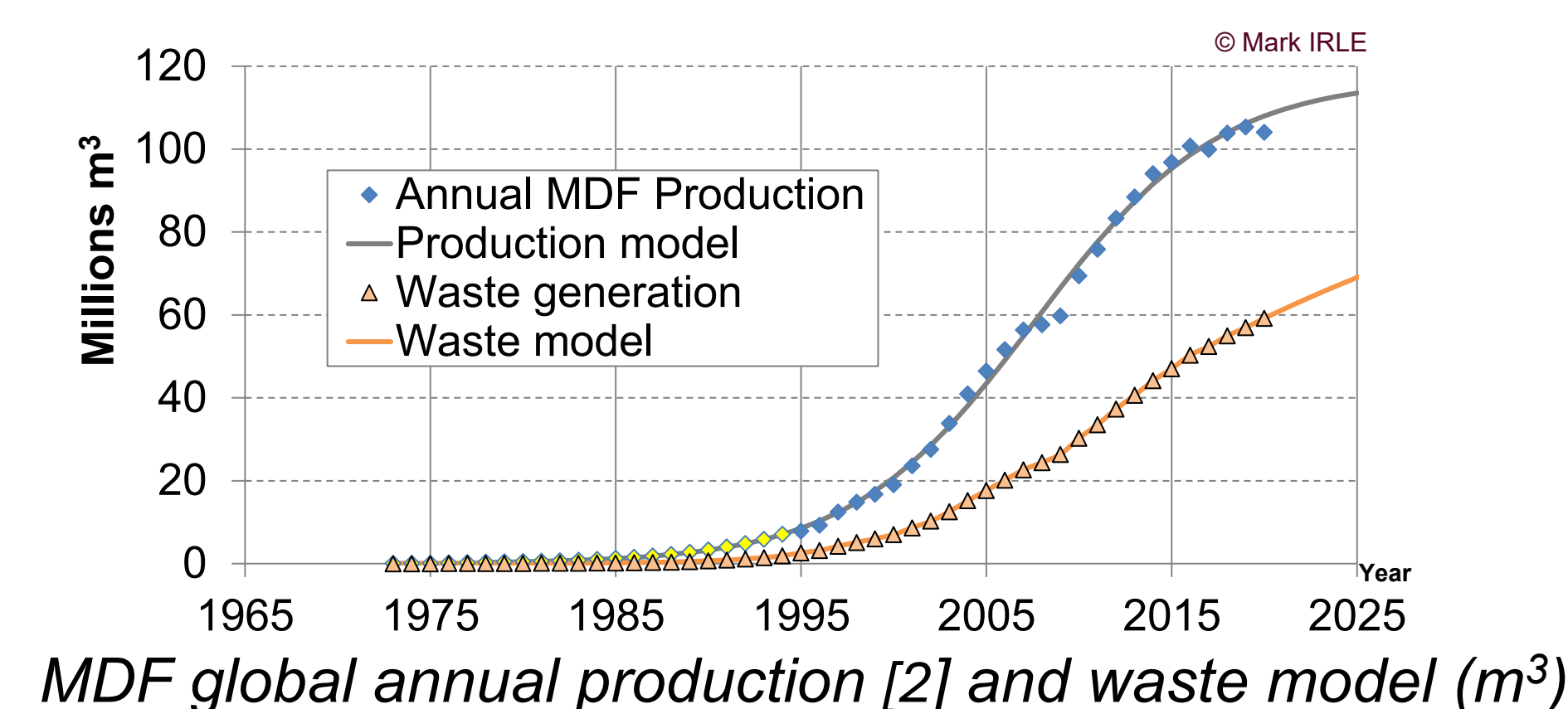


CONTEXT & OBJECTIVES

THE FACTS

- Medium Density Fibreboard (MDF) is considered a product success story, as its global production has grown almost exponentially since the 1990s.
- Particleboard production is the first pathway for recycling wood, using waste wood from solid wood, engineered products, and wood-based panels.
- Waste fibreboard chips are increasingly found in wood waste streams.
- However, an excessive amount of fibreboard waste (> 3%) in the mix used for particleboard production is problematic, as it negatively affects the mechanical performance of the panels [1].



OBJECTIVES

- Propose a high-performance sorting machine to extract fibreboard waste from the post-consumer wood flow
- Implement robust, industrial-scale technology to process fibreboard waste into secondary raw materials
- Demonstrate the quality of these secondary raw materials by incorporating them into market certifiable products

OBJECTIVE : Characterise fibreboard waste in terms of their quantity and chemical composition

MATERIAL & METHOD

Quantity evaluation

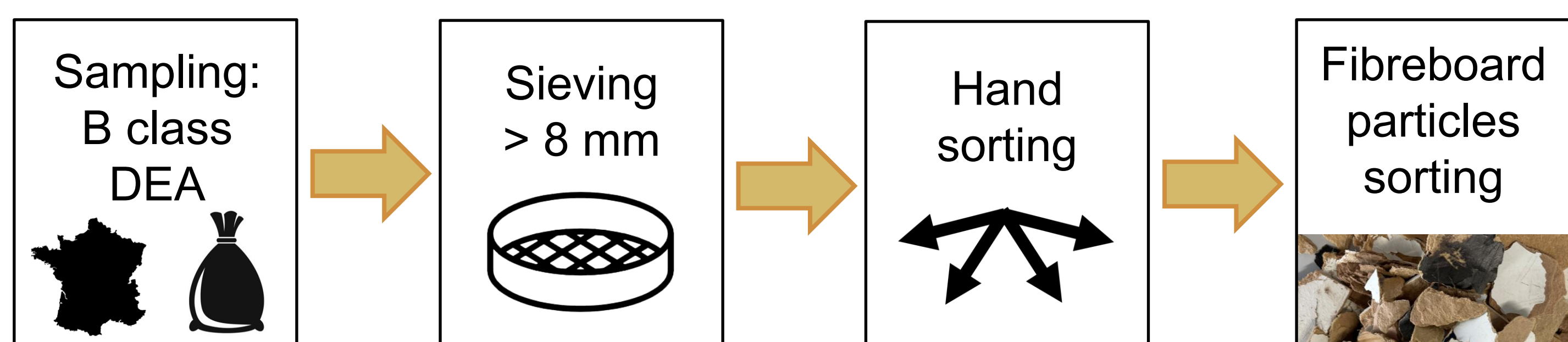


Fig. 1: simplified diagram of the experiment (B class: post consumer wood but not packaging, pallets and preservative treated wood. DEA: wood furniture waste)

Chemical characterisation

Tab. 1: chemical elements limit values for recycling wood (EPF standard) [3]

Elements	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Chlorine (Cl)
Limit values (mg/kg recycled wood)	25	50	25	40	90	25	1000

Surface chemical characterisation



- X-ray Fluorescence (XRF) surface analysis
- 459 particles are chosen randomly
- 5 measurements on the different spots of the coating (60 seconds)
- When at least 1 element is on excess according to EPF standard then the reverse face is also measured

Fig. 2: illustration of the surface analysis experiment

Particle chemical characterisation



- 12 specimens of uncoated fibreboard waste particles are ground and analyze by Inductively Coupled Plasma (ICP)
- 18 particles of coated fibreboard have also been analysed by ICP
- 5 of which were large enough to separate the panel and coating; both fractions are grounded and analyze by ICP

RESULTS

- 1.47 tones of wood waste sampled between June 2022 and June 2025
- Fibreboard fraction represents in average 4,8% of the waste wood collected: 3,4% for Class B and 9,3% of DEA.
- 50,6 kg of fibreboard particles were analysed (collected from Oct. 2022)

	Weight (kg)		Proportion (%)	
	Fibreboard with coating	Pure fibreboard	Fibreboard with coating	Pure fibreboard
Class B	12.1kg	11.6kg	51.2%	48.8%
DEA	18.5kg	8.5kg	68.6%	31.4%

Fig. 3: detailed results from the picking of the fibreboard fraction

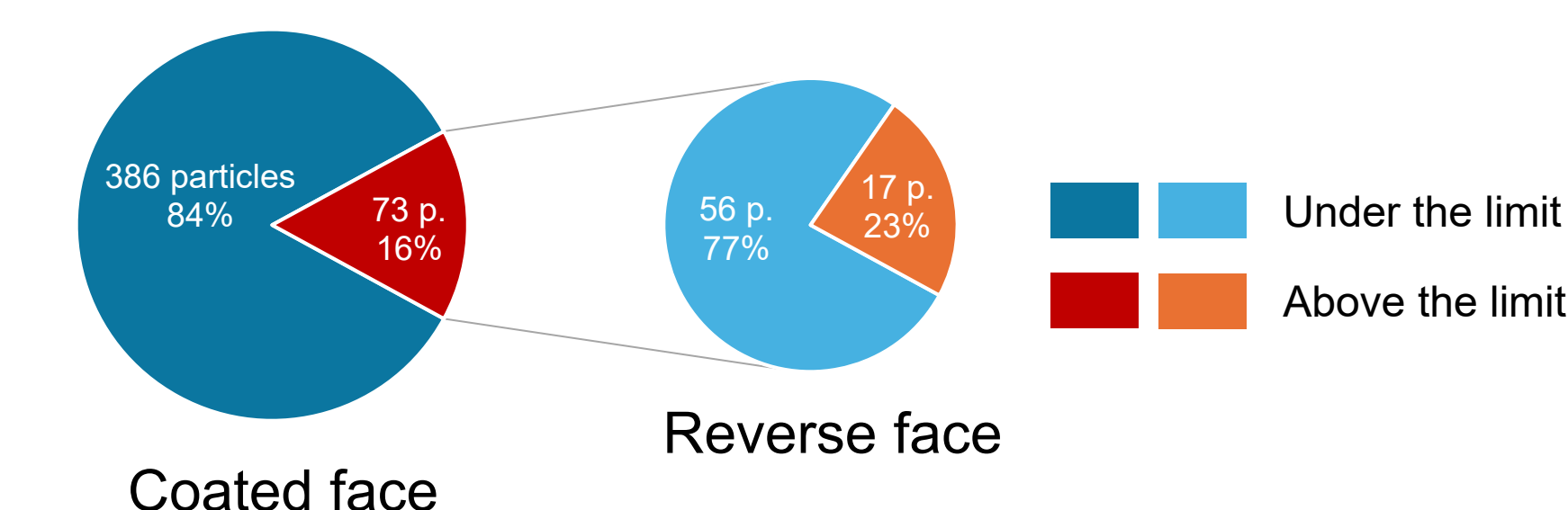


Fig. 4: XRF results on coated fibreboard particles

- Uncoated fibreboard particles present no contamination above the standard values.
- The contaminants are in the coatings and they do not migrate to the panel.
- Only 4% of the coated particles present a contamination on both faces.



Fig. 5: XRF results on both faces of the 73 particles

Tab. 2: ICP analysis (ppm) on uncoated fibreboard powder samples

Sample names	Cl	F	Cr	Cu	As	Cd	Pb	Hg
S1	0.0	0.0	0.0	4.1	0.0	0.0	35.3	0.0
S3	0.0	0.0	0.0	0.0	0.0	0.0	15.7	0.0
S4	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
S5	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
S6	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0
S10	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.1
S12	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0
S14	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0
S16	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
S17	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
S24	0.0	0.0	0.0	0.0	0.0	0.0	8.1	0.0
S25	0.0	0.0	0.0	0.0	0.0	0.0	10.2	0.0
Average	0.0	0.0	0.0	0.3	0.0	0.0	7.9	0.0

Tab. 3: ICP analysis of finishes separated from their fibreboard substates. Elements that exceed the EPF limits shown as orange cells.

Coating Colour	Sample content	As	Cd	Cr	Cu	Pb
Brown	Coating	100%	100%	100%	100%	100%
	Panel	19%	1%	40%	49%	73%
Grey	Coating	100%	100%	100%	100%	100%
	Panel	63%	57%	28%	3%	21%
Red	Coating	100%	100%	100%	100%	100%
	Panel	28%	42%	62%	112%	41%
White	Coating	100%	100%	100%	100%	100%
	Panel	20%	65%	24%	88%	5%
Beige	Coating	100%	100%	100%	100%	100%
	Panel	8%	4%	2%	56%	5%

REFERENCES

- [1] Lee et al. 2022. « Particleboard from Agricultural Biomass and Recycled Wood Waste: A Review ». Journal of Materials Research and Technology 20 (September): 4630-58. <https://doi.org/10.1016/j.jmrt.2022.08.166>.
- [2] Organisation des Nations unies pour l'alimentation et l'agriculture (FAO). 2022. « FAOSTAT ». FAOSTAT. (<https://www.fao.org/faostat/en/#data/FO>).
- [3] EPF. 2002. EPF standard on the use of recycled wood in wood-based panels.