

Module D in Environmental Product Declarations (EPDs): Sorting the Weed of Misinterpretation

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Agenda

- **What is Module D ?**
- **Challenges in Module D**
- **Observations in current EPD**
- **Practical Advice**
- **Conclusion**

EPDs

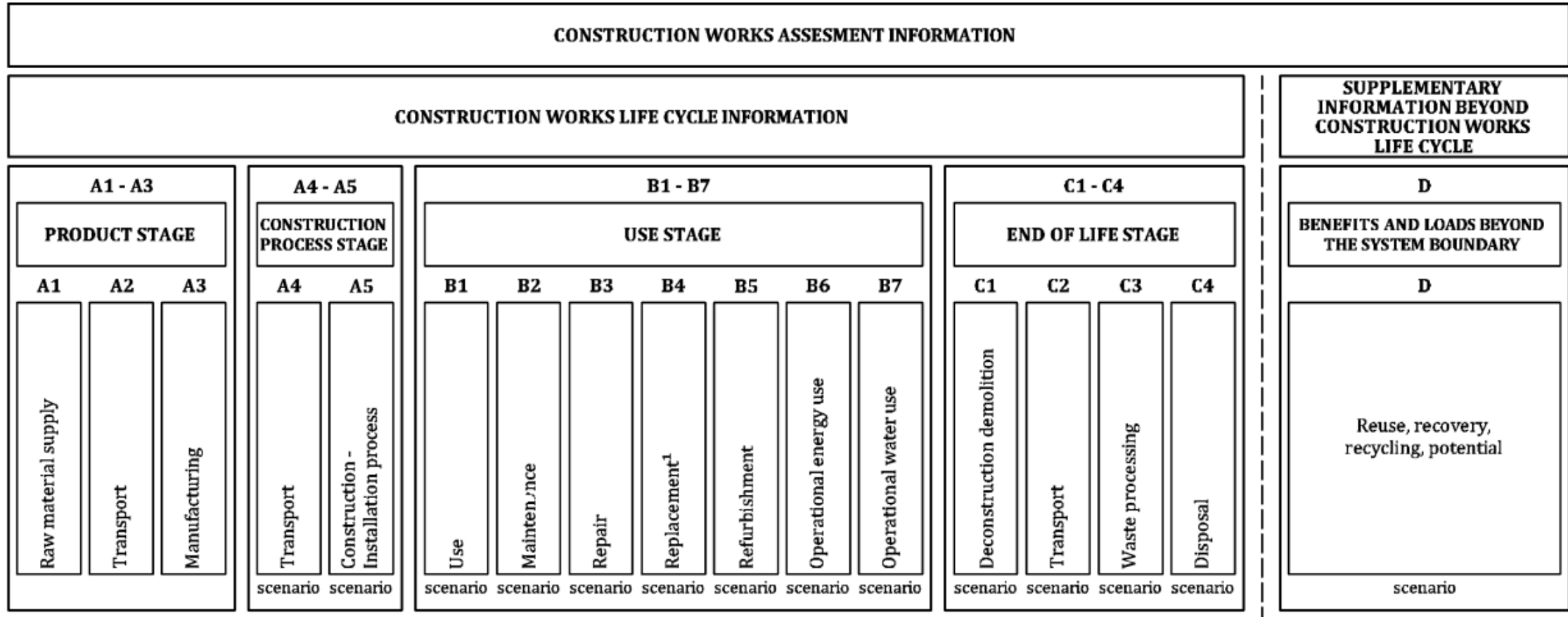
Life Cycle Assessments (LCAs): powerful, flexible, holistic, ... - but the entire modeling and study depends on goal and scope (system boundary, impact methods, ...) -> different LCAs, even compliant with the ISO 14040 standard, may not be comparable.

→ Environmental Product Declarations, EPDs

For a category of similar products, modeling rules are specified which need to be followed -> idea is to make the results comparable (and speed up the modeling as discussions about a suitable approach for a specific case are shortcut).

EPDs

In the norms for the construction sector (EN15804, ISO 21930), the life cycle is structured in detailed phases.

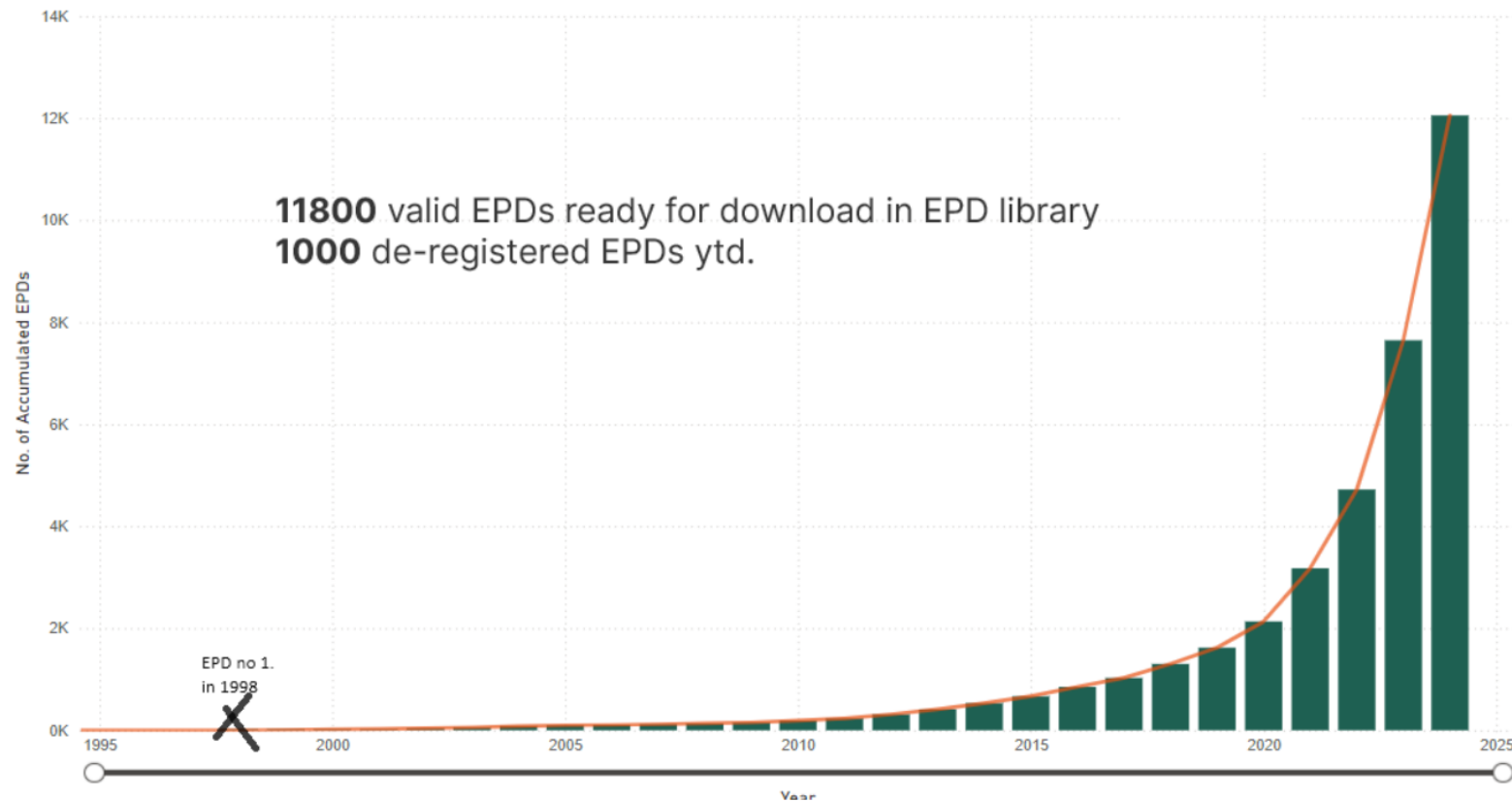


EPDs

In recent years, EPDs have become very popular

1. Accumulated EPDs by year

Accumulation of count of EPDs registered with IES

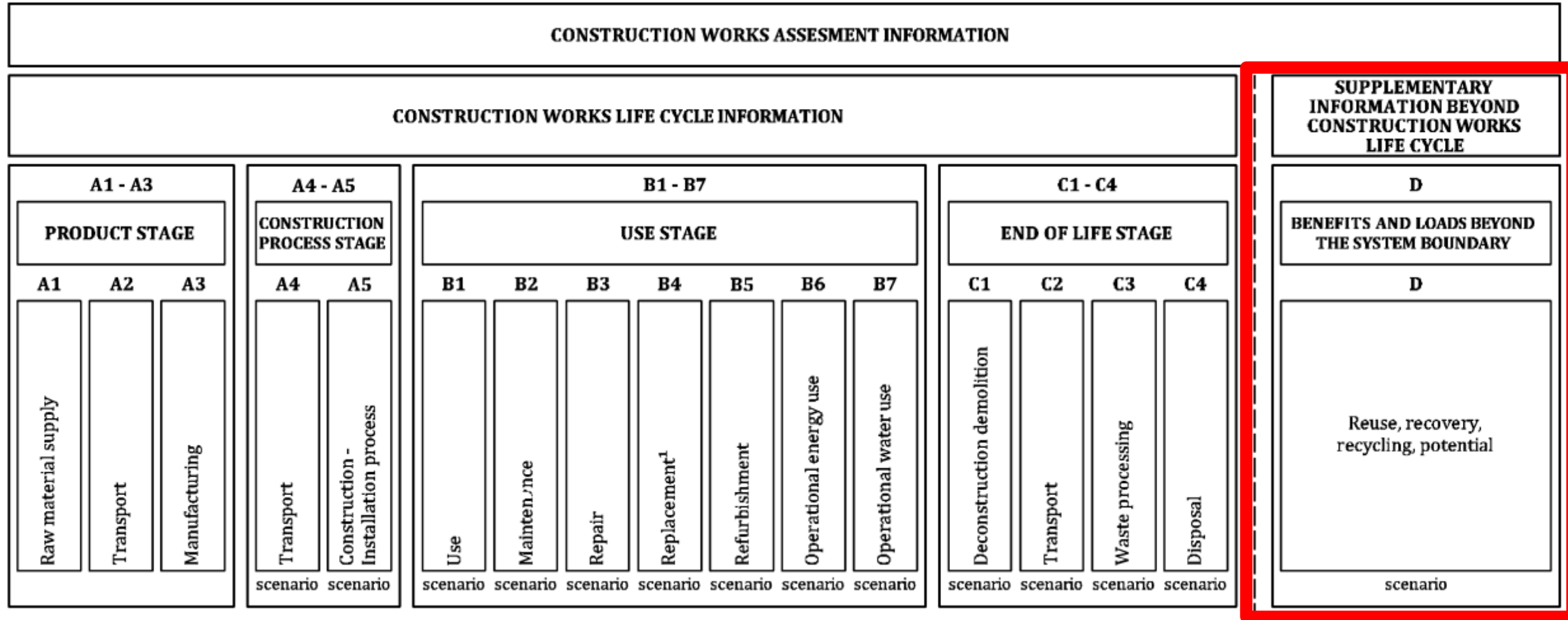




What is Module D ?

What is Module D?

EN 15804:2012+A2:2019 (E)

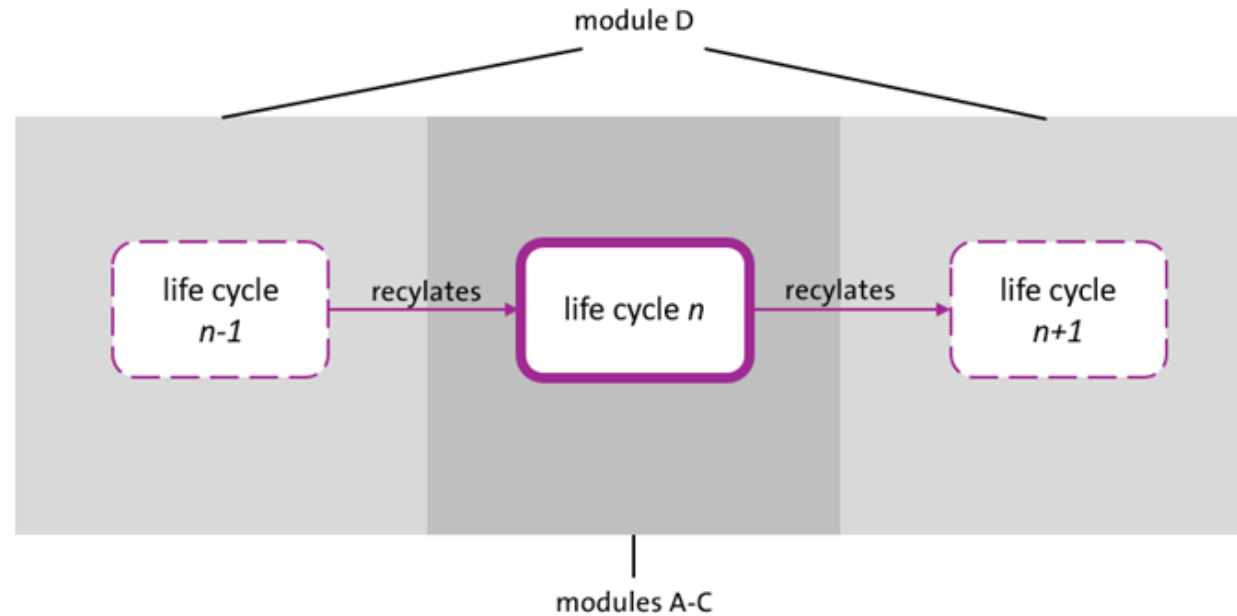


The EN15804 standard on Module D

- Module D aims at
“transparency for the environmental benefits or loads resulting from reusable products, recyclable materials, and/or useful energy carriers leaving a product system, e.g., as secondary materials or fuels.”
- But:
“Any declared net benefits and loads from net flows (...) leaving the product system that have passed the end-of-waste state shall be included in Module D, except those which have been allocated as co-products.”

Why module D?

- EN15804: Focus is on one life cycle; previous and next life cycles (for recycles, in input or output) are not considered (“cut-off” system model)
- Module D is responsible for addressing impacts of other life cycles





Challenges in Module D

Challenges for modeling module D in EPDs

Context-dependent recycling efficiency

- Material recovery rates and recycling processes vary by location and project use, relying on assumptions that heavily impact EPD results.

Geographical variability in disposal practices

- Regional differences in recycling, reuse, and energy recovery, compounded by limited global datasets for end-of-life modeling.

Complex net benefit/load calculations

- Balancing environmental gains (recycling) with upstream burdens of recycle production, hindered by data gaps and external supply chain factors.

Recyclate quality and system expansion issues

- Mixed waste streams require refining to usable recyclates, with challenges in defining equivalence (e.g., scrap vs. virgin materials) during modeling.



Module D can be a potential trap for greenwashing. It is relatively easy to claim that a significant portion of a given product is recycled when, in reality, it may end up in landfills

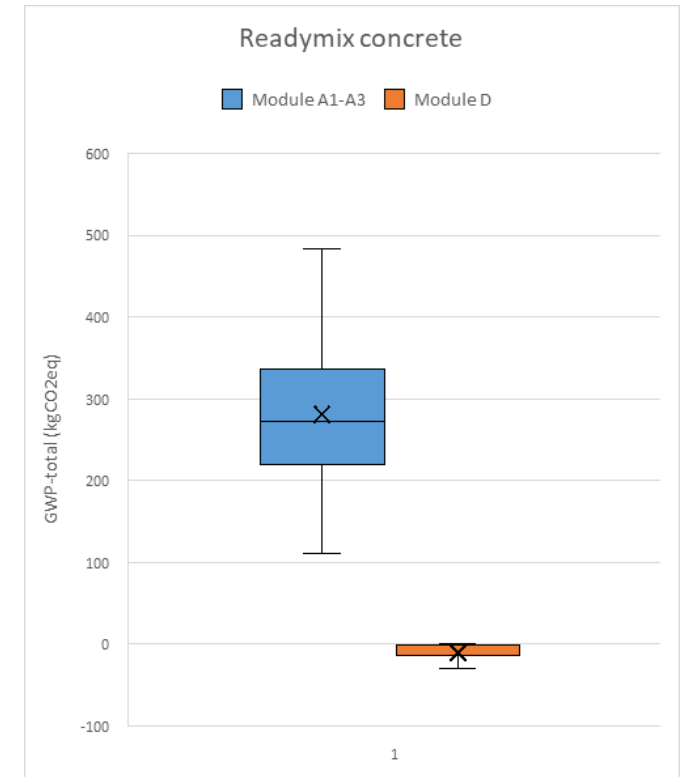
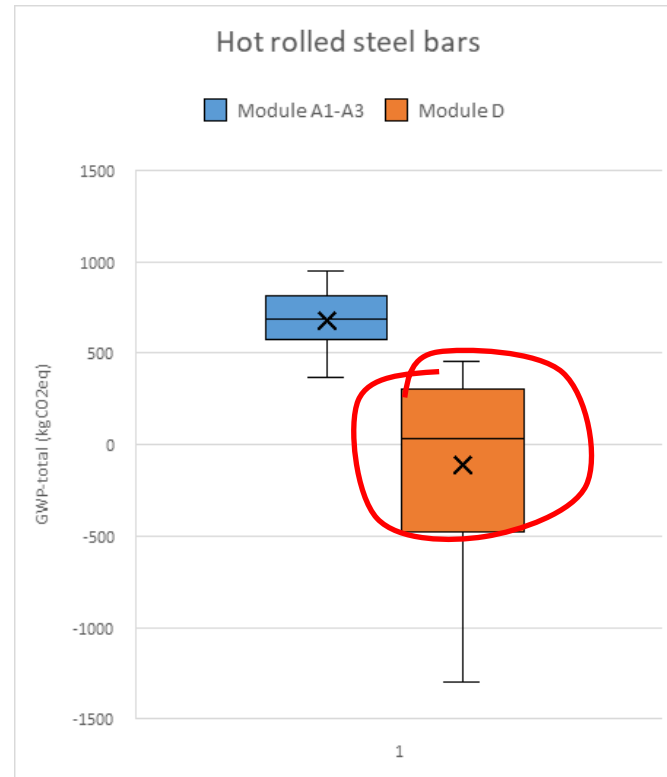
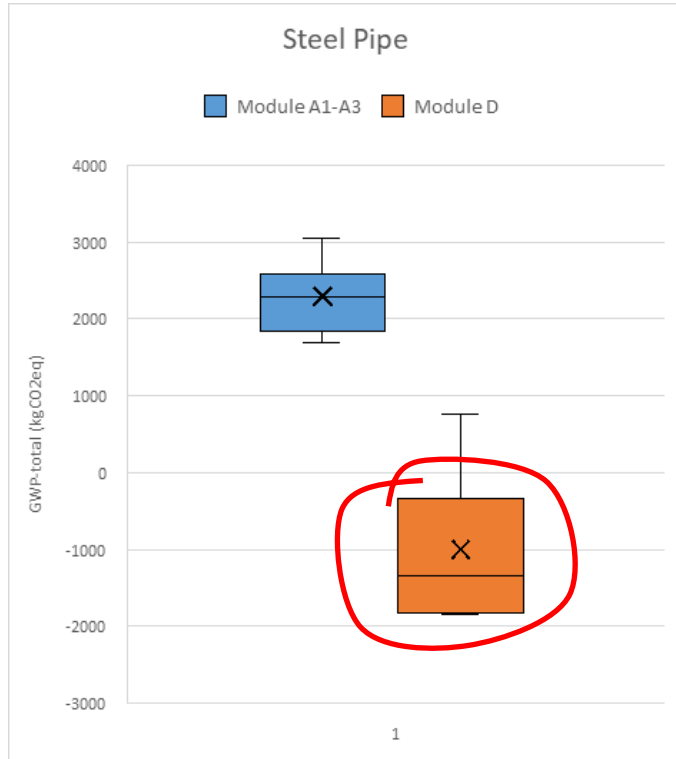


Observations on module D in existing EPDs

Observations on module D in existing EPDs

- Assess current treatment of Module D by comparing EPD variations for identical products.
- Calculated standard deviation and coefficient of variance for Module A1-A3 and Module D results (GWP-total, EF3.0) using openLCA and Soda4LCA.
- EPDs from *International EPD System* and *EPD Italy*.
- **Products Analyzed:**
 1. 1 kg steel pipe
 2. 1 kg hot-rolled steel bar
 3. 1 m³ ready-mix concrete

Observations on module D in existing EPDs



No. of EPDs evaluated	7	9	47
A1-A3 (CV)	0.20	0.26	0.31
D (CV)	-0.95	-5.28	-0.70

Practical Advice:
Sorting the Weed of *Misinterpretation* for *Module D*

Practical advice for modeling Module D

There are three main aspects to be aware of:

The determination of the
final waste stage

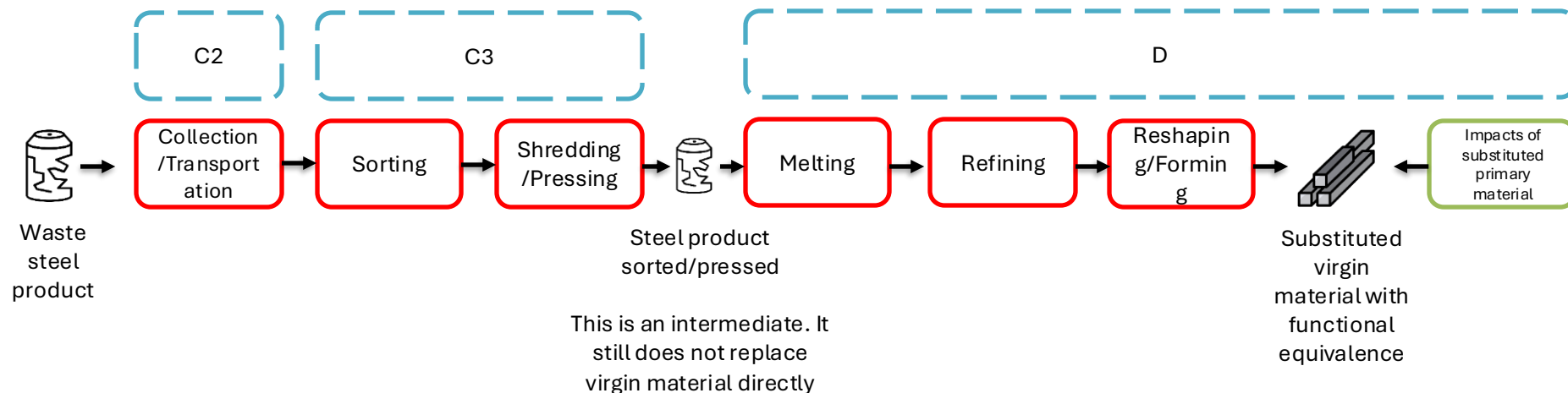
The determination of the
quality ratio, both
interrelated

How to model and
calculate the net flows

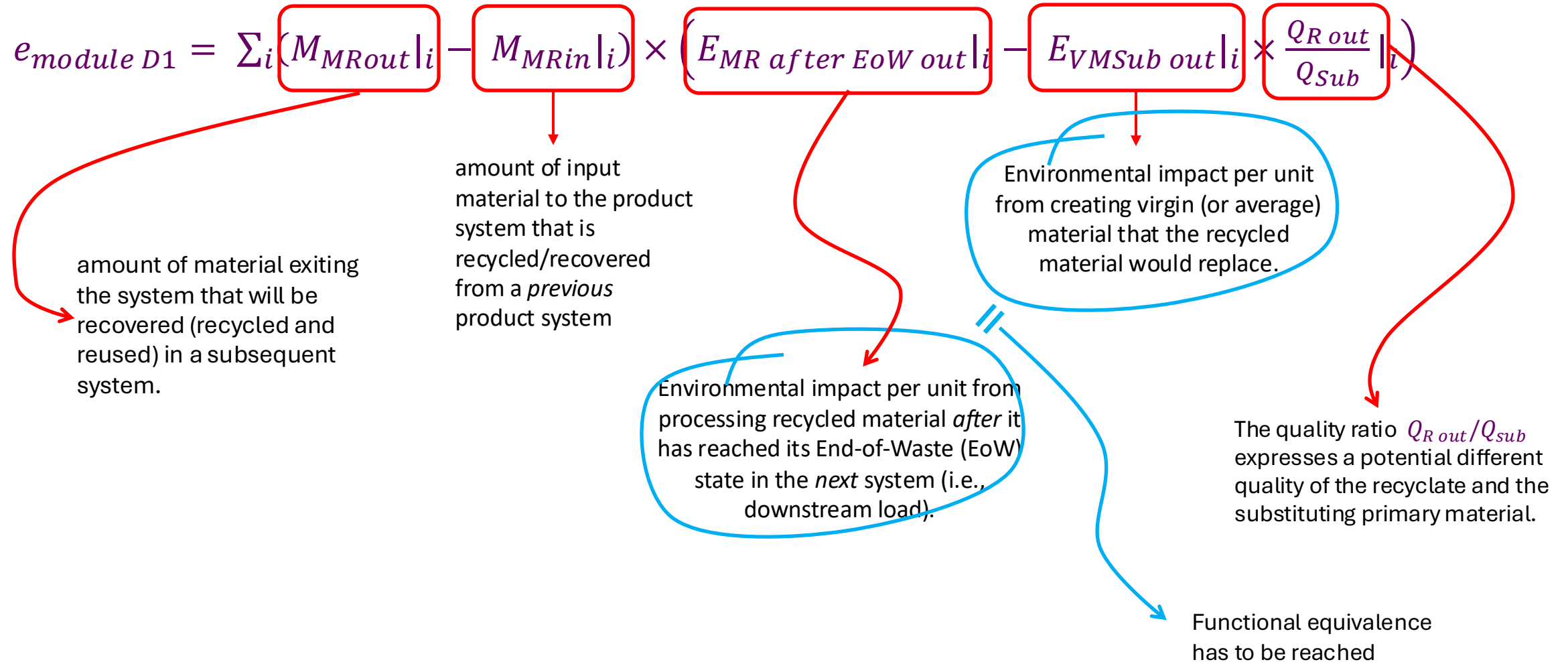
Determination of final waste

A waste is final waste if these criteria are met¹ :

1. The substance or object is commonly used for specific purposes.
2. A market or demand exists for such a substance or object.
3. The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products.
4. Use of the substance or object will not lead to overall adverse environmental or human health impacts.



Unpacking Annex D equation



Determination of the quality ratio and the “correct” substitute

$$e_{module\ D1} = \sum_i (M_{MRout|i} - M_{MRin|i}) \times (E_{MR\ after\ EoW\ out|i} - E_{VMSub\ out|i} \times \frac{Q_{R\ out}}{Q_{Sub}} |i)$$

In most cases = 1 ; also mentioned e.g. in the environdec PCR 2019:14 version 1.3.4



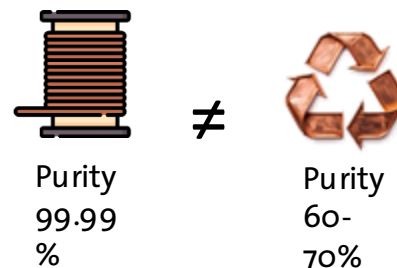
Consequently, the benefits of Module D would be overstated, resulting in greenwashing

$$\frac{Q_{R\ out}}{Q_{Sub}} = ?$$

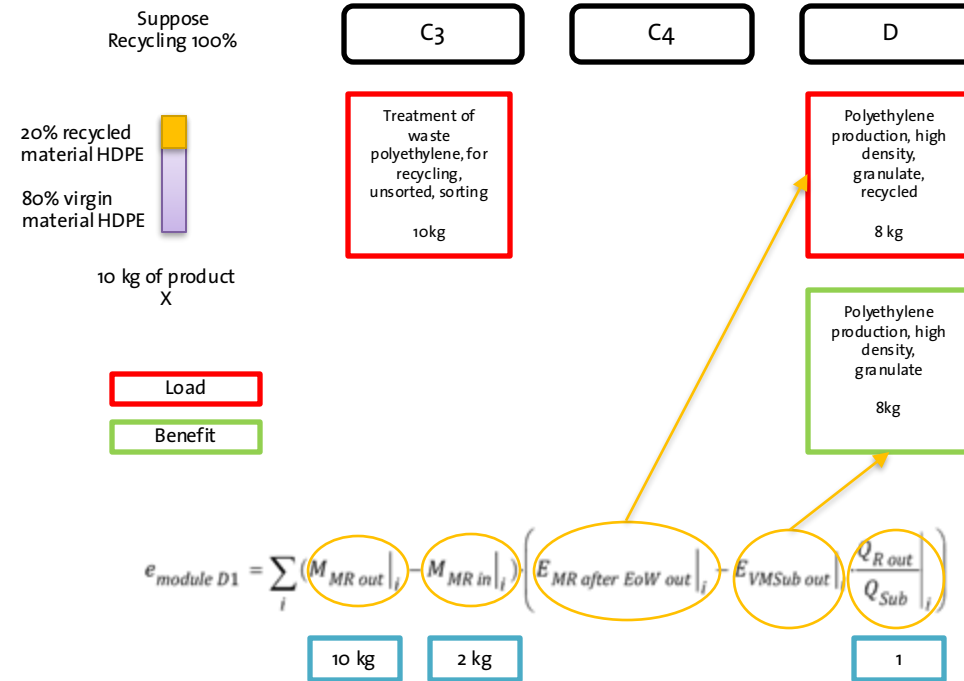
$$\frac{\text{Bottle with } \text{€}3}{\text{Bottle}} = \frac{0.85}{1} \quad \text{OR} \quad \frac{EUR\ 0.7}{EUR\ 1.1}$$

Similar for final waste, setting the appropriate substitute flow that is used for obtaining the credits in module D is important, setting a **too-precious substituted** product may yield too high credits.

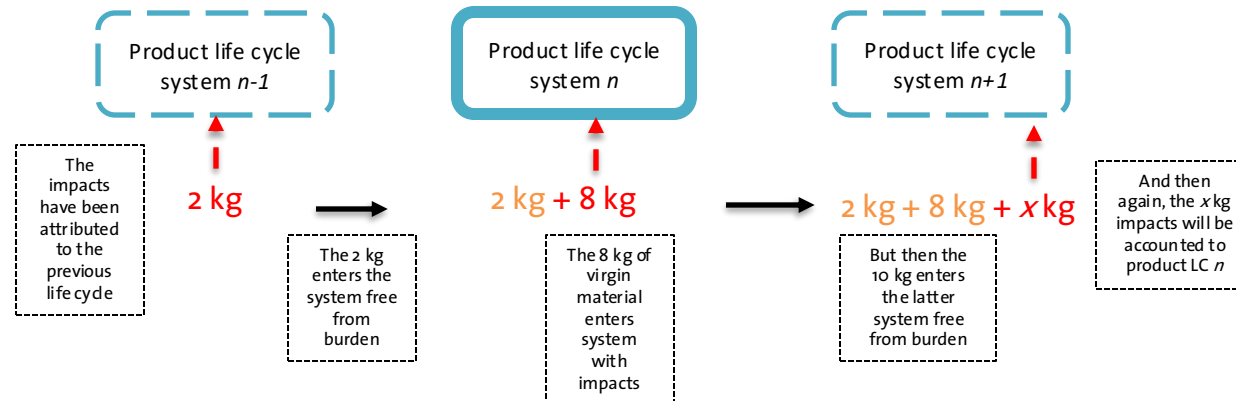
For example copper,



Modeling the net flows, loads and benefits



Why not the entire 10 kg of product undertaken in module D?



A limit to Module D

$$e_{module\ D1} = \sum_i (M_{MRout|i} - M_{MRin|i}) \times \underbrace{\left(E_{MR\ after\ EoW\ out|i} - E_{VMSub\ out|i} \times \frac{Q_{R\ out}}{Q_{Sub}} |i \right)}_{\text{Constant}}$$

M _{MRout}	M _{MRin}	Net flows	Constant	<i>e_{module D1}</i>
-	-	-	-	-

using recycled materials **must be paired** with adequate end-of-life material recovery

Conclusion

- In principle, modeling module D according to EN15804 is quite straightforward
- Module D is responsible for considering credits for following and burdens from previous life cycles
- Module D typically contains credits
- However, in practice,
 - Module D is a source for greenwashing
 - Aggregating module D with “the rest” of the EPD stages is not permitted but still done
 - Rules are unnecessarily cumbersome and unclear, with even mistakes in published PCRs and the EN15804 standard (see whitepaper for details)

More on this,

The white paper

Find it on:

<https://www.greendelta.com/resources/>

Or scan QR code



GreenDELTA

Whitepaper

Module D in Environmental Product Declarations (EPDs)

Commissioned by:

Interface

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Thank you!

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