

On use and limitations of labels for building materials: requirements from a scientific viewpoint

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Life Cycle Inventory Flows for Joint Metal Resources *

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Abstract

In this presentation a methodology of inventorying joint metal resources is proposed. Impact assessment methods usually aggregate and assess resources based on a) mass, b) reserves, c) cost of restoration or substitution of the resource or d) change in the future impact of the extraction due to the need to extract from lower grade deposits. Inventory data for metal ores on the other hand usually relate either to the amount of a specific metal in the ore or to the amount of a specific metal-containing mineral in the ore. Such inventory data doesn't allow an assessment based on d) since it doesn't indicate the quality of the deposit from which a resource is extracted and it doesn't allow an assessment of coupled resources at all since it bears no information on other elements or minerals present in the ore. Withinecoinvent a new method of inventorying abiotic resources was developed. The elementary flow relates to the element or mineral in focus and delivers information about its content in the ore and other economically valuable elements or minerals in the ore and in the crude ore. Thus the coupled extraction of e.g. copper and molybdenum from sulfidic ore is inventoried as extraction of copper and molybdenum as 'Copper, 0.59% in sulfide, Cu 0.22% and Mo 8.2E-3% in crude ore, in ground' and 'Molybdenum, 0.022% in sulfide, Mo 8.2E-3% and Cu 0.22% in crude ore, in ground'. The extraction of the copper resource is completely allocated to the copper produced while the extraction of the molybdenum resource is allocated to the copper and the molybdenum produced since on a global scale only part of the molybdenum mined together with copper is actually won. These elementary flows allow an assessment of all abiotic resources based on any of the existing impact assessment methods.

Keywords

Inventory, joined resource, allocation

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Overview

- Sustainable Buildings
- Case Study: Swiss Eco-Label “eco-devis”
- Cut-off vs. Value Corrected Substitution
- Conclusions

Sustainable Buildings

■ Rating of Products & Processes

■ Products

- Labelling based on Life Cycle Inventory
- Regulations (knock-off – criteria)
- Buildings, Construction Parts

■ Processes

- ... Energy efficiency
- Usually construction or use phase

Sustainable Buildings: Building Products

■ Building Products

- Focus on planning (architecture) & construction (building site)
- Rating based on Life Cycle Inventory
- Valuation often by Cumulated Primary Energy Demand (CED)

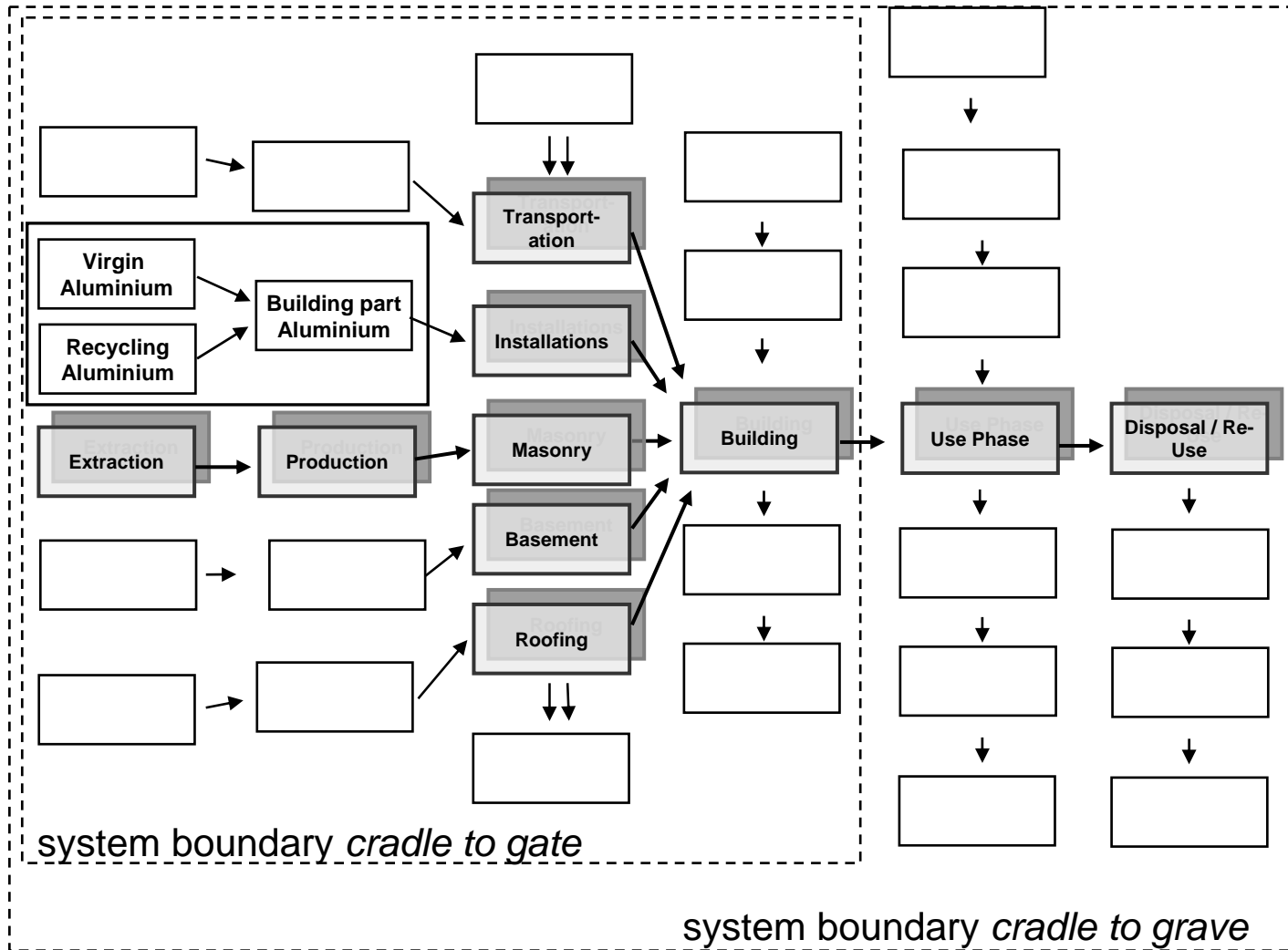
■ Assessment

- Goal: Comparison (which alternative is best?)
- Building represented by aggregation of building components
- “cradle-to-gate”

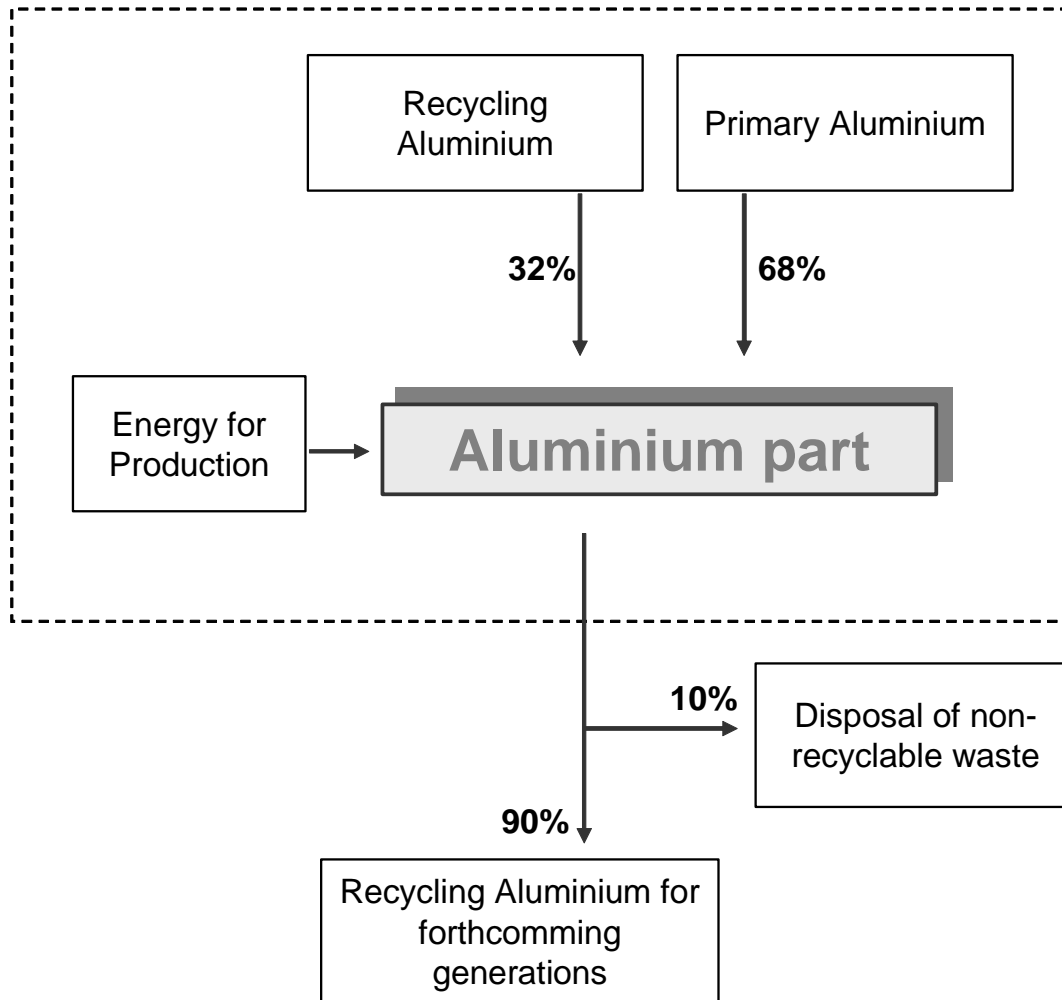
Case Study: The Label “eco-devis”

- Rating building components (comparative)
- Covering **material production, construction and disposal**
- Criteria:
 - Absence of toxic substances
 - No emissions during handling and use (VOC, heavy metals)
 - Disposability
 - Threshold value for Cumulative Energy Demand (CED) in production
- Criteria specification case specific
 - CED: Average of best- and worst-in-class
- CED based on “cradle-to-gate” Inventories

CED: „cradle-to-gate“ Inventories



Aluminium: „cradle-to-gate“ with „cut-off“



- Usual approach
- Single processes
- Depending on modelling principles:
 - consumption mix
 - Production mix

Comparison of different building components

- Facade-tile 10 kg

- loose

- Wrought alloy

 - Collection ~100%

 - Preparation 98.5%

 - Re-melting 98%

- CED = 1800 MJ / part *

- Total recovery ~90%

- Facade-tile 10 kg

- fix riveted

- Wrought alloy

 - Collection ~50%

 - Preparation 98.5%

 - Re-melting 98%

- CED = 1800 MJ / part *

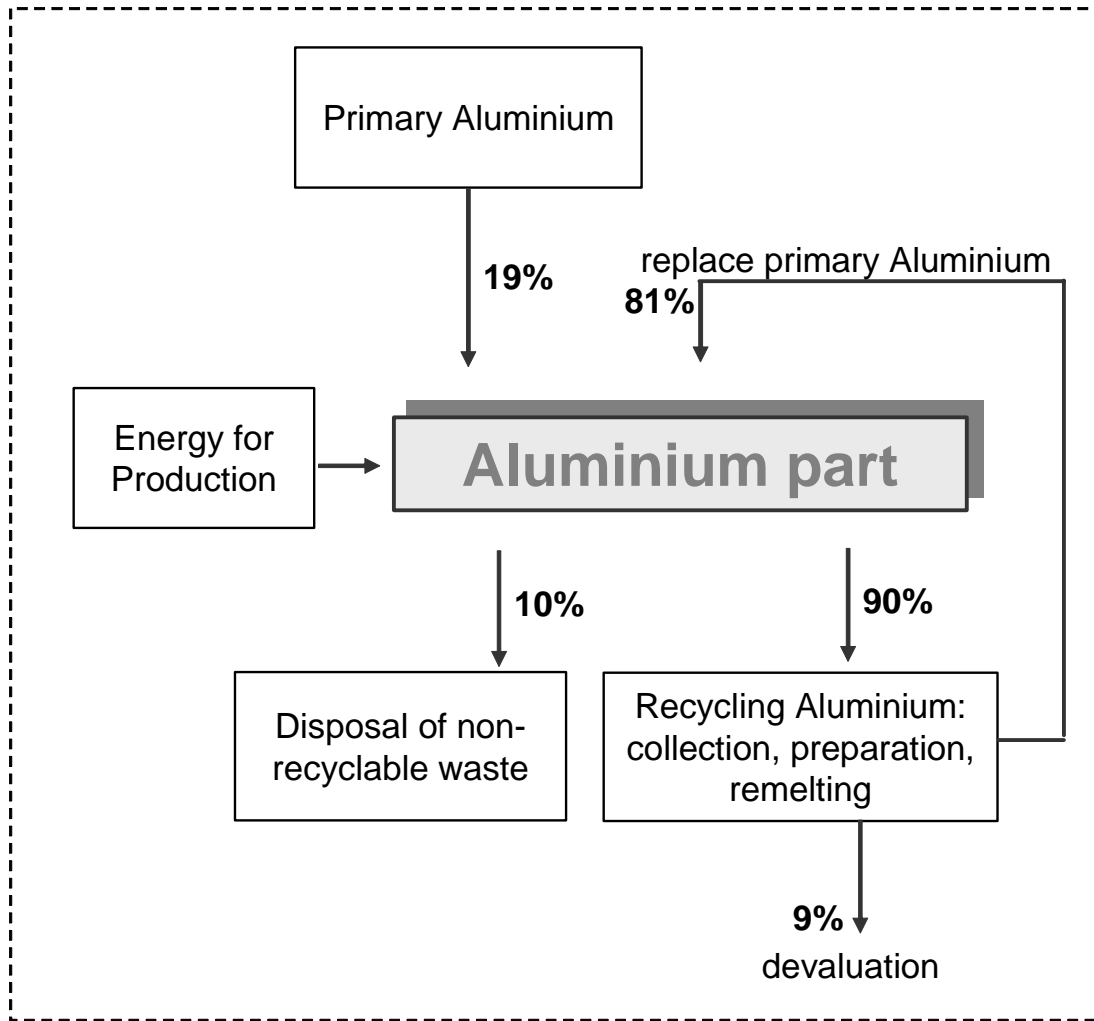
- Total recovery ~45%

→ **Same CED, but different recycling potential**

→ **No incentive to use better recyclable part**

* aluminium, production mix, wrought alloy, at plant (RER):
178.9 MJ / kg CED (ren. & non-renewable), source: ecoinvent centre (2004)

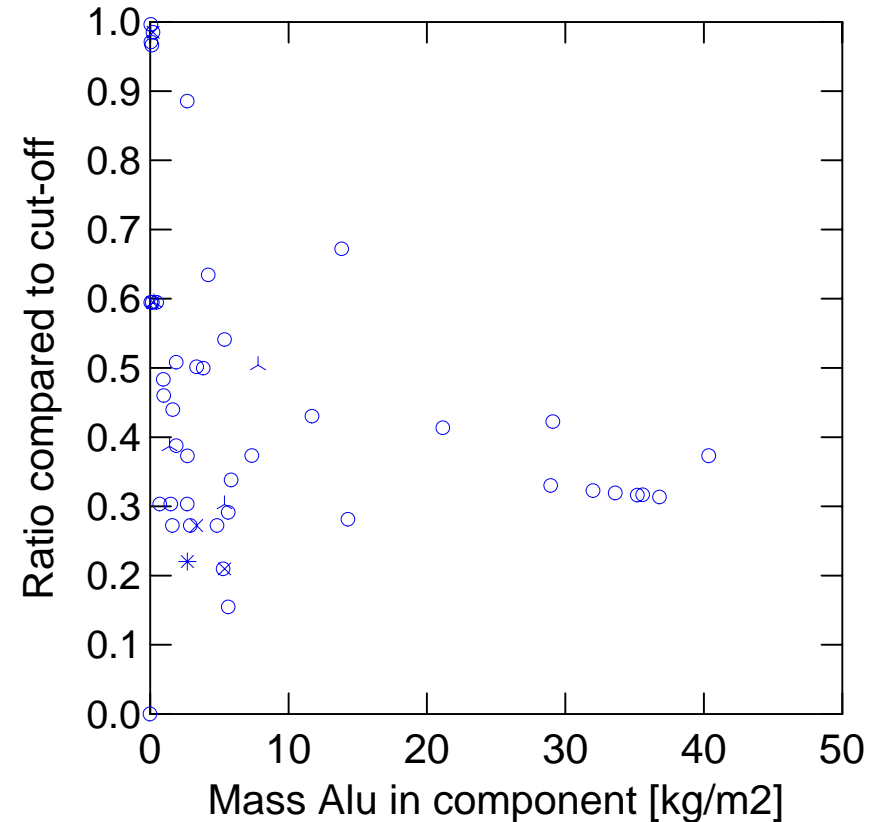
Aluminium: Value Corrected Substitution



- Based on Werner (2003)
- System expansion
- Substitution of virgin Aluminium
- Accounting for individual recycling potential
- Strong influence of part's mass towards collection rate and overall recovery

Aluminium: „cut-off“ vs. „value corrected substitution“

- 80 Alu-elements in 68 parts were analysed
- Strong influence of mass on collection rate and hence substitution effect
- mass → collection → substitution
- Significant reduction of fairly recyclable construction parts
- Recycling potential reflected by CED



Comparison of the approaches

■ Cut-off

- **Consistency** ensured:
Subsequent lifecycle bear burden from recycling
- No implications on product's **recycling potential** = no incentives for recoverability today
- No implications for **forthcoming generations** = intact incentives to recycle material in future

■ Value Corrected Substitution

- **Consistency** ensured: Recycling only within boundaries of product-lifecycle – rest is virgin material.
- Implications on product's **recycling potential** = good recycling abilities are rewarded
- Implications for **forthcoming generations** = no incentives to recycle material in future

Conclusions

- Different **mental models** underlie different approaches
 - Cut-off: stresses inter-generative equity.
 - Value corrected substitution stresses integrated product policy (IPP), decision oriented valuation method.

- Requirement 1: **Consistent modelling**
 - no double counting,
 - no burden shifting

- Requirement 2: **Transparency of valuation dimensions**
 - Revealing preferences of authors: IPP, inter-generative equity or ...?
 - Enhancing overall quality of the rating, ensuring “requirement 1” (see above)

Thank you!

■ Referred Sources:

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