DYNAMIC BENCHMARKING OF BUILDING STRATEGIES FOR A CIRCULAR ECONOMY

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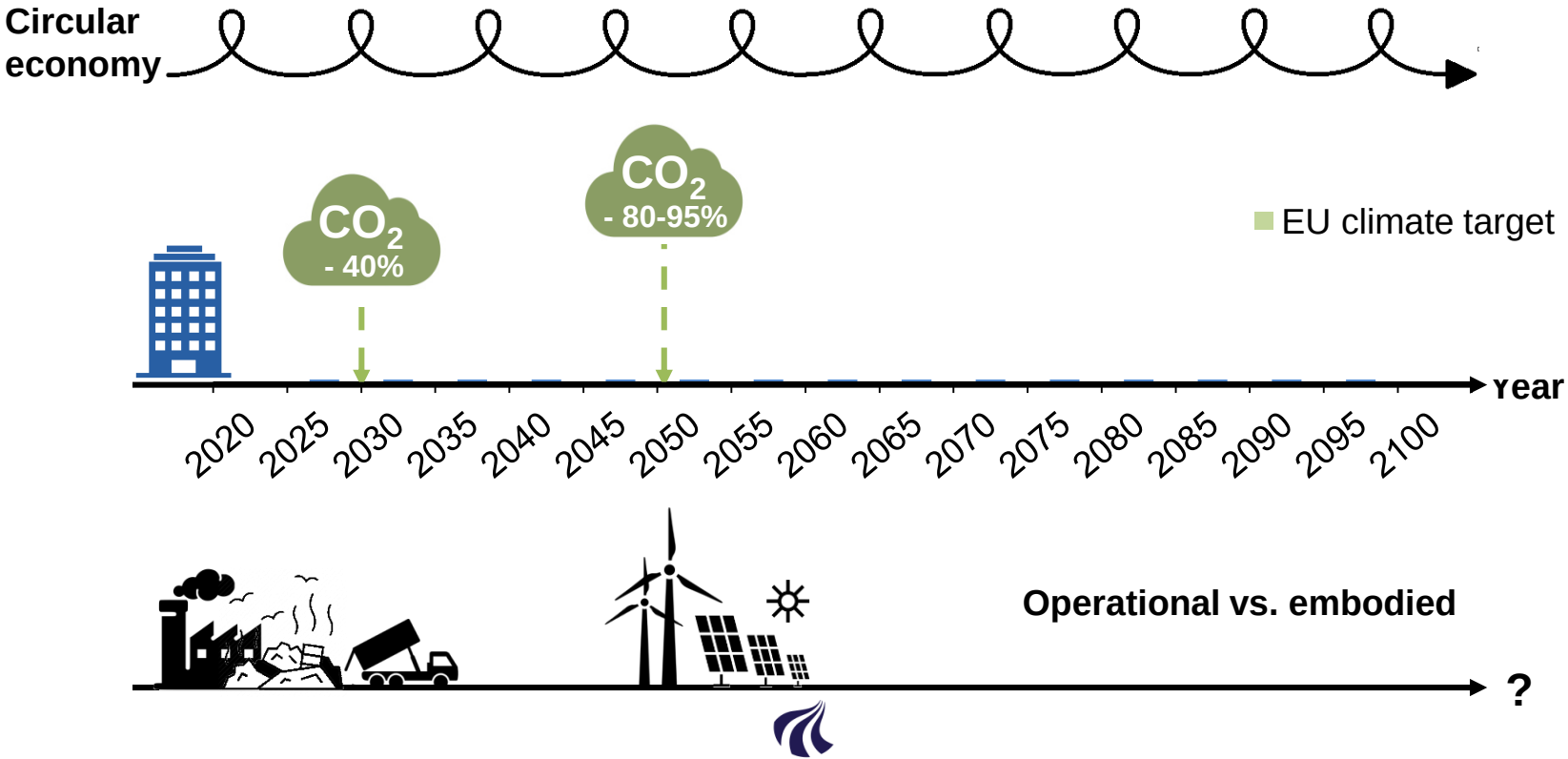
Background



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Research design

Methodology

Objectives

Not to develop benchmarks!

Literature review → 1. to create an understanding of the DLCA approach in the context of buildings

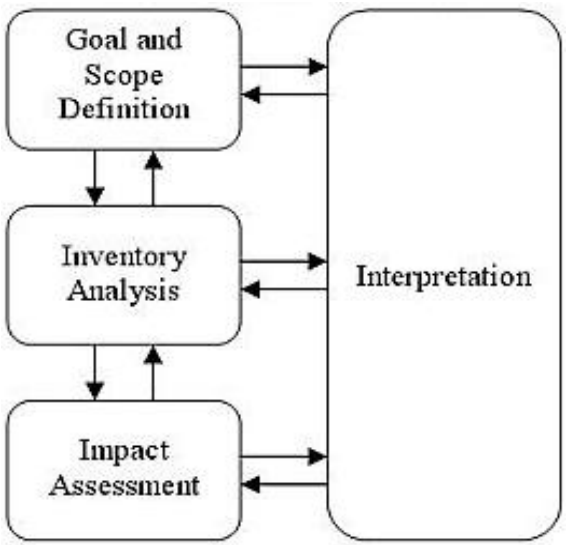
Case study → 2. of a CE designed concrete column to explore how significant dynamic factors may affect LCA results

To keep in mind when developing benchmarks to reach future goals!

Dynamic LCA

Partially dynamic LCA

ISO 14040 LCA framework



Modelling methods

a) Dynamic process inventories (incorporation into single unit processes)
b) Dynamic systems (change between unit processes)
c) Dynamic characterisation factors (impact change over time)
d) Dynamic normalization/ weighting

Dynamic factors in buildings

- resource and energy consumption
- compositional changes in energy structures and grid mix
- waste management
- design and innovation (production efficiency)

Challenges of full DLCA

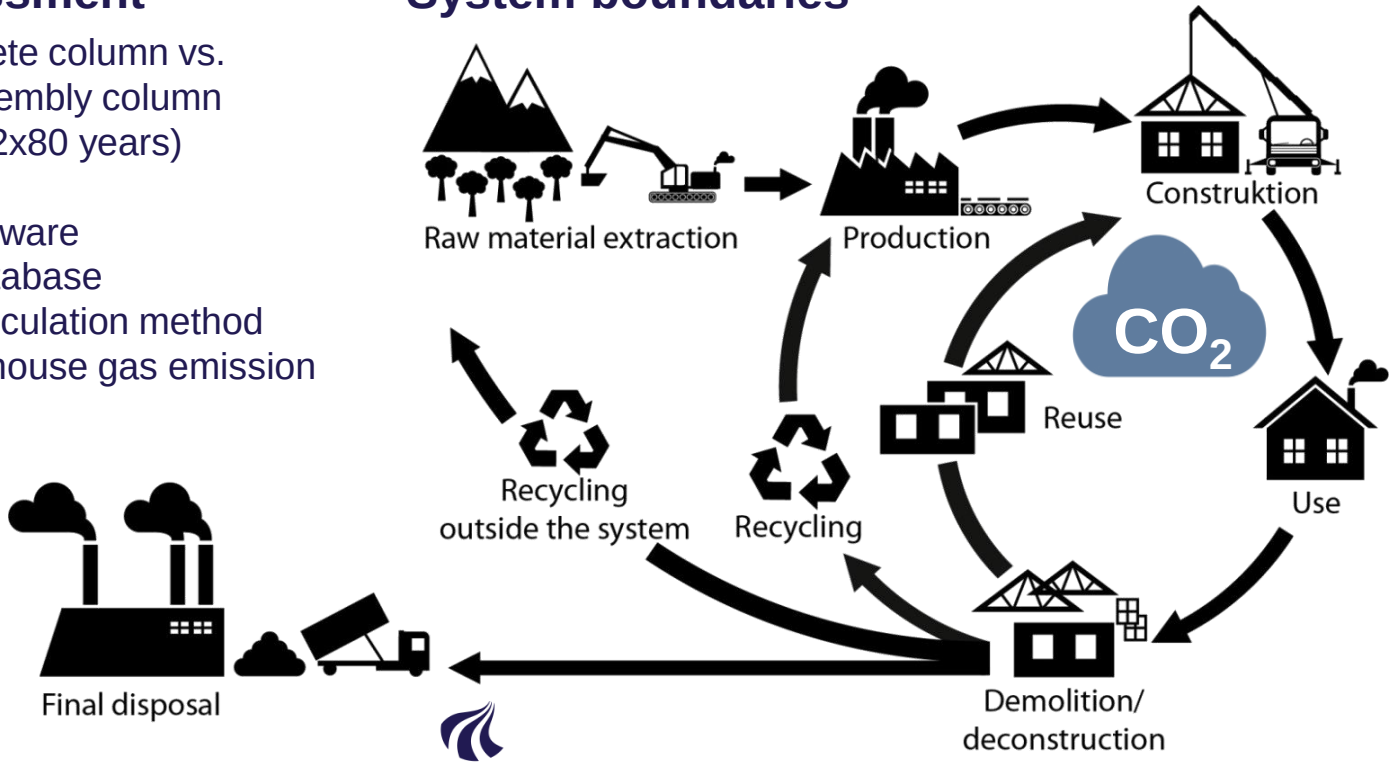
- Data intensity
- Lack of adequate data
- Increased model complexity
- Lack of established method
- Difficult to incorporate in LCA software

Case study

Life cycle assessment

- Traditional concrete column vs. design for disassembly column
- Two use cycles (2x80 years)
- EN 15978
- openLCA 1.4 software
- Ecoinvent 3.2 database
- CML-baseline calculation method
- Embodied greenhouse gas emission

System boundaries



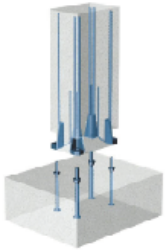
Case study scenarios

Traditional

sT

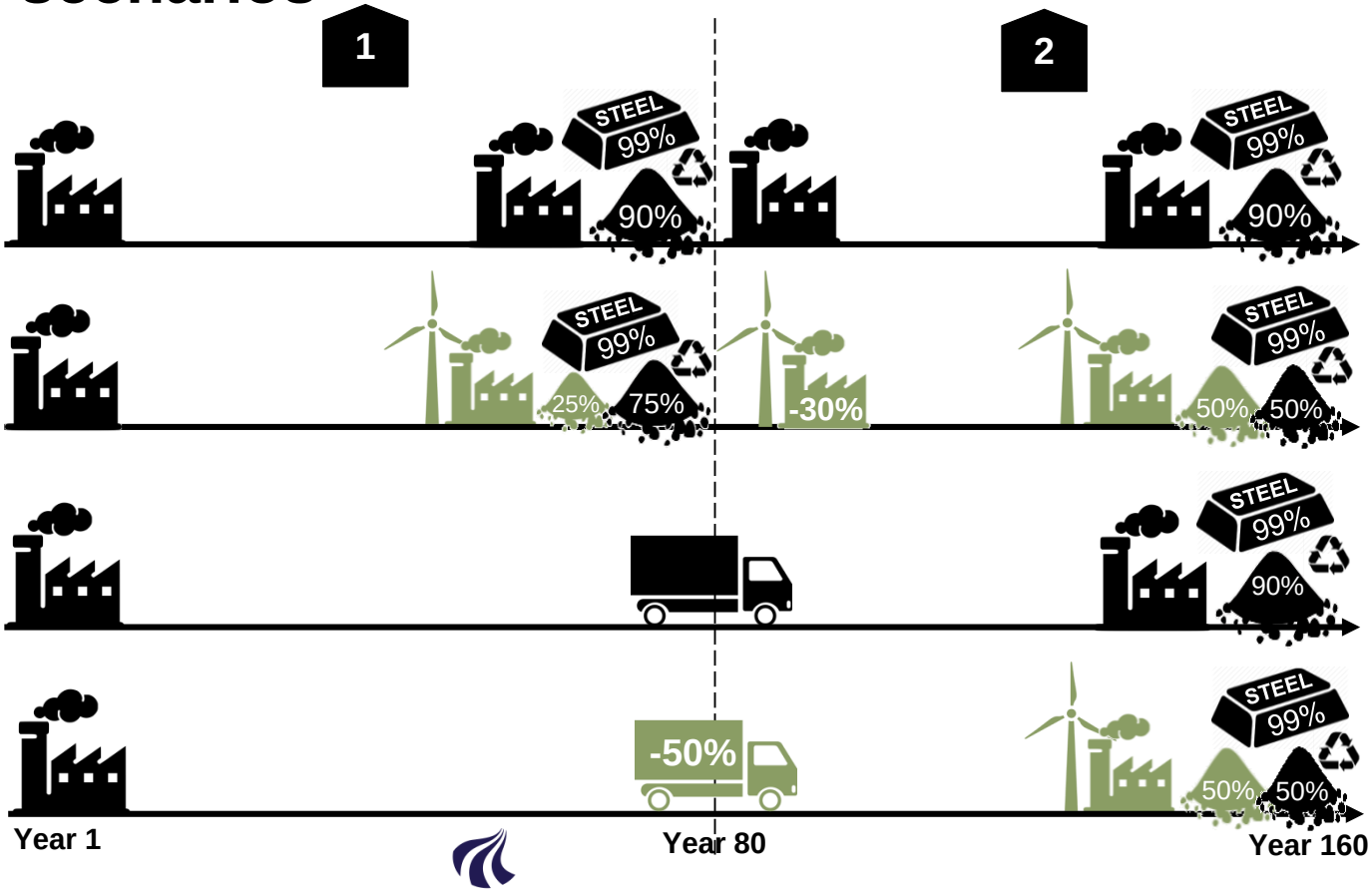
dT

Designed for disassembly



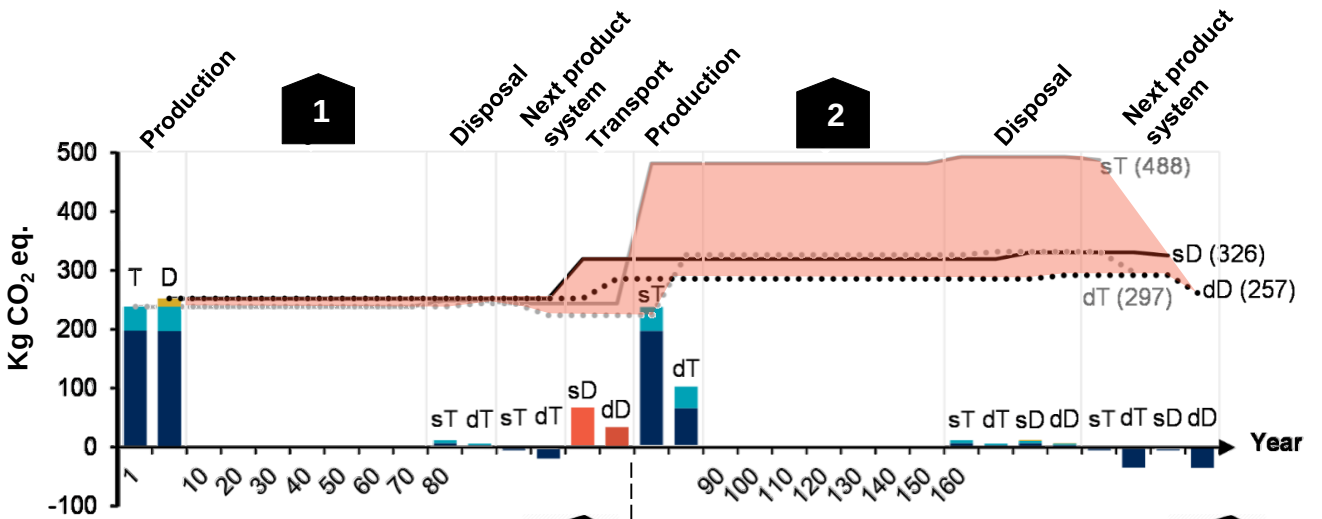
sD

dD



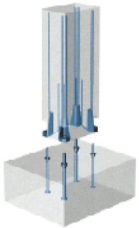
Case study results

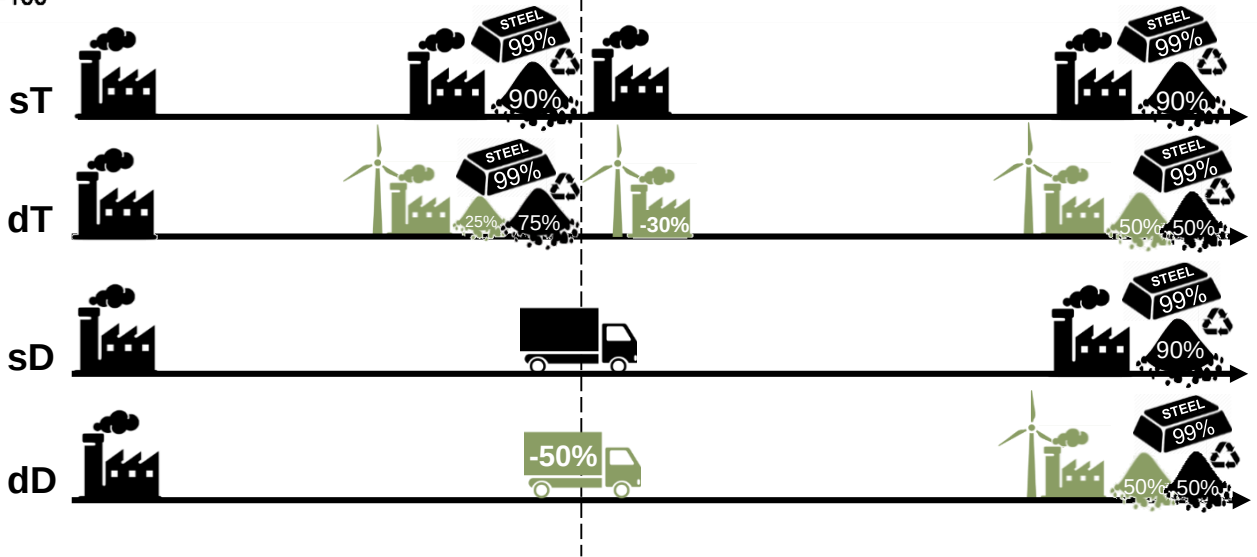
- Concrete
- Reinforcement steel
- Steel connections



Traditional

Designed for disassembly





Conclusion

- Performance is determined by the use contex
- Dynamic LCA can potetnially provide a better decision basis

Challenges:

- Various methods are applied
- Many alterations to a vast number of inventory datasets is required
- Assessing multiple life cycles
- Defining general benchmarks

Future work

- Modular datasets
- De-composition of building into their seperate functions
- Focus on the largest environmental and resource burdens