

Circular Skills

Vocational Training for a Circular Built Environment



LEREN VOOR MORGEN

Authors

Daan de Kruijf (Coöperatie Leren voor Morgen)

Jan Cromwijk (ISSO, Kennisinstituut voor de bouw- en installatiesector)

Interviewees

Jim Teunizen (Alba Concepts), Hannah Bakker (Heijmans Vastgoed), Rutger Sypkens (Dura Vermeer Vastgoed), Steven de Kruijf (Dura Vermeer Infra Divisie), Paul van Doorn (Giesbers Ontwikkelen en Bouwen), Michel Baars (New Horizon)

Thanks to

Helen Visser (Bouwend Nederland), Karlijn Mol (Dura Vermeer), Murk de Roos (Ministerie van IenW), André Rodenburg (Ministerie van IenW), Rob de Vrind (Koning Willem I College), Tessa de Haas (RVO), Antoine Heideveld (Het Groene Brein), Giuseppe van der Helm (Coöperatie Leren voor Morgen)

Utrecht, Netherlands | January 2020

www.lerenvoormorgen.org

Executive Summary

Over the course of the past few years, circularity has risen markedly on the agenda of the construction sector. An increasing number of companies in different fields, ranging from architecture to building services, are experimenting with circular practices such as reusing discarded building materials, optimizing the adaptive potential of their designs or shifting operations to a service-based economy.

At the same time, the urgent need for housing in an increasingly urbanized society is threatening the ambitions of the Dutch government to minimize the use of (critical) resources. To resolve the tension between these opposing objectives requires innovative solutions and sufficient capacity to carry them out.

The Circular Skills program, run by the cooperative *Leren voor Morgen*, aims to contribute to the circular transition of the construction sector by skilling the future workforce through circular vocational training programs.

About us | *Leren voor Morgen* is an Utrecht-based cooperative working on education for sustainable development in the Netherlands. Over 100 member-organizations collaborate on projects to drive systemic change in the field of education, from pre-school to university and lifelong-learning programs. *Leren voor Morgen* acts as the national coordinator for the implementation in the Netherlands of Sustainable Development Goal 4, Quality Education.

In order to achieve this goal, we must first identify (potential) skill gaps in the circular economy. This report is the first in a series of publications in which we work towards a clear set of skills required to successfully perform circular practices in different occupations in the construction sector. In this report, we identify 7 trends in circular design, construction, development and building services. Based on these outcomes, we will conduct a thorough consultation with leading actors in the Dutch circular construction sector to distill the required skills and capacities from the most important trends.

Gauging circular construction practices: 7 key trends

Based on an extensive review of available literature and a series of semi-structured, in-depth interviews with leading experts in the field of circular construction, we identified 7 key trends that we believe summarize the current state of affairs in the Dutch construction sector.

1. Constructing adaptive, modular and *remountable* buildings...

... by optimizing the extent to which individual parts can be separated from one another without causing damage and thereby decreasing their value; optimizing the adaptive potential of buildings by attaining the greatest possible measure of flexibility in interior and exterior functions; or optimizing the technical and logistical ability to remount the parts of a building after they have been separated from one another.

Innovations: Building Information Modelling (BIM), Bill of Materials / Building Passport

Skills: 3D-printing components, adaptive (project) development, parametric installation

2. Reusing resources and products at the highest level...

... to retain their greatest possible value. The more alterations are made to the original product, the lesser its remaining value. Hence reusing a product in its original form is preferred to refurbishing or remanufacturing it.

Innovations: Excess Materials Exchange, RFID / tracking and tracing technology

Skills: disassembling, repairing, brokering resources

3. Using secondary resources and bio-based materials...

... to reduce the carbon-footprint of buildings and to close the chain of resources and materials used in the construction sector.

Innovations: cellulose insulation, lignin-based pavement

Skills: eco-design / nature-inclusive design, risk assessment

4. Optimizing lifespan and usability...

... of resources, products and components by separating the shearing layers of a building and making them individually accessible for maintenance and replacement.

Innovations: "swap-boiler", repairable (window) frames

Skills: modular design, layering, repairing

5. Developing circular business models ...

... such as offering products as a service, charging for use instead of ownership or purchasing back at the end of usage for refurbishment; as a means to make circular solutions competitive in a linear economy and shift focus to performance.

Innovations: Building Management System / Building Automation System linked to performance

Skills: data analysis and optimization, market research, entrepreneurship

6. Enhancing chain-wide collaboration ...

... to enable the circular flow of resources and materials; allow for design based on availability of secondary materials; share knowledge and expertise; and increase trust and mutual understanding.

Innovations: Madaster, knowledge hubs, chain platforms

Skills: systems-thinking, non-violent communication, empathy

7. Measuring circularity in the built environment ...

... to develop a shared understanding of circularity; assess the impact and value of circular solutions; and facilitate impact-driven policy. Indicators of circularity may include: input materials (quantity, toxicity, history, scarcity), output materials (remaining value / reusing potential, damage), climate impact (resource depletion, acidification, eutrophication), detachability / demountability.

Innovations: Building Circularity Index, Detachability Index, tracking and tracing technology

Skills: data collection / analysis / optimization, lifecycle analysis, material flow analysis