

The logo features the word "REBLADE" in a bold, sans-serif font. The letters "RE" are green, and "BLADE" is blue. A green circle is positioned behind the text, with a small gap at the top and bottom where the text overlaps it.

**REBLADE**

**Maximising Circularity through  
Sustainable Decommissioning**

# ReBlade is a wind sector operations, logistics and decommissioning solutions provider specialising in remanufacturing

We operate in sustainable, circular ways because looking after the planet is good for our clients, which means it's good for business.



# The Team



## COMPANY MANAGING DIRECTOR

Steven is a blade specialist with extensive industry connections and trusted contractor status among major utilities.



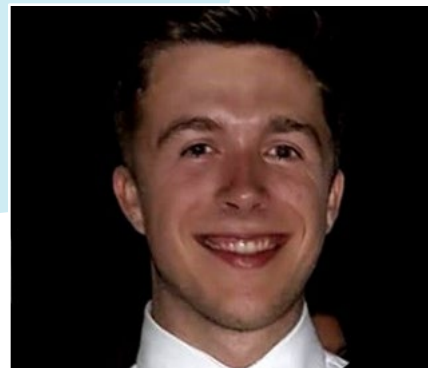
## COMPANY MANAGING DIRECTOR

Fiona is a renewables expert with a background in wind energy design, construction, planning and project management.



## BUSINESS DEVELOPMENT CONSULTANT

Lorna is a marketing and economic development specialist with proven success supporting SME growth.



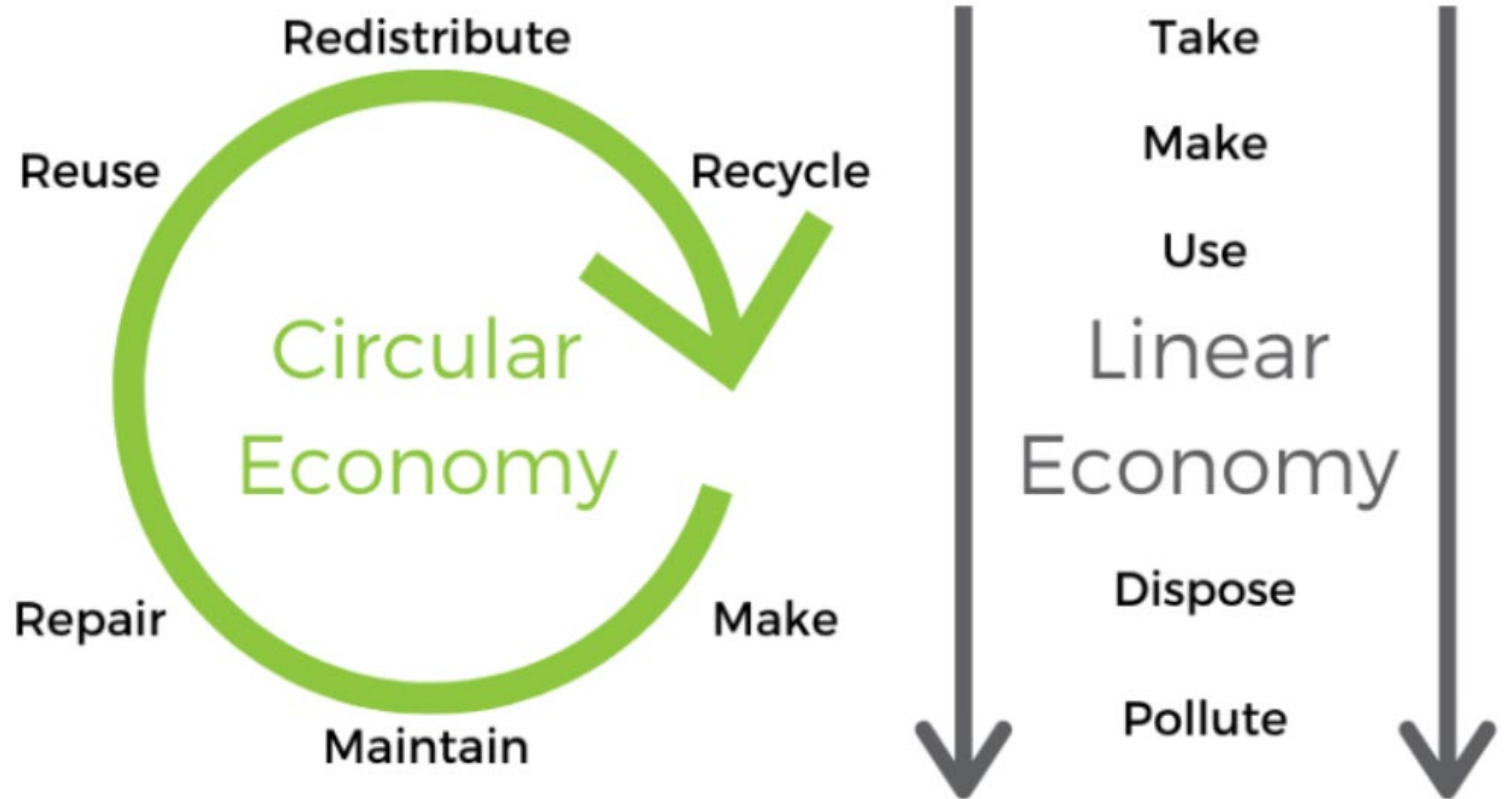
## SUSTAINABLE DEVELOPMENT MANAGER

Luke has a background in electronics and blade engineering and expert knowledge of turbines.

# Circular Economy Principles

A **circular economy** is an all-encompassing approach to life and business.

In simple terms, it can be explained as 'make, use, **remake**' rather than 'make, use, **dispose**' (linear economy).



**...we are still a long, long way from circular practices in Scotland!**

# Wind Farm Decommissioning

Wind turbines are a valuable source of resources which can be reused in the circular economy.

85-90% of a dismantled wind turbine are recycled today, including the towers, foundations, generators and gearboxes.

Most of these materials are made up of concrete, steel and cast iron which are easy to recycle and for which there is an active circular economy market in Europe.

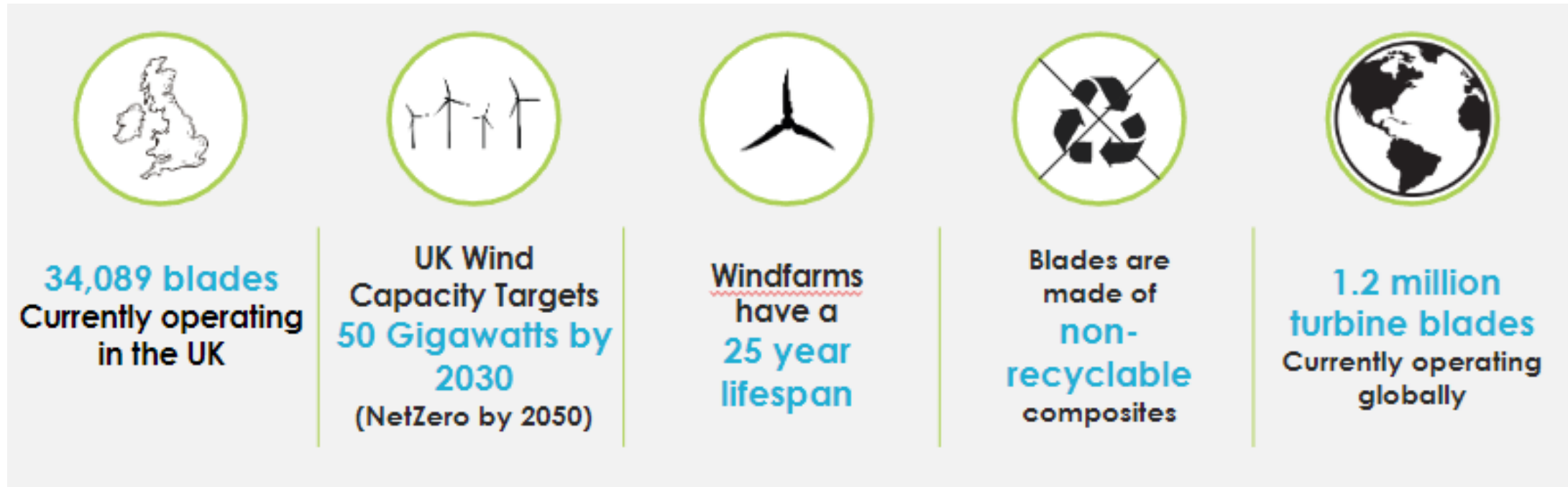
**So what's the problem?**





# Composite Materials

**There are over 1.2 million blades currently in operation across the globe and this number is increasing.**



The energy sector has a significant role to play in the transition to circular practices. Globally, as the first generation of wind farms are nearing end of life and are being decommissioned in greater numbers there is an industry wide acceptance and continent/country wide bans on the landfilling of blades.

# What's the sector doing about it?

Today WindEurope called for a Europe-wide landfill ban on decommissioned wind turbine blades by 2025. Europe's wind industry actively commits to re-use, recycle, or recover 100% of decommissioned blades. This comes after several industry-leading companies announced ambitious plans for blade recycling and recovery. A landfill ban would further accelerate the development of sustainable recycling technologies for composite materials."

EUROPEAN WIND ENERGY ASSOCIATION  
JUNE 2021



**CHEMICAL  
RECYCLING**



**MECHANICAL AND  
THERMAL RECOVERY**



**LANDFILL  
DISPOSAL**



**RECYCLABLE  
BLADES**

# Comparing Options

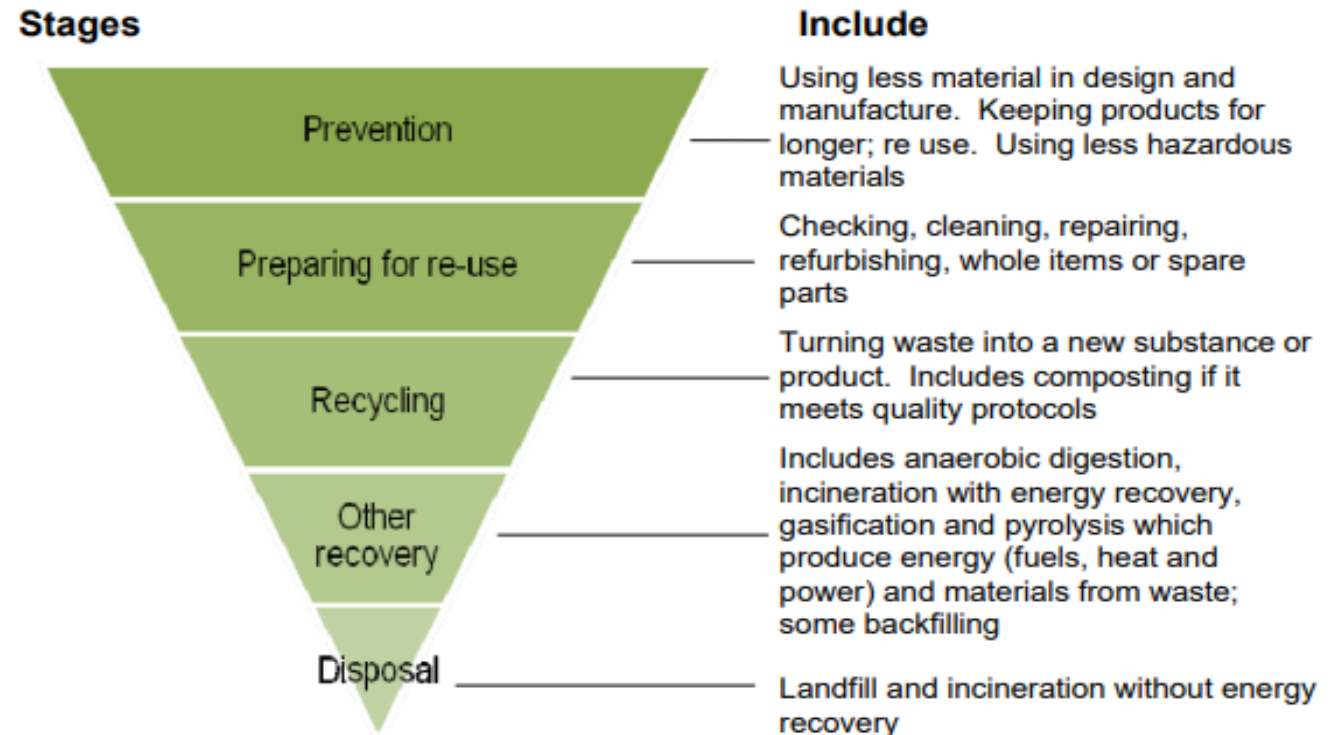
	Fibre value	Resin value	Energy use	Cost (at scale)	Commercial status
Refurbishment / repurposing				varies	
Mechanical recycling					
Thermal – pyrolysis		 			
Thermal – fluidised bed + fibre recovery		 			
Chemical recycling					
Cement kiln co-processing		 			
Energy from waste		 			
Landfill					



# Applying The Waste Regulations

The “**waste hierarchy**” ranks waste management options according to what is best for the environment. By law, reasonable measures must be taken to apply the waste hierarchy to prevent waste and to apply the hierarchy.

**The Waste Hierarchy gives top priority to preventing waste in the first place. When waste is created, it gives priority to preparing it for re-use, then recycling, then recovery, and last of all disposal (e.g. landfill).**

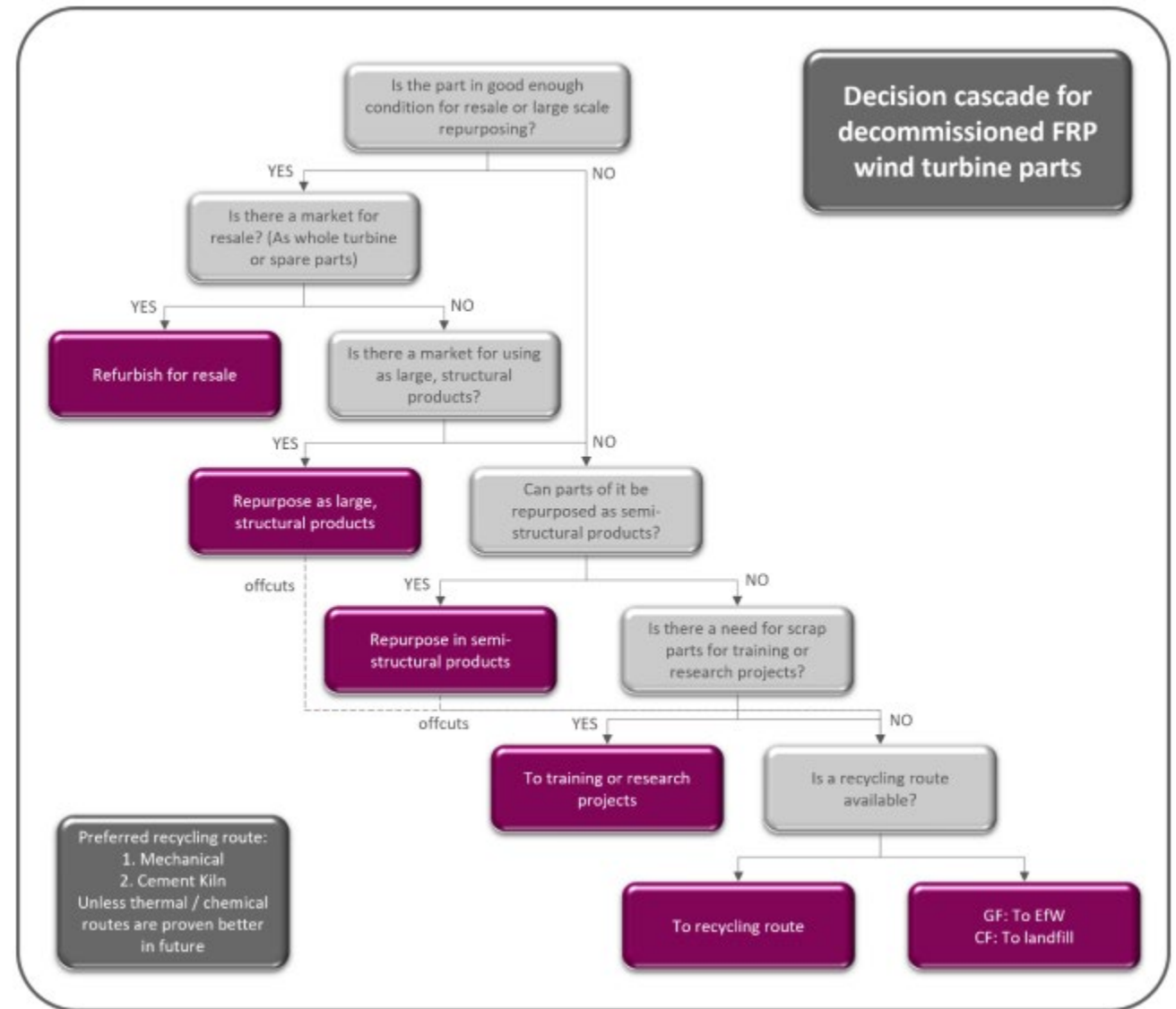


# Using The Regs as a Decision Making tool

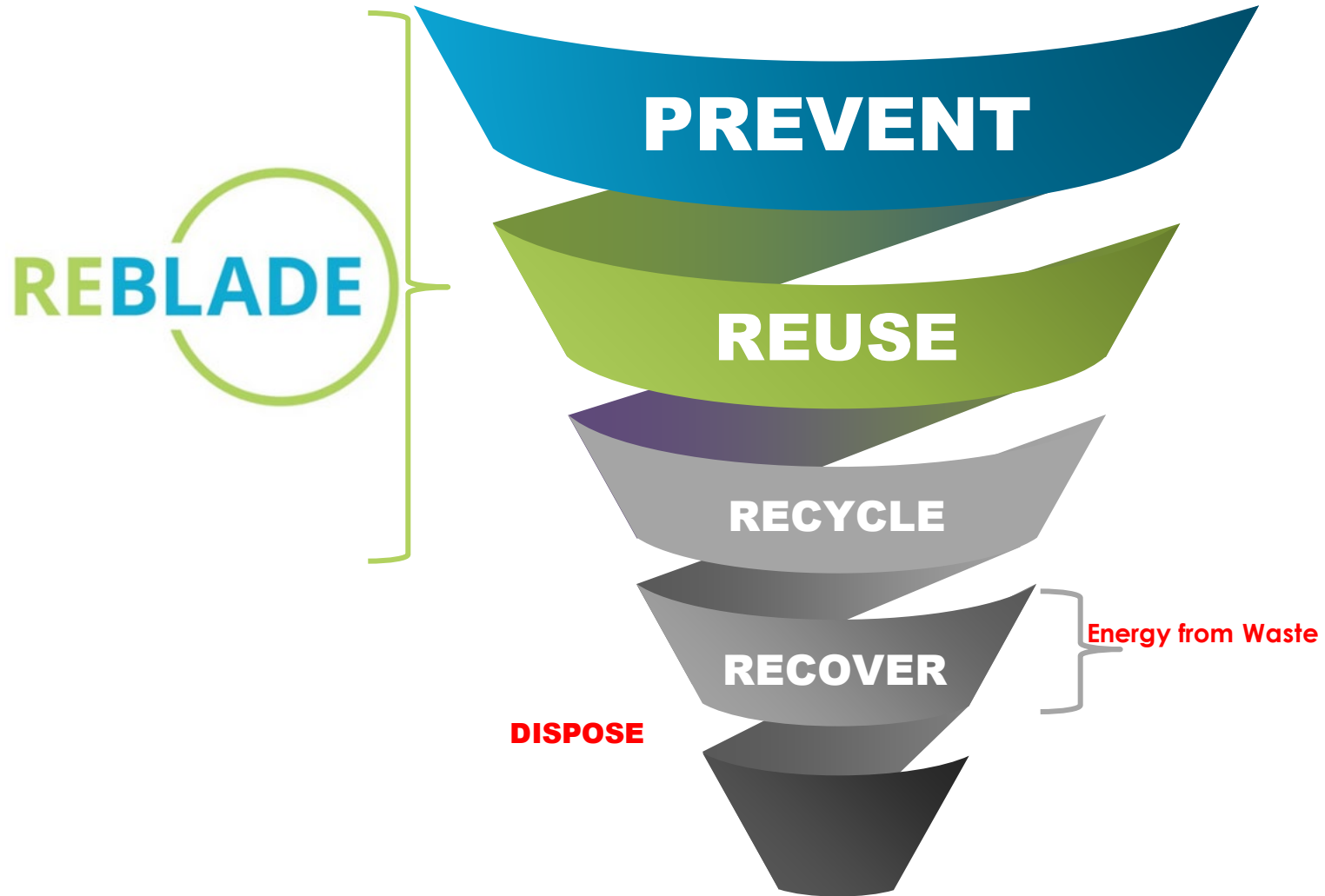
Adopt a method of Blade Triage.

This method represents an innovative approach to how we can rethink our use of materials.

**This decision making protocol establishes the best use of materials in line with the waste hierarchy.**



# Aim to move up the Waste Hierarchy!



1. Remove the need for landfill.
2. Retain embodied carbon in the material.
3. Reduce the need for virgin material.
4. Creates good, skilled jobs.

# 1.Remove the Need for Landfill

**Every blade reused is one less piece of composite diverted to landfill or burned in incinerators.**

**Plans ahead for  
Decommissioning**



**Think circular:  
make, use and  
remake!**



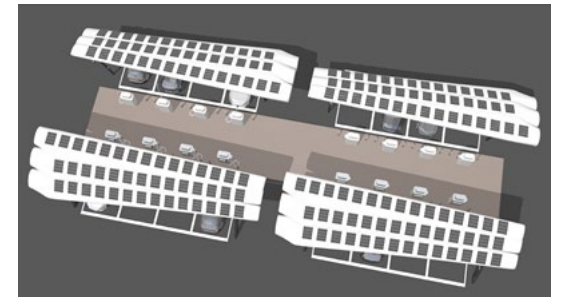
**Support during  
site design and  
operations**



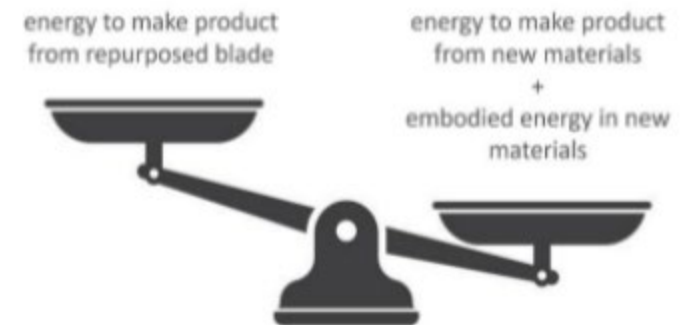


## 2. Retain Embodied Carbon in the Material

Life Cycle Analysis is a critical tool for assessing the carbon footprint of products and processes as we head towards a future, net-zero economy.



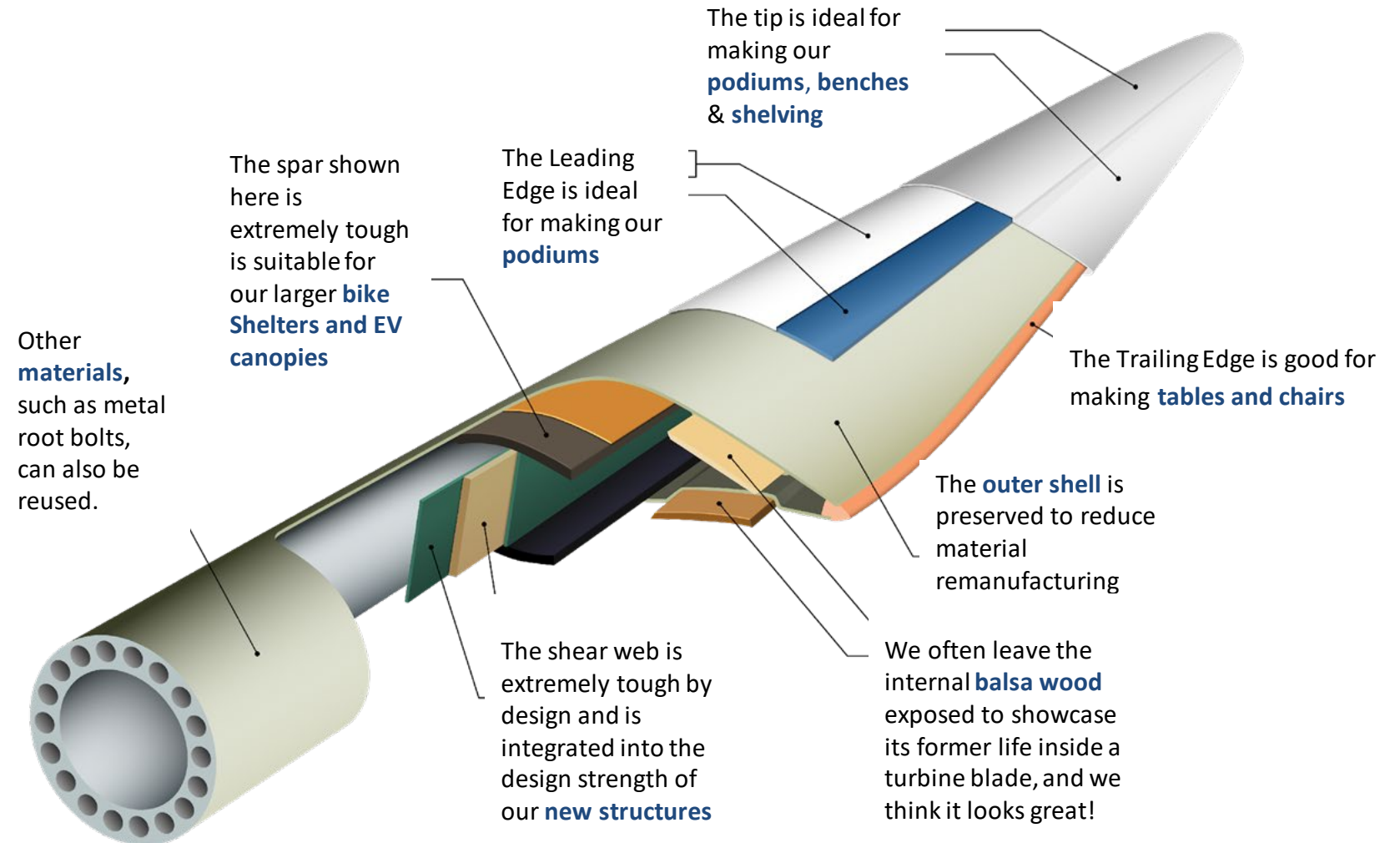
**Evaluating reuse potential through an LCA approach starts on site.**



# 3. Reduce the Need for Virgin Materials

We work with clients to create unique and bespoke designs to fit their needs.

Each design conforms to Eurocode standards and are fit for installation within the public realm.





# 4. Create Good Skilled Jobs

## SKILLS

Maximising the reuse of materials and minimising waste in the supply chain presents an opportunity for the development of high-value industries and jobs, particularly as more sites become ready for decommissioning.

Scotland can be a world leader in the reuse, refurbishment, remanufacturing and recycling of wind turbine components and wider assets, which in turn will create jobs and export opportunities.

### Enabling Circular Jobs

It is important to recognise that many jobs can support and enable the circular economy in Scotland.

Many of these job roles already exist within the supply chain of the circular sectors, with new roles emerging across the whole economy that raise awareness and promote circular strategies.

At the centre of these exciting new and innovative roles are key circular skills applied with an understanding of the value and opportunities created by the transition to a circular economy.



### Enabling Jobs

These jobs remove barriers and support the acceleration and upscaling of circular activities as we transition to a circular economy across Scotland.

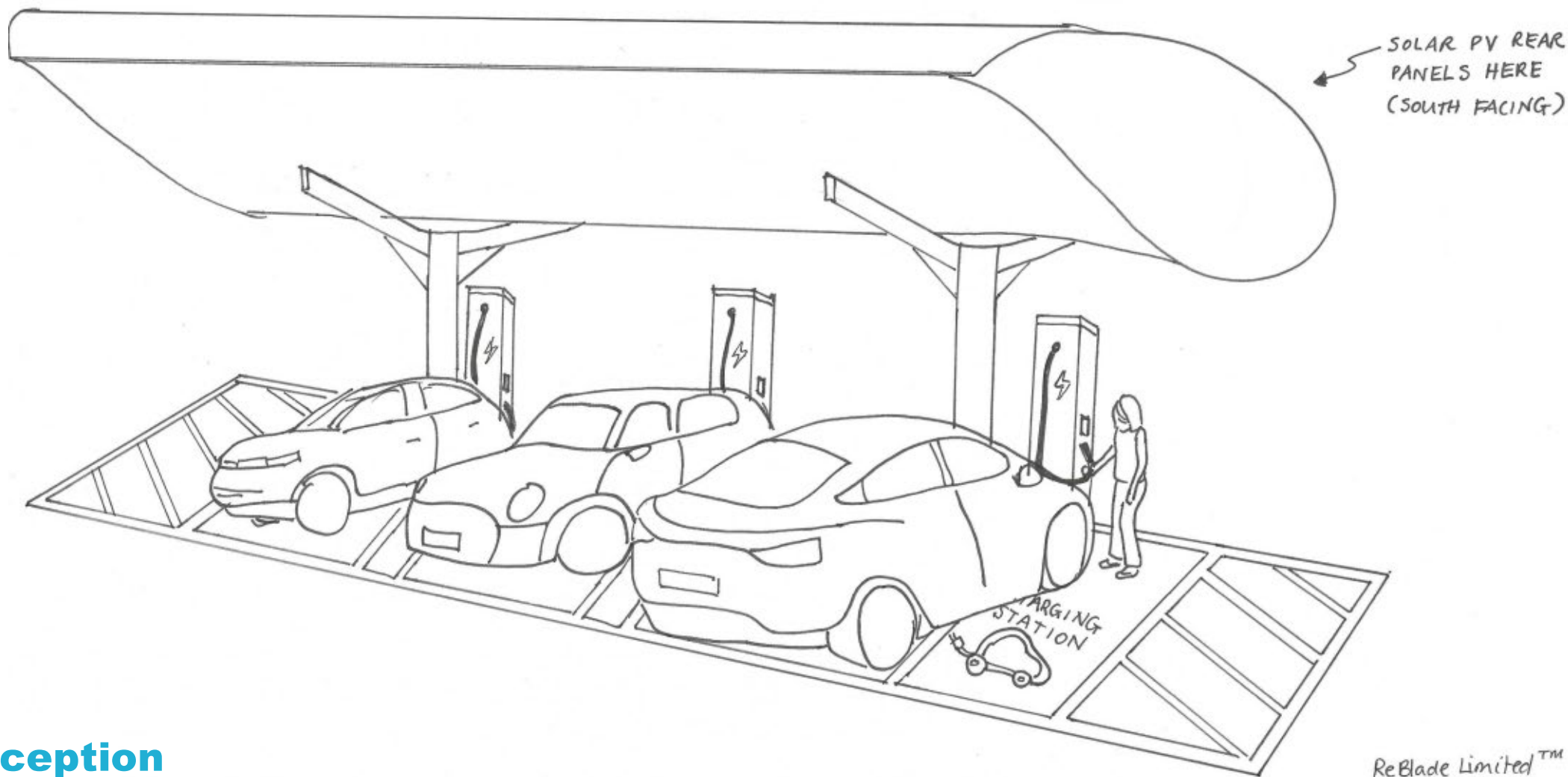
Enabling jobs could be jobs in design or digital technology or jobs that occur in the supply chain of the circular sectors and provide a service to uphold the circular jobs in repair, reuse, resource recovery and recycling.

# CASE STUDY





# Design for the Best Reuse of Materials



**Design inception**

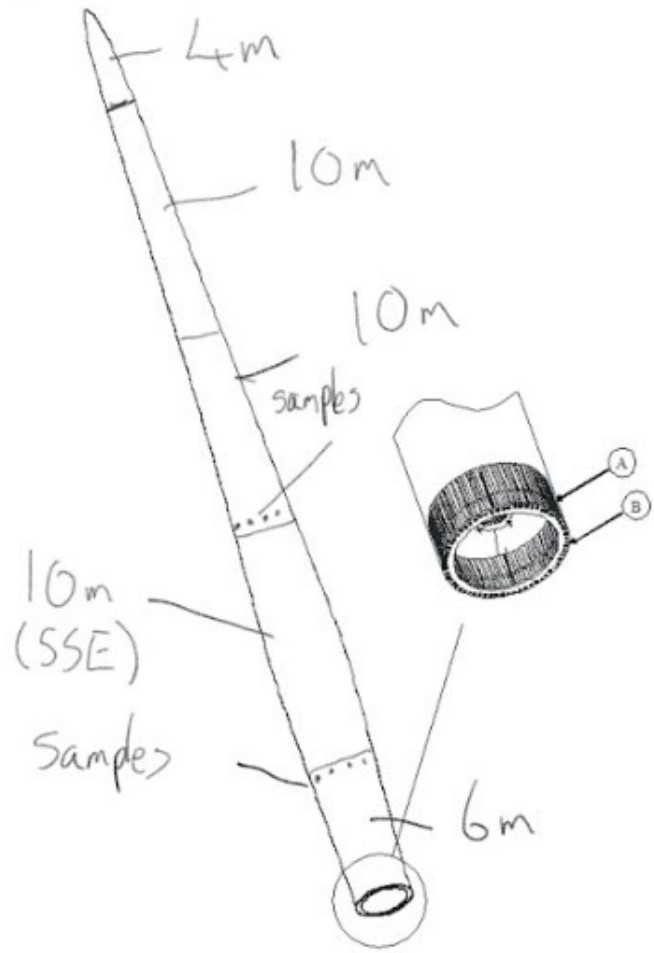
ReBlade Limited™

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**Detailed planning  
ahead of  
decommissioning  
site works**

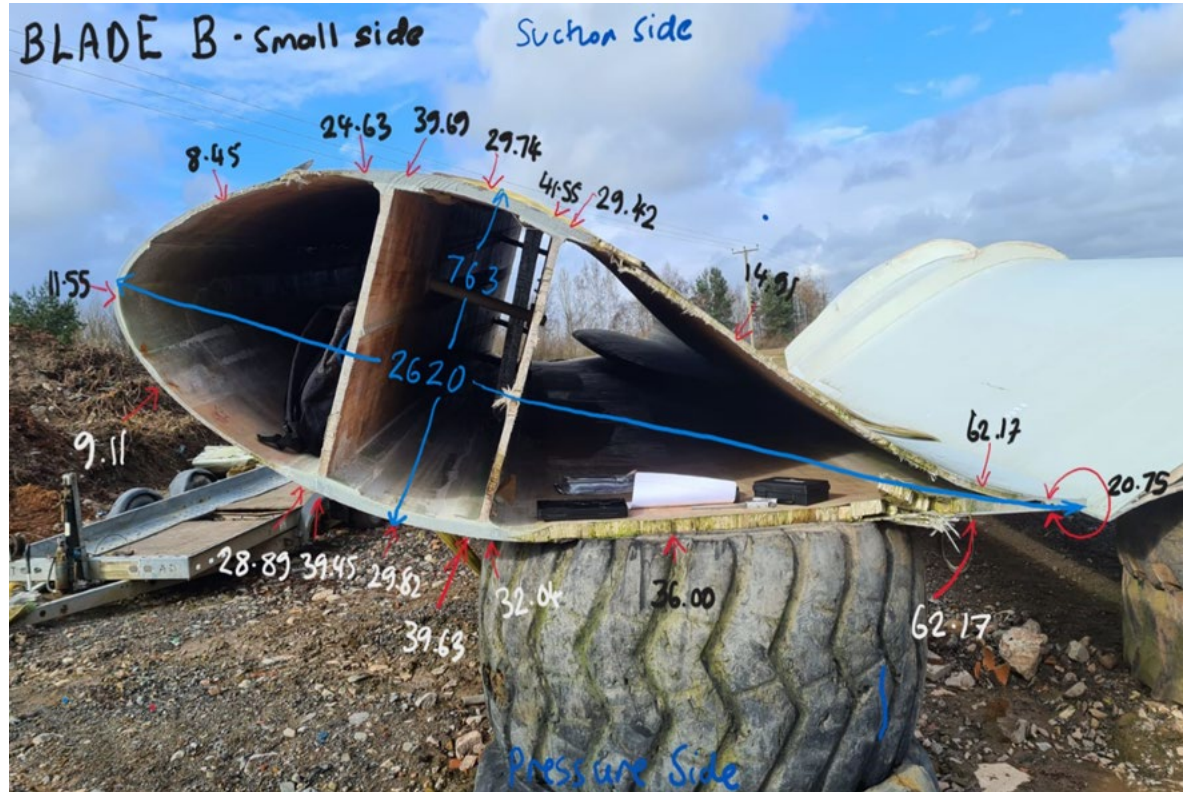




**Careful storage,  
sampling and  
testing**

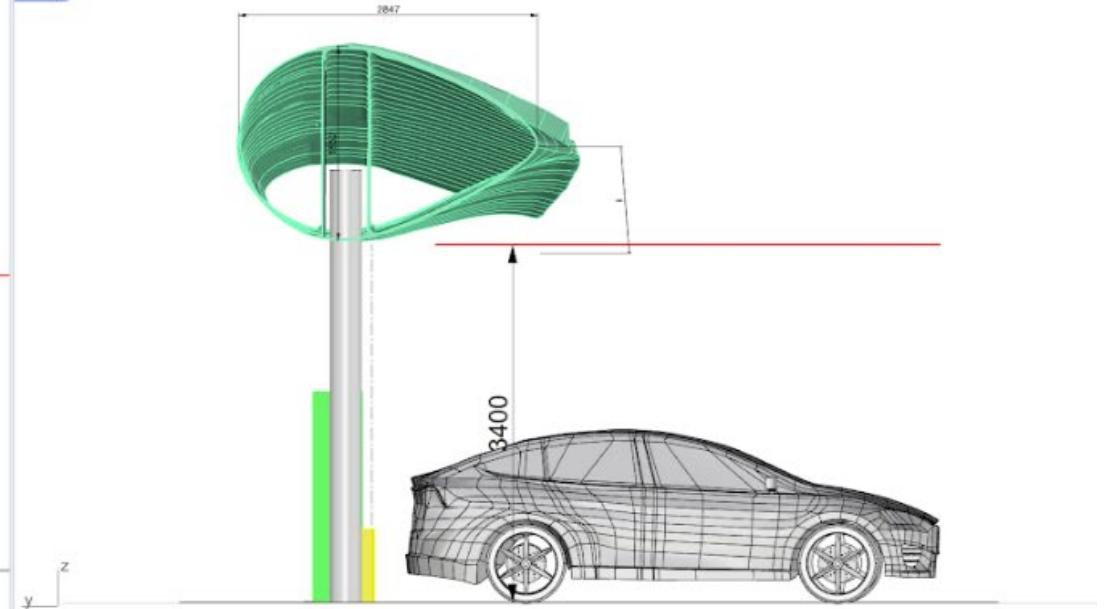
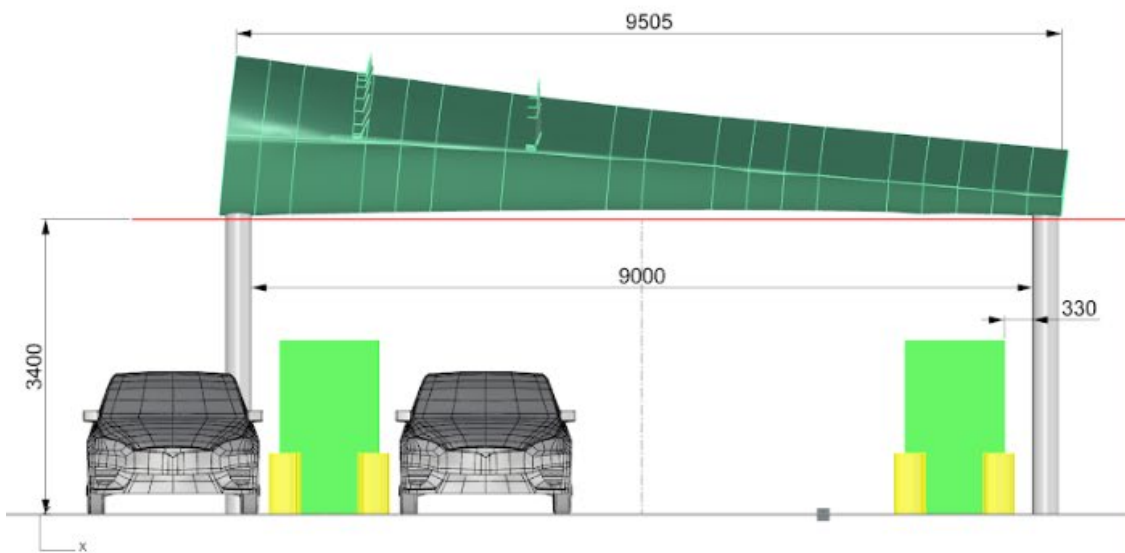
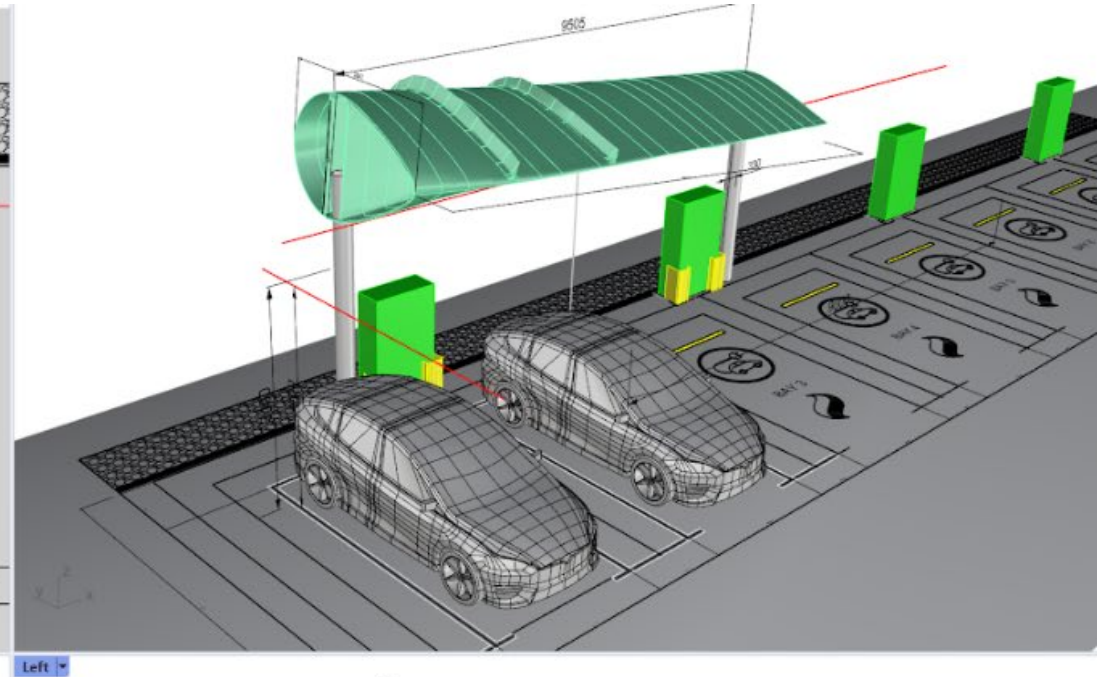
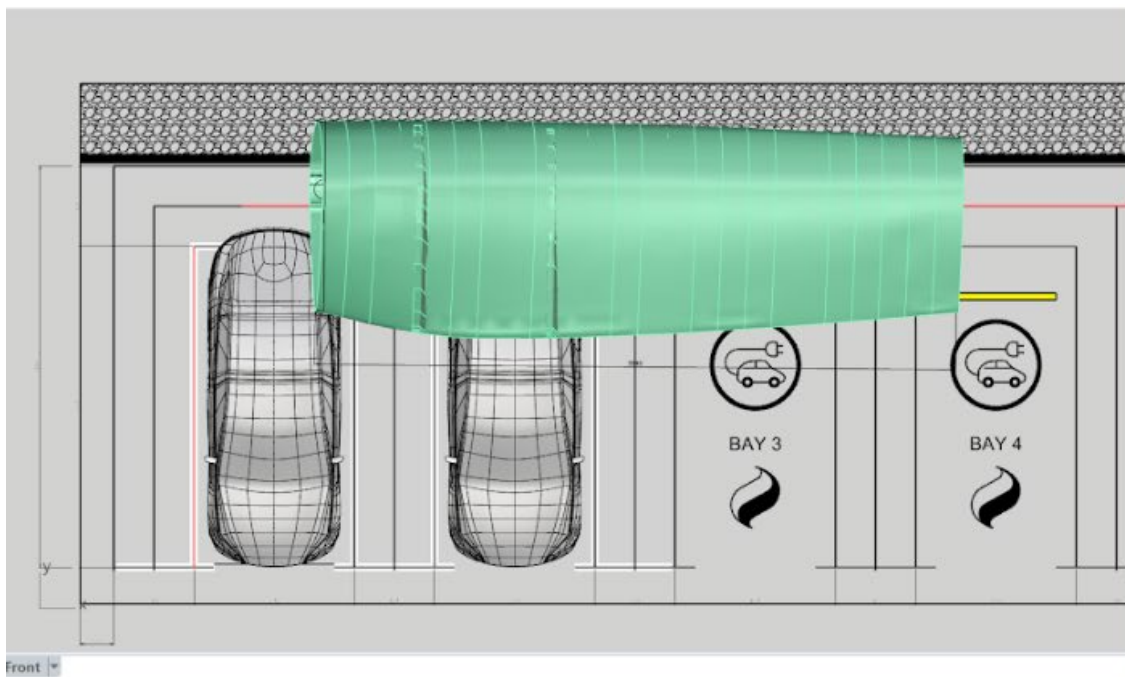






## Measurements and 3D scanning





**Bringing it all together**



**Pre site installation  
preparations and  
delivery**





**Installation works - planned lifting and handling methodologies**















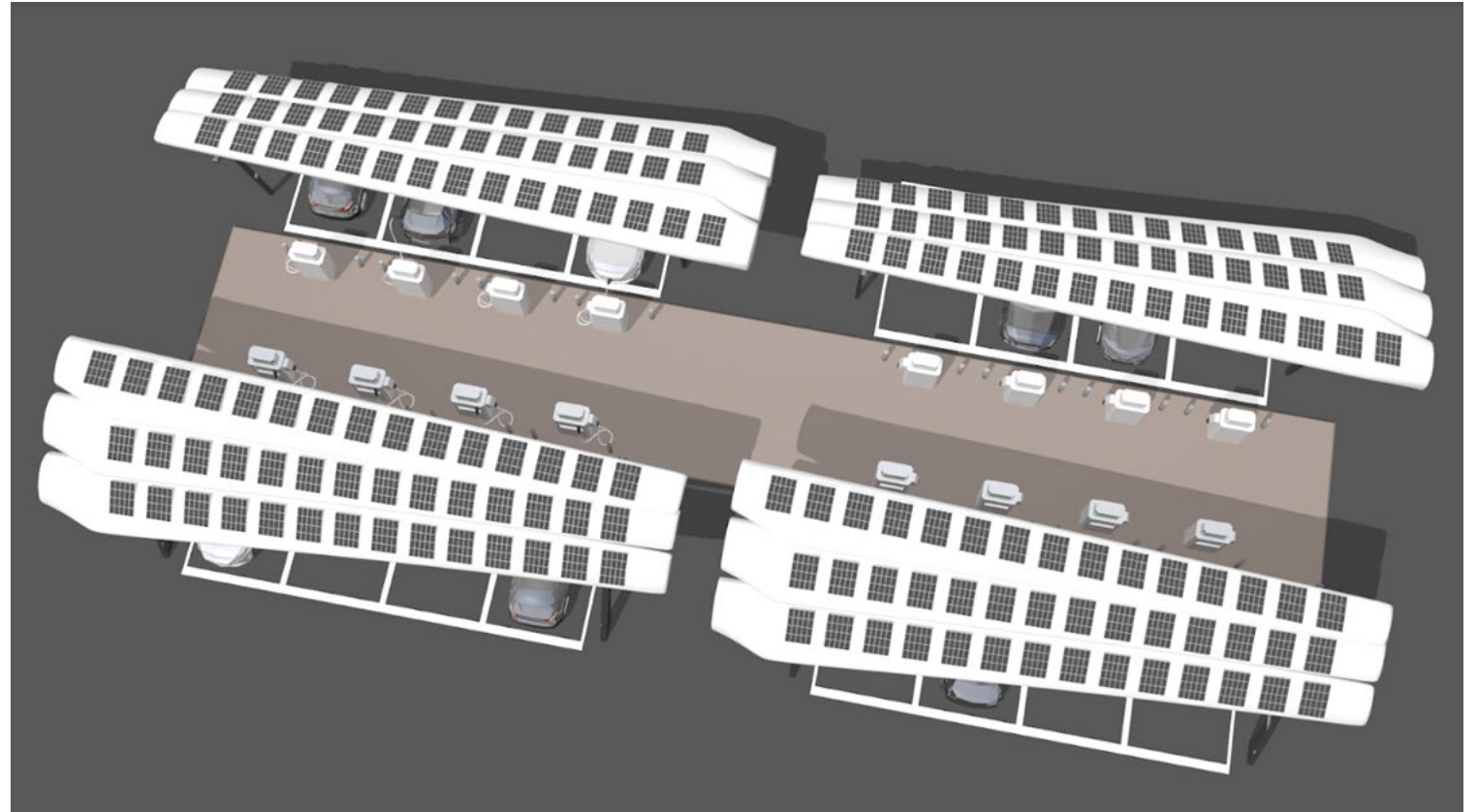




# What lies ahead?

**Continued Innovative Research and Development.**

**ReBlade will continue to support academia, industry and government to help deliver a fully circular economy in the wind sector and beyond.**





# Opportunities for Scotland!



## Exciting news for Scotland!

On 21st September the Onshore Sector Deal was signed, marking a momentous day for the industry and a massive commitment from the government and industry towards delivering targets *responsibly*."

**Circular economy can help create and support a thriving economy in Scotland!**

# Thank You

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