



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement no. 101096858.



Thermochemical treatment of dust and fines

ENECOLAB s.r.l.

Jan Kašpar, CTO

Online Workshop, 2025, Nov. 17th



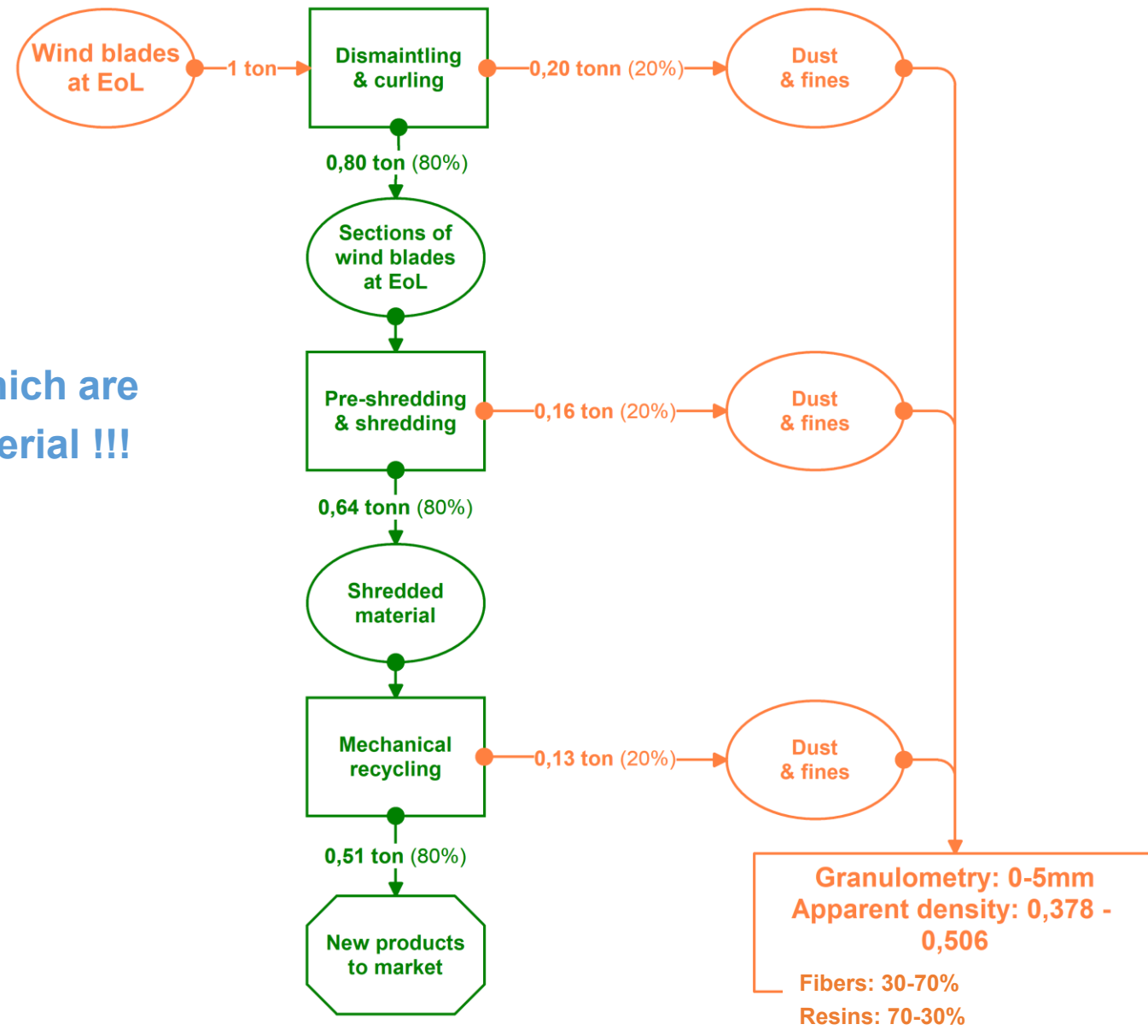
Photo by Nicholas Doherty on Unsplash

DUST & FINES, Overview

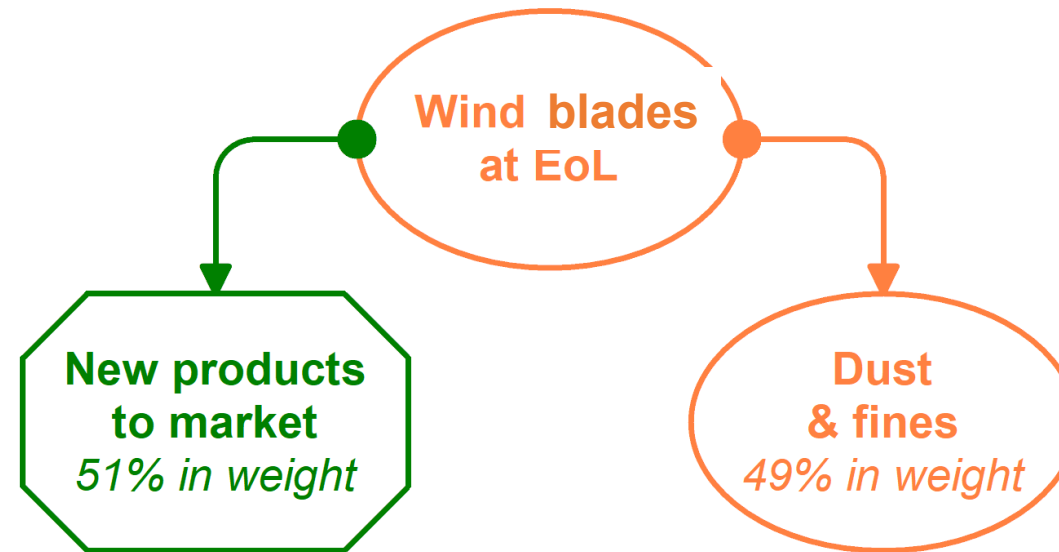


Horizon Europe
101096858

Recycling processes generate, step by step, dusts and fines, which are up to ca. 50% of the starting material !!!



The % of generated dusts and fines is relevant:



ENECOLAB mission:

- I. Cooperating in finding a way to reduce the amount of dusts and fines
- II. Cooperating in increasing the dusts and fines capture
- III. Recovery of dusts and fines : **waste valorization**

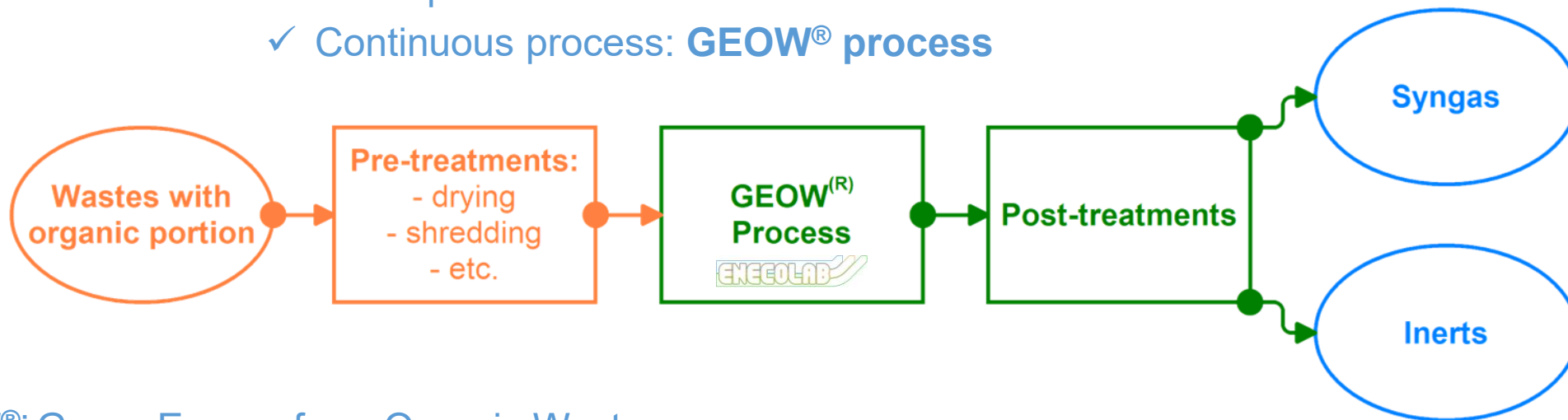
Dusts and fines, present routes:

- Cement factories as a fuel (i.e.: France)
- Landfill



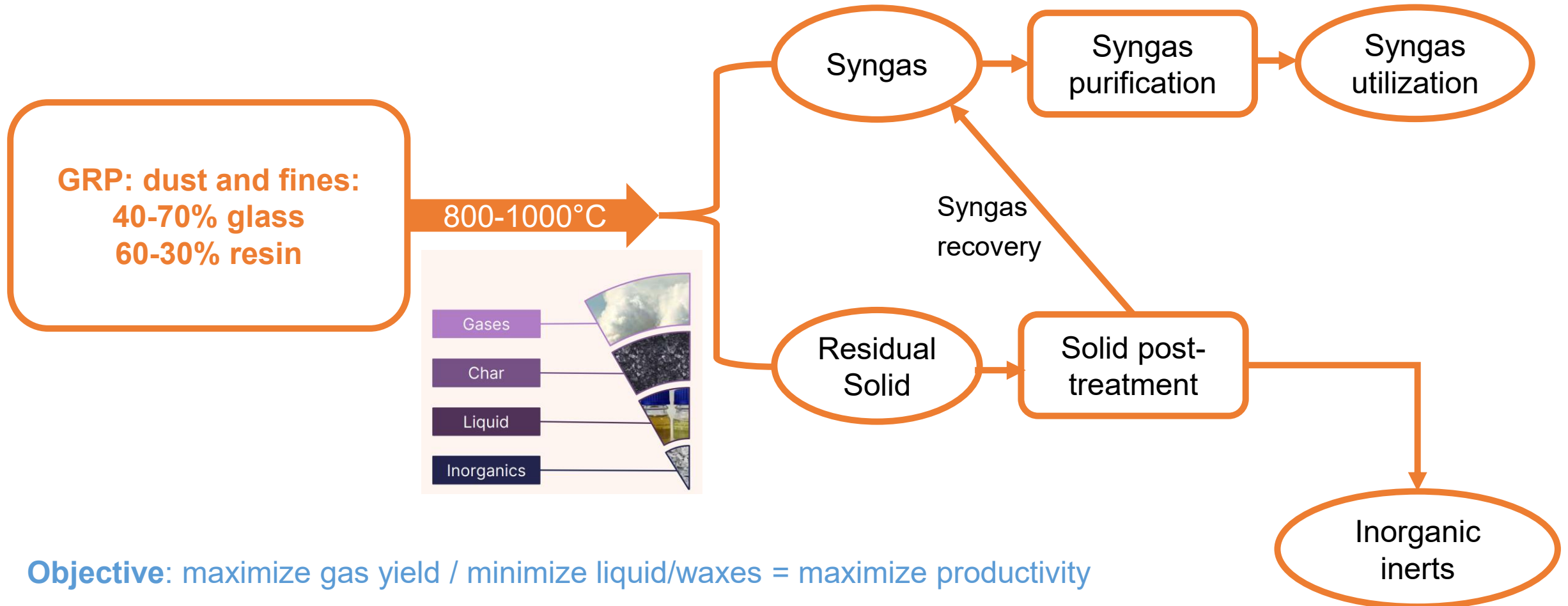
Dusts and fines, alternative routes:

- Recovery by chemical processes (chemolysis)
- Recovery by anaerobic thermochemical processes:
 - ✓ Batch processes
 - ✓ Continuous process: **GEOW[®] process**



GEOW[®]: Green Energy from Organic Waste

Dusts & fines, Recovery, GEOW[®] process: pyrolysis at high temperature to generate gas fraction as energy carrier



Objective: maximize gas yield / minimize liquid/waxes = maximize productivity

Variables:

- Apparent density → Material flow inside the reactor
- Proportion between fibers and resins → Residual solids/ amount of gas produced
- Kind of resin → calorific value
- Process parameters → temperature, contact time, catalysts, etc.

Example of gas composition obtained at the laboratory and industrial scale:

	Laboratory scale	Industrial scale
CnHm:	2.2	2.5
CH ₄ :	20.9	18.6
H ₂ :	14.7	10.8
CO:	36.7	31.0
CO ₂ :	16.2	20.7
N ₂ :	9.2	16.3
CV (MJ/Nm ³)	13.2	11.3

Process optimization is on-going

Dusts & fines, Recovery, GEOW[®] process: pyrolysis at high temperature: design of laboratory and industrial scale reactors



Horizon Europe
1010196858



	Laboratory	Industrial
Treated material (kg/h)	1.2	7.5 (max 20)
Gas flow (Nm ³ /h)	0.26	2.1
Furnace consumption (kW)	1.8	5
Gasification efficiency (Nm ³ /kg)	0.22	0.28
Energy consumed (kWh/kg)	1.5	0.67
Energy obtained (kWh/kg)	0.79	0.88

Summary:

- **GEOW® efficiently converts the dust and fine waste generated recycling processes in of the EoL materials to obtain syngas as an energy carrier**
- **Preliminary results clearly indicate that the amount of energy recovered in the GEOW® process exceeds that used in the process.**
- **The GEOW® process is designed to be integrated into an industrial process to minimize and to inertize the waste and to recover the energy content.**



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement no. 101096858



Questions?

Thank you for your attention!

Jan Kašpar, Enecolab

jan.kaspar@enecolab.com

Views and opinions expressed here are those of the author(s) only and do not necessarily reflect those of the European Union. The European Union cannot be held responsible for them.



© Jason Bickley