ECETOC Task Force on Aquatic Ecotoxicity as an Impact in LCA

Management Summary for LCM 2017

ECETOC, 2017

Context in European Union

REGULATION OF CHEMICALS

- Management of **toxicity to aquatic species through a RA method** developed & improved since the 1990's
- Integration of a **key criterion (CDV) derived from the RA method for aquatic species** in the method developed in the 2000's to award EU Ecolabels to consumer products

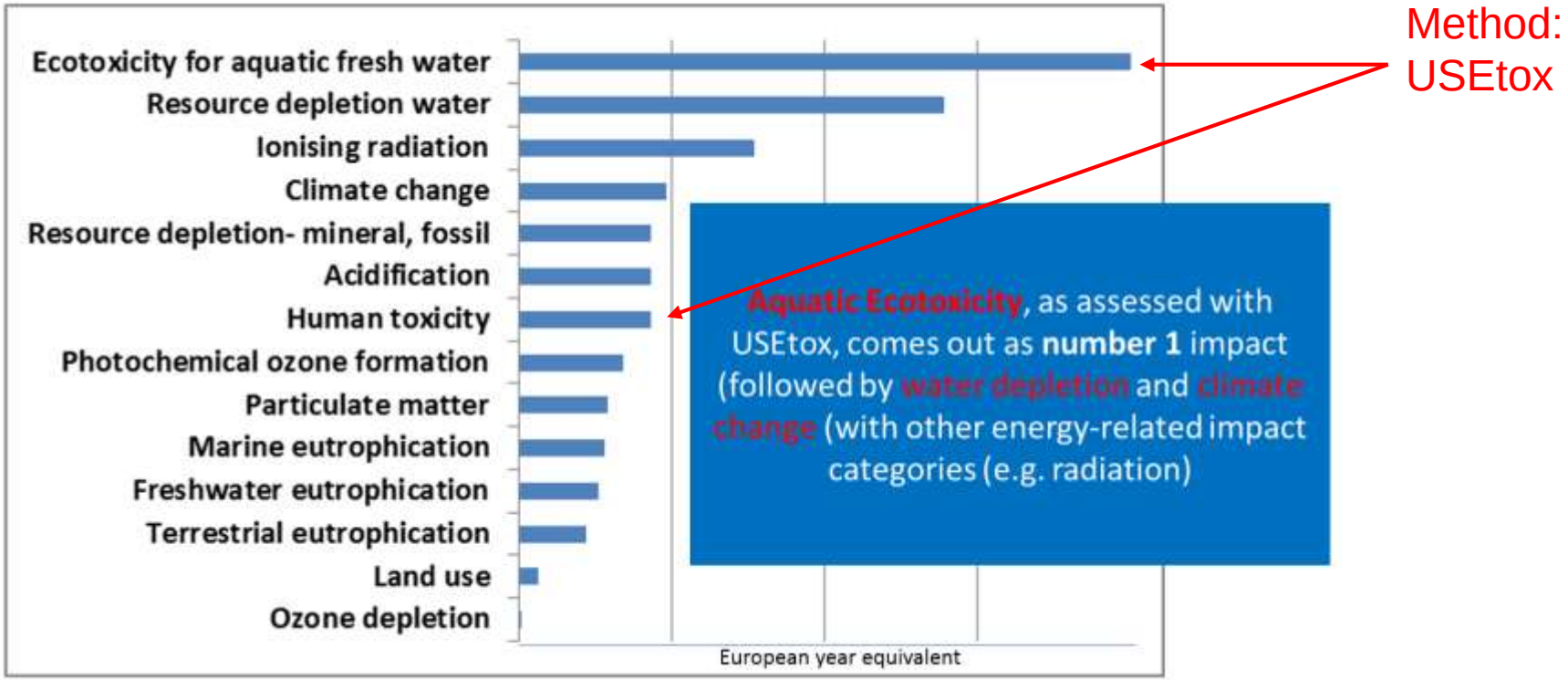
PEF OF CONSUMER PRODUCTS

- Product Environmental Footprint (PEF) is based on LCA
- Management of **toxicity to aquatic species through the USEtox® method** in PEF pilots launched in 2013

Different methods recommended by EU Authorities to approximate aquatic toxicity

PEF Pilots by product category

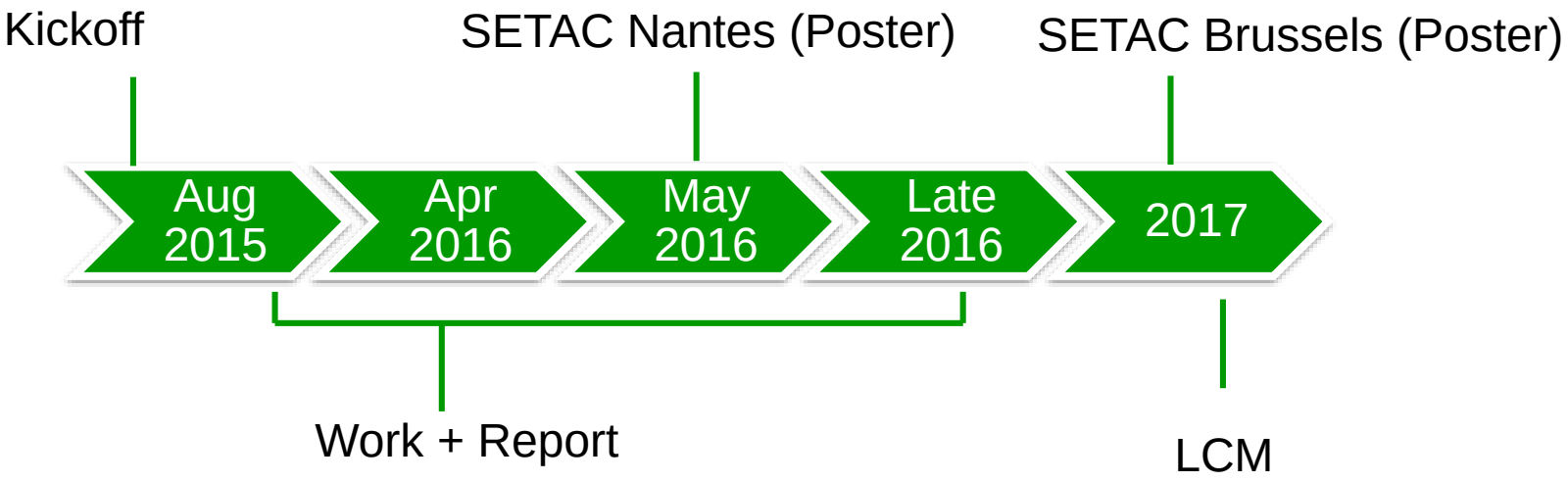
- A.I.S.E. pilot study of a liquid laundry detergent



Source: A.I.S.E. (Association Internationale de la Savonnerie, de la Détergence et des Produits d'Entretien) presentation, 'Liquid Laundry Detergents PEF pilot: Findings, Learnings, Outlook', Nov. 2015

Task Force Goals

- Comparison of LCA and RA
- Analysis of the USEtox Method
- Case Study on a virtual product using USEtox and CDV



LCA versus RA Thinking

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	LCA	RA
Focus	Product – Service Functional unit	Single substance Tonnage on market
Aim	Compare / identify hotspots	Assess safety
Result	Impact score	Safe/unsafe vs threshold
System boundaries	Variable – upstream, own operations, downstream	Set - own operations, downstream users
Approach	Real case scenario	Conservative scenario
	Use of databases inventories	Tiered approach
Spatio-temporal Δ	Not integrated	Integrated
Data gap	No impact	Taken into account
Uncertainties	Not explicitly adressed	Safety factors

** Inspired by other authors, who have investigated this relationship as well: Olsen SI, Christensen FM, Hauschild M, Pedersen F, Larsen HF, Tørsløv J. 2001. Life cycle impact assessment and risk assessment of chemicals − a methodological comparison. Environ Impact Assess Rev 21(4):385-404; Askham C. 2012. REACH and LCA-methodological approaches and challenges. Int J LCA 17(1):43–57.*

LCA / RA → different scopes & aims in common contexts

Aquatic Ecotoxicity - Case Study

* Position adopted by manufacturer of virtual product

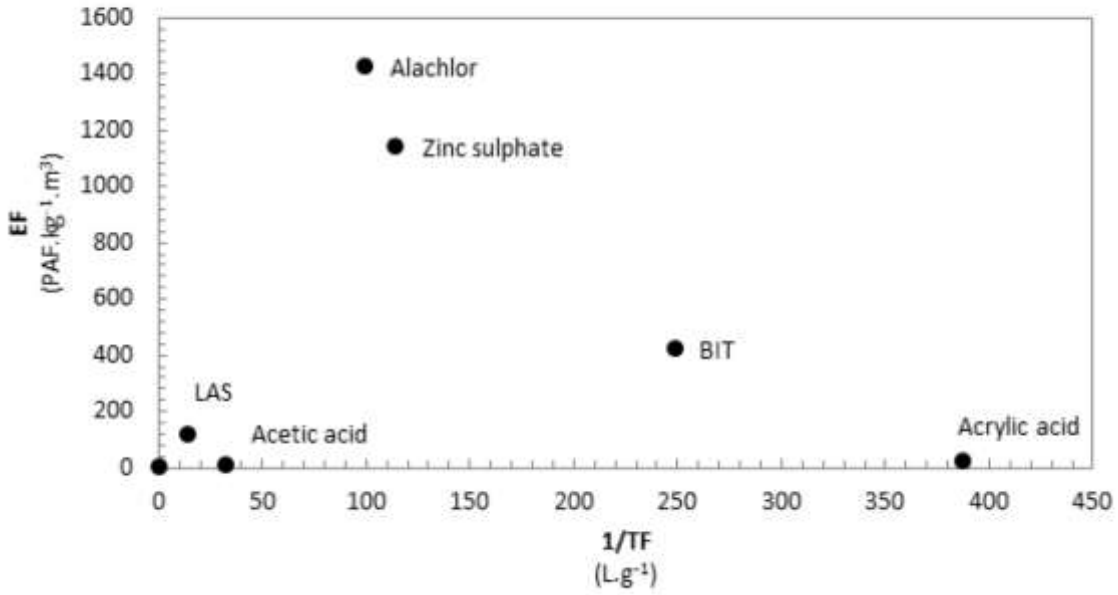
- Case Study – Virtual down-the-drain product
  - 7 chemicals, no packaging
  - USEtox 1.1 and 2.0 (disposal) versus CDV (disposal)
  - Ecoinvent 2.2 for upstream contributions

Results

- Disposal is confirmed to be the worst impact for down-the-drain product
- But what about other product categories (*e.g.* water pipes) ?
  What is their relative scale in overall societal impact ?

Aquatic Ecotoxicity - Case Study

Figure 5.3: Comparison of the ecotoxicity parameters applied for CF calculation (EF) and CDV calculation (1/TF)



- Relative contribution of chemicals to product ecotoxicity differs for USEtox and CDV, giving different eco-design options to reduce product impact on the environment
- Variations come from conceptual differences in models and data sets used
- Minimisation of differences between model results could be achieved by using same data for parametrisation (*e.g.* REACh data)

Current Practice in LCA

Collect foreground data

Select impact category, get results

Focus 1 for LCA practitioners

LCI
Several thousand flows

Characterisation Factors

LCIA

Low Uncertainty

Selection of background data

+

Focus 2 for LCA practitioners

LCI
Databases, Datasets + Dependencies
Several thousand flows

Characterisation Factors

LCIA

Medium to high Uncertainty

On-going Initiatives

- European Commission (JRC) investigations on USEtox characterisation factors for PEF project

- UNEP / SETAC taskforce to address LCIA modeling for Ecotoxicity (improving **CFs**)

  →out of scope: contribution of inventories (**LCI**) ?

$$\textbf{LCIA Score} = \sum_{i} LCI_i \cdot CF_i$$

LCIA Score has 2 operands, both should be investigated

Possible Ways Forward

A holistic LCA assessment is incomplete without addressing ecotoxicity

A) Improve databases on substances and emissions inventories (e.g. metals)

B) Improve realism of ecotoxicity assessment – reflect more ecology, spatio-temporal variations

C) Provide guidelines to manage uncertainty of results and to compare products

Alternative: Use a method derived from RA

→ Use results from RA-based methods (e.g. CDV or ESC) to augment LCA reports

People Behind Task Force

Stewards: Johannes Tolls (Henkel)
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Members: Michiel Claessens (Chemours)
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Nikolaj Otte (Henkel) - Chair
Frederic Palais (Solvay)
Florian Schmidt (BASF)
Diederik Schowanek (P&G)
Thomas Wolf (L'Oréal)

Backup

LCA Databases: Complex Dependencies

- Datasets in databases such as Ecoinvent, GaBi & others are highly interlinked
- Radial tree display shows linkage up to level 3
- Analysis for contributions to USEtox impact score