




What are the end-of-life options for wind turbines?

Wind turbines do not last forever. They typically have a life of 20-25 years. There are about 8,000 separate parts, some of which need to be replaced during the turbine's lifetime. For wind energy to be sustainable, it is important to understand the end-of-life options and to make these as sustainable as possible.

1. Complete the table below to summarise the three end-of-life options. Some keywords have been written in the table to help you.

<p>Life-extension</p> 	<p>Keywords: maintenance, repair, planning consent</p>
<p>Repowering</p> 	<p>Keywords: removing, replacing, planning application, community</p>
<p>Decommissioning</p> 	<p>Keywords: infrastructure, turbine components, recycled, re-purposed</p>

2. The diagram below lists some of the materials used in wind turbines. It shows how these materials can be handled at end-of-life.

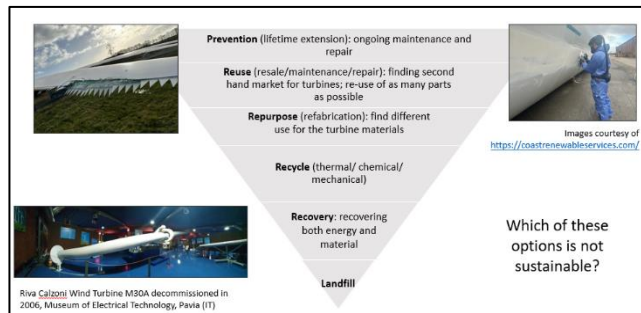


Part of turbine	Main Material(s)	End of life handling
Hub	Iron	Recycling (foundry)
Canopy	Glass/ Fibre/Epoxy or steel	Recycling, incineration or landfill
Nacelle	Steel, permanent magnets, batteries	Recycling (as fibre), incineration or landfill
Platforms and ladders	Aluminium	Recycling (foundry)
Blades	Glass/ Fibre/Epoxy and Balsa wood	Recycling (as fibre), incineration or landfill
Cables and busbars	Plastic, copper and aluminium	Recycling (foundry)
Tower	Steel	Recycling (foundry)
Miscellaneous	Lubricants, grease, paint, rubber, plastic	Recycling, incineration or landfill

- (a) Use a highlighter or draw a ring to identify the metals.
- (b) How are the metals handled at end-of-life? _____
- (c) Explain why the handling of metals is sustainable.

- (d) What is 'incineration' and why can it be environmentally harmful?

3. The diagram below shows the options for waste management when a wind turbine reaches its end-of-life.






- (a) How can some component parts be reused?

- (b) What is the difference between 'repurpose' and 'recycle'?

- (c) Which option is unsustainable?

- (d) Can you suggest why the diagram takes the form of a pyramid?

- (e) Complete the table by suggesting the component part (e.g. blade) and describing how it has been repurposed.

	Component part	Repurpose
		
		
		

Images from the Re-Wind Network's Design Catalog 2nd Edition Fall/Autumn 2022, <https://www.re-wind.info/>

4. Working in pairs, can you suggest some other options for repurposing wind turbine component parts? Draw sketches to describe your suggestions. Alternatively, research the internet to find other examples of wind turbine repurposing.