

ProScale



Why ProScale and ProScaleE? The regulatory and business contexts

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ProScale – Historical Background

ProScale

- Developed 2016-2017 with focus on Construction Product Regulation (CPR)
 - ▶ Revision required Environmental Product Declaration (EPD) including consideration of toxicological endpoints
 - ▶ Was developed as alternative to USEtox
- First conceptual development 2015 by BASF SE and team of LCA/Risk Assessment Consultants
- Industrial Consortium created to promote ProScale as tool for life cycle and toxicological risk assessment
 - ▶ Members to date: BASF, Covestro, Deutsche Bauchemie, DSM, Kingspan, Solvay, Dow, Merck, Clariant; Technical secretariat: IVL; Positioning support: UetlibergPartners
- 05.10.2017: ProScale - Presented to wider audience to broaden participation for further development
- 31.05.2024: ProScaleE Webinar

ProScale

Basic Considerations

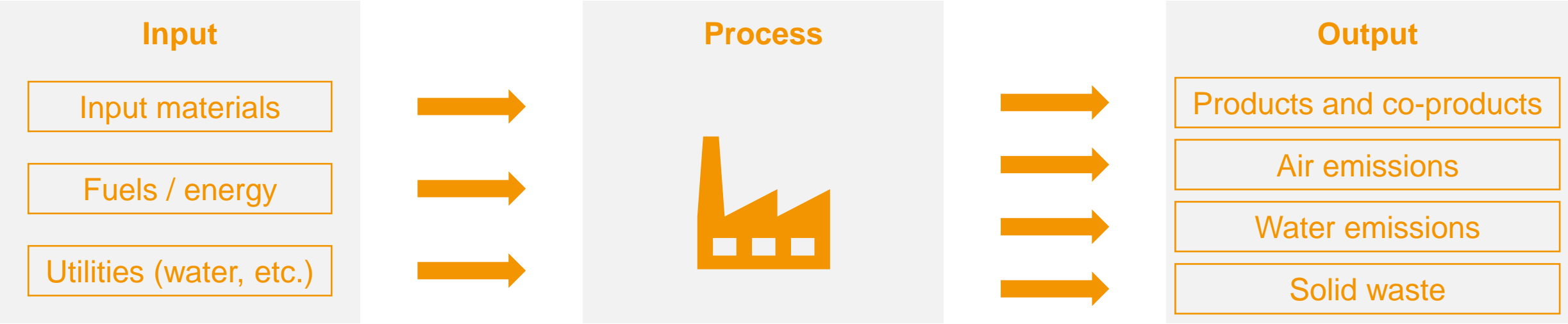


ProScale

- **Objective:** Develop a tool to assess toxicological risk for life cycle analysis
 - ▶ EASY to USE with available data sets
 - ▶ Clear identification of risk drivers
 - ▶ Easy correlation of chemistry and risk
 - ▶ Inclusion of all toxicological risks coming from raw materials used in manufacture at all life cycle stages
- → ProScale as method for human toxicity assessment in sustainability assessments, complementary to other approaches
 - ▶ Ensure taking into account of chemical risk-based elements in LCA of products
 - ▶ Prevent the use of hazard-only assessment methods in LCA

Life Cycle Assessment (LCA)

- compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

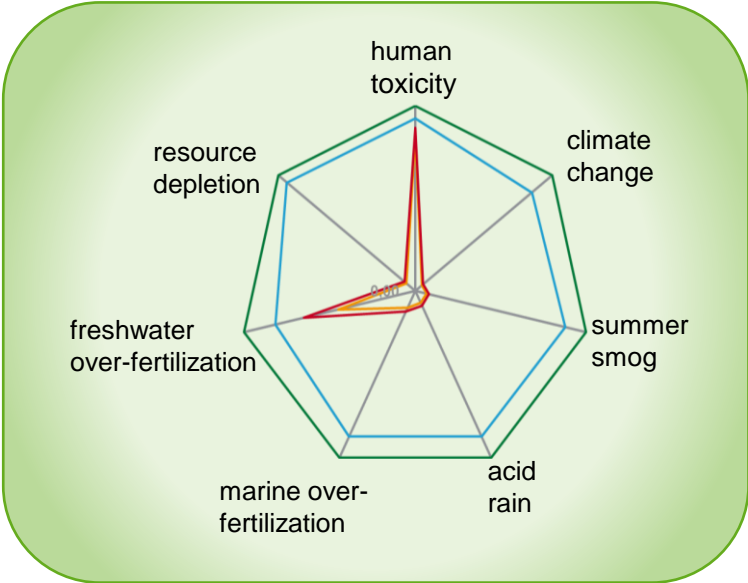


Environmental Product Declaration (CPR*) and Product Environmental Footprint (PEF) (ESPR**)

- Full life cycle assessment of environmental performance of products

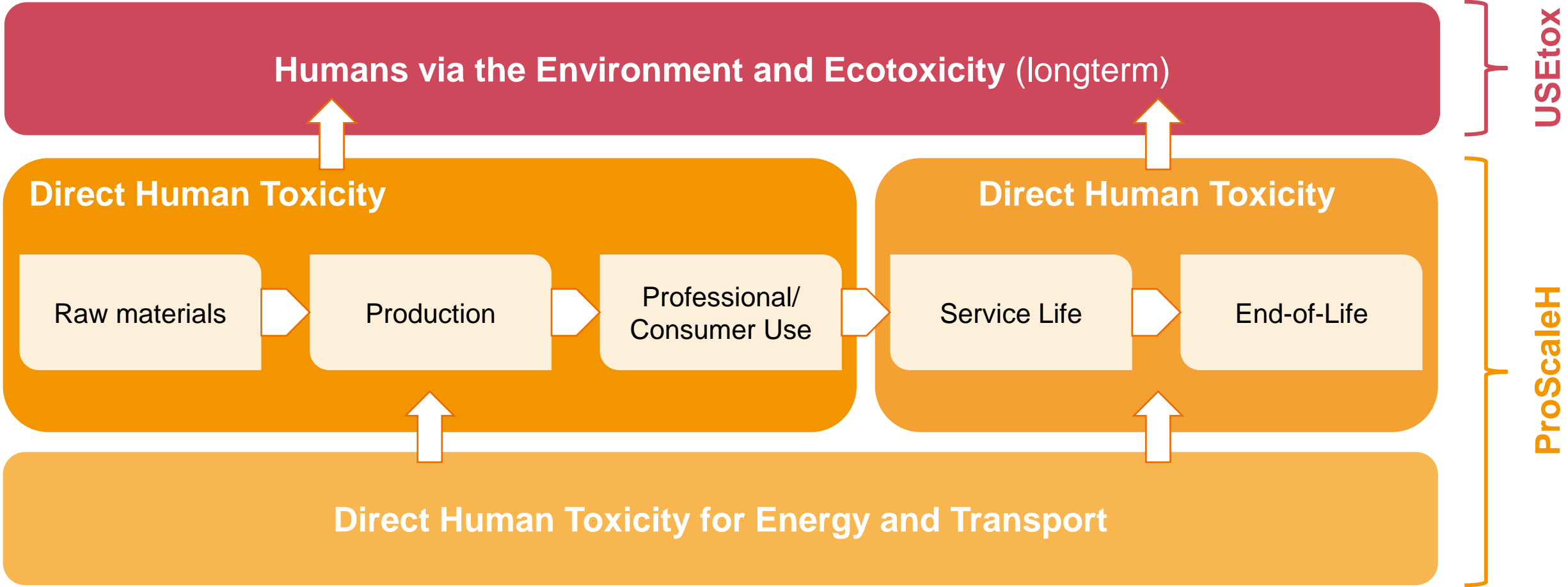
- **16 Impact Categories**

- ▶ Climate change
- ▶ Resource depletion
- ▶ Land use
- ▶ Photochemical ozone formation
- ▶ Ozone depletion
- ▶ ...
- ▶ Water use
- ▶ Eutrophication
- ▶ Acidification
- ▶ **Human toxicity**
- ▶ Ecotoxicity



* CPR: Construction Product Regulation,
** ESPR: EcoDesign for Sustainable Products Regulation

ProScale Versus USEtox



$$\text{ProScale} = \sum_{\substack{\text{substances} \\ \text{unit process}}} \text{HF} \times \text{ECF} \times \text{PHF} \times \text{MF}$$

HF: Hazard Factor
 ECF: Exposure Concentration Factor
 PHF: Person-Hours Factor
 MF: Mass Flow

- Information about the substance combined: toxicology, physical properties, route, conditions and time of exposure, exposed population, quantity of substance
- ProScale as function of four parameters
 - ▶ **Hazard Factor**
→ health effect, severity, potency based on H phrases and concentration limits (data from SDS)
 - ▶ **Exposure Concentration Factor**
→ exposure modelling based on process information (ECETOC TRA)
 - ▶ **Person-Hours Factor**
→ person-hours per mass unit of produced product or service, default values available
 - ▶ **Mass Flow**
→ amount of substances needed per functional unit, defined by system boundaries



Substance specific



Process specific



Product System specific

ProScale in Action – possible uses

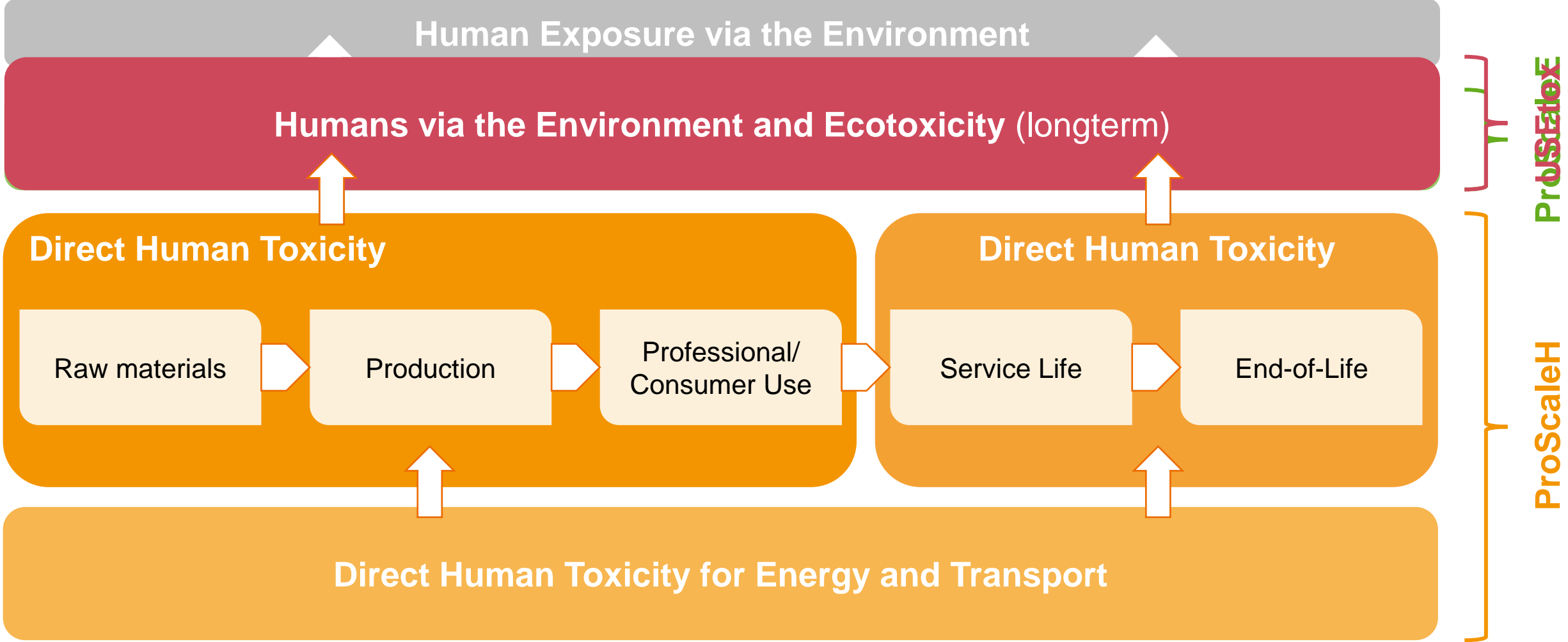
For EU / National Policies

- PEF – Product Environmental Footprint
 - ▶ Complementary method for evaluating toxicity of product components
- ESPR – EcoDesign for Sustainable Products Regulation
- SSbD – Safe & Sustainable by Design
- REACH/CSS – Chemical Strategy for Sustainability
- EPD – Environmental Product Declaration
- etc...

At Company Level

- Screening of existing products/ chemical components portfolios
- Assistance in product design
- Answering customer requests
- Anticipation of or compliance with regulatory requirements
- Value chain risk tracking

Scope of ProScale



Establishing an easy-to-use method to calculate aggregated ecotoxicity potentials, based on a consolidated environmental exposure and ecotoxicity scoring model, derived from REACH-based data.

- performance-based indicator that can be applied and communicated within LCAs, considering all outputs and the potential environmental impacts of a product system throughout its life cycle
- identifying ecotoxicological hot spots and reducing environmental hazards and exposures in a products' life cycle
- meeting existing and forthcoming regulatory requirements for safe and sustainable chemical use and increasing demands for information on ecotoxicity aspects of products beyond the current regulatory requirements for chemicals



We create chemistry