

Increase renewable energy production avoiding ice build-up on wind turbine



NanoWings technology

Bio-inspired NANO coating for WINGS ice protection of wind turbines that can be installed under remotely controlled commercial drones.

NanoWings will result in lower material and manufacturing costs while reducing downtime, environmental impact and risk during O&M operations.

In detail, NanoWings is an effective and cost-efficient passive anti-icing technology comprising 2 innovations: First a layered and transparent nanocoating of super-glue and Teflon nanofibers loaded with Active nanoparticles that via a bio-inspired, Loto foils morphology, reaches outstanding hydrophobic, antifouling, antistatic and UV protection properties. Second is in-situ application system: an innovative and portable mini-electrospinning device.

NanoWings technology entails significant advancements with respect to the current anti-icing alternatives reducing ice adhesion over 20% with just 5 g/m² instead of 200 of the current paints and cutting related VOC emissions from solvents. Thus, to protect an entire turbine for at least 3 years only 4kg of NanoWings coating and 8 hours are required.

Business case & benefits for wind energy



ENVIRONMENTAL
BENEFITS



ECONOMIC
BENEFITS



SOCIETAL
BENEFITS

NanoWings has the potential to increase 2% the global wind energy production with economic benefits on energy cost and environmental benefits saving 4 million tons/year of CO₂ emission only in EU.

NanoWings will provide even an extra societal benefit reducing dangerous working conditions for O&M operators creating skilled positions as drone operators without gender bias.



From wind tunnel to Eolic park with nanomaterials

As **Linari Engineering**, we are recognized as technological world leader in electrospinning systems manufacturing to produce nanomaterials.

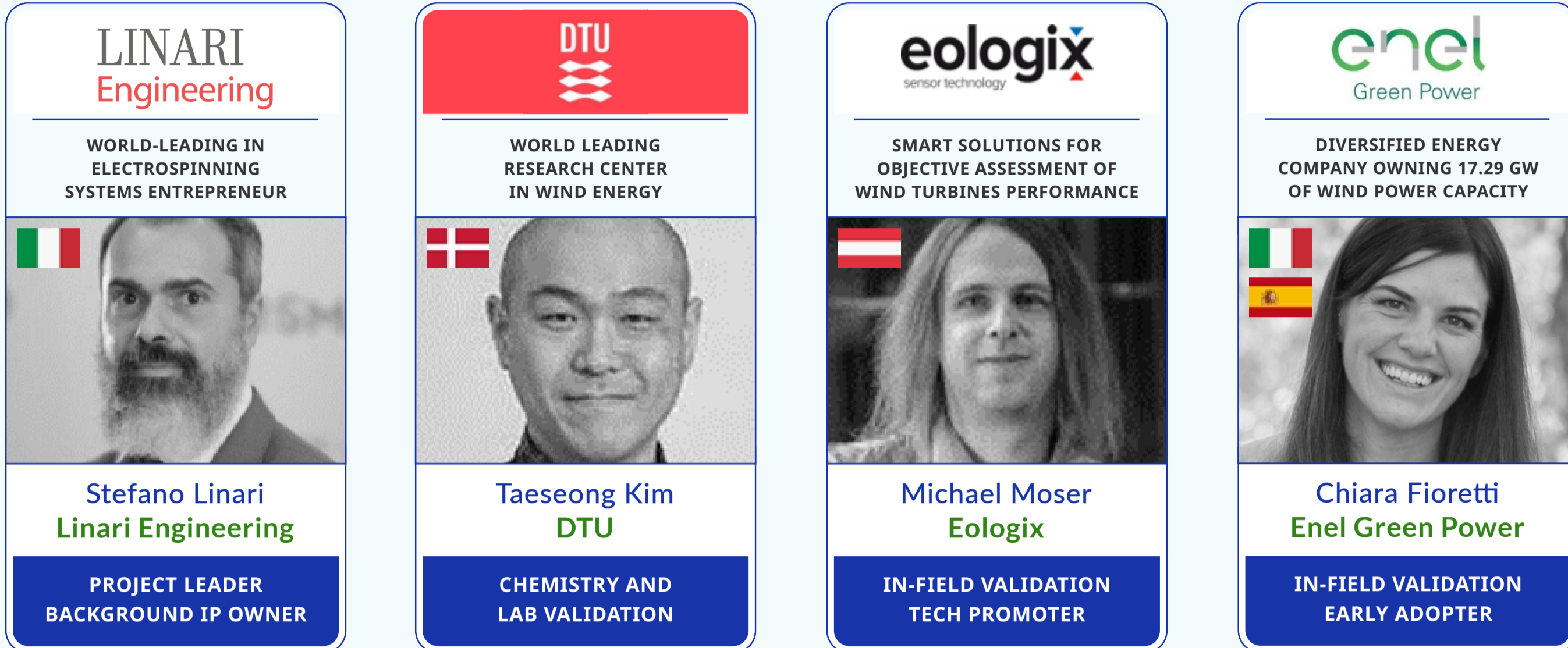
DTU Energy and Wind departments have a unique experimental facility and cooperate with us since 2013 to develop new nanomaterials.

eologix, a disruptive SME with patented wireless sensors for ice detection on wind turbines used by a large customer base of utilities and turbine manufacturers, is key for both NanoWings performance quantification and market entry.

And, **Enel Green Power**, as one of the world largest wind energy operators with 17.29 GW of wind power capacity worldwide, will be the early adopter supporting us during the validation of NanoWings under real conditions and referral once reached a high TRL.

The consortium

To reach this ambitious result, where many companies still fail, we have closed a unique consortium that covers the whole value chain of the project.



Background

NanoWings roots started in 2019 with Growbot project in which a miniature electrospinning system has been developed and later with Nanofix this technology was adapted to be mounted under a drone reaching the PoC. Moreover, this year we applied for a patent on nanocoating configuration and production process.

With NanoWings project we'll work on technical aspects of the coating and miniature electrospinning system to adapt them to wind turbine needs, in-field test validation in a Spanish Enel wind farm, and set the bases for the go-to-market strategy, mainly led by Linari from 2026, with the economic support of EIC Acceleration funds and equity.

NANOWINGS BACKGROUND & ROADMAP

