

Concepts of attributional and consequential LCA

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Characteristics

	Attributional LCA	Consequential LCA
Allocation	Partitioning	System enlargement
Input data	Average	Marginal (at least in part)

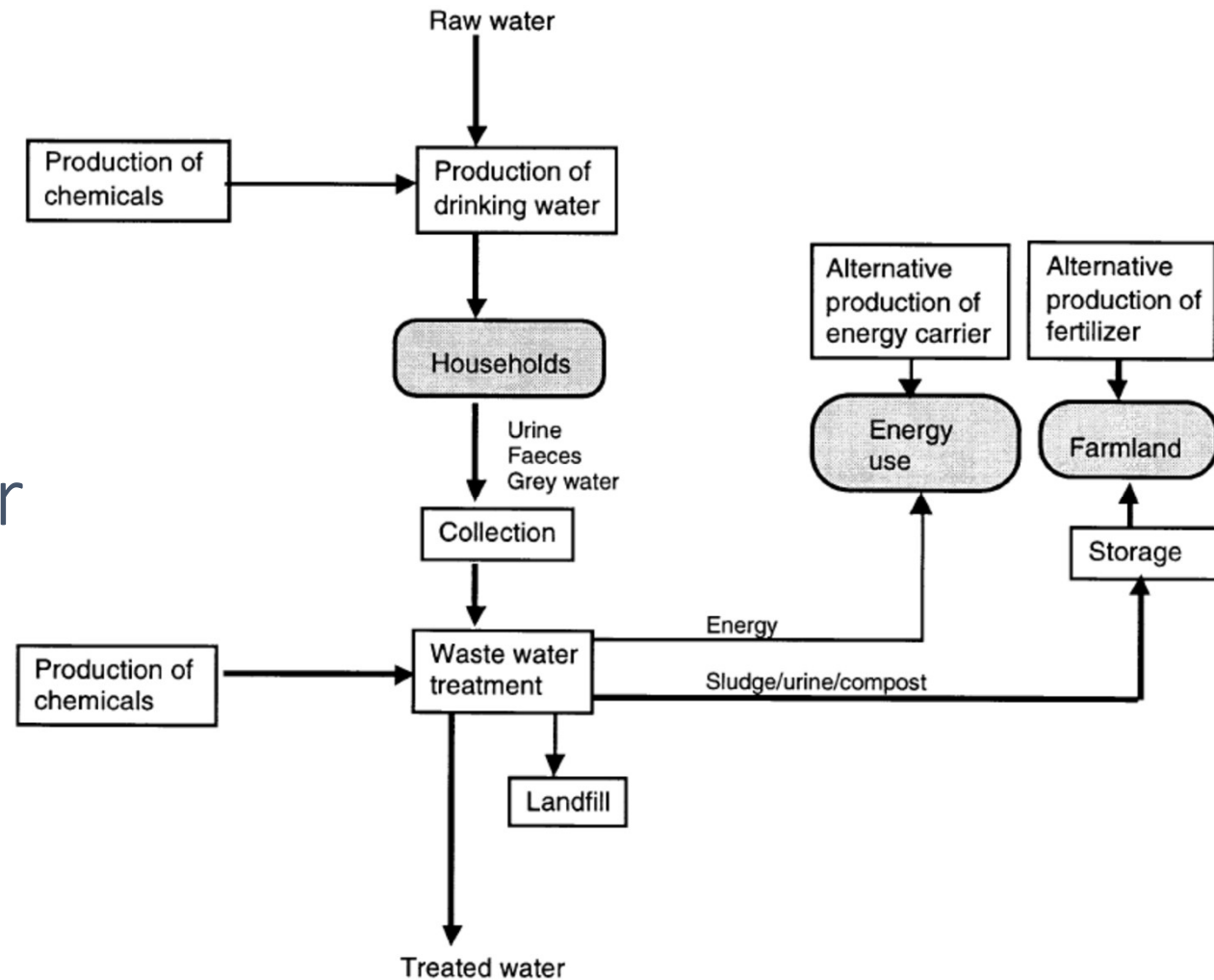
Ref: Tillman 2000



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System enlargement: substitution at wastewater treatment



Ref: Tillman 2000

Substitution in attributional LCA?

Moretti et al. (2020), Tsalidis & Korevaar (2020), Suckling et al. (2020), etc.:
Yes, that's what we do.

Greenhouse Gas Protocol:
Yes, with average or specific data.

ILCD Handbook:
Yes, if it aims to include existing interactions with other systems.

Majeau-Bettez et al. (2017):
Only if no net negative results occur, because ALCA is about attribution.

Brander & Wylie (2011):
No, because ALCA should be applicable for carbon accounting.

Finnveden et al. (2009), Goglio et al. (2020), Schrijvers et al. (2020), etc.:
No.

Starting point

**Concepts are useful only to the extent
they make communication more efficient**



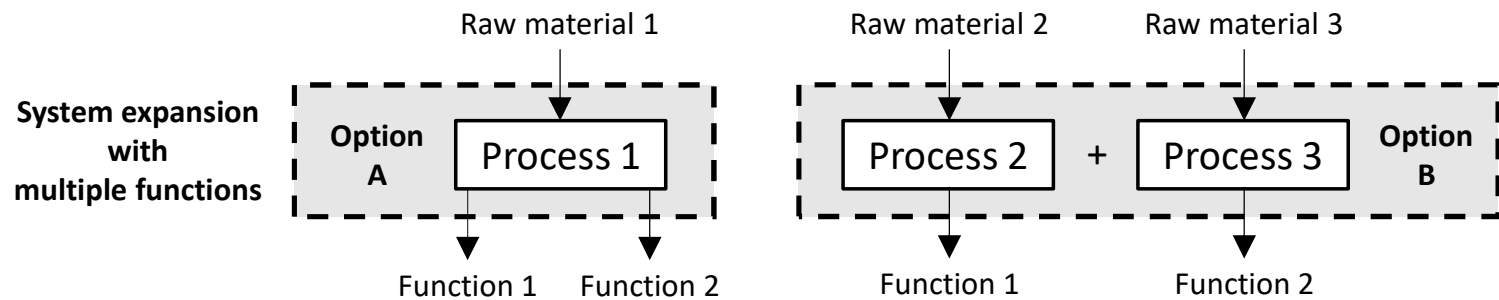
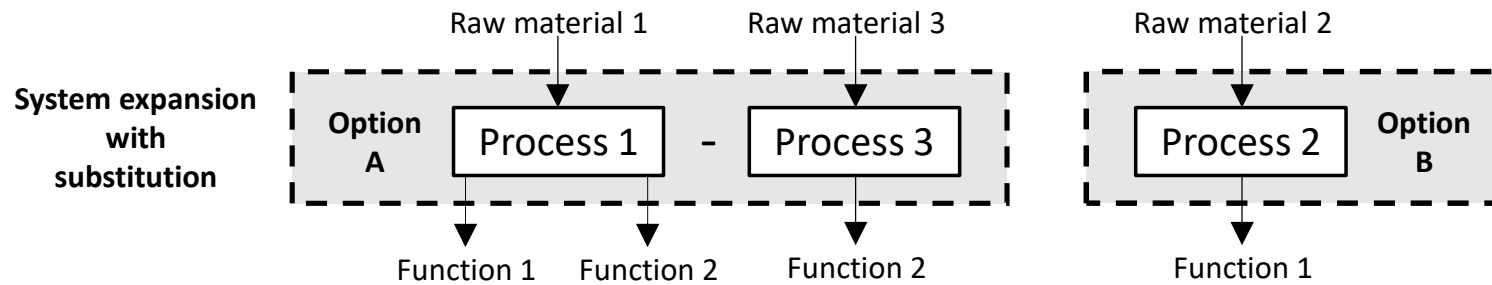
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System enlargement/expansion



Ref: Tillman et al. 1994

Characteristics

	Attributional LCA	Consequential LCA
Allocation	Partitioning	Substitution
Input data	Average	Marginal



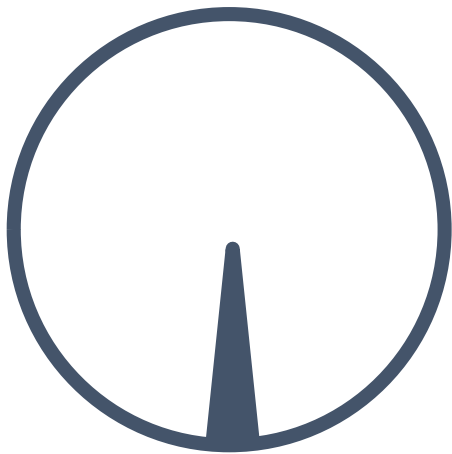
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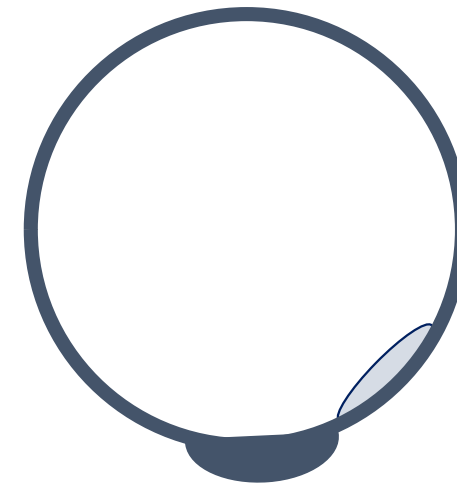
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Attributional & Consequential LCA



What part of the global environmental burdens should be assigned to the product?

XX kg CO₂-equ.
etc.



What is the impact of the product on the global environmental burdens?

ZZ kg CO₂-equ.
etc.

Respond to
different questions

Ref: Weidema 2003



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Suggested definitions

Attributional LCA:

An LCA that aims at describing the environmentally relevant physical flows to and from a life cycle and its subsystems

Consequential LCA:

An LCA that aims at describing how the environmentally relevant physical flows to and from the technological system will change in response to a change in the life cycle

Ref: Ekvall & Weidema 2004



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Defining the life cycle

0. Consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal (ISO 14040)
1. The system investigated in an LCA
2. The system of activities identified by tracing each product input backwards to marginal suppliers and substitution (Weidema 2018)
3. The system of activities connected by material and energy flows that are part of the product or service investigated, or part of its production, use or waste management. The activities range from the production of virgin or secondary material, through manufacturing processes and use, to the waste management of the product, which might generate material for recycling into other product life cycles (Ekvall et al. 2020)



Preferred methods

	Attributional LCA	Consequential LCA
Allocation	Partitioning	Substitution
Input data	Specific or average	Marginal



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Operational LCA

	Attributional LCA	Consequential LCA
Allocation	Partitioning	Substitution (alt. partitioning)
Input data	Specific or average	Marginal (alt. specific/average)

⇒ Most LCAs are consequential



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Thanks for the attention!

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