

Adding "E" to ProScale

Tomas Rydberg, IVL, 2024-05-31

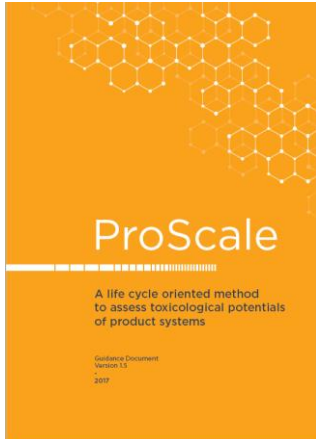
ProScale Fundamentals

- Transparent, pragmatic and generally applicable and methodology for a toxicological/ecotoxicological assessment of products, based upon 4 principles/requirements:
 - Ability to assess the relevant toxicity potential along the whole life cycle;
 - Use existing data, e.g. REACH based;
 - Allow comparison in relation to technical performance , i.e. LCA-compatible; and
 - Be relevant for business-to-business and business-to-customer communication

Setting the scene for ProScaleE

Proscale guidance Section 1.2.

“ProScale is intended as a widely applicable method that can cover both human and eco-toxicity aspects, be applicable to any kind of products on a worldwide basis. The ProScale consortium decided to first focus on near-field human toxicity, on The method can nevertheless be extended following the same principles.”



<https://proscale.org> -> Tools



<https://www.mistrasafechem.se>

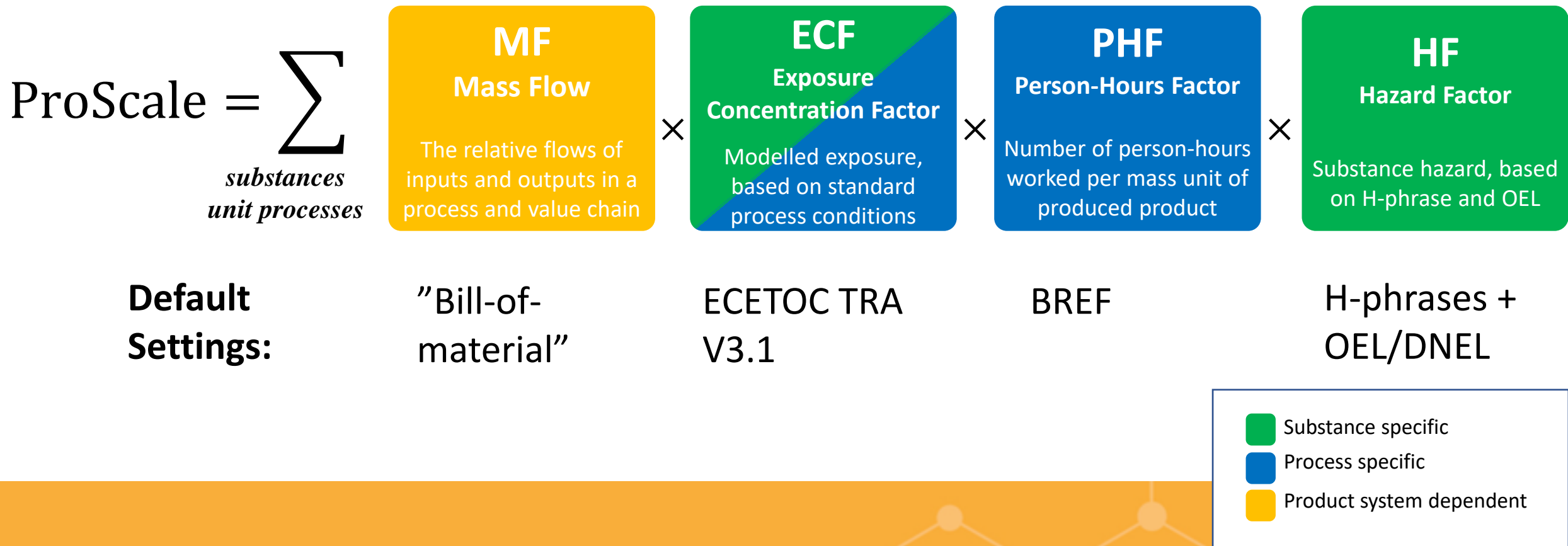
-> Deliverables

ProScaleE – user needs and perspectives

- Recommendation of similar approach as for ProScale development
- Feasibility and practicability
- Intrinsic ecotoxicity
- Exposure estimate



Parameters of ProScale – what could be corresponding parameters for ProScaleE ?

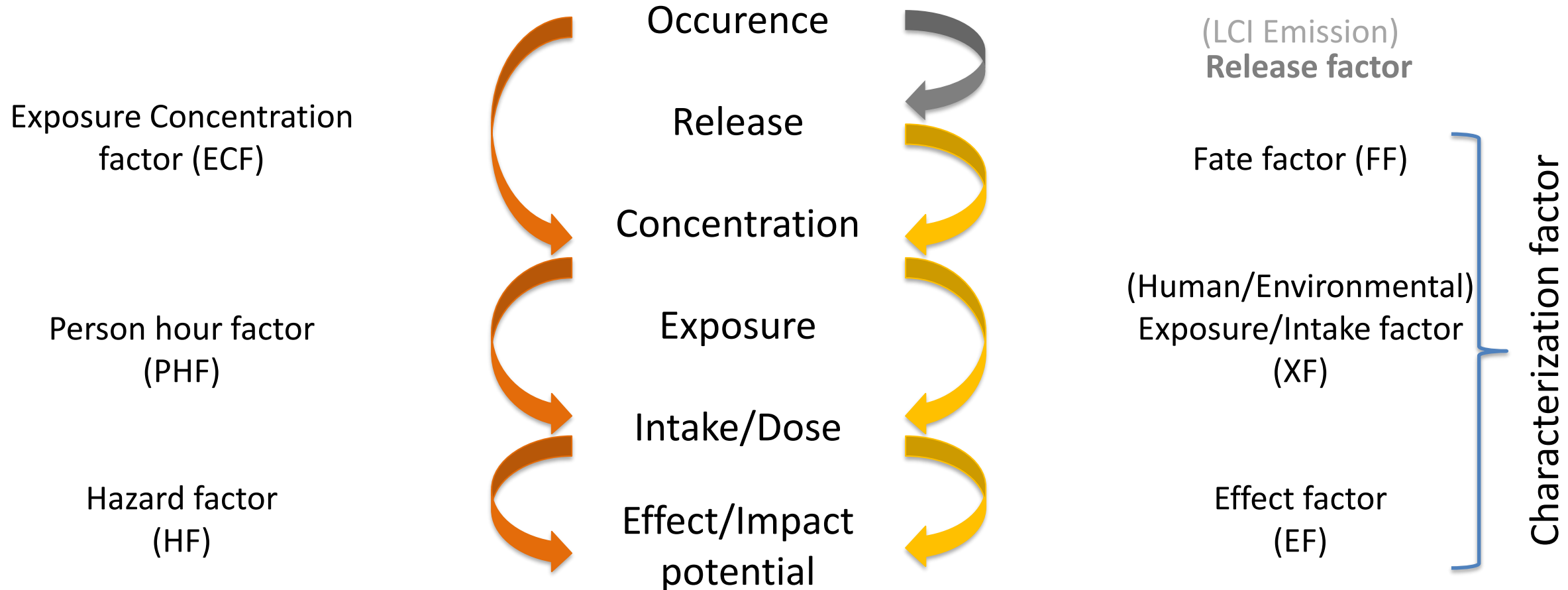


Schematic from presence/occurrence of a chemical, to effect



ProScale
(for direct human
exposure)

Other LCIA methods,
(via env exposure)



Building the analogy: ProScale and ProScaleE Release/Exposure/Dose

Release/Exposure in ProScale,
based on ECETOC TRA

Approach to Release/
Exposure model in ProScaleE?

Exposure
Concentration Factor

Vapour press.
ranges

PROC example

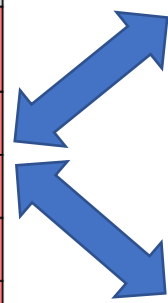
| | | Fugacity level, fluids | | | |
|----------------------|----|------------------------|--------------------------|-----------|------|
| | | negligible | low | medium | high |
| Vapour press. ranges | | < 0.00001 | ≥ 0.00001 - <0.5 | 0.5 to 10 | >10 |
| PROC example | 1 | 0.01 | 0.01 | 0.01 | 0.01 |
| | 4 | 0.1 | 5 | 20 | 100 |
| | 5 | 0.1 | 5 | 50 | 250 |
| | 8b | 0.1 | 5 | 25 | 150 |

Emission rate
prediction

Rely on ECETOC TRA?

Air exchange
rate

Fate model based on
P,B,M,... banding?



ProScale and ProScaleE Hazard factor

Hazard factor **banding** in ProScale

| ProScale Hazard class | H-phrases according to GHS/CLP, grouped by exposure route |
|--|--|
| E 10 000 - 100 000 (highest hazard) | All routes : H340, H350, H360, H362 |
| D 1000 - 10 000 | Dermal : H310 Inhalation : H330, H334, EUH032 Oral : H300, All routes : H341, H351, H361, H372 |
| C 100 - 1000 | Dermal : H311, H314, H317, H318, EUH070 Inhalation : H331, EUH029, EUH031, EUH071 Oral : H301, H304 All routes : H370, H373 |
| B 10 - 100 | Dermal : H312, H315, H319, Inhalation : H332, H335 Oral : H302 All routes : H371 |
| A 1 - 10 (lowest hazard) | Dermal : H313, H316, H320, EUH066 Inhalation : H333, H336 Oral : H303, H305, |

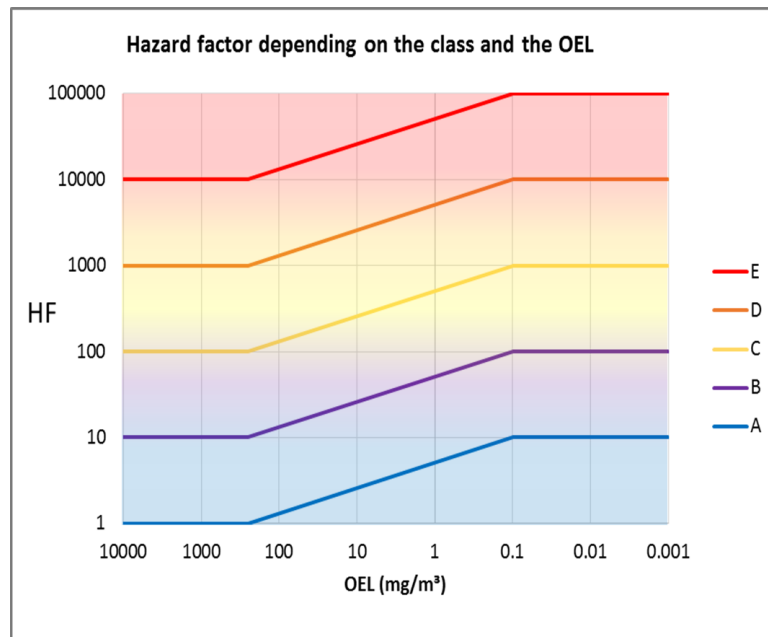
Approach to Hazard factor banding in ProScaleE

Ecotoxicity HAZARD
banding model based on
H400 –phrases?

Hazard Factor
“severity”
Hazard banding

ProScale and ProScaleE Hazard factor

Hazard factor **potency** in ProScale



ProScale Hazard Factor
“potency/strength”
OEL/DNEL

Approach to Hazard factor model in ProScaleE

A suitable analog for
ecotoxicity to
OEL/DNEL?

Science support for simplified LCIA models

- Main factors are
 - A metric of (eco)toxicity
 - A metric of persistence/degradation
 - (sometimes) a Henry's constant

LCA Methodology

OMNIITOX

OMNIITOX: LCA Methodology

Bringing Science and Pragmatism together

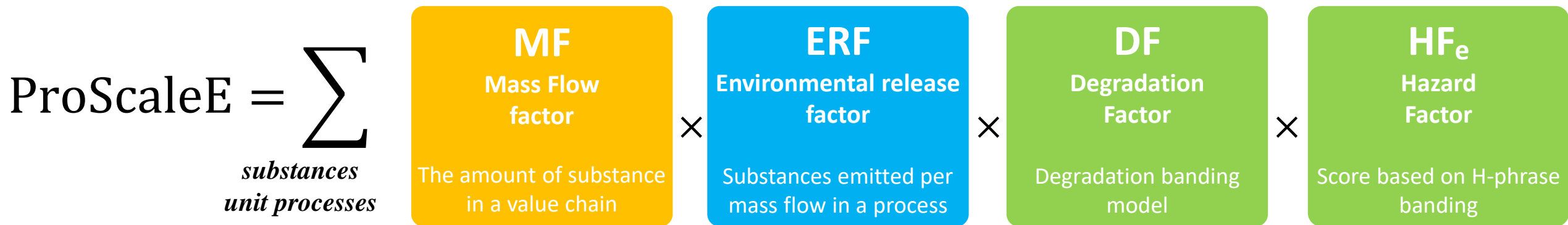
A Tiered Approach for Modelling Toxicological Impacts in LCA

Jeroen B. Guinée^{1*}, Arjan de Koning¹, David W. Pennington², Ralph Rosenbaum², Michael Hauschild³, Stig I. Olsen³, Sverker Molander⁴, Till M. Bachmann⁵ and Rana Pant⁶

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Guinée, Jeroen B., et al. *The International Journal of Life Cycle Assessment* 9 (2004): 320-326.
doi.org/10.1007/BF02979421

Result: Parameters of ProScaleE – schematic presentation



- Substance specific
- Process specific
- Product system dependent

Takeaways

- Building on the experience with ProScale for human toxicity, an analogous approach for ecotoxicological assessments for LCA has been developed, ProScaleE
- Details of the method and the practical application of it will be presented in the following presentations



Thank you !

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