their regular suppliers. The growing interest in recovered materials and increasing demand from final customers (both building owners and their clients, such as entities renting office spaces) is consistently shown as a positive force towards a circular approach to materials, along with the relatively compact size of Norwegian value chains, which allows for easier networking. Logistical and data gathering barriers are presented as significant challenges to be solved, i.a., by the operation of reuse hubs and increased focus of research institutions on resource-mapping (e.g. NTNU-led initiative to map the entire building stock of Trondheim with regard to embedded materials and resource flows)

In addition, the carbon footprint of construction site activity is being addressed, principally on the municipal level, in order to render on-site energy use fossil-free by 2030 and improve waste management, and procurement regulations change to accommodate the increased weight of environmental criteria in procurement procedures, including those related to construction.

Traditionally, processed wood has long been a dominant material in residential housing in Norway, but it is being supplemented with more innovative products, such as cross-laminated wood (CLT) and glue-laminated wood (glulam), for the purposes of urban and high-rise construction. Currently, private sector and local authorities, often with governmental funding, are leading practical attempts to use wood in large-scale construction projects; however, public programs initiated these efforts. It has been observed by the experts that the capacity of domestic industry to provide properly processed material has improved significantly compared to early pilot projects, which were more reliant on imports (i.a., from Austria and Germany), but that the will to create local value chains to avoid high transport-related emissions was consistently present in the sector from the very inception of the idea for the use of wood in large-scale construction projects.

The Norwegian Wood-based Innovation Scheme (2006-2016), administered by the governmental agency Innovation Norway, aimed to stimulate activity in three main areas:

- industrial building and construction
- wood products and traditional use of wood
- innovation systems<sup>75</sup>

The scheme attempted to mobilise all relevant stakeholders, from researchers and public decision-makers through designers and architects, to construction companies and traders. Wood-based Innovation Program, along with Nordic Wooden Cities and the Norwegian Wood Project conducted in Stavanger from 2008 (the latter including a series of projects with diverse scale and purpose) stimulated the idea of testing the use of wood in various types of buildings - at first, with residential uses and tourism in mind. Gradually, the market attention turned towards more high-profile projects, including public utility buildings and high-rise buildings. Projects realised with innovative applications of wood, often developed by multi-stakeholder alliances (Powerhouse Collaboration, Nordic Smart House and others), include:

- Vennesla library and cultural centre (2011)
- Powerhouse Kjørbo (2014)
- 14-story Treet in Bergen (2015)
- Moholt student housing in Trondheim (2017)<sup>76</sup>
- Oslo Airport North Pier with glulam roof (2017)
- Powerhouse Drøbak Montessori school (2018)
- glulam-structured 18-story Mjøstårnet in Brumunddal (2019)

Appropriate funding schemes (managed primarily by state agency Enova) and green public procurement regulations (the requirement of a minimum weight of 30% for environmental criteria in all relevant public procurement procedures—Norwegian Procurement Regulation, Utilities Regulation) have a supporting role in reinforcing this direction in Norwegian construction as, respectively, enablers of innovations and increased demand for low-to-zero carbon building materials and techniques. Still, in the opinion of the interviewed experts, funding for relevant research is only recently reaching the levels necessary to produce meaningful progress in the circular use of wood and other construction materials, particularly in terms of actual reuse and recovery. It is noted that the academic community has consistently demonstrated an overall high level of ambition in creating innovative research projects for at least a decade, but it is only recently seeing improved funding opportunities and increased interest from relevant bodies, such as the Norwegian Research Council.

It seems, however, that current provisions on construction material recycling and reuse do not yet provide solutions for future reuse of wood from demolitions or renovations—expert interviews have consistently showed that burning for energy remains the dominant method of wood utilisation. Although the application of wood as material develops dynamically, it is not matched by equivalent progress in methods of reuse and recovery, owing, i.e. to the abovementioned limitations in relevant research and lack of consistent political will to deliver stable regulation of the issue.

<sup>75</sup> Norwegian Ministry of Agriculture and Food (2011), *Norwegian forest policy*.

<sup>76</sup> Brenna, A., Marique, A.-F., & Reiter, S. (2019), *Towards a more circular construction sector: Estimating and spatializing the reuse potential of building materials*. *Frontiers in Built Environment*, 5, 131.

**Table 8. Solutions relevant to the Norwegian construction industry (sustainable materials and additional areas)**

Area of activity	Objective	Instruments	Description
Sustainable construction materials	Wood – sustainable sourcing	Nature Diversity Act of 2005: Forest management plans	<ul style="list-style-type: none"> <li>Combining conservation with sustainable use of forest areas for resources, recreation and CO<sub>2</sub> sequestration</li> <li>Places the primary obligation on landowners (70% of forests are private property)</li> <li>requires landowners to develop forest management plans, including inventories of environmental resources and values and means to maintain them<sup>77</sup>.</li> </ul>
		Norwegian Forest Certification System and Regulation on Sustainable Forestry	<p>Two systems in place:</p> <ul style="list-style-type: none"> <li>Program for the Endorsement of Forest Certification (PEFC) standard (covers over 70% of total forest area)<sup>78</sup>. Considered to be more lenient to sourcing.</li> <li>Forest Stewardship Council (FSC)<sup>79</sup>, with 10% of the forest area certified accordingly to FSC guidelines<sup>80</sup>. Considered to be environmentally stricter</li> </ul> <p>The Regulation on Sustainable Forestry requires that forestry operations adhere to the requirements of the Program for the Endorsement of Forest Certification (PEFC) standard, limiting the landowner's management options to be more sustainable<sup>81</sup>. Since 2022, the certification scheme has been in place. The latter are generally perceived as stricter from the perspective of environmental protection, while PEFCs are viewed as a bit more lenient to resource-harvesting</p>
		Forestry Act 2005	<ul style="list-style-type: none"> <li>Forestry Act 2005 requires landowners to regenerate forest areas within three years after harvesting.</li> <li>Minimum age requirements for felling are also to be observed.</li> <li>In practice, felling through clear-cutting and stem-only harvesting are the dominant approaches to wood-sourcing, likely due to smaller demand in energy generation compared to e.g. Sweden or Finland.</li> </ul>
	Wood – sustainable and durable construction material	Building and safety regulations	<ul style="list-style-type: none"> <li>Norwegian regulations permit the use of wood in high-rise buildings as well, subject to fire-resistance requirements</li> <li>Said requirements, including strict provisions on the use of sprinkler systems in high-rise construction, provide favourable conditions for wood use<sup>82</sup>.</li> </ul>
		Support for commercialisation of innovative wooden products for the purposes of urban and high-rise construction.	<ul style="list-style-type: none"> <li>Early pilot projects: Wood-based Innovation Program, Nordic Wooden Cities and the Norwegian Wood Project, continued by industry alliances such as Powerhouse Collaboration, Nordic Smart House</li> <li>Pilot projects using cross-laminated wood (CLT) and glue-laminated wood (glulam)</li> </ul>
	Procurement	Environmental requirements in procurement	Amendments to procurement legislation

<sup>77</sup> Pomponi, F., & Moncaster, A. (2020), *Scrutinising embodied carbon in buildings: The next performance gap made manifest. Buildings and Cities*, 1(1), 183–197.

<sup>78</sup> Programme for the Endorsement of Forest Certification, *Public consultation: Norwegian forest certification system*, 27.09.2022.

<sup>79</sup> Forest Stewardship Council, *Norway Officially Joins FSC for Stronger Forest Protection*, 02.02.2022.

<sup>80</sup> Forest Stewardship Council, *FSC Forest Stewardship Standard for Norway is published*, 12.01.2024.

<sup>81</sup> Pomponi, F., & Moncaster, A. (2020), *Scrutinising embodied carbon in buildings: The next performance gap made manifest. Buildings and Cities*, 1(1), pp. 183–197.

<sup>82</sup> Zahiri, S (2019), *Timber high-rises in Nordic countries: An overview*. Council on Tall Buildings and Urban Habitat.

### 5.1.1. Case-study: Powerhouse Collaboration and the Paris-Proof standard for buildings

- **Type of Cooperative Activity Amongst the Actors Involved**  
Multi-stakeholder industry alliance for energy efficient construction
- **Type of Actors Involved**  
Business (Skanska, Snøhetta, Entra, Hydro, Asplan Viak), NGO (ZERO Environmental Foundation) with financial input from academic and scientific organisations (Research Center on Zero Emission Buildings) and the Norwegian state (Enova SF funding)
- **Type of Solution (already on the market, new one)**  
Integration of existing and development of innovative technologies to achieve the standard of energy-positive building design and construction, especially in the large-scale and non-residential sector
- **Description of the Case**  
Started in 2011 with a renovation project in Kjørbo, Powerhouse coordinates efforts of designers, developers and tech solution suppliers to reach the so-called "Paris Proof Standard". Paris Proof requires buildings to be constructed as energy-positive and sets a total lifespan greenhouse gas (GHG) emission cap for buildings. The powerhouse approach thus integrates passive measures in design, low-carbon construction materials (including wood and green aluminium), greening the construction sites through, i.e., on-site renewable energy generation, as well as reuse and renovation of buildings to zero-emission standards. The most illustrative projects to date include Powerhouse Kjørbo (the renovation of two 1980-era office buildings to an energy-positive standard) and Drøbak Montessori School (a mostly wooden building with a 30,500 kWh solar power generation capacity and passive design optimised for heating).
- **Main Needs for the Deployment of the Case-Study Ecosystem**
  1. Mature companies with strong R&D capabilities, including technology solutions, least in the pilot phase
  2. NGOs and scientific networks capable of productively engaging with business
  3. Sound criteria for state funding and oversight of funded projects: Enova applies the "energy efficiency first principle" and prioritises projects with circular solutions to capture and utilise any excess energy and heat/cold, as well as document the feasibility of applied technologies and ensure a long lifespan. A high ratio of energy result to funding) kWh per NOK.
  4. Domestic capacity to provide sustainable materials or trusted source of import (e.g. sustainably sourced glulam wood for construction) – it was observed that Norwegian glulam suppliers lost contracts such as Oslo Airport North Pier to German competitors – this is acceptable as long as imported product meets the comparable criteria of sustainable sourcing and production to those binding in the country of import.
  5. Trusted certification system to measure the performance of projects – Norway does not have a mandatory national certificate, but BREEAM NOR has been broadly and voluntarily accepted as the benchmark for building certification.
  6. Standards for on-site GHG emission management – in Norway are provided on the municipal level by cities that experience the most construction activity (Oslo and six other largest cities)

- **Main Benefits Created by the Deployment/Operation of the Case-Study System**

Creation of the integrated domestic value chain allowing for complete coverage of construction efforts – from design through supply and on-site management. Such an integrated chain creates networks of entities sharing know-how and develops a culture of collaboration between stakeholders from various backgrounds (smoothing the business-science interactions). Such an environment not only allows for the faster introduction of further innovative solutions to the market but also creates a value chain and complete industrial processes that can be then exported to third countries as a package rather than isolated services and products. It also promotes the propagation of know-how across the networks of participating entities. Furthermore, projects like Powerhouse Kjørbo demonstrate the potential of not just the reuse of recycled construction materials but also renovation as the reuse of entire buildings or building complexes by bringing their energy and thermal parameters up to the desired modern standards.

- **Source of Funding**

Mixed Corporate and State (members' own financing + Enova SF funding)

- **Conclusions**

Nordic countries, especially Norway, are well-positioned to lead the way in sustainable construction through the innovative use of wood, thanks to their abundant forests and favourable climate. Their efforts extend beyond materials, targeting a carbon reduction in construction sites and promoting circular practices. Initiatives like Powerhouse thrive because of strong governance, transparency, and a mature innovation ecosystem. The Nordic model shows that success in sustainable building comes from both structural collaboration and a shared commitment to sound governance and environmental principles.

## 5.1.2. Recommendations

Based on the interviews, we identify the following lessons learned from the Norwegian system that could be applied in other countries:

- 1. Ensure Sustainable Sourcing Through Strong Forest Management and Certification**

The Norwegian case illustrates both the potential and current limitations of sustainable construction using wood and timber. High forest management standards, embedded in legislation and reinforced by internationally recognised certification systems, ensure that wood sourcing delivers high-quality material while supporting conservation efforts. This approach offers a valuable model for countries seeking to strike a balance between material quality and environmental protection.

- 2. Develop Material Banks and Reuse Hubs to Strengthen the Value Chain**

The distribution and recovery segments of the construction value chain in Norway are still underdeveloped, both for wood and other recovered construction materials. Norwegian municipalities, businesses, and NGOs are addressing this gap by establishing material banks and reuse hubs—often with support from EU funding. These facilities serve a dual function: improving the logistics of material circulation (by collecting and making recovered materials available for reuse) and acting as centres of excellence for training and knowledge-sharing. Their establishment is recommended as a key step in enabling circular construction practices.

### 3. Establish Coherent National Policies and Standards for Material Recovery

A lack of a unified and binding policy framework at the national level remains a significant barrier to advancing circularity. While surveying buildings before demolition is mandatory in Norway, there is no legal obligation to recover materials, and no standard exists for the treatment of reclaimed wood. Consequently, the incineration of most recovered timber for energy is common, often contradicting the EU's cascading use principle. To support a shift toward true circularity, it is recommended to develop robust, nationwide standards and obligations governing the recovery, treatment, and reuse of construction materials—particularly wood.

### 4. Foster Collaboration Between Academia, Government, and Industry

One of Norway's strengths lies in its established culture of collaboration among academia, industry, and government. The relatively small population facilitates personal networks, making cooperation more efficient. While this model may be more challenging to replicate in larger countries such as Poland or Ukraine, it highlights the importance of building institutions and networks that promote coordination and trust among stakeholders. Developing industrial alliances, research-industry partnerships, and public-private cooperation mechanisms should be a policy priority in such contexts.

### 5. Support High-Quality Research Through Data Access and Strategic Funding

Academic research plays a key role in developing circular solutions with commercial applications. Its success depends on talent, stable funding, and access to complete, high-quality data—particularly regarding the national building stock. Experts emphasised the importance of enabling research institutions to access public databases (e.g. cadasters) and aligning their research agendas with industry needs. It is therefore recommended to invest in competent research centres, enhance their cooperation with industry, and ensure they have reliable access to relevant data sources.

## 5.2. Overview of the reuse of construction and demolition products in Finland

Finland aims to achieve a carbon-neutral circular economy by 2035, with a key focus on reducing raw material consumption and minimising waste generation through a circularity approach. The Finnish government's Resolution on the Strategic Programme for a Circular Economy outlines specific goals, including maintaining domestic raw material consumption at 2015 levels (excluding export materials), doubling resource productivity, and doubling the circular material use rate by 2035. The strategy prioritises sustainable resource use and highlights the construction sector as a key area for action. Specific measures include:

- Implementing low-carbon procurement criteria for buildings
- Promoting renovation activities,
- Enhancing awareness and expertise in the real estate and construction sectors
- Increasing the use of recycled materials.

The EU Waste Framework Directive (Directive 2008/98/EC) outlines one of the primary targets for the circularity of construction and demolition waste at the EU level. This directive introduced the obligation to achieve a minimum rate of 70% by weight for preparation for reuse, recycling, and recovery of such waste by 2020. However, Finland has not yet achieved this goal.<sup>83,84</sup> Studies in the Nordic region show that none of the Nor-

<sup>83</sup> More information about Statistics Finland's Waste Statistics is available [here](#).

<sup>84</sup> Cristóbal García, J., Caro, D., Foster, G., Pristerà, G., Gallo, F. and Tonini, D., (2024), [Techno-economic and environmental assessment of construction and demolition waste management in the European Union](#).

dic countries have yet reached this target.<sup>85</sup> According to Finnish statistics, the recycling and recovery rate was consistently around 55%.<sup>86</sup>

On a national level, most construction and demolition waste in Finland originates from repair projects and building demolitions (approximately 85%), with the rest resulting from new construction activities.<sup>87</sup> Currently, Finnish regulations do not distinguish between reused materials and new products, creating practical challenges and hindering effective reuse.<sup>88</sup> As a result, the use of dismantled building components in new construction projects remains very limited due to strict validation requirements.<sup>89</sup> The revision of the Construction Products Regulation offers a potential solution by incorporating used and remanufactured products within its regulatory framework. The interviewed expert emphasised the importance of establishing a clear hierarchy to facilitate the optimal recovery and reuse of materials. In Finland, the reuse process for the concrete fraction is still under development and is expected to be completed later this year. The expert also stressed the importance of creating financial incentives to make reused products more appealing than new ones, as well as streamlining the permitting process for their use. According to the expert, the regulatory framework should encourage repair and reuse over demolition. Although research-based projects and municipal-level pilots have been introduced, they remain financially demanding and time-consuming to implement.

The main actions already developed to support reuse processes include:

- The 2021 revision of the Finnish Waste Act, which requires construction projects to minimise waste and toxicity, promote material reuse, and arrange separate collection for key materials such as concrete, asphalt, untreated wood, metal, and hazardous waste.<sup>90</sup>
- Demolition work – a guide for operators and contractors
- Pre-demolition Audit – A Guide for Authors (Institutional Repository for the Government)
- Circular economy in public demolition projects – Procurement guide (Institutional Repository for the Government)
- Life cycle assessment mechanisms implemented in Finland and other Nordic countries, supporting material reuse and targeting CO<sub>2</sub> emissions reductions to zero for modules A1-A3 (raw materials, transport, and manufacturing).<sup>91</sup>

New actions will further support implementation through the new Construction Act, which entered the force at the beginning of 2025, which will address the following:

- **Digitalisation of data**, enhancing transparency in reuse and recycling activities.
- **New requirements for life cycle assessment in new buildings**, including provisions for repair and demolition activities
- **Promotion of low-carbon construction**, emphasising the use of reused and recycled materials.

The interviews emphasised the key components of the new Construction Act, particularly those promoting the recycling, recovery, and reuse of construction and demolition products. One of the most significant elements is the introduction of low-carbon building regulations, which require a climate declaration for new buildings. This declaration is based on a 50-year calculation and includes both the carbon footprint and carbon handprint. From a life cycle perspective, interviewees also stressed the importance of assessing the overall lifecycle performance of buildings.

<sup>85</sup> Svedmyr, K., Weckman, A., Suikkanen, T., Wium Pálmarisdóttir, J., Grønhaug, B., Damsgaard, J., Lund, M. and Jönbrink, A.K., 2024. *Reuse, recycling and recovery of construction and demolition waste in the Nordic countries: An inventory of facilities and techniques in the Nordics including an outlook on other European countries.*

<sup>86</sup> Ibidem.

<sup>87</sup> More information about Circular economy in the construction sector is available [here](#).

<sup>88</sup> Laarsberg S., Kress L. (2023), *Policies Enabling the Reuse of Construction Products in the Nordics.*

<sup>89</sup> Zhu, Y., & Tähtinen, K. (2022). *Conditions for reuse of building components in Finland*, Ramboll Finland Ltd & Building Information Foundation RTS.

<sup>90</sup> Luoma-aho, K., Weckman, A., Anttonen, R., Suvanto, J., Rantala, H., Nissilä, T. and Toorikka, A., (2024), *Circular Construction in Nordic cities: Current state and development.*

<sup>91</sup> Nordic Sustainable Construction, *Reuse of construction materials is rewarded in the Nordic building LCA*, 09.05.2023,.

In addition, the new Construction Act introduces a more structured approach to promoting the circulation of materials through the demolition material declaration process. This consists of two stages:<sup>92</sup>

- **Permit Stage:** During the building or demolition permit phase, information must be provided on estimated demolition materials, hazardous substances, and landmasses. There is also an option to report reusable materials and products voluntarily; however, most renovation projects are now also required to include this information.
- **Final Inspection Stage:** At this stage, details must be provided regarding the actual quantities of demolition and construction waste, their destinations, and the methods of treatment, including handling of hazardous waste and contaminated landmass. Reporting on reused building materials remains voluntary.

Based on these requirements, the Finnish Environment Institute (SYKE) is developing a new demolition materials database. This database is aligned with the new permit system and aims to support opportunities related to the reuse of building materials and landmasses.<sup>93</sup>

At the end-of-life stage, preparations are underway for a new Circular Economy Act, which will replace the current Waste Act. This forthcoming legislation aims to increase the use of secondary raw materials, potentially leading to a long-term boost in the reuse of construction materials.

The interviews also highlighted the voluntary agreement under the Finnish Green Deal. The core idea is that organisations choose actions in at least two focus areas<sup>94</sup> and define concrete steps to implement them. A research-based evaluation group reviews each commitment and provides recommendations to the Ministry for approval or revision. Once approved by the organisation's highest decision-making body, progress is reported every three years, and the Circular Economy Green Deal steering group oversees implementation.

The interviews highlighted the importance of a standardised framework of key performance indicators for effectively measuring progress toward circular economy objectives. One notable initiative in this area is a collaborative project between Eco-Fellows and Tampere University. The project is developing KPIs based on existing frameworks from the Organisation for Economic Co-operation and Development (OECD), the European Commission, and the Circular Cities and Regions Initiative (CCRI). Its primary focus is on house construction, land and earthworks, and industrial material flows.

### 5.2.1. Case-Study: Circular Pirkanmaa – Regional Development Center for Circular Economy operated by EcoFellows Ltd

- **Type of Cooperative Activity Amongst the Actors Involved:**
  - Regional development centre for circular economy supporting municipalities and companies.
- **Type of Solution**
  - Creation of a circular economy service focused on building, road and street construction, earthworks, and industrial material flows.
- **Description of the Case**  
**Circular Pirkanmaa – Regional Development Center for Circular Economy operated by EcoFellows Ltd**, which is a public-sector-owned company dedicated to the circular economy, established in 2023. Its operations are primarily based in the Tampere region.

<sup>92</sup> Hakaste, H. (2025) Circular building policies in Finland [Presentation]. Ministry of the Environment, Finland.

<sup>93</sup> Ibidem.

<sup>94</sup> Resource-wise built environment, Industry based on a circular economy, Sustainable consumption and business, Material-efficient energy system, Renewing food system.

In the building and construction materials sector, the operational model emphasises what municipalities can do differently—not only within the built environment but also in managing industrial material flows. The approach goes beyond resource efficiency, focusing on how municipalities manage planning, zoning, and procurement. By influencing these upstream decisions, the model aims to increase opportunities for building repair and material reuse while reducing unnecessary demolition.

For companies, **the centre** facilitates market dialogue to create a collaborative platform between municipalities and businesses. These platforms serve to translate shared needs and challenges into actionable solutions and provide a forum for discussing broader circular economy issues.

- **Fundament and Objectives for the Deployment of the Case-Study Ecosystem**

- Establish a service and operational model that enables systematic circularity in construction, with an emphasis on repair and reuse over demolition.
- Create a collaborative exchange platform between municipalities and businesses.
- Develop an ecosystem that maps and understands the regional building stock in Tampere, estimates future urban mining potential, and quantifies the impact of reused materials in terms of CO<sub>2</sub> reduction and cost savings on virgin materials.

- **Main Benefits Created by the Deployment/Operation of the Case-Study System**

Creation of a collaborative ecosystem where municipalities and businesses align on solutions for circular practices in home building, road and street construction, earthworks, and industrial material flows.

- **Source of Funding**

The initiative is funded through a development contract with a waste management company, which focuses on expanding material flows, as well as additional project-based funding.

- **Conclusions**

Circular Pirkanmaa showcases how a regional, public-sector-led initiative can foster circular economy practices in construction by aligning municipal planning and operations with business collaboration

## 5.2.2. Recommendations

Based on the interviews, we identify the following lessons learned from the Finish system that could be applied in other countries:

1. **Promote Repair and Reuse over Demolition**

A key lesson from the Finnish model is the importance of prioritising repair and reuse mechanisms rather than defaulting to demolition. This requires the development of clear qualification criteria and legal frameworks for reused construction products, allowing them to compete with new materials in both regulatory and financial terms. One effective approach is to introduce ambitious CO<sub>2</sub> emission limits for buildings, which encourage circular practices that reduce emissions throughout the entire lifecycle.

## 2. Establish Ecosystems for Circular Solutions

Creating collaborative frameworks, such as the Finnish Green Deal, is a good practice that brings stakeholders together to co-develop strategies and climate commitments. This is particularly important for countries with limited experience in the circular economy. Additionally, fostering collaborative networks—such as hubs, clusters, and other local or regional initiatives—can accelerate the adoption of circular practices. Nordic collaboration platforms (e.g., the Nordic Sustainable Construction Programme 2021–2024, the Nordic Network for Circular Construction 2021–2024, and the Nordic Carbon Neutral Bauhaus 2023–2024) provide strong examples of how national cooperation can enhance knowledge sharing and system innovation.

## 3. Advance Digitalization for Traceability and Transparency

A common challenge in construction processes is ensuring the traceability and digital mapping of building components. Finland's new Construction Act has introduced data collection frameworks ahead of the corresponding European requirements. This represents a good practice for other countries, which will need to align with upcoming obligations under the CPR and the EPBD.

## 4. Support Pilot Projects and Business Model Innovation

Promoting reuse, recycling, and material recovery requires pilot projects that address both technical and organisational aspects. Across Finland, local, regional, and national initiatives launched such pilot projects to define technical standards and develop new business models, including material banks and reuse warehouses. However, demolition and construction are still too often treated as separate value chains. A key insight is to align them, envisioning scenarios where materials from demolition directly support new construction, thereby closing the loop.

### 5.3. Overview of sustainable skills development for the built environment in Sweden

According to The Circularity Gap Report,<sup>95</sup> the construction industry accounts for the largest share of Sweden's total material footprint, contributing 32% (82.17 million tonnes). Housing and infrastructure dominate resource use, accounting for 46.9% of total material consumption (approximately 125 million tonnes).

Recognising these significant impacts, Sweden published the Circular Economy – Strategy for the Transition in 2020,<sup>96</sup> focusing on sustainable production and product design, sustainable consumption, non-toxic and circular material cycles, circular business models, and innovation. The strategy emphasises the significance of the construction and property sectors in enhancing circularity and improving waste management. It highlights the need for better waste separation and sorting, restricting hazardous substances, and increasing transparency about materials and construction content. To drive progress in these areas, the Swedish government tasked the National Board of Housing, Building, and Planning, supported by the Swedish EPA and the Swedish Agency for Innovation Systems, with developing indicators, disseminating information, and guiding authorities and stakeholders in advancing the transition toward circularity in the construction sector.<sup>97</sup>

The sector's transformation, driven by decarbonisation and circularity requirements, has also led to a skills shortage. One reason for the Pact for Skills pushes the large upskill and reskill at least 25% of the construction industry's workforce in the next five years.<sup>98</sup> Two factors primarily caused the skills shortage:

<sup>95</sup> Circularity Gap initiative (2023), *Circularity Gap Report Sweden*.

<sup>96</sup> Lövin, I., Baylan, I. (2020), *Circular Economy-Strategy for the Transition in Sweden*.

<sup>97</sup> European Environment Information and Observation Network (2024), *Sweden: 2024 country profile - Climate and Energy*.

<sup>98</sup> European Commission, *Pact for Skills: Commission facilitates upskilling and reskilling of workers in the construction ecosystem*, 8 February 2022.

- A lack of skilled workers due to retirements and difficulties in attracting younger employees,
- The growing demand for expertise in green and digital transitions to support the evolving ecosystem.<sup>99</sup>

Like other EU countries, the Nordic Region struggles to find qualified employees with the knowledge, skills, and competence to match the construction industry's needs.<sup>100</sup> The research provided by Autodesk shows that 1,000 construction professionals throughout Denmark, Finland, Norway, and Sweden show that 84% of firms struggle to recruit workers.<sup>101</sup>

The Nordic Sustainable Construction, the main programme aimed at sustainability in this sector, as part of Work Package 5: Competences for Reuse in Construction and Programme Secretariat, focuses primarily on developing educational materials for students to enhance their competencies in reusing construction materials. Those work pages concentrate on the following:

- **Educational Materials:** Skills4Reuse (An introduction to terms within sustainability, circularity, reuse vs. recycle and, design for disassembly, A module on reuse of wood, A module on reuse of brick)
- **Creating Links and Engaging Stakeholders**
- **Organisation events**
- **Community of Practices.**<sup>102</sup>

Sweden, like other Nordic countries, has recognised the need for better governance of skills. This includes organising upskilling and reskilling initiatives, introducing alternative forms of education better aligned with the needs of working life, strengthening the connection between adult education and employment, and establishing a new public agency with overarching responsibility for skills policy.<sup>103</sup>

The most significant initiative for skills system development was introduced by the Swedish government in 2022. This initiative involved seven national authorities<sup>104</sup> and focused on key areas such as education, healthcare, social work, information and communication technology (ICT), industry, and construction. Its primary outcome was the creation of a roadmap aimed at enhancing Sweden's governance system.<sup>105</sup> In 2022, the government proposed measures to align labour market skills with a circular economy; however, implementing these roadmaps will require SEK 10 billion annually over ten years.<sup>106</sup> The key challenges currently faced by Sweden in the skills area within the building and construction materials sector include:

- **Workforce shortages** – Approximately 10% of the construction sector's workforce is expected to reach retirement age by 2028.<sup>107</sup>
- **A mismatch between education and market needs** – The construction sector is the most affected by a significant prevalence of under-qualification among workers.<sup>108</sup>
- **Limited educational materials** – the majority of available resources are generic, primarily addressing broad themes such as sustainability or the transition to circular practices rather than focusing on tailored ones.<sup>109</sup>
- **Competence gaps in the market** – the sector experiences the greatest shortage in tertiary-level occupations within the building and construction sector.<sup>110</sup>

<sup>99</sup> European Commission (2023), [Transition pathways for construction](#).

<sup>100</sup> Norlén, G., Heleniak, T., Sánchez Gassen, N., Stjernberg, M., Maersk, E., Berbert, K., Jessen, S., Refsgaard, K., & Topia, C. (2024), [State of the Nordic Region Nordic Council of Ministers](#).

<sup>101</sup> Autodesk (2023). [Nordic Skills Report](#).

<sup>102</sup> More information available on [Nordic Sustainable Construction](#).

<sup>103</sup> OECD (2024), [Strengthening the Governance of the Swedish Skills System: Final Report](#), OECD Skills Studies, OECD Publishing, Paris.

<sup>104</sup> Swedish Public Employment Service, with co-operation with the six other authorities (Swedish National Agency for Higher Vocational Education, Swedish Council for Higher Education, Swedish Higher Education Authority, Swedish National Agency for Education, Swedish Agency for Economic and Regional Growth and the Council for the European Social Fund in Sweden).

<sup>105</sup> OECD (2024), [Strengthening the Governance of the Swedish Skills System: Final Report](#), OECD Skills Studies, OECD Publishing, Paris.

<sup>106</sup> More information available on [Circular Skills](#).

<sup>107</sup> European Labour Authority (2024), [EURES report: Labour shortages and surpluses](#).

<sup>108</sup> Organisation for Economic Co-operation and Development (2016), [Getting Skills Right: Sweden](#).

<sup>109</sup> More information available on [Nordic Sustainable Construction](#).

<sup>110</sup> Organisation for Economic Co-operation and Development (2016), [Getting Skills Right: Sweden](#).

In response to these challenges, Sweden has introduced several top-down measures aimed at improving alignment between education, training, and labour market needs:

- Dialogue forums:
  - National Programme Councils for VET at Upper Secondary Level<sup>111</sup>
- Enhanced Career Guidance and Recruitment Tools
  - Recruitment platform [www.byggdinfamtid.se](http://www.byggdinfamtid.se) ("Construct Your Future")
- Engagement with social partners:
  - Renewed National Agreement for Construction Apprenticeships

<sup>111</sup> Organisation for Economic Co-operation and Development (2024), *Strengthening the Governance of the Swedish Skills System: Final Report*.

Besides these systemic initiatives, expert interviews highlight the growing need for specific skills that will enable the future development of the digital product passport — particularly in the areas of data management, digitalisation, and life cycle assessment. These competencies will be essential to ensure that the data required for such solutions is well-structured, reliable, and transparent, which in turn will shape market expectations regarding product and process innovation. On the supply side, there is also a clear need to strengthen competencies and increase awareness of the benefits and practical implementation of circular solutions, as the current demand for these approaches remains relatively low. Supporting skills development for the design and management of circular business models, including materials banks and resource tracking systems, is therefore a crucial step toward accelerating the transition to a circular economy.

While these top-down policy measures provide a framework for systemic change, bottom-up initiatives play an equally important role in driving innovation and experimentation at the company and local government levels. This shift also requires new skills and approaches across the entire system's operations. A good example at the company level is Atrium Ljungberg, where at least 20% of the materials used in projects must be recycled, upcycled, or made from reused materials. Crucially, the first stage of the entire life cycle — the eco-design phase — plays a vital role in achieving this. This stage requires new competencies focused on rethinking resource use and material repurposing in innovative ways.

Another example comes from public procurement in Kungsbacka, where one of the key challenges in demolition projects is the lack of capacity to store and handle reclaimed materials. In order to maximise the amount of material that could be given a second life, an innovative evaluation model was introduced in the procurement process. Within this model, contractors were granted fictive discounts on their bids based on the share of materials they committed to reuse or resell. This approach incentivised careful dismantling and made reuse a viable option, even when it involved higher costs or longer project timelines. Importantly, the contract was not awarded to the bidder offering the lowest price but to the one who showed the highest level of material recovery. Penalties were applied if the contractor failed to meet the reuse commitments set out in the offer.

Together, these examples illustrate how the Swedish building and construction materials sector is responding to the twin challenges of skills shortages and the need for sustainable transformation. Achieving long-term success in this area will require the continued interaction between top-down policy frameworks and bottom-up innovation, with skills development serving as the crucial link between ambition and implementation.

### 5.3.1. Case-study: New European Bauhaus Academy

- **Type of Cooperative Activity Amongst the Actors Involved:**
  - Multi-stakeholder alliance for skills development in the construction industry towards circularity
- **Type of Actors Involved**
  - Universities
  - Local Authorities
  - Professional Network
  - Research institutions
- **Type of Solution (already on the market, new one)**
  - Creation of a new professional education training program and network for bio-based materials, digital technologies, and increased circularity in construction.
- **Description of the Case**

The NEB Academy aims to enhance up-skilling and reskilling opportunities within the construction ecosystem. It targets stakeholders from various sectors, including education, training, academia, public bodies, policymakers, the construction industry, the private sector, civil society, and the general public. The project brings together 14 partners from Austria, Belgium, Estonia, Finland, Germany, Italy, Poland, Spain, Sweden, and the Netherlands, aiming to develop training infrastructures and a matchmaking service to enhance skills development within the construction ecosystem.

The RISE Research Institutes of Sweden, a project partner, has developed a dedicated course for professionals in real estate development, architecture, and building design. It focuses on practical applications of sustainability in construction through key modules: The Design Process for Green Transition, addressing low-carbon solutions; Timber on Top, exploring timber additions to existing structures; Wood First–Building Sustainably, promoting increased use of wood in construction and Inclusive Urban Planning, fostering equitable and accessible community designs. Currently, new courses are being developed in collaboration with other stakeholders in the sector. So far, RISE has implemented seven digital training sessions.
- **Main Needs and Objectives for the Deployment of the Case-Study Ecosystem**
  - There is a lack of specific courses in Sweden for concrete actions related to the circular economy in the construction sector, with existing courses being more general and focused on sustainability.
  - A mismatch exists between the education and market needs in the Swedish construction sector; therefore, business actors are actively involved in these courses.
  - There is a need for better governance of the Swedish skills system to address new legislative requirements introduced by the European Green Deal.
  - Blended e-learning platforms are crucial for enhancing the development of skills, knowledge, and competencies necessary for meeting the sustainability needs of the construction sector.

- **Main Benefits Created by the Deployment/Operation of the Case-Study System**

The main benefit lies in a horizontal approach to addressing training and education challenges for various stakeholders in circularity. Combined with the practical focus of the e-learning courses, this approach could significantly help bridge key gaps in the Swedish ecosystem, particularly the mismatch between educational needs and market demands.

- **Source of Funding**

- Horizon Europe - Circular Bio-based Europe Joint Undertaking (HORIZON-JU-CBE-2023-2)
- RISE also receives support for these activities from the Ministry of Housing

- **Conclusions**

The NEB Academy addresses critical challenges in the construction ecosystem by bridging the skills gap and aligning education with market needs. By fostering collaboration among diverse stakeholders and emphasising real-world applications, the initiative supports sustainable construction practices and prepares professionals for the industry's future. It provides a robust and inclusive framework for upskilling and reskilling, contributing to green transition goals.

### 5.3.2. Recommendations

Based on the interviews, we identify the following lessons learned from the Swedish system that could be applied in other countries:

- 1. Promote a Better Understanding of Circularity and Scalable Solutions**

Strengthening the understanding of circularity within learning outcomes through clear standards and realistic pathways for scaling up solutions is a crucial element of the education and training system. It is essential to identify which solutions are already mature and to develop in-depth knowledge of how circular approaches can be both profitable and sustainable. This understanding should be integrated across the entire system, from education to industry practice.

- 2. Develop Advanced Courses Aligned with Future Market Needs**

There is a clear need to design more advanced courses that address the future demands of the building sector, particularly by adopting a life cycle perspective. In recent years, the demand for such knowledge has increased, particularly due to climate declaration requirements. Academic programs, particularly in engineering and architecture, should be better aligned with these emerging needs by integrating life cycle assessment (LCA) and supporting lifelong learning. Furthermore, new regulations regarding the Digital Product Passport for construction products will increase market demand for these competencies, underlining the urgency of this development.

- 3. Clarify Roles and Build Skills Across the Value Chain**

Defining future skill and competence requirements necessitates a better understanding of the roles and responsibilities of all stakeholders across the value chain. This includes expertise in areas such as storage solutions for reusable materials, data digitalisation, and managing the growing demand for recycled materials. Clearly defining responsibilities will ensure the development and application of the right skills at each stage of the process.

#### **4. Strengthen Eco-Design Practices and Focus on Existing Resources**

Effective eco-design is the first critical step in implementing circular solutions. This requires a shift in focus from using new raw materials to prioritising resources that are already available in the market. To achieve this, stakeholders such as real estate developers, architects, and building designers must adopt a new mindset that embraces reuse, adaptability, and resource efficiency from the earliest design stages. Supporting this shift through targeted education and skills development will be essential for successful implementation.

## 6. Conclusions

Despite the different stages of development in Denmark, Poland, and Ukraine regarding the building and construction materials sectors, a common challenge remains: the need for better alignment between circular economy and climate-energy policies. Denmark leads with comprehensive climate legislation and emerging circular economy initiatives in the building sector. Poland is actively adapting to increasing EU requirements, while Ukraine, although not an EU Member State, is proactively aligning its national policies with EU standards.

There is a clear need for the development of comprehensive guidelines and strategies to drive the holistic transformation toward decarbonisation in the building and construction materials sectors. Clear roadmaps are essential to ensure that both legislative and non-legislative efforts are effectively implemented. Additionally, the development of infrastructural, operational, and circular business models is crucial for fully addressing sectoral needs.

The new legislative frameworks stemming from the Circular Economy Action Plan 2.0 and the Fit for 55 package present an opportunity to promote a whole-life-cycle perspective in the built environment. Emphasising recycling and reuse over demolition and waste, alongside creating a sustainable, top-down regulatory framework, can significantly support a sustainable building sector. From a bottom-up perspective, investment in infrastructure, research, and development can further strengthen circularity efforts. Such actions contribute to extending the life cycle of buildings and construction materials, aligning closely with climate and energy initiatives such as the Energy Performance of Buildings Directive, the EU Emissions Trading System, and the Carbon Border Adjustment Mechanism. These measures will not only improve energy efficiency and reduce greenhouse gas emissions but also enhance material savings throughout the life cycle of building and construction materials, in line with circular economy goals.

Moreover, Nordic countries are implementing a range of best practices, including networked collaboration and infrastructure development, which can serve as models for other countries seeking to advance sustainable infrastructure initiatives.

While Ukraine's current efforts primarily focus on waste management, there is potential to integrate a European circular economy framework further, building on existing initiatives.

In conclusion, circular economy actions in the building and construction sector still require scaling up and a more structured strategy. To ensure effective monitoring and implementation at local, regional, national, and European levels, a helpful solution could be the introduction of mandatory European-level roadmaps. These would be similar to national climate and energy plans but tailored explicitly to circularity needs, with a focus on the building and construction materials sector, providing a more coordinated path forward.

