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REFRESH

Efficient shredding and sorting solutions for wind blades

Dr Guilhem GRIMAUD, Eco-Innovation Leader MTB

First stakeholder workshop

17 November, 2025, Online

Photo by Nicholas Doherty on Unsplash

Technologies for efficient shredding and sorting for windblades

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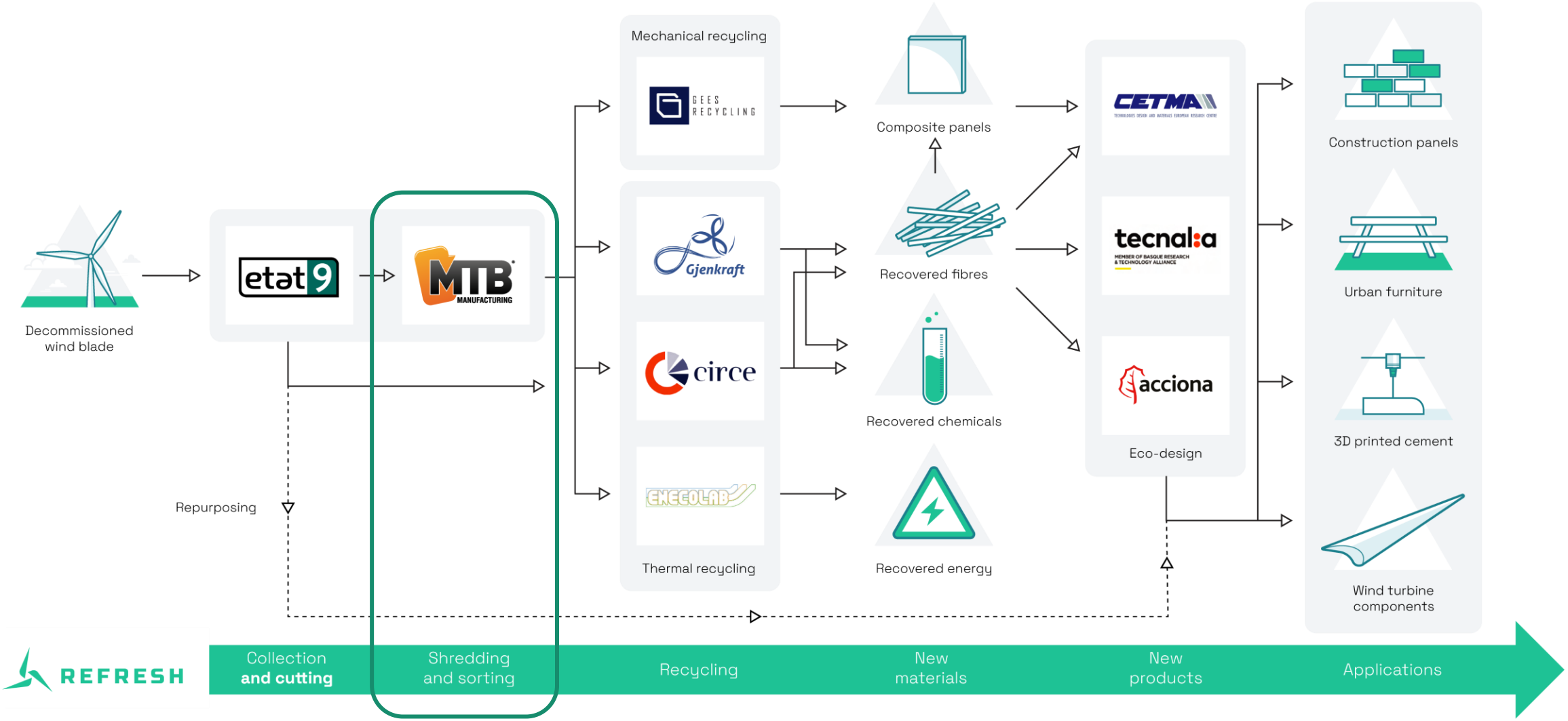

Challenges for efficient shredding and sorting for wind blades

1. Large Blade Dimensions

- Wind turbine blades can exceed 60 meters in length and weigh several tons, making handling and preshredding logistically complex and energy-intensive.

2. Complex Composite Structure

- Blades combine glass fiber, carbon fiber, resins, wood and foam. This multi-material design creates difficulties in achieving clean separation of material families during mechanical processing.

3. Material Heterogeneity

- Internal composition varies by blade section (spar cap, trailing edge, leading edge), requiring selective cutting and adaptable shredding strategies to avoid cross-contamination.

4. Dust Emissions During Shredding

- High-speed shredding generates significant fine particles and dust, posing health, safety, and environmental challenges that demand efficient de-dusting and filtration systems.

Prototyping and test of the pre-shredding equipment – RSX2300

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MTB pre-shredding equipment

- Installed on MTB factory since 2024
- ✓ **Multiple test on pre-cutting blades**

Test of the sorting sequence for material recovery

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5 families of materials

Depending on the model, the year and the manufacturer, the composition of a wind blade varies

1) **Composite materials**
   - Glass fiber reinforced plastic (60-80%)
   - Carbon fiber reinforced plastic (0%-20%)

2) **Rigid foam**
   - PET or PU (5-10%)

3) **Glue**
   - Epoxy or vinylester (5-10%)

4) **Wood**
   - “Balsa wood” (0%-5%)

5) **Metals**
   - Lightning wire (copper or aluminium) (2%-3%)

Figure 1 Shredded wind blade

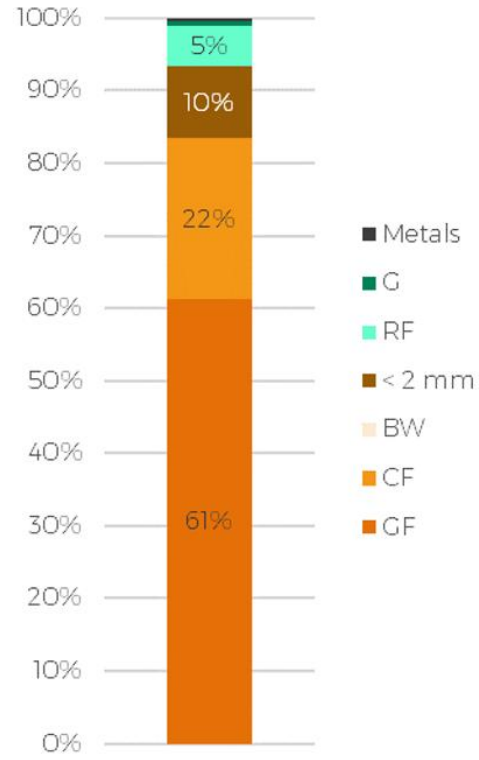

Figure 2 Manual counting of the shredded wind blade

Test of the pre-shredding equipment

MTB wind blade pre-shredding results

Still mixing materials, too difficult to separate them despite optical, robotic and mechanical sorting...

New approach to cutting in the fields to enable optimized sorting.

Proposal for an optimized composite recycling value chain

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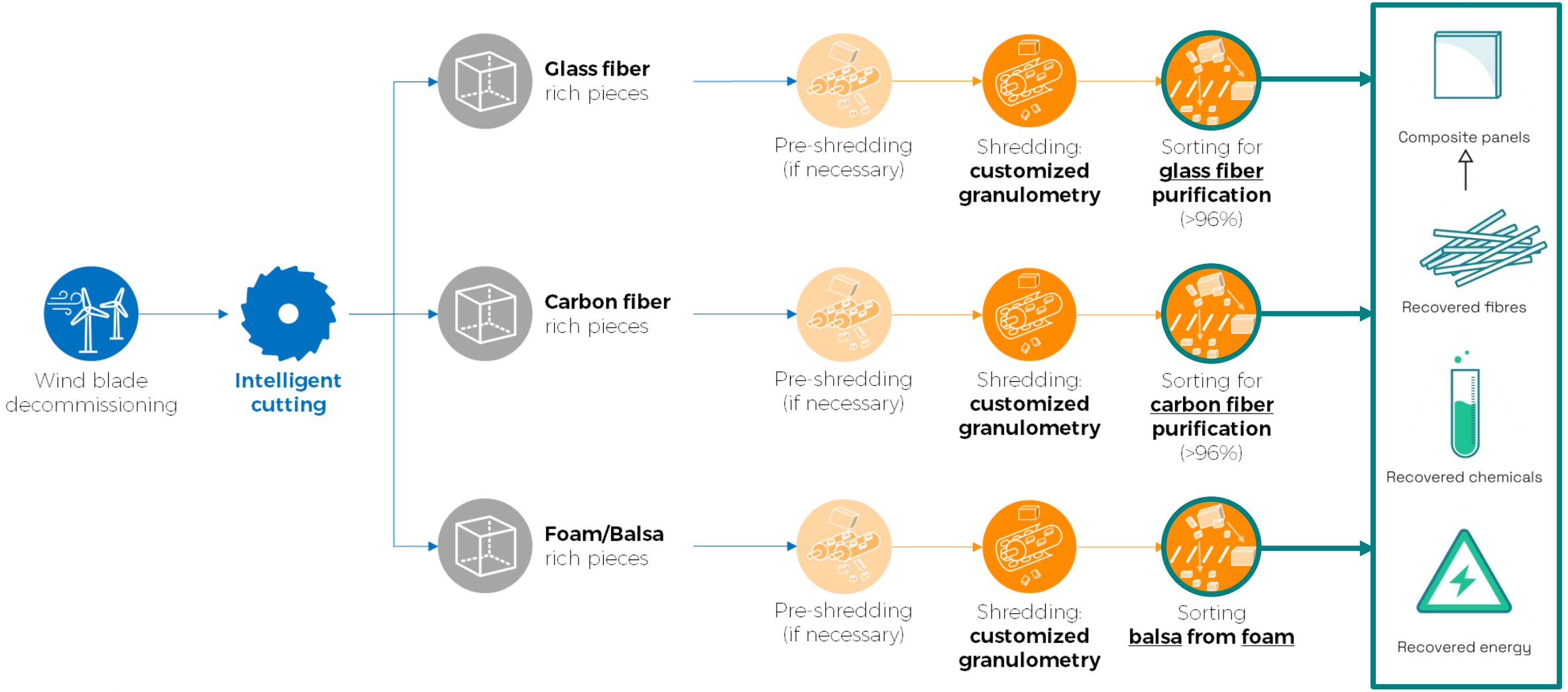
GOAL : create 3 material channels from a decommissioned wind blade



Test of the intelligent cutting process

ETAT9: cutting process to avoid carbon contamination
MTB: shredding process for recovery

Summary of the sorting tests done and next steps

MTB sorting results

✓ Good separation of **composites from balsa wood and rigid foam**

× Bad mechanical sorting of **glass fibers from carbon fibers**

Technologic locks : separation of glass and carbon fiber composites

- Mechanical dry separation : not successful
- High technology optical sorting (color and infrared) : not successful
- Robotized picking technology : not successful

Requires implementation of the intelligent cutting process before shredding

- Separate the carbon sections from the non-carbon sections before shredding the blades
- Tests currently in progress with ETAT9

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Thank you for your attention!

Dr Guilhem GRIMAUD, Eco-Innovation Leader MTB

g.grimaud@mtb.fr