

Environmental impacts of food products investigated in life cycle assessment

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Food and Environmental Impacts



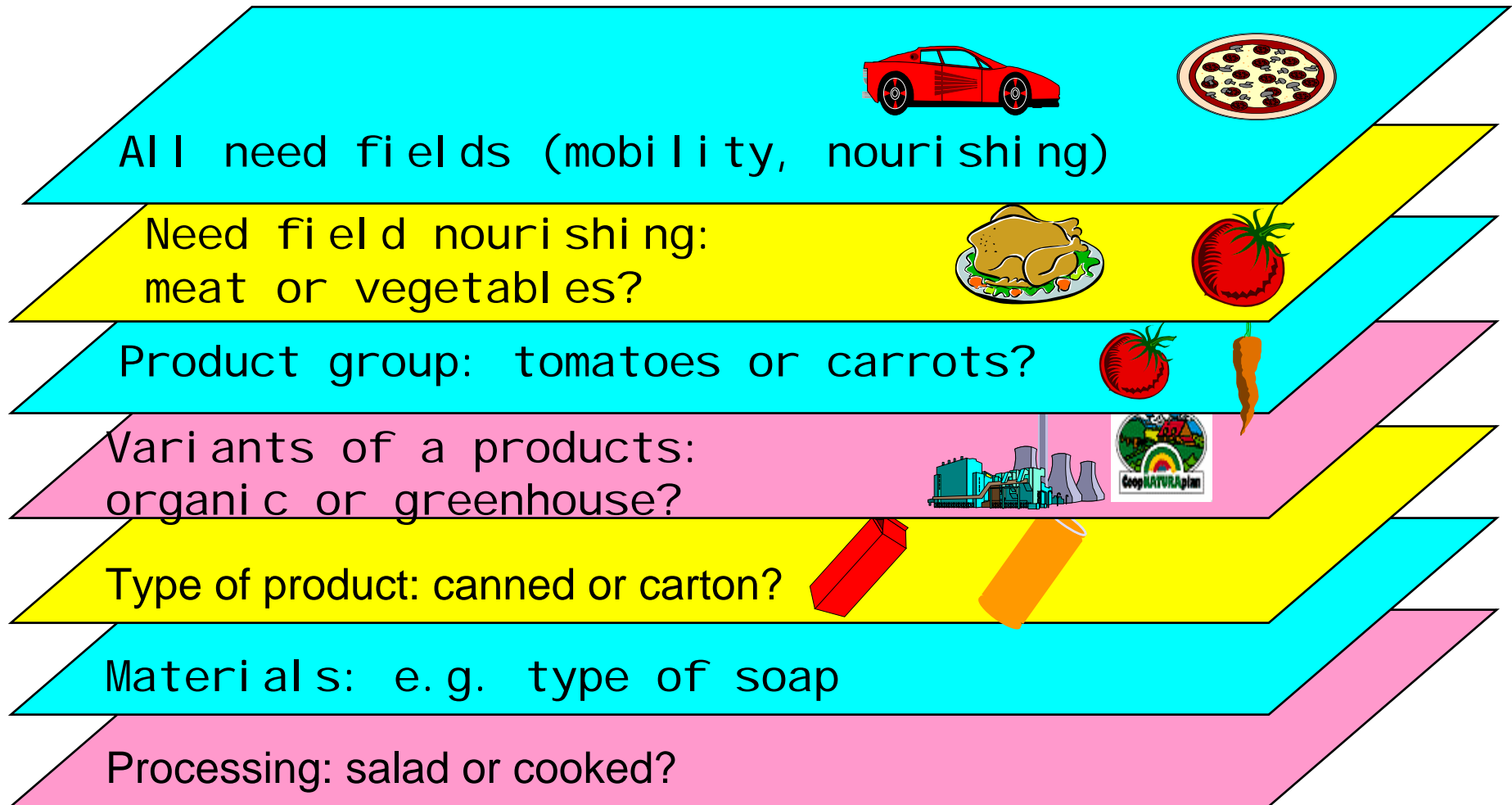
Contents

- Research questions and goals
- The method of a modular life cycle assessment (LCA)
- Conclusions concerning food purchases from the consumers point of view
- LCA database ecoinvent

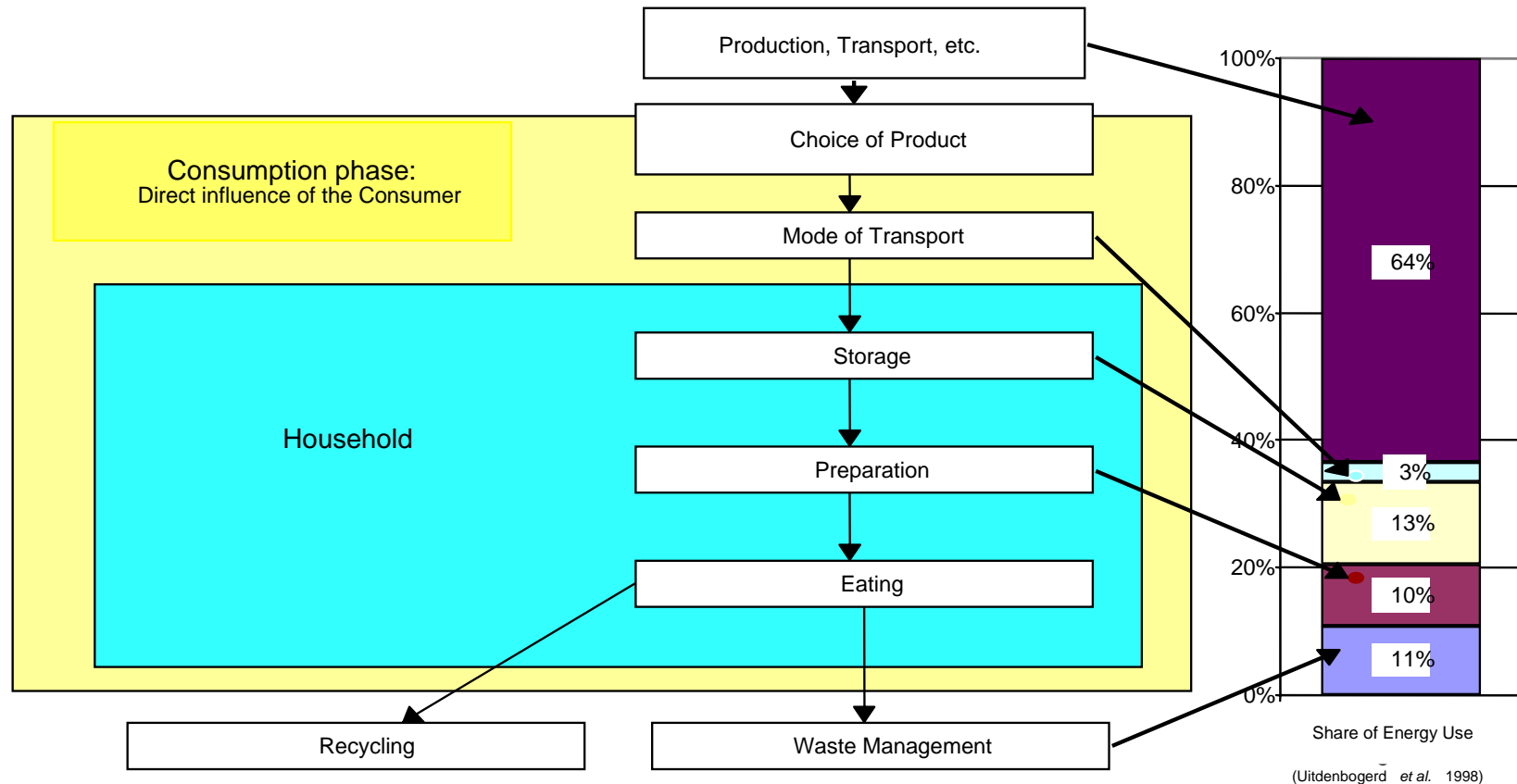
Research Questions and Goals

- What is a good environmental choice from the consumers' point of view when purchasing vegetables and meat?
- How can the environmental impacts be judged?
- Which characteristics of the products are important?
- Do different consumers differ with regard to the environmental impacts caused by their consumption patterns?

Levels of Decision Making



Consumer Choices in the Life Cycle of Food Products



➤ Pre-consumption dominates the energy use

Modular LCA to assess Food Products

Purchase

Product
characteristics

Modular LCA

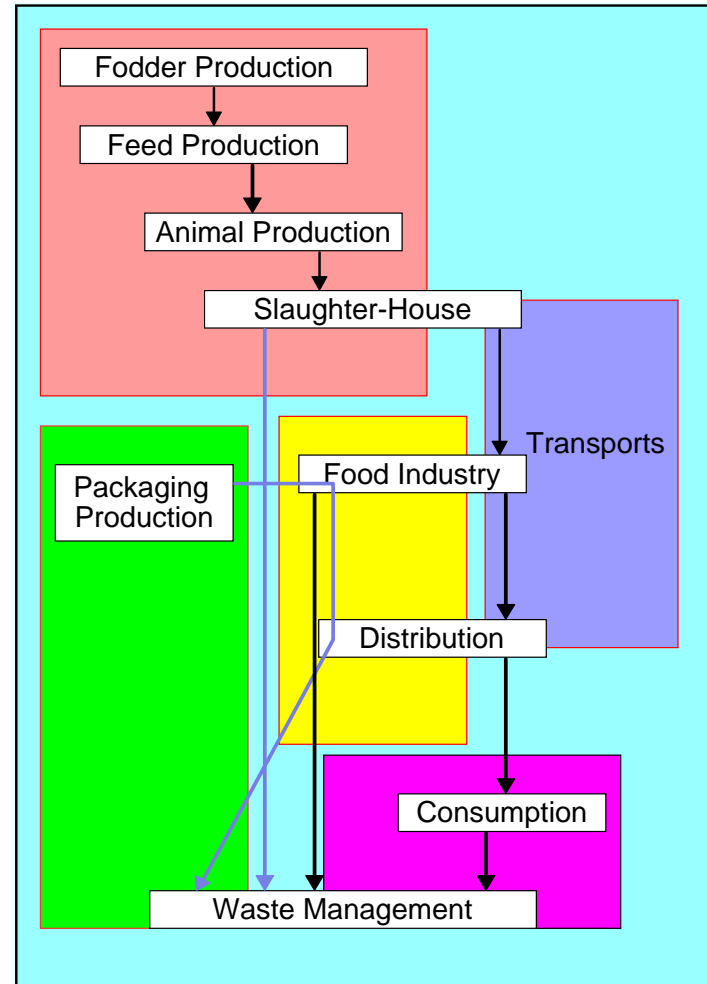
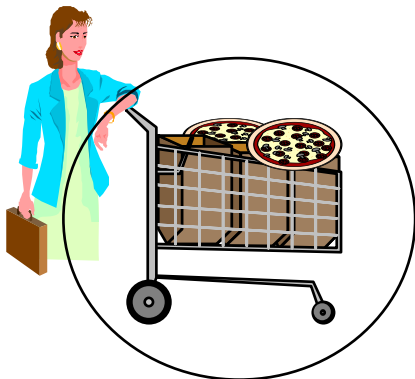
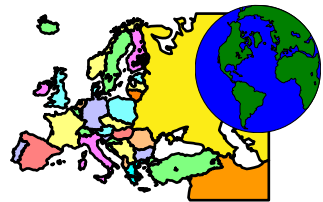
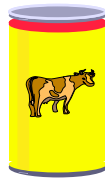
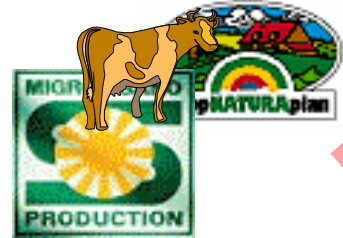
Agricultural
practice

Packaging

Origin

Conservation

Consumption

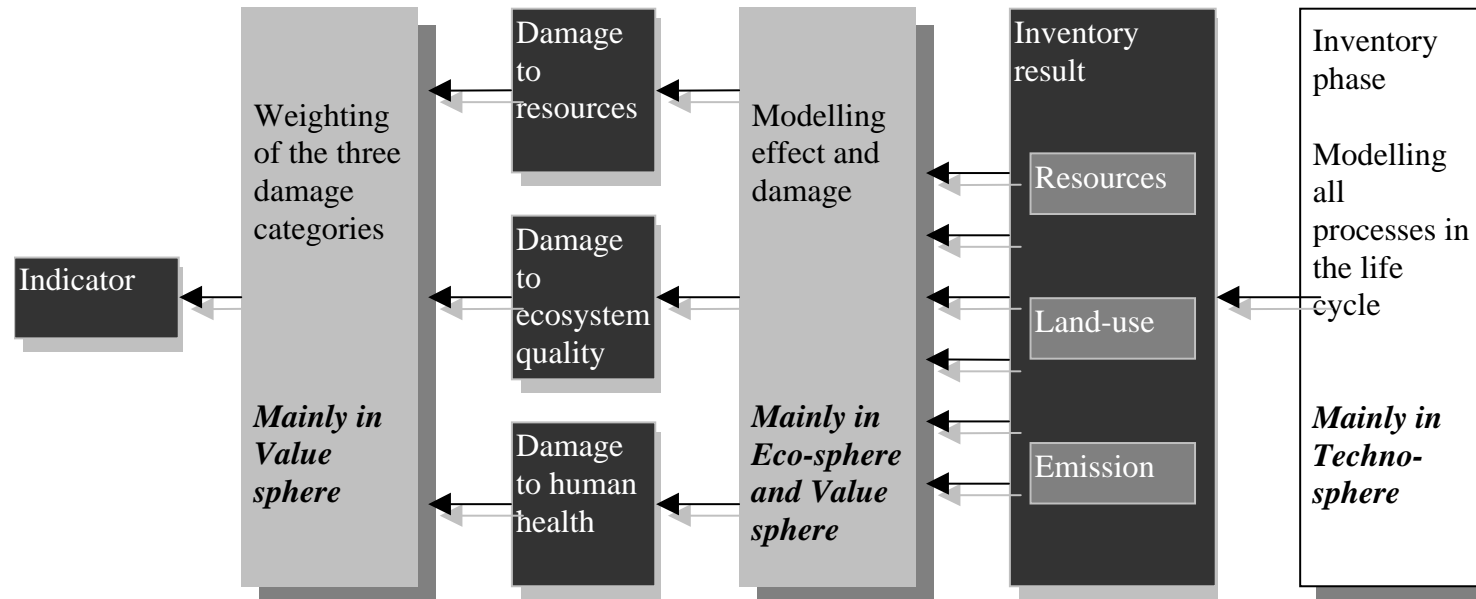


Inventory for the modular LCA

- Investigation of the most important product groups meat and vegetables
- Use of existing LCA studies as far as possible
- Agricultural inventory based on economic data
- Simplifications at all stages by modular approach
- Combination of module results for the full LCA

➤ Easy environmental assessment with a modular LCA for a range of food products

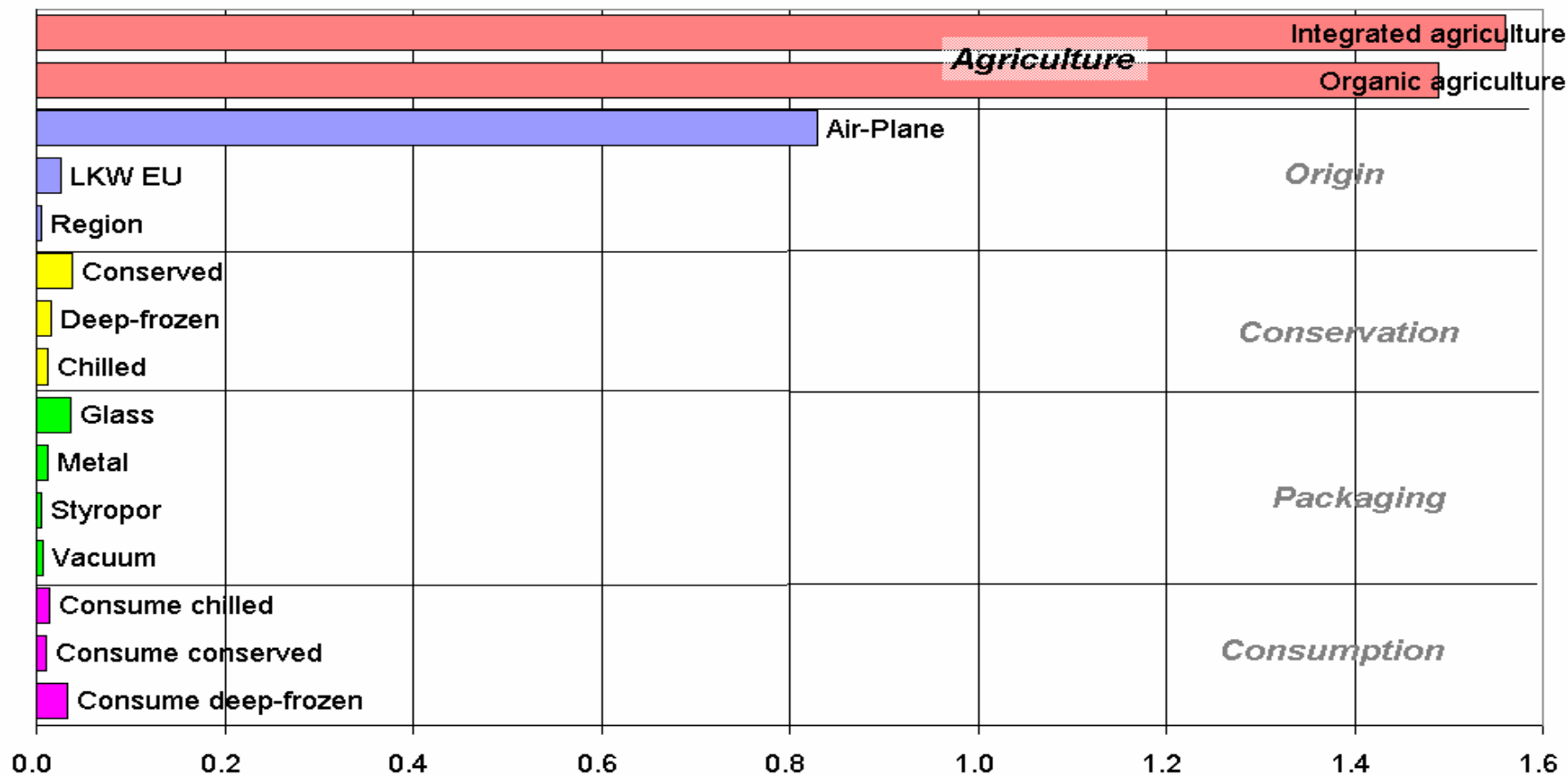
Impact Assessment: Eco-indicator 99



- Models damages instead of damage potentials
- Considers, e.g. greenhouse gasses, pesticides, land use, resource use
- Acidification and eutrophication are not fully modelled
- Direct impacts on the field are not modelled in detail

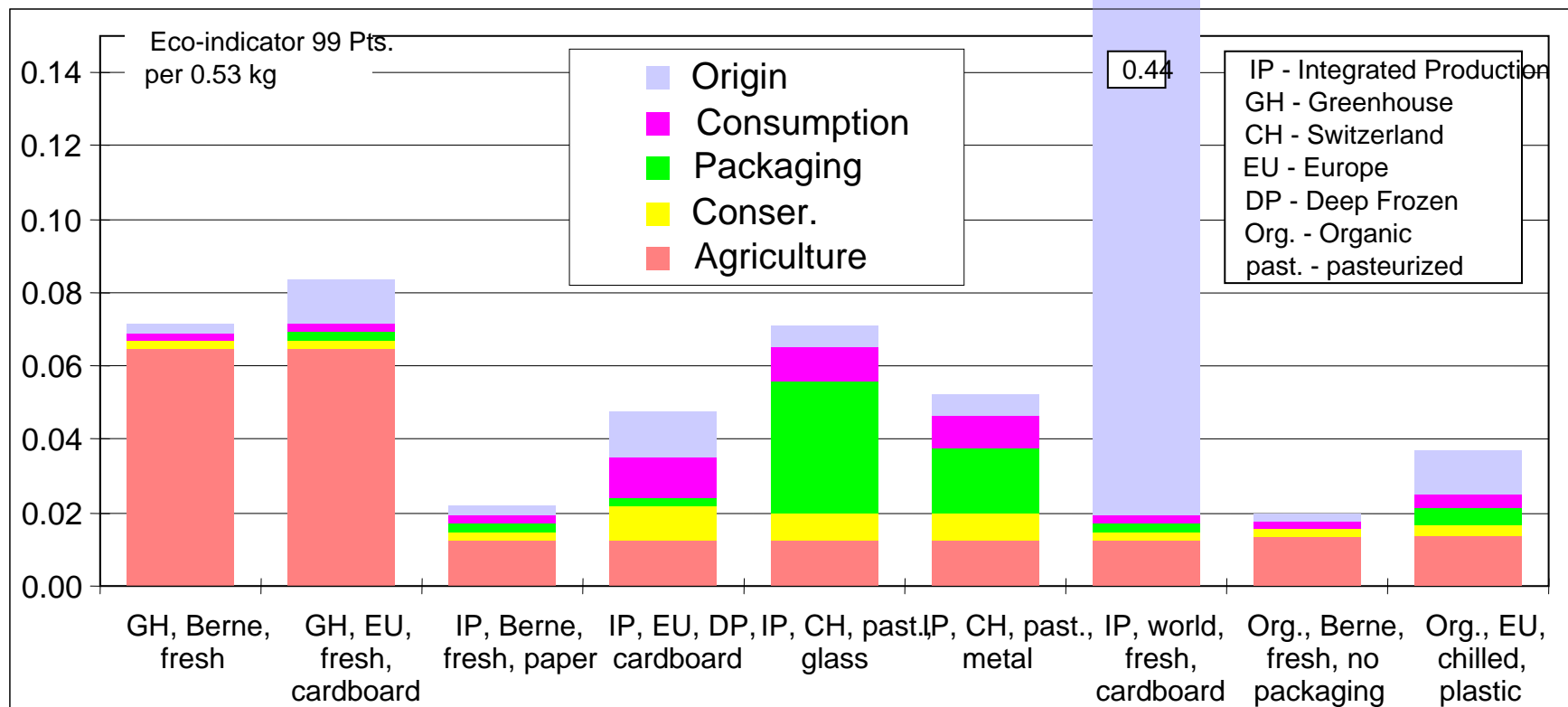
Eco-indicator 99 for Meat

El'99-aggregated, Hierarchist El99-points per kg of a meat purchase



➤ Agricultural production dominates total impacts

Combination for Product Characteristics of Vegetables



➤ Easy evaluation of consumption patterns

Conclusions for Food Consumption

- All stages and environmental impacts of the life cycle should be considered for the assessment
- Consumption of meat and animal products should be reduced
- Air transported products should be left in the shop
- Less products from heated greenhouse should be bought
- Reduce wastage and over consumption

Objectives of ecoinvent database

- Provide consistent, harmonized, quality controlled, international, industrial LCA data
- Support
 - government with accepted life cycle data
 - academia with transparent data
 - industry with easy to use indicators
- Increase
 - efficiency in LCA work
 - Increase credibility and acceptance of LCA
- Establish LCA as a tool to support IPP, EPD, DfE, EMAS

ecoinvent database content, v1.3

2'700

±200

•Impact 2002+

•CML Method 2001

•EPS 2000

•Eco-Indicator'99

•Ecological scarcity 1997

•EDIP 1997

•Climate Change 2001

•Cumulative Energy Demand

Agriculture

Energy supply

Basic chemicals

Material supply

Transports

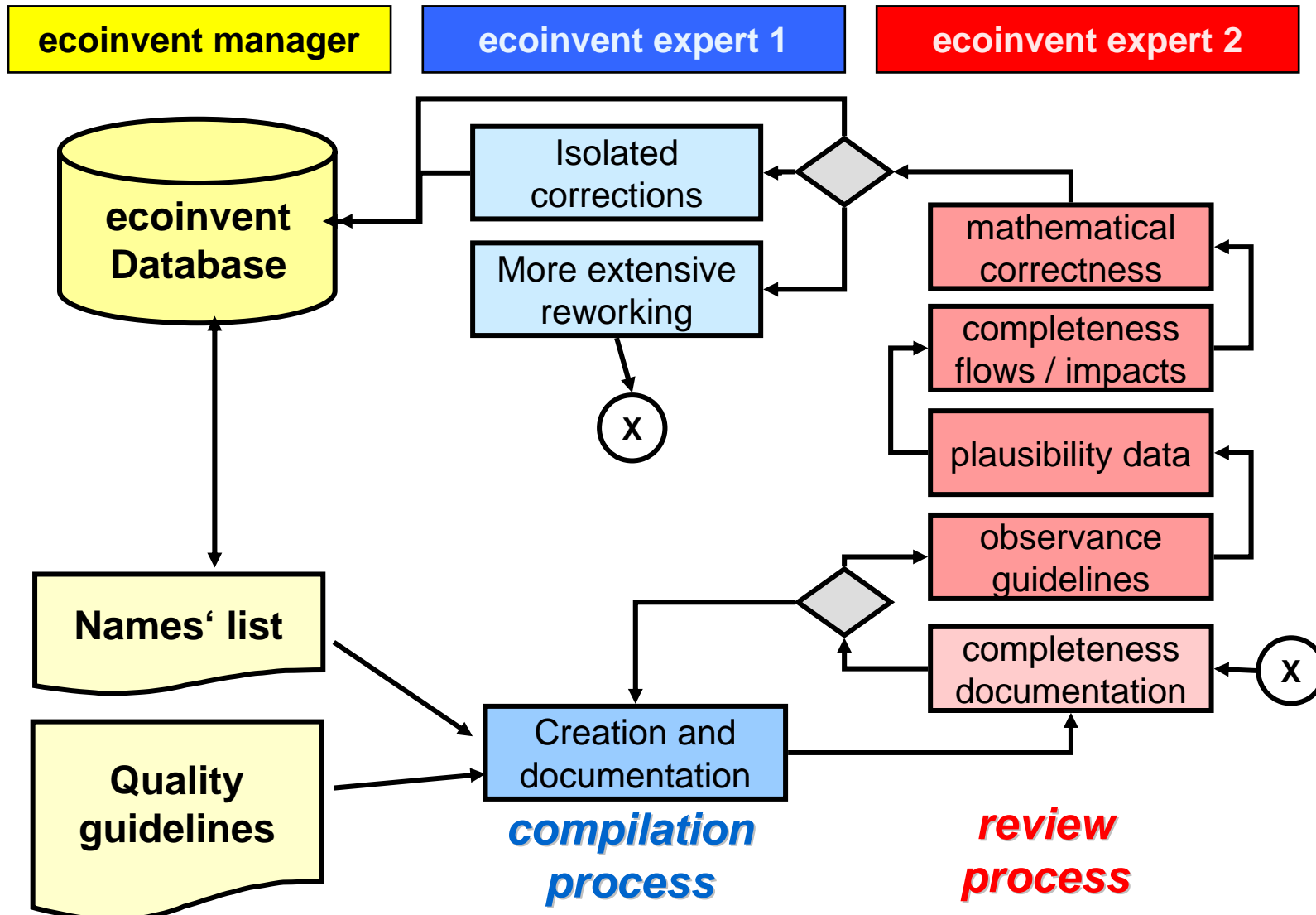
Waste treatment

ecoinvent
Database

Data collection procedure

- Data imported on a unit process level
- Connected to product systems within the ecoinvent database
 - > maximum transparency,
 - > maximum consistency,
 - > maximum flexibility
(punctual updates, if necessary),
- More than 2'700 unit processes =
more than 2'700 product systems !

Data compilation and quality assurance



Granted,
my car consumes a
lot ... But, Your
Californian
asparagus needs also
5 liters per kg (in
Switzerland)!

Download of the Ph.d. thesis
www.jungbluth.de.vu

Calculate the environmental impacts
of Your food consumption
www.ulme.ethz.ch



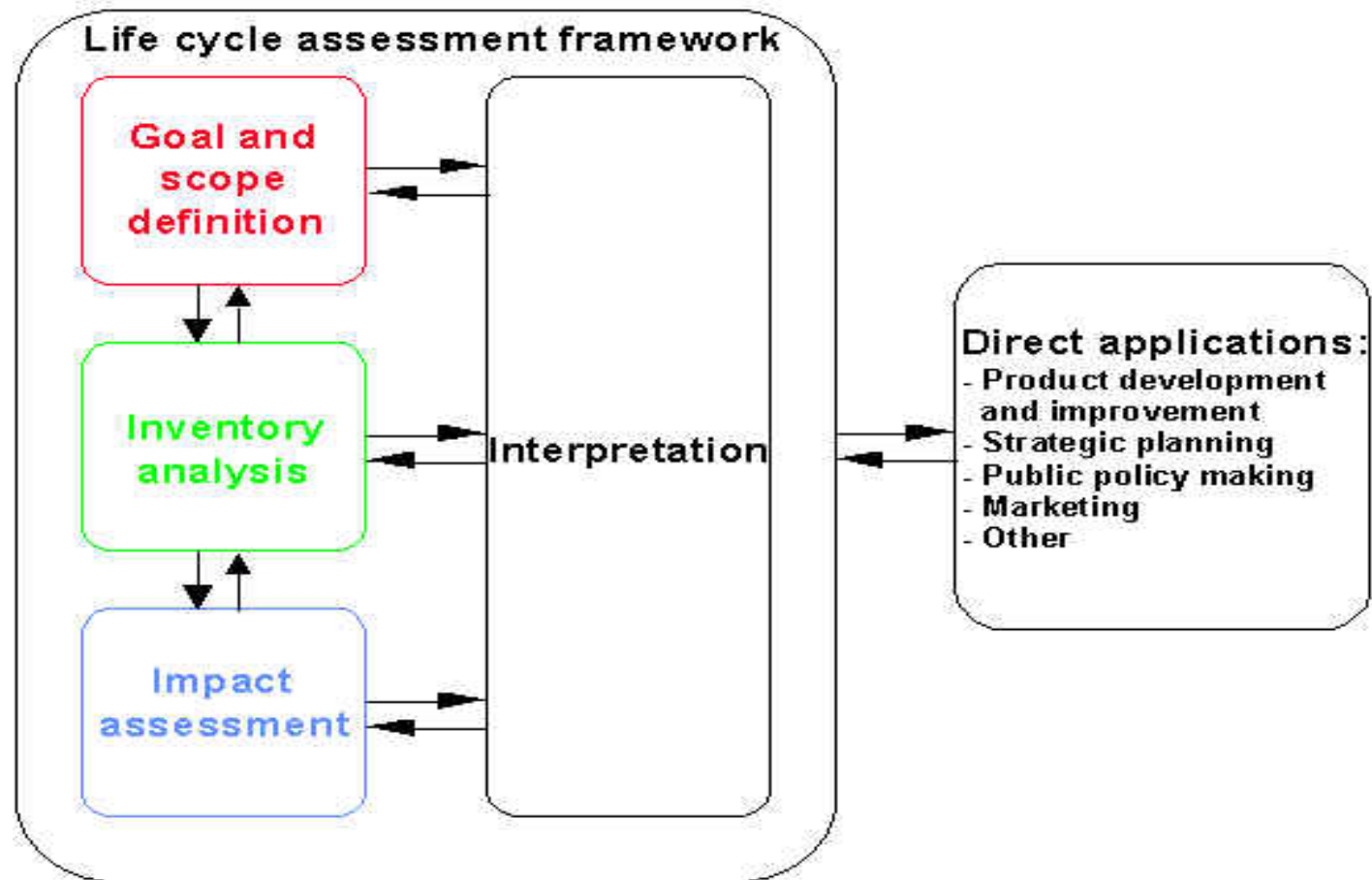


Today I can enjoy the
Californian asparagus,
But it took me 950
liters of oil to travel
18'777 km to California!

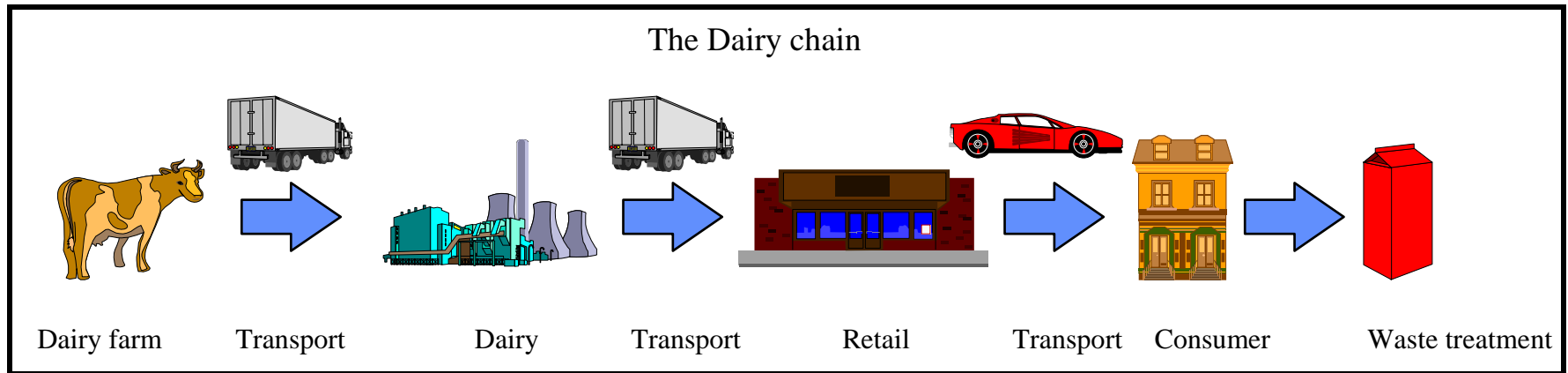
- Keep the relevance of decisions in mind and do not get lost in details!

Annexe

Life Cycle Assessment (LCA) ISO-14040 Norm



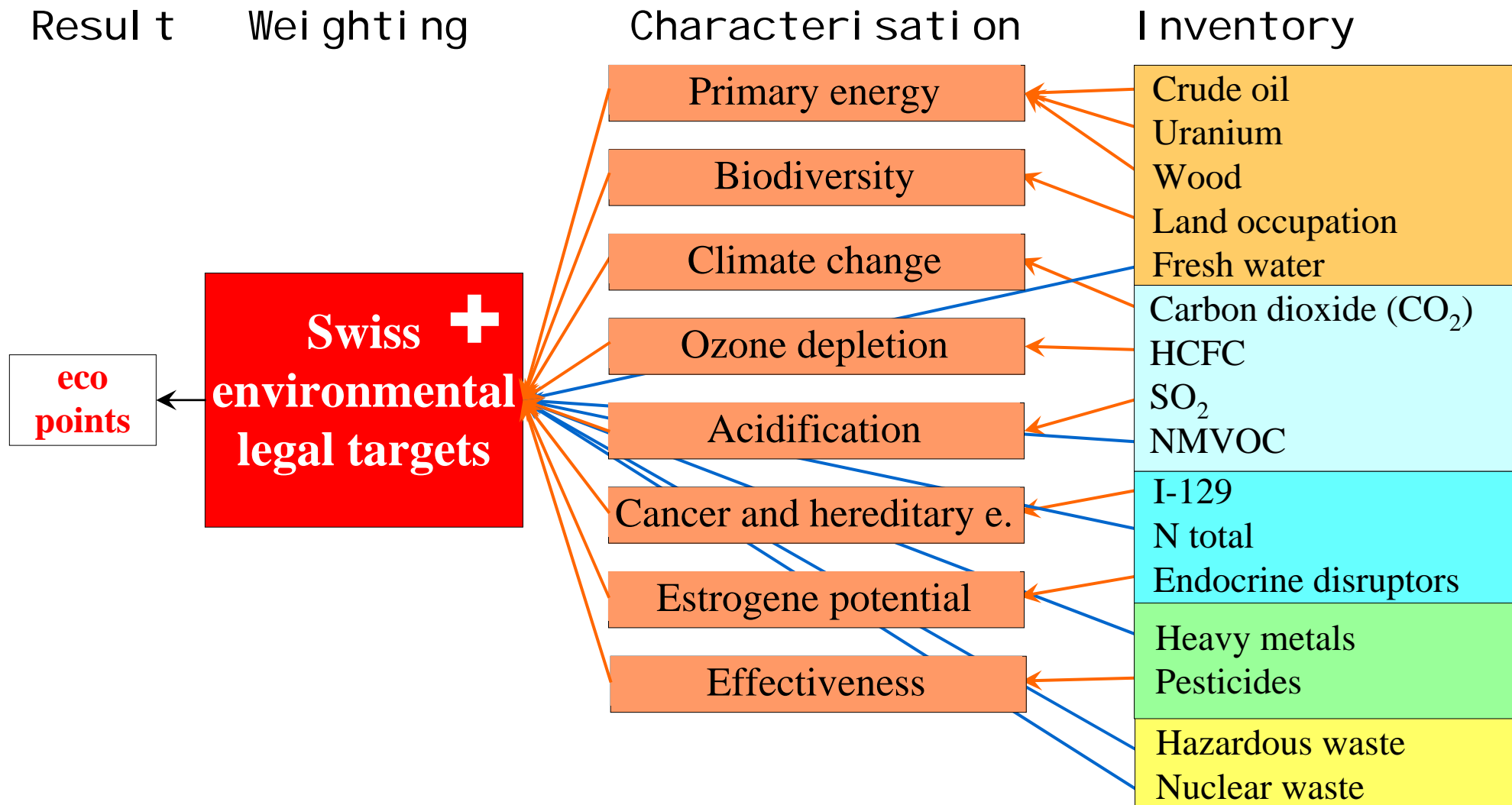
Life Cycle Assessment for Food Products



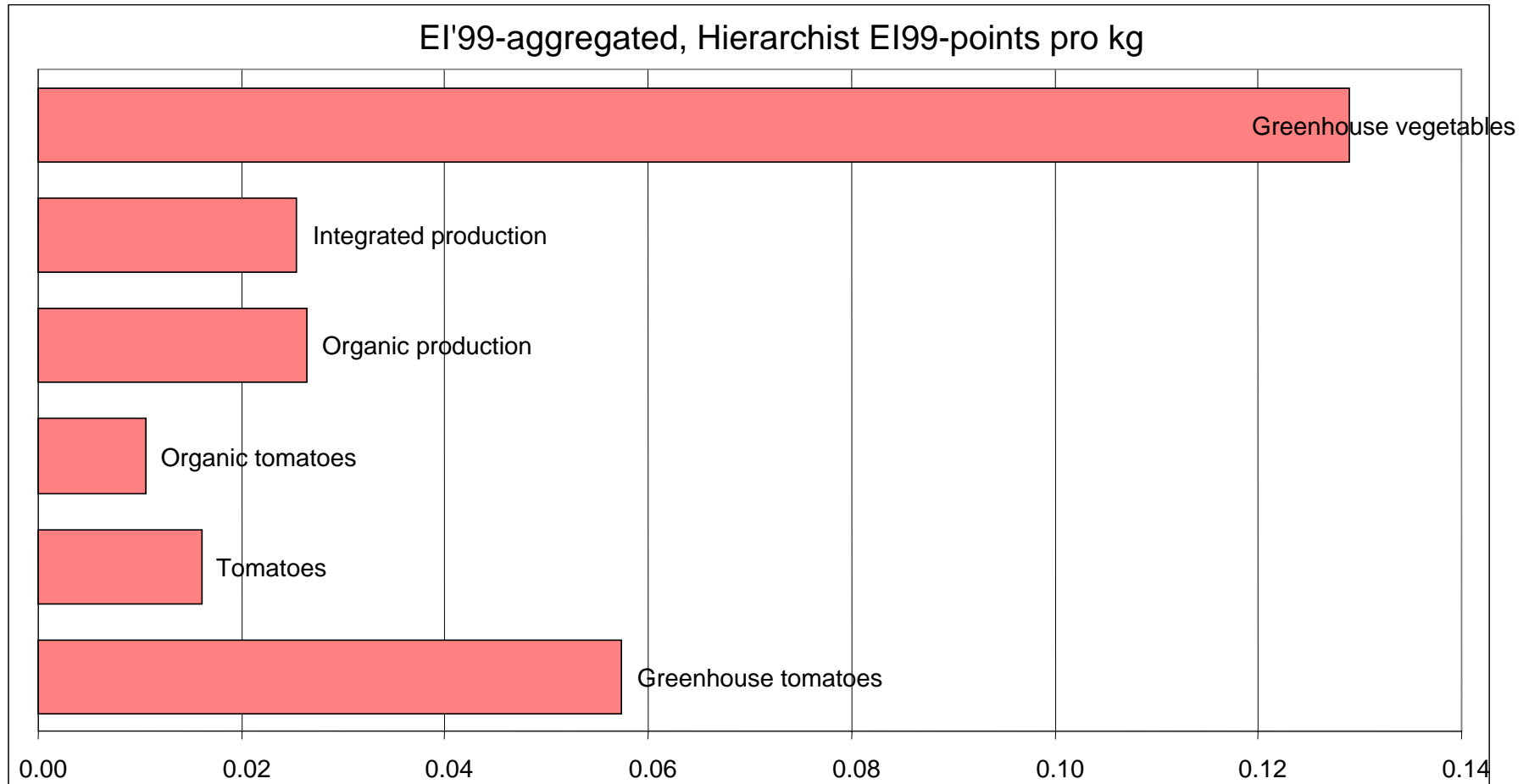
© LCA network food, final document

➤ LCA looks from cradle to grave

Ecological Scarcity 2006



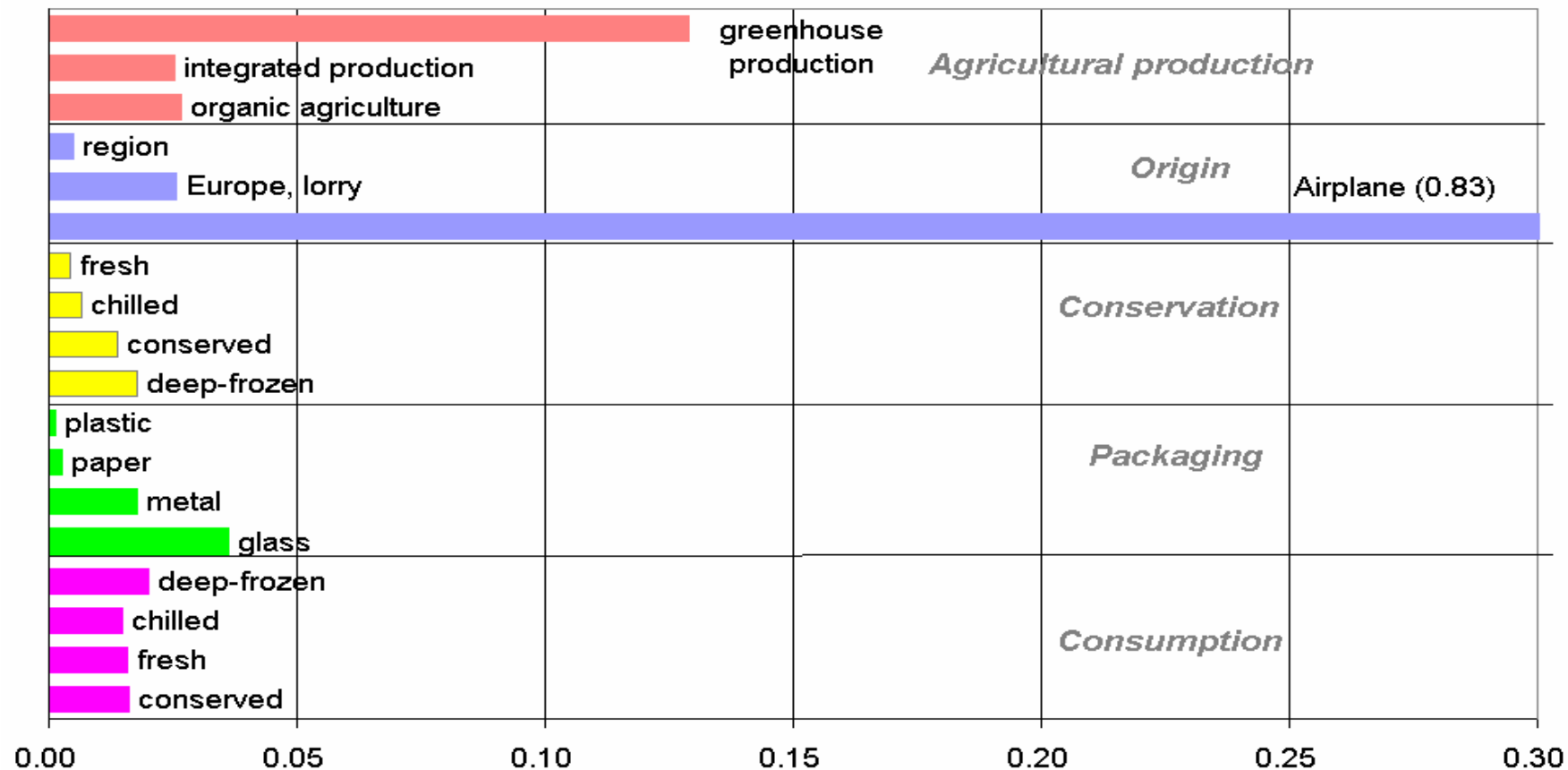
Organic Agricultural Production



➤ High differences between different products

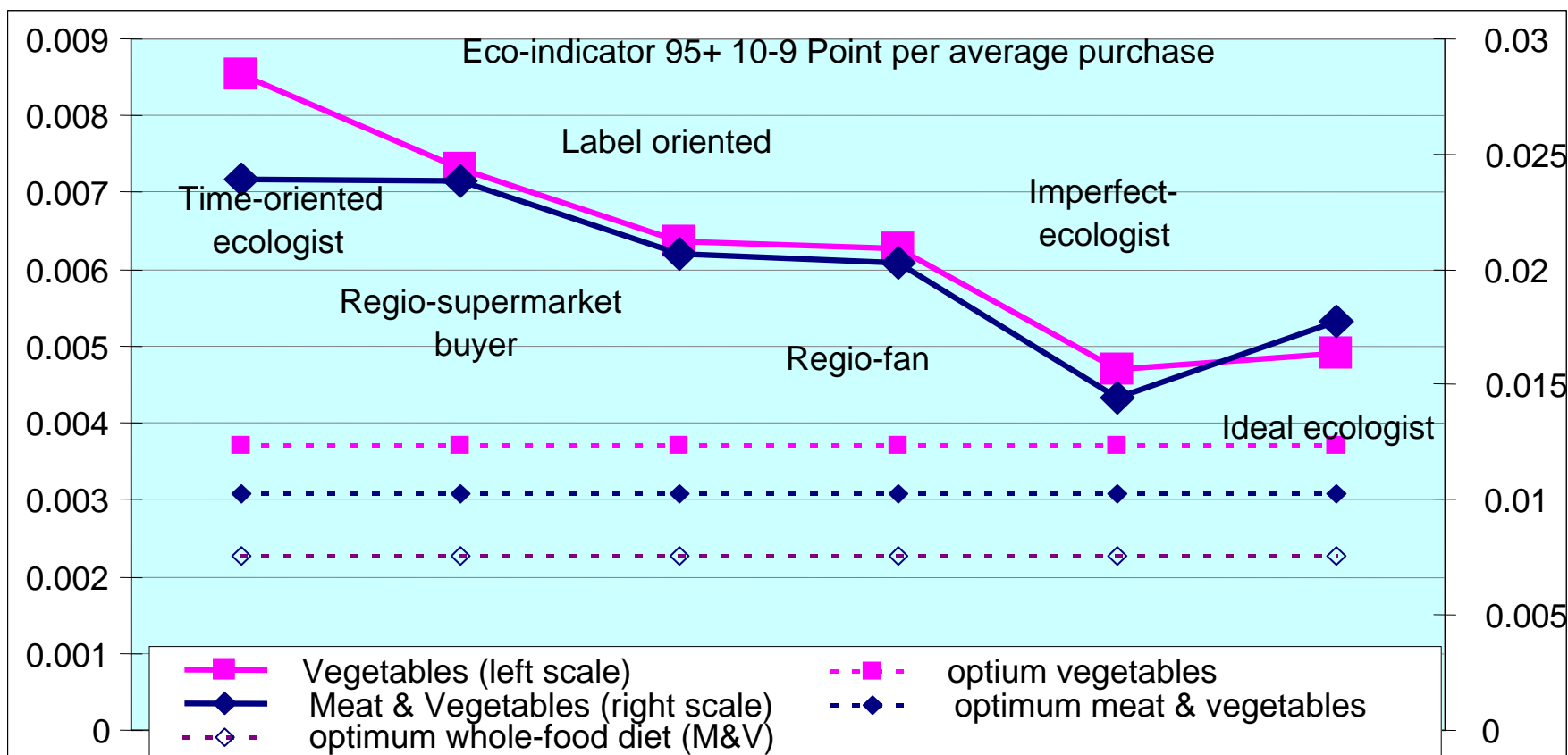
Eco-indicator 99 for Vegetables

El'99-aggregated, Hierarchist El99-points per kg



➤ All characteristics are important

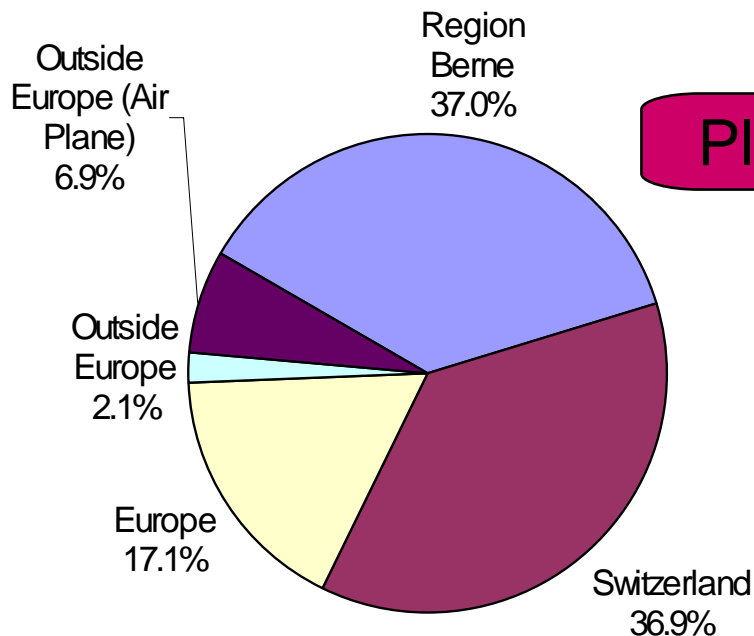
Environmental Impacts of Food Purchases



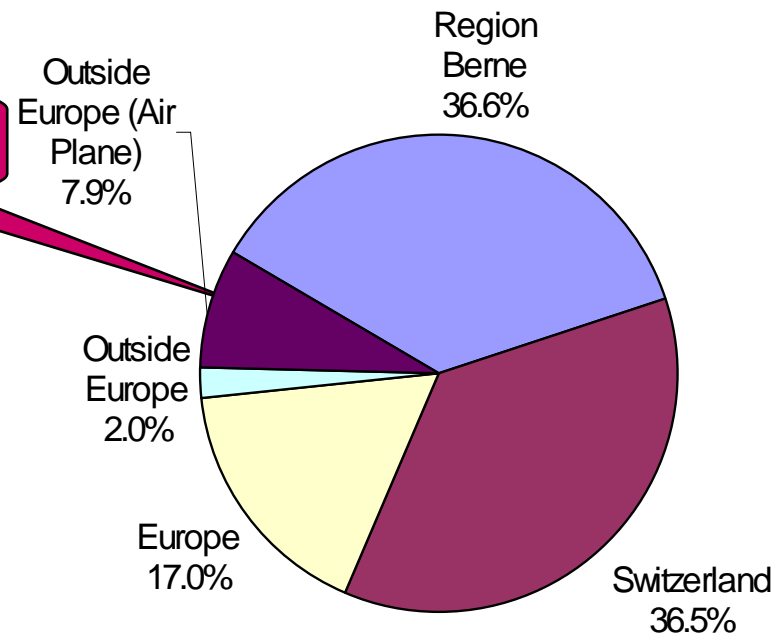
Marginal Change of Consumption Patterns

- Which influence has a marginal change of consumption patterns for the average purchases?

Today

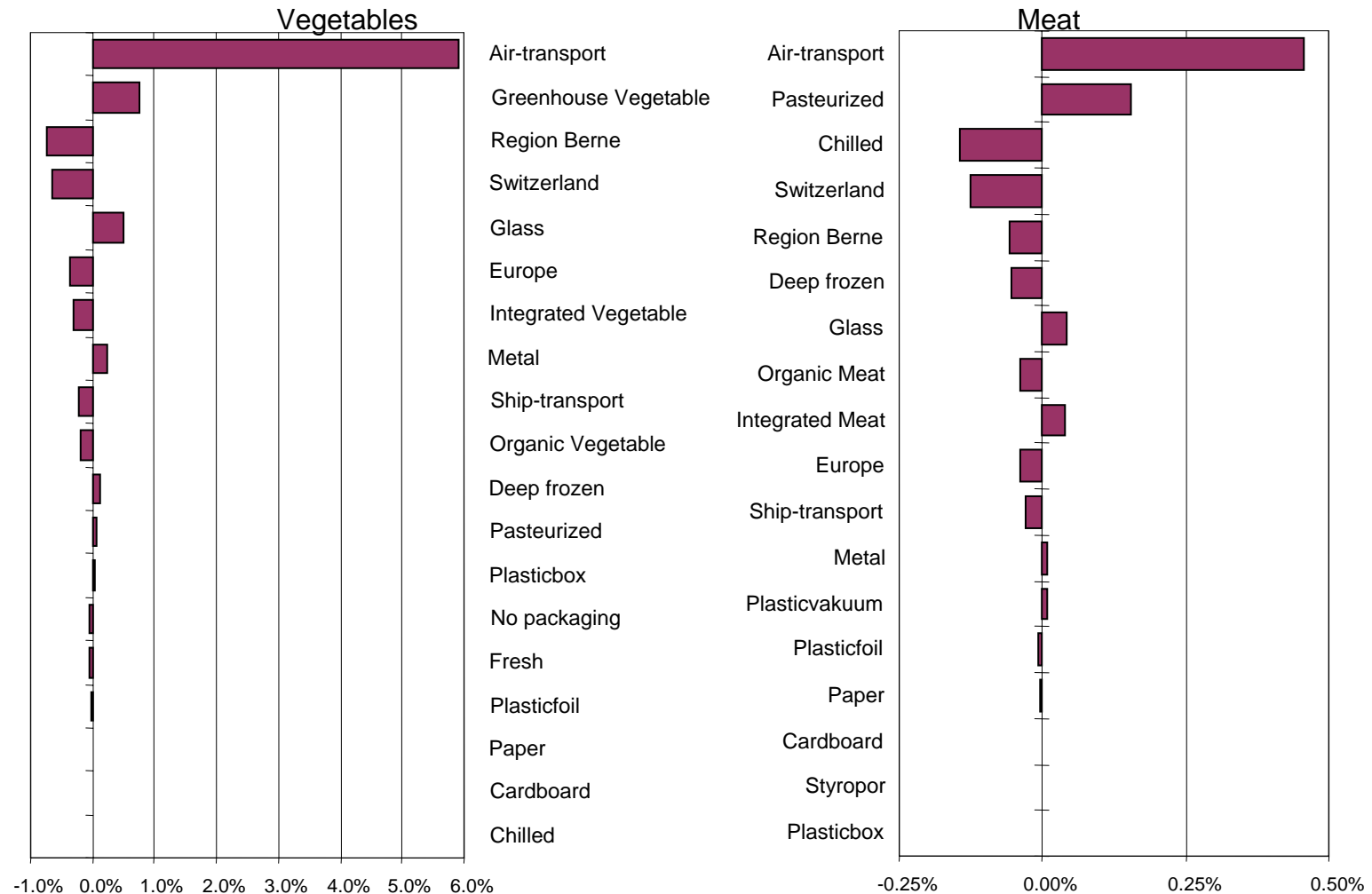


Modeling



Plus 1%

Marginal Change of Consumption Patterns



Share of EI99 Damage Categories

