


Interpretation and Decision Making in LCA studies

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Starting point



- A common starting point for an LCA study:
 - Compare two alternatives A & B in order to decide which one is environmentally preferable.
- This presentation focuses on:
 - How can an LCA practitioner facilitate the decision making process and provide the user with sound advice?

Approach (ISO14040)



- Step 1) Determine the goal and scope:
 - Objective
 - Target audience
 - Functional unit
 - System Boundaries
 - Selection of impact categories
 - Data (quality) requirements
 - Allocation & other methodological choices

Goal & Scope Definition



- Audience:
 - Decision maker...
(at what stage do you know the audience?)
- System Boundaries:
 - Cradle-to-Grave
 - Cut-off of 1%
 - Include / exclude capital goods?
- Selection of Impact categories:
 - Resource depletion + Carbon + Water + Toxicity

Life Cycle Inventory (LCI)



- Step 2) Data collection / Inventory:
 - Primary data collected from key stakeholder
 - Additional data from literature (AusLCI?!)
 - Combined with input-output data

Result: Inventory List



Raw Materials		GHG emissions	
Crude Oil	... kg	Carbon dioxide	... kg
Natural gas	... kg	Methane	... Kg
Uranium (U)	... kg	Other GHG emissions	... kg
Iron (Fe)	... kg	Toxic emissions	
Chromium (Cr)	... kg	Arsenicum	... mg
Manganese (Mn)	... kg	PAH	... mg
Copper (Cu)	... kg	Benzene	... mg
Zinc (Zn)	... kg	Chromium (III)	... mg
Water Use		Chromium (VI)	... µg
Potable water	... kL	Mercury (Hg)	... µg
Ground water	... kL	Dioxins	... µg

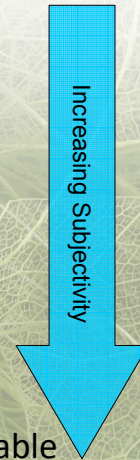


Life Cycle Impact Assessment (LCIA)

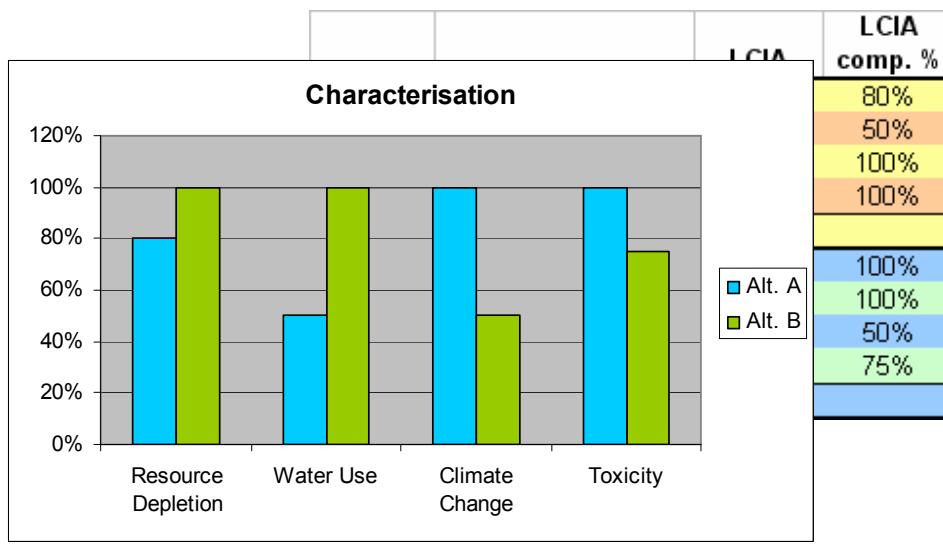


Midpoints or Endpoints

1. Classification/Characterisation
 - Range of indicators
 - Graphs often show highest at 100% (because of different units)
2. (Optional) Normalisation
 - Graphs show absolute values (unit-less!)
3. (Optional) Weighting
 - Only AFTER normalisation!
 - Results BEFORE weighting should be available



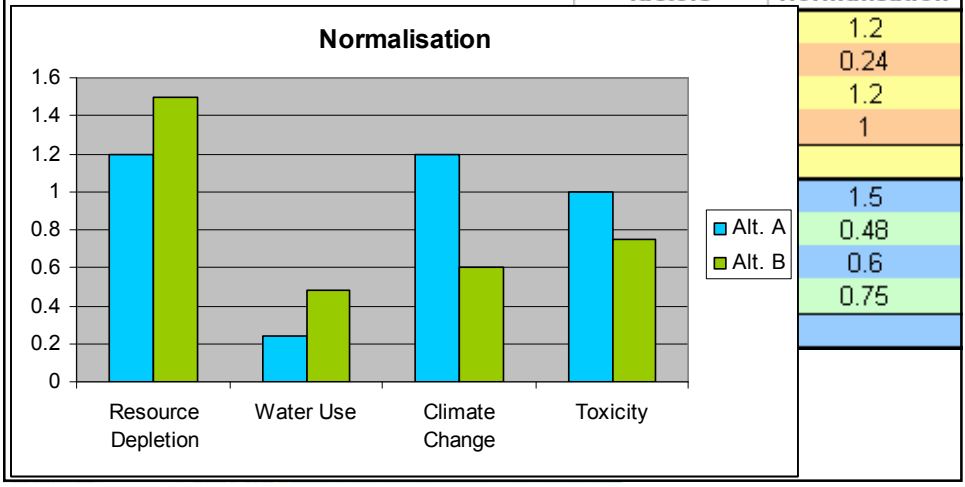
LCIA – Characterisation



LCIA – Normalisation



Normalisation factors	Normalisation
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LCIA – Weighting



Weighting factors	Score
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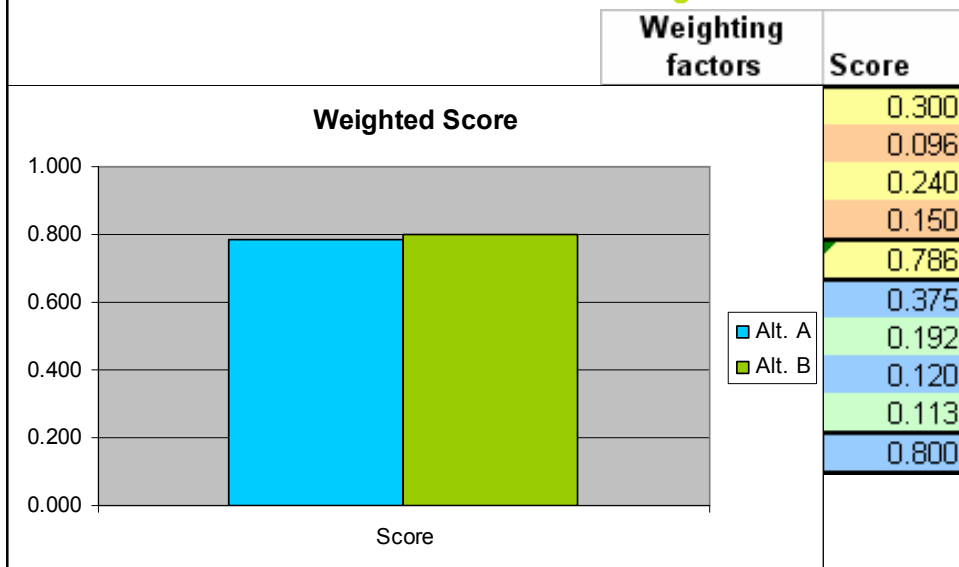
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Alternative weighting methods are available:

1. Different metrics
 - Distance-to-target
 - Economics
 - (Expert) panels
 - Etc.
2. (Political; Geo-/Demo-graphic;...) Variation
 - Different users have different needs & likes

Life Cycle Impact Assessment (LCIA)



Life Cycle Impact Assessment (LCIA)



This alternative weighting set (highest priority for water [savings] due to availability):

- Although small, slight advantage for Alt. A
 - Minor turnaround from previous conclusion

For discussion:

How and to what extent has this optional exercise helped the user in their (interpretation and) decision making?

Decision Making



Statements for consideration:

- A single score always provides an answer!
- If water is so important, why not make your decision on the individual (water) indicator?
- A single score leads us in the right direction (reducing environmental impacts)!
- Does the decision maker know the relationship between the inventory and the priority given by a weighting set?

Decision Making - relevancy



The user of the previous example decided water was a main concern.

- What do we know about the quality of water inventories?
- Is there a valid relationship between where the hotspots for water consumption occur and what the user wants to achieve (regional aspect)?



Decision Making – Industry concerns



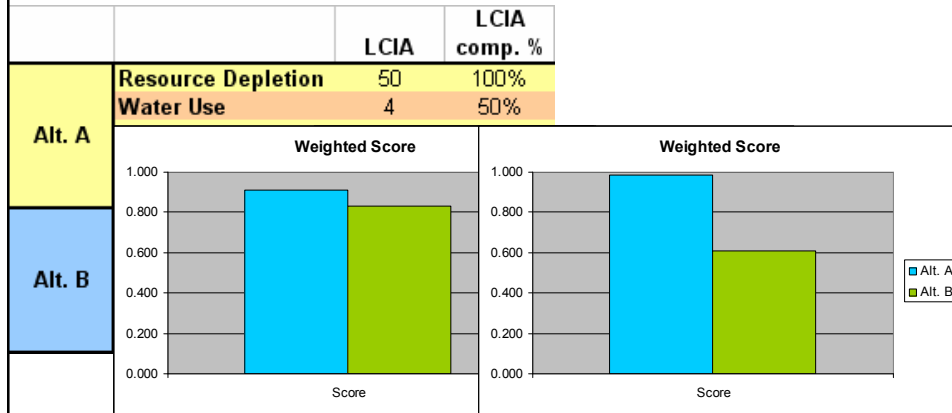
The user (e.g. architect) does the exercise once, and from then on makes the same decision over-and-over again -> without realising variations in functional unit, system boundaries and issues discussed before.

- This leads to materials “preference lists”
- Industry does not like this as it ignores the grounds for doing LCA’s in the first place: exposing trade-offs and lift the debate to a higher (more complex) level

Typical situations for interpretation



- Study effect of LCIA method (e.g. vary resource depletion IA model)

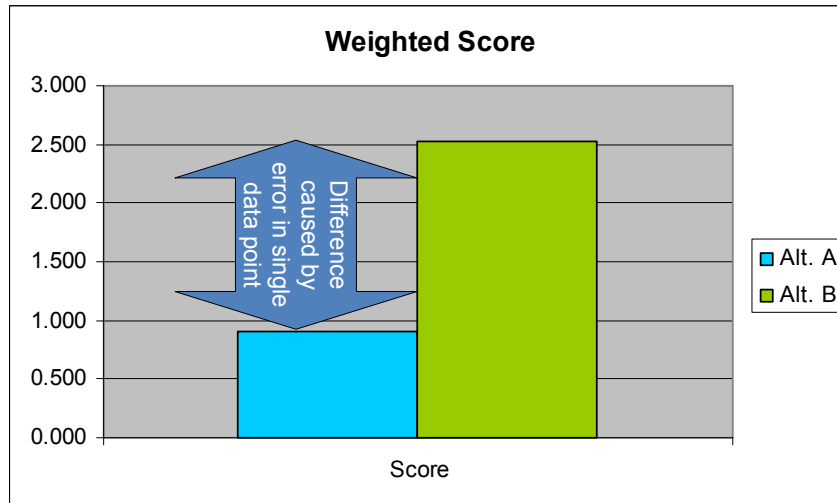


Typical situations for interpretation



- Error in inventory
 - Dodgy data source
 - Data entry error (e.g. missing decimal point, unit)
 - Wrong substance (e.g. Cr-VI instead of Cr-III)
- Error (uncertainty) in Impact Assessment Method (characterisation/normalisation)
- Inconsistent system boundaries
 - Capital goods included in some background processes, excluded elsewhere

Life Cycle Impact Assessment (LCIA)



My view on Decision Making



- Always present characterised results and start interpretation here
- Normalisation can be helpful to shed light on larger (NOT necessarily more important!) contributions, but increases subjectivity
- Weighting can be useful for internal purposes (ISO14040) and only when the user knows what they are doing (also studies pre-weighted results)

My view on Decision Making



- I believe, as an LCA-practitioner, it is my job to present data; not to make decisions. I guide the client as objectively as I can, but they have to make the final decision from their perspective.
- I accept that this can lead to conflicting decisions for the same LCA

