



DANISH
TECHNOLOGICAL
INSTITUTE

SDU

University of
Southern Denmark

The project will seek to answer the overall research question: *How do we ensure/enable that building principles and economic models are selected/developed so that environmental performance gains are optimal both on micro-, meso- and macro-level.*



EMBRACER

(Novel framework for decision support regarding sustainability of circular economy within the built environment)

Background

In order to assess how building principles and economic models, deployed broadly in the society, can facilitate/enable the society to comply with absolute environmental targets/-goals (i.e. planetary boundaries, the planetary carrying capacity or e.g. a politically defined 70 % reduction of GHG emissions) there is a need to account for consequences beyond the building principle's system boundary occurring via market mechanism changes.

Applying the conventional attributional form of LCA for environmental performance assessment only enables answering the question: "how far one (i.e. seen isolated at micro level) particular building is from being sustainable in e.g. absolute sustainable terms" and not the more appropriate question "to which extent selected novel building principles and economic models can contribute to make e.g. the Danish society sustainable in absolute terms" thus taking into account the societal responsibility of the building sector by accounting for consequences beyond the building principle's system boundaries.

Objectives

The overall objective of the project is to improve the validity and quality of environmentally related decision support, considering the circular quality of product- and building designs.

The project will demonstrate how environmental performance assessments of building principles and economic models (i.e. building designs/concepts/technologies and their related linear and circular economic models), can be made more aligned with the real world, by applying most recent and promising developments within Life Cycle Assessment (LCA).

The vision of the project is to develop a novel framework, which allows for evaluation of the *societal quality* of circular building principles.



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Methodology/methods

To answer the overall research question, the project will be carried out in 5 smaller, however distinctively different, work packages (WP). Each WP is delegated one sub-research question, addressing the overall research question from a specific angle.

- **WP1:** Mapping of scale dependent decision support needs on building principles and economic models
- **WP2:** Defining common future scenarios for micro and macro level LCA
- **WP3:** Development of Multi-Criteria Decision Analysis supporting multi-angle/indicator assessments
- **WP4:** Case studies on CE and absolute sustainability as well as formulation of multi-scale assessment guidelines
- **WP5:** Implementation

WP1-4 relies on several specific methods:

- Attributional LCA (ALCA)
- Consequential LCA (CLCA)
- Multi-criteria decision analysis (MCDA)
- Systematic literature review
- Scenario development

The PhD project is a cooperation between

- The Danish Technological Institute (DTI),
- University of Southern Denmark (SDU)
- BUILD (Aalborg University)

Supervisors are: Stefania Butera, Anke Oberender, Morten Birkved and Harpa Birgisdottir.

Third party



BUILD
AALBORG UNIVERSITET