Vestas

Wind. It means the world to us.™

SUSTAINABILITY AT VESTAS

THE VESTAS SUSTAINABILITY STRATEGY

Sustainability in Everything We Do

Carbon Footprint

Circularity

Safety, inclusion and social responsibility

Energy Transition

SUSTAINABILITY IN EVERYTHING WE DO

CARBON FOOTPRINT

Carbon neutral company by 2030 – without using carbon offsets

Reducing CO_2 emissions in own operations by 55% by 2025, without using carbon offsets

Reducing CO_2 emissions in own operations by 100% by 2030, without using carbon offsets

Reducing CO_2 emissions in the supply chain by 45% per MWh generated by 2030 compared to 2019

CIRCULARITY

Producing zero-waste wind turbines by 2040

Fully recyclable rotors by 2030, at the latest

Circularity roadmap with 2030 targets across the value chain

PEOPLE

Safest, most inclusive & socially-responsible company in the energy industry

Reduce the rate of total recordable injuries to 1.5 by 2025, and to 0.6 by 2030

25% women in leadership positions by 2025 and 30% by 2030

Reach 35.000 direct beneficiaries through our community engagement initiatives by 2025

ENERGY TRANSITION

Leading the transition towards a world powered by sustainable energy

Take a leading role in driving electrification beyond the power sector

Team up with other sustainability leaders to drive change

Supporting our partners in their journey to become more sustainable

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PRODUCING ZERO-WASTE WIND TURBINES BY 2040

SUSTAINABILITY IN EVERYTHING WE DO | **Today's recyclability** | **1 / 6**

Producing zero-waste wind turbines by 2040

Approximately **80-90%** of a Vestas turbine is already recyclable - or it can be re-used – depending on the turbine variant.

Steel, copper and other metal parts make up a large percentage of our turbines and are highly recyclable.

Other components, such as; electrical parts, cables and fluids can be **recycled or re-used** to varying degrees.

Foundations or hybrid-towers, containing large quantities of concrete also have **recycling solutions available.**

Composite materials used in turbine blades and covers pose the **greatest recycling challenge.**

Blades are made from composite material which primarily is a mix of epoxy glue, glass fibres and carbon fibres.

PRODUCING ZERO-WASTE WIND TURBINES BY 2040

Producing zero-waste wind turbines by 2040

By ‘zero waste’, we mean preventing all waste and developing a circular economy for all materials, including the carbon cycle. We aim to reuse, repair, remanufacture or recycle, without recourse to incineration or landfilling. This process encompasses all our own operations as well as our direct suppliers, covering design and procurement, production, construction, service and sales, and end-of-life solutions.

Our Circularity Roadmap:

In October 2021, Vestas launched a Circularity Roadmap - **introducing a circular economy approach** in the different phases of the value chain. It has three focus areas to establish a circular value chain by 2040:

- Design for Circularity
- Operational Circularity
- Material Recovery

PRODUCING ZERO-WASTE WIND TURBINES BY 2040

SUSTAINABILITY IN EVERYTHING WE DO | **Circularity Roadmap - Design for Circularity** | **4 / 6**

Improve material efficiency in our own operations

Increasing material efficiency

In our own operations, we will increase the material efficiency from 2.5 t of waste generated per MW installed in 2020 to only 0.3 t by 2030.

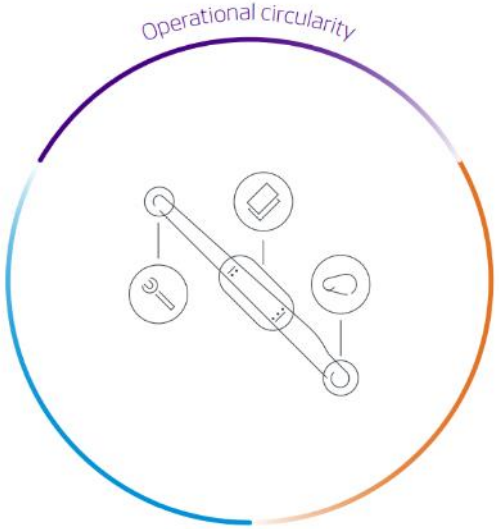
Designing turbines for circularity

Increasing rotor recyclability (hub and blades) from 42% in 2019 to 100% by 2030. This is done by scaling the recycling infrastructure for blades through the DecomBlades project and developing a fully circular blade through the CETEC project.

Supplier engagement

Strategic suppliers are asked to report on their waste generation, set waste reduction targets for their own operations, and then asked to set waste reduction targets for their own suppliers by 2025. Overall, we are targeting a 50% decrease in the waste intensity of our supply chain by 2030.

PRODUCING ZERO-WASTE WIND TURBINES BY 2040



Refurbishment saves CO2

A refurbished component at Vestas saves on average 45% CO2e compared to a new part (incl. transport).

Expanding repair capabilities

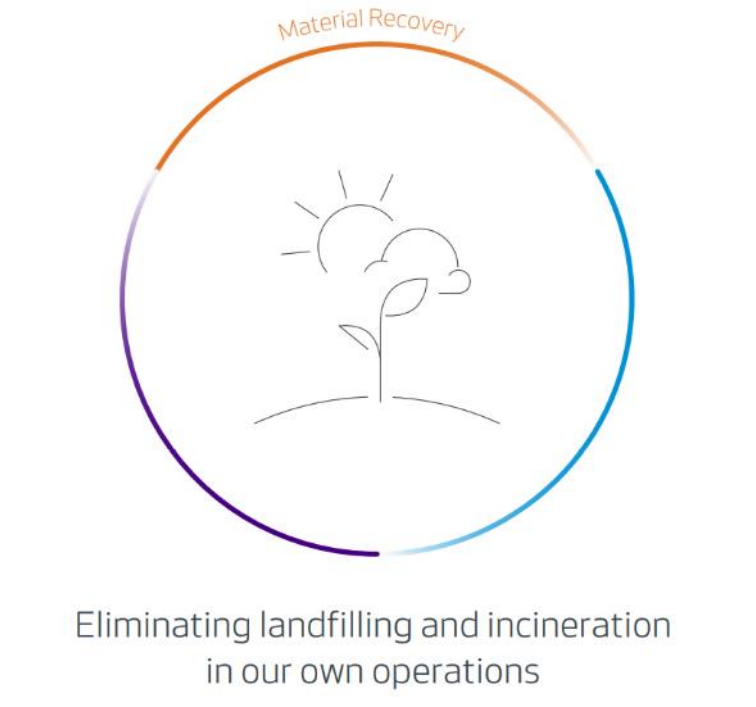
Circularity is about closing resource loops. Being able to reuse, repair and refurbish to increase the lifetime and utilization of items that have already been produced is desirable.

In 2020, we recorded a 14% refurbished component utilisation rate. By 2030 we want to increase this to 55%. The final goal is a 75% refurbished component utilisation rate in 2040.

On top of that, we are working on creating local repair loops to keep transport distances short.

PRODUCING ZERO-WASTE WIND TURBINES BY 2040

SUSTAINABILITY IN EVERYTHING WE DO | **Circularity Roadmap - Material Recovery** **6 / 6**



Recycling and decommissioning

Keeping materials in a circular economy, when reuse and refurbishment is not an option, while recycling and decommissioning is key.

Reduce landfilling and incineration

Currently, 25% of waste from our own operations gets landfilled. By 2030, we aim reduce it to <1% and finally reach 0% by 2040. This will be achieved by temporarily increasing the amount of waste being incinerated with heat recovery until 2025.

Increase recycling

By 2040, we will recycle 100% of the waste produced by our own operations. In incremental steps, we will increase the recycling rate from 52% in 2020 to >94% in 2030.

Wind turbine blades: Large, composite structures, built to last 20+ years

CIRCULARITY – BLADE RECYCLING INITIATIVES

DecomBlades – Upscale existing recycling techniques

Industry

- Detailed blade knowledge (design, content, volumes)
- Shredding and logistics
- Recycled materials market
- Pyrolysis technology
- Cement co-processing

Academia

- Material analysis
- Economic and environmental assessment

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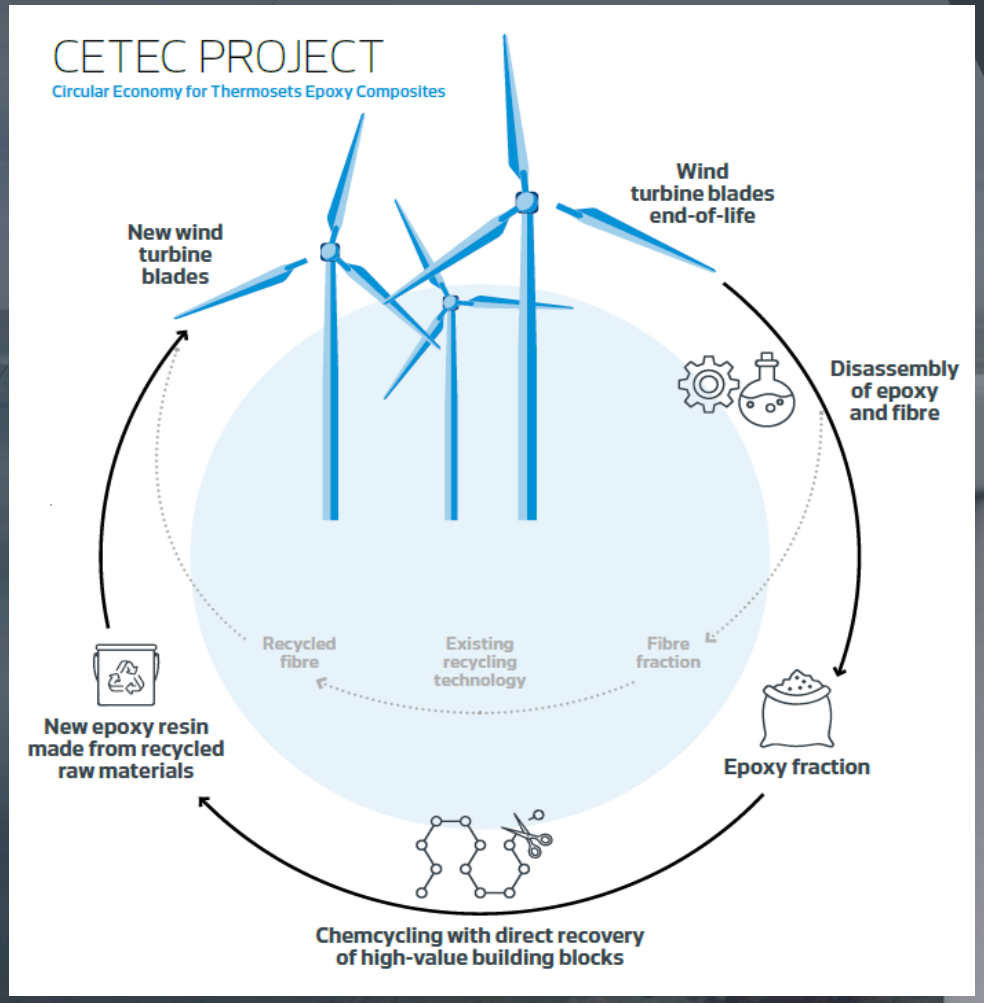
CIRCULARITY - BLADE RECYCLING INITIATIVES

CETEC aims to close the loop and develop a truly circular resin-system



Disassembly

Disassembly and separation of material streams is the **first step** towards a circular system

Modifications cannot sacrifice **mechanical performance** of composite

Disassembly rely on **mild conditions** reducing the energy consumption

Project Partners

Vestas · Innovation Fund Denmark · Olin · Danish Technological Institute · Aarhus University

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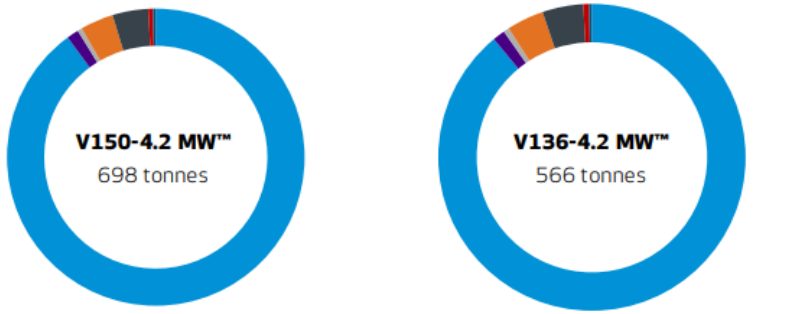
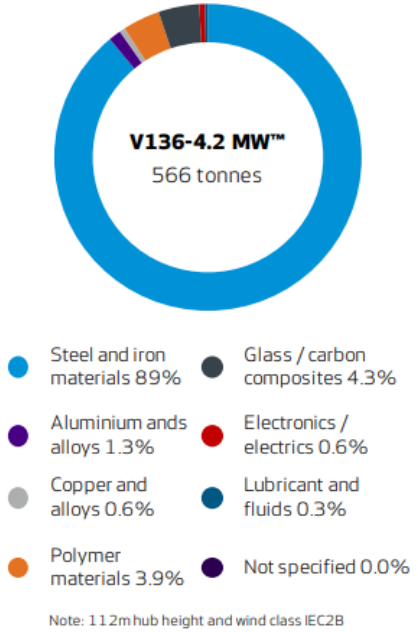
MATERIAL COMPOSITION

By knowing how materials contribute to environmental performance it is possible to make fact-based and informed decisions

4 MW Platform Turbines





Managing Materials at End-of-Life

- By weight, around **80-90% of a Vestas wind turbine is recyclable**, depending on turbine variants[1]
- Life Cycle Assessment is used to provide **detailed knowledge regarding material composition, where around 25,000 parts are mapped per turbine**
- Being in control of chemicals and hazardous substances for the development, manufacturing and service of Vestas turbines is a core part of our operations and managed through the **Prohibited Substances** and **Restricted Substances** lists.

[1] Vestas 4 MW Platform

FROM RECYCLING TO CIRCULARITY

NOW

- Recycling is downcycling
- Energy intensive (and expensive) recycling technologies
- No demand for most of recycled materials
- Landfilling and incineration

NEAR TERM FUTURE

- Less energy intensive recycling technologies
- Increased demand for recycled materials
- Some companies will require recycled materials as part of new materials
- Landfill bans
- Reduced production waste through design
- Design for disassembly

LONG TERM FUTURE

- Materials designed for recycling
- Legislative requirements for recycled materials as part of new materials
- Zero waste wind turbine
- Zero emission steel
- Closed carbon cycle
- Legislation on landfill and recycling

THANK YOU FOR YOUR TIME

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