

# Risks in the Transition to Circular Economy in the Construction Sector

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## Summary

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*The Intergovernmental Panel on Climate Change (IPCC) has noted with "very high confidence" that global warming reaching 1.5°C in the near-term will present multiple risks to ecosystems and humans, and that immediate actions to limit global warming can substantially reduce future losses and damage. In parallel to climate change, we currently face global energy and resources crises necessitating the development of science for new, sustainable production technologies and approaches. The construction industry is at the heart of these issues. In the European Union, it accounts for approximately half of all raw materials used, one third of all waste generated and 40% of final energy consumption occurs in buildings. The Council of the European Union has specifically identified the need for Circular Economy in the Construction Sector and the importance of research in bringing about this transition. However, the planned transition to circular production and operation approaches in the construction sector also carries with it considerable (economic, social, environmental and political) risks which this research will systematically explore.*

Research field:	Building and civil engineering and architecture
Supervisors:	Dr. Simo Ilomets Prof. Dr. Emlyn David Qivitoq Witt
Availability:	This position is available.
Offered by:	School of Engineering Department of Civil Engineering and Architecture
Application deadline:	Applications are accepted between June 01, 2024 00:00 and June 30, 2024 23:59 (Europe/Zurich)

## Description

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The purpose of this research is to understand the changes required from current construction industry practices (in terms of work-flows, stakeholders' interests and behaviours, products and services, business models, etc.) for the transition to a circular economy in the construction sector and to explore the consequences of these changes. The research will address the following questions:

- What is the state of the art in relation to circular economy in the construction sector?
- To what extent are current construction industry practices circular?
- What are the changes required to achieve circularity in this sector?
- What are the consequences of those changes?
- How can the positive consequences be maximized and the negative consequences be mitigated?
- What are the implications of the above for industry practice and policy?
- What are the associated skills needs for industry professionals and what are the implications for the development of curricula at higher education institutions?

It is expected that the research will lead to advances in relation to the measurement of construction industry performance in terms of circular economy, to the development of theory, practical processes, risk analysis, decision tools, curriculum development and policy guidance.

### *Responsibilities and (foreseen) tasks*

- Conduct a systematic review of the relevant literature.
- Develop a conceptual framework for the transition to a circular economy in the construction sector.
- Define the research methodology and identify data collection strategies.
- Collect and analyze data.
- Model construction industry performance and transition risks.
- Refine theoretical framework.
- Develop decision tools, practice and policy guidance.
- Participate in teaching and the development of courses related to the research subject.

- Contribute to the organization of research, training and practitioner events where the research findings are presented.

*Applicants should fulfil the following requirements:*

- A relevant master's degree in a construction-, built environment- or sustainability-related discipline.
- A keen interest in the topic.
- Research (including publication) experience.
- Excellent proficiency in English.
- Strong and demonstrable writing and analytical skills.
- Capacity to work both as an independent researcher and as part of an international team.
- Capacity and willingness to assist in research and teaching activities relevant to the research and the dissemination and exploitation of its results.

The candidate should submit a research plan for the topic, including an overall research and data collection strategy. The candidate may expand on the listed research questions and tasks and suggest additional, specific focuses for the research.

*We offer:*

- A 4-year, funded PhD position in Estonia's leading university of technology.
- The chance to pursue high-level research in a dynamic, technologically advanced context.
- Opportunities to participate in conferences, study visits and international networking with researchers from leading universities and research institutions.

*About the department*

The Building Lifecycle Research Group approaches the building lifecycle as a whole, integrating the construction process and its outcomes with management strategies, technologies, building materials, economics and facilities management. Recent research has included:

- Circular economy in the Estonian construction sector;
- Energy saving, sustainable construction and the renovation of buildings;
- Multiple criteria analysis of BIM-based Building Permits;
- BIM-enabled construction education;
- Developing and providing BIM-related know-how;
- Regulation of construction activities and the creation of standards for the Estonian construction industry;
- Surveys on the building life cycle and technical conditions of housing;
- Sustainable use of secondary raw materials, by-products and waste such as oil shale or construction and demolition waste materials in the development and production of building materials;
- Disaster resilience and the built environment.

*(Additional information)*

For further information, please contact Prof Emlyn Witt [emlyn.witt@taltech.ee](mailto:emlyn.witt@taltech.ee) and Dr Simo Ilomets [simo.ilomets@taltech.ee](mailto:simo.ilomets@taltech.ee).



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