Life Cycle Assessment
A product-oriented method for sustainability analysis

UNEP LCA Training Kit
Module c – Goal and scope definition
ISO 14040 framework

Life cycle assessment framework

Goal and scope definition

Inventory analysis

Impact assessment

Interpretation

Direct applications:
- Product development and improvement
- Strategic planning
- Public policy making
- Marketing
- Other

Source: ISO 14040
Life cycle goal and scope definition

- **Goal and Scope definition** is the LCA phase in which the aim of the study, and in relation to that, the breadth and depth of the study is established.
  - International Standard ISO 14044
  - Technical Report ISO/TR 14049

- It is the first phase of an LCA.
Contents

• Purpose of LCA
• Goal of the study

• Scope of the study
  – function, functional unit and reference flow
  – initial choices (system boundaries, data categories, inputs and outputs, data quality, critical review)
  – critical review and other procedural aspects
Purpose of LCA

- The purpose of LCA is to compile and evaluate the environmental consequences of options for fulfilling a certain function.
  - descriptive mode of LCA
  - change-oriented mode of LCA
• **Questions asked in descriptive LCA:**
  – Which environmental problems can be attributed to a certain product?
  – What is the share of a certain product in the world’s environmental problems?
Questions asked in change-oriented LCA:

- What changes in environmental problems occur if option B is replaced by option A?
- What are the environmental problems of choosing option A rather than option B for fulfilling a certain function?
Purpose of LCA

• Variety of change-oriented questions:
  – Occasional choices
    • Take train or plane for business meeting next week?
  – Structural choices
    • Take train or plane for weekly business meetings?
  – Strategic choices
    • Invest in rail infrastructure or airports?
The LCA method and even its scientific basis will depend on the purpose of the LCA.

- **Descriptive LCA**
  - based on “logic”: axioms, definition, theorems

- **Change-oriented LCA**
  - based on “science”: empirically established models, inductive
Types of LCA study

- **Descriptive mode** → attribution problem
- **Change-oriented mode**
  - occasional choices → LP/OR-models
  - structural choices → mainstream LCA
  - strategic choices → scenario analyses
Goal definition

• **Intended application**
  – product development and improvement
  – strategic planning
  – public decision making
  – marketing
  – other

• **An LCA’s final application may differ from intended application.**
Goal definition

- **Goal, application, decision to be supported**
- **Parties involved:**
  - researcher(s)
  - commissioner(s)
  - target audience(s)
  - steering/supervising committee
  - expert reviewer(s)
Goal definition

• ISO’s “comparative assertion disclosed to the public”
  ISO 14044 defines as an “environmental claim regarding the superiority or equivalence of one product versus a competing product which performs the same function.”

  ISO 14044 specifies nine evaluation steps required for “comparative assertions” that are made to the public.
Goal definition

- Is LCA the most appropriate tool to solve the problem?
Scope definition

- Change-oriented, structural decision(s)
- Detailed LCA
- Temporal coverage
- Geographical coverage
- Technology coverage
- Coverage of processes
- Coverage of interventions and impacts
Scope definition

System qualities to identify:

• Identification of system function
• Identification of functional unit
• Selection of alternatives
• Determination of reference flow for each alternative
Scope definition

• **Example:**
  – Function: lighting a room
  – Functional unit: 1000 hours of 1250 lumen light
  – Alternatives: incandescent, fluorescent and compact fluorescent
• **Example** (continued)
  – **Reference flows**
    • 1000 hours fluorescent tube 1250 lumen light
    • 1000 hours compact fluorescent 1250 lumen light
    • 1000 hours incandescent 1250 lumen light
Scope definition

- **Functional unit:** exercises
  - *electricity* (coal, oil, wind)
  - *beverage containers* (one-way, reusable)
  - *potatoes* (traditional, organic)
  - *paint* (alkyd, acryl)
  - *TV* (normal, plasma)
  - *communication* (paper, telephone, e-mail)
Are there segments you wish to review from this module?

- **Purpose of LCA**
- **Goal of the study**

- **Scope of the study**
  - function, functional unit and reference flow
  - initial choices (system boundaries, data categories, inputs and outputs, data quality, critical review)
  - critical review and other procedural aspects
This is an overview of the remaining modules in the toolkit.

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