

CONSTRUCTION

Circular economy and new materials in the construction industry

The construction sector currently accounts for 22 per cent of Denmark's CO₂ footprint, 33 per cent of our total material consumption, and 40 per cent of our total waste volume.

In 2021 alone, global cement production emitted 2.9 billion tonnes of CO₂, equivalent to more than 7 per cent of total global CO₂ emissions, according to calculations by the International Energy Agency (IEA). To achieve a lower climate footprint, we must develop new building materials, new methods for renovation, and recycling of materials and waste from the construction sector.

Research is needed on how we can meaningfully transform the industry and create coherence in processes across actors and suppliers. The construction sector is a key player in the green transition, and Denmark must act now to reach its goal.

At DTU, we have the latest research and technologies in areas such as:

- Development and testing of new building materials
- Optimization of project management of large public construction projects
- Recycling and reuse of building materials
- Life Cycle Assessment (LCA)
- Biodiversity in buildings and facilities
- Social sustainability in construction
- Climate proofing of cities and buildings

At DTU we are committed to a responsible future

In Europe we must transition towards a more viable society based on more sustainable solutions.

At DTU, we lead cutting-edge research in engineering and natural sciences, supported by one of Europe's most robust innovation ecosystems.

Our strength lies in interdisciplinary collaboration, where we develop advanced technologies and sustainable solutions to benefit society.

Kind regards,



Christine Nellemann,
provost

New materials – development, design, and material understanding

The construction industry requires the development of new materials that can be tested and implemented faster to move the industry in a more sustainable direction. DTU's interdisciplinary approach to materials development ranges from chemical components and processes through the possibilities of digitalization to knowledge about environmental challenges.

DTU conducts research in:

- Development of new materials
- Materials science
- New production methods

Project management and coherent processes in the construction industry

Engineering is necessary to transform construction processes, and optimize cohesion across all suppliers in construction projects.

- By applying engineering, we can enhance project management, streamline processes, and optimize the use of resources in construction projects, including waste of resources in the construction phase
- Development of digital technologies and tools to support collaboration, processes, and systems in construction supply chains
- The impact of construction on communities, cities, and people (e.g. indoor climate, biodiversity)
- Optimization of areas, load-bearing structures, installations, energy consumption, construction management, service life, maintenance, and potential future applications of the structure

Recycling, recirculation, and maintenance

DTU's research helps with understanding material recycling, accelerating the circular economy in the construction industry, as well as the maintenance and operation of existing buildings.

- Testing recycled building materials for durability and toxicity
- Innovating products, services, and business models related to used building materials
- Knowledge about energy savings by improving energy management and insulation

Qualification and quantification of sustainability in construction

- DTU's Centre for Absolute Sustainability develops models to calculate the absolute sustainability of products and our behaviour based on our planet's resources and planetary boundaries. The models show whether something is sustainable in an absolute sense and not just less environmentally harmful than the alternatives
- Life Cycle Assessment (LCA) – including open-loop and closed-loop recycling
- Including biodiversity parameters in life cycle assessments (LCA)
- Knowledge about social sustainability in construction

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