



Relevance of a French simplified LCI database using building products industry data

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Session: LCI data, validation, aggregation, uncertainties

- In some Product Category Rules (PCR) defined to produce EPD according to ISO 14025, templates for reporting a reduced list of LCI flows can be provided e.g. RT Env. Declaration (Finland), INIES (France) etc.
- In the French EPD (called FDES), this template, not compulsory but highly followed by the building industry, is included in the publicly EPD report available online.



Emissions to air

	g/kg
CO ₂	265
CO	0,233
	0,195
	0,975
	0,753
	4×10 ⁻³
	52,5×10 ⁻³
	0,55
(Ti)	19,3×10 ⁻³
	62,5×10 ⁻³
Other particles	Not specific.



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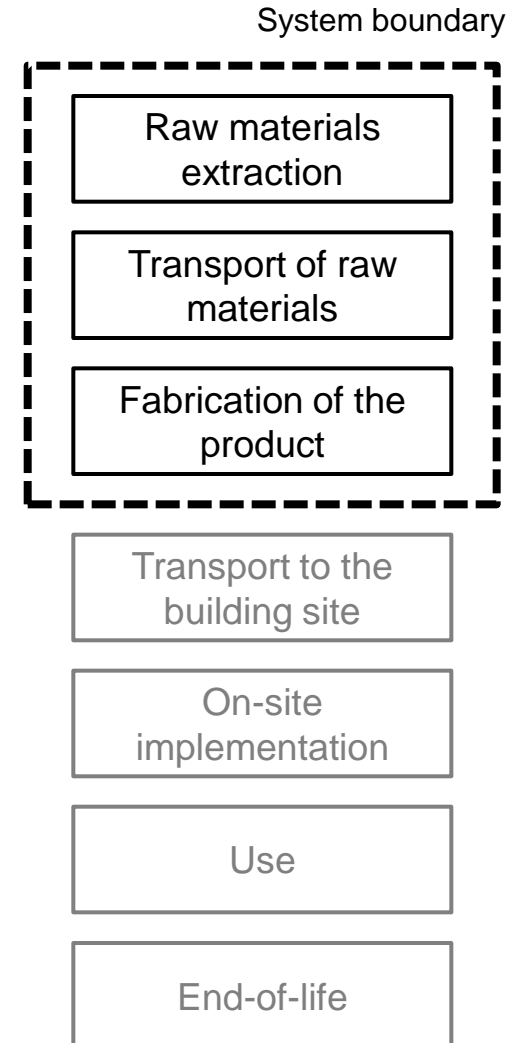
Objective of this study

Assess the relevance of such reduced list of LCI flows in a French LCI database using industry data

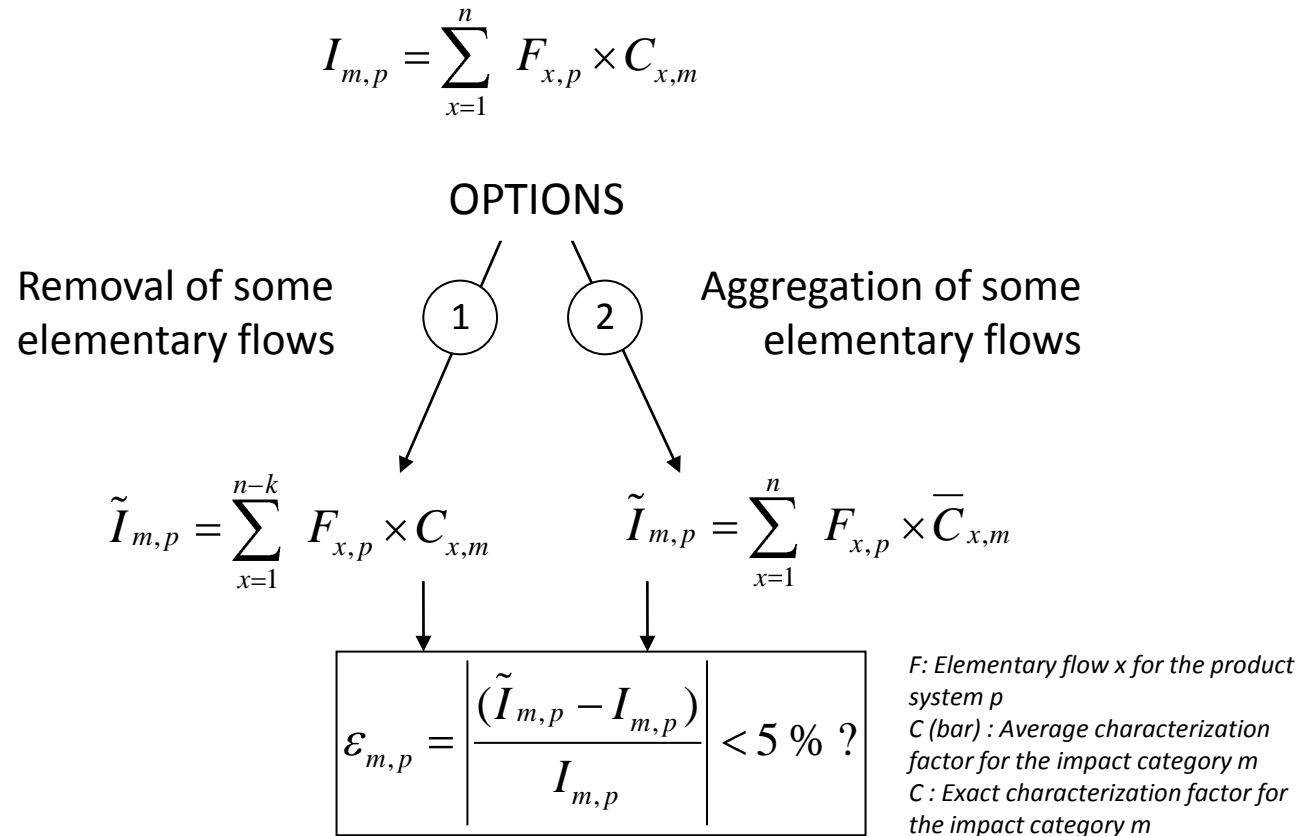
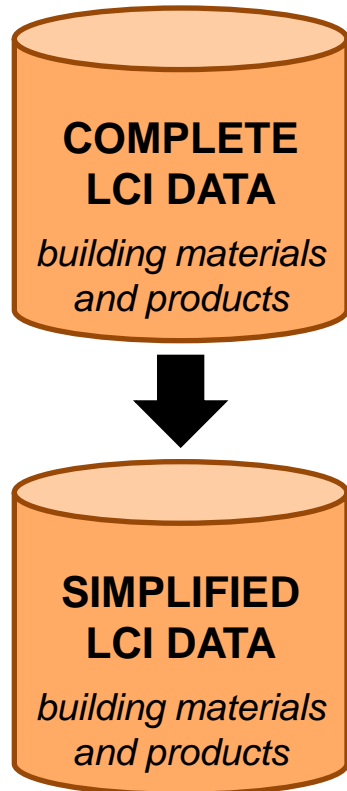


Exemple of reporting on LCI flows in the RT Finnish EPD program

- ecoinvent database (version 2.0)
- 113 LCA data on building materials and products collected as « complete cumulative LCI »
 - Bitumen, brick, cement, concrete, glass, gypsum plaster board, insulation products (e.g. wood, glass and rock wools)
 - Wooden products (e.g. glued laminated timber, particle board, sawn timber)
 - Paint, polycarbonate, polyurethane, polystyrene, PVC
 - Metals (e.g. aluminium, copper, steel, zinc) etc.



Classification rules based on a document (in addition to the PCR) provided by the French trade union of construction materials*



* Available online: www.aimcc.org/pages/documents/PUB05008.doc

- Global Warming Potential (GWP)
 - Complete LCIA following [IPCC, 2007]
 - Simplified LCIA using
 - 3 elementary flows only, no aggregated flows

$$\tilde{I}_{GWP,p} = F_{CO_2,p} \times C_{CO_2} + F_{CH_4,p} \times C_{CH_4} + F_{N_2O,p} \times C_{N_2O}$$

- Photochemical Ozone Creation Potential (POCP)
 - Complete LCIA following [Derwendt et al, 1998] used in [CML, 2001]
 - Simplified LCIA using
 - 1 aggregated flow (hydrocarbons) and 4 other flows

$$\tilde{I}_{POCP,p} = F_{Hydrocarb,p} \times \bar{C}_{Hydrocarb} + F_{CH_4,p} \times C_{CH_4} + F_{CO,p} \times C_{CO} + F_{SO_2,p} \times C_{SO_2}$$

[IPCC 2007] Changes in Atmospheric Constituents and in Radiative Forcing. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

[Derwent et al, 1998] Derwent R. G, Jenkin ME, Saunders S. M, et Pilling M. J. (1998) Photochemical ozone creation potentials for organic compounds in northwest Europe calculated with a master chemical mechanism. *Atmospheric Environment*, août 1998, 32 (14-15), p. 2429-2441.

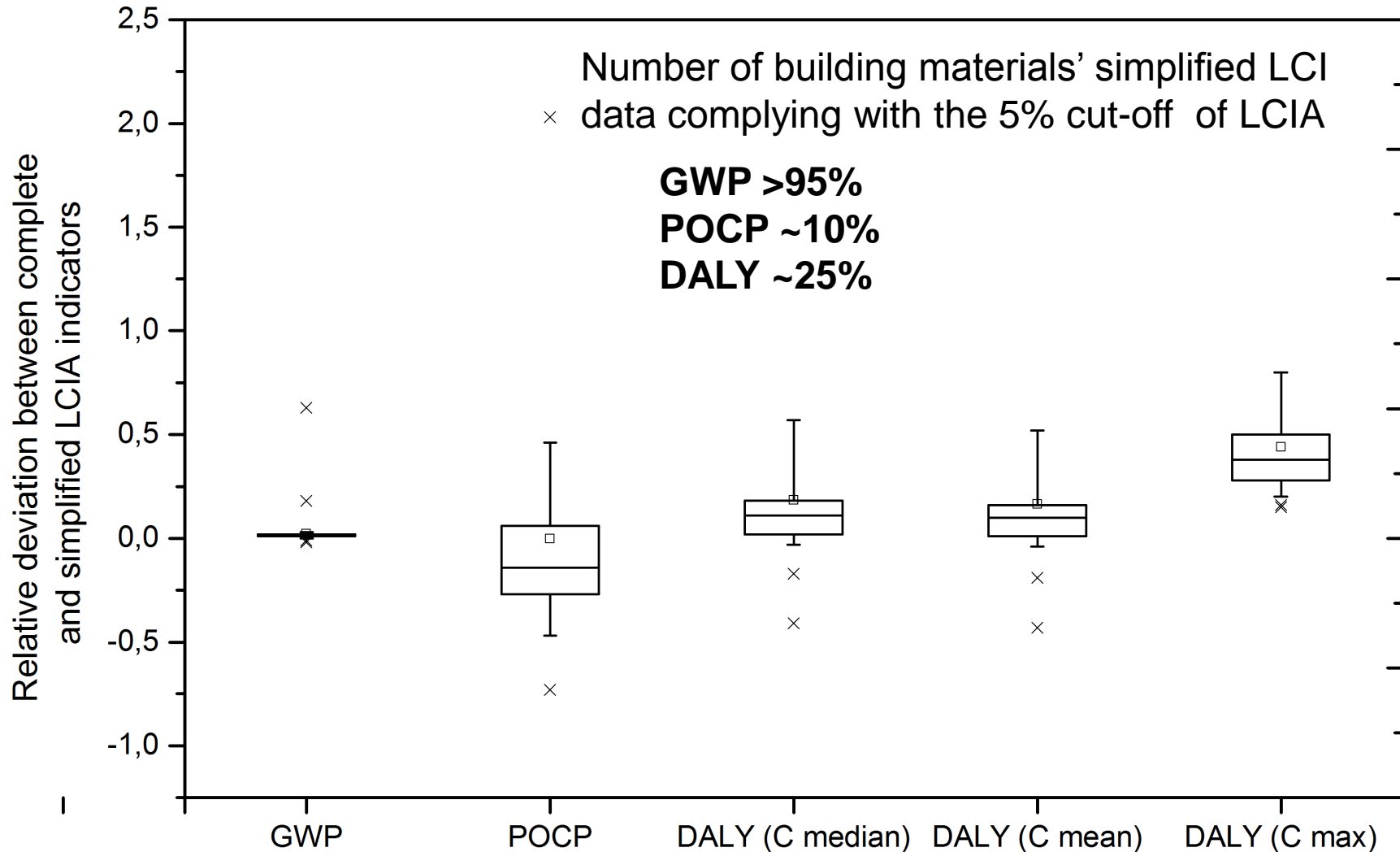
[CML, 2001] Handbook on Life Cycle Assessment, available online: <http://cml.leiden.edu/software/data-cmlia.html>

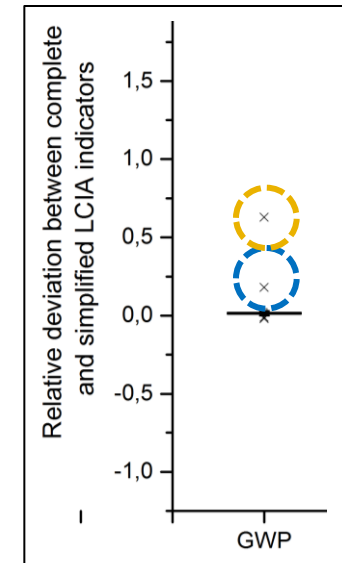
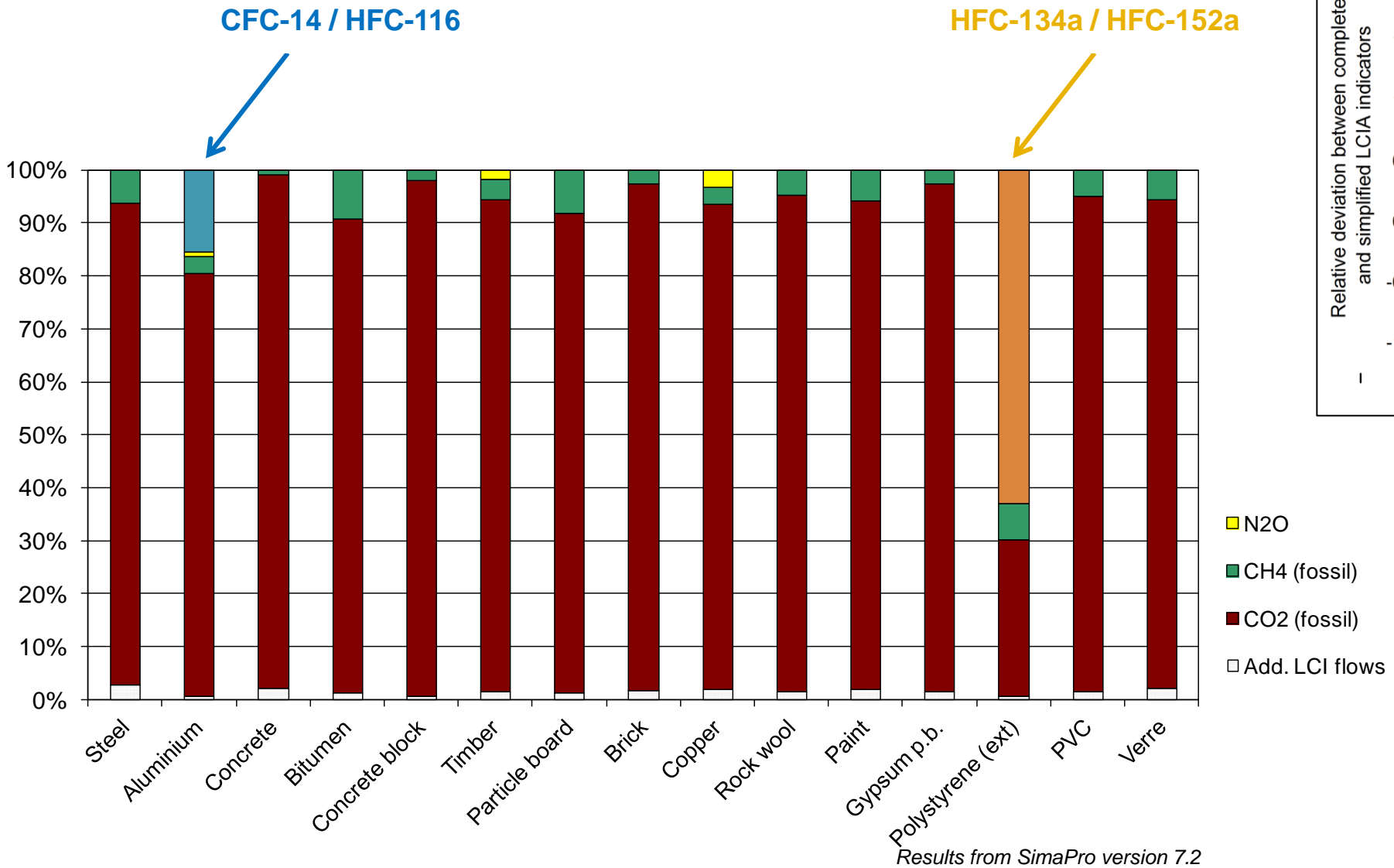
- Photochemical Ozone Creation Potential (POCP)
 - Simplified LCIA
 - Statistical distribution of POCP factors for hydrocarbons

	Min	1 st quartile	Median	Mean	3 rd quartile	Max
POCP factors	-0.09	0.24	0.41	0.49	0.66	1.38

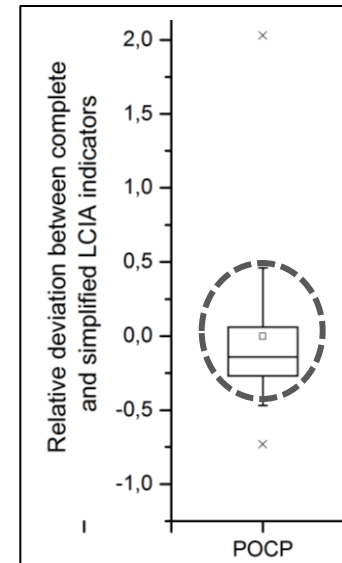
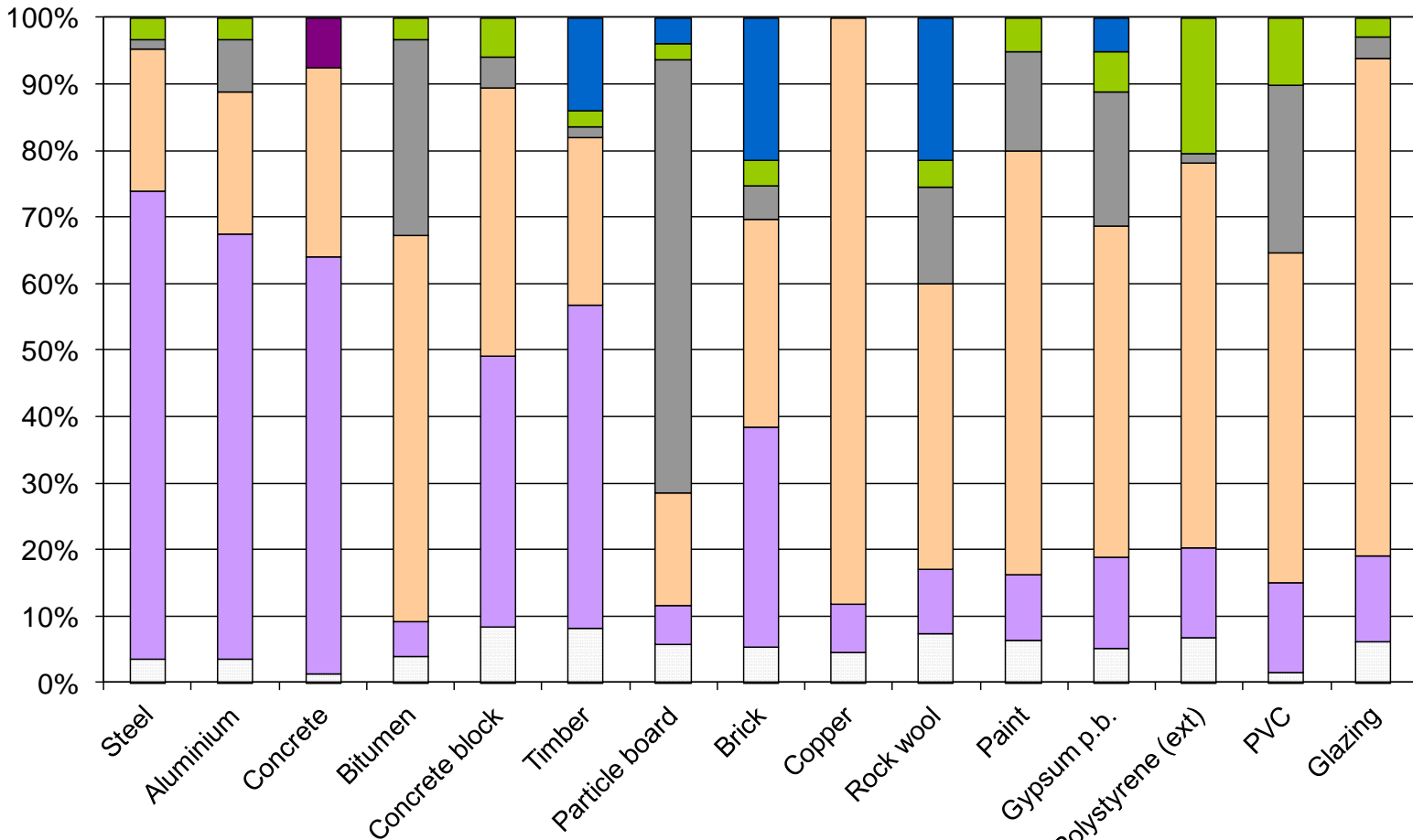
- Disability Adjusted Life Loss Years (DALY)
 - Complete LCA according to [Goedkoop and Spriesma, 2000]
 - Simplified LCIA using
 - Aggregated flows: particles (PM2.5, PM10), PAH, chromium etc.
 - Non aggregated flows for the rest of the elementary flows

NB: All the assumptions for the elementary flows and characterization factors are available in the appendix of the article available on the website of the symposium





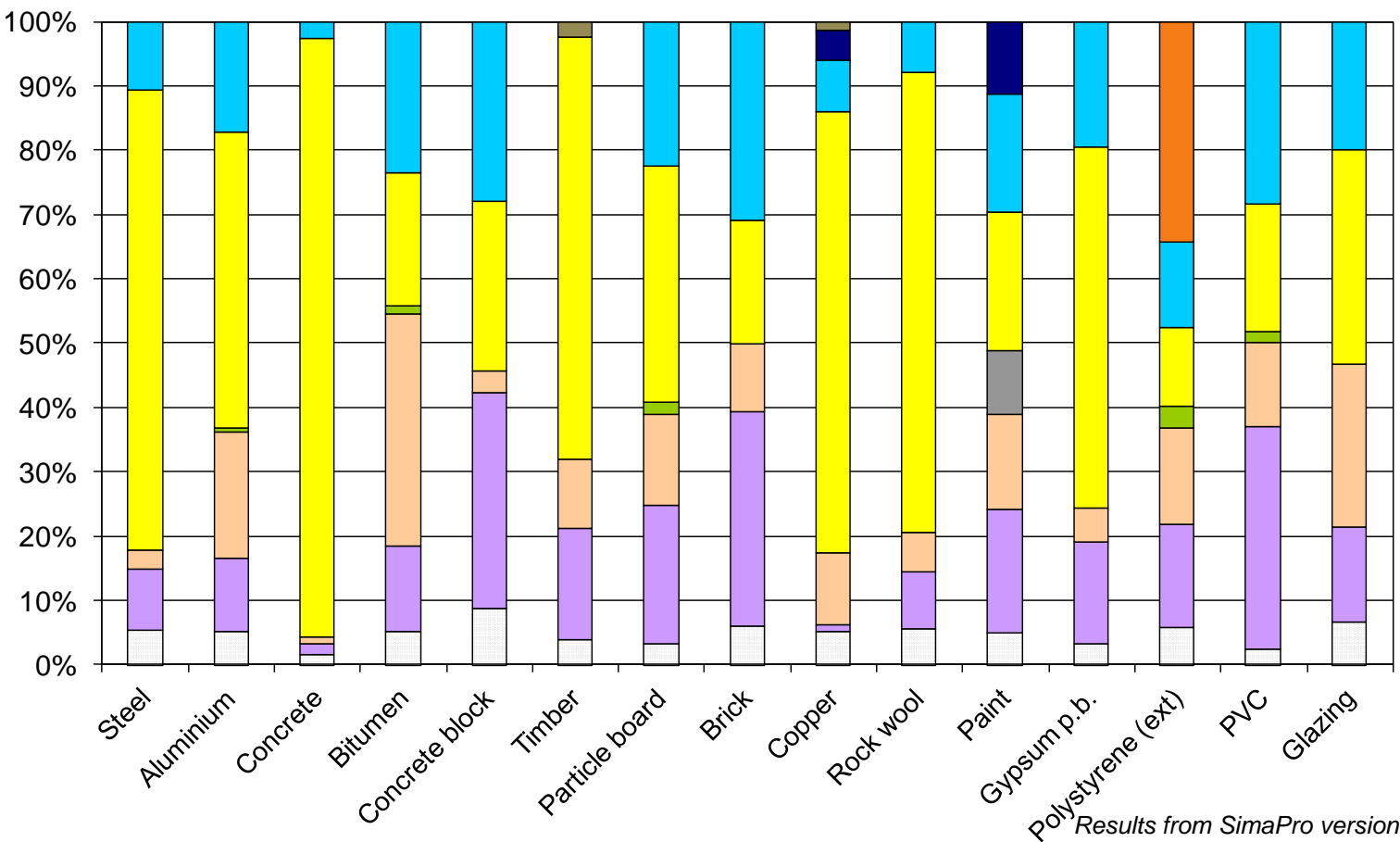
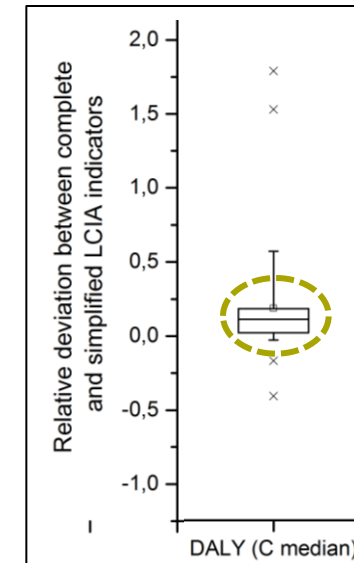
The hydrocarbons as well as VOC are mainly responsible for the differences between complete and simplified LCIA



- VOC
- NOx
- CH4
- Hydrocarbons (unspecified)
- SO2
- CO
- Add. LCI flows

Results from SimaPro version 7.2

The particles (<2.5µm, >2.5µm and <10µm) are mainly responsible for the differences between complete and simplified LCIA



Results from SimaPro version 7.2

- For 113 cradle-to-gate data of building materials (ecoinvent 2.0)

LCIA indicators	GWP	DALY	POCP
Current flows for simplified LCIA (FDES)	3	30	5

Added elementary flow to the list	Accuracy of results compared to complete LCIA method *		
	GWP	DALY	POCP
0	95%	25%	10%
2-4	100% (CFC, HCFC)	50% (PM10, PM2.5)	10%
50	100%	100%	> 50% (Hydrocarbon)

**in terms of percentage of building materials' LCI data complying with the 5% threshold for LCIA calculations*

- This study enabled to identify improvement potentials for reduced LCI data
- GWP, POCP and DALY were studied for cradle-to-gate LCI data of building materials integrated in a LCI database developed at CSTB
- Specific actions need to be taken into account to improve the accuracy of some selected LCI flows (e.g. VOC, hydrocarbons, particles) in the French LCI database using industry data
- New European standard for EPD (EN 15804) coming up...
 - French EPDs will be updated and the level of details of LCI will be improved (compliance with e.g. ILCD Handbook nomenclature of elementary flows)
 - Specific actions (e.g. differentiation of size of particles) may not be taken into account by the building industry as the EN 15804 standard does not require toxicity indicators



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THANK YOU VERY MUCH FOR YOUR ATTENTION

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