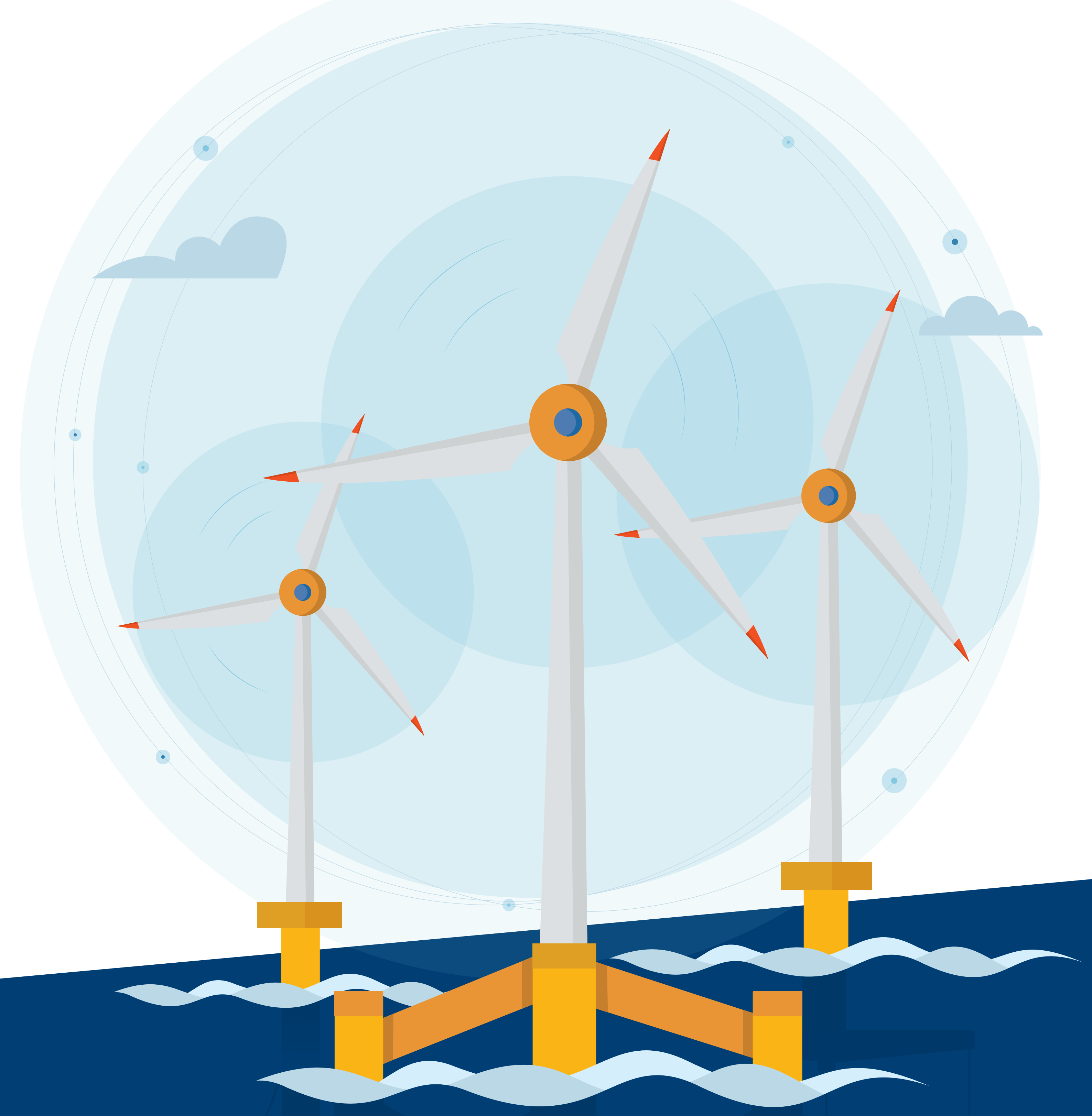
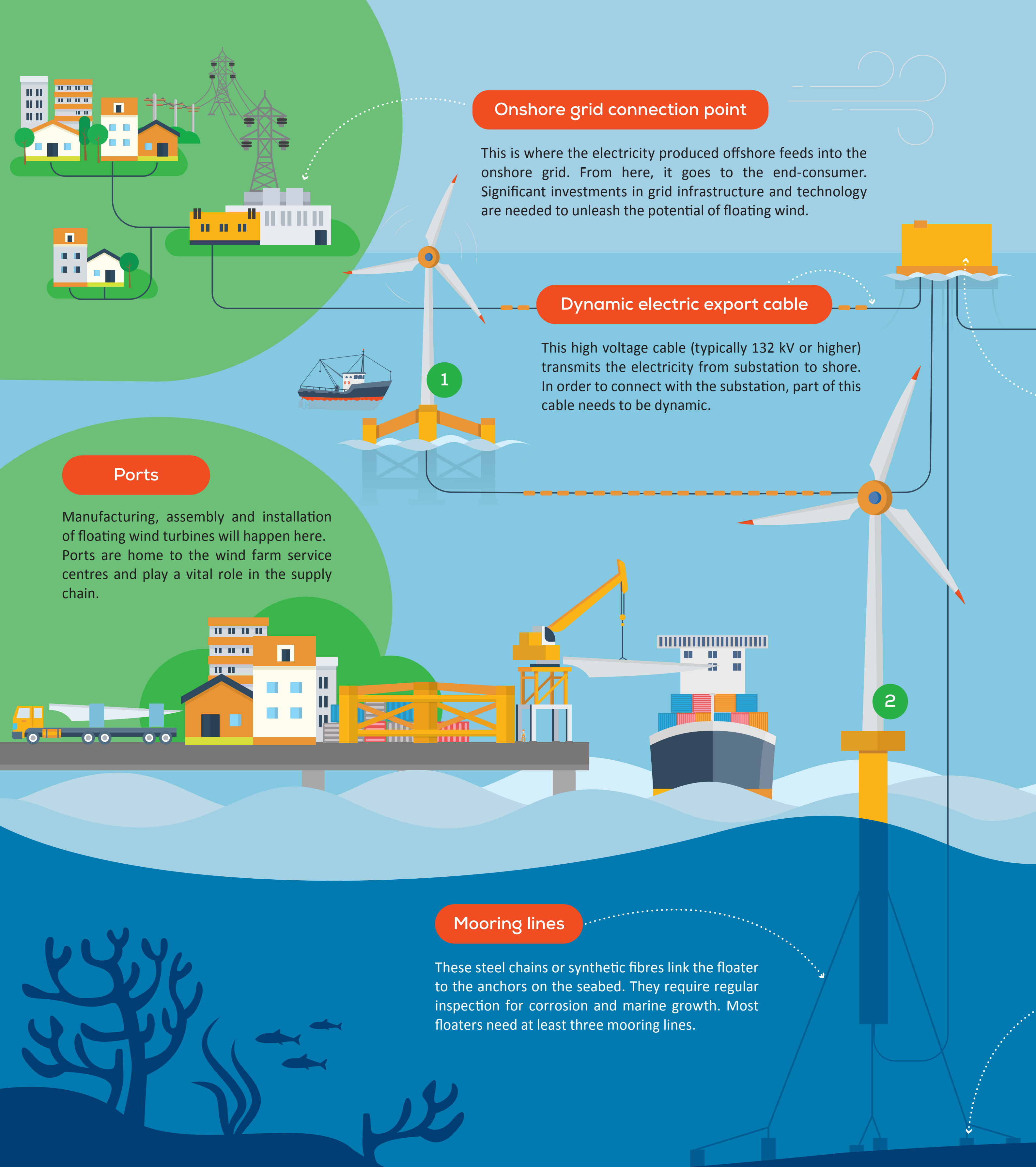


FLOATING OFFSHORE WIND

DELIVERING CLIMATE NEUTRALITY

etipwind.eu

ETIP Wind
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM ON WIND ENERGY



Onshore grid connection point

This is where the electricity produced offshore feeds into the onshore grid. From here, it goes to the end-consumer. Significant investments in grid infrastructure and technology are needed to unleash the potential of floating wind.

Dynamic electric export cable

This high voltage cable (typically 132 kV or higher) transmits the electricity from substation to shore. In order to connect with the substation, part of this cable needs to be dynamic.

Ports

Manufacturing, assembly and installation of floating wind turbines will happen here. Ports are home to the wind farm service centres and play a vital role in the supply chain.

Mooring lines

These steel chains or synthetic fibres link the floater to the anchors on the seabed. They require regular inspection for corrosion and marine growth. Most floaters need at least three mooring lines.

1

Semi-submersibles

This concept is built around a number of large columns connected with pontoons and/or bracings. The structure is stabilised by its buoyancy and kept in place by catenary or taut spread mooring lines linked to drag anchors.

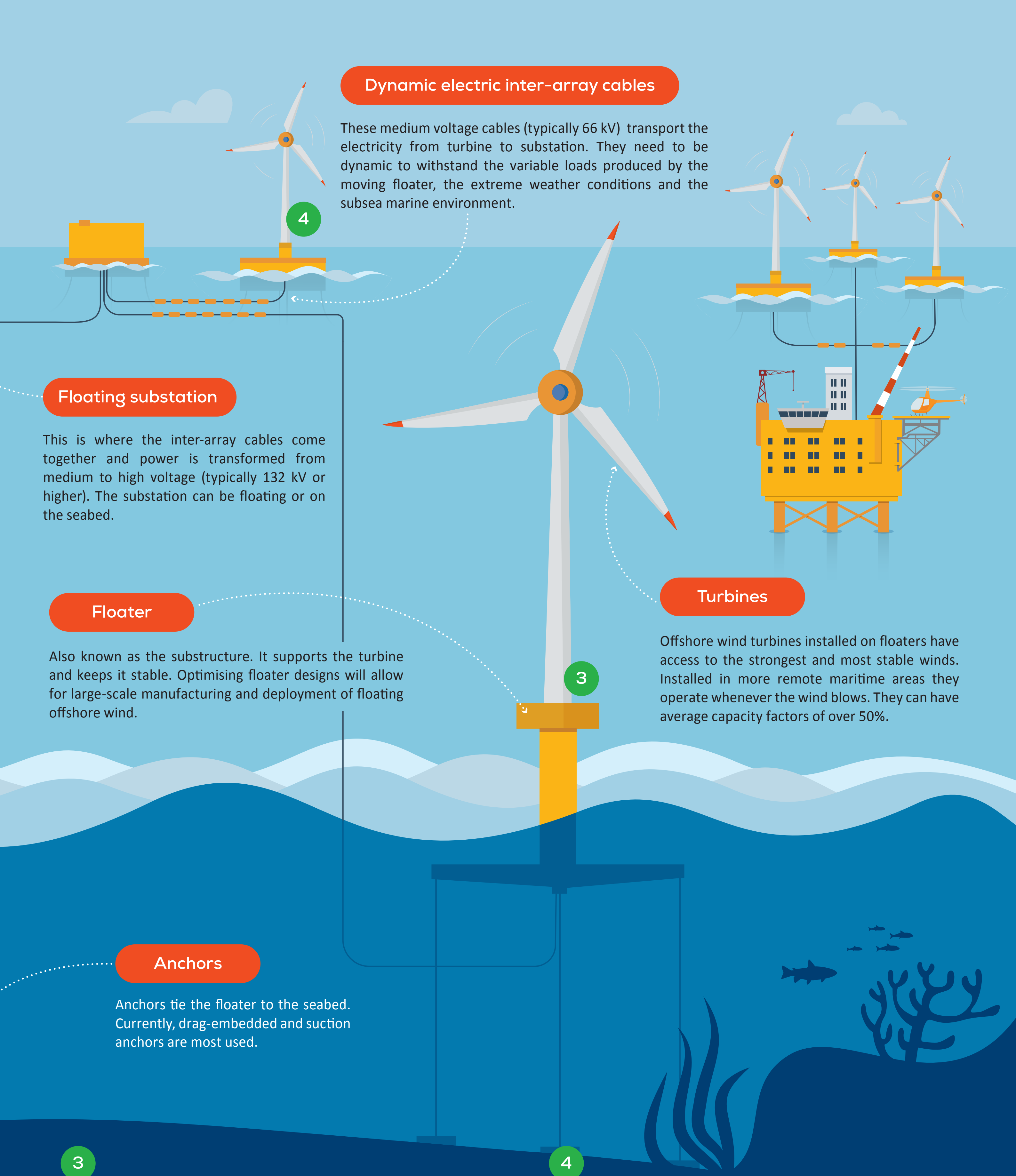
Water depth: +40m
Draught (installed): 15m – 25m
Active concepts in Europe: 14
Installations in Europe: 4

2

Single Point Anchorage (SPAR) buoys

The SPAR buoys comprise a single large cylinder with a low waterplane area. Ballast is added to keep a very low centre of gravity. The structures are kept in place by catenary or taut spread mooring lines linked to drag or suction anchors.

Water depth: +100m
Draught (installed): 70m – 90m
Active concepts in Europe: 9
Installations in Europe: 7



Dynamic electric inter-array cables

These medium voltage cables (typically 66 kV) transport the electricity from turbine to substation. They need to be dynamic to withstand the variable loads produced by the moving floater, the extreme weather conditions and the subsea marine environment.

Floating substation

This is where the inter-array cables come together and power is transformed from medium to high voltage (typically 132 kV or higher). The substation can be floating or on the seabed.

Floater

Also known as the substructure. It supports the turbine and keeps it stable. Optimising floater designs will allow for large-scale manufacturing and deployment of floating offshore wind.

Turbines

Offshore wind turbines installed on floaters have access to the strongest and most stable winds. Installed in more remote maritime areas they operate whenever the wind blows. They can have average capacity factors of over 50%.

Anchors

Anchors tie the floater to the seabed. Currently, drag-embedded and suction anchors are most used.

3

Tension Leg Platforms (TLP)

The TLP concepts make use of a large submerged volume, either a central column or several large buoys. TLPs are highly buoyant and are stabilised and kept in place by steel tendons that link the floater to the anchors on the seabed.

Water depth: +50m
Draught (installed): 25m – 35m
Active concepts in Europe: 5
Installations in Europe: 1

4

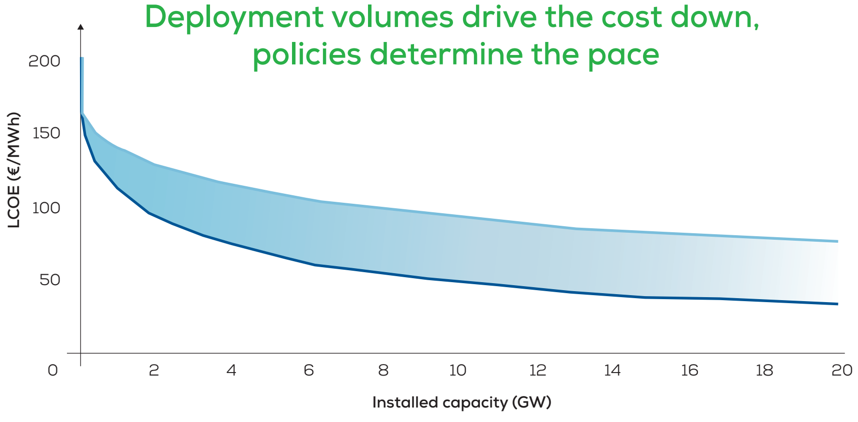
Barges

Barges are built around a steel or concrete hull. The structures are stabilised using its buoyancy and anchored to the seabed with catenary mooring lines or other configurations depending on the water depth.

Water depth: +30m
Draught (installed): 10m – 15m
Active concepts in Europe: 2
Installations in Europe: 2

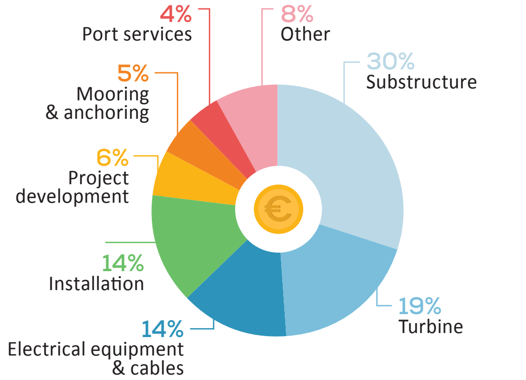
How Europe can become the global leader

Deployment volumes drive the cost down, policies determine the pace



Source: ETIPWind (see footnote 1)

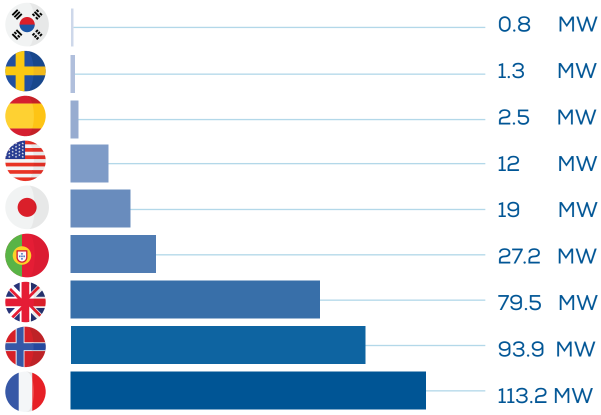
Industrialisation will lower the CAPEX of floating-specific technology



CAPEX of a pre-commercial floating offshore wind farm

Source: ETIPWind

Cumulative capacity by 2022



Source: WindEurope (see footnote 2)

Europe

Concepts: 34

Installed capacity: 48.5 MW

Technical potential: 4,000 GW

Volume by 2022: 318 MW

Rest of the World

Concepts: 16

Installed capacity: 16 MW

Technical potential: >14,000 GW

Volume by 2022: 32 MW

How floating offshore wind benefits Europe

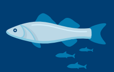
Social and environmental

Maximising clean energy

Floating offshore wind will unlock 80% of global offshore wind resources located in deep waters (> 50m). It has the potential to supply more electricity than the entire world consumes today. And it would be clean.

Geographical spread

Floating offshore wind turbines will be in areas where bottom-fixed wind turbines are not economically attractive. This geographic spread smoothens offshore wind generation and contributes to balancing the energy system.



Lower environmental footprint

Floating offshore wind turbines are assembled onshore and towed to site. This reduces the impact on the marine environment during installation. Floating offshore wind farms could also become safe havens for recovering marine fauna.

Decarbonising islands

Floating offshore wind will be the prime technology to reduce the dependency of Europe's islands on expensive and polluting fossil-fuel-powered generators.

Economic

Synergies with bottom-fixed offshore wind

Floating technologies can build on the expertise of Europe's bottom-fixed offshore wind sector. Moving into deeper waters is the logical next step for Europe's offshore wind industry.

New businesses and export potential

Floating offshore wind requires a specific supply chain for mooring, electrical cabling and installation. Capitalising on their technology leadership European companies can tap into a global market of up to 18,000 GW and generate export revenues back home.

Job creation

Floating offshore wind requires local supply chains and will stimulate job growth in marine industries. Industrialised coastal regions affected by the decline in shipbuilding will gain the most from reorienting their infrastructure towards floating offshore wind.

Building on Europe's offshore expertise

Floating offshore wind is an opportunity to repurpose Europe's Oil and Gas infrastructure and provide more sustainable job alternatives to Europe's offshore workforce.

How to make floating offshore wind a European success story

European floating offshore wind requires urgent action from policymakers to unleash large-scale commercialisation and deliver the clean, competitive and reliable energy society wants. Europe has an unique opportunity to capitalise on its technology leadership. Floating offshore wind opens up 80% of the world's offshore wind resources, which are located in waters deeper than 50 metres. To become climate-neutral by 2050 Europe needs up to 150 GW of floating offshore wind. This is feasible and affordable. European companies have the tools to take the lead and deliver.

A supportive regulatory framework capitalising on academic excellence and the first pilot projects will unlock industrialisation and faster market deployment. A significant increase in the build-out of floating offshore wind will bring costs further down and demonstrate commercial viability, similar to bottom-fixed offshore wind.

This factsheet provides policymakers with an overview of the current state-of-the-art in floating offshore wind technology and the measures needed for commercialisation. Implementing the outlined recommendations will allow Europe to take a decisive lead in a vast and untapped global market and will support European competitiveness.

Policy recommendations

Bring technology to maturity

Provide grants for industrialisation

Serial production is a main driver of cost reductions. The European Commission should prioritise funding for industrialisation in Horizon Europe and the ETS Innovation Fund aligned with the ETIPWind Roadmap.

Build up a floating offshore wind portfolio

Meeting global demand will require different floating designs to reach maturity fast. Each call of the ETS Innovation Fund should dedicate funding for first-of-a-kind demonstrations of floating designs.

Incentivise pre-commercial procurement of floating offshore wind energy

Pre-commercial deployment is important to validate new technologies. The European Commission and Member States should facilitate the installation of pre-commercial projects, ease project permitting and allow specific procurement rates.

Start up an Important Project of Common European Interest (IPCEI) on floating offshore wind

Member States should cooperate and channel funds through an IPCEI to accelerate the development and deployment of floating technology.

Set up strategic partnerships

To fully unlock the potential of floating offshore wind, the EU should create a dedicated public-private Research & Innovation partnership on offshore wind as part of Horizon Europe.

Accelerate large-scale deployment

Offer visibility for investments

National Governments must spell out clear ambitions for floating wind in their 2030 National Energy & Climate Plans. The European Commission should publish the aggregated European volume to provide investors with clear market visibility.

Hold technology-specific auctions

National Governments should hold dedicated auction rounds for floating wind technology, similar to the French and UK plans. Europe needs at least 4 GW of floating offshore wind by 2030. The European Commission must assess the feasibility of auction timelines in the 2030 National Energy & Climate Plans.

Invest in enabling infrastructure

The EU should upgrade its coastal infrastructure in preparation for the large-scale deployment of floating offshore wind. Investments could be channeled through the Cohesion and Regional Development funds or the Connecting Europe Facility.

Facilitate access to finance

The European Investment Bank should offer more de-risking instruments to attract private capital. The EU should dedicate funding windows to floating offshore wind as part of the EU Recovery Strategy.

Create regional cooperation fora

The EU should establish dedicated intergovernmental workstreams on floating wind, based on experiences of the North Sea Energy Forum and the Energy Islands Initiative.

ETIPWind®, the European Technology and Innovation Platform on Wind Energy, connects Europe's wind energy community. Key stakeholders involved in the platform include the wind energy industry, political stakeholders and research institutions.

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.

Its recommendations highlight the pivotal role of wind energy in the clean energy transition. They inform policymakers on how to maintain Europe's global leadership in wind energy technology so that wind delivers on the EU's Climate and Energy objectives. As such, the platform will be key in supporting the implementation of the Integrated SET-Plan.

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Footnotes

1. The underlying assumptions for this cost projection model include:
- a capacity factor of 45%;
- a turbine lifetime of 25 years; and
- a weighted average cost of capital of 9%.

2. This forecast includes only projects that have reached final investment decision (FiD), have all permits in place or are in advanced permitting procedures by 22 June 2020.

For more information check the ETIPWind website under https://etipwind.eu/publications/

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