



Member of CENERGY HOLDINGS

The Role of Plastics in the Green Transition

*Dr. Michail Kalloudis, CEng
Senior Project Manager
Hellenic Cables*

BOUSSIAS presents

Future of Plastics conference

Λόγω των έκτακτων καιρικών συνθηκών το Future of Plastics Conference μετατίθεται
Φεβρουαρίου 2023

Τρίτη 14 Φεβρουαρίου 2023 | OTEAcademy

Innovative production and recycling

February 2023

www.hellenic-cables.com





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Power Cables
Telecommunication – Optic Fibers
Submarine cables
Enameled wires
Compounds (PVC, Rubber, PE, HFFR)

Hellenic Cables Group is one of the largest cable producers in Europe



VIOHALCO



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5

Manufacturing plants across 3 countries

€

25.3

Million EUR on average invested annually over the last five years



50

Markets exported to globally



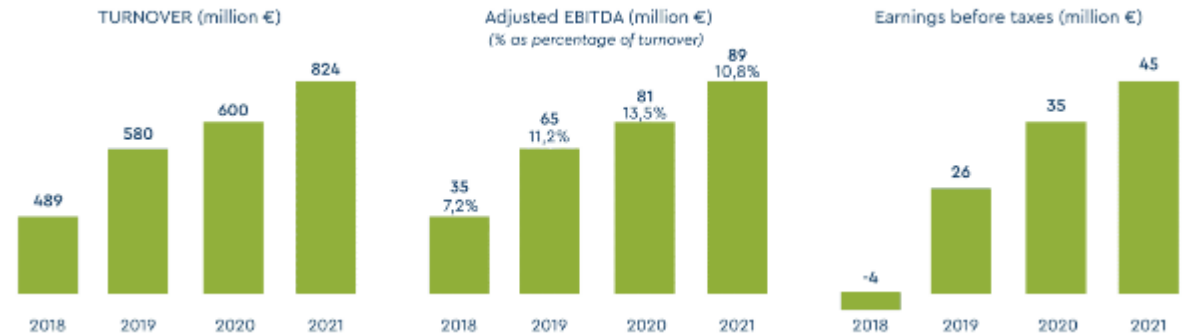
1,490

Employees

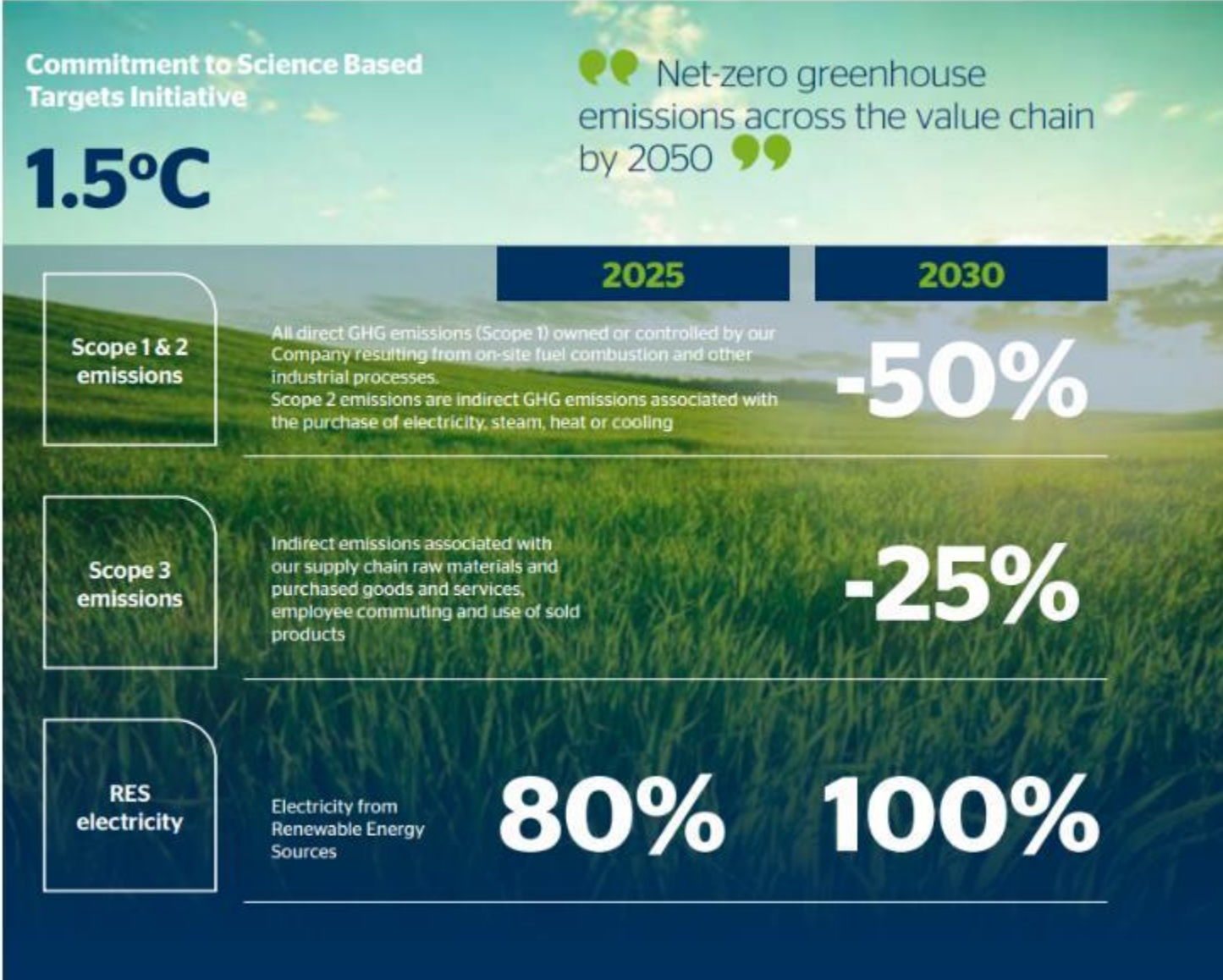


180,000

tn annual capacity Of cables



Environmental Commitment





Cable Core Business is based on Green Energy

- Connected Crete with clean electricity from the Greek Mainland
- *Producing products for Solar and Wind Turbine applications*
- *Countries interconnection.. The Future..*



“High quality underground and submarine cables are the key to enable Europe’s energy transition and our industry is ready to deliver them.”

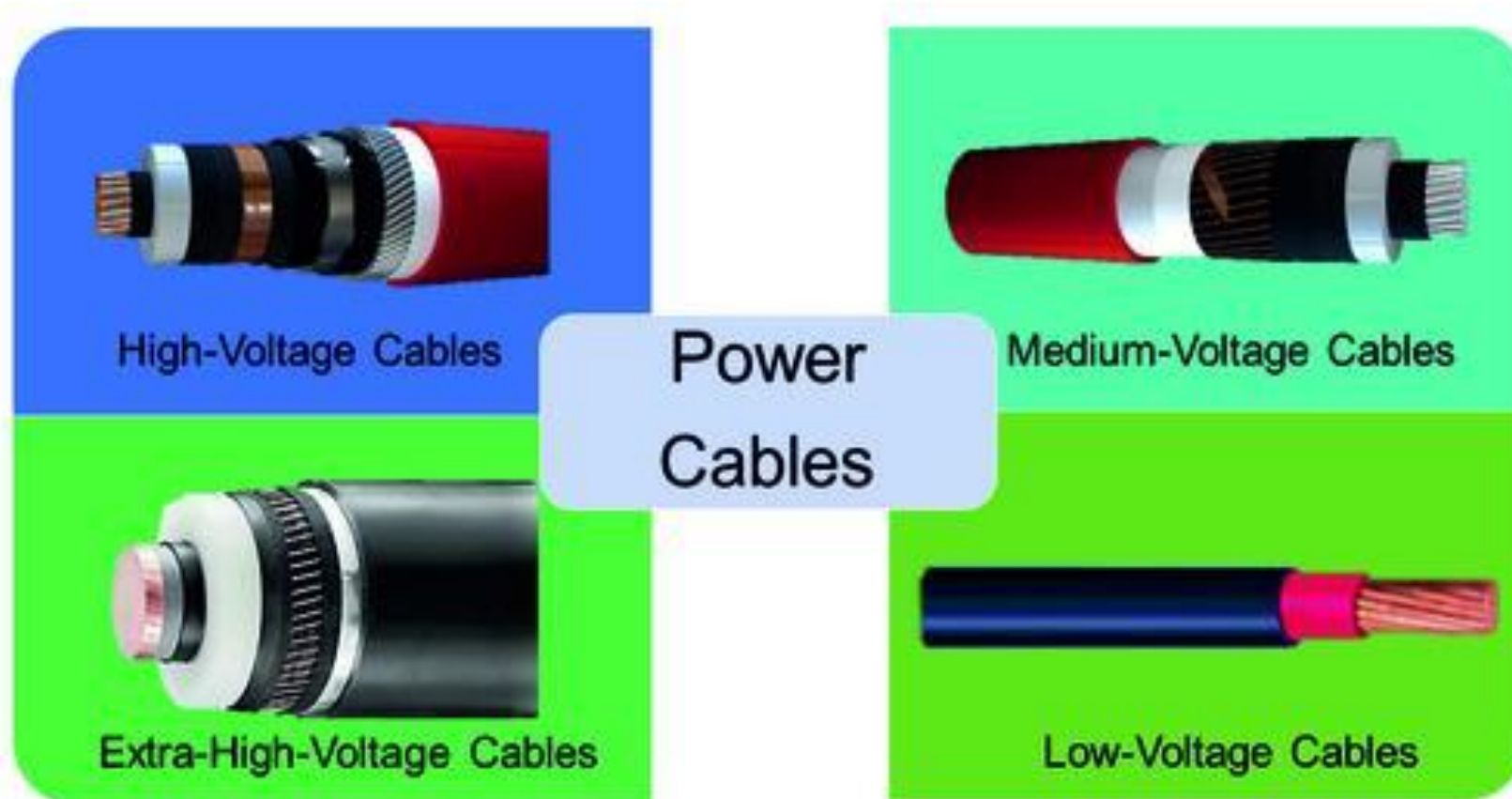
– **Marcello Del Brenna, Chair of Europa Cables**



Cables and Renewables



The link between Cables and Plastics

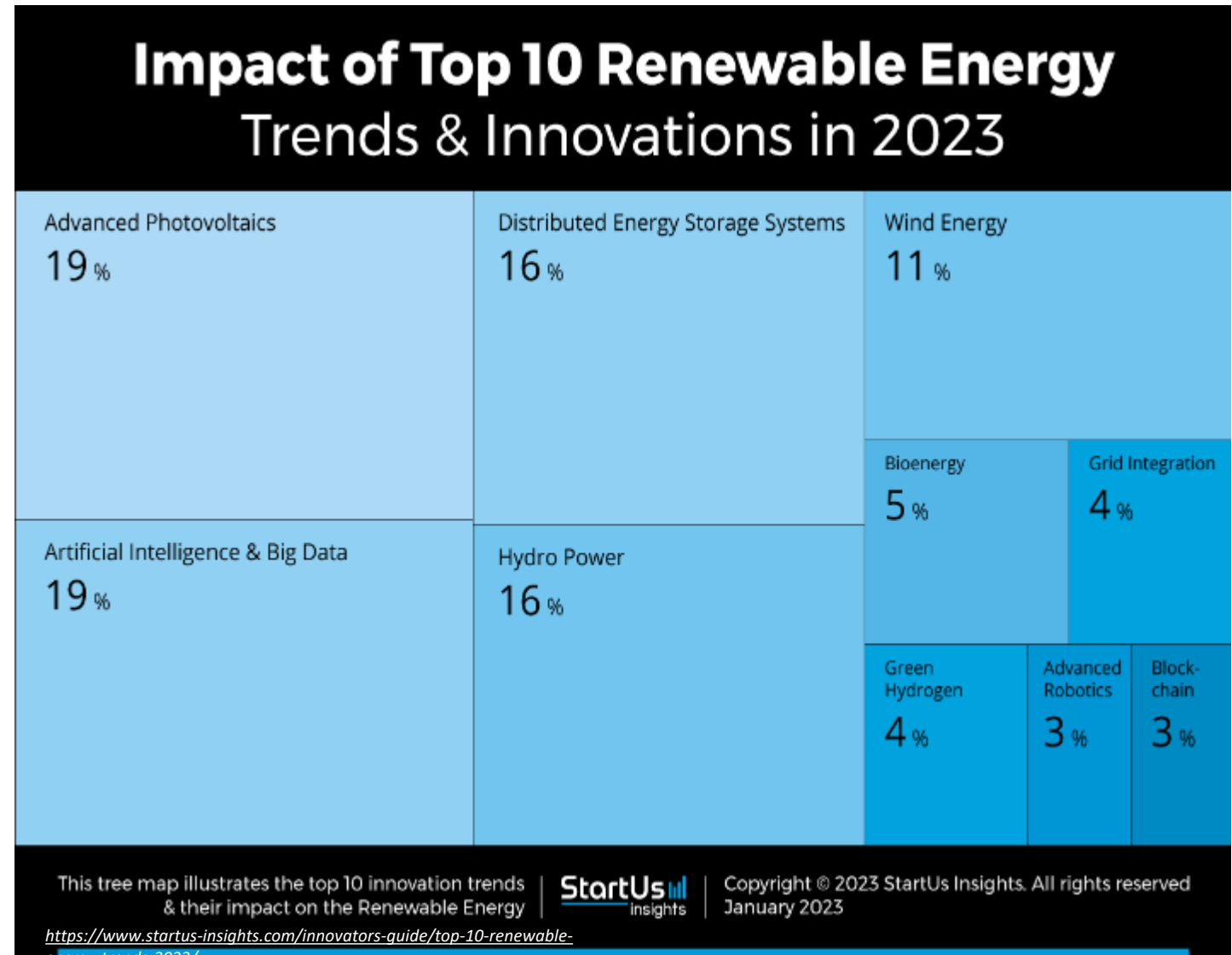


- PE and Polyolefin Compounds
- XLPE
- PVC
- EPDM
- Rubber Special
- TPE/TPU
- PET
- Engineering Plastics

Renewable energy is at the forefront of the energy policy of all major economies



- Reduces the dependence on fossil fuel and the negative impact on the environment and economy.
- *A major portion of greenhouse gas is carbon dioxide, pumped into the environment by industries, specifically the power sector.*
- *Major sources of carbon dioxide gas are the burning of fossil fuels in the production of electricity and heat in various industries.*



High-performance plastics for renewables

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- Renewables Industry is considered predominantly still young...
- Innovative Materials enable their growth and find new applications
- High Performance Plastics are the key to the widespread expansion of the renewables.
- Plastics provide solutions to major challenges such as:
 - Short maintenance Intervals and increase the lifespan of the structures
 - Light weight and flexible applications
 - Increased Strength
 - Efficiency
 - Ease of Manufacturing
 - Low Transportation and erection costs



ThermoPlastic Green Enablers..



- **Polyolefins** ease of processing, corrosion, water, UV resistant, lightweight, cost effective, 100% recycled
- **PTFE** Particularly low coefficient of friction. Exceptional chemical resistance. Inherently flame resistant, self-extinguishing.
- **PEEK** High thermal stability. Excellent dimensional stability. High degree of toughness.
- **Acetal - POM-C** Dimensionally stable. Grease-resistant. High resilience
- **Acetal - POM-H - Derlin** High mechanical strength. Very good machining properties
- **PA6** and **PA6-G** High degree of toughness. Resistance to oils, greases and fuels. Good abrasion resistance.
- **PET** Good machining properties. Very low moisture absorption. Very good electrical insulation properties
- **PI (Kapton)** Low outgassing. High rigidity with low weight. The typical service temperature range of polyetherimides is about -270°C to + 300°C.



PTFE liners



PEEK screws



POM - Gears



© DuPont™ Kapton™

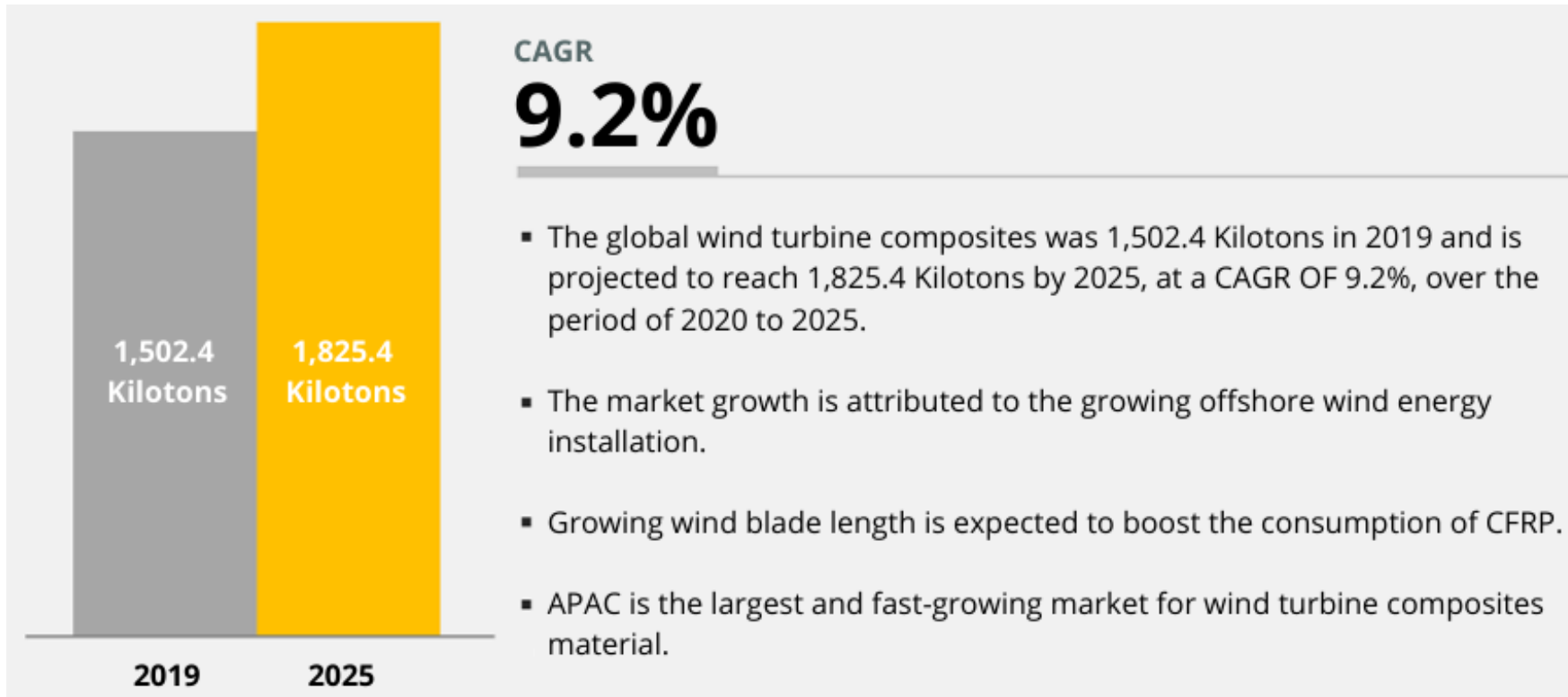
Plastics for Wind Energy



The wind energy is the second-largest consumer of polymer composite materials in 2019*.

The global polymer composites demand from the wind energy industry stand at 1,502.4 Kiloton in 2019

The polymer composites demand in the wind energy industry is expected to be 9.2% between 2020 and 2025.



used in:

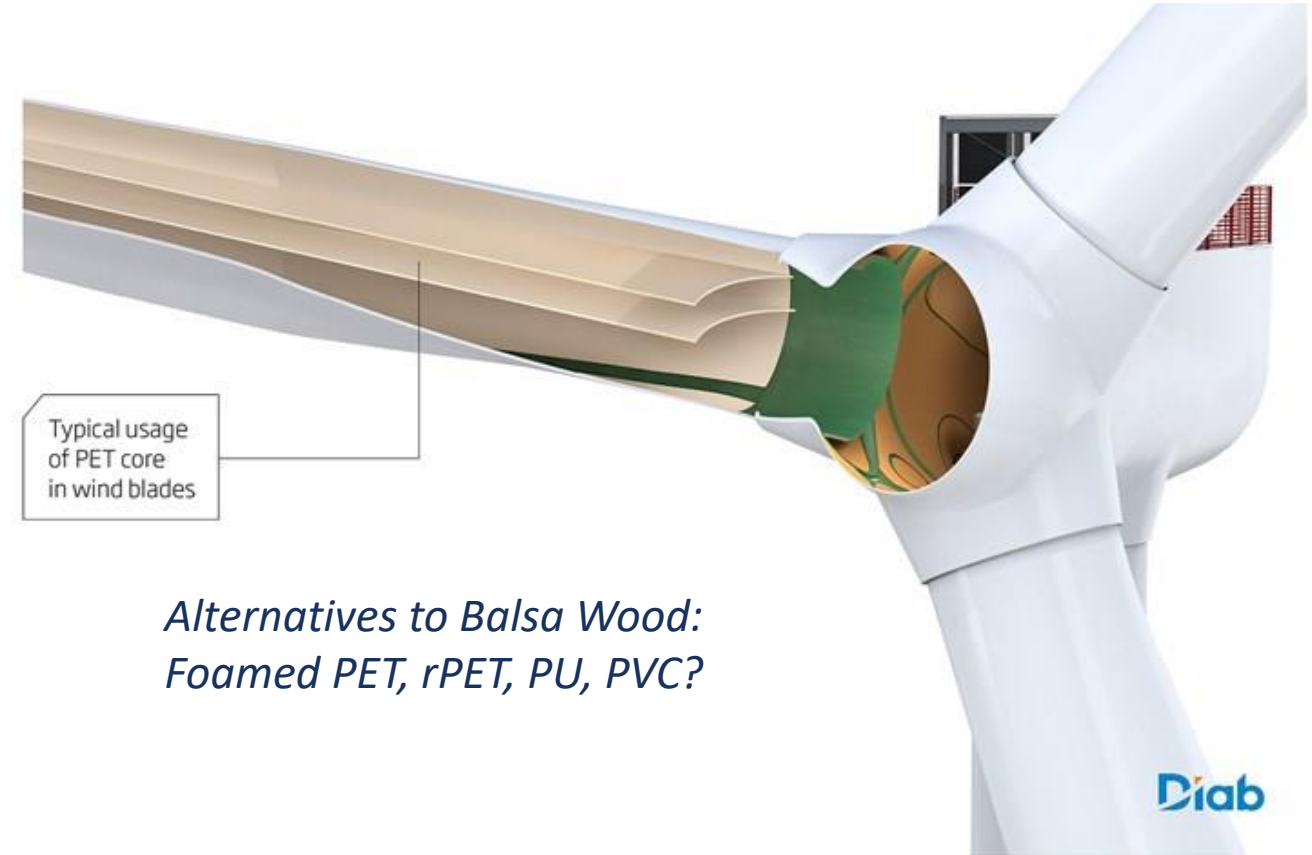
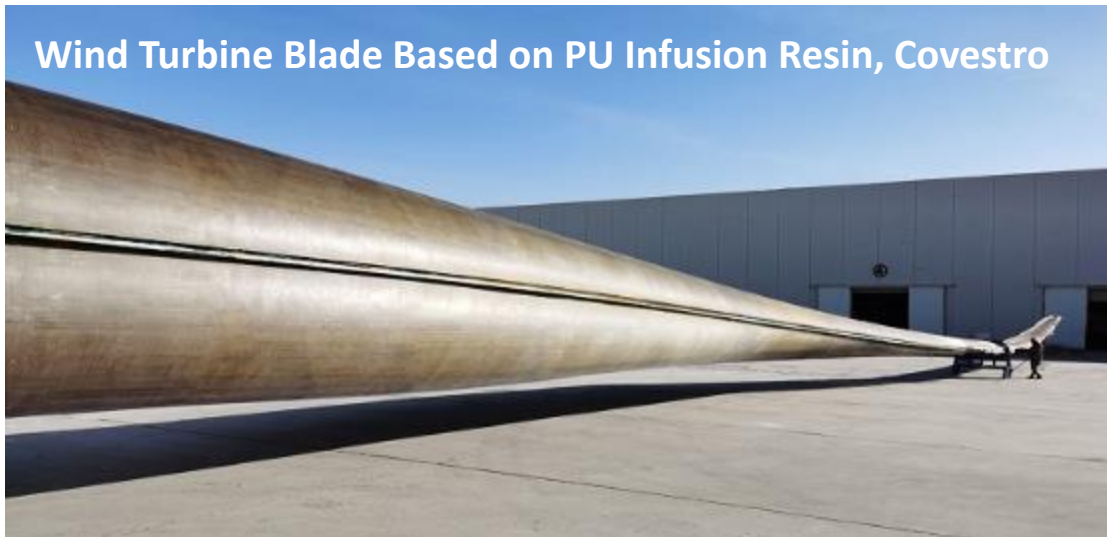
- ❖ Wind turbine blades,
- ❖ Nacelles,
- ❖ Towers,
- ❖ Hubs

From Epoxy Resins To Thermoplastics



- Epoxy Resins (Glass, Aramide, Carbon filled)
- Recyclable Alternatives: Thermoplastic Composites
- PU alternative:

Wind Turbine Blade Based on PU Infusion Resin, Covestro



*Alternatives to Balsa Wood:
Foamed PET, rPET, PU, PVC?*

Plastics for Solar Energy



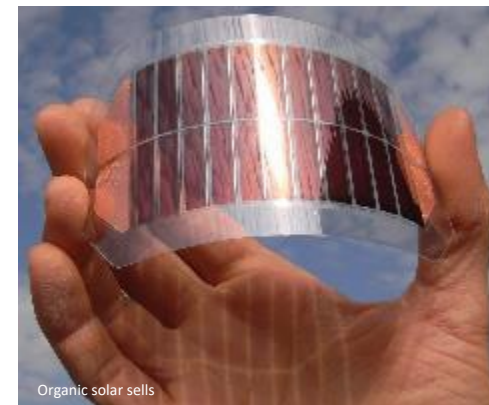
Solar energy is about to increase from 3% of global electricity demand in 2019 to 16% by 2050*

Solar technology installations are set to become lighter and more flexible, with developments including

- floating solar farms,
- Building Integrated Photovoltaic (BIPV) solar technology,
- solar skins and fabrics,
- photovoltaic solar noise barriers (PVNB)

It is estimated that a conventional photovoltaic silicon module must operate for at least three years just to compensate for the energy required to manufacture it.

Solar panel manufacturers have been looking at replacing the glass with polymers. Polymer-based organic photovoltaic cells are opening new prospects for solar energy, particularly in transport.



<https://www.qookka.com/en/blog/pannelli-fotovoltaici/etfe-and-pet-two-key-materials-in-the-field-of-semi-flexible-panels>

*<https://knowledge.ulprospector.com/13283/pe-polymers-in-renewable-energy-applications/>

Plastics for Wave and Tidal Energy

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Tidal and wave power plants are increasingly attracting interest within the industry. I

Technical plastics can also make an essential contribution towards efficient, low-maintenance operation.

Thermoplastic materials can improve fatigue performance, decreasing the probability for catastrophic blade failures and making tidal turbine blades more sustainable for marine energy applications. The manufacturing process is also faster and more energy efficient.

A project aiming to maximise tidal energy generation has been launched in the presence of Her Royal Highness, The Princess Royal, at the University of Edinburgh's FastBlade facility in 2022.

FastBlade: The world's first rapid testing facility for tidal turbine blades, which researchers say can speed up development of marine energy technologies while helping to reduce costs, has opened for business.



Plastics for Hydrogen Pipelines



Existing steel pipelines are subject to hydrogen embrittlement and are inadequate for widespread H2 distribution.

Alternatives to metallic pipelines - pipelines constructed entirely from polymeric composites and engineered plastics – could enable reductions in capital costs and provide safer, more reliable H2 delivery.

Even HDPE Pipelines could be fit for H2 transport up to specific pressures and temperatures*



HDPE based Pipe certified for Hydrogen Transport



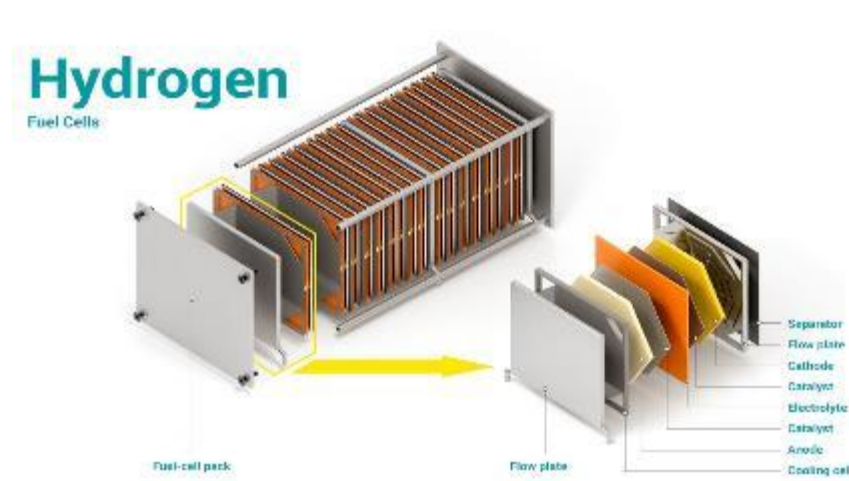
With steel proving vulnerable to corrosion, TCP was deemed suitable for the extreme environment of deepwater applications (Credit: 4level/Shutterstock.com)

Plastics for Hydrogen Fuel Cells



Hydrogen fuel cells are based on a simple chemical reaction. Hydrogen flows into the fuel cell and is stripped of its single electron. That electron is then used for power.

When the hydrogen fuel is made with renewable energy, such as solar power, the entire process can be completely clean. Materials used in fuel cells are PTFE, PEEK, PI (membranes) and carbon-filled thermoplastics and thermosets (casing)



<http://smttoday.com/2022/05/23/secure-drying-process-for-manufacturing-fuel-cells/>



200 MW solar power plant in Greece with batteries and a green hydrogen production unit.

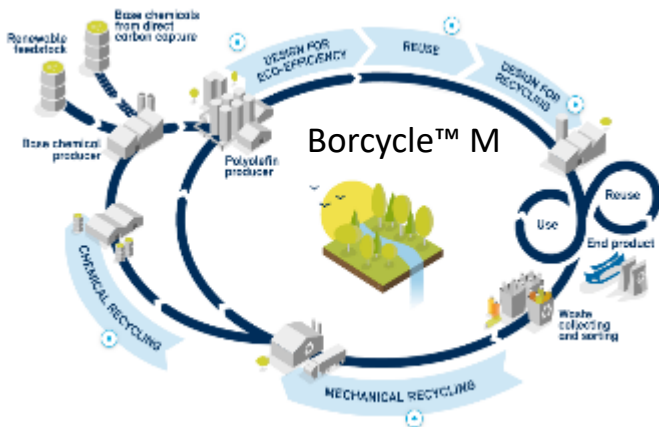
Bluesky300: Greece declares solar-hydrogen project with batteries its first flagship investment of exceptional importance

But the Plastics are made of Fossil Sources..



Not for Long and not Entirely...

- INEOS signs agreement with Plastic Energy for its largest plant to produce 100,000 tonnes of raw materials from plastic waste (Oct 2022)
- Borealis plans new advanced recycling plant to convert PO waste into high-performance polymers (by 2025)
- Dow intends to transform the waste to deliver 3 million metric tons per year of circular and renewable solutions by 2030.
- Biovyn: the world's first commercial producer of bio-attributed PVC by Inovyn
- Arlanxeo (Saudi Aramco): Keltan – ECO, EPDM with ethylene obtained from sugar canes



Indeed, let's close the loop and STOP the Waste

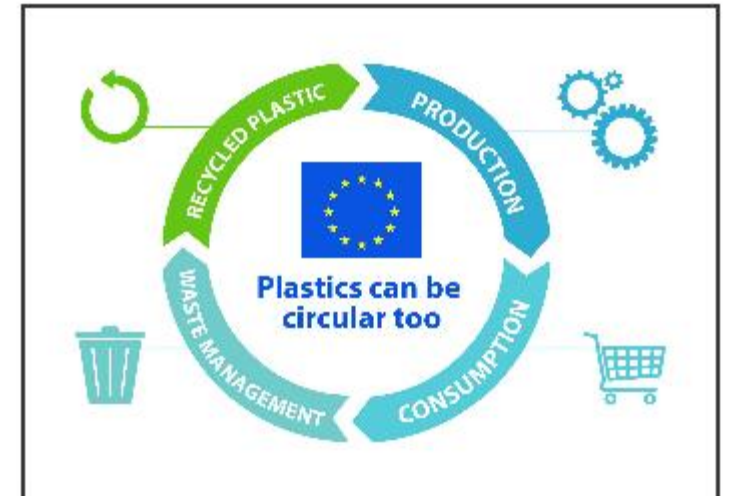
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We have proven that plastics and green transition go hand to hand...

Make Waste Valuable source of Energy for High performance Plastics which are used back in Renewables

Support Chemical and Mechanical Recycling and give Plastics back the Value they deserve.





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Plastics provide solutions to our society and hold the key to the green energy transition.

Thank you, Questions?

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Chartered Engineer Materials (IOM3)
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Member of the Plastic Consultancy Network*

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