**PRESS RELEASE**

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Green feature to wind turbines:

# Y-MatTec® has Developed Groundbreaking Method to Capture Carbon and Harmful Waste Material in Ultra-High-Performance Concrete (UHPC)

*Soon on- and offshore wind turbines will grow to become an even more convincing part of green energy transition in our efforts to reach ambitious targets on CO2 reduction. Future wind turbines will even have the capacity to solve challenges with environmentally harmful industrial waste.*

The groundbreaking method to capture CO2 in the wind turbine concrete foundations is developed by Y-MatTec® headquartered in Denmark. In essence by introducing +10% pyrolysis material to the concrete mortar without compromising the unique UHPC density and strength.

Carbon capture in ordinary concrete is a technology well-known. CO2 capture in UHPC, however, is breaking news never achieved before. Y-MatTec® is expected to be granted a patent for the method in Denmark late 2024. Next step in the process will include patents in the EU, North- and South America, Asia, as well as European countries outside the European Union.

“In the laboratory we have proven ourselves capable of what no one else succeeded with. Our patent is now being processed,” says Y-MatTec® CEO Elo Yde. Due to the patent process, he cannot reveal the method in detail. In general terms, however, the method is a chemical process transforming pyrolysis material into a well-designed UHPC-component.

Manufacturing ultra-high-performance concrete is a restricted business. In the European market only a handful of companies are certified to manufacture and cast the tremendously strong concrete in foundations that absorb incessant stress and vibrations from wind turbines for decades.

“The strength in concrete is measured in megapascal (MPa). Ordinary concrete is usually 15-40 megapascal. Modern bridges are 65-75 MPa. UHPC is 120 MPa and above. At Y-MatTec® we produce UHPC with up to 200 megapascal (29,000 PSI) strength. That is rather extreme and the reason for Y-MatTec® to be approved by Vestas, Siemens Gamesa, and other world-leading wind turbine manufacturers,” Elo Yde explains.

It may seem a paradox to mix 10% pyrolysis material in concrete: The unique strength in UHPC is based on an extremely dense paste with ultra-low permeability. Y-MatTec succeeded to research and develop a chemical process that eliminate the permeability properties in pyrolysis material without compromising the UHPC-strength.

“Material from pyrolysis processing is interesting for several reasons: The pyrolysis process is likely to become one in several future sustainable energy solutions. Pyrolysis residual materials appear as a result from organic and industrial waste combustion at 600 degrees °C / 1,100 degrees °F with no oxygen present. The alternative in farming as an example would be to plow straw and plant residues into the soil. The plants will subsequently decay submitting carbon dioxide to the atmosphere and become part of the problem

related to climate change. In the pyrolysis process, however, the CO2 obtained by the plant in its life cycle through photosynthesis will be captured. Forever".

"Estimates suggest that the pyrolysis process may cut half of the carbon dioxide footprint in intensive agriculture. Clean pyrolysis material is suitable for improving sandy field soil. Yet, some pyrolysis material is contaminated with environmentally harmful residues such as heavy metal from industrial production or sewage treatment plants. It's rather obvious to mix contaminated pyrolysis material with our ultra-high-performance concrete as these harmful residues will be isolated from the environment and captured in the concrete permanently. Harmful residues will stay captured in the extremely dense UHPC even after decades of service as wind turbine concrete foundations are demolished and decomposed," Y-MatTec® CEO Elo Yde explains.

"10% pyrolysis material will replace a corresponding amount of cement. The carbon footprint in cement production is intense: Powdered limestone and clayey material are combusted at +1,400 °C / 2,250 degrees °F temperatures. Cement containing pyrolysis material will eventually turn into a greener ultra-high-performance concrete".

The perspectives are significant – for society in general as well as for the wind turbine industry:

"Promising news indeed – I dare to say. Soon the wind turbine industry can add a ground-breaking feature to its sustainable energy production – literally based on a greener and more climate-friendly foundation. In addition, saving society from expensive handling of environmentally harmful residues. Furthermore, the industry will support the pyrolysis industry at a crucial start-up phase empowering pyrolysis to become a significant part of sustainable future energy supply. That is concrete with a unique strength as well as corporate social responsibility," says Elo Yde in a closing remark.

**Notes to the editor:**

Media is invited to visit our production plant and laboratories in Holstebro, Denmark.

Please contact Y-MatTec® CEO Elo Yde for interview and inquiries:

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**Global Market Preparations**

- Y-MatTec® and Springkilde Bio – providing pyrolysis material – started a 2-year research and development project 1 January 2024. The project has been granted a DKK 2M funding by the Danish Energy Agency.
- By the end of 2025 ultra-high-performance concrete (UHPC) containing pyrolysis material is expected to enter final approval process and preparations for the international market.
- UHPC with pyrolysis material will have a 130-150 megapascal (MPa) strength.
- Y-MatTec® headquartered in Holstebro, Denmark, is the only UHPC manufacturer worldwide capable of producing a more sustainable ultra-high-performance concrete for on- and offshore wind turbines. A UHPC product containing pyrolysis material with carbon capture properties from agriculture as well as the capacity to enclose heavy metal residues from

industrial waste, plastic, paint, demolition waste, slam from sewage plants, PFAS, fiberglass from discarded wind turbine wings, yachts etc.

- As part of market preparations Y-MatTec® will invest DKK 50M in capacity building in Denmark and abroad. Approximately 90% of total UHPC-production is export. Y-MatTec® expect staff to increase from currently 7 to 50 employees in the years to come.

## Pyrolysis – Combustion Without Oxygen

- Pyrolysis is a combustion process at 600 degrees °C / 1,100 degrees °F with no oxygen present. The absence of oxygen leaves no carbon emissions to the atmosphere. Residual products are gases suitable for the energy sector and solid pyrolysis material.
- If clean the pyrolysis material can serve as agricultural soil improvement.
- If contaminated the groundbreaking Y-MatTec® method can recycle pyrolysis material as component in ultra-high-performance concrete (UHPC).

## A High-Value Green Choice

- Steel, fiberglass, and cement are by far the wind turbine components with the most significant carbon footprint. For cement approximately 750-kilogram carbon dioxide per ton cement produced.
- Y-MatTec® will replace +10% of the UHPC-cement with pyrolysis material.

## Small-Size Companies with Huge Ambitions

- Strict regulations apply to businesses casting ultra-high-performance concrete foundations for on- and offshore wind turbines. In the EU market only a handful of enterprises – including Y-MatTec® sister company Oestermark Grouting – are certified to perform the job.
- Oestermark Grouting cast UHPC foundations for Vestas, Siemens Gamesa, and other leading wind turbine manufacturers. In the European market Oestermark Grouting is a market leader with a 75% onshore market share. The onshore market value is DKK 200M per year – expected to grow to DKK 1.5Bn over the next 7-8 years.
- Markets in North America, Australia and Europe are expected to fuel most of the growing demand.
- With a greener and more sustainable ultra-high-performance concrete (UHPC) Oestermark Grouting and international partners expect to take a market leading position in the European market equivalent to its current 75% onshore market position.

## Forces of Gigantic Dimensions

- Testing of the World's largest wind turbines is ongoing in Denmark. With a massive 236-meter wingspan and 50-ton weight per wing gigantic forces are unleashed and propagated to the foundations keeping the enormous wind turbines in place.
- Ordinary concrete has a 15-40 megapascal (MPa) strength. Modern bridges are built with 65-75 MPa concrete. Ultra-high-performance concrete is >120 megapascal. The Y-MatTec® mortar has a 130-160 MPa strength.