

Feasibility study for environmental product information based on LCA

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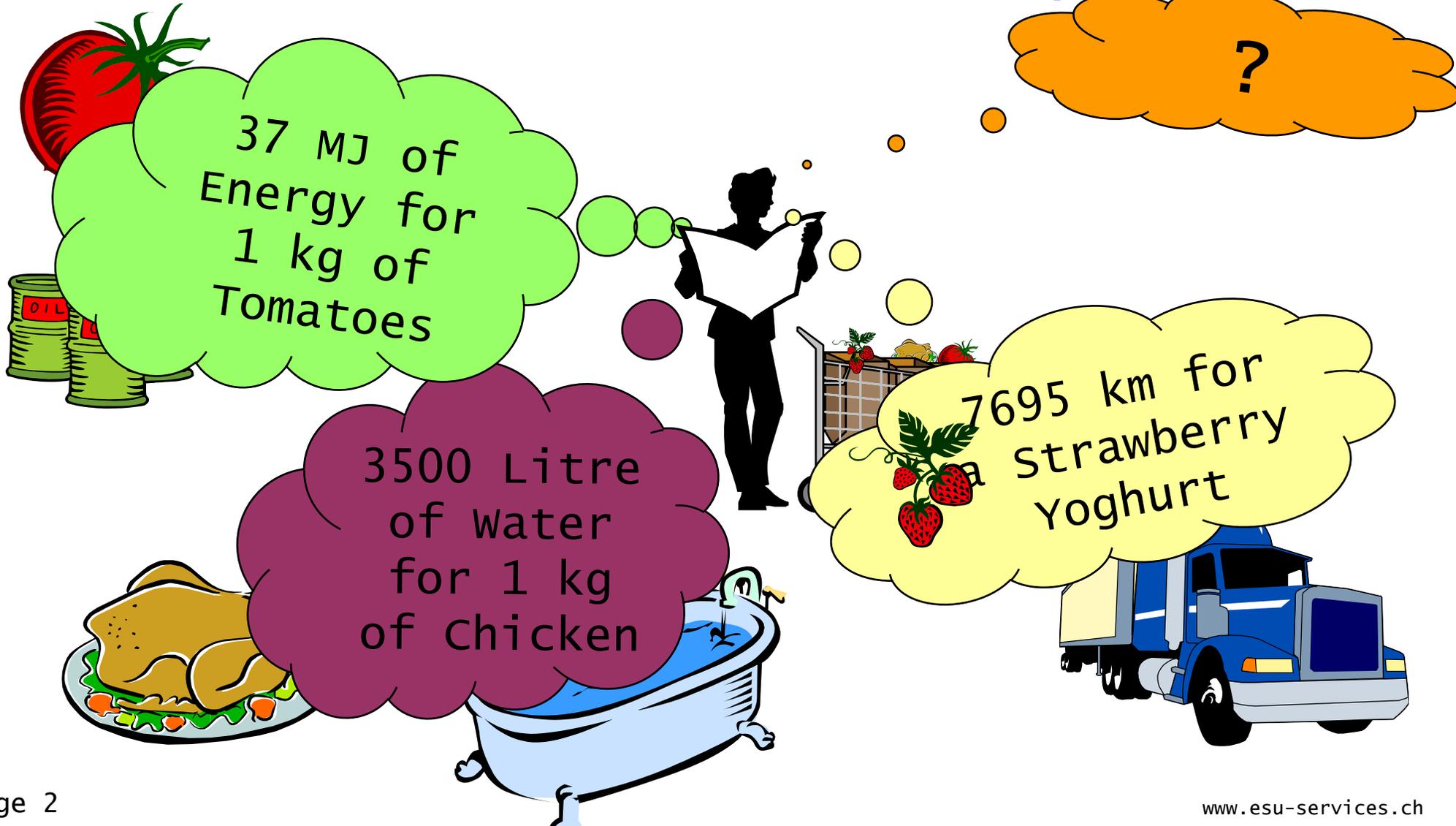
www.esu-services.ch



Presentation of the software and database platform MEANS,
for multi-criteria assessment of agri-food systems

INRA UMR SAS, Rennes - 6 March 2012

Food and Environmental Impacts



Background

Environmental Product Information

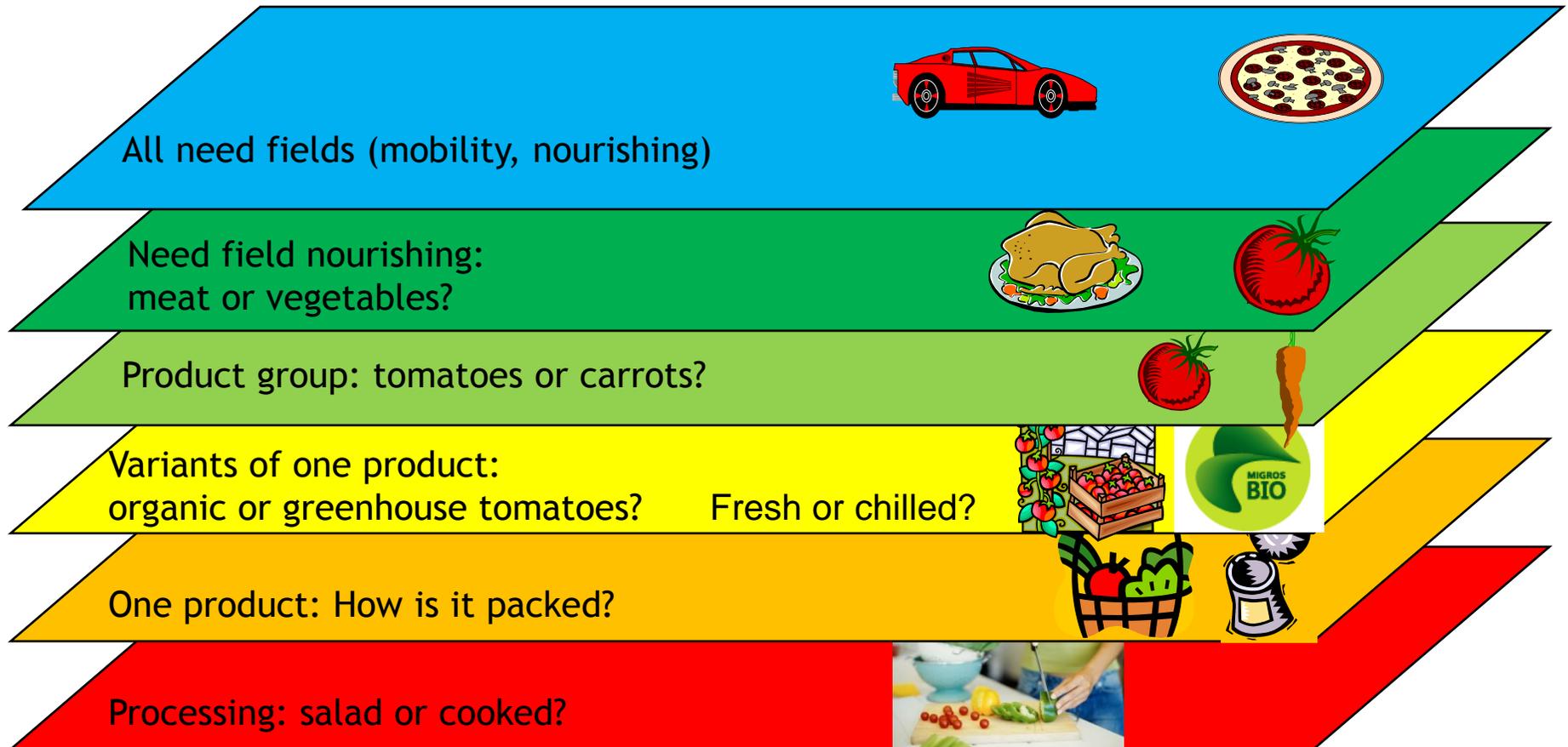
- Fast paced developments in France and Great Britain concerning carbon footprinting
- Severe scepticism by distributors and authorities in Switzerland
- Methodological challenges for differentiating single products
- Chance to better establish life cycle thinking

- We investigated the feasibility for the Federal Office for the Environment (FOEN)
- Here we present our personal viewpoint and not this of the FOEN

Purpose of and Requirements of Environmental Information for Products

- Quantifying environmental impacts of all products and informing consumers about it in order to support sustainable consumption
- Criteria set for Environmental Product Information (EPI)
 - Is comprehensive concerning life cycle stages and environmental impacts
 - Is transparent and verifiable
 - Can be standardised (applicable for all types of products not only food)
 - Scalable (single products, household, national economy)
 - Internationally transferable
 - Can be elaborated with reasonable effort
 - Allows an understandable communication of results
 - Clear separation of scientific modelling and political decisions

Which questions to be answered? Levels of Consumer Decision Making (DML)



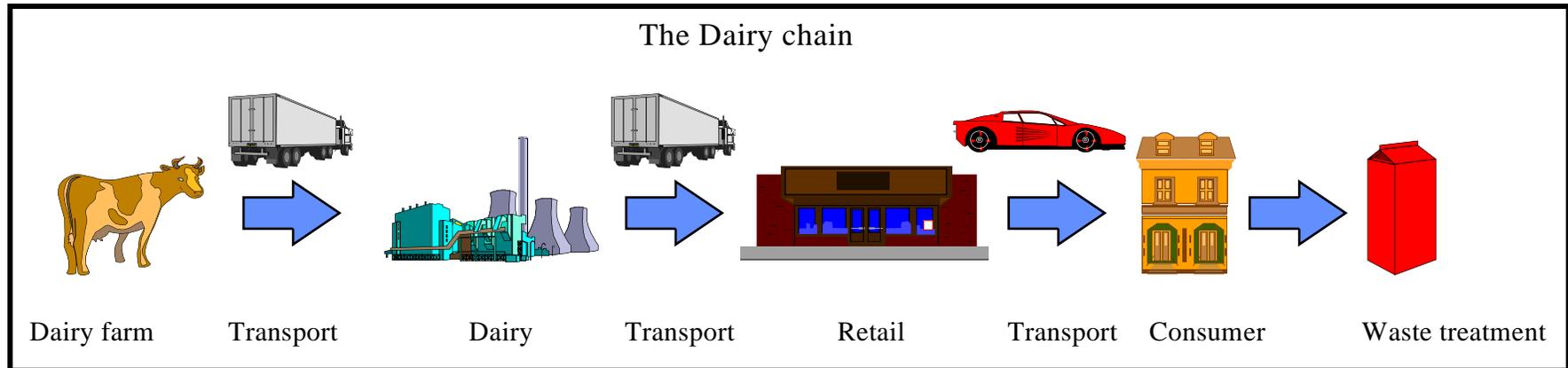
➤ It is possible to address different types of questions, but not with one analysis

Which method shall be used for EPI?

- We investigated about ten different “methods”, such as LCA, CF, EF, MFA, IOA, CED, etc.
- Different principles for data inventory (physical, economic, spatial) as one criterion
- Some “methods” are named according to indicator, e.g. carbon footprint, water footprint, energy analysis
- Method has to be chosen according to the question
- Good databases for LCA in Switzerland (ecoinvent)

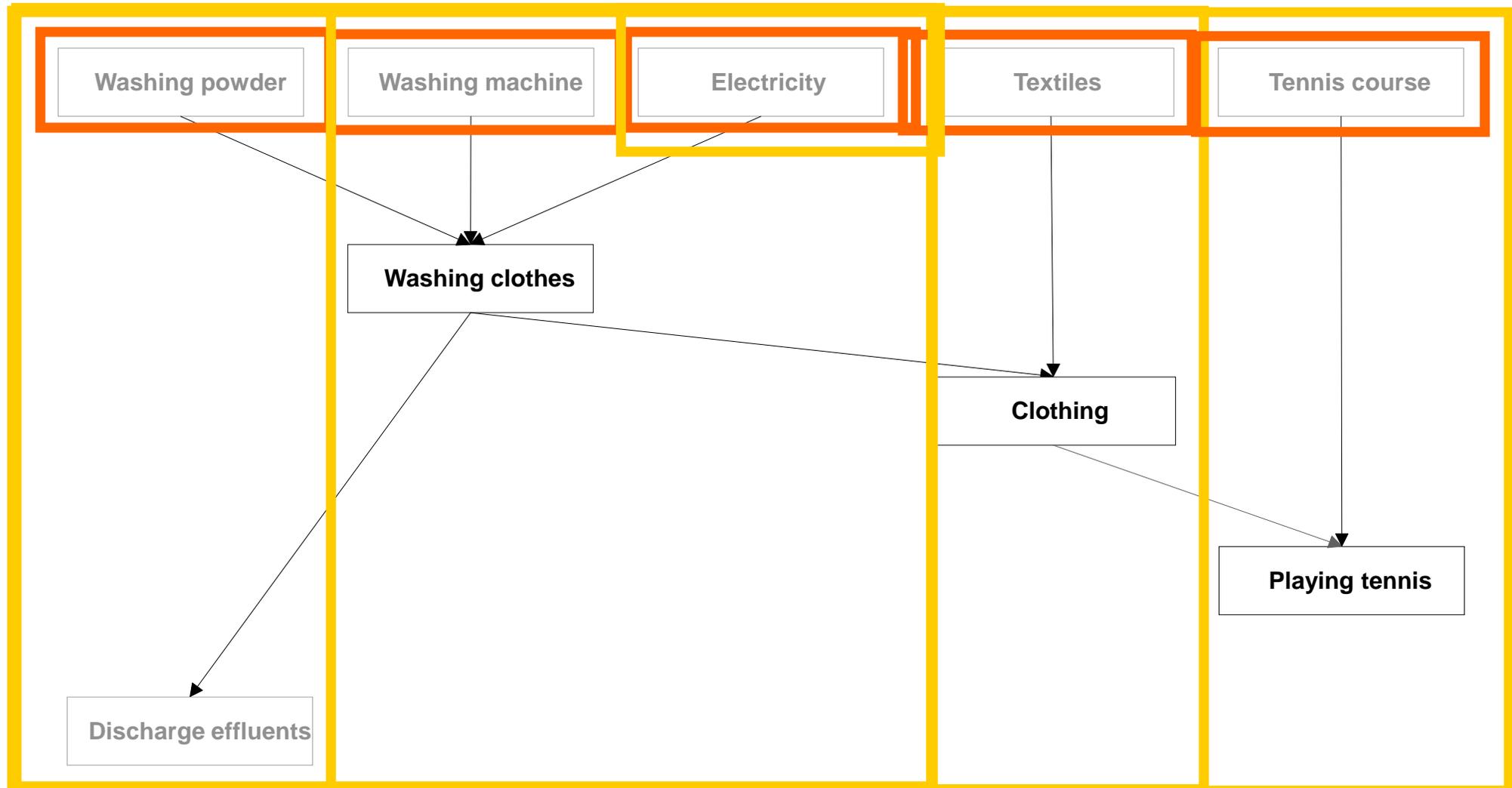
- LCA methodology is recommended for EPI (in Switzerland)
- Follow ecoinvent v2.0 ideas of modelling and transparency

Life Cycle Assessment of Products



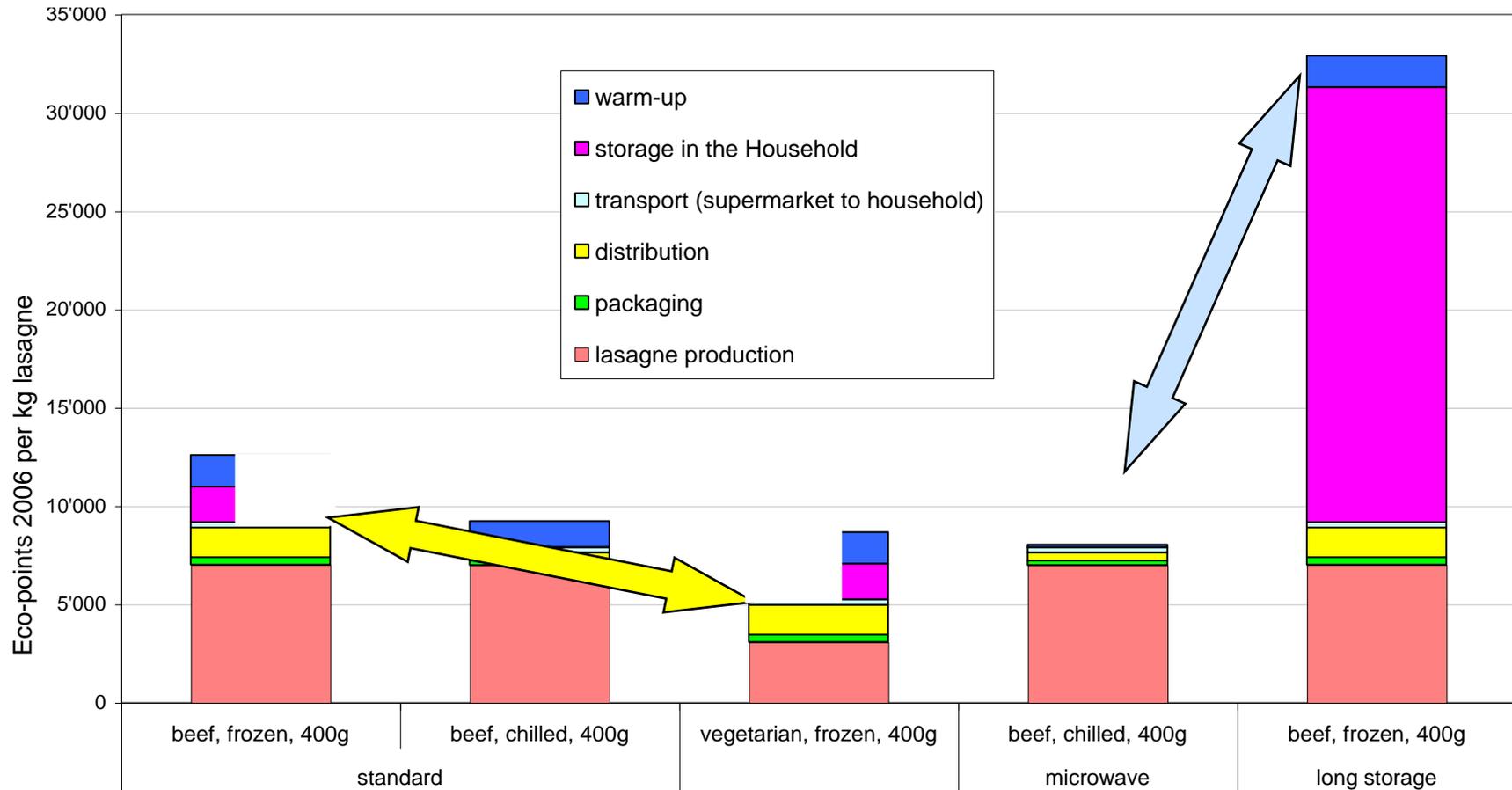
- Cradle to grave
- Assessment of emission to air, water and soil as well as resources (water, energy, land)
- International standardisation ISO 14040 ff
- No absolute judgment nor accounting for social and economic aspects
- Main responsibilities to be distinguished for environmental product information:
production - distribution - delivery - use phase - disposal
producer - retailer - consumer

Problems of defining and including the use phase



➤ Including full life cycle means double counting and high variability

Lasagne production and user behaviour



- Differences in production less obvious if full life cycle is evaluated
- Important differences in the use phase difficult to handle

System boundaries

- **In the basket**

- + Consistent with price and organic or fair trade label
- + Shows what the distribution chain has achieved
- + Directs the buying decision to production with lower impacts
- + Allows add-up calculation of personal impacts
- Misguiding if product influences the use phase

- **Full life cycle**

- + Post purchase are important → life cycle thinking for comparison
- + Traditional LCA acc. ISO14040
- Functional unit must be clarified and restricts application
- As consumer behaviour is variable, information is not valid
- Product design or clear description must ensure forecasted benefits
- Double counting of impacts

➤ No perfect solution

➤ “In the basket”, without functional unit more consistent and easier to apply

Product category rules for the use phase

- Investigate use phase additionally for energy using products with a plug or a tank
 - Develop product category rules on important issues, e.g.
 - On what functional level can one compare in a product group?
 - Standard scenarios for the use phase e.g. driving cycle
 - Standard assumptions for modelling of emissions
 - Overall comparability for all levels of decisions not feasible
 - Examples: cars, electric devices, heating
 - Do not include use phase for all other products, e.g. food products, washing powder, textiles
- Add additional information for the use phase only were necessary and feasible

Which Life cycle impact assessment

LCIA method:	Impact category	One environmental issue		Several issues	
		CED	Carbon footprint	Ecological footprint	Ecological scarcity 2006
Resources	Energy, non-renewable	√	∅	∅	√
	Energy, renewable	∅	∅	∅	√
	Ore and minerals	∅	∅	∅	√
	Water	∅	∅	∅	√
	Biotic resources	∅	∅	∅	∅
	Land occupation	∅	∅	√	√
	Land transformation	∅	∅	∅	∅
Emissions	Only CO ₂	∅	∅	√	∅
	Climate change incl. CO ₂	∅	√	∅	√
	Ozone depletion	∅	∅	∅	√
	Human toxicity	∅	∅	∅	√
	Particulate matter formation	∅	∅	∅	√
	Photochemical ozone formation	∅	∅	∅	√
	Ecotoxicity	∅	∅	∅	√
	Acidification	∅	∅	∅	√
	Eutrophication	∅	∅	∅	√
	Odours	∅	∅	∅	∅
	Noise	∅	∅	∅	∅
	Ionising radiation	∅	∅	∅	√
	Endocrine disruptors	∅	∅	∅	√
	Others	Accidents	∅	∅	∅
Wastes		∅	∅	∅	√
Littering		∅	∅	∅	∅

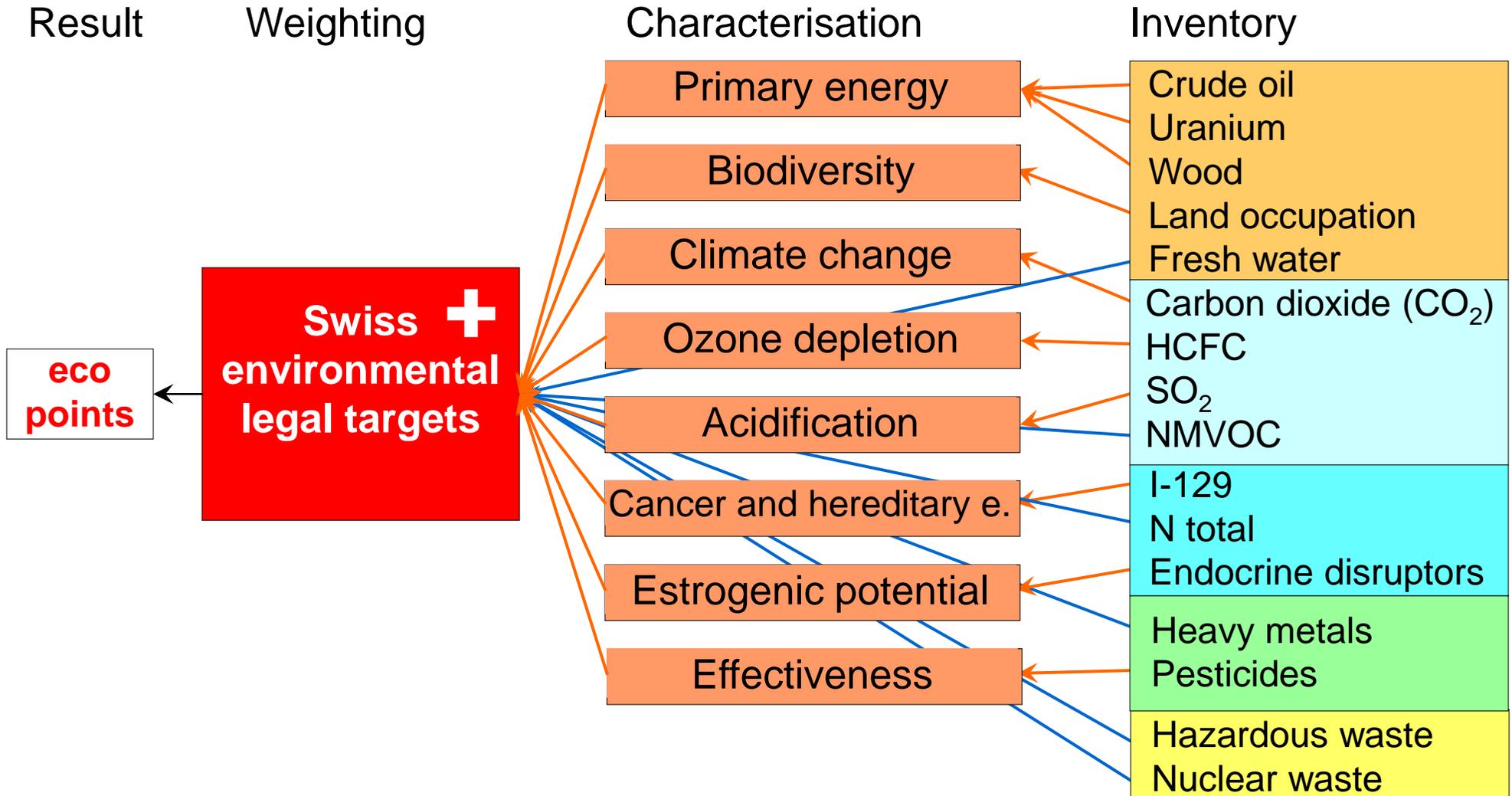
Carbon Footprint, CED:

Ecological footprint:
easy to understand, low

Ecological scarcity:
Comprehensive, reflects Swiss policy targets, used for assessment of products, companies and for the whole economy

- It is necessary to apply LCIA methods that cover a range of environmental impacts
- For EPI in Switzerland we recommend the ecological scarcity method 2006

Ecological Scarcity 2006



International acceptance of LCIA

- No acceptance of single score methods in the international LCA community because not allowed by ISO 14040
- Different political views in different regions and communities e.g. nuclear energy, water scarcity, resources
- Ecological scarcity concept is being used in other nations and world regions (e.g. Japan) and can be applied where quantified environmental goals are available

- LCIA method developed as combination of a scientific and political process
- Different priorities set by different groups of people

Different interests behind communication

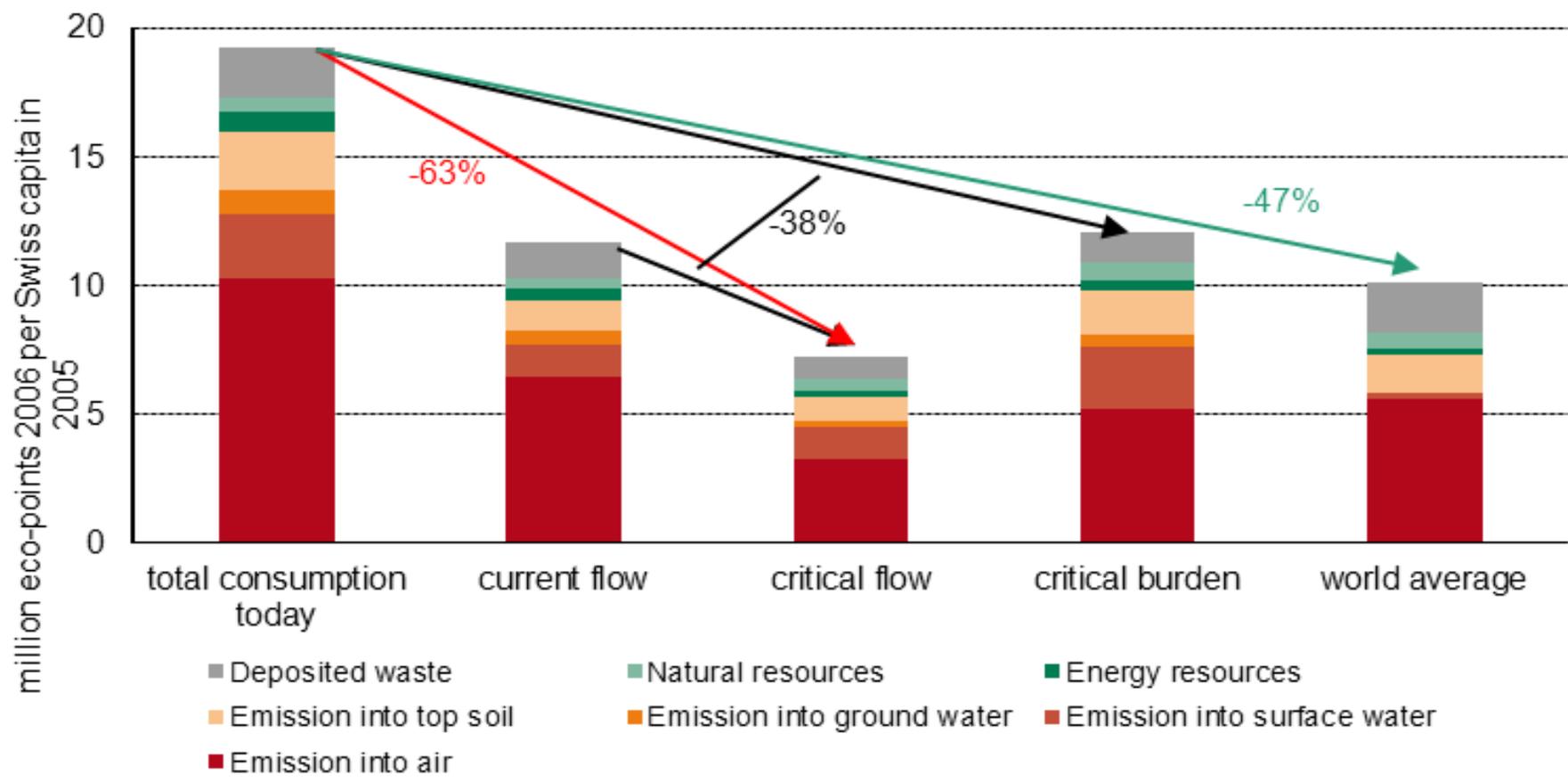
- Consumers want to get clear and simple recommendations
- LCA experts want to show all relevant aspects
- Producers want to be better than others
- Distributors want to strengthen their image
- Government wants to guide consumption

How to communicate?

- Overflow of information for products, especially food products
- Different means of communication allow different level of detail
- Clear guidance necessary without expecting too much background knowledge
- Different perception concerning simplicity and correctness

➤ It is necessary to develop a communication concept

Setting targets and simplification Ecological Scarcity 2006



➤ Swiss policy aims for substantial reduction of emissions

Environmental Time Unit

Product	Real time duration hours	Ecological scarcity eco-points	Ecological Time eco-hours
Annual budget	365d 0h 0' 0''	12'000'000	365d 0h 0' 0''
Spinach, deep frozen, 1 kg	0d 0h 30' 0''	3'000	0d 2h 11' 24''
T-Shirt, cotton	66d 16h 0' 0''	12'400	0d 9h 3' 7''
Car, VW Golf	83d 8h 0' 0''	6'370'000	193d 18h 6' 0''
Car driving, 10'000 km	8d 7h 59' 60''	2'320'000	70d 13h 36' 0''
Mineral water, 1 litre	0d 0h 10' 0''	200	0d 0h 8' 46''
Flight, New York, 12'600 km	0d 13h 0' 0''	920'696	28d 0h 6' 28''
Electricity, 1 kWh	0d 10h 0' 0''	340	0d 0h 14' 54''

- Normalize the critical burden (target) with the time budget
- Easier to understand than eco-points

Summary of Main Challenges

- Levels of decision making and main questions addressed
- System boundaries concerning distribution and use phase
- Not feasible to show the full life cycle and add-up the impacts with one type of information
- Product category rules vs. comparability of all products
- Low workload vs. accuracy of results
- Comprehensive impact assessment method that gives the right direction for consumer decisions, but so far no international agreement on weighting of environmental goals
- Reference set for environmental indicator

- Methodological challenges go beyond the ones known for LCA
- There is not one concept to answer all questions with one number

Conflicts between different goals

	Choices to be made	Goal and Scope									LCI		Reference				Indicator				Communication	
		DML 1	DML 2	DML 3	DML 4	DML 5	DML 6	DML 7	DML 8	DML 9	Develop PCR	at shop	full life cycle	Impacts per unit	Impacts per function	Quantitative results	Qualitative results	carbon footprint	ecological footprint	ecological scarcity 2006	ReCiPe	Indicator result
Criterion demanded for good EPI																						
Allows a fair comparison of single products (C4)		.	.	+	+	+	+	.	.	+	.	+	.	+	+	.	.	.	+	+	.	.
Allows a good guidance for sustainable consumption (C1)	
Includes all relevant aspects in the full life cycle (C1)		.	.	+	+	+
Low uncertainties of judgements		+	+	+	.	+	.	.	.	+
Inclusion of several environmental impacts (C1)	
Approach is transparent for consumer (C2)	
Low workload (C4)	
Add up of impacts is possible (life cycle, household, national) (C5)		.	.	+	+	+	+	+	+	+
One approach is possible for all products (C3)	
Worldwide accepted as a method (C6)		.	.	.	+	+
Information on traded products is valid (C7)		.	.	+	+	+
Communication is understandable (C7)		.	.	+	+	+	+	+	+	+
Value judgements are separated (C8)	
Criterion can be fulfilled		+																				
Criterion difficult to be fulfilled		.																				
Neutral concerning criterion or unsure		.																				

➤ It is not possible to fulfil all criteria with one concept

Summary of Recommendations for EPI in Switzerland

- Inform about environmental impacts cradle-to-basket based on LCA
- Simplify communication of ecological scarcity 2006 method by using eco-time
- Start with generic values assisting the higher level of decision making, e.g. meat vs. vegetables
- Refine the approach by differentiating within need fields
→ product groups → single products and developing PCR

Further information about the project
<http://www.esu-services.ch/projects/epi/>

Full publication(English)

www.bafu.admin.ch/produkte/10446/index.html?lang=de

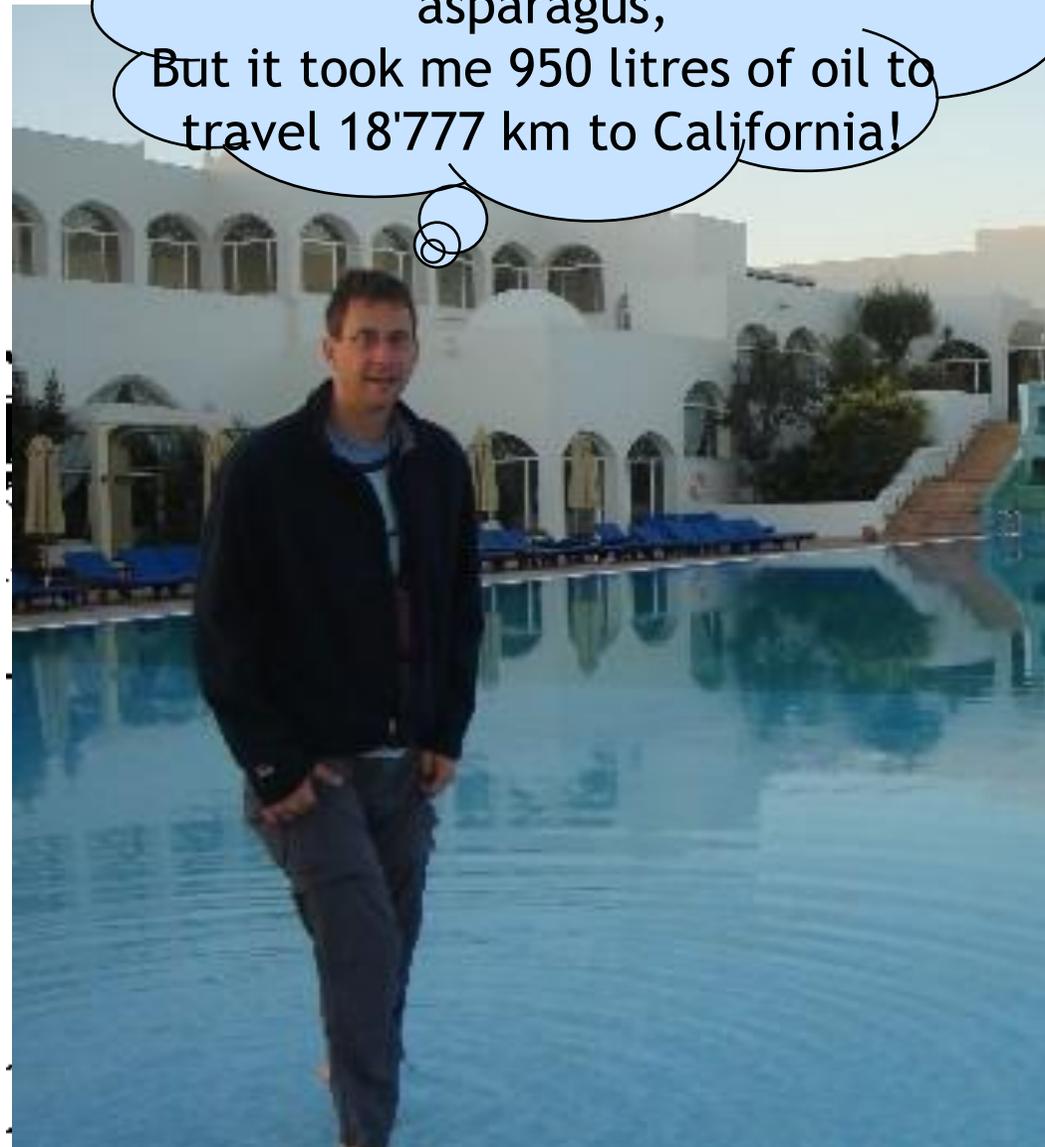
Peer reviewed article in Journal of Cleaner
Production

www.esu-services.ch/fileadmin/download/jungbluth-2011-envinfo-JCLEPRO.pdf

Discussion forum LCA on EPI

www.lcaforum.ch/Downloads/DF41/tabid/79/Default.aspx

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



➤ LCA shows the relevance

Annexe

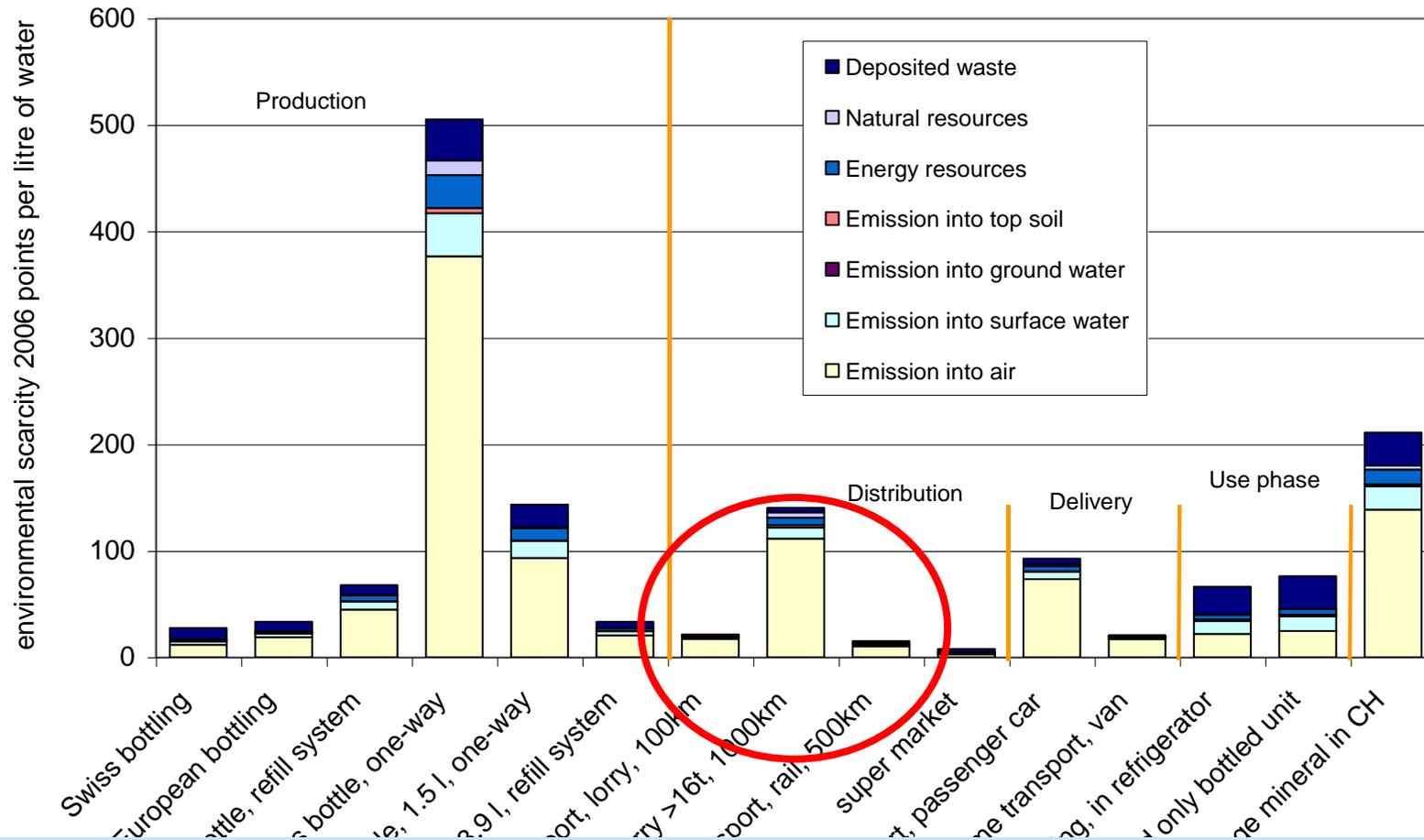


Analysing international EPI initiatives

- Different approaches based on life cycle thinking
- Focus on carbon footprint as one impact and only on single products
- Differences concerning inclusion of the use phase
- Organisational aspects range from driven by one stakeholder to approaches lead independently
- Different ideas for communication, absolute, relative, best of class
- ISO standards for env. product declaration (EPD) and life cycle assessment (LCA) only partly followed

➤ So far no complete environmental information on all products

Distribution of mineral water



- Impacts of distribution can vary considerably by point of sale
- Not feasible to assist comparisons without considering difference

Conclusions on what is feasible

- Questions to be answered have to be defined in the first step
- EPI can help to consider environmental impacts
- It is feasible to show the life cycle until the shop and add-up the impacts for total consumption
- A comprehensive impact assessment method is mainly a matter of choice and workload
- Clear procedure and guidelines are necessary

Keep other options of politics in mind

- Financial incentives: subsidies or tax reduction
- Regulations on advertisement
- Regulations on production processes
- Mandatory EPD instead of product labels
- Awareness rising with leaflets and brochures
- Generic web calculators for environmental impacts of products
- Wiki database for environmental impacts of consumer products

Recommendations for next steps

- Establish an independent organisation for guiding and review
- Write down the general methodology as a handbook
- Agree on environmental targets and develop a communication concept
- Start with case studies and data already available for consumer products

Research questions facilitating an EPI

- Investigate background data for consumer products (e.g. textiles, electronics)
- Provide statistical data e.g. on pesticide use
- Further develop Swiss ecological scarcity (e.g. land transformation, pesticides)
- Find international agreement on LCIA and weighting
- Investigate the acceptance and understanding of EPI by consumers