The practical use of module D in a building case study: assumptions, limitations and methodological issues

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Objective and Methodology

- Objective:
  - Explain the idea behind module D
  - Provide a critical discussion on the practical implementation of module D
    - Assumptions and methodological choices
    - Aspects that are not clearly specified in the EN 15804 standard $\Rightarrow$open for interpretation

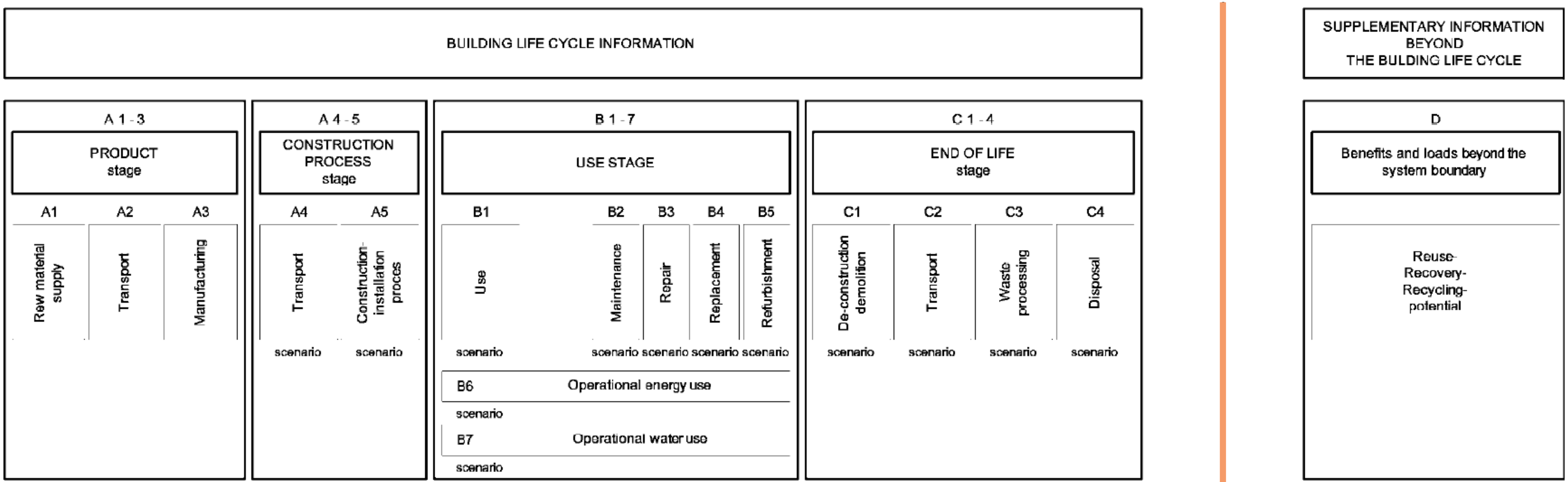
- Based on insights gained from:
  - Discussions with LCA experts
  - Translation of module D into a formulae as part of EN 15804+A2 (CEN TC350 WG3)
  - Building case study

IDEA BEHIND MODULE D

- **Theory**: EN 15804+A1 (+A2)
- **Why module D?**
  - Cut-off approach
  - Net benefits beyond the system boundaries=valuable information
- **Why outside the system boundaries?**
  - Uncertainty related to long life span

Waste framework directive:
- Commonly used for specific purpose
- Fulfils the technical requirements for that purpose
- Market demand
- use will not lead to adverse environmental/health effects

End of Waste (EOW)



POINT OF FUNCTIONAL EQUIVALENCE (FE)

Concrete demolition waste

Concrete crusher

EOW

FE

30km

Recycled aggregates

Application: subbase for road construction

FE

Crushed limestone

100km

POINT OF FUNCTIONAL EQUIVALENCE

Concrete demolition waste

Concrete crusher

EOW

Recycled aggregates

Application: Concrete

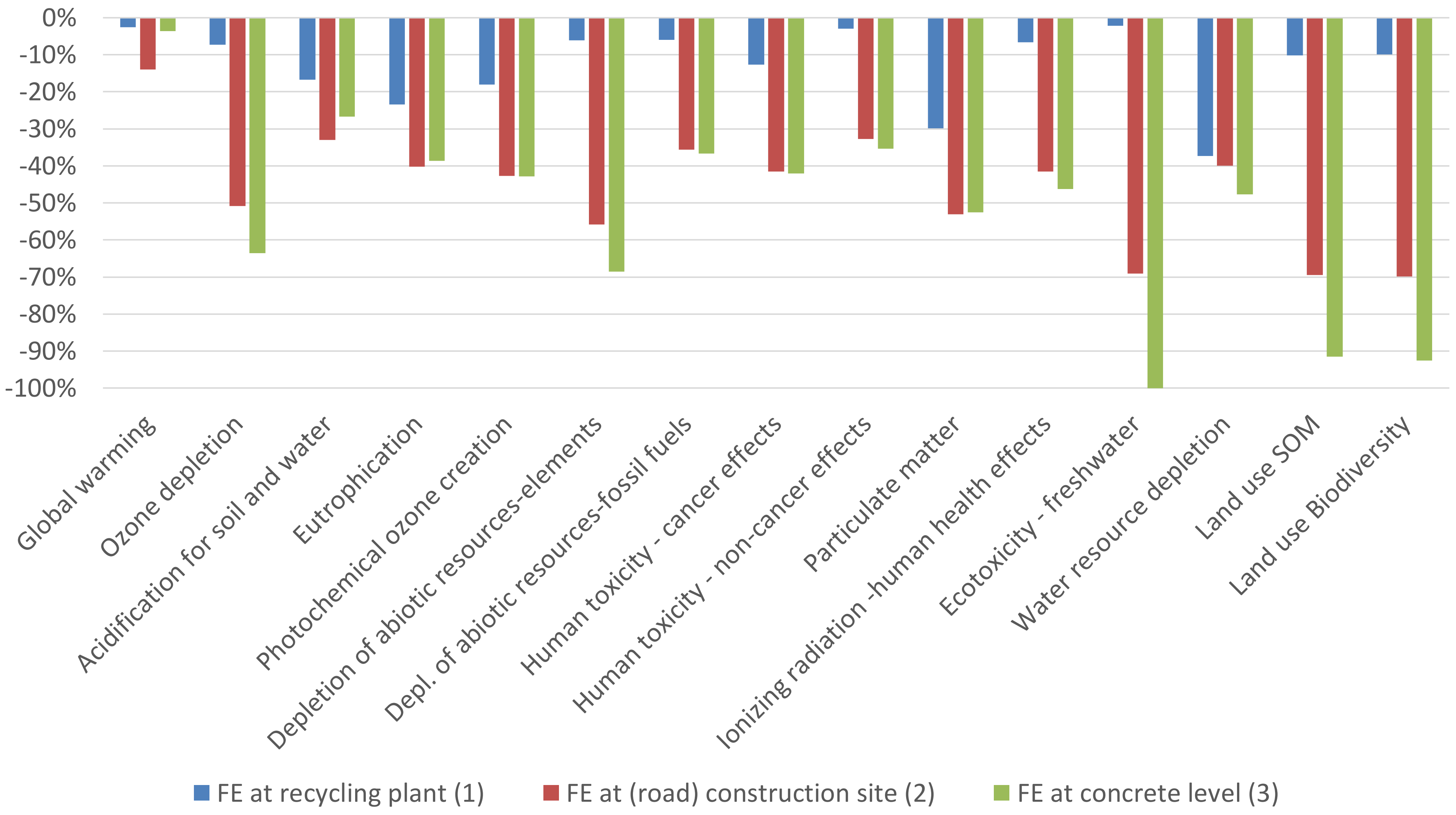
Crushed limestone

POINT OF FUNCTIONAL EQUIVALENCE (FE)

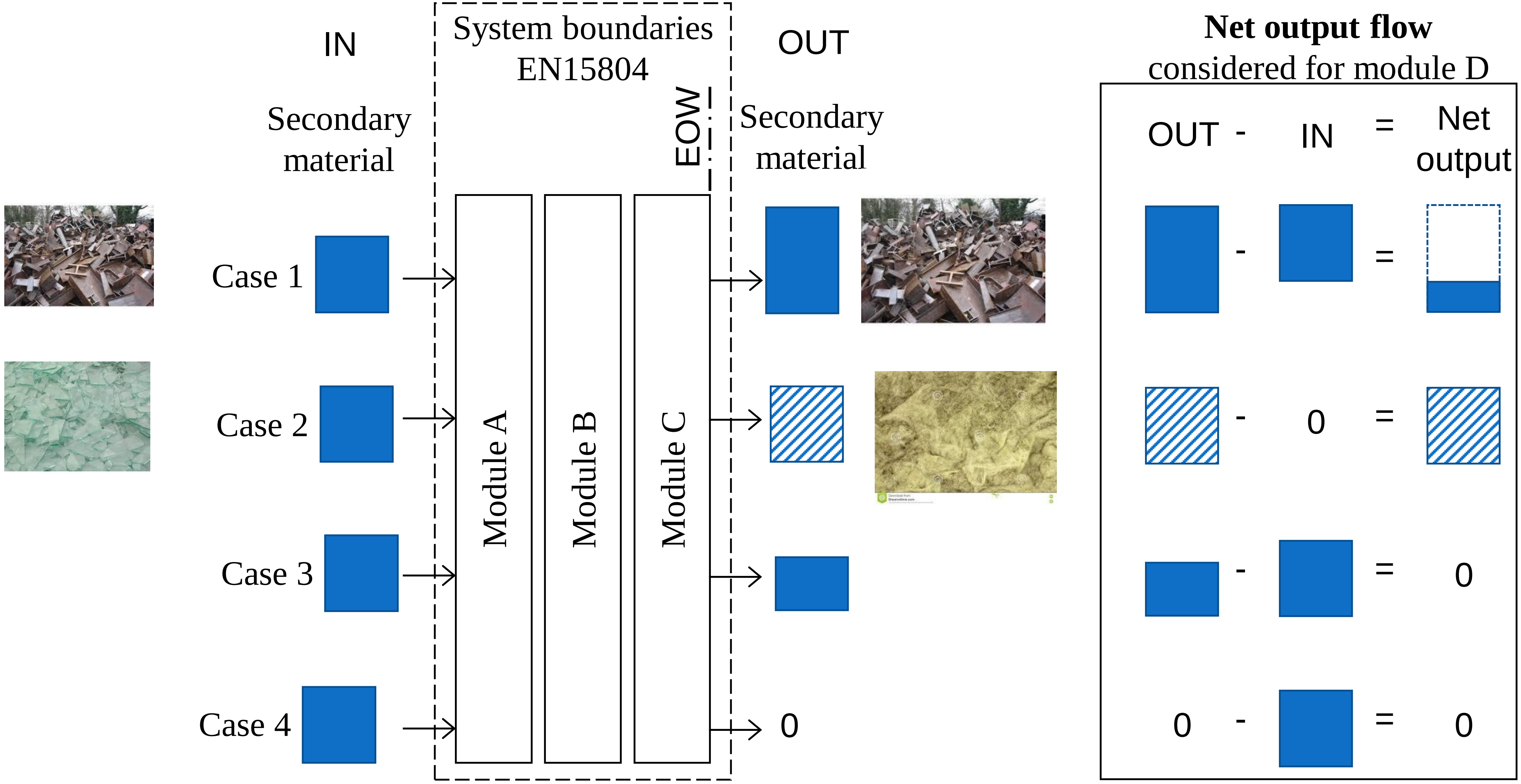
Point of FE	Impacts reported in module D	Benefits reported in module D
Gate of recycling plant (raw material level)	▪ 0	▪ **1 kg limestone, crushed**
At (road) construction site	▪ Transport of secondary aggregates to construction site (**30** kgkm by 16ton lorry, EURO5)	▪ **1 kg Limestone, crushed** ▪ Transport of primary aggregates to construction site (100 kgkm by 16ton lorry, EURO 5)
At end-product level (gate of concrete factory)	▪ 1/X[a] m³ of **concrete** made with . **recycled aggregates** (**impact = 0** unless some additional crushing is needed) . **385** kg **cement** /m³ concrete . **2.11** kg **plasticizer** /m³ concrete ▪ Transport of secondary aggregates to concrete factory site (**0** kgkm as recycling plant = concrete plant)	▪ 1/X[a] m³ of **concrete** made with . **Limestone** crushed . **380** kg **cement** /m³ concrete . **2.08** kg **plasticizer** /m³ concrete ▪ Transport of crushed limestone to concrete factory (**100** kgkm by 16 ton lorry, EURO5)

[a] With X = mass of secondary aggregates /m³ of concrete

POINT OF FUNCTIONAL EQUIVALENCE



NET OUTPUT FLOWS



AVOIDED (PRIMARY) PRODUCTION

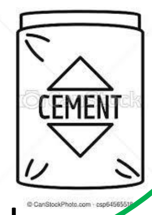
- Secondary materials
  - are part of common practice
  - affect the production process
  - replace secondary materials

Crushed concrete

Application: subbase for road construction

Crushed limestone

?



Stabilised sand

CONCLUSIONS

- Module D=valuable information as it recognizes the design for reuse, recycling and recovery
- Uncertainty related to module D is high
  - Long life span of a building
  - Many assumptions and methodological choices → significant impact on the results
- There is a need to further discuss/harmonise the calculation of module D
- Results should always be used with care and interpreted together with underlying scenario’s

Questions?

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Module D in the Building Life Cycle: Significance Based on a Case Study Analysis
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