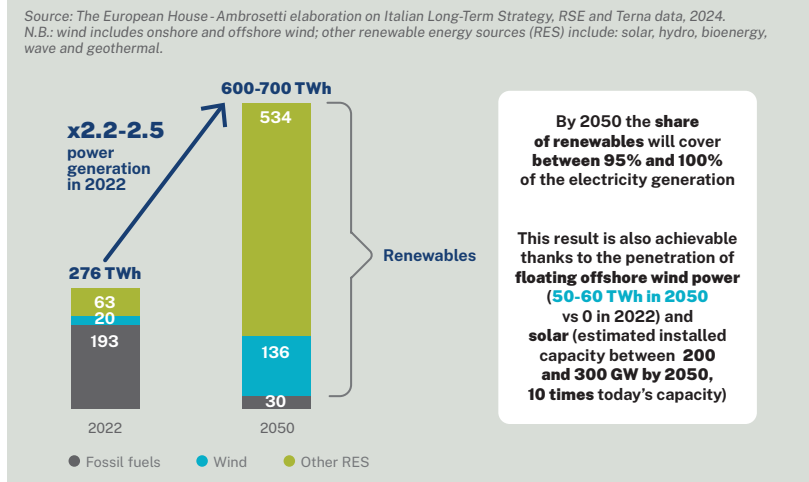




### FLOATING OFFSHORE WIND POWER IS A CRITICAL RENEWABLE ENERGY COMPONENT FOR REALISING THE FOSSIL FUEL PHASE-OUT AND ACHIEVING NATIONAL ENERGY POLICY TARGETS

- In the decarbonisation scenario of the "Italian Long-Term Strategy on the Reduction of greenhouse gas emissions", published in 2021 by the former Ministry of the Environment and Land and Sea Protection, **electricity production is expected to more than double by 2050 compared to today (600-700 TWh vs. 276 in 2022)**, with renewables contributing between 95% and 100% of the total electricity generation
- In 2050, wind power will be crucial: it will account for **23%** of the total electricity generated (7% in 2022), with **10%** coming from floating offshore wind power, which will be an important part of the Italian energy mix with **at least 20 GW**
- Based on the theoretical national potential estimated by the Politecnico di Turin of about 207 GW and the advantages of the floating wind technology, the 2050 targets of generation from floating offshore wind **could be increased even beyond 20 GW**, setting challenging intermediate targets

Figure 1. The electricity generation park in Italy: a comparison of the current state and the decarbonisation scenario of the Italian Long-Term Strategy (TWh), 2022 and 2050.



#### MYTHBUSTERS

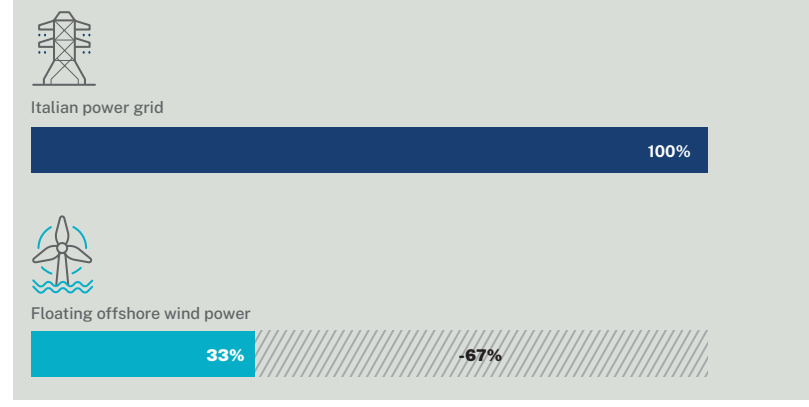
**FALSE** To accelerate the decarbonisation process it is necessary to identify a single green technology to focus on

**TRUE** The synergistic and complementary contribution of all the available green technologies, including floating offshore wind, must be exploited to achieve climate neutrality goals

### IN THE MEDITERRANEAN SEA, FLOATING OFFSHORE WIND HAS HIGHER PRODUCTIVITY THAN TRADITIONAL WIND TECHNOLOGIES AND HAS A LOWER VISUAL/ENVIRONMENTAL IMPACT

- Floating offshore wind power can be installed in **deep waters**
- The large distance from the coast makes floating offshore wind field less visible on the horizon, reducing the risk of provoking social opposition movements, so-called **NIMBY** (Not In My BackYard)
- The offshore location also allows for stronger winds to be intercepted, with an estimated 50% increase in productivity compared to an onshore wind farm
- By not presenting a buried surface, the floating turbine is less impactful on the seabed and the marine ecosystem than the fixed-bottom one. In addition, the electricity generated by floating offshore wind has **significantly better environmental performance** than the average energy mix of the national power grid

Figure 2. Comparison of potential average environmental impacts for the supply of 1 GWh of electricity from a floating offshore wind farm or taken from the Italian national grid (%values - impacts of 1 GWh from the grid = 100), 2023.



#### MYTHBUSTERS

**FALSE** The Mediterranean Sea is not suitable for hosting offshore turbines, which damage the coastline and the marine ecosystem

**TRUE** Considering the morphological characteristics of the Mediterranean Sea and the depth of its water, floating offshore wind is the most suitable solution for scaling up the installed capacity of renewable energy sources with the least impact on the environment - and it is almost invisible on the horizon

### 5 POLICY PROPOSALS

- 1. Floating offshore wind targets**  
Since the floating offshore wind will be an important part of Italy's energy mix by 2050, it is crucial to set an ambitious long-term floating offshore wind target of **at least 20 GW by 2050**, with **intermediate targets for 2035 and 2040**, in order to provide a stimulus to investors and achieve a critical size for investment  
**Set a transparent, long-term auction planning**, enabling the financing of floating offshore wind projects in Italy
- 2. Maritime Spatial Planning**  
**Accelerate the implementation of the Maritime Spatial Planning (MSP)**, also to avoid the penalties related to the infringement procedure opened by the European Commission against Italy  
In the short term, facilitate a **decentralised mechanism** for the quick identification of offshore wind sites suitable for the development of major projects. In this regard, leverage on the preparatory works carried out by developers  
In the meanwhile, carry on the implementation of the MSP based on a **centralised approach**, enhancing debate and stakeholder engagement, even if MSP **should not overrule the work already done**
- 3. Authorisation schemes**  
In project development, require the developers to **anticipate** as much as possible the work with the **impacted territories** and economic operators  
Engage the **Regions** in the definition of long-lasting **compensatory measures**, that accompany large-scale projects, through a preliminary agreement between the Government and the Regions  
Engage the impacted **Regions** in the **evaluation** of offshore projects from the very early stage of the **permitting process**  
Strengthen the auctions' **Non-Pricing Criteria** for the development of plants that are committed to the localisation of industrial supply chains dedicated to offshore wind in Italy
- 4. Economic incentives**  
Publish the **final RES 2** decree to unlock incentive mechanisms, defining a stable regulatory regime  
Extend the current **time and capacity limits** outlined by the RES 2 in order to **incentivise investments** and reach the **20 GW target by 2050**  
Defining the **maximum price and construction time for RES 2 tender by tender**  
**Constantly update auction tariffs in line with inflation and market trends** to ensure the projects' competitiveness
- 5. Electricity grid**  
Promoting Terna's role in the implementation of an **adequate development plan of the grid infrastructure**  
**Encourage the extension of the scope of Terna's responsibility** in order to distribute more rationally the costs of grid connection, as is the case in other European countries  
Fostering a **constant dialogue** between Terna and offshore wind operators



SCAN THE QR CODE WITH YOUR SMARTPHONE TO DOWNLOAD AND READ THE DIGITAL VERSION OF THE STRATEGIC STUDY



### FLOATING OFFSHORE WIND POWER CAN UNLOCK ITALY'S WIND POWER POTENTIAL

According to the Global Wind Energy Council, Italy is the **world's 3rd largest potential market for floating offshore wind power**. Furthermore, according to studies by the Politecnico di Turin, floating offshore wind energy in Italy has a potential of **207.3 GW**, representing almost all of the Country's wind power potential

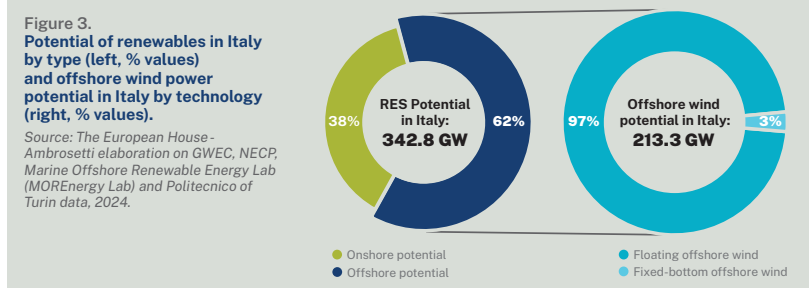
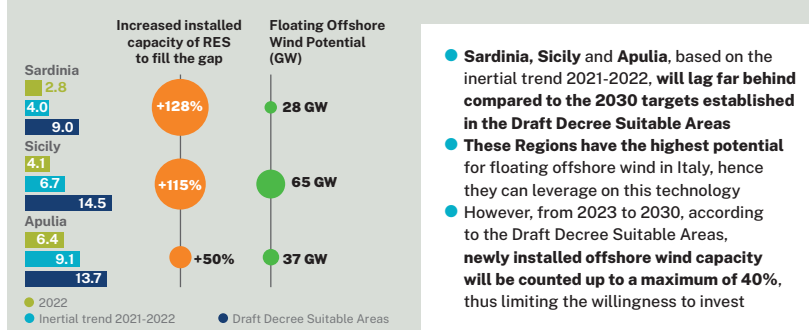


Figure 4. Historical and inertial trends of the installed renewable energy capacity and comparison with policy targets in the top-3 Italian Regions by floating offshore wind potential (GW), 2022 and 2030.



#### MYTHBUSTERS

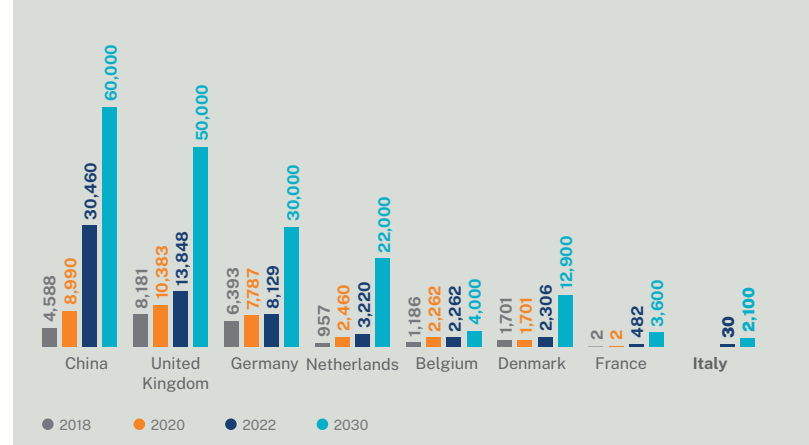
**FALSE** In Italy it makes no sense to focus on floating offshore wind technology because there is no development potential

**TRUE** Italy is the ideal Country for floating offshore wind, being the third potential market. >60% of the Italian renewable electric energy potential comes from this technology

### GLOBALLY, THE OFFSHORE WIND SECTOR ATTRACTS SUBSTANTIAL INVESTMENTS. ITALY LAGS FAR BEHIND GERMANY, THE UK AND CHINA

- Energy companies and Governments are expanding their offshore wind portfolios globally, with **China** as the **market leader** (more than doubling the capacity of offshore wind of the second largest market, the UK)
- In the European Union, **Germany** has the highest installed capacity of offshore wind power, with over **8 GW** installed
- In Italy, the installed capacity of offshore wind is **30 MW (0.2%** compared to UK and **0.4%** compared to Germany). **Italy is also far behind in terms of offshore wind 2030 targets: 4.2%** compared to the UK and **7%** compared to Germany
- While global powers are betting heavily on this technology, the draft update of the **National Energy and Climate Plan (NECP)** establishes that only 2% of the renewable energy target for **2030 will come from offshore wind farms** (fixed-bottom and floating)

Figure 5. Installed capacity of offshore wind energy and 2030 targets in selected Countries (MW), 2018, 2020, 2022 and 2030.



#### MYTHBUSTERS

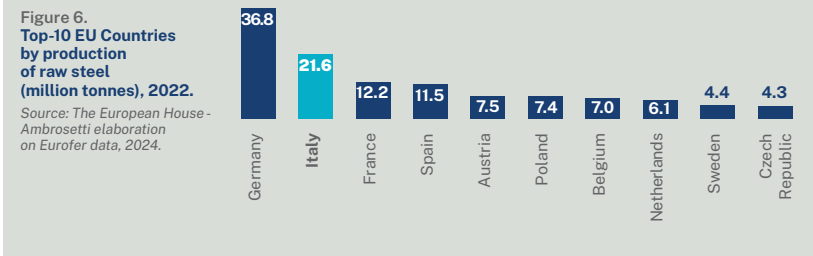
**FALSE** The best strategy for Italy is waiting for other Countries to develop floating offshore wind power, before starting its own development cycle

**TRUE** In other Countries, the adoption strategies of floating offshore wind have already been initiated and consolidated - whoever succeeds in first achieving the industrial development of this technology will become the supplier to all the other markets

## ITALY'S INDUSTRIAL FRAMEWORK (SHIPBUILDING, STEEL) IS IDEAL FOR DEVELOPING THE FLOATING OFFSHORE WIND SUPPLY CHAIN

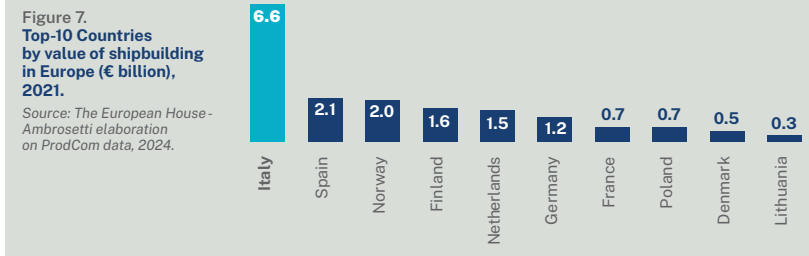
### METALLURGICAL MANUFACTURING

- Steel is a material that will be used extensively in the production of offshore floating wind turbines
- With 21.6 million tonnes produced, Italy is the 2<sup>nd</sup> largest steel producer in the EU-27



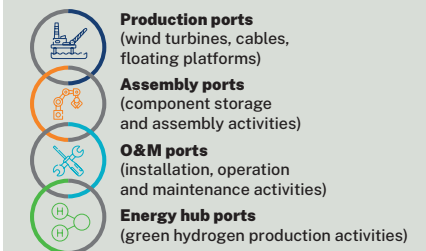
### ADVANCED MECHANICS AND NAVAL MECHANICS

- In Europe, Italy ranks first in the production of ships and boats, with a total value of production of 6.6 billions Euro
- Domestic shipbuilding has the necessary design and implementation capacity to manage complex mass production and assembly projects of floating wind platforms and substations



### PORT INFRASTRUCTURE

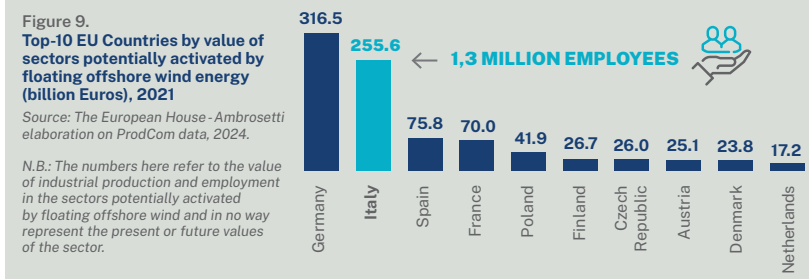
Figure 8. The essential role of ports for floating offshore wind (illustrative). Source: The European House - Ambrosetti elaboration, 2024.



- Ports have a key role: unlike fixed-bottom wind, where the assembly and installation of turbines takes place at sea, for floating wind turbines most of these activities take place in ports
- Although there are large and deep harbors in close proximity to potential offshore wind sites, there is not a single port in Italy that currently meets all the necessary requirements to implement a floating offshore wind project

### THE ECONOMIC AND EMPLOYMENT VALUE POTENTIALLY ACTIVATED

- Floating offshore wind power can activate 5 key sectors of the Italian economy (construction materials, metal goods, advanced mechanics, shipbuilding, electrical equipment), with a total value of 255.6 billion of Euros and 1.3 million employees



N.B. The numbers here refer to the value of industrial production and employment in the sectors potentially activated by floating offshore wind and in no way represent the present or future values of the sector.

### MYTHBUSTERS

**FALSE** The Italian supply chain is not ready to start working on ambitious floating offshore wind targets set for 2030 and 2040

**TRUE** If the Government sets short, medium and long-term targets, providing a stimulus to investors, and encourages the industry's efforts with a clear industrial vision for this technology, Italy can aspire to more than 2.1 GW by 2030 leveraging on an industrial value chain in which Italy has a leadership, with a value of €255 billion Euros and 1.3 million employees

## MARITIME SPATIAL PLANNING (MSP) IS A STRATEGIC PLANNING THAT CONCILIATES THE DIFFERENT SECTORS THAT RELY ON THE SEA

- Maritime Spatial Planning (MSP) aims to establish a more rational organisation of the use of maritime space and the interactions between its uses, proving essential for the implementation of renewable offshore installations. However, although almost all EU coastal Countries have adopted a MSP, Italy remains one of the few Countries that have not adopted this instrument yet, with the European Commission announcing in April 2023 the opening of the second stage of the infringement procedure against Italy
- Currently, floating offshore wind licensing models tend to develop following two main approaches: the centralised approach and the decentralised approach. In the short term, a hybrid model may be adopted, combining the advantages of the previous two models

Figure 12. General outline of the offshore wind authorisation process (centralised and decentralised). Source: The European House - Ambrosetti elaboration on 'Enabling frameworks for offshore wind scale up - innovations in permitting', Irena and GWEC data, 2024.

ACTIVITIES	DESCRIPTION	CENTRALISED MODEL	DECENTRALISED MODEL
Area selection	MSP overview	Government	Government
Site Selection	MSP detail	Government	Developer
Development	Socio-environmental impact assessments, site feasibility studies, network applications, stakeholders involvement	Government	Developer
Procurement	Selection of suppliers, permits and licences	Developer	Developer
Construction	Onshore works, cabling, foundations, turbines, substations	Developer	Developer
Operations	Performance, maintenance and asset management	Developer	Developer

## FLOATING OFFSHORE WIND FARMS ARE COMPLEX PROJECTS, REQUIRING CONSULTATION WITH LOCAL AREAS

- NIMBY movements may hinder the implementation of floating offshore wind projects in our seas. It is therefore essential to promote the participation of territorial communities and stakeholders in a concerted approach
- This is what France has been doing since 1995 through the institution of the Public Debate, according to which, for each offshore wind farm project the French National Commission for Public Debate (CNPD) is required to organise public participation with people affected by the installation of the turbines
- In Italy, the Public Debate was introduced by Legislative Decree 50 (Code of public contracts) in 2016, making it mandatory for major infrastructure projects and architectural works of social significance, impacting the environment, cities and territorial planning. However, public debate in Italy is still scarcely applied: it is necessary to strengthen this institution

Figure 13. Offshore wind farm projects in France, (illustrative) 2024. Source: The European House - Ambrosetti elaboration based on data from the French Ministry of Energy Transition, 2024.

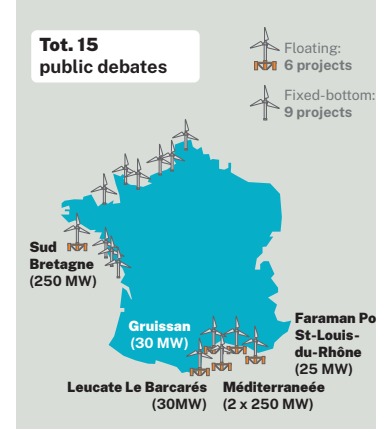
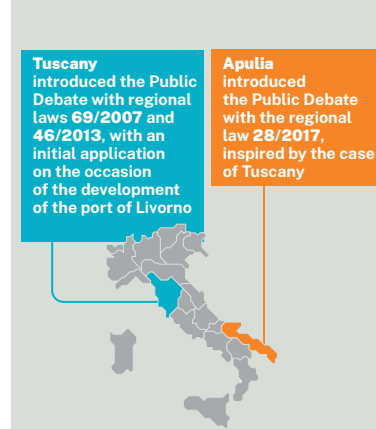


Figure 14. The Regions that first adopted the public debate in Italy, (illustrative) 2024. Source: The European House - Ambrosetti elaboration on Ministry of Infrastructure data and Transport, 2024.



### MYTHBUSTERS

**FALSE** Italy can't start floating offshore wind projects until the Maritime Spatial Planning (MSP) is finalised

**TRUE** Best practices at the European level show that in the short term it's possible to follow a decentralised approach for the quick identification of offshore wind sites suitable for the development of major projects, while implementing the MSP based on a centralised mechanism

### MYTHBUSTERS

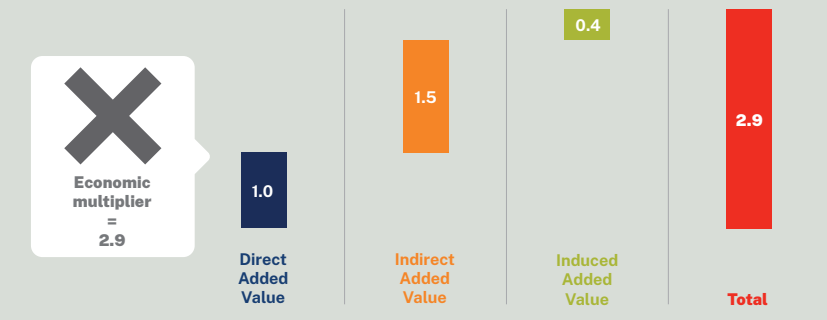
**FALSE** In Italy it's not possible to overcome local oppositions and avoid NIMBY movements that block the installation of floating offshore wind turbines

**TRUE** Best practices at the European level show that there are concertation mechanisms that enable stakeholders' participation in the definition of offshore wind projects, enhancing social acceptability in less than 1 year

## THE FLOATING OFFSHORE WIND SECTOR CREATES SIGNIFICANT POSITIVE EXTERNALITIES ON LOCAL TERRITORIES

Figure 10. Direct, indirect and induced Added Value generated by the expected investment for 1 GW of floating offshore wind in Italy (billion of Euros).

Source: The European House - Ambrosetti elaboration on "Project for an offshore wind power plant in the Strait of Sicily and related connection works to the national electricity grid - preliminary environmental study", NECP, Terna, Aurora Research and Italian long-term strategy on the reduction of greenhouse gas emissions data, 2024.

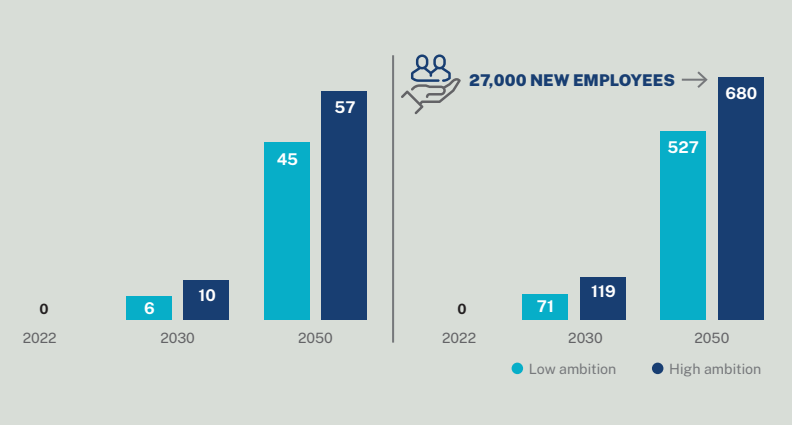


- By analysing data and input-output matrices from Istat, The European House - Ambrosetti estimated that the development of a domestic supply chain for floating offshore wind power can generate a significant direct, indirect and induced impact, with a total value of approximately 2.9 billion Euro per GW installed, compared to a direct Value Added of 1 billion per GW
- In other words, every Euro of Added Value generated in the floating offshore wind industry in Italy activates further 1.9 in the rest of the Italian economy, thanks to the activation of supply chains within the national territory

Figure 11. Direct, indirect and induced Added Value (left, billion of Euros) and direct, indirect and induced employment (right, thousands FTE) generated by the expected investments in floating offshore wind according to the 2030 and 2050 scenarios in Italy, 2022, 2030 and 2050.

Source: The European House - Ambrosetti elaboration "Project for an offshore wind farm in the Strait of Sicily and related connection works to the national electricity grid - preliminary environmental study", NECP, Terna, Aurora Research and Italian long-term strategy on the reduction of greenhouse gas emissions data, 2024.

N.B. 2030 low scenario reflects the target reported in the draft version of the National Energy and Climate Plan. 2030 high scenario reflects the values reported in the RES 2 draft decree. 2050 low scenario is based on the report "Documento di Descrizione degli Scenari 2022" by Terna and Snam, which reports in 2040 an offshore wind installed capacity of 15.5 GW, which conservatively was carried forward 10 years. 2050 high scenario's installed capacity is based on the offshore wind production assumed in the Italian Long-Term Strategy (up to 60 TWh in 2050).



- Given the required investments and the scenarios projected to 2030 and 2050 for floating offshore wind in Italy, it has been estimated an Added Value generated at the national level between 6 and 10 billion Euros by 2030 and between 45 and 57 billion Euros by 2050 (116% of the 2022 GDP of the Liguria Region)
- From an employment perspective, achieving the targets of floating offshore wind power in Italy could guarantee an increase of employment between 71,000 and 119,000 FTEs by 2030 and between 527,000 and 680,000 FTEs by 2050. In other terms, under the assumption of realising 20 GW as of 2050, around 27,000 new jobs could be generated in Italy

NB: Initial investments for 1 GW of floating offshore wind include both CAPEX (capital expenditure) and OPEX (operating expenditure, discounted over a 25-year period). Investments include only the Italian part and amount to EUR 2.7 billion of Euros/GW. The estimate of new employees was calculated from the expected Full-Time Equivalents, assuming a plant life of 25 years.

### MYTHBUSTERS

**FALSE** The development of renewables energy sources does not allow to create value directly in local territories and benefits foreign supply chains

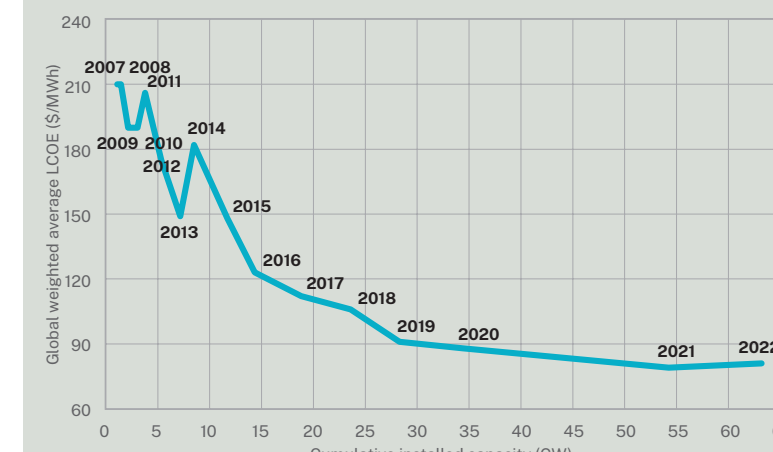
**TRUE** The floating offshore wind sector generates high positive externalities on the local territories, involving nationwide manufacturing companies and local businesses

## THE STANDARDISATION AND SUBSEQUENT INDUSTRIALISATION OF FLOATING OFFSHORE WIND TECHNOLOGY WILL SIGNIFICANTLY REDUCE COSTS

- Economies of scale and industrialisation can lead to significant cost reductions for floating offshore wind power, as was the case for fixed-bottom offshore wind
- Support mechanisms are key to reducing risk and lowering the Levelized Cost of Electricity (LCOE): only appropriate incentive tariffs can ensure the bankability of projects and attract investments
- In the UK, after the outcome of the last auction (Allocation Round 5), which for the first time in history failed to attract any offshore wind projects, the UK Government increased subsidies for floating offshore wind by 52%, giving a positive signal to the sector

Figure 15. Global Levelised Cost Of Electricity (\$/MWh) and global cumulative installed capacity of fixed-bottom offshore wind (GW), 2007-2022.

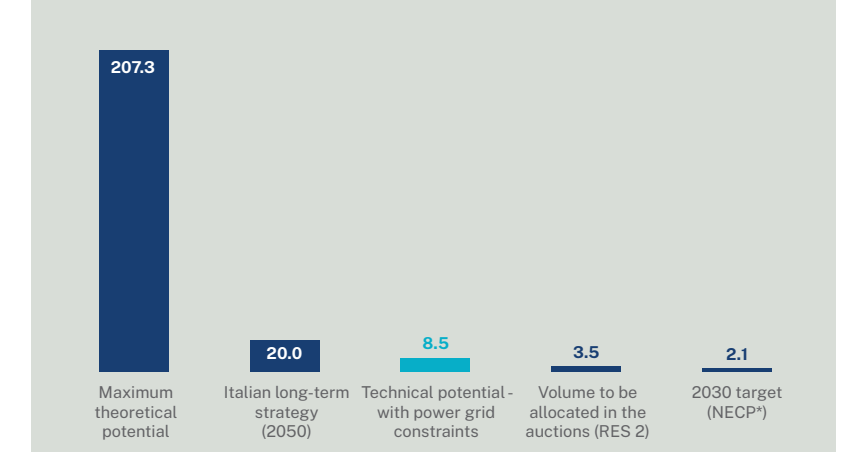
Source: The European House - Ambrosetti elaboration on Irena data, 2024. N.B. 2007 was chosen as the starting year because it was the year that recorded the first GW of cumulative offshore wind installation globally.



## THE CURRENT POWER GRID LIMITS THE DEPLOYMENT OF FLOATING OFFSHORE WIND POWER

- In its latest Development Plan, Terna has planned about 21 billion Euros in investments over the next 10 years, up 17% from the previous strategy. Among those investments, 5 new electricity backbones are planned that will allow doubling the current transmission capacity between Market Zones to more than 30 GW (vs. about 16 GW today)
- The deployment of floating offshore wind in Italy, in fact, will depend on the capacity of the power grid to deliver electricity from the South to the North: connection requests are concentrated in the South, but Northern Italy is the leading consumption hub in Italy (50% of total electricity consumption)
- The current infrastructural limitations of the power grid constrain the potential of floating offshore wind in Italy to a maximum of 8.5 GW. The development of offshore wind capacity in Italy will therefore have to consider the adequacy of the power grid and will have to be adapted to its upgrading, as well as to the availability of storage systems

Figure 16. The potential of floating offshore wind power in Italy under different scenarios (GW). Source: The European House - Ambrosetti elaboration on Terna data, 2024.



(\*) Draft of the National Energy and Climate Plan.

### MYTHBUSTERS

**FALSE** The levelised cost of energy associated to the floating offshore wind represents a huge obstacle to a sustainable development of this technology

**TRUE** The standardisation and subsequent industrialisation of the technology will allow, as happened for the fixed-bottom, to significantly reduce costs

### MYTHBUSTERS

**FALSE** There is no adequate power grid infrastructure to develop floating offshore wind projects in Italy

**TRUE** Further adjustments to the Italian power grid are necessary, but Terna's Development Plan already envisages strengthening the grid's export capacity by 2030