

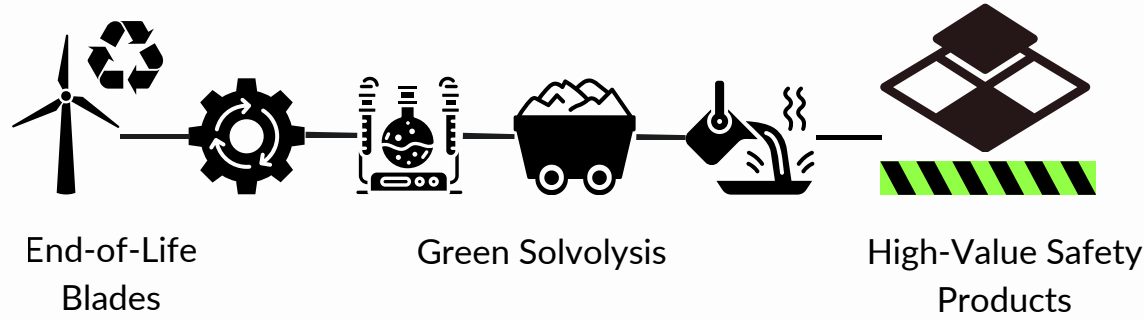
Microwave-Assisted Green Solvolysis of Wind Turbine Blades for Upcycling into Photoluminescent Safety Tiles

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Concept

Microwave-assisted green solvolysis is used to break down the thermoset matrix of end-of-life wind turbine blades. This method enables the recovery of glass fibers for upcycling into valuable safety products.

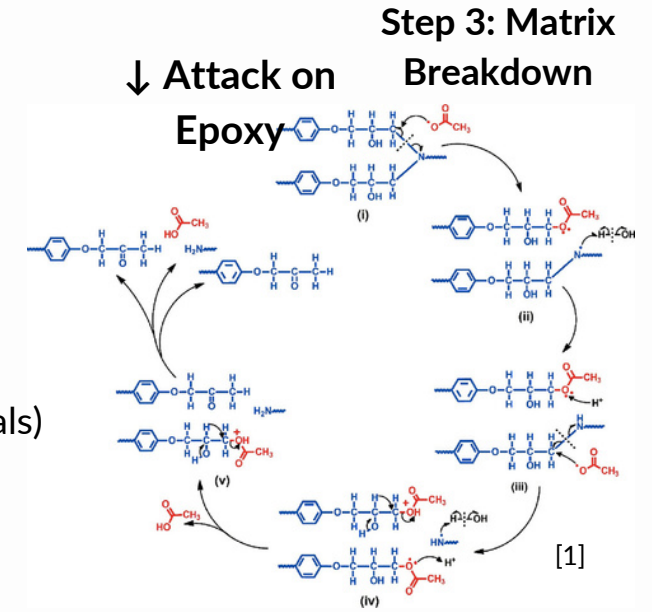


Reaction

Step 1: Reagent Formation
 $\text{H}_2\text{O}_2 + \text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COOOH}$ [1]
(Peracetic Acid)

Step 2: Radical Generation
 $\text{CH}_3\text{COOOH} \rightarrow \bullet\text{OH} + \text{CH}_3\text{COO}\bullet$ [1]
(Peracetic Acid \rightarrow Hydroxyl & Acyloxy Radicals)

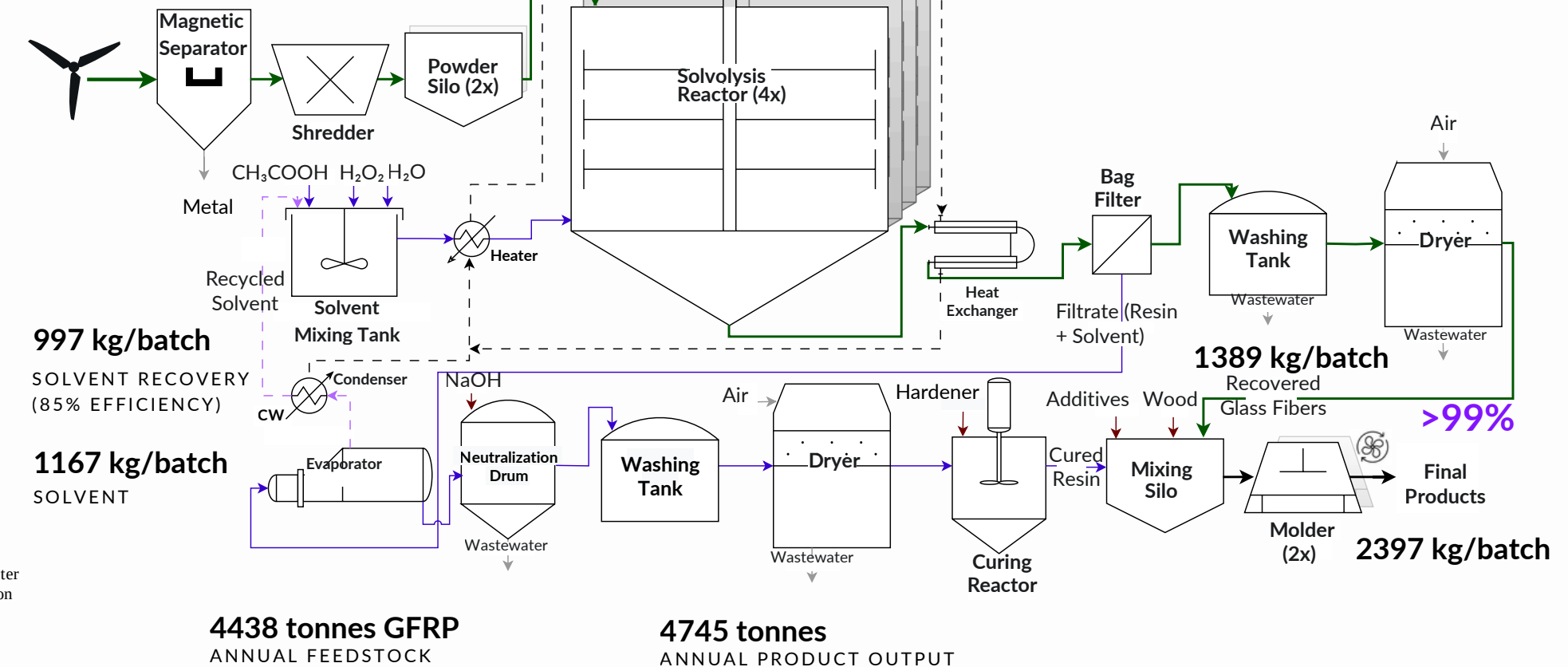
90 °C [1]
TEMPERATURE



Process

- Feeds tock
- Solvent Mixture
- N-acetylenehydramine
- Bisphenol A-type Diol
- Glass Fiber
- Drinking Water
- Sodium Hydroxide
- Waste Water
- Air
- Cured Thermoplastic Matrix
- Safety Tile
- Composite Blend DOPO
- Wood

2242 kg/batch
SHREDDED BLADE
COMPOSITE



Photoluminescent Safety Tiles

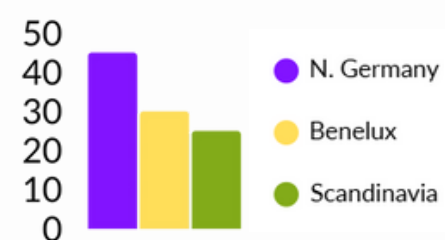
- Fire-rated [2]
- Glow-in-the-dark pigment [3]
- Flame retardants [2]
- UV and thermal stabilizers [4, 5, 6]

Rubber Floor Blocks

- Slip-resistant
 - Made with recovered fibers and wood fillers
 - Excellent load-bearing and weather resistance
- 60% recycled glass fiber content

Market & Application

REGIONAL MARKET REACH %

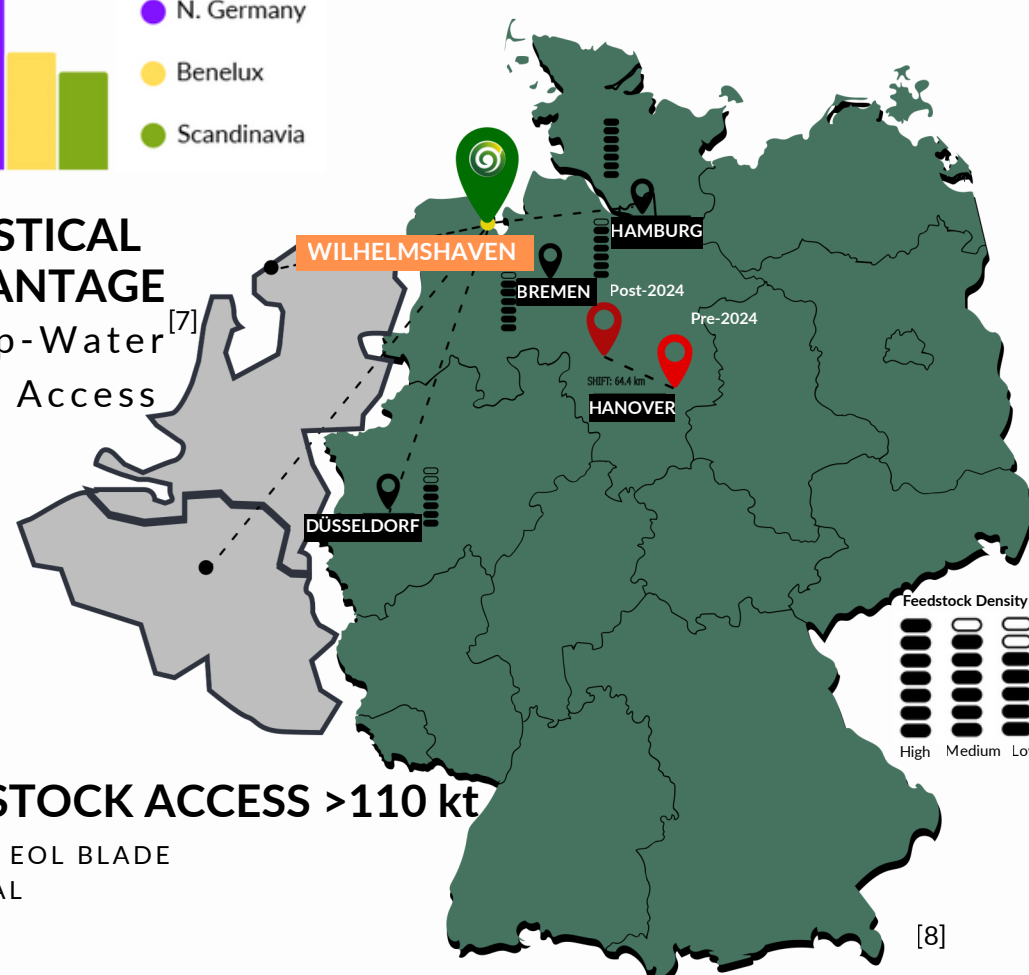


LOGISTICAL ADVANTAGE

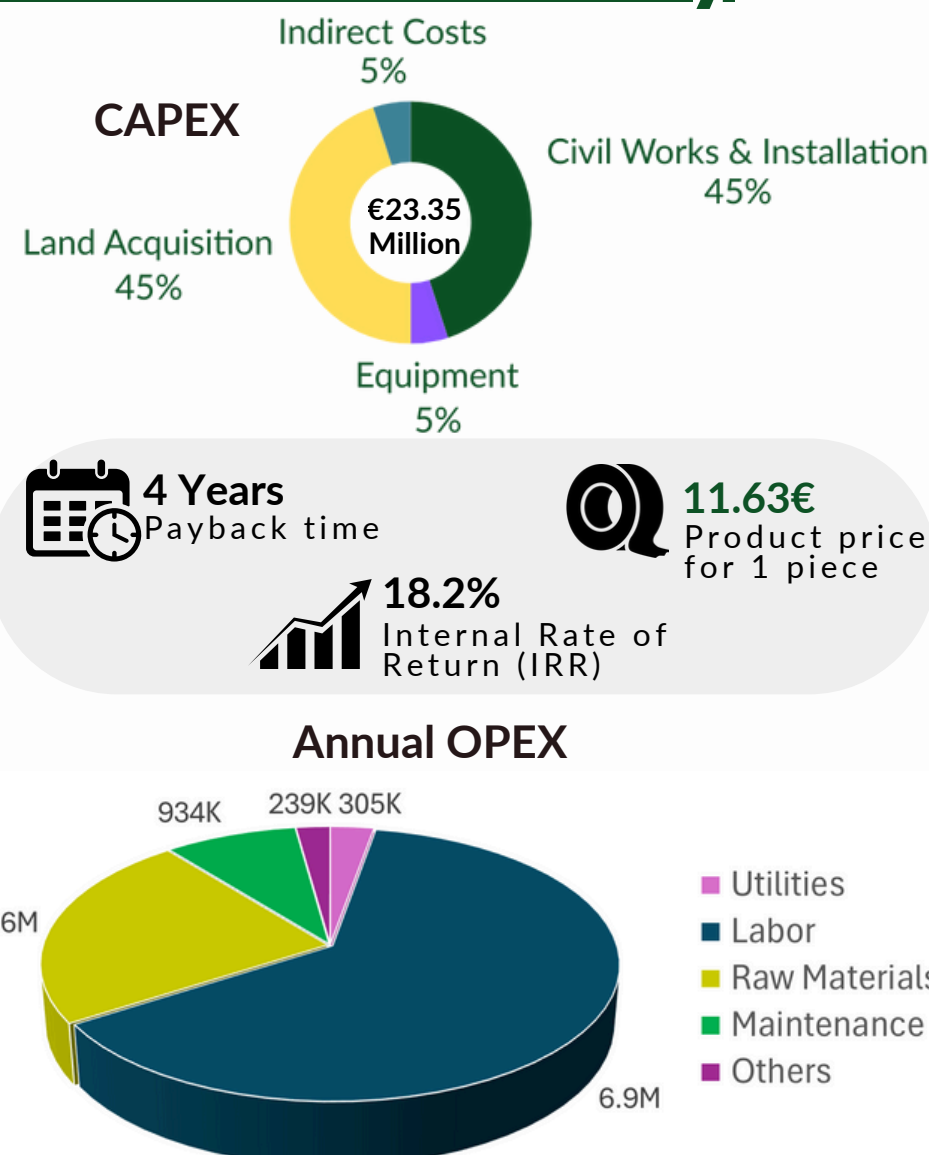
- Deep-Water Port Access [7]

FEEDSTOCK ACCESS >110 kt

ANNUAL EOL BLADE MATERIAL



Economic Feasibility



Environmental Impact

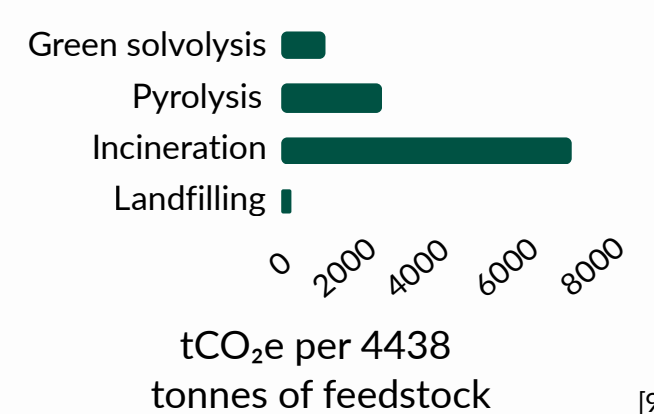
Solvent

Biodegradable
and recyclable



Greenhouse Gas Emissions

Methods



Literature

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- [9] LCA data synthesized from: Tazi, N. et al., J. Clean. Prod. (2019) & Bank, L. C. et al., NREL Tech. Rep. (2021).

Acknowledgements



Contact & More Information

Explore our solution.