THE CIRCULARITY GAP REPORT

Danish Industry leaders provide recommendations for a circular construction industry

INDUSTRIENS FOND · DA · DDC · Dansk Industri · DTU · TEKNOLOGISK INSTITUT · Lifestyle & Design Cluster

A NATIONAL BENCHLINE FOR CIRCULAR ECONOMY IN DENMARK

In 2023 Denmark launched its first Circularity Gap Report and was, for the first time, able to set a national benchmark for circularity, revealing these three main findings:

Denmark is only four percent circular. Well below the global average. This means that the vast majority of material inputs to the Danish economy comes from virgin sources. It is striking that Denmark's material consumption is more than three times higher than the estimated 'sustainable' level.

MATERIAL FOOTPRINT

24,5 tonnes per person

EU average is 17,1 tonnes per person

CARBON FOOTPRINT

11 tonnes per person

EU average is 9,5 tonnes per person

CIRCULARITY METRIC

4%

Global average is 7,2%

CIRCULAR STRATEGIES CAN DRAMATICALLY REDUCE THE DANISH MATERIAL FOOTPRINT

Circular strategies can dramatically reduce the Danish material footprint. The report explores five 'what-if' scenarios with key levers to boost circularity. Together, they can transform the economy and increase the Circularity Metric from 4% to 7,6%. The material footprint could be reduced by 39%, while the carbon footprint could decrease by 42%. The five scenarios are: 1) Build a Circular Built Environment, 2) Embrace a Circular Lifestyle, 3) Rethink Transport & Mobility, 4) Nurture a Circular Food System, and 5) Advance Circular Manufacturing.

Build a Circular Built Environment
This report covers scenario one on building a circular built environment. It presents proposals for the construction sector's next steps towards a more circular Denmark. These proposals build on existing initiatives, including the 2023 Roadmap for a Circular Economy in the Construction Industry. This Roadmap provides an overview of the barriers and efforts in transitioning to a circular economy within the construction sector.

According to The Circularity Gap Report, the construction industry holds the largest share of Denmark's total footprint, with 31% of the material footprint and 17% of the CO2 footprint. The construction sector includes various processes such as material extraction, processing, distribution, installation in buildings, the operational phase of buildings, and the handling of resources at the end of a building's life. Currently, most materials end up as waste.

Scenario one, covering the built environment includes the following measures:

- Optimize the expansion of the existing housing stock.
- Ensure an energy-efficient housing stock.
- Create a low-emission and resource-efficient building stock.
- Increase the number of shared housing, co-housing, and multifunctional buildings.

By implementing these measures, Denmark can achieve:

- 19.2% reduction in material footprint (from 142.2 mill tons to 114.8 mill tons).
- 11.9% reduction in CO2 footprint (from 61.8 mill tons CO2e to 54.5 mill tons CO2e).
- Increase Denmark's circularity from 4% to 5.2%.

Therefore, the manufacturing industry has been singled out for this report by the Danish Circularity Gap Alliance. Two other similar industry reports are produced by the Alliance: one focusing on the constructions sector, and one focusing on textiles and furnitures.

Behind the report:
The Circularity Gap Report is produced by the Dutch organization "Circle Economy" in close collaboration with an alliance of six Danish organizations: IDA - the Engineers Association, DI - Danish Industry, DTU - The Technical University of Denmark, DDC - The Danish Design Center, Danish Technological Institute, and Lifestyle and Design Cluster. The report is financed by The Danish Industry Fund.

Read the Circularity Gap Report
This is a very short recap of the Circularity Gap Report for Denmark. Read the full report to understand the methodology behind the report, to get a more granulated introduction to Denmark's material use, and to dive into the five circular scenarios: www.circularity-gap.world/denmark

WORKSHOP ON A CIRCULAR BUILT ENVIRONMENT

Sector-specific workshop at Circular Build Forum 2024
The Circular Build Forum in Nyborg on January 31, 2024, gathered over 200 frontrunners from the construction sector, representing the entire construction value chain. The conference participants were consultants, architects, industry organizations, suppliers, building owners, public authorities, contractors, demolishers, waste and recycling actors, engineers, manufacturers as well as knowledge and educational institutions.

Participants in the workshop were pioneers in the construction sector, particularly in circular economy practices such as careful dismantling, reuse, and recycling. This event showcased extensive practical knowledge and insights that can inspire other companies.

Anchoring the insights from the Roadmap for a Circular Economy in the Construction Industry
Roadmap for a Circular Economy in the Construction Industry was launched by Realdania in April 2023. The Roadmap provides an overview of barriers and relevant initiatives, creating a foundation for further work on the circular economy in the Danish construction sector. The workshop participants were divided into four parallel workshop sessions based on themes from the Roadmap: reduce, preserve, recirculate, and regenerate. The Circularity Gap report adds inspiration and suggests prioritizing efforts to reduce the material and climate footprint in the construction industry.

The workshop focused on translating these recommendations into concrete actions to ensure their implementation in the construction industry. Participants worked on defining value chain collaborations to advance specific initiatives from the Roadmap and the Circularity Gap report.

The workshop was organized by the Technological Institute in collaboration with We Build Denmark.

CASE

Næste

Næste is a unique company in the circular economy sector, providing complete delivery of unheated shed construction built according to circular principles and made from waste materials from the construction and industrial sectors. They won the Realdania "Circular Construction Challenge" in 2019. The sheds are used for purposes such as waste sorting for housing associations and schools, equipment storage, bicycles, storage rooms, and similar uses.

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"First and foremost, you must find a niche with real market potential. It's not enough to base your product solely on circularity. You need to identify where you can create value in the market and bring other qualities and arguments to the table. Once you've found your niche, you need to build your value chain by identifying the factors necessary to deliver the product. This requires going out, knocking on doors, building relationships, and creating prototypes and tests, even though it takes a lot of time and effort. There's no way around it. It's crucial to start testing your ideas in practice instead of staying in the theoretical realm. It's in the real world that you learn which barriers are the hardest to overcome. They are rarely the ones you expect."

Niels Jakubiak Andersen, Owner, CEO at Næste ApS

SCOPE OF THE WORKSHOP

The long-term vision for a circular economy in construction includes using regenerative energy, maximizing existing resources in the building stock, and avoiding materials based on primary resources. This approach addresses climate challenges, resource scarcity, and the biodiversity crisis.

Achieving this vision requires a systemic transformation where circular principles are put into practice. The Roadmap for a Circular Economy in the Construction Industry outlines four themes with concrete goals to guide the sector: reduce, preserve, recirculate, and regenerate.

The workshop, based on insights from the Roadmap, was divided into four parallel sessions, each focusing on one of these themes. The goal were to anchor the common vision and identify next steps in transitioning to a circular construction industry through value chain collaboration. After a brief recap of the vision and targets, participants defined concrete activities for each theme.

CASE

Sweco

Sweco is a consulting engineering company that employs over 18,000 employees and provides technical consulting in construction, civil engineering projects, and architecture. Sweco has incorporated initiatives into their internal business, where sustainability is the overarching element, with a particular focus on preservation and transformation.

"Several of our architects have worked extensively on mapping areas in municipalities to investigate how often the buildings are vacant. It is frightening that municipal schools are often vacant 50% of the time. This leaves a chance to optimize the existing areas. We have also conducted analyses showing that square meters in detached houses are no longer inhabited by the amount of people it was designed for. There is therefore potential in better utilizing the existing square meters rather than building new ones."

Christine Collen, Head of Sustainability in Construction at SWECO Denmark A/S

FOUR THEMES

The workshop resulted in proposed activities around four different themes described below:

Reduce
Fewer square meters with minimal footprint and more shared buildings and common areas.

Preserve
Renovation and transformation instead of new construction. Extend the lifespan of products, buildings, and facilities. Aesthetics and architecture are adapted to a circular economy.

Recirculate
Closed material loops by repairing, reusing, and recycling. Design for disassembly and avoid the use of problematic substances in construction.

Regenerate
Construction with plus energy, which produces clean water and increases biodiversity.

Recommendations

The following recommendations result from the suggested projects and activities from the workshop, reflecting the participants' opinions and roles in the value chain. The participants identified specific activities for collaborative efforts as the next step. This list is not an exhaustive overview of the initiatives needed to transition towards a circular economy in the construction industry.

Reduce

- Promote Co-Ownership and Leasing: Encourage a shift from ownership to co-ownership and leasing by making it easier to access shared local areas and facilities. The goal is to reduce square meters per person.
- Shift Consumer Mindsets: Change the mindset of consumers and those in the construction sector to value indoor climate, aesthetics, architecture, the sharing economy, and quality over newness. This could be achieved through campaigns.

Preserve

- Incentivize Building Preservation: Develop an incentive structure to preserve buildings, such as requiring documented reasons for demolition permits.
- Share Renovation Knowledge: Disseminate successful renovation and transformation examples to industry actors through inspiration catalogs and pre-approved solutions based on different building types.
- Transform Existing Buildings: Develop solutions and incentives to repurpose existing buildings for new uses, such as converting industrial spaces to offices, enhancing comfort and usability.

Recirculate

- Design for Disassembly: Focus on creating buildings with separable, reusable, and repairable materials and components. Prioritize less complex materials to increase recycling rates and make maintenance easier. Favor reused building materials over virgin materials through procurement.
- Reassess Environmental Limits: Reevaluate knowledge on harmful substances and disseminate information on when these substances pose risks.
- Streamline Approval Processes: Improve approval processes with uniform documentation, such as a voluntary material passport, to support the scaling up of recycled materials in professional construction.
- Prepare the Value Chain: Equip all parts of the value chain to handle new tasks, like facilitating the use of recycled materials and implementing take-back solutions, e.g., supported by deposit-refund schemes.
- Resource Inventory: Develop a consolidated overview of resources in existing buildings through open-source data and material exchanges, making this information accessible.

Regenerate

- Define Regenerative Construction: Create a clear, common definition and guidelines for regenerative construction, including relevant indicators for measuring progress.
- Build Knowledge Platforms: Develop databases, manuals, catalogs, and platforms for regenerative solutions, disseminated through education, entrepreneurs, and foundations.
- Translate Planetary Boundaries: Convert planetary boundaries into actionable parameters that the industry can use.

CASE

Aarhus Center for Regenerative Construction and Søren Jensen A/S

The Aarhus Center for Regenerative Construction serves as a hub for collaboration between companies, authorities, knowledge institutions, and citizens with the aim of accelerating the development and implementation of regenerative building principles.

The center facilitates research, demonstration, and knowledge sharing on topics such as sustainable materials, energy-efficient solutions, green roofs, and facades, as well as socially and economically sustainable urban development projects. By bringing together different stakeholders, the center creates synergy and promotes a holistic approach to creating buildings and urban environments that benefit both people and the planet.

"Knowledge from Søren Jensen A/S and the Aarhus Center for Regenerative Construction can be shared with educational institutions to foster collaboration across the value chain for concrete solutions. Even though it is important that we together define the framework for regenerative construction, it is also crucial to translate this knowledge into practice. In our own rental premises, for example, we have investigated Carbon Capture as a local solution, and furthermore, we have explored opportunities for reusing materials such as radiators, electrical cables, cable trays, ventilation pipes, and acoustic panels - something that has not been done before."

Hanne Tine Ring Hansen, Director of Regenerative Construction at Søren Jensen A/S

EXAMPLES OF CURRENT DANISH CIRCULAR INITIATIVES:

Roadmap for a Circular Economy in the Construction Industry - An Initiative by Realdania. A comprehensive overview of the necessary efforts to promote circular principles in the construction sector.

Circue - A digital platform supporting circular construction. The platform assists the building owner in making sustainable choices throughout the construction process.

Material Passport - Two documentation paradigms for both new and reused building materials, supporting reuse and circular economy in construction.

(P)RECAST - A project focusing on enabling the reuse of entire prefabricated concrete elements from existing buildings as load-bearing structures in new construction. The goal is to develop the technological and documentation basis for this.

Circularity City - An initiative in the Region of Central Denmark (Jutland), seeking to promote circular economy in construction through collaboration between municipalities, companies, and knowledge institutions.

The Partnership for Circular Municipalities - A project in the Capital Region of Denmark that implements circular principles and lessons from pilot projects in municipal operations and urban development.

Closing Loops – An EU and Danish Business Promotion Board funded project focusing on implementing circular value chains in small and medium-sized enterprises across sectors, including the construction industry.

The Construction Industry Action Tank for Sustainability - An initiative under the Danish Construction Association (Dansk Byggeri). The Action Tank was established in 2021 with the purpose of promoting sustainability and green transition in the construction industry.

This report is brought to you by the Danish Alliance behind the Circularity Gap Report in Denmark:

The Circularity Gap Report for Denmark is made by the Dutch organization “Circle Economy”.

Read the full report here: www.circularity-gap.world/denmark

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