"Identifying Key Products for the Federal Environmental Product Policy"

**Federal Services of Environment,
Department Product Policy**

**Office for Scientific, Technical and Cultural
affairs – OSTC**
*"Integrating climate, resource and waste policies
through a product policy"*

Report >> www.iwallon.be

OBJECTIVE

Product Policy « what are priority product groups consumed in Belgium »

Environmental impacts
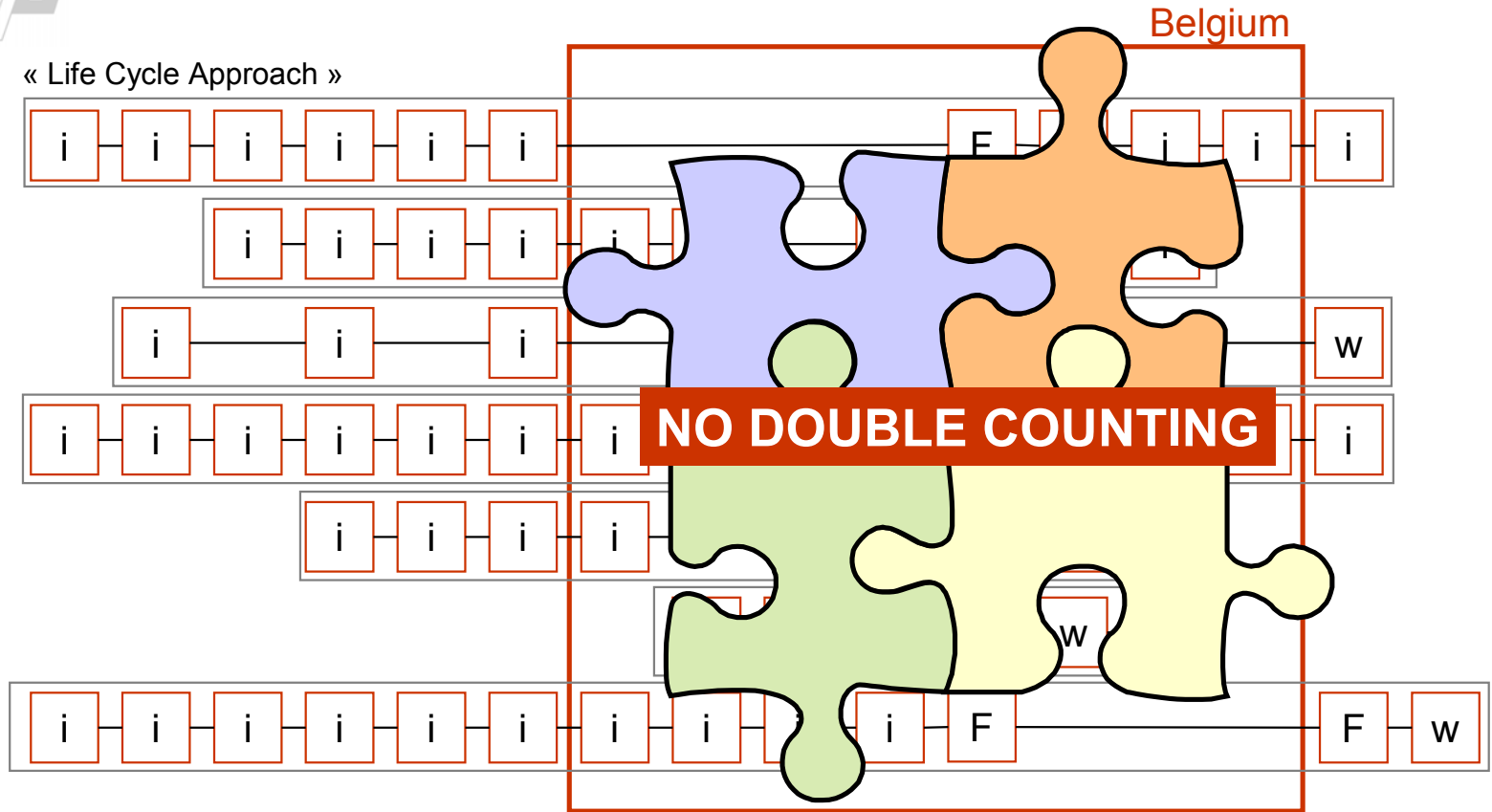
« Life Cycle Perspective »

PRODUCT   **CONSUMPTION**

Belgium

				F	w	i	i
i	i		i	F	w	i	
	i		i	F	w		
i	i	i	i	F	w	i	i
i			i	F	w		
	i	i	i	F	w	i	
i	i	i	i	F			

FINAL PRODUCT SYSTEM CONSUMPTION

Belgium

« Life Cycle Approach »

NO DOUBLE COUNTING
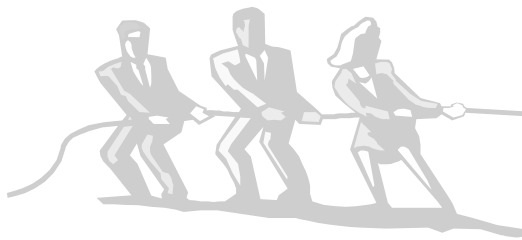
RESEARCHERS → POLICY MAKERS

methodology
limitations of study

Boundaries determined by:

- Time & Resources for study
- Data availability
- Importance in framework of P&E Policy areas
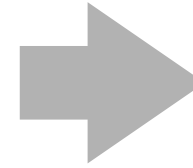
DETAIL / COMPLETENESS

TIME TO IMPLEMENT

LCApproach

Inputs → | **final product category** | → **Outputs**
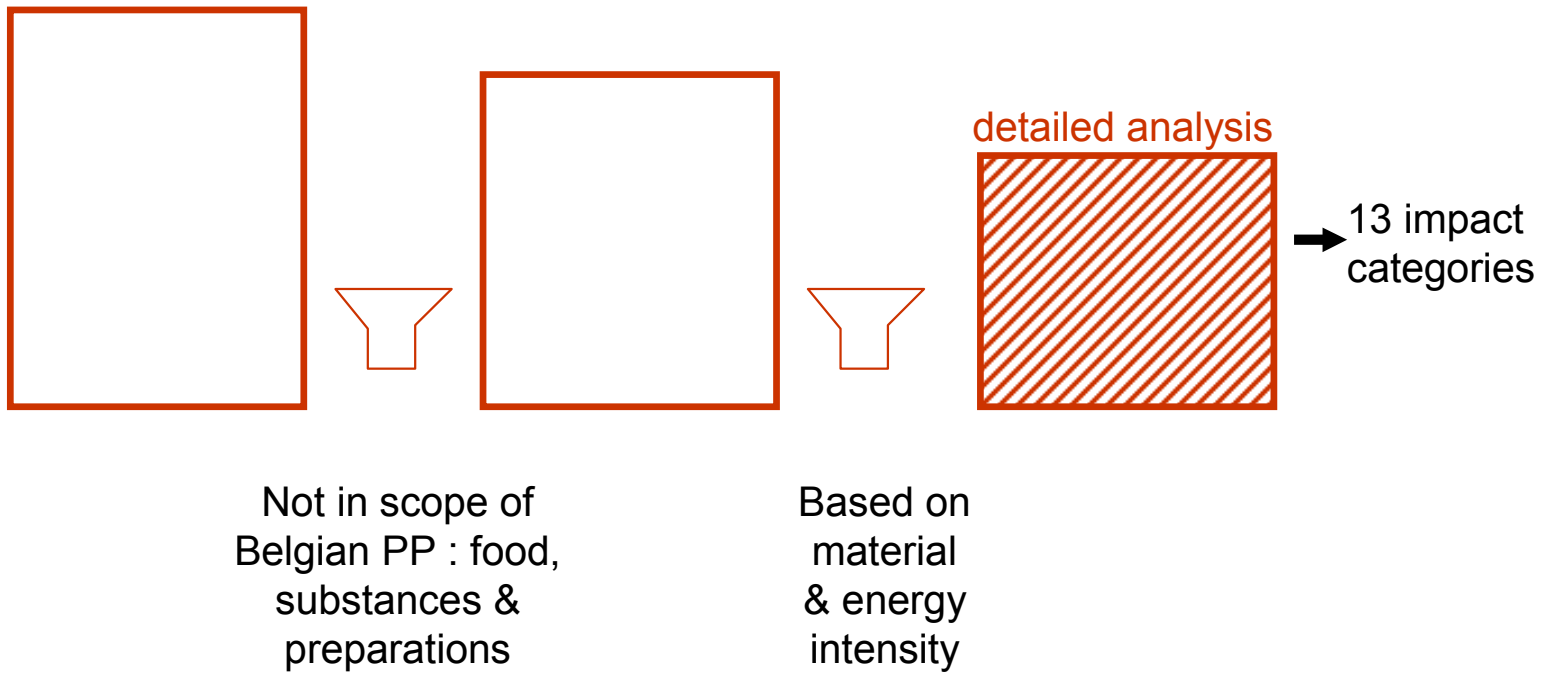
final product category

Final products with identical / similar « function »

x

C

detailed analysis

→ 13 impact categories

Not in scope of Belgian PP : food, substances & preparations

Based on material & energy intensity
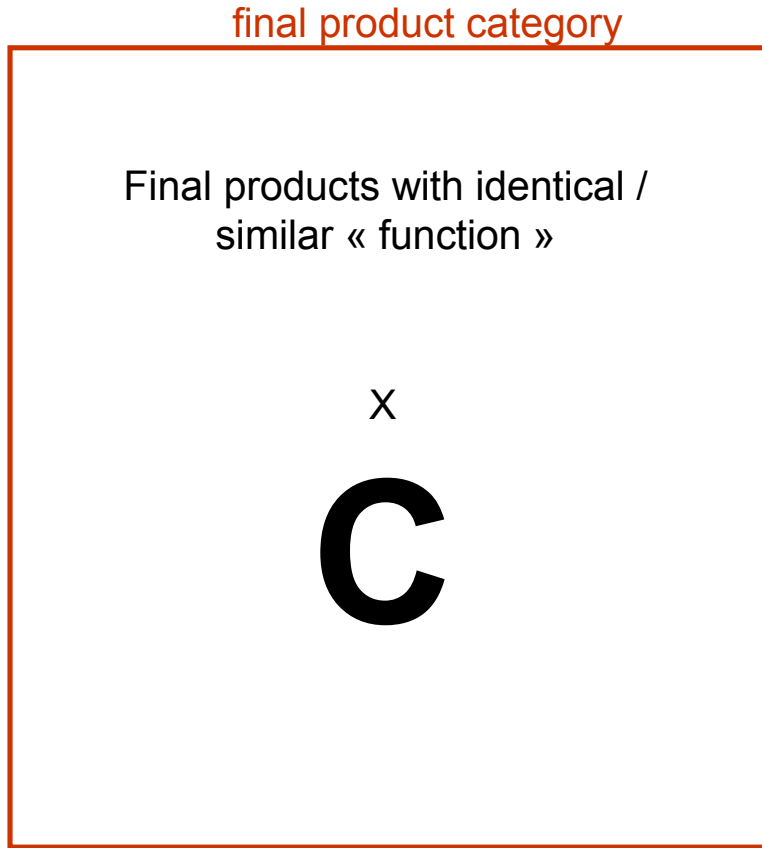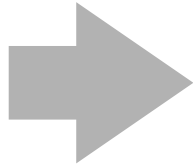
Inputs

Outputs
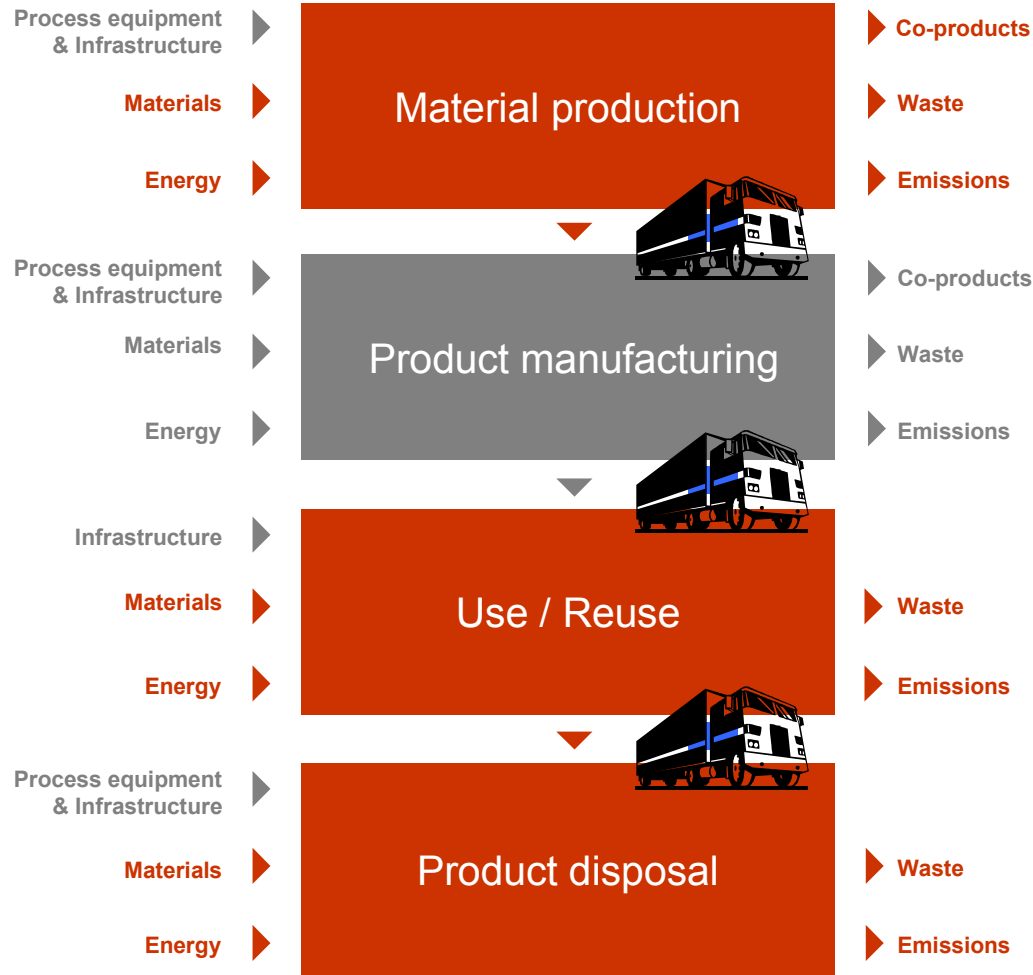
Inputs		Outputs
Process equipment & Infrastructure ▶	**Material production**	▶ Co-products
Materials ▶		▶ Waste
Energy ▶		▶ Emissions
Process equipment & Infrastructure ▶	**Product manufacturing**	▶ Co-products
Materials ▶		▶ Waste
Energy ▶		▶ Emissions
Infrastructure ▶	**Use / Reuse**	
Materials ▶		▶ Waste
Energy ▶		▶ Emissions
Process equipment & Infrastructure ▶	**Product disposal**	
Materials ▶		▶ Waste
Energy ▶		▶ Emissions

Inputs

Outputs

Material production

Materials ▶
Energy ▶

▶ Co-products
▶ Waste
▶ Emissions

▼

Use / Reuse

Consumables & Spare parts ▶
Energy ▶

▶ Waste
▶ Emissions

▼

Product disposal

Energy ▶

▶ Waste
▶ Emissions

waste

characterized
impacts

existing
policy targets

Inputs / **Outputs**

Impact	Substances	Policy level
Use of raw materials	All	E, F, R
Use of water	Water	E, F, R
Use of energy	Fuels	I, E, F, R
Greenhouse gas emissions	CO_2, CH_4, N_2O, SF_6, PFCs, HFCs	I, E, F, R
Acidification	SO_2, SO_3, NOx, NH_3,	I, F, R
Photochemical pollution	VOCs, CO, NOx	I, E, F, R
Heavy metals to air	Pb, Cd, Hg, As, Cr, Ni, Cu, Se, Zn	I, E, F, R
Heavy metals to water		I, E, F, R
POP's to air	Several molecules, Dioxins, furans, PCB, PAH, pesticides	I, F, R
POP's to water		I, F, R
COD in water	Organic subst.	I, E, F, R
Eutrophication	Phosphates, nitrates	I, E, F, R
Ozone layer depletion	CFCs, HCFCs, CCl_4 …	I, E, F, R
(Ultimate) waste		I, E, F, R

Co-products

Materials

Waste

Energy

Emissions

Consumables & Spare parts

Waste

Energy

Emissions

Waste

Energy

Emissions

DATAvailability

ECONOMIC FLOWS	PRODUCT DATA

CONSUMPTION
Stats Belgium:
• Consumption (NIS-household budget)
•Market penetration rates (NIS)
•« Apparent consumption »
•Production (NIS)
•Foreign trade (NBB)
 	
Stats EU extrapolated to Belgium
Specific market & sector reports
 	
→Compatibility of product lists
→Sector data representative for products « consumed » in Belgium
→Mass/units AND/OR monetary terms
 	
(DIFFERENT approach : Expanded IO, Not available in Belgium)
	MATERIAL COMPOSITION
	LIFESPAN
	« average » consumed unit
	    •**Different base materials (%)**
	    •**Different base technologies (%)**
	    •**Different sizes… (%)**
	Specific market & sector reports
	(market reports: available but costly)
	Waste/takeback studies
	LCA case studies
	Own models i.e. dwelling (Institut Wallon)
	Often « rough » estimates
	
	TOXIC/CHEMICAL CONTENT ???
	No data available
	
	E&MLCI – availability, representativess
	Anno 2000 (depends on material category)
	Iconsistent waste categories
	(APME now: EURAL), definition of waste, destination of waste…

ECONOMIC FLOWS

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PRODUCT DATA

ENERGY CONSUMPTION
USE OF CONSUMABLES
Low for « average » units
(cars: NIS, own models i.e. TEMAT at Vito)
Case studies
Mainly own calculations/assumptions

WASTE TREATMENT
Destinations: DataA Ok, waste studies,
i.e. OVAM, OWD reports

EXPORT (« hidden export », waste
treatment in country of destination?)

Waste treatment processLCI :
Data availability low (compared to MLCI)

Availability
Consistency

different « problem » definitions

no characterization so far

inconsistent categories

Impact	Substances	Policy level
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Eutrophication	Phosphates, nitrates	I, E, F, R
Ozone layer depletion	CFCs, HCFCs, CCl_4 ...	I, E, F, R
Waste		I, E, F, R

A,C

A,C

A (use), Not up to date in MLCI

RESEARCHERS   POLICY MAKERS

conclusions

- Results as order of magnitude enable to draw conclusions on key product categories. Uncertainties do not enable a real ranking.
- Need for consistent and operational definition of products + consistent product list for this type of studies
- Need for « understanding » and « selection » of consistent set of impact definitions and indicators. Need for INPUT <u>from</u> AND <u>to</u> policy during process.
- IPP - Focus on « consumption » means : international context (contribution to national targets).
- « Ambition » of « full » LCA for IPP studies required?

ongoing work

- Detailed study for key product categories:
  - Building materials
  - Cars
  - Packaging
  - EEE
- Scenario's
- Resource use, waste, GHG
- National vs. International contributions

Process equipment

Sectoring policies

Energy

Process equipment & Infrastructure

Emissions

By-product

Sectoring policies

Energy

Dematerialization

Energy

Process equipment & Infrastructure

Energy

Resource policies

Substances & Preparations

Transport policies

Water policies

Midpoint policies

Endpoint policies
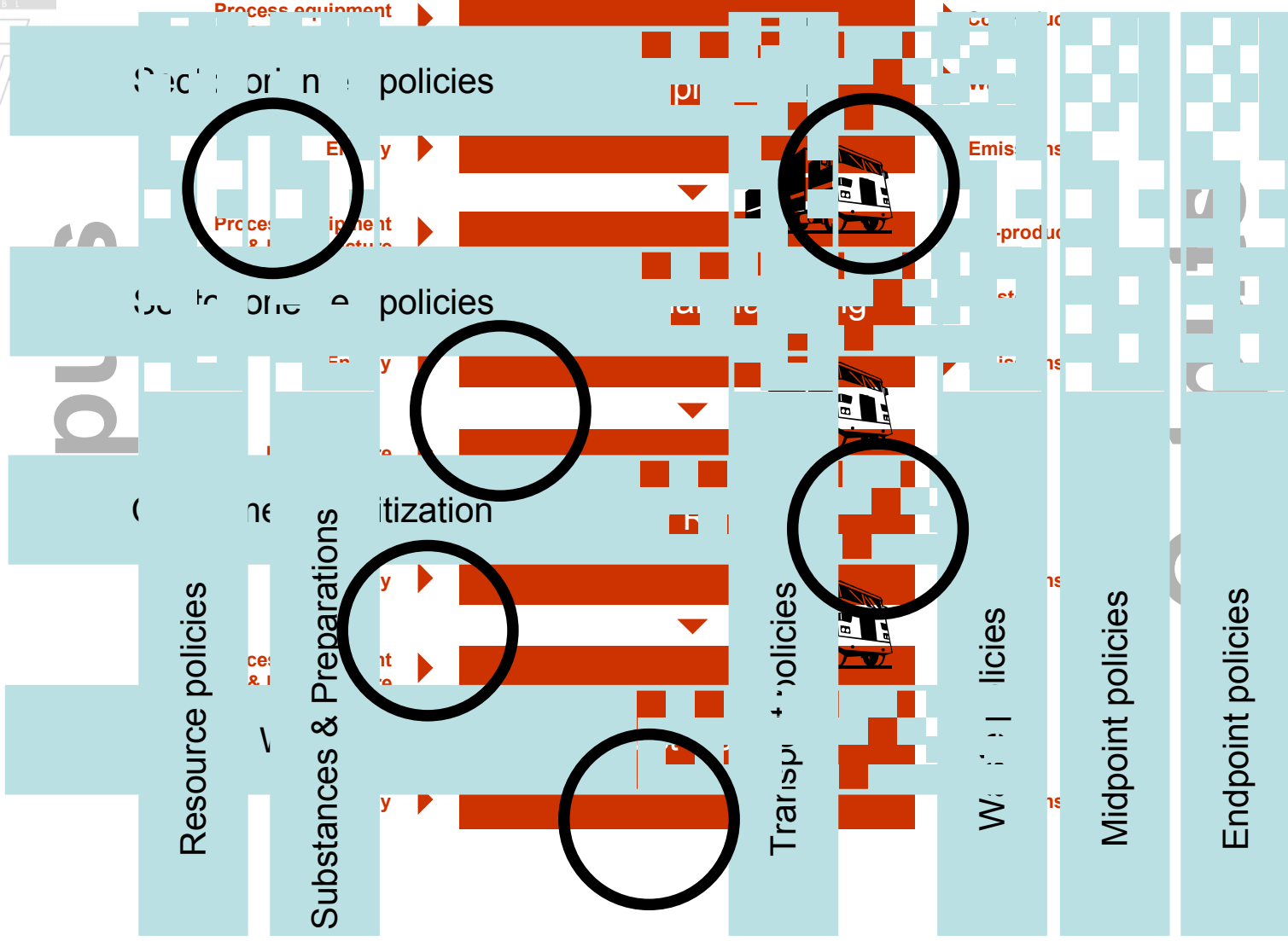
II.1. Ranking resource intensive products : General overview

| Function class | Energy | Water | Raw materials | emissions to air | | | | emissions to water | | waste |
				acidifying substances	greenhouse gases	photochemical substances	POPs	oxygen depletion	eutrophying substances	
BUILDING STRUCTURE	6%	0%	64%	10%	11%	4%		5%		79%
BUILDING OCCUPANCY	44%	93%	1%	12%	39%	21%		0%		0%
FURNITURE FOR INTERIOR	0%	0%	1%	1%	1%	1%		0%		1%
ELECTRICAL APPLIANCES	5%	7%	0%	2%	3%	1%		0%		0%
HEALTHCARE AND DETERGENTS	1%	0%	1%	1%	0%	0%		7%		1%
TRANSPORT	34%	0%	16%	43%	33%	60%		1%		4%
INFORMATION TECHNOLOGIES AND	2%	0%	4%	6%	3%	2%		51%		4%
PACKAGING	7%	0%	13%	20%	9%	8%		36%		11%
TEXTILE	1%	0%	0%	5%	1%	3%		0%		0%

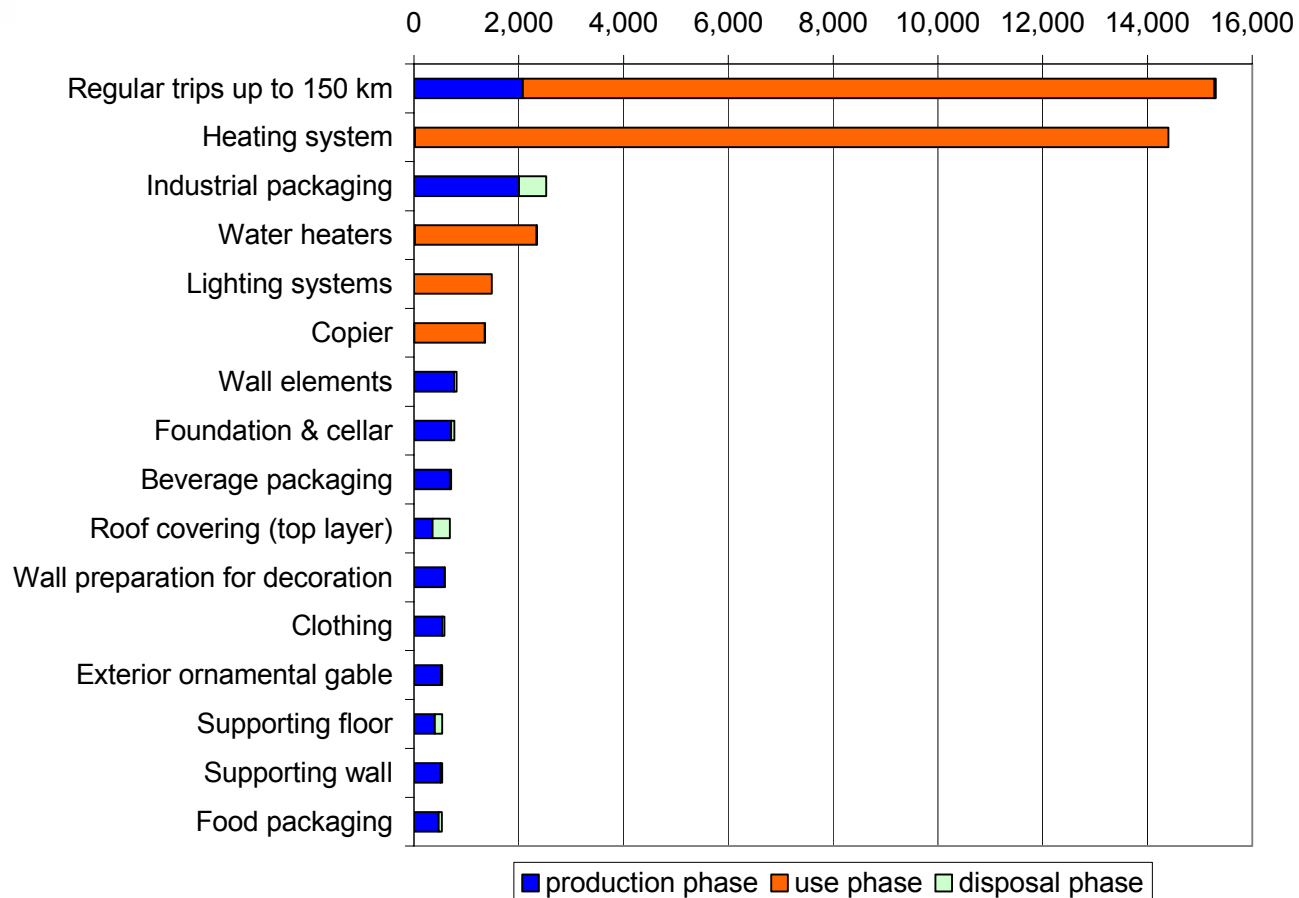|		
	>	30%
15%	-	30%
5%	-	15%

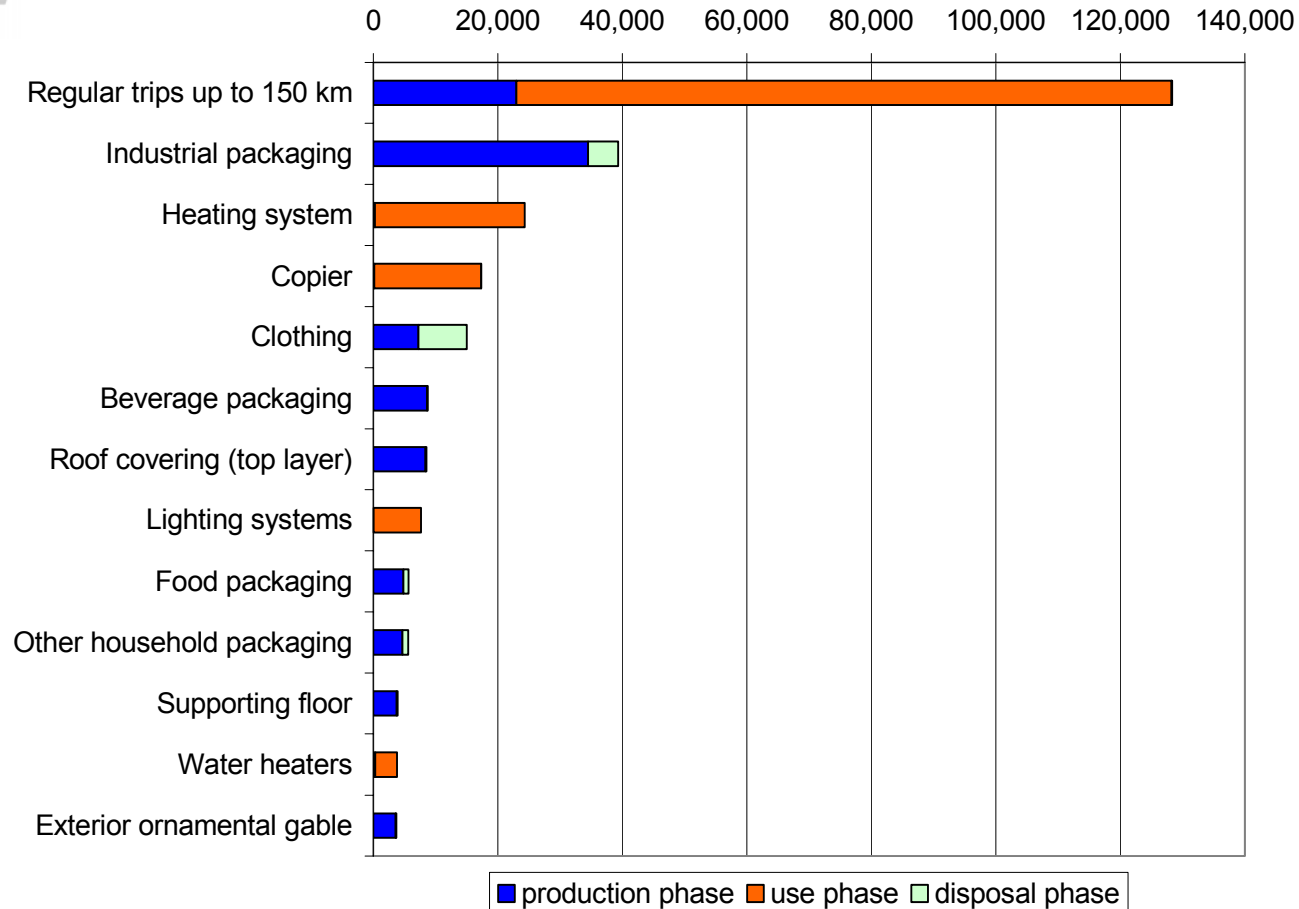# II.1. Ranking resource intensive products : Raw materials (ktonnes)
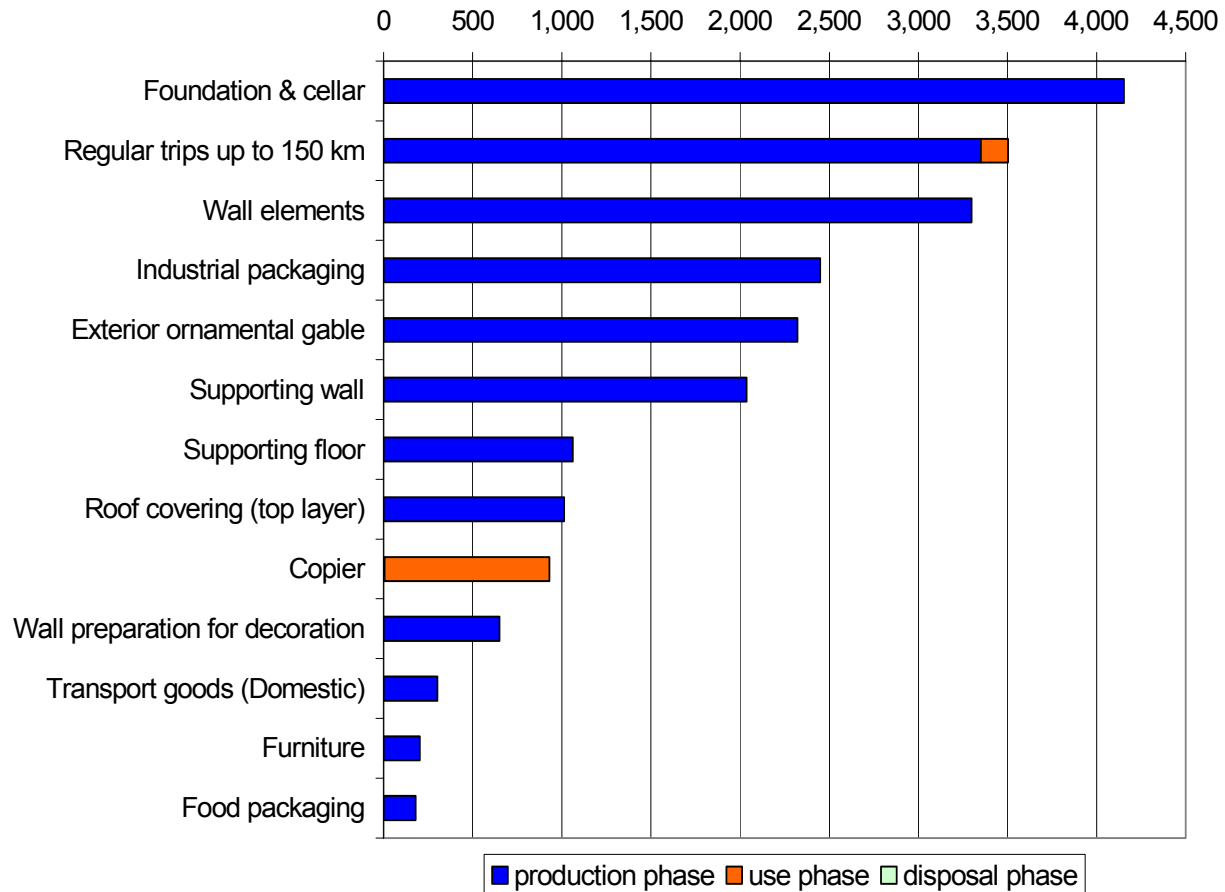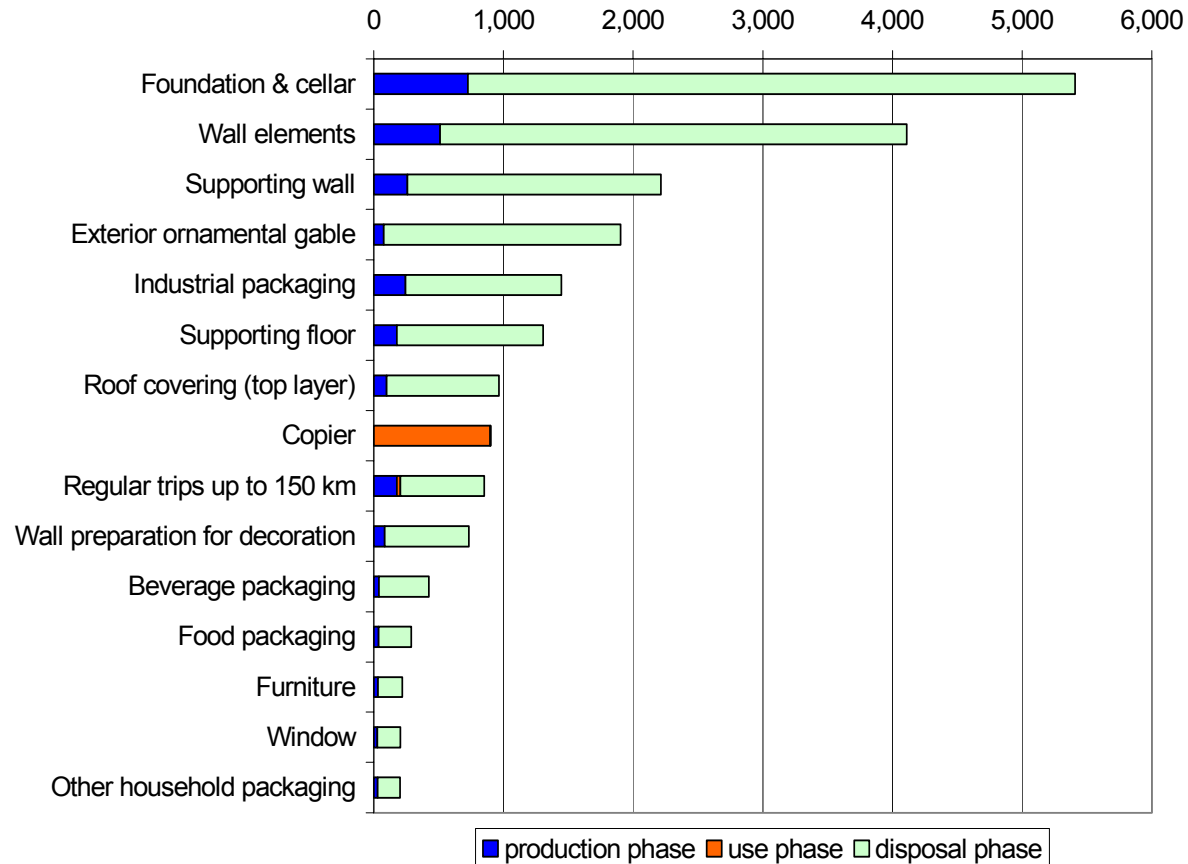
II.1. Ranking resource intensive products : Energy (PJ)
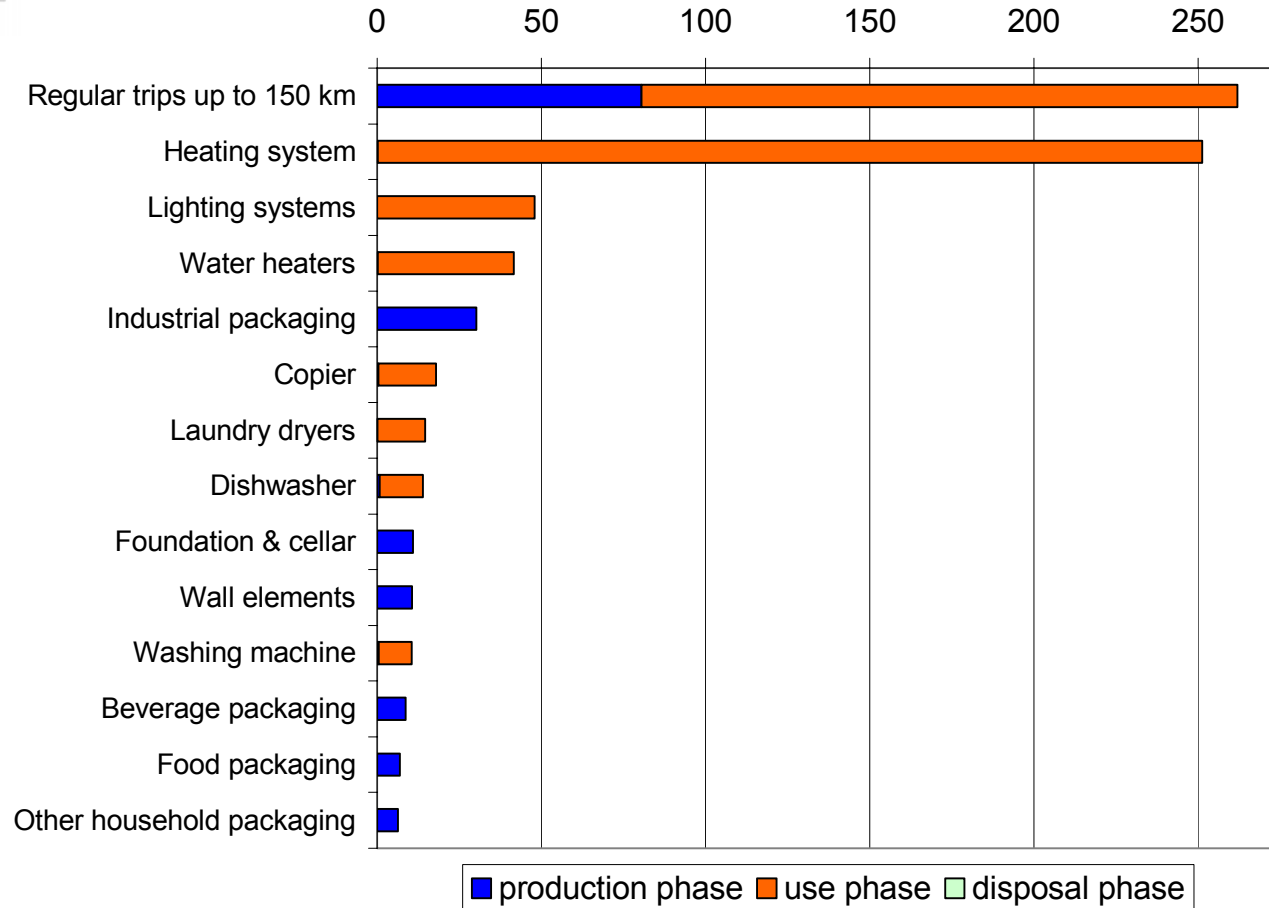
II.1. Ranking resource intensive products :
Greenhouse gases (ktonnes)

Bar chart showing greenhouse gas emissions (ktonnes) by product across production phase, use phase, and disposal phase. X-axis from 0 to 16,000.

Product	Greenhouse gases
Regular trips up to 150 km	~15,300 (production + use)
Heating system	~14,400 (use)
Industrial packaging	~2,500 (production + disposal)
Water heaters	~2,400 (use)
Lighting systems	~1,500 (use)
Copier	~1,400 (use)
Wall elements	~700 (production)
Foundation & cellar	~700 (production)
Beverage packaging	~700 (production)
Roof covering (top layer)	~600 (production + disposal)
Wall preparation for decoration	~500 (production)
Clothing	~500 (production)
Exterior ornamental gable	~500 (production)
Supporting floor	~400 (production + disposal)
Supporting wall	~500 (production)
Food packaging	~400 (production)

Legend: production phase, use phase, disposal phase

II.1. Ranking resource intensive products :
Acidifying substances (tonnes)

production phase ■ use phase ■ disposal phase

II.1. Ranking resource intensive products : Waste (ktonnes)

	uncertainty on emission factors	other sources of uncertainties	other relevant sources
emissions to air			
heavy metals	x	-	-
POPs	x	only few substances accounted (HAP, dioxins)	regional inventories => heating & transport
ODS and F-gases	not reflecting recent developments	assembly phase not accounted	-
emissions to water			
eutrophying substances	x	-	regional inventories => paper and packaging
heavy metals	x	-	-

Transport

FUNCTION CLASS

Passenger transport

FUNCTION GROUP

Passenger car

PRODUCT CATEGORY

km

Fu...

Type of intermediate products related to the final product system (use stage)

all unit processes / intermediate products related to life cycle of final product

Diesel car

FINAL PRODUCT (SYSTEM)

Fuel, tyres, accu's…

CONSUMABLES / SPARE PARTS

group op functions belonging to the same basic (need) family

group of products that are intended for the same use and can be used in a similar way

Overview

Function CLASS	Remarks
Building structure	*- Considered final products -* *Related to construction of building*
Building occupancy	*- Considered final products -* *Related to living (houses) or working (office buildings, production plants…)*
Furniture	
Electrical Appliances	*EEE related to food preparation and storage, laundry, bathroom, DIY tools*
Information & Communication	*ICT equipment and traditional information carriers (paper books, newspapers etc…)*
Leisures	*Includes audio- and video equipment, computer games, photography etc…*
Healthcare & Detergents	
Transport	Only passenger cars considered (no public transport or transport of goods)
Garden	Garden furniture, garden tools…
Packaging	*- Considered final products -*
Textile & Footwear	Besides clothes and footwear also housetextiles, bags/sacks etc…

EEE

Used Data

- **Product consumption data [n° functional units]:**
  - All products (except mentioned below) : NSI statistics (household budget) / CRIOC study : based on penetration rates, extrapolated EU-wide statistics to Belgium
  - Packaging: extrapolations based on data reported by recognised bodies (VAL-I-PAC and FOST PLUS)
  - Passenger cars: NSI & TEMAT model (Vito)
  - Building materials : models from previous OSTC study (Institut Wallon)

- **Product material composition [%] and product weight [kg]:**
  - All products (except mentioned below) : pure estimates or extrapolations based on scattered published data (LCA product case studies, BAT studies, waste studies, other…)
  - Transport: study Belauto (1997), Vito study on shredder waste (2001)
  - Building : model (Institut Wallon)
  - Packaging : based on data reported by recognised bodies (VAL-I-PAC and FOST PLUS)

- **Product Lifespan [yrs]**
  - Pure estimates for most products
  - Electronic appliances : Miplan-study for OVAM (1999)
  - Transport : calculated values based on yearly consumption

- **Resource requirements [kg], emission- and waste factors [kg]**
  - Material production/material recycling: LCA databases (BUWAL, APME, ETH, IDEMAT 2001, IVAM LCA DATA 4.0, …), existing data on GER, waste factors (several studies)
  - Use phase
    - Energy/fuel-use: mostly internet sources
    - Consumables: mostly estimates or allocations of consumable-consumption data to specific final product groups
  - Treatment of wasted (after use) materials: LCA databases (BUWAL…)

- **Waste treatment scenario's for disposed products**
  - Electronic appliances : Miplan-study for OVAM (1999), Recupel year report 2001
  - Passenger cars : study Belauto (1997), Vito study on shredder waste (2001)
  - Building materials : Plan Wallon des déchets(DGRNE) and data OVAM
  - Packaging : based on data reported by recognised bodies (VAL-I-PAC and FOST PLUS)
  - Mixed municipal waste : data OVAM for Flanders, data DGRNE for Walloon region

LCApproach

- LCApproach
  - LCI data
  - Principles of LCA (allocation, FU, credit…)
  - Principles of sector studies / economic studies (IO)
- Ranking product groups:
  - NOT Comparative LCA : Compare competitive product systems based on the same functional unit
  - Rank non-competitive product groups (functional categorization) consumed in Belgium (x C)
- Growing demand: IPP, Belgian Product Policy, Flemish resource policy…
- Existing studies
  - 2003, « Study on external environmental effects related to the life cycle of products and services » – BIOIS, O2 France (comm. By EC, DG ENV)
  - 1995, Danish EPA « ranking of industrial products », Hansen E.
  - 2003, « Prioritisation within the integrated product policy », LCA Consultants, Copenhagen
  - Eco-Top Ten Initiative – Öko-Institut e.V.
  - …