

A life cycle assessment of the end-of-life solutions for wind turbine blades

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Aim

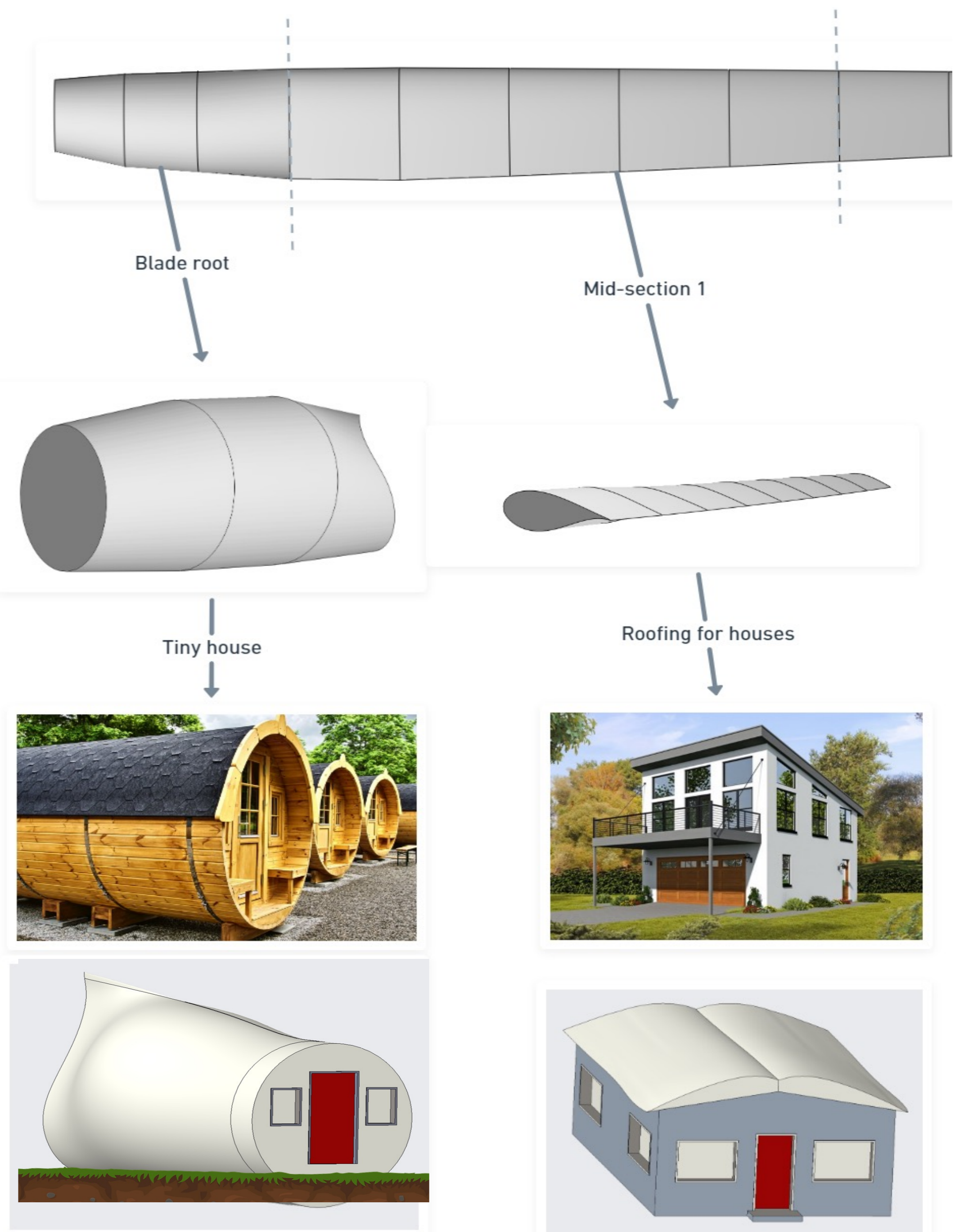
The aim of this thesis is to assess various end-of-life solutions for wind turbine blades after decommissioning. Thus, evaluating the environmental impact related to the various solutions through a life cycle assessment of an offshore wind farm.

There is a significant amount of energy and emissions from wind turbine blade manufacturing, and it is currently not possible to recycle the blades. In this study the waste management hierarchy is used as a foundation. The waste management hierarchy evaluates resource and energy consumption alongside protecting the environment for future generations.

Case study

Energy consumption, emissions and costs are compared in the following end-of-life scenarios:

1. Landfill
2. Cement co-processing
3. Repurposing as tiny house and roofing



Results

Repurposing the wind turbine blades as tiny houses and roofing only accounts for 0.09 % of the energy consumption from manufacturing, and 4.1 % of the emissions. This means that the total life cycle energy consumption and emissions from the blades will not be significantly increased, while the lifetime will increase with over a 100 years.

Conclusion

Repurposing decommissioned blades are the most preferred solution. Tiny houses and roofs are a reasonable solution that serves a purpose while keeping the product's value of the blades as high as possible within its lifetime.