

Circular Economy Business Models (CEBMs) and Sustainable Measures of Value: End-of-life Wind Turbine Blades

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Circular Economy Business Models: Make it profitable to be circular

- ▶ Product as Service
- ▶ Prosumer - Consumer as Producer
- ▶ Performance Contracts
- ▶ Hiring not Owning
- ▶ Reward Longevity
- ▶ Platform to facilitate other businesses
- ▶ Sell Efficiency Savings
- ▶ Change waste into resource

Wind Turbine Blades Size is variable



- ▶ Serious logistics problems



Wind Turbine Blades Chop up to move

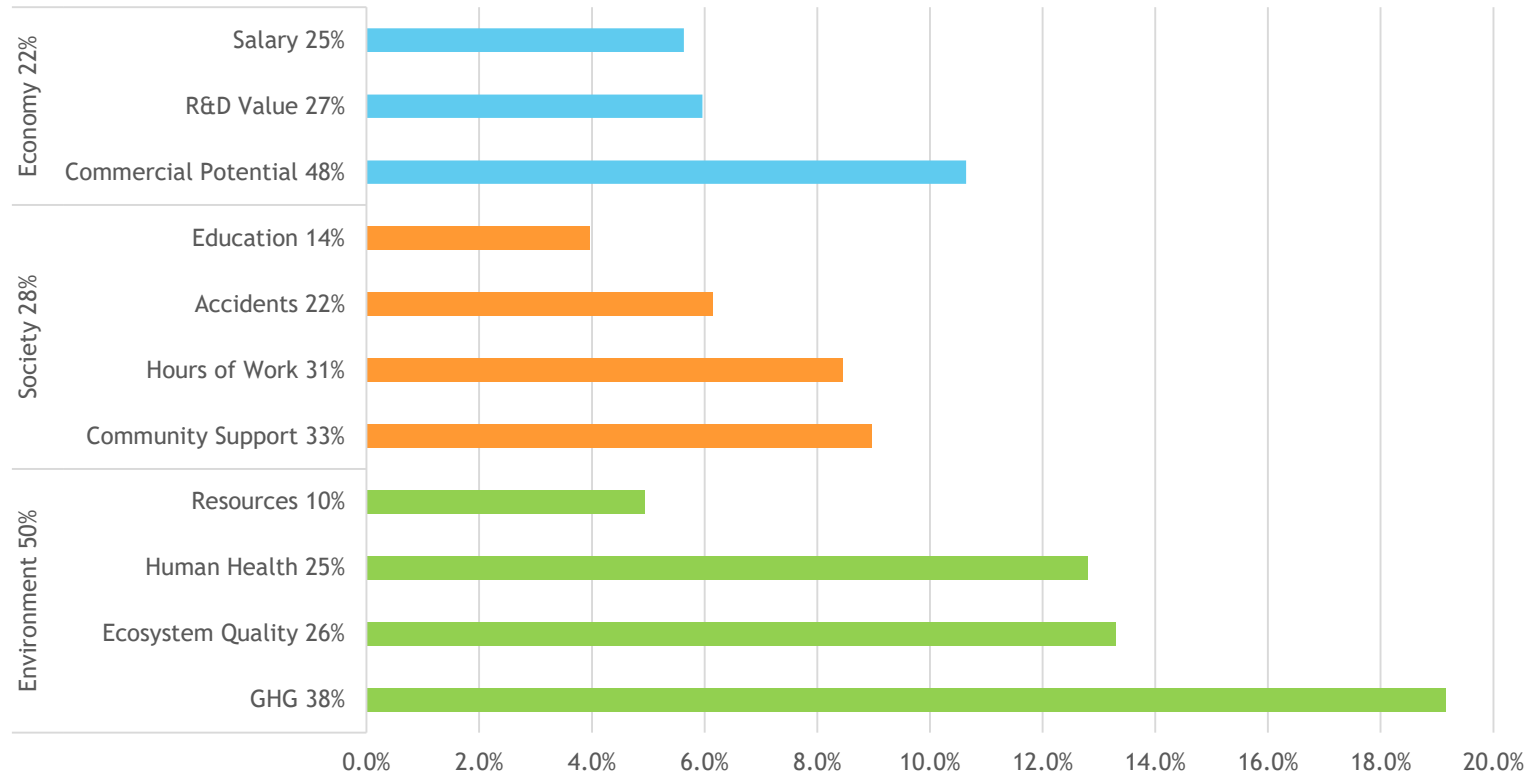


- ▶ Moving smaller pieces is easier

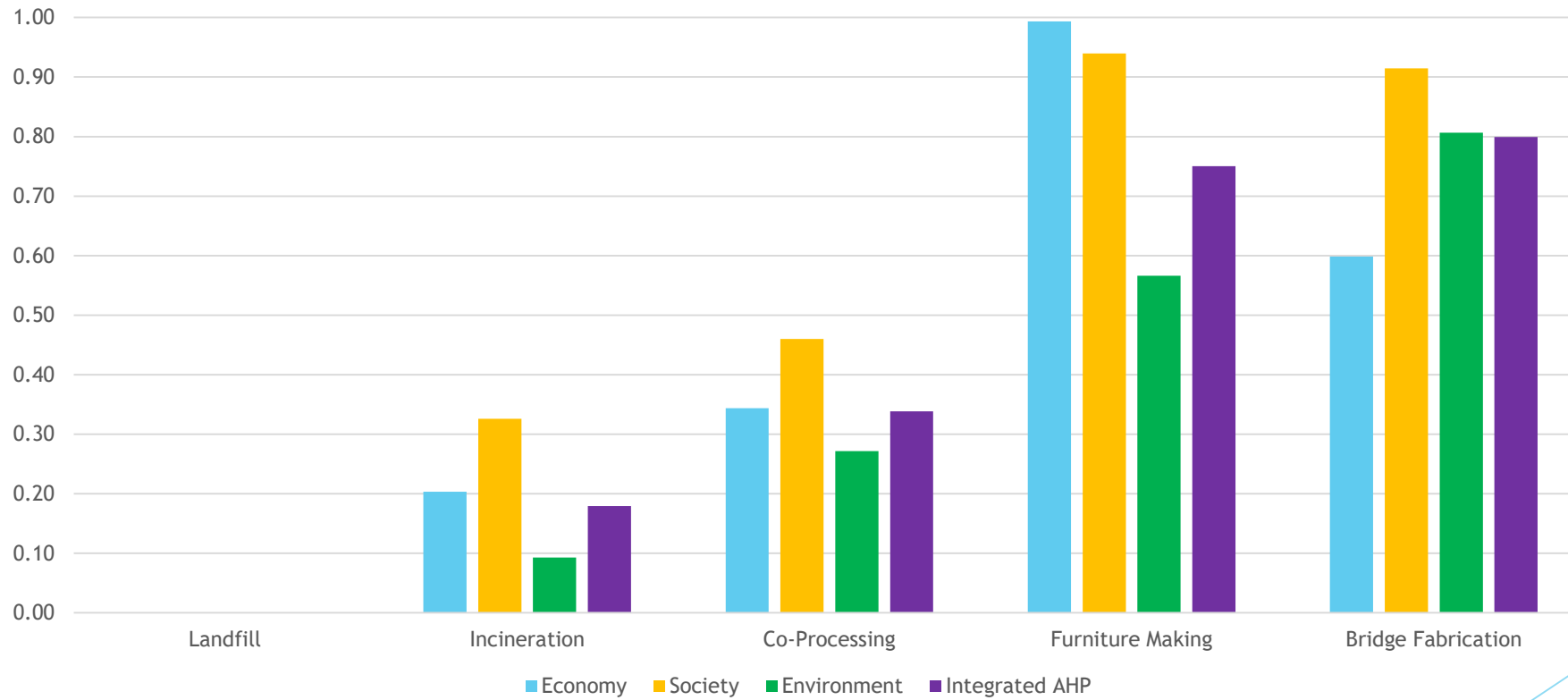
Wind Turbine Blades Recycling Possibilities

- ▶ Landfill
- ▶ Incineration
- ▶ Co-processing
- ▶ Furniture
- ▶ Bridges

What is valued?



Comparison of Values



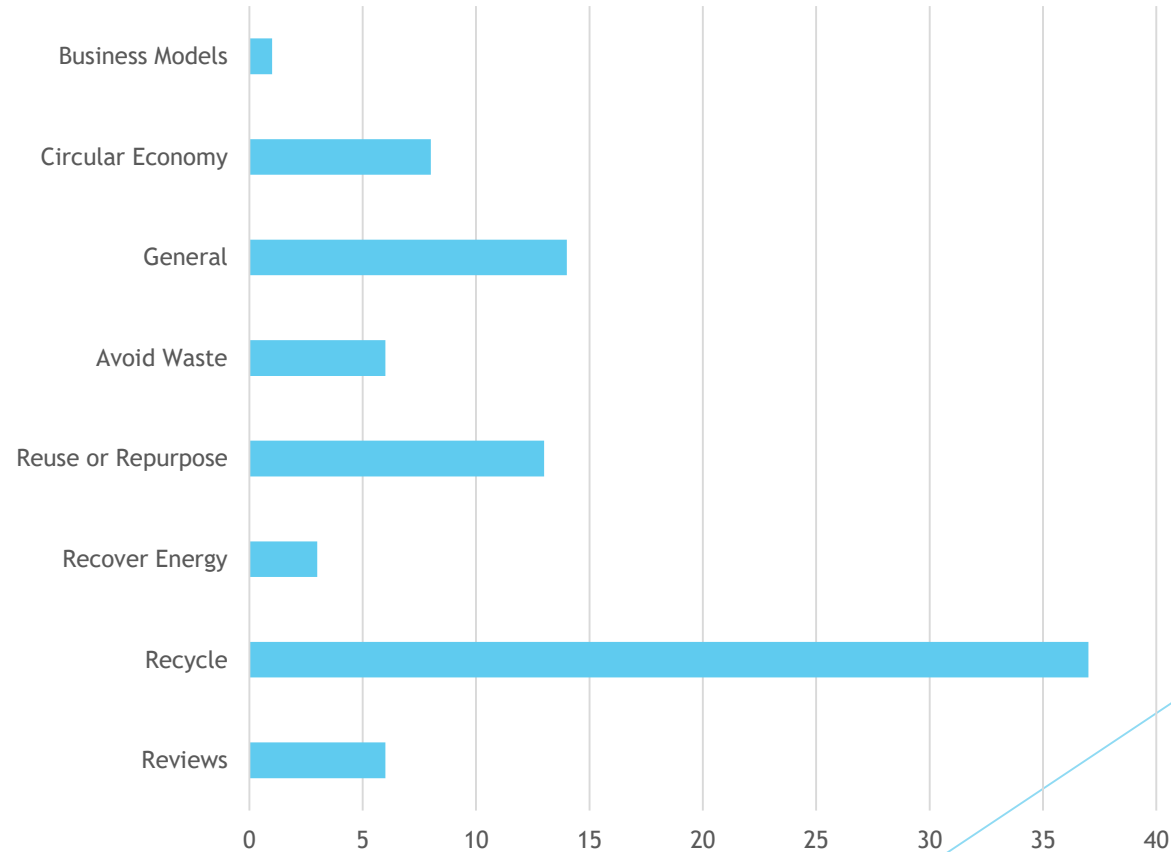
Literature Review

Wind Blade Recycling

Comments

- ▶ Recycling dominates
- ▶ Reuse or Repurposing is an important consideration (often due to Re-Wind's recent publications).
- ▶ Business models are almost ignored

Topics in Recent Literature out of 72 papers



The Problems

Two squeeze points in the process of successfully bringing wind turbine blades into a circular economy:

- ▶ 1) **Lack of interest in reuse** (compared with recycling) - manufacturers would prefer to make something entirely rather than depend on the condition of second hand inputs.
- ▶ 2) **Lack of business opportunities** -the recent literature (2020, 2021) says recycling methods are not commercially viable

Ways Forward

- ▶ Pay per Turn
 - ▶ Financial barrier creation for OEM
 - ▶ Financial barrier removal for users (community energy)
- ▶ Blade Discovery for a Blade Market
 - ▶ The Blade Machine (software programme to convert scans to plans) can sell information to connect buyers and sellers. Bridges and Furniture
 - ▶ Expensive enough to cover the costs of safety certification
- ▶ Mass Market Materials
 - ▶ Cheap enough to provide for outdoor products

Further Questions

- ▶ How much can a firm lose by not being circular?
- ▶ How much is community support worth?

Thank you

- ▶ <https://www.re-wind.info/>
- ▶ [https://authors.elsevier.com/sd/article/S0921-3449\(21\)00251-2](https://authors.elsevier.com/sd/article/S0921-3449(21)00251-2)
- ▶ Deeney et al (2021). “End-of-Life alternatives for wind turbine blades: Sustainability Indices based on the UN sustainable development goals”. *Resources, Conservation & Recycling*
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