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PRESS RELEASE

## IRT Jules Verne launches 'ZEBRA project' to develop 100% recyclable composite wind turbine blades with industrial partners

Wind energy, both onshore and offshore, plays a critical role in the world's transition to carbon-free energy sources. With a product lifespan of 30 years and a wind turbine recyclability rate of 85% to 90%, the wind power industry is now looking to close the remaining gap by designing and manufacturing the first 100% recyclable wind turbine blade. The ZEBRA (Zero wastE Blade ReseArch) project, driven by IRT Jules Verne, now brings together industrial companies and technological centers (Arkema, CANOE, ENGIE, Suez, LM Wind Power, Owens Corning) to tackle with this new challenge.

*Nantes, 22 September 2020* – A cross-sector consortium today announced a groundbreaking project to design and manufacture the wind power industry's first 100% recyclable wind turbine blade.

### Towards highly recyclable composites

The ZEBRA (Zero wastE Blade ReseArch) project, driven by IRT Jules Verne, brings together industrial companies and technical centers to demonstrate on a full scale the technical, economic and environmental relevance of thermoplastic wind turbine blades, with an eco-design approach to facilitate recycling. The project has been launched for a period of 42 months with a budget of 18.5M€.

To accelerate the wind power industry's transition to a circular economy for wind turbine blades, the ZEBRA project establishes a strategic consortium that represents the full value chain: from development of materials, to blade manufacturing, to wind turbine operation and decommissioning, and finally recycling of the decommissioned blade material.

- **Arkema** has developed Elium®, a thermoplastic resin, well known for its recyclable properties by depolymerization or dissolution. This resin will be used in the ZEBRA project.
- The project will benefit from **CANOE** expertise on polymer formulation, carbon fiber development and polymer recycling. CANOE has recently developed a very innovative recycling process of fiber-reinforced acrylic composite material by dissolution method providing a high added-value recovery of both separate recycled methyl methacrylate monomer and recycled fiber.
- **ENGIE** is a world-class wind farm operator, with 8.5 GW under management, and the French leader of the wind industry, with more than 2.6 GW of installed capacities. Its purpose is to act to accelerate the transition towards a carbon-neutral economy, in particular through the sustainable development of renewable technologies.
- **LM Wind Power** is a world leading designer and manufacturer of wind turbine blades, with more than 228,000 blades produced since 1978. The Cherbourg factory associated with the ZEBRA project has produced the largest blade ever manufactured at 107 meters in length.
- **Owens Corning** is one of the world leaders in the field of glass fiber and composite elements and the inventor of patented High Modulus Glass technology that created step change performances in the wind industry the last decade.



- **SUEZ**, which helps cities and industries to intelligently and sustainably manage their resources, brings its expertise in the eco-design of the materials used and in the best recycling techniques.

Within the ZEBRA project, LM Wind Power will design the product, process and manufacture two prototype blades using Arkema's Elium® resin, in order to test and validate the behavior of the composite material and its feasibility for industrial production. In parallel, the ZEBRA project partners will focus on developing and optimizing the manufacturing process by using automation, to reduce energy consumption and waste from production. Project partners will then explore methods to recycle the materials used in the prototype blades into new products. Finally, a life cycle analysis will assess the environmental and economic viability of further utilizing the thermoplastic material in future wind turbine blades.

### A project supported by the entire wind energy sector

**Céline Largeau**, ZEBRA project Manager, IRT Jules Verne, stated: *"Demonstrating a circular approach to wind turbine blades throughout their lifetime requires mobilizing a strategic consortium covering the whole value chain to guarantee valuable and precise industrial data and achievements. The ZEBRA project is a great opportunity to join together Arkema, CANOE, ENGIE, LM Wind Power, Owens Corning and Suez who are key leaders in the wind energy sector. We look forward to carrying out constructive work altogether to improve wind energy performance and efficiency."*

**Torben K. Jacobsen**, Senior Director Advanced Technology Systems, LM Wind Power, stated: *"As a key player in the transition to affordable, renewable energy sources across the world, the wind power industry works actively to develop new materials with higher performance, longer lifespan and recyclable properties. Using Elium® resin, combined with design, manufacturing and recycling process optimization, constitutes an opportunity to reduce cost, production time and environmental impact of wind turbine blades. We are thrilled to be a launching partner for a truly recyclable blade for future wind turbines, leading the way to a sustainable world that works for generations to come."*

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#### About IRT Jules Verne – [www.irt-jules-verne.fr](http://www.irt-jules-verne.fr)

IRT Jules Verne is a mutualized industrial research centre dedicated to manufacturing. Working closely with production equipment manufacturers and integrators, IRT Jules Verne caters to 4 strategic industrial sectors: aeronautics, shipbuilding, the automotive industry, and renewable marine energy. The IRT team works hand in hand with the very best industrial and academic resources in the manufacturing field. Its vocation is to improve the competitiveness of strategic industrial sectors in France by creating disruptive technologies for manufacturing processes. Its mission is to speed up innovation and technology transfer to factories. In its bid to provide comprehensive solutions up to scale-1 demonstrators, IRT Jules Verne installs and utilises a wide range of exclusive state-of-the-art equipment.

#### About Arkema

Building on its unique set of expertise in materials science, Arkema offers a portfolio of first-class technologies to address ever-growing demand for new and sustainable materials. With the ambition to become in 2024 a pure player in Specialty Materials, the Group is structured into 3 complementary, resilient and highly innovative segments dedicated to Specialty Materials -Adhesive solutions, Advanced Materials, and Coating Solutions- accounting for some 80% of Group sales, and a well-positioned and competitive Intermediates segment. Arkema offers cutting-edge technological solutions to meet the challenges of, among other things, new energies, access to water, recycling, urbanization and mobility, and fosters a permanent dialogue with all its stakeholders. The Group reported sales of €8.7 billion in 2019, and operates in some 55 countries with 20,500 employees worldwide. [www.arkema.com](http://www.arkema.com)



## MANUFACTURING THE FUTURE

### **About CANOE**

CANOE is a R&T center in the field of composites and advanced materials which is located in New-Aquitaine region (France). CANOE employs a staff of 45 chemistry/materials engineers, PhD and technicians. The major objective is to support companies and more particularly SMEs in the development of new products and process through pilot line capabilities (from TRL3 to TRL6): R&D service (feasibility study, prototyping, scale-up demonstration, materials testing...), R&D cooperative project, training course. CANOE mainly address the following application sectors: transport (automotive, aerospace, railway, marine industry...), defense, renewable energy (wind energy, photovoltaics, hydrogen storage and battery), sustainable building. [www.plateforme-canoe.com](http://www.plateforme-canoe.com).

### **About Engie**

Our Group is a global reference in low-carbon energy and services. In response to the urgency of climate change, our ambition is to become the world leader in the zero-carbon transition "as a service" for our customers, in particular global companies and local authorities. We rely on our key activities (renewable energy, gas, services) to offer competitive turnkey solutions. With our 170,000 employees, our customers, partners and stakeholders, we are a community of Imaginative Builders, committed every day to more harmonious progress. Turnover in 2019: EUR 60.1 billion. The Group is listed on the Paris and Brussels stock exchanges (ENGI) and is represented in the main financial indices (CAC 40, DJ Euro Stoxx 50, Euronext 100, FTSE Eurotop 100, MSCI Europe) and non-financial indices (DJSI World, DJSI Europe and Euronext Vigeo Eiris - World 120, Eurozone 120, Europe 120, France 20, CAC 40 Governance).

### **About LM Wind Power**

LM Wind Power, a GE Renewable Energy Business, is a world leading designer and manufacturer of rotor blades for wind turbines, with a global manufacturing footprint that includes blade factories in Brazil, Canada, China, Denmark, India, Poland, Spain, France, Turkey and the United States. The company has produced more than 228,000 blades since 1978, corresponding to more than 113GW installed capacity and global savings of 242 million metric tons of CO2 annually. In 2018, LM Wind Power became the first carbon neutral business in the wind industry. Follow us at [www.lmwindpower.com](http://www.lmwindpower.com).

### **About Owens Corning**

Owens Corning is a global building and industrial materials leader. The company's three integrated businesses are dedicated to the manufacture and advancement of a broad range of insulation, roofing and fiberglass composite materials. Leveraging the talents of 18,000 employees in 33 countries, Owens Corning provides innovative products and sustainable solutions that address energy efficiency, product safety, renewable energy, durable infrastructure, and labor productivity. These solutions provide a material difference to the company's customers and make the world a better place. Based in Toledo, Ohio, USA, the company posted 2019 sales of \$7.2 billion. Founded in 1938, it has been a Fortune 500® company for 66 consecutive years. For more information, please visit [www.owenscorning.com](http://www.owenscorning.com).

### **About Suez**

Since the end of the 19th century, SUEZ has built expertise aimed at helping people to constantly improve their quality of life by protecting their health and supporting economic growth. With an active presence on five continents, SUEZ and its 90,000 employees strive to preserve our environment's natural capital: water, soil, and air. SUEZ provides innovative and resilient solutions in water management, waste recovery, site remediation and air treatment, optimizing municipalities' and industries' resource management through "smart" cities and improving their environmental and economic performance. The Group delivers sanitation services to 64 million people and produces 7.1 billion m3 of drinking water. SUEZ is also a contributor to economic growth, with more than 200,000 jobs created directly and indirectly on an annual basis, and a provider of new resources, with 4.2 million tons of secondary raw materials produced. By 2030, the Group is targeting 100% sustainable solutions, with a positive impact on our environment, health and climate. SUEZ generated total revenue of €18.0 billion in 2019.