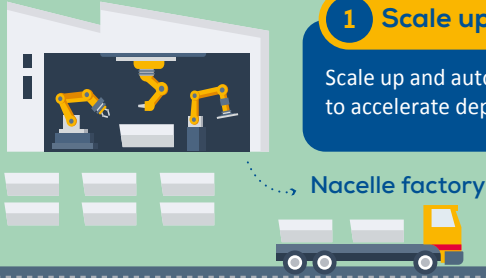


Five Megatrends in Wind Energy Technology

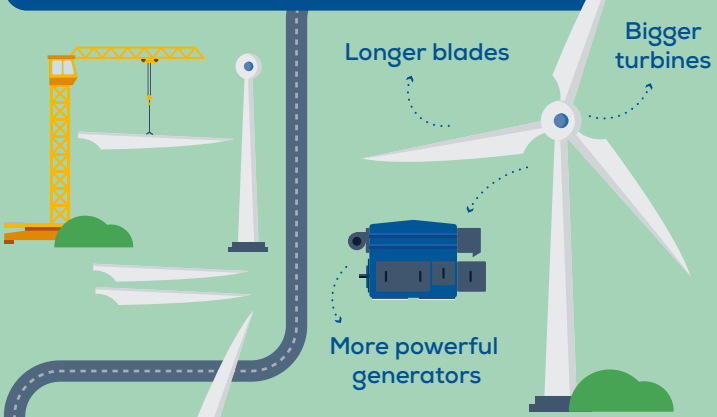
1 Scale up manufacturing

Scale up and automate manufacturing to accelerate deployment



2 Optimise turbine performance

Bigger and more performant turbines to power the future



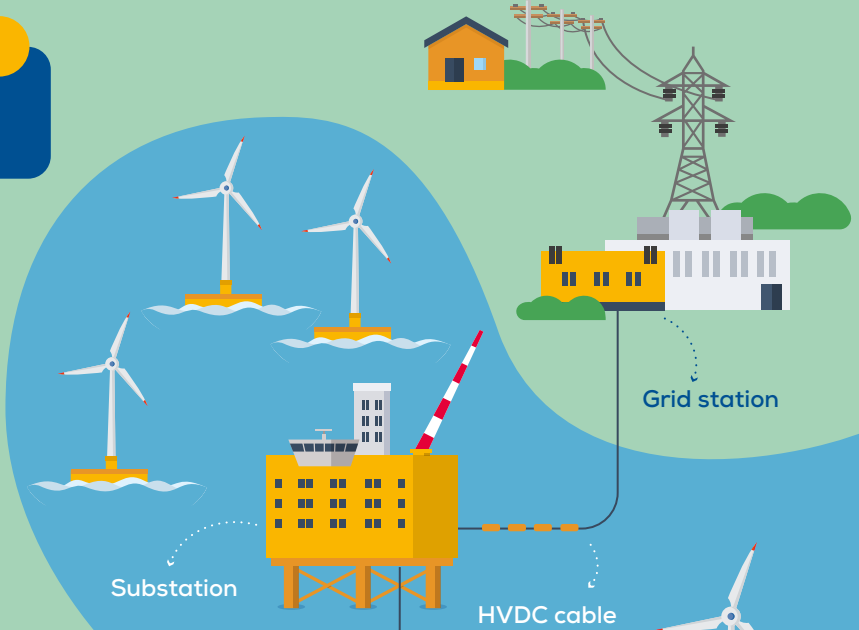
5 Sustainability

Powering a greener tomorrow with wind energy

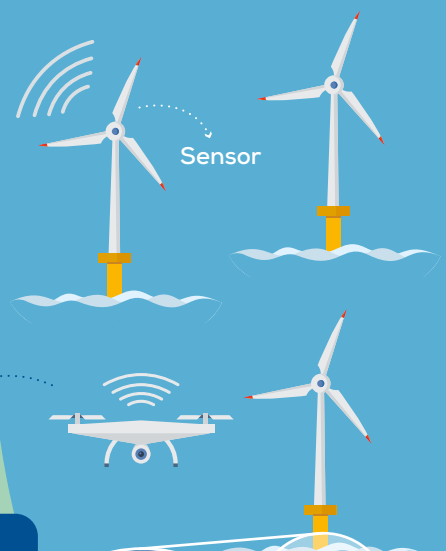


3 More efficient and interconnected systems

Connect wind to the grid in the most efficient way



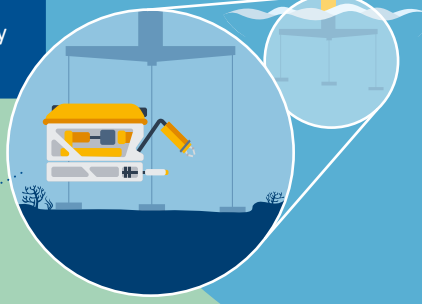
Drones for inspection



4 Digitalisation

The digital age for wind energy has arrived

Underwater vehicles



1 Scale up manufacturing



The wind industry holds a unique position in Europe's industrial landscape. It is a high-tech, sustainable, and heavy manufacturing industry. To deliver Europe's energy ambitions wind manufacturing capacity needs to scale up and automate to produce and install on average 30 GW of new installations a year by 2030.

- **Innovative turbine designs** suited to large-volume manufacturing with (semi-)automated production processes.
- **New and upgraded facilities** to deploy the increasingly higher, wider, and heavier turbines.
- **New installation and transport methods** to transport and install the bigger turbines faster and easier.

2 Optimise turbine performance



The demand to optimise turbine performance keeps increasing. To maximise energy production we'll need innovative solutions to increase the turbine size, make them more powerful, and increase their availability.

- **Higher towers** to reach stronger and more stable winds.
- **Longer blades** to capture more kinetic energy from the wind.
- More **powerful generators** to turn the energy captured into electricity.

3 More efficient and interconnected systems



Wind energy could account for half of the EU's electricity demand by 2050. Europe will need more, and more performant grids to integrate these large amounts of wind. In addition, energy storage solutions and power-to-x will help balance the system and ensure no wind energy is lost or curtailed.

- **Advanced grid management technologies** enable better coordination between wind farms and other energy sources.
- **Innovation in real-time data exchange and adaptive control mechanisms** will help maximise the share of clean electricity in the grid.
- **High Voltage Direct Current (HVDC technology)** allows the collection and transmission of very large volumes of electricity across great distances.

4 Digitalisation



Digitalisation is reshaping the wind energy industry by integrating advanced technologies that enhance operational efficiency and facilitate decision-making. The rapid development of digital technologies pushes the industry to keep innovating, including to safeguard the cybersecurity of its infrastructures.

- **Artificial Intelligence (AI) and digital tools** will help to facilitate monitoring the condition of the assets and send signals when repairs are needed.
- **Advanced data analytics and AI-driven tools** help further refine wind forecasting and measurements to optimise electricity production and consumption.
- **Long-term innovation in autonomous tools, robots, and vehicles** could enable wind farms to operate and maintain themselves almost independently.

5 Sustainability



Wind energy is a sustainable technology which cuts down CO₂ emissions and is already 90% recyclable. The industry is committed to become 100% sustainable and achieve the highest levels of circularity. Sustainability is in our DNA.

- **Innovations to recycle key components** such as blades and permanent magnets.
- **Developing new materials and component** that are sustainable by design.
- **New sustainable practices** to ensure that wind farms remain nature inclusive and are developed in harmony with ecosystems and local communities.

What is ETIPWind?

The European Technology & Innovation Platform on Wind Energy (ETIPWind) was established in 2016 to inform Research & Innovation policy at European and national level. ETIPWind provides a public platform to wind energy stakeholders to identify common Research & Innovation priorities and to foster breakthrough innovations in the sector. *ETIPWind is supported by the Horizon Europe project SETIPWind.*



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