Global ProScale assessment for use in Normalisation in LCA

Tomas Rydberg, IVL, 2023-05-12

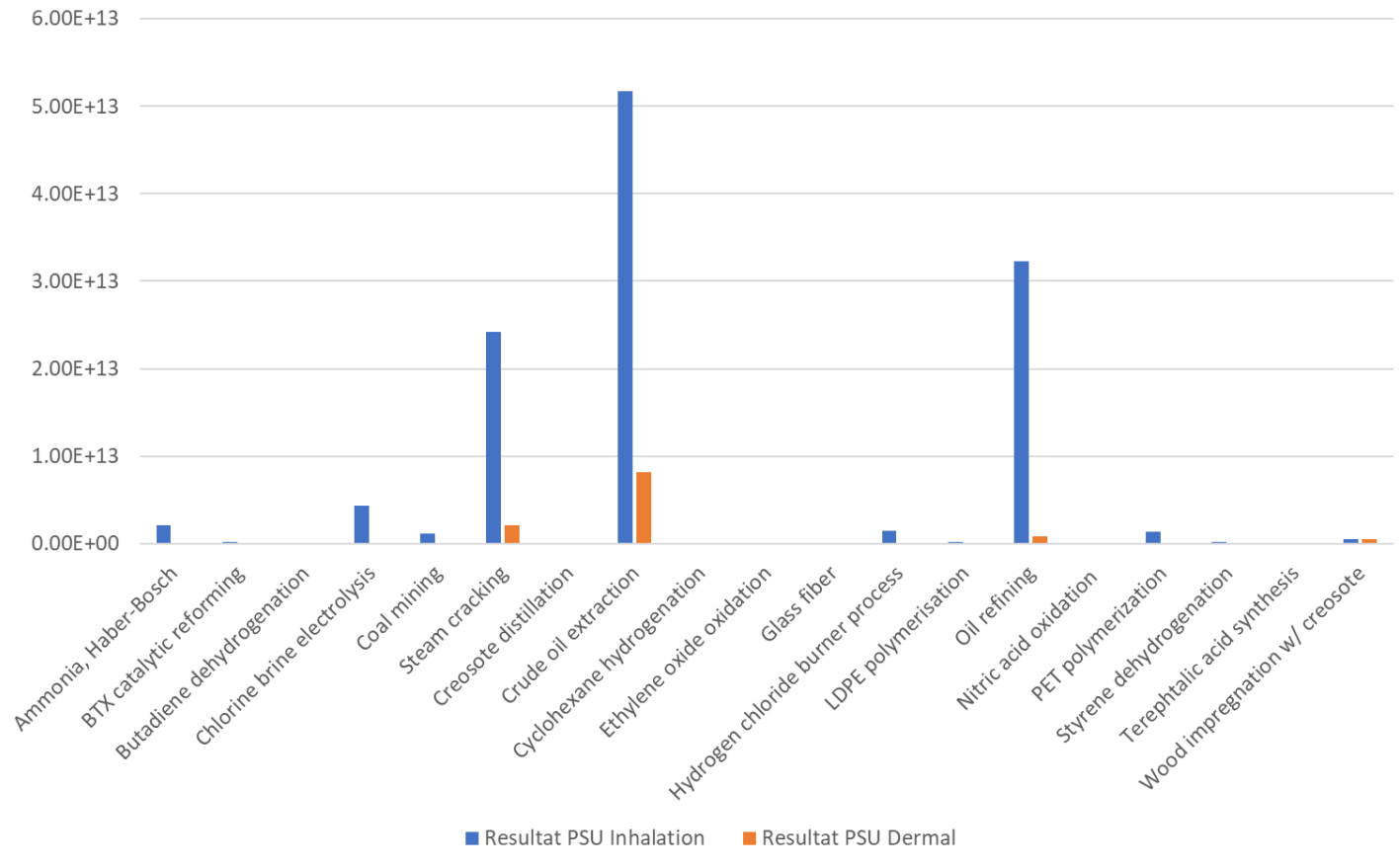
ProScale

Purpose

- Compile data for and calculate two Normalisation scores for ProScale, inhalation and dermal.
- Identify for both inhalation and dermal exposure routes which processes in petrochemistry and plastics that have the largest contribution to direct human toxicity potential.

Key results

- Coverage
  - About 60 globally important processes with respect to their global production (capacity) – 19 shown =>
- Total results scores:
  - ProScale (inhalation): 1.2E+14 ProScale points
  - ProScale (dermal): 1.2E+13 ProScale points.
- Main processes (% contribution inhalation/dermal)
  - crude oil extraction (43/69)
  - crude oil refining (27/7)
  - steam cracking (20/18)



Rydberg T, Gunnarsson J, Gottfridsson M, Global Human Toxicity Potential assessed with the ProScale method for use in Normalisation in LCA, Toxicology Letters, Volume 350, Supplement, 2021, Page S242, ISSN 0378-4274, https://doi.org/10.1016/S0378-4274(21)00800-6. Abstract/Poster to Eurotox 2021

Take-aways

- The results may serve as a first set of normalisation scores
  - Global normalisation =>
- Notes:
  - Mainly petrochemical sector activities are included.
  - For example metal mining, extraction and processing could also be important contributors to be further investigated

Impact category	Global NFs total
Climate change [kg CO2 eq]	5.55E+13
Ozone depletion [kg CFC-11 eq]	3.33E+08
Human toxicity, indirect exposure, cancer [CTUh]	2.66E+05
Human toxicity, indirect exposure, non-cancer [CTUh]	3.27E+06
Particulate matter [disease incidences]	4.11E+06
Ionising radiation [kBq U235 eq]	9.54E+11
Photochemical ozone formation [kg NMVOC eq]	2.80E+11
Acidification [mol H+ eq]	3.83E+11
Eutrophication, terrestrial [Mole of N eq]	1.22E+12
Eutrophication, freshwater [kg P eq]	1.11E+10
Eutrophication, marine [kg N eq]	1.35E+11
Ecotoxicity freshwater [CTUe]	8.15E+13
Land use [pt]	1.54E+16
Water use [m^3 water eq of deprived water]	7.91E+13
Resource use, mineral and metals [kg Sb eq]	4.39E+08
Resource use, fossils [MJ]	4.48E+14
Direct inhalative exposure toxicity [ProScale points]	**1.20E+14**
Direct dermal exposure toxicity [ProScale points]	**1.20E+13**

All scores except ProScale Adapted from: Crenna E., Secchi M., Benini L., Sala S. 2018. Global environmental impacts: data sources and methodological choices for calculating normalisation factors for LCA. Int. J. LCA doi:10.1007/s11367-018-1534-9

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