

News release from Vestas Wind Systems A/S, Olin Corporation, Danish Technological Institute, and Aarhus University

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New coalition of industry and academia to commercialise solution for full recyclability of wind turbine blades

A coalition of industry and academic leaders have developed a new technology to enable circularity for thermoset composites, the material used to make wind turbine blades. The new technology delivers the final technological step on the journey towards a fully recyclable wind turbine value chain. To enable the adoption of this new technology, and to advance a circular economy across the wind industry, a new initiative entitled CETEC (Circular Economy for Thermosets Epoxy Composites) has been established. Within three years, CETEC is aiming to present a fully scoped solution ready for industrial adoption, based on commercialisation of the novel circularity technology.

Partly funded by Innovation Fund Denmark (IFD), CETEC is spearheaded by Vestas, the global leader in sustainable energy solutions, and involves both industrial and academic leaders including Olin, the world leading producer of Epoxy, the Danish Technological Institute (DTI), and Aarhus University.

Developed by DreamWind, an innovation initiative driven by the same partners, the new technology consists of a two-step process. Firstly, thermoset composites are disassembled into fibre and epoxy. Secondly, through a novel chemcycling process, the epoxy is further broken up into base components similar to virgin materials. These materials can then be reintroduced into the manufacturing of new turbine blades, constituting a new circularity pathway for epoxy resin.

Wind turbines are 85-90 percent recyclable, with turbine blade material constituting the remaining percentage that cannot be recycled, due to the nature of thermoset composites. CETEC is aiming to close this recycling gap and enable a significant step forward in the elimination of waste across the wind energy industry.

“As global commitments to a net-zero future increase, it’s absolutely crucial to ensure the wind industry can scale sustainably, which includes Vestas fulfilling our ambition to produce zero-waste turbines by 2040. Leveraging this new technological breakthrough in chemcycling epoxy resin, the CETEC project will be a significant milestone in Vestas’ journey towards achieving this goal, and in enabling a future where landfill is no longer required in blade decommissioning,” said Allan Korsgaard Poulsen, Head of Sustainability and Advanced Materials, Vestas Innovation and Concepts.

“The key characteristic of composite materials is their unique combination of low weight and high strength. This is governed by the strong bonding of two different materials – fibre and epoxy. The dilemma is that this strong bond is also the feature that renders these materials difficult to recycle. Therefore, the development of CETEC’s novel technology, enabling disassembly of the composite at end-of-life, is a gamechanger, that will allow us to capture the value represented by each material stream in a new circular value chain”, said Simon Frølich, Team Manager, PhD, Danish Technological Institute.

“Chemcycling of epoxy-based materials would allow deconstructing these highly stable polymer chains into molecular building blocks. These building blocks are easily processable and can be utilised to produce new epoxy, which will have the same quality as the original material. Avoiding the loss of valuable molecular complexity in such a way is a highly desirable concept and an important step to sustainable materials,” said Prof. Dr. Troels Skrydstrup, Aarhus University.

CETEC's solution will address the lack of available recycling technology for epoxy resins. This would in turn create the possibility to introduce new recycling solutions to the wind industry. This holds significant potential for commercial value capture, particularly in markets where regulation around waste management for manufacturing industries is tightening to serve a broader sustainability agenda. When fully developed, the solution may also have an impact for other industries that rely on thermoset composite in production, such as automotive and aviation.

"As the leading Epoxy producer and global supplier for the wind industry, Olin is proud to provide our technological expertise to this important sustainability project," said Leif Ole Meyer, TS&D Leader EMEAL at Olin. *"To develop technologies which close an existing gap of thermosets by creating a circularity is yet another example of putting our Resource Efficiency sustainability goal into action. This innovation will help the industry to minimize consumption of virgin material sources and increase the reuse and recycling of materials."*

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About Danish Technological Institute

Danish Technological Institute (DTI) is an independent research and development institute. We take an innovative approach to improving the competitiveness of business and industry, society and public life. With more than 12,000 customers in 65 countries, we develop new knowledge through research and development activities in close corporation with Danish and international companies and research institutes.

Learn more about us here:

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About Aarhus University

Aarhus University is a globally oriented, academically diverse and research-intensive university. Aarhus University ranks among the top 100 universities in the world on several of the most important international ranking lists, out of over 17,000 universities worldwide. Around 12 per cent of AU's 40,000 students are international, representing over 120 nationalities. Aarhus University offers state-of-the-art facilities and laboratories having a strong tradition of multidisciplinary research for instance in one of our 42 major research centres. The university's goal is to contribute towards solving the complex global challenges facing the world. The university therefore strives to combine the high level of academic standards of its researchers with collaboration across disciplinary boundaries to combine research in new ways and solve challenges in close contact with the world around us.

For more information please visit: <https://www.au.dk/>

About Olin

With over 8,000 employees globally and almost 130 years in business, Olin Corporation is the world's chlor-alkali leader, including epoxy products and chlorinated organics. Olin's regional headquarters for Europe, Middle East, Africa, and India is based in Zug, Switzerland. The company employs over 650 professionals in its European offices, research and innovation centers, and manufacturing locations in Baltringen, Rheinmunster and Stade, Germany, Pisticci, Italy, and Terneuzen, Netherlands. Olin is committed to exceeding customer expectations through operational and commercial excellence, innovation capabilities and quality people who serve our valued customers.

For more information, visit www.olin.com

About Vestas

Vestas is the energy industry's global partner on sustainable energy solutions. We design, manufacture, install, and service onshore and offshore wind turbines across the globe, and with more than 136 GW of wind turbines in 84 countries, we have installed more wind power than anyone else. Through our industry-leading smart data capabilities and unparalleled more than 117 GW of wind turbines under service, we use data to interpret, forecast, and exploit wind resources and deliver best-in-class wind power solutions. Together with our customers, Vestas' more than 29,000 employees are bringing the world sustainable energy solutions to power a bright future.

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