

Comparing life cycle assessment modelling of linear vs. circular building components

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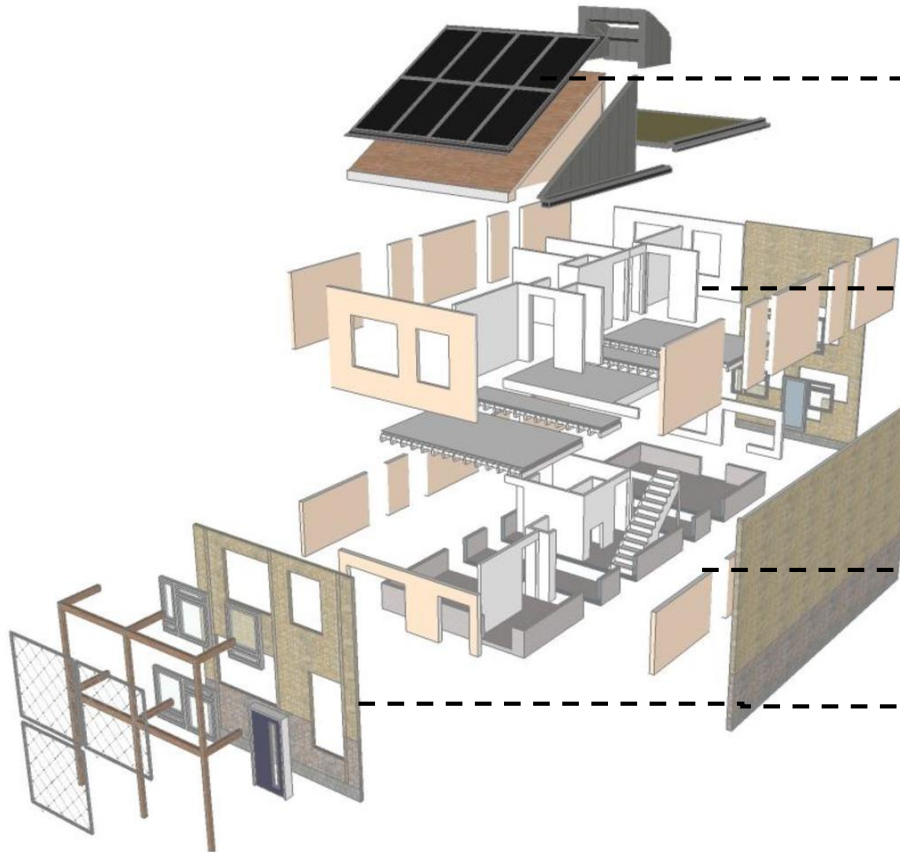
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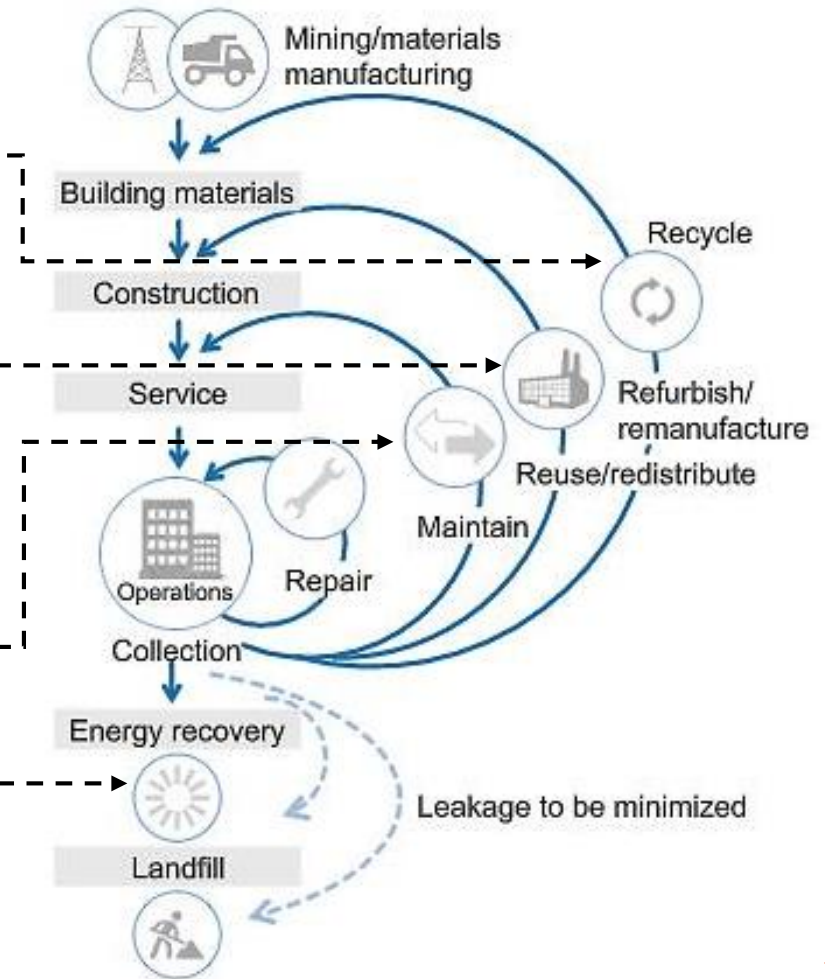
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642384.

PhD

Environmental performance and material composition



Circular Economy



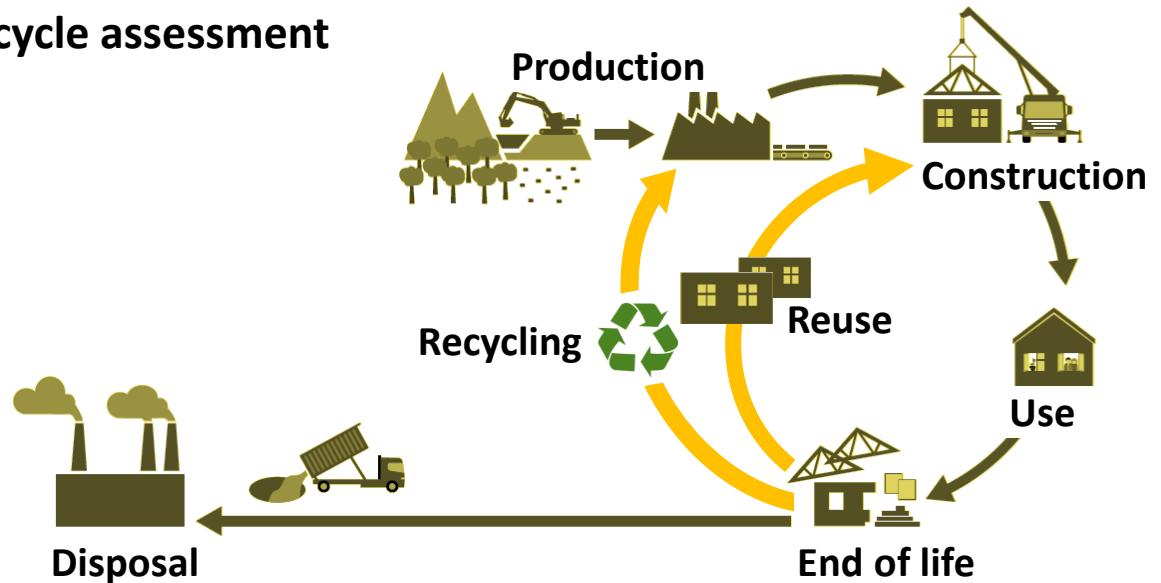
Knowledge gap

from research to practice

Knowledge gap



Life cycle assessment



EN 15978 standard

openLCA 1.4 software

Ecoinvent 3.2 database

CML baseline method



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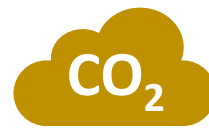


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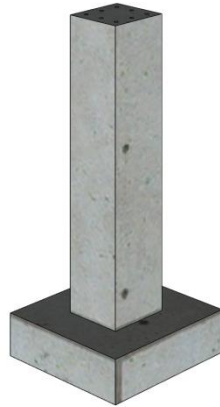


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Examples from the industry



Concrete column



A: linear
(worst case practice)

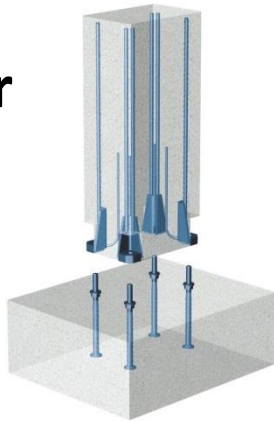
Window

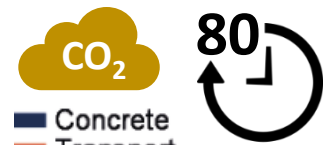


Roof felt



B: circular
(reuse/
recycling)





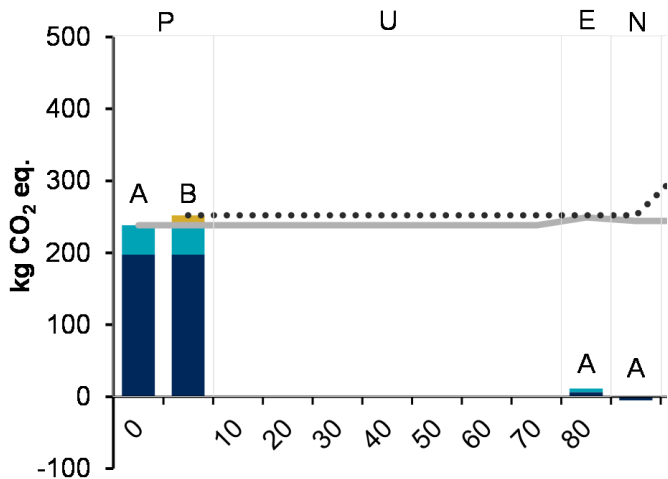
- Concrete
- Transport
- Reinforcement steel
- Steel connections

... B accumulated
 — A accumulated

- ➔ Recycling/reuse
- ➔ Recycling outside the product system
- ➔✕ Landfill
- ➔ Energy recovery

- P Production
- U Use
- E End-of-life
- N Next product system

- 1 first use cycle
- 2 second use cycle



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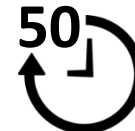


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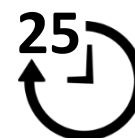
Frame

- Wood
- Zink
- Steel
- Rubber
- Aluminium
- PVC



Glass

- Glass

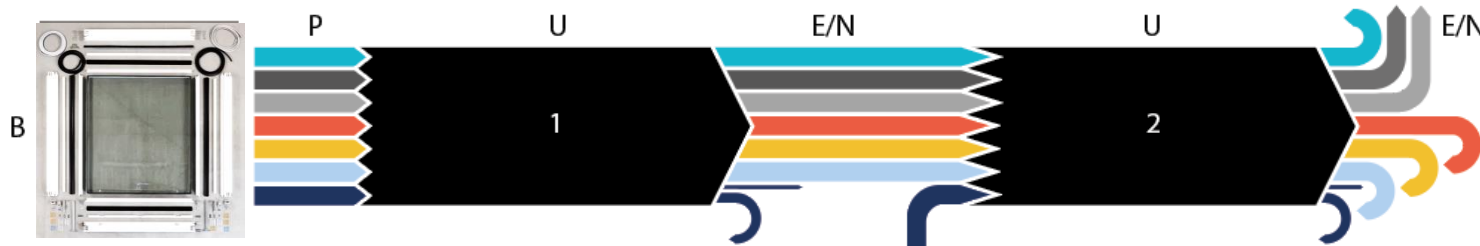
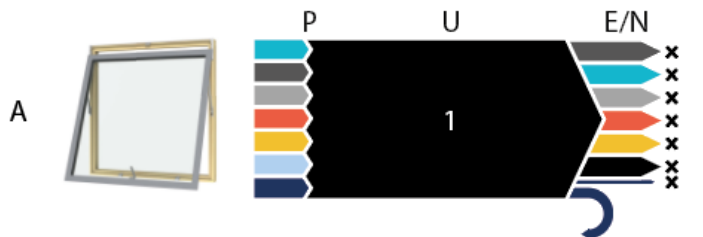
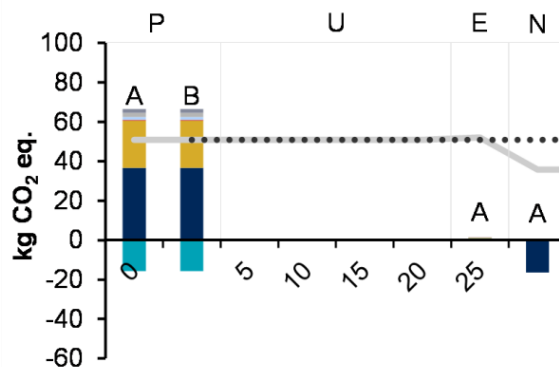


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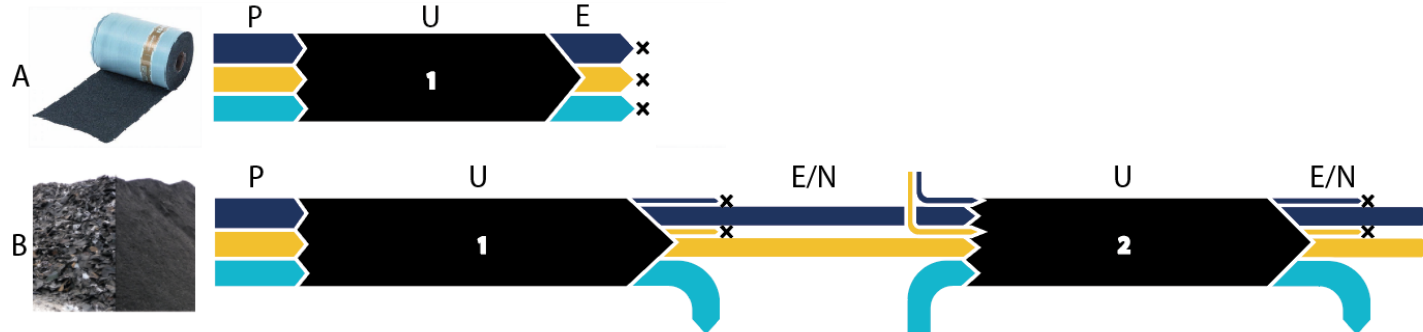
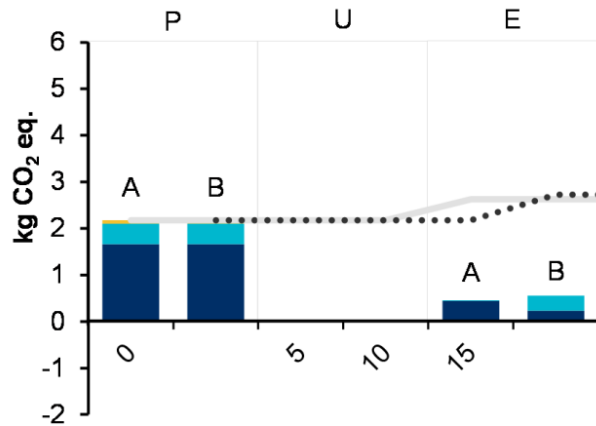
- Bitumen
- Polyester felt
- Slate

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Conclusion

The visualization approach shows:

- The material flows
- When and where impacts and benefits occur
- Size of impacts and origin
- Material losses and inputs
- Helps understand complex building components
- Subsequent life cycle thinking

Future work

Things to keep in mind:

- Future circumstances
- Allocation methods
- Resource scarcity

