Life Cycle Assessment: why what and how?

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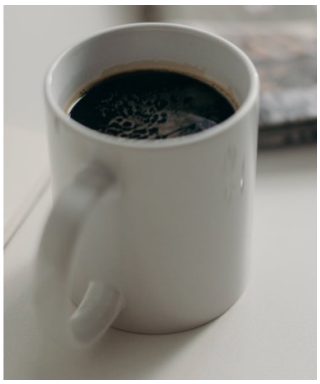
Question:

- What is the better choice ? (from an environmental perspective)



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Answer:

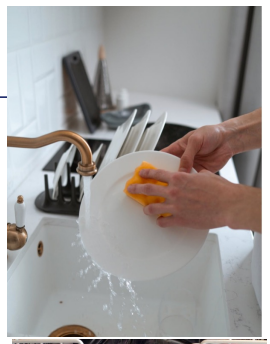
- It depends !
- LCA answers the question : it depends on what ?
  - Material, energy, waste treatment etc. …
  - …but most of all it depends on behavior !

Life Cycle Thinking

- Upstream:
  - Every product is produced using materials, these materials need to be produced as well and raw materials need to be mined etc
- Downstream:
  - After use products will become waste and re-use, recycling and waste treatment will come into play
- For many products, the impacts are concentrated in the use-phase

User behavior !! !

- How do you clean your mug ?
- How often do you clean your mug?
- How often do you use the plastic cup?
- What do you do with the plastic cup after you used in it ? Seperate collection vs general waste bin?



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What is Life Cycle Assessment ?

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What is LCA?

- *Method* to structure the large amount of complex data
- *Quantitative* (as much as possible)
- *Environmental* (thus not costs, safety, user friendliness, ...)
- *Life Cycle* (from the cradle to the grave)
- *Products* (with a central role for the function of the product and services)

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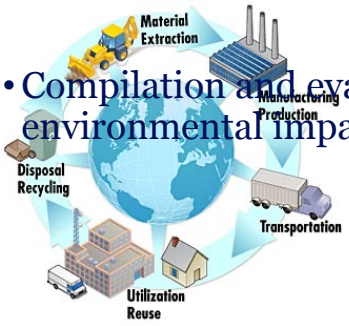
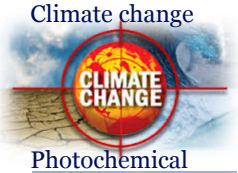
Life cycle assessment in a nutshell



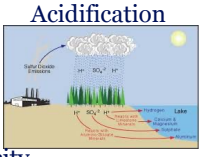
- Compilation and evaluation environmental impacts of a p
- Complete picture to map and avoid potential problem shifting
  - whole life-cycle
  - All burdens and impacts

Climate change



Str. ozone depl.

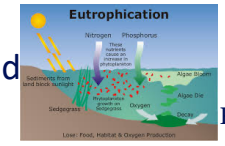
Acidification



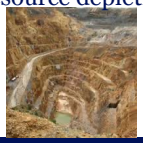
Photochemical ozone formation

Human toxicity

Ecotoxicity



Resource depletion



Water scarcity

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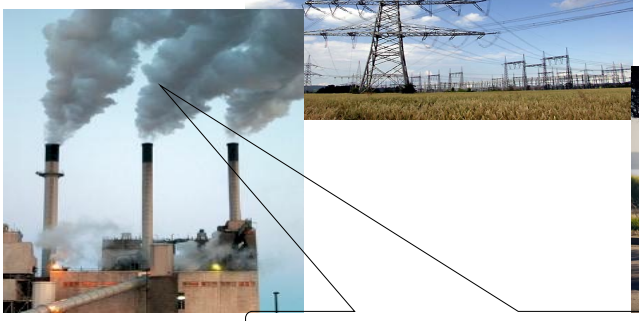
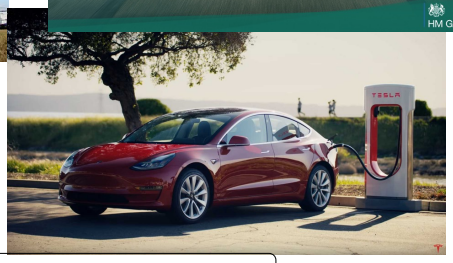
Zero emission cars





What do you mean …. zero emission?

Life Cycle Assessment (LCA)

- Science, not an ideology
  - is an electric car indeed better ?
  - is recycling always a good idea ?
- Systems analysis
  - technosphere (‘economy’)
  - nature (‘natural environment’)
- Analysis of ‘externalities’
  - starts from the assumption that we need, and already value, the product’s functions/services
  - aims to map the non-accounted ‘externalities’ (air pollution, water pollution, etc.)

Integral analysis of environmental impacts

- Whole life-cycle (any where)
- All substances
- All countries (any place)
- All types of environmental impacts
- Integrated over time (any time)
- ...

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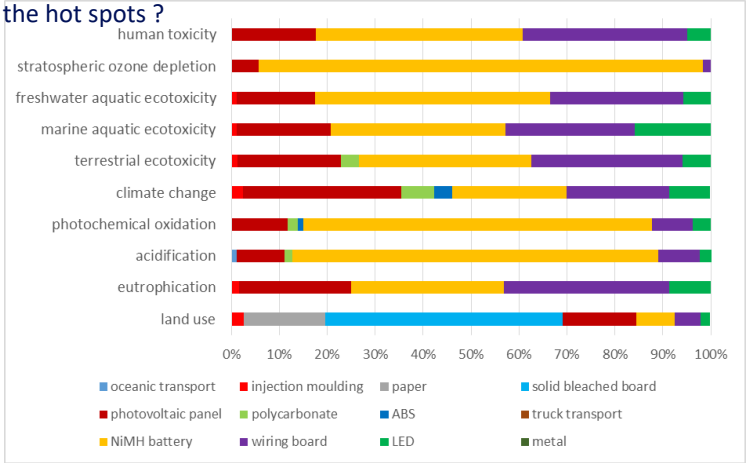
Interpretation

- Conclusions, recommendations, analyses, all related to goal and scope of the research
  - detailed analysis of results: where are the hot spots ?
    - contribution analysis
    - uncertainty analysis



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LCA in practice

LCA: four stages of grief…..

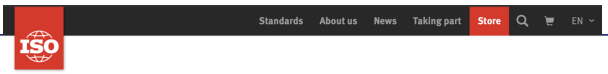
- What happens if LCA is introduced in a new sector:
  - **Exitement**: wow this is the holy grail ! the tool we have been looking for and answers all our questions !
  - **Frustration:** this is very complex, requires a lot of data and time, the outcomes are very uncertain
  - **Disappointment:** the answer to the question 'is A better than B' is always the same: 'it depends'
  - **Realism:** this is a very useful (and in fact the only) tool that can be used to quantitatively identify the environmental hotspots in the life cycle of a product or service

LCA in practice

- A *real* LCA can only be done with dedicated software
  - Commercial & open source
    - Commercial software: integrated database (SIMAPRO, GaBi)
    - Open-source software: database not incldued (OpenLCA, Brightway, CMLCA)
- Performing a good LCA can only be done if you know what you are doing
  - Many methodological choices
  - Many pitfalls
- Simplification is possible : white goods -> electricty

LCA in practice

- ISO standard: 14040
- Handbooks



Take home messages:

- LCA is *the only* tool that can quantify the environmental impacts of the whole product/service life cycle
- LCA is very suited for identifying environmental hotspots and improvement options
- Behavior is often a crucial factor, include this in the study e.g. by using scenarios
- A good LCA requires expertise, using a Life Cycle Thinking apporach can be a good alternative / starting point
- Don't expect that all data for a specific sector will be available

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