

FACTS

48
MONTHS

12
MILLION
EUROS

11
MONTHS

29
PARTNERS



CRACKING COMPOSITES



Composite materials are everywhere, and their use is on the rise, but when it comes to final disposal, reuse and recycling options have so far been limited. A new Horizon 2020 project aims to change that.

By Ben Messenger

Formula 1 cars may be unlikely to enter the recycling stream, but they are a perfect example of why the use of many composite materials is growing - their strength and lightness.

The combination of two or more substances to produce a material with superior physical properties is not new. Both wood and bone fall into this category. Today fibre-reinforced polymers are in wide use.

Hugely strong and very light, they offer advantages in a wide range of applications, from aircraft to cars to buildings. But while these materials can reduce fuel consumption and improve efficiencies, there are challenges to be overcome when it comes to recycling them once they reach end of life. That's something a new EU project, funded by Horizon 2020, aims to tackle.

The ECOBULK project has officially started its four-year journey towards formulating new materials and design models for the circular economy. Spanning three industries - automotive, furniture and construction - the project is focused on bulky composite materials, which are a significant obstacle to the mainstream adoption of circular economy models.

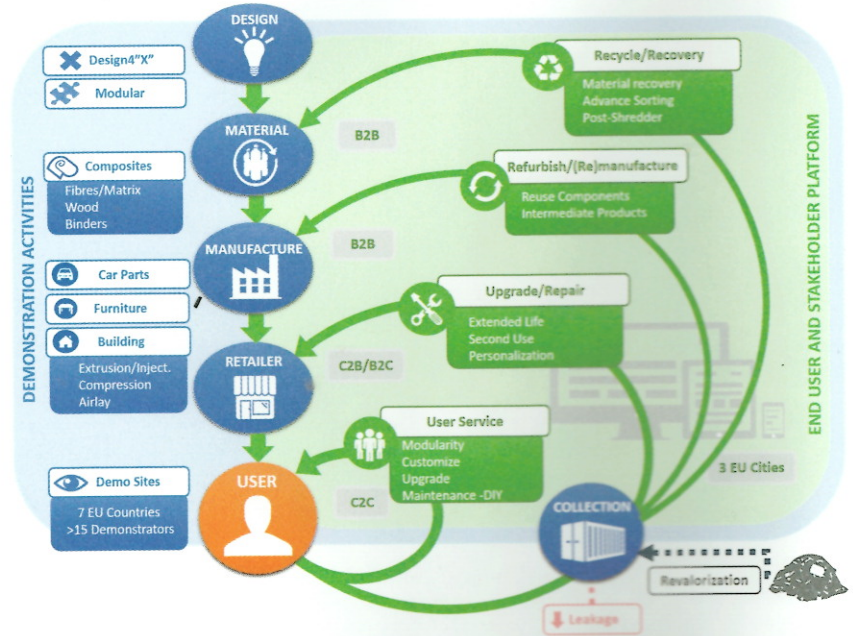
"Currently around 50 million tonnes of bulky composite waste is produced in the EU each year, of which around 60% ends up either in landfill or being incinerated," explains Dominik Jasiński, Sustainability Project Coordinator at Engineering and technology firm, Exergy, which is coordinating the project. "The idea behind the project is to design, demonstrate and manufacture completely new products made of composites which will be char-

RECYCLING

acterised by high modularity to facilitate the implementation of circular economy strategies through reuse, remanufacture and recycling.”

The methodology will focus on demonstration activities in seven countries, with around 15 demonstrators to address the key components of the circular economy solutions. It is hoped that a stakeholder platform linking end users with relevant actors from the early design stages to end-of-life will foster second life, reuse, and recycling of products and parts as well as material recovery for reintroduction into a circular production chain.

“The project is big,” says Ruud Balkenende, Professor of Circular Product Design at Delft University of Technology’s Department of Design Engineering. “We cover a broad range of composite materials – thermoplastic



The ECOBULK concept.

CLARITY MULTIWAY TURNS LIGHTWEIGHT PACKAGING WASTE INTO PURE MONEY.

1 for 6



Revolutionary: 1 sensor for up to 6 fractions.

Binder+Co is the sorting specialist for glass, plastics, paper, MSW, RDF, WEEE, slag, metals and C&D waste. Highest purity, consistent product quality and high yields with flexible and economic systems.

There is no other sensor based sorting system that has changed the world of recycling as sustainably as CLARITY.
www.binder-co.com

Come and see for yourself at



May 14-18, 2018, Exhibition Center Munich, Hall B5, Booth 115/214

binder+co
we process the future



The three industries being focused on by the ECOBULK project are automotive, furniture and construction – the project is aiming to find reuse and recycling routes for bulky composite materials. If anyone does have carbon fibre Koenigsegg that needs a second life please get in touch...

polymers with filler particles, advanced carbon fibre materials, glass fibres used in construction – all those composites have their own potential recycling route and their own specific properties that are tailored to an application.”

“What is important is that on the one hand we should look into the recyclability of materials, but also that we should realise that these composites have their own specific structural function properties and we need to understand from a design perspective how we can maintain those properties,” he continues.

The professor explains that when you recycle the material, you end up with fairly low-end material. You lose any additional properties generated by tailoring a composite.

“We have to think about what uses a specific composite might still have, what options are there for reshaping the composite, and that is quite different for a thermoplastic with filler materials compared to a glass fibre reinforced epoxy material,” says Balkenende. “Reusing things at a functional level is a major step. When you look into lifecycle assessments of, say, plastics, usually the impact of recycled plastics is around 50% of vir-

gin plastics, but for reused material that benefit is considerably larger.”

Dominik adds that it is important to note that the key aim of the project is not to design new products with waste materials, although that is one aspect, but to learn how to better design products so that in the future, it will be far easier to extract the full value of the materials used in them.

“That applies to both the fairly simple composites used in cars to the far more advanced materials used in wind turbines,” he tells WMW. “We have partners in 11 countries which are able to cover every stage of the economic system. We have designers, manufacturers, collectors and recyclers. We are in the initial stages of the project, so we’ve just defined the type of products we are going to develop.”

Jelle Joustra, PhD Researcher at Delft University of Technology, who is currently researching design strategies for composite materials in the circular economy adds that: “ECOBULK is different because it’s not another waste valorisation project. The key innovation is that we are using a disruptive approach. We are starting with the design to develop completely new

“FROM A DESIGN PERSPECTIVE, LINEAR PRODUCT RECYCLING IS COINCIDENTAL. ECOBULK, WITH ITS COMPLETE DESIGN AND PRODUCTION MODEL FOR CIRCULAR PRODUCTS, ELIMINATES THIS COINCIDENCE AND REPLACES IT WITH THE PROMISE OF LONGER PRODUCT LIFECYCLES AND A HIGHER RETENTION OF VALUE.”

Professor Ruud Balkenende
of TU Delft

“THE PROJECT IS BIG.”



Professor Ruud Balkenende of TU Delft

products and a completely new economic approach. If we can demonstrate it in this sector, we believe the results could be applicable in other sectors.”

Felipe Maya, Manager of the Green Building and Cities Department at Exergy and Coordinator of the ECOBULK Project, adds that the idea behind the project was to find sectors where composites are important. “That’s why we got into the automotive sector, the furniture industry, and the building and construction industry,” he says.

END GAME

Central to the ECOBULK approach is that the design and business model aspects need to be better integrated into production to enable circular economy features in products. When it comes to returning a profit from the reuse and re-

cycling of composites, Dominic explains that ECOBULK is aiming to promote new business models, shifting away from the traditional buy/sell model towards leasing and take-back models.

“It’s something that we’re going to investigate. At the end of the project, we’re going to present a business case for three different sectors because we realise that without the business case it is very difficult to practically implement the solutions,” he says.

Felipe agrees and concludes: “One of the key components of the project is design, to make sure that a product can be easily recycled in the future, but at the same time we are investigating how to make money out of it. We have a work package dedicated to that. If we are not able to find economically sustainable solutions, we have a problem.” —

UNTHA
shredding technology

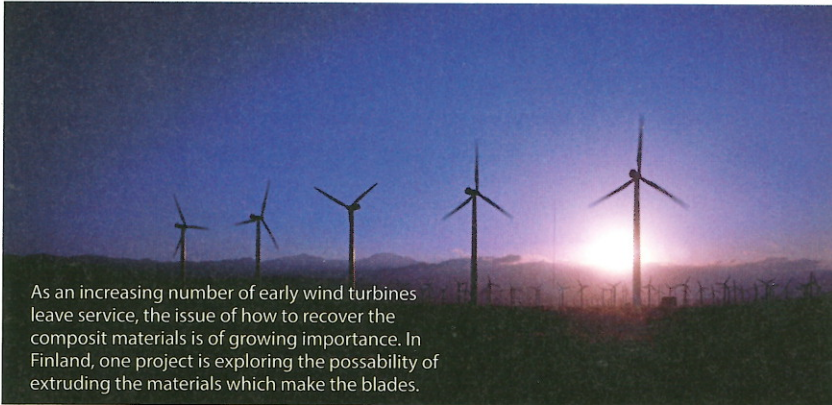
The reliable brand!

SOLUTIONS TO TRUST IN

- > Static and mobile XR class: get up close to our waste wood shredder at the Biomass Preparation Technology (VDMA) Demonstration Days
- > RS150 4-shaft shredder: the power pack for extraordinary requirements
- > QR class: trouble-free shredding of recyclables
- > UNTHA Lifetime Support: new service packages for a long uptime and machine life

Hall B6, Stand 127/226

www.untha.com/ifat



As an increasing number of early wind turbines leave service, the issue of how to recover the composite materials is of growing importance. In Finland, one project is exploring the possibility of extruding the materials which make the blades.

BLADE RE-RUNNER

A short time ago, Finland's very first wind power turbines were dismantled after nearly 30 years in service. Much of the material is easy to recycle – mostly steel. But the blades are made with thermoset FRPs that have so far been considered unrecyclable. Finnish engineering R&D firm Conenor began experimenting with them using extrusion techniques. While these still need more thorough testing, early results show that these could well be used in lightweight construction applications. Markku Vilkki, CEO of Conenor and demonstration manager for the project ECOBULK, has already produced samples of wood composite extrusion profiles containing 20% FRP waste from wind turbines. At Delft University of Technology, Professor Ruud Balkenende and his team of researchers are experimenting with a large sample

of wind turbine waste that was supplied by project partner Virol.

So far, its approach is to use the waste to build new products, and through this experience learn how we can improve the original materials for better and easier reuse at the first end-of-life stage.

"Wind turbines are quite interesting," explains Dominik. "Already in tenders for wind farms, bidders are having to say how they will deal with the decommissioning, so blade manufacturers are aware that they will have to dispose of the blades in a decent way at the end-of-life, so we already have interest from blade manufacturers in how they can use our findings."

Professor Balkenende adds: "At the moment we have to do reverse engineering, looking at what components we have available and how we can apply those materials and

structures. What would be far more interesting would be to trace the product back to its origins to see how we could adapt the design of a blade to make the parts more easily available for later reuse." —

"THIS IS NOT JUST A PROBLEM FOR TURBINE BLADES. COMPOSITE MATERIALS ARE A FAST-GROWING CHOICE FOR MANY APPLICATIONS DUE TO THE EXCELLENT WEIGHT-TO-STRENGTH RATIOS, EXCELLENT DURABILITY, AND HIGHLY FLEXIBLE MOULDING AND MANUFACTURING TECHNIQUES."

Markku Vilkki

CEO of Conenor and demonstration manager for the ECOBULK project

INTELLIGENT CHANNEL BALING PRESS THE WORLD INNOVATION AT THE IFAT 2018 IN MUNICH

With the **UPASMART®** we present, exclusively at the IFAT in Munich, the **first channel baling press, equipped with artificial intelligence for optimal baling of secondary raw materials.**

CONVINCE YOURSELF!
FROM 14 TO 18 MAY 2018
HALL B5, STAND 217/316