

ProScale Conference



A method for assessing the toxicological potentials of product systems in a life cycle perspective

Brussels, | 5 October 2017
Hôtel Métropole | 9.30 to 17.00

**ProScale™ TEST CASE EXAMPLES &
OBSERVATIONS**

ProScale
Conference



Tomas Rydberg, IVL
Ivana Dencic, Corbion

ProScale™ TEST CASE EXAMPLES & OBSERVATIONS

ProScale
Conference



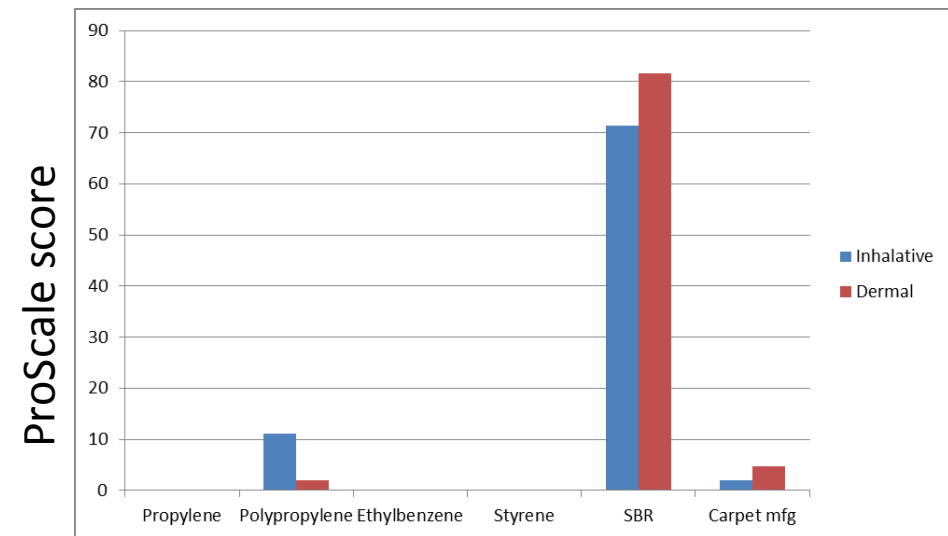
Case study: carpet

System boundary cradle to gate



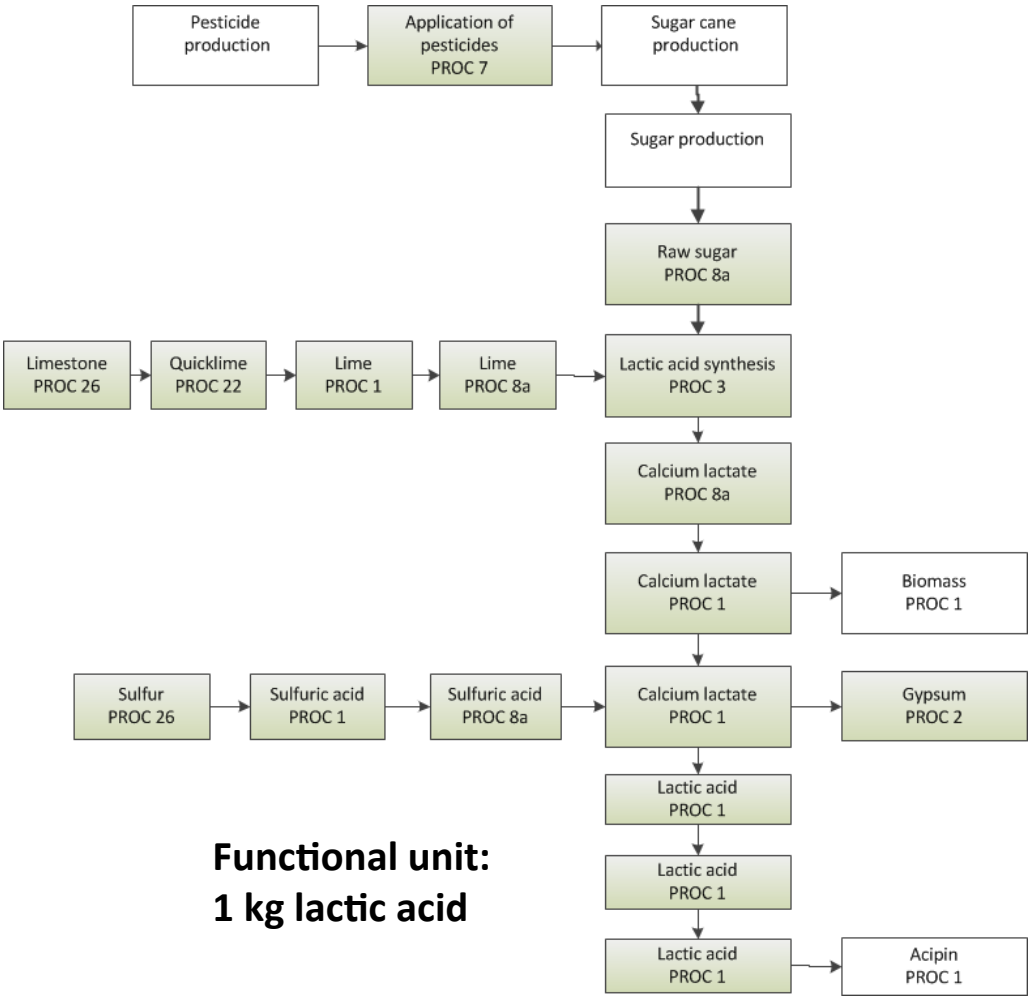
Composition:

PP : 2.4 kg
SBR 2.8 kg
Total: 5.2 kg



Case study: lactic acid

System boundary cradle to gate



Assumptions

Sugar manufacturing

- spraying of pesticides; herbicides 2 kg/ha, insecticides 7.5 kg/ha (*source: Agrifootprint V2*).
- Application 2 ha/h

Lime manufacturing

- limestone mining, calcination, lime production

Sulfuric acid manufacturing

- sulfur mining, SO₂ and SO₃ production, H₂SO₄ production

Lactic acid process*

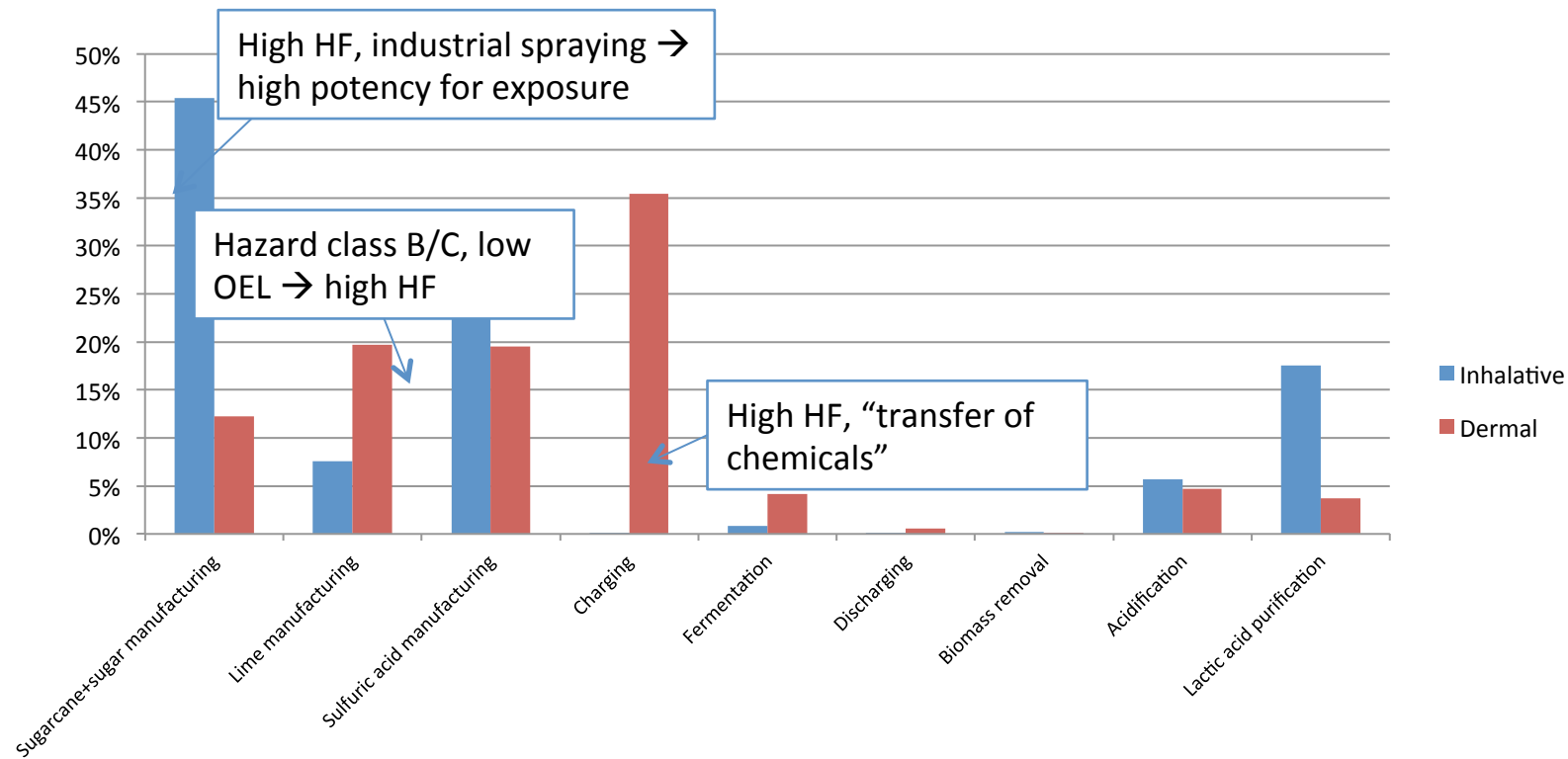
- 100 kT/y
- 90 % fermentation yield

Assumptions for exposure scenario:

- Core process: indoors with LEV, no RP, no PPE*
- Pesticide spraying: no LEV, 95 % RP, gloves APF 10
- Lime and sulfuric acid production: limestone and sulfur mining with RP and gloves APF 20, calcination gloves APF10, the rest as lactic acid



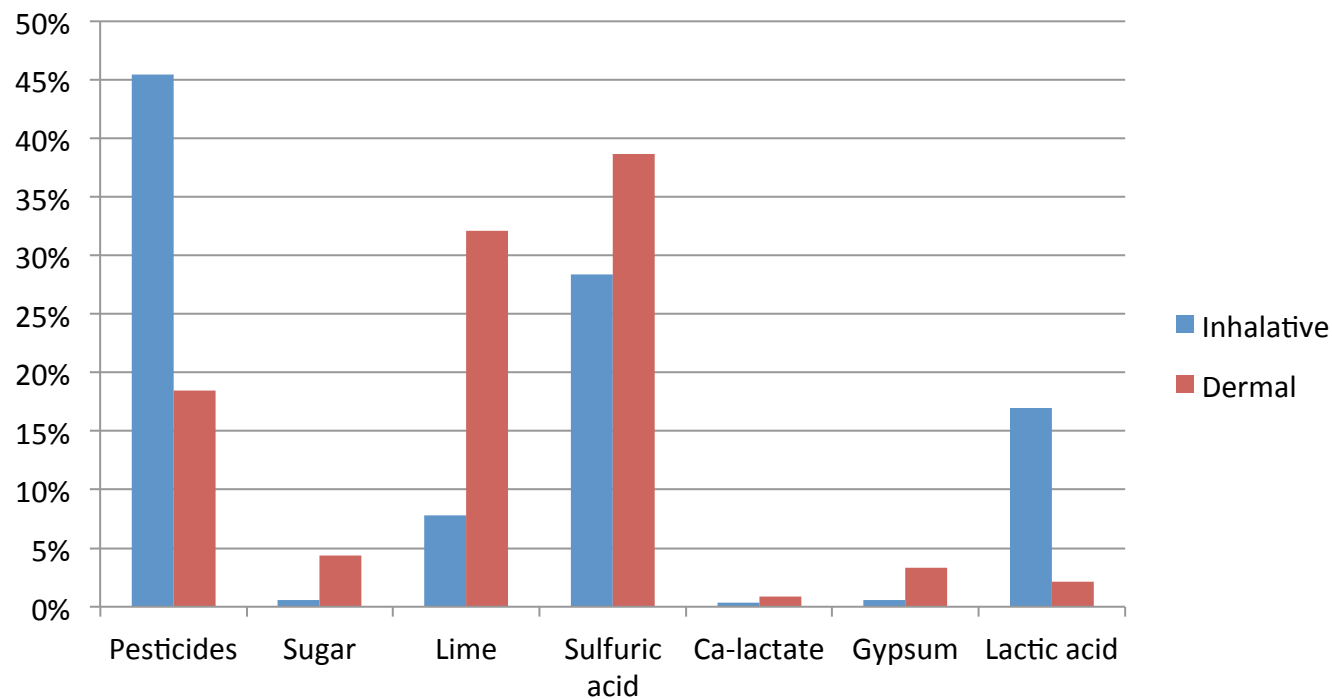
ProScale scores (cradle-to-gate) Breakdown per process units



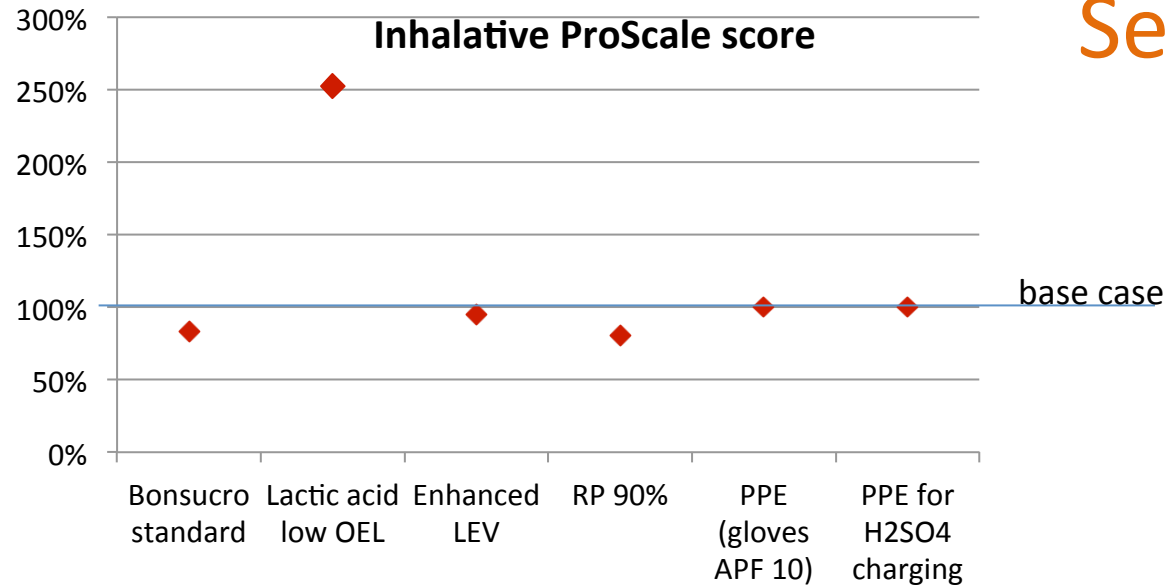
Calcination step,
CaO hazard class C

- 76 % of inhalative impacts upstream
- 52 % of dermal impacts upstream

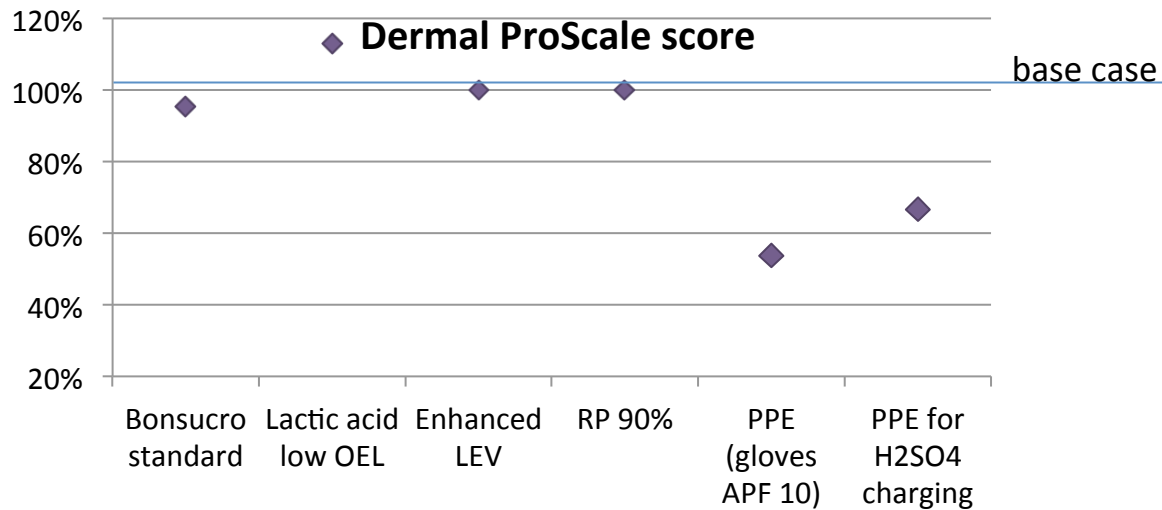
ProScale scores (cradle-to-gate) Breakdown per chemical



Sensitivity study



- Bonsucro standard: 17 % reduction in inhalative score
- OEL is an important parameter



- High sensitivity on the type of PPE: 50 % reduction
- PPE for H2SO4 charging!

Observations

- The method provides a good insight into human toxicity along the life cycle of the lactic acid
- Easy to use template, clear guidance document
- H-phrases and OEL databases can be improved

- Surprisingly high sensitivity on the **type/use of PPE**
- **PHF** assumes continuous direct exposure of workers?
- Lactic acid has hazard class C, no established **OEL value**. Selecting HF = 100 or HF = 1000 has a high impact on the total score
- **Uncertain parameters**: upstream RMM, FTEs and PHF – default values suggested, however impact can be high
- **PROCs**: no differentiation between different process conditions?
- **Allocation method** not fully consistent with LCA ISO guidance where suggestion is to apply system expansion with substitution rather than allocation
- By products (biomass, acipin) could not be considered - no HF and OEL defined



Ivana Dencic, ivana.dencic@corbion.com

Tomas Rydberg, tomas.rydberg@ivl.se

THANK YOU FOR YOUR ATTENTION

**ProScale
Conference**

