WIND TURBINE BLADES OF THE FUTURE COULD BE RECYCLABLE

What do you do with a wind turbine that is no longer operational? This question is becoming more and more relevant as the expiration date is drawing closer and closer for wind farms that were erected early on.

According to Mogens Hinge, an associate professor in the Department of Engineering at Aarhus University, who, along with his research team and industrial experts, has specialized in developing nanobinders, the first generation of wind turbines that have already been scrapped at enormous "graveyards" where the components are crushed and buried in the ground because it is virtually impossible to recycle the material.

"Components made of fiberglass have to go through a difficult procedure before they can be reused," Hinge said. "This entails separating the glass from the plastic, and you can only do this if you heat the material for a long time at 600 degrees Celsius, which is far from profitable from both an energy and an economic standpoint."

This acute problem in the wind turbine industry inspired them to develop a solvent with the opposite properties so that instead of binding materials to each other, it can separate them chemically with limited or no heating.

In the DreamWind project, researchers are working toward developing a chemical substance that will make it possible to separate composite materials from each other. This means that the large, expensive fiberglass components from wind turbines will be recyclable in the future.

There will be plenty of activity in the laboratories in the coming years when researchers develop new materials that make recycling wind turbines easier. Associate Professor Mogens Hinge (pictured here) works in the Department of Engineering.

NEW BINDING AGENT FOR FIBERGLASS

The researchers are initially focusing on designing an agent for fiberglass, and the first laboratory results are promising. The idea is that when the glass has been cleaned it can be reused for new structural fiberglass components such as wind turbines.

"This way, we can retain the value of the material instead of just discarding it," Hinge said. "The technology holds great potential for recycling."

At the same time, the technology can save the wind turbine industry a considerable amount of money and reduce carbon dioxide emissions.

"It's expensive to manufacture fiberglass that can't be recycled and to drive around with blades when they have to be scrapped," Hinge said. "It's expensive to smash them to pieces and bury them. Chemical research can provide the industry with an enormous boost of innovation."

CHEMICAL RESEARCH PAVES THE WAY FOR MORE RECYCLING

Innovation Fund Denmark has invested a total of DKK 17.6 million (approximately $2.6 million) in the project, which could influence the recycling of composite materials outside the wind turbine industry.

"With the investment from Innovation Fund Denmark, we now have an opportunity to develop smart new materials that can change shape or separate as required when they're no longer in use," said Kim Daasbjerg, a professor in the Department of Chemistry at Aarhus University. "This is an important project that could have a major impact on the way in which materials are recycled in the future."

In the DreamWind project, Aarhus University will collaborate with partners including Vestas Wind Systems A/S and the Danish Technological Institute to develop new composite materials for wind turbine blades.

The parties expect to be ready with a chemical compound for separating fiberglass within four years.

— Source: Aarhus University

For more information, go to www.au.dk/en.