Resource depletion indicators in LCA

A quantitative comparison of selected characterization methods

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Aim & Scope

- **Quantitative comparison** of **resource depletion methods** in Life Cycle Assessment:
  - The aim is to show differences in coverage, model approach, & impact assessment results
  - with the outcome of providing better understanding **effects** of **model choice** of todays **assessment models** for method developers.
- The study includes
  - comparison of **resource coverag**e, correlation between **CFs**, impact **contribution analysis** as well as comparison of **total resource depletion impact scores** over 2,747 product systems for **11 impact assessment methods**.

Resource depletion assessment methods

- Selection is based on the ILCD REVIEW[1] and Carvalho et al.[2] with conditions of including
  - methods with **distinct** natural abiotic **resource depletion models**
  - methods **applying impact modeling beyond simple aggregation** of mass or energy
  - methods being used in a **substantial number of case studies** or being recently developed.

Existing indicators

Modeling approach		Methods	Metals & minerals	Nuclear	Fossils
Type 1	*Aggr. of mass and energy content*	-			
Type 2	*Use-to-availability*	CML–U/R[4]	29	1	4
		EDIP[3]	48	1	4
		CML–R/B (ILCD)[1,4]	42	1	4
Type 3	*Ore grade quality (through future scenario modeling)*	EI99[5]	13	0	3
		EPS[6]	64	1	4
		I2002+[7]	12	1	4
		ReCiPe[8]	19	1	5
		ORI[9]	9	0	0
Type 4	*Universal limited resource*	CEENE[10]	53	1	4
		CExD[11]	64	1	5
		SED[12]	68	1	4

Rørbech et al. (in preparation)

Slides 5-10 omitted, to be published in Rorbech et al. (*in preparation*)

Conclusions

It is shown that

1. Different answers can be obtained from the available assessment methods, thus uncritical selection of assessment method in a specific LCA will impact the result of resource depletion considerably

2. Most "ore grade quality" methods face major challenges in terms of resource coverage (16-25 resources) regarding especially identified critical elements such as REE

3. Comprehensive coverage is important to avoid burden shifting between resources

4. Existing classification of resource depletion methods do neither systematically reflect
   - underlying environmental concerns within the methods, nor
   - grouping according to impact profiles

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Thank you
for your attention