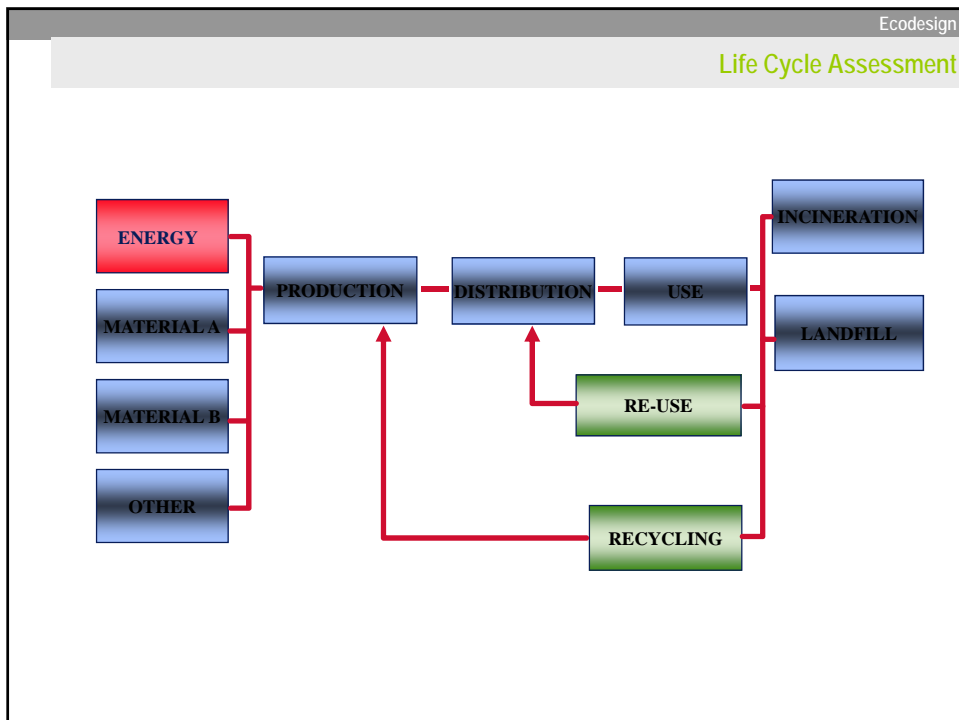


Da Análise de Ciclo de Vida ao Ecodesign

Paulo Ferrão
ferrao@ist.utl.pt

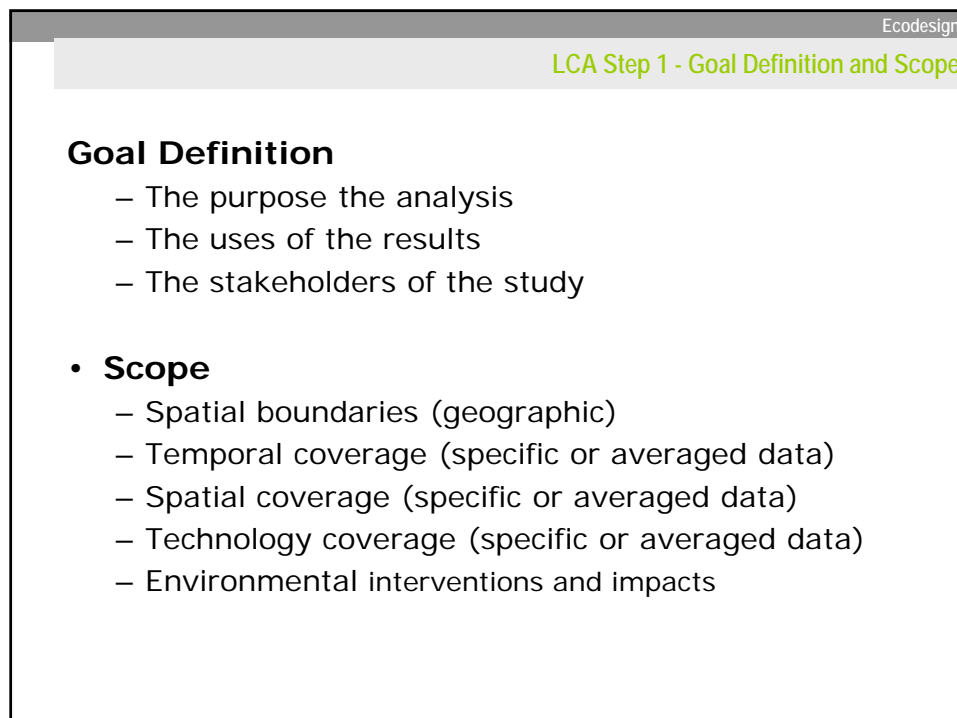
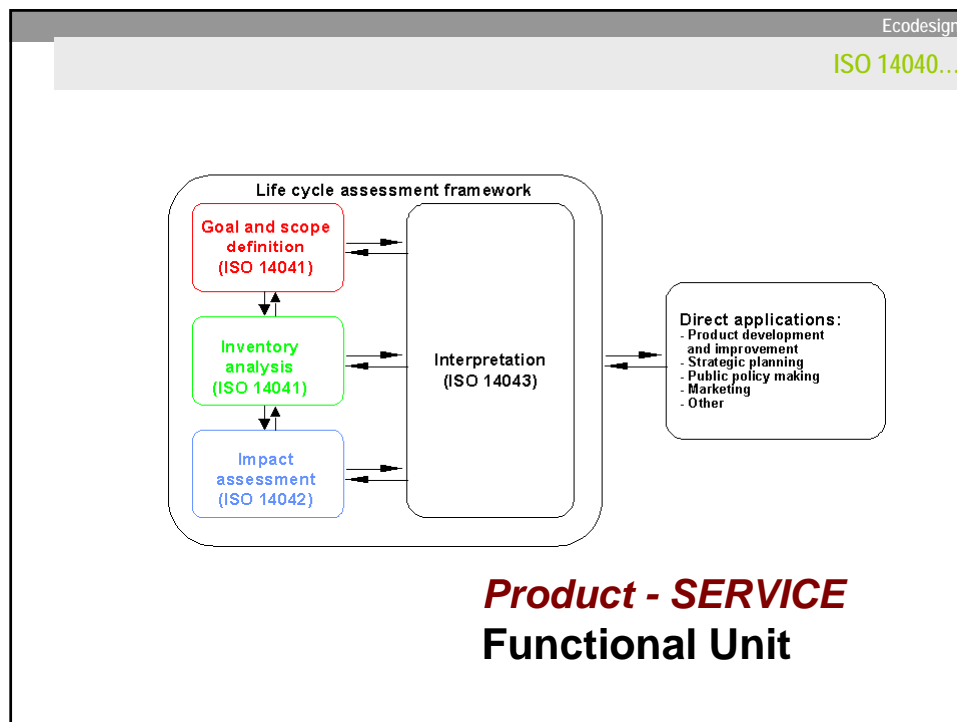


Definition of LCA according to ISO 14040:

LCA is a technique [...] compiling an inventory of relevant inputs and outputs of a product system; evaluating the potential environmental impacts associated with those inputs and outputs; and interpreting the results of the inventory and impact phases in relation to the objectives of the study.

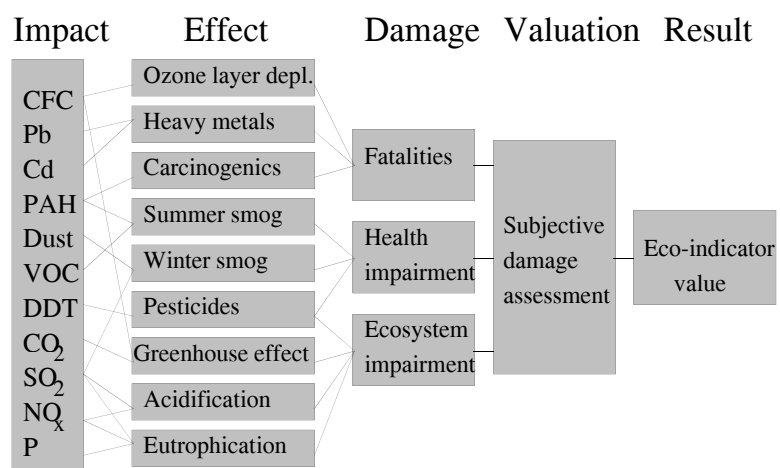
The main stages of an LCA are:

- 1. *Inventory*** – in which the data describing the system are collected and converted to a standard format to provide a description of the physical characteristics of the system of interest.
- 2. *Interpretation*** – in which the physical data from the inventory are related to observable environmental problems.
- 3. *Improvement*** – in which the system is modified in some way to reduce or ameliorate the observed environmental impacts.



• Step 2 - Inventory Analysis

- Determine inputs and outputs of all life-cycle (material and energy)
- Process tree or flow-chart classifying the events in a product's life-cycle
- Collect relevant data for each event (emissions produced and resources used)
- Material and energy balance(s) for each process stage



Ecodesign

LCA- Characterization

Efeito de estufa	kgCO₂equivalente	Camada de ozono	KgCFC11 equivalente
CFC-13	13000	HALON-1301	16
CFC (hard)	7100	HALON-2402	7
CFC-12	7100	HALON-1211	4
CFC-114	7000	HALON-1201	1,4
CFC-115	7000	HALON-1202	1,25
CFC-116	6200	Tetraclorometano	1,08
HALON-1211	4900	CFC-113	1,07
HALON-1301	4900	CFC (hard)	1
CFC-113	4500	CFC-11	1
CFC-14	4500	CFC-12	1
HFC-143a	3800	CFC-13	1
CFC-11	3400	CFC-114	0,8
HFC-125	3400	methyl bromide	0,6
HCFC-142b	1800	CFC-115	0,5
CFC (soft)	1600	HALON-2401	0,25
HCFC-22	1600	HALON-2311	0,14
Tetraclorometano	1300	Tricloroetano	0,12
HFC-134a	1200	HCFC-141b	0,11
HCFC-141b	580	HCFC-142b	0,065
HCFC-124	440	CFC (soft)	0,055
N ₂ O	270	HCFC-22	0,055
HFC-152a	150	HCFC-225cb	0,033
1,1,1-trichloroethane	100	HCFC-225ca	0,025
HCFC-123	90	HCFC-124	0,022
Triclorometano	25	HCFC-123	0,02
Diclorometano	15		
Metano	11		
CO ₂	1		

Ecodesign

Eco-Indicator 95

- Setting equivalents for these damage levels is a subjective choice. The current choice (see below) came about after consultation with various experts and a comparison with other systems.

Environmental effect	Weighting factor	Criterion
Greenhouse effect	2.5	0.1°C rise every 10 years, 5% ecosystem degradation
Ozone layer depletion	100	Probability of 1 fatality per year per million inhabitants
Acidification	10	5% ecosystem degradation
Eutrophication	5	Rivers and lakes, degradation of an unknown number of aquatic ecosystems (5% degradation)
Summer smog	2.5	Occurrence of smog periods, health complaints, particularly amongst asthma patients and the elderly, prevention of agricultural damage
Winter smog	5	Occurrence of smog periods, health complaints, particularly amongst asthma patients and the elderly
Pesticides	25	5% ecosystem degradation
Airborne heavy metals	5	Lead content in children's blood, reduced life expectancy and learning performance in an unknown number of people
Waterborne heavy metals	5	Cadmium content in rivers, ultimately also impacts on people (see airborne)
Carcinogenic substances	10	Probability of 1 fatality per year per million people

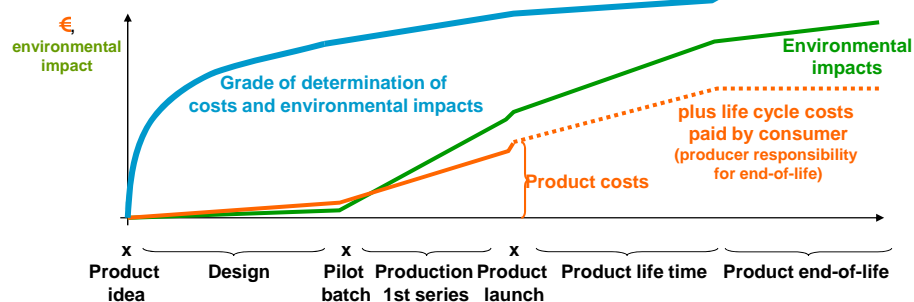
What is Eco-Design?

Product design effect on environment and costs over life-cycle

- Production, distribution, use and end of life management of energy-using products causing impacts on the environment
- **Approx. 80% of all product-related environmental impacts are determined during the product design phase**
- Considering environmental aspects in the design phase is an effective approach to improve products

What is Eco-Design?

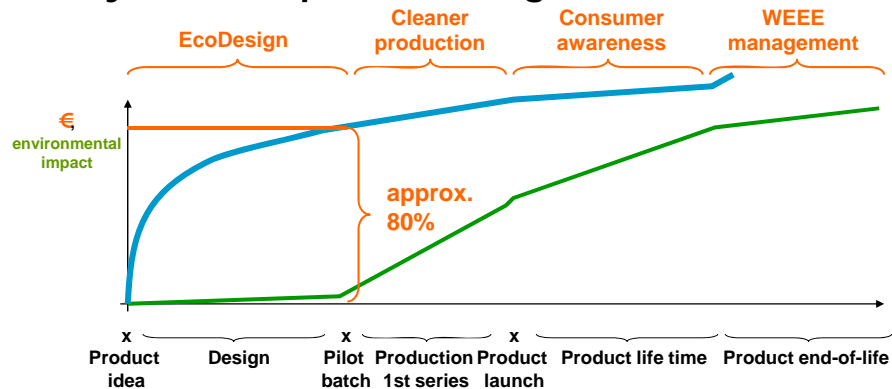
Why focus on product design?



- **Although design by itself is a “clean” process, it determines most of the product related environmental impacts!**

What is Eco-Design?

Why focus on product design?



First Exercise in Eco-Design

The very first step:

- What are environmentally relevant aspects of my product? Imagine the whole life-cycle: **Your product tells you the key issues!** These lead the way to environmental assessment.
- What is your product? (or: for which product are you supplier?)
 - Main purpose / application
 - Intended lifetime
 - User (B2B, B2C?)
 - Size

