MARINEWIND

Market Uptake Measures of Floating Offshore Wind Technology Systems (FOWTs)

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D4.4: Webinars for policy makers and public authorities

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EXECUTIVE SUMMARY

This deliverable D4.4 “Webinars for policy makers and public authorities” outlines the objectives, methodology, implementation and content of the two informative webinars organised by APRE, with the support of the whole Consortium, in the framework of Task 4.3 *Webinars for policy makers and public authorities.* The activity aimed at raising awareness and providing evidence-based insights to support the development of more informed policies for the deployment of Floating Offshore Wind (FOW) across Europe, leveraging on the key results of the MARINEWIND project. The webinars delved into a wide range of topics, which encompassed the policy frameworks, environmental and socio-economic impacts, financial and techno-economic aspects. Furthermore, they served as a platform to foster knowledge exchange, stakeholder engagement, and co-creation, involving representatives from industry, academia, civil society, and public institutions, as well as promoting the sharing of best practices beyond the MARINEWIND Consortium. The webinars were recorded and translated into the five languages of the Labs (English, Greek, Italian, Portuguese and Spanish) to maximise their outreach and accessibility, both at European and national levels. Building upon the main outcomes of the webinars, this deliverable provides a list of actionable takeaways mainly targeted at policy makers and public authorities and is divided into different thematic areas, which include social acceptance and socio-economic aspects, environmental dimensions, policy, financial and techno-economic actions and best practices. The takeaways identified are emphasising the need for coordinated industrial strategies, inclusive stakeholder engagement, and robust regulatory support to foster a competitive and sustainable European value chain for FOW farms.

1 INTRODUCTION

As Europe intensifies its efforts to meet ambitious climate and energy targets for 2030 and 2050, Floating Offshore Wind (FOW) represents a strategic solution in the renewable energy mix, providing the potential to harness wind resources in deeper waters, diversify energy sources, and reinforce energy security. However, the market uptake of FOW across Europe still faces many challenges, including regulatory complexity, environmental concerns, social acceptance, and financial uncertainty. These issues are particularly pronounced in regions such as the Mediterranean, where the technology is still in its early stages and public awareness remains limited. The MARINEWIND - Market Uptake Measures of Floating Offshore Wind Technology Systems project aims at further explore the existing bottlenecks and potential opportunities at national and European level to strengthen FOW role in delivering innovative solutions to system integration, which will be translated into actionable recommendations and tools to accelerate its market uptake, as a result of a continuous dialogue with all the stakeholders categories in the established Labs.

In the framework of Task 4.3 *Webinars for policy makers and public authorities*, APRE organised two informative webinars targeted mainly to policy makers and public authorities with the goal of raising awareness and providing evidence-based insights for the shaping of more informative RES policies. The webinars built on the basis of the three-fold analysis performed within the project - covering the assessment of the policy framework, the social and environmental impacts analysis and the financial and techno-economic aspects – in order to provide an overview of the main barriers and enablers identified, stemming from regulatory, social, environmental, financial, market and technological aspects. To ensure a wider outreach, the webinars were recorded and translated into the five languages of the MARINEWIND Labs, namely English, Greek, Italian, Portuguese, and Spanish.

The webinars were conceived as strategic instruments to share best practices and disseminate the key findings of the MARINEWIND project, fostering a wider understanding of the barriers and enablers to accelerate FOW uptake at national level. Furthermore, the webinars represented a key component of the engagement pathway developed within the MARINEWIND project, with sessions dedicated to enhance the dialogue amongst the Quintuple-Helix stakeholders, with the ultimate goal to promote knowledge exchange and co-creation.

This deliverable, entitled “Webinars for policy makers and public authorities”, comprises five chapters, as follows:

- **Chapter 1 – Introduction** provides introductory information about the context in which this report has been elaborated and describes its structure.
- **Chapter 2 – Objectives and methodology** outlines the main objectives to be pursued and the methodology applied to design and organise the webinars.
- **Chapter 3 – First MARINEWIND webinar** describes the agenda and the content of the first webinar, focusing on the key topics highlighted by each intervention and the results of the co-creation activities.
- **Chapter 4 – Second MARINEWIND webinar** delves into the content of the second webinar, providing a summary of the topics discussed in each session and briefly describing the results of the co-creation exercise.

- **Chapter 5 – Conclusions** reports the reflections arising from the webinars and outlines the key takeaways for policy makers and public authorities that can be extracted from the different sessions.

2 OBJECTIVES AND METHODOLOGY

This chapter provides a description of the main objectives and target groups of the MARINEWIND informative webinars, while outlining the methodology and the approach adopted in the design phase, as well as the structure followed throughout the organisation.

2.1 Objectives

The MARINEWIND webinars aimed at increasing the level of awareness of policymakers and public authorities for developing more informed policies in the renewable energy sector, with a specific focus on Floating Offshore Wind (FOW) by:

- **Providing evidence-based insights** leveraging on the main MARINEWIND results, stemming from the assessment of the policy framework, the analysis of the social and environmental impacts and the investigation of financial and techno-economic solutions to accelerate the market uptake of FOW across Europe.
- **Fostering knowledge exchange and mutual learning** between forerunner countries in the sector and those where FOW farms are still under development through the identification and presentation of concrete best practices available, to shape inspirational pathways for the acceleration of FOW across Europe.
- Contributing to **raise awareness about FOW farms** at the community level, focusing on the potential socio-economic and financial benefits and opportunities, especially in terms of job creation, stemming from the creation of a competitive European-based value chain, while also tackling existing misconceptions and false myths.
- **Fostering a wider understanding of the main national-specific barriers** to be addressed **and enablers** to be leveraged to accelerate the deployment of FOW farms, to be translated into recommendations for the shaping of more informed Renewable Energy Sources (RES) policies**,** bridging policy interventions with competitiveness.
- **Continuing to involve the Quintuple-Helix stakeholders in the engagement pathway established in the MARINEWIND project** by engaging them in meaningful discussions with experts and gathering their opinions and concerns through a co-creative approach, to ensure that their perspectives are properly considered and addressed from the early stages of the FOW farms development, thus reducing potential local opposition and maximising their successful realisation.

2.2 Methodology and target audience

The MARINEWIND informative webinars were designed to offer an overview of the main national-specific barriers and enablers stemming from regulatory, social, environmental, financial, market and technological aspects identified in the five Labs, providing key insights, recommendations and first-hand indications to shape a national and European policy framework capable to facilitate the deployment of floating offshore wind farms, as well as further extending the dialogue and engagement pathway with the communities under investigation.

The primary target group of the informative webinars was represented mainly by policymakers and public authorities. However, the promotional actions were oriented towards all the stakeholder categories of the Quintuple Helix - including industry, green innovators, civil society and academia – to further disseminate the results of the MARINEWIND project. In addition, the outreach of the webinars was further extended across Europe and also at the national level, since the two events were recorded and made available with subtitles in the five languages of the MARINEWIND Labs (namely English, Greek, Italian, Spanish, and Portuguese). The objective was to reach at least 250 participants in total, including both live attendees and views.

The format and content of the webinars were previously discussed and agreed with the whole Consortium during a co-creation session organised in the framework of the MARINEWIND Annual Meeting.

The webinars, which lasted around two hours each and were held in English in a live format, have been structured around five main sessions, preceded by a general introduction to the MARINEWIND project, covering its main objectives, results and key activities, and followed by closing remarks. Each session responds to a specific objective, as shown in Figure 1.

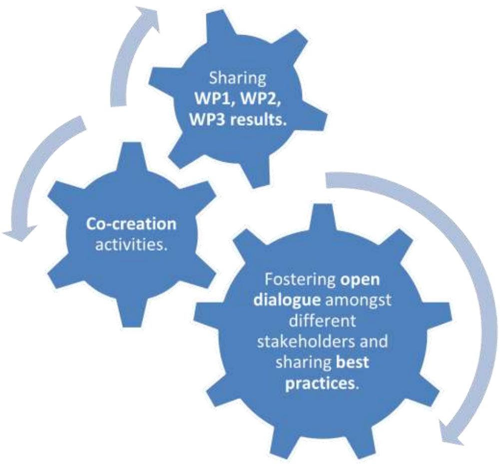

Figure 1 - Objectives of the MARINEWIND webinars

The first session, called "The MARINEWIND Experience" involved experts from the Consortium and aimed at showcasing and further disseminating the scientific results of the project, as well as highlighting the approaches adopted in the engagement pathway with the local communities across the five Labs, with a focus on the dialogue with the fishing sector to address the potential conflicts in the co-existence between different uses of the sea. The ultimate objective of the session was to communicate the main results of the techno-economic, financial, policy and social analyses to a wider public by translating the findings into operational insights to raise awareness about FOW and to inform evidence-based RES policies.

The objective of the "Best practice" session was to identify and give further visibility to concrete actions and first-hand insights contributing to the deployment of FOW across Europe, which could be inspirational for other basin areas, based on the idea that the knowledge exchange between forerunner countries and those under development is pivotal for accelerating the future of FOW. For this session, different external experts were contacted and invited.

Afterwards, the “MARINEWIND Dialogue” foresaw a roundtable with two experts, either external or internal, who were asked three round of questions, which they had to answer in turn. The questions were previously agreed with the speakers and a coordination meeting was organised prior to the webinar, in order to get to know each other and to avoid duplications in the answers. This session aimed at fostering the dialogue amongst all stakeholders categories to discuss the most pressing topics in the field from different perspectives and identify concrete actions to move forward.

On the other hand, part of the webinar was designed in an interactive way, following a co-creation approach which could allow the consortium to collect feedback, experiences, and inputs to inform the MARINEWIND project outcomes. The interaction between the MARINEWIND consortium and the audience attending the workshop was supported by a significant use of Mentimeter, which has been the instrument to pose questions throughout the ice-breaking session, focusing on the different areas of analysis addressed in each webinar. Furthermore, the webinars foresaw an interactive Q&A session at the end.

To further amplify the outreach of the webinars and facilitate the accessibility of the content also at national level, the webinars were recorded and translated in the five languages of the Labs. The recordings with subtitles are available on the MARINEWIND WebGIS (“Additional tools” section).

Timing	Title of the session	Type of experts
10 minutes	*Welcoming session* **Presentation of the MARINEWIND Project and Introduction to the webinar**	Project coordinator
10 minutes	*Mentimeter Session*	All participants
20 minutes	*The MARINEWIND Experience*	Expert from the MARINEWIND Consortium
20 minutes	*Best practice* session	External expert
30 minutes	*MARINEWIND Dialogue*	Dialogue with 2 experts (either internal or external)
25 minutes	*Interactive session* **Q&A with MARINEWIND experts**	All participants
5 minutes	**Closing Remarks**	Project coordinator

Table 1 - Structure of the MARINEWIND Webinars

3 FIRST MARINEWIND WEBINAR

This chapter provides an overview of the first MARINEWIND webinar, entitled “Shaping integrated policy frameworks for Floating Offshore Wind deployment: best practices and recommendations across Europe”, which was held on the 18th of March, from 11:00 to 13:00 CET.

The webinar explored how key aspects connected to environmental impacts assessment and ongoing participatory processes to foster social acceptance and manage potential conflicts with other uses of the sea could be successfully integrated in a coherent framework generating more informed RES policies, with the ultimate goal to further accelerate the market uptake of FOW across Europe.

A total number of 130 stakeholders registered for the webinar, while 93 actively participated, representing different stakeholders categories, as described in Table 1.

Registered participants	
Industry representatives	49
Researchers / Academics	37
Policymakers / Public Authorities	13
Civil Society	7
Green Technology Innovators	3
Other	20
Prefer not to say	1

Table 2 - Registered participants' profiles

This chapter will present a summary of the content and highlights extracted from the speakers' interventions, while also providing an analysis of the results collected during the co-creation session, which was run through Mentimeter.

As shown in Table 2, the agenda of the webinar foresaw three thematic slots and two interactive sessions (Mentimeter and open Q&A), preceded by an introductory and closing sessions, delivered by the MARINEWIND Coordinator.

Time	Title of the Intervention	Speaker
11:00 – 11:10	*Welcoming session* **Presentation of the MARINEWIND Project and Introduction to the webinar**	Riccardo Coletta, *Agency for the Promotion of the European Research*
11:10 – 11:20	*Mentimeter Session* **Have your say on barriers and enablers for FOWTs**	All Participants
11:20 – 11:40	*The MARINEWIND Experience* **The ongoing dialogue with local communities and the fishing industry**	Leonidas Parodos, *Q-PLAN INTERNATIONAL* Rosalie Tukker, *Europêche*
11:40 – 12:00	*Best practice* **The Danish Energy Model: A holistic approach to develop the offshore wind market**	Enrico Carloni, *Royal Danish Embassy*
12:00 – 12:30	*MARINEWIND Dialogue* **Towards integrated policies for sustainable FOW deployment: social acceptance and environmental aspects**	Elena Ciappi, *National Research Council* Cristina Simioli, *Renewables Grid Initiative*
12:30 – 12:55	*Interactive session* **Q&A with MARINEWIND experts**	All Participants
12:55 – 13:00	**Closing Remarks**	Riccardo Coletta, *Agency for the Promotion of the European Research*

Table 3 - Agenda of the first MARINEWIND Webinar

3.1 Overview of contributions and interventions by the speakers

3.1.1 Session 1: Welcoming session

The "Welcoming session" foresaw a presentation of the MARINEWIND project given by Riccardo Coletta, as project coordinator, aiming at setting the scene for the webinar. The presentation focused on the main objectives and impacts to be reached by the project, the Consortium partners, and the multi-stakeholders co-creation approach applied as main methodology to investigate and collect data about national-specific barriers and enablers linked to policy frameworks; stakeholders engagement and environmental impact; financial solutions and techno-economic implications for the commercialisation of FOW technologies. The second part of the presentation highlighted the main ongoing activities, trying to enhance the stakeholders' participation in the MARINEWIND Survey and to promote the WebGIS tool.

The welcoming session was followed by an interactive Mentimeter session, working as an ice-breaker to introduce the content of the webinar and investigate the stakeholders' perceptions about key barriers and enablers linked to social acceptance, environmental concerns and policy frameworks for the uptake of FOW. The main results of the co-creation session are presented in section 3.2.

3.1.2 Session 2: The MARINEWIND Experience - The ongoing dialogue with local communities and the fishing industry

Figure 2 - MARINEWIND Webinar promotional card sessions 1 & 2

The "MARINEWIND Experience" session was dedicated to the presentation of the work performed within the project, with a focus on the approach adopted for the establishment of an ongoing dialogue with relevant stakeholders within the five Labs. The session was divided into two different parts. First, Leonidas Parodos from Q-PLAN International provided a general overview of the strategy applied by MARINEWIND to engage with local stakeholders, focusing on the methodology and the concrete experience of the co-creation workshops realised throughout the project.

The intervention focused on the presentation of the overall MARINEWIND methodology for community engagement, based on the establishment of five Labs (Greece, Italy, Spain, Portugal, United Kingdom) in which the responsible partners have organised a total of fifteen physical co-creation workshops (three in each country), bringing together a wide range of stakeholders from the Quintuple-helix, including industry, academia, public authorities, civil society and green innovators. The co-creation workshops aimed at spreading knowledge about the innovative technology to foster social acceptance and collaborations among stakeholders, as well as identifying the main barriers and enablers affecting FOW deployment. The main challenges emerged in the framework of the co-creation workshops included: complex regulatory and authorisation process and the lack of Maritime Spatial Planning, especially in the Mediterranean countries, the unclear allocation of responsibilities among the public and private entities, and the limited availability of proper infrastructures to develop FOW, which is often perceived as an obstacle to the other uses of the sea.

Then, the intervention concentrated on the Greek Lab, showcasing the experience of the co-creation workshops realised in the region. The first workshop, which took place in the framework of the “Greek Offshore Renewable Energy Conference”, in Athens, targeted mainly industrial and green innovation stakeholders and led to the identification of the key enabling factors to invest in FOW, which included the need for a clear regulatory framework and the development of a local supply chain. The second event was organised as a side event of the “Renewable Energy Tech Expo” in Thessaloniki and was mainly oriented towards academia, civil society and green innovation stakeholders to dive into the strategies to successfully engage the coastal communities in the overall deployment of wind farms. The need to increase community outreach and educational programmes emerged as key priorities, due to the fact that local communities are not properly informed about the potential benefits stemming from FOW. Lastly, the third workshop was held in Crete, as a consequence of the emerging debate following the publication of the Greek National OWF Development Programme[1], which identified the island as a prioritised area for the deployment of FOW farms in Greece. Thus, the main goal of the third workshop was to gather the perceptions of the coastal communities on the potential impacts of FOW farms. The big picture resulting from the consultation was quite different from the opinion of industry representatives, with the local communities being split with regards to the FOW impact on the socio-economic activities and on the environment.

The second intervention was provided by Rosalie Tukker from Europêche – an umbrella association of national organisations of small and large scale fishing enterprises and shipowners in the European Union - presented the main concerns expressed by the local fishing industry regarding FOW, as well as good practices, potential policy actions and solutions that could be implemented to foster the co-existence between FOW and the fishing sector.

Although the EU fishing sector is not opposed to offshore wind farms and could be considered as part of the solution to address climate changes, it is often sidelined when it comes to renewable energy and its management has to deal with many legislations (e.g., the Nature Restoration Regulation[2], Managing and Protecting Natura 2000 site[3]). To date, offshore wind is expanding, further intensifying the competition for marine space and dealing with the EU Exclusive Economic Zone (EEZ)[4], which is the

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[1] https://herema.gr/wp-content/uploads/2023/10/%CE%A3%CE%A7%CE%95%CE%94%CE%99%CE%9F-%CE%95%CE%98%CE%9D%CE%99%CE%9A%CE%9F%CE%A5-%CE%A0%CE%A1%CE%9F%CE%93%CE%A1%CE%91%CE%9C%CE%9C%CE%91%CE%A4%CE%9F%CE%A3-%CE%A5%CE%91%CE%A0_%CE%95%CE%94%CE%95%CE%A5%CE%95%CE%A0.pdf

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202401991.

[3] https://environment.ec.europa.eu/topics/nature-and-biodiversity/natura-2000/managing-and-protecting-natura-2000-sites_en#marine-natura-2000-sites.

[4] https://emodnet.ec.europa.eu/en/map-week-exclusive-economic-zones-0.

largest in the world. In this context, fishing grounds are shrinking as energy projects take priority, pushing fisheries further offshore and increasing fuel consumption, emissions, and safety risks, potentially undermining the targets linked to energy efficiency and net-zero. For instance, the EU fishing sector has already reduced its emissions by almost 50%, nearly achieving the EU Green Deal's 55% target, five years ahead of schedule, by adopting energy-efficient technologies to modernise the fleet and reduce the environmental footprint (e.g., transitioning to lower emission fuels, improving gear selectivity to reduce bycatch). In this context, fisheries is proactively engaging in science, co-management initiatives and sustainability efforts. Moreover, offshore wind further contributes to concentrates fishing activities in smaller areas, rather than having a more balanced and lower-impact distribution across the sea. Therefore, according to fisheries, FOW can be promoted as a promising solution, but it still requires anchoring systems, subsea cables, and maintenance corridors, having an impact on the marine ecosystems and creating the aforementioned operational challenge for fishers.

Amongst its main objectives, the Blue Economy aims to create synergies between different maritime sectors in the EU. Even if many discussions are underway and co-existence options such as the passive gear fishing have been explored, the Member States still struggle to find viable solutions integrating offshore wind and fisheries and some activities may not be fully compatible within the same space. Therefore, the approach to offshore wind development should be guided by the Maritime Spatial Planning and be aligned with Article 2b of the Paris Agreement[5] which, under the United Nations Framework Convention on Climate Change, calls for climate action that does not threaten food production. In addition, promoting the cooperation amongst different sectors and actors (e.g., fisheries and aquaculture, energy developers, and policymakers) is crucial to identify sustainable solutions.

The second part of the presentation focused on the identification of best practices to foster the co-existence between FOW and other sea activities. First, initiatives to support co-existence should proactively address safety concerns rather than only warning, suggesting vessels to stay away from offshore wind farms (e.g., Belgian government flyer warning that Offshore Wind farms "look beautiful from afar"). Secondly, the optimisation of the MSP is crucial to reduce the cumulative pressures. For instance, in the Netherlands, wind farms have been installed too close to shore, displacing traditional trawling from valuable fishing grounds. Thus, future projects should ensure that the navigation channels are wide enough to allow all fishing techniques to operate safely. A third best practice is represented by the Mariner Notices system[6], developed in the US to improve the communication between fisheries and wind developers, reducing gear conflicts and enhancing safety throughout all the construction phases of offshore wind farms. It has been developed by fishers since the maps shared by offshore wind developers are not that practical for the other users at sea. Therefore, the system provides plotter files that can be used with numerous navigation systems for tourism, recreational and fishing vessels. Lastly, Italy's Emilia-Romagna region also provides a strong example regarding safety

[5] https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf

[6] https://marinernotices.com/.

concerns and collaborative process, with the launch of structured consultations to ensure that wind projects consider the needs coastal communities and the fishing sector through an active involvement process. From *Europêche* perspective, these kinds of collaborative processes should be a standard practice in Europe.

To conclude, the socio-economic fabric of fisheries and coastal communities must be prioritised in the MSP to make the energy transition fair and inclusive by incorporating social benefits into wind auctions, levelling the playing field in terms of standards and defining long-term sustainability goals. Furthermore, the long-term impacts generated by FOW should be further investigated (e.g., how infrastructure degrades over time, posing a risk to marine environment and ecosystems), while addressing existing concerns to protect fish stock and marine biodiversity, ensuring that offshore energy is built with – and not against - the people who rely on the seas.

3.1.3 Session 3: Best practices - The Danish Energy Model: A holistic approach to develop the offshore wind market

The *Best practices* session aimed at providing an overview of the Danish Energy Model, which is globally recognised as a best practice for transitioning towards renewable energy, driving environmental sustainability and economic growth, through the adoption of an holistic approach, which is built upon four key pillars: (i) long-term energy policies and stable regulatory frameworks; (ii) supply chain and infrastructure development; (iii) stakeholder engagement, and (iv) upskilling.

Figure 3 - MARINEWIND Webinar promotional card session 3

For this purpose, Enrico Carloni, working as Energy Expert at the Royal Danish Embassy in Italy, was invited to explain how Denmark managed to build up an offshore wind market over several decades, combining the energy transition with economic development to reach the ambitions set for 2030 and 2050 (namely the 70% reduction in CO_2 emission by 2030 compared to 1990 levels and to be climate-neutral by 2050). Despite the fact that the Danish model is based on bottom-fixed technologies, generating different scenarios regarding supply chain and infrastructure development, as well as diverse technological challenges, its path can be inspiring also for the FOW market in Europe.

Regarding the long-term policies and planning, it can be noted that the public-private partnership is at the core of the Danish energy systems today, with different renewables in the electricity generation. The primary energy supply and the domestic energy production show that oil is still quite relevant. However, Denmark has gradually reconsidered its status as a major oil and gas producer and, through the 2020 North Sea Agreement, has set 2050 as the end date to produce fossil fuels.

Looking at the onshore and offshore wind market, there are both existing wind farms and the ones under planning or construction, such as the Thor offshore wind farm (1 GW)[7] in the Danish Nort Sea, which will start operating in 2027. To date, Denmark covers the full value chain and the wind industry employs more than 33,000 people. Overall, the installed power capacity for onshore and offshore wind accounts for 7 GW installed including onshore and offshore wind. Denmark installed offshore wind farms accounting for 2.7 GW and is looking to increase up to 10 GW with the possibility of overplanting, while onshore wind power capacity rose during 2010 to 2023 at a Compound Annual Growth Rate (CAGR) of 4%, with 2% expected during 2023-2035, representing a challenge for the whole market since offshore wind is seen as the leading technology to achieve decarbonisation targets.

According to Carloni, long-term policies and planning are the first condition for making the market attractive for investors, since offshore wind is CAPEX intensive, technologically challenging and requires actions related to supply chain and infrastructure. In Denmark, the energy transition was driven by the 1973 oil crisis causing severe economic impacts which triggered a fundamental rethinking, rather than concerns related to the environment protection. In response to this crisis, the Danish Energy Agency was established to implement energy policies, coordinate planning, and promote energy savings leveraging on multi-parties agreement and based only on cost-competitiveness analysis of the technology.

In 2021, the first MSP for Denmark was submitted, in accordance with the EU deadlines , and serving as a good example of how long-term plans are being made regarding the surrounding sea usage. In 2023, a revised version of the MSP was agreed, allocating the 30% of the sea area to renewable energy, actually doubling the amount set in the first MSP and showcasing an increased ambition for the Danish offshore wind market.

Then, an additional important factor of the Danish model is represented by the One-Stop-Shop model for offshore wind. Denmark primarily uses the Regulated Tender Procedure, which is entirely managed by the Danish Energy Agency (DEA), the central government authority for energy, working as a collector of multiple stakeholders, representing both ministries, the Transmission System Operators (TSOs), Danish investors and renewable developers. In this context, the DEA acts as a One-Stop-Shop for offshore wind, streamlining the planning, consenting, and commissioning processes, while coordinating all necessary permits across relevant authorities, reducing litigation and stakeholder opposition. The government identifies the sites, conducts the assessments, and invites to competitive bids, guaranteeing lowest electricity production cost, while also ensuring long-term, stable, and broad political commitment to lower investment risks. Market dialogues before tenders are an additional core part of the model to ensure transparency, feasibility, flexibility, and fair competition, as well as facilitating the gathering of valuable market input to refine tender conditions, marking them attractive for the industry. Actually, market dialogues were performed also after the last auction, in order to understand the reasons behind its failure. Key lessons emerged from the market dialogue that

[7] https://thor.rwe.com/.

followed up the unsuccessful 3 GW North Sea offshore wind tender[8], which could be summarised as follows:

- **Global economic challenges faced by developers:** Companies could not justify the economics due to increasing costs and low expected returns driven by anticipated low electricity prices in Danish markets (e.g., +30% increasing CAPEX costs; export cables cost accounting for 25% of CAPEX).
- **Insufficient market demand:** A lack of robust internal industry demand and significant uncertainties, particularly around the unmet expectations of a burgeoning hydrogen market (Germany hydrogen pipeline not progressing), hindered confidence.
- **Regulatory and financial barriers:** Complex and expensive permitting and grid connection processes, coupled with financial concerns about electricity price volatility, discouraged bids. In addition, rising interest rates affected financing costs and market uncertainties required higher return on investments.

As a result of the market dialogue, potential solutions and recommendation were proposed, such as (i) more gradual tender processes; (ii) adoption of two-sided Contracts for Difference (CfD) to mitigate price risks; (iii) enhanced flexibility in project timelines to better manage supply chain constraints and market conditions (suggested construction deadline: 2032 at the earliest); (iv) TSO to sustain export cables costs (as it was prior to Thor Tender).

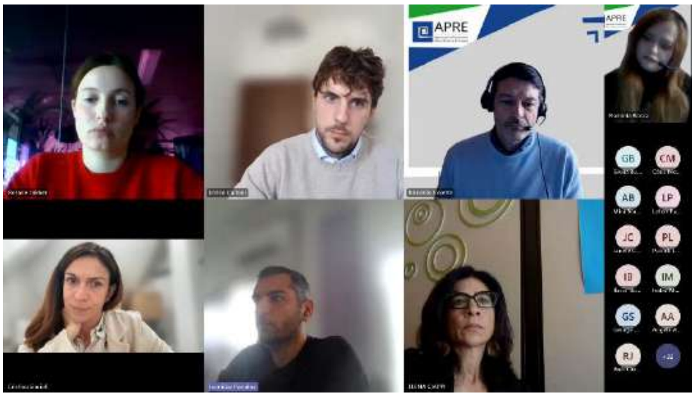

Figure 4 - Screenshot from the 1st webinar

The four pillars of the Danish model are strictly intertwined, with the workforce deployment, the stakeholder engagement and the upskilling process seen as a unique thing and with the multi-stakeholder and public-private platforms being one of the most important elements, bringing together all the categories (e.g., politicians, local communities and industry, private companies and port authorities, fisheries, R&D and academia) to be aligned on the same goal and implementing the same approach.

The Danish Energy Agency and Rambøll carried out an interesting study on the workforce deployment in Denmark, investigating the main elements and conditions (e.g., specific policies, initiatives and strategies to support job creation), as well as exploring success factors guiding the shaping of an industry from offshore wind farms. From this study, some key aspects can be highlighted, including: (i)

8 https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjoj-Wmu4eMAxXsSvEDHfv1LJYQFnoECBYQAQ&url=https%3A%2F%2Fens.dk%2Fmedia%2F6454%2Fdownload&usg=AOvVaw32nmhUndrEsto3m0yzPYjf&opi=89978449

local authorities actively facilitated matchmaking between local SMEs and major suppliers; (ii) cluster organisations significantly contributed to identifying skills gaps and organizing local competencies; (iii) private-sector driven skills initiatives, with companies proactively collaborating with educational institutions to align training with industry needs; (iv) indirect support through regulatory conditions (e.g., guaranteed electricity prices); (v) early mover advantage allowed Denmark to build expertise without imposing local content rules; (vi) existing supply chains from onshore wind and offshore oil and gas naturally engaged local suppliers; (vii) focus on specialization, international competitiveness, and cost efficiency enabled Danish companies to expand globally; (viii) open knowledge-sharing ("open-book") fostered rapid innovation, skill development, and global leadership without formal local-content policies. To summarise, job creation in Denmark was intentional and actively supported, leveraging on a strong involvement from private companies and cluster organisations, targeted efforts (e.g., tailored trainings and capacity building activities) and on local stakeholders networks, which played a critical role in fostering growth and employment opportunities.

Regarding the supply chain, Denmark developed a diffused and interconnected value chain, involving many ports dedicated to offshore wind activities, such as the Odense and the Esbjerg Port, which acted as system-builder in the North Sea. In particular, the Esbjerg Port is the North Sea’s leading port for offshore wind (e.g., 4.5 million square meters allocated to related activities; 4,150 turbines assembled here since 2001, covering about 92.8% of the Northern European market), covering the whole supply chain. Moreover, the port is home to more than 200 companies (employing approximately 10,000 people together) and the port authority, in cooperation with Business Esbjerg, facilitates active B2B matchmaking between suppliers, SMEs, and industry leaders and successfully integrates local SMEs into the offshore wind supply chain. Moreover, by signing the Esbjerg Declaration, Denmark, Belgium, Germany and the Netherlands committed to build up 65 GW by 2030. The Danish experience could be inspiring also for the Mediterranean area, especially for countries like Italy or France which could play a similar role.

The last part of the intervention aimed at presenting some best practices from the Danish case. First, Semco Maritime transitioned from offshore oil and gas to become a global leader in offshore wind substations (23 offshore substations built since 2002) and transition components and services.

A second relevant example is represented by the Odense Port, where the Odense Steel Shipyard was transformed into a modern industrial park specialising in offshore wind manufacturing, innovation, and testing, thanks to the support from local authorities, workers’ unions, and a donation from A.P. Moller-Maersk. Following the financial crisis in 2008, the Odense Port, which was based on steel production, was forced to close down and the resources were converted, with many former shipyard workers transitioned into the offshore wind sector, leveraging their skills in heavy industry and precision engineering. Today, more than 120 large and small companies dominate the activities at the Port of Odense, making crucial contributions to the green transition by producing parts for offshore wind turbine (including Vestas producing the nacelle for 15 MW turbines) and it hosts the Lindø Offshore Renewables Center (LORC), a world-class facility capable of testing wind turbine components up to 25 MW under extreme conditions.

Then, the developers’ engagement with SMEs and local companies to create local industrial ecosystems is another cornerstone for FOW deployment, as happened for the Anholt offshore wind farm, which is the largest offshore wind farm in Denmark, providing green energy for more than 400,000 Danish households. DEA has estimated the total employment effect of the construction phase of Anholt OWF to be 8,000 jobs. The main suppliers for the offshore wind farm were both Danish and international companies. In fact, Ørsted invested DKK (Danish krone) 10 billion in total, with nearly DKK 7 billion going to Danish companies. Additionally, Djurs Wind Power, a group of 32 local companies in Djursland, were involved throughout the Anholt OWF construction, receiving orders worth over DKK 450 million and creating 330 jobs, thus showing the local benefits of large projects.

Furthermore, Denmark was a frontrunner in considering the implications of offshore wind for the fishing sector through the creation of a clear regulation framework, which is represented by the Danish Fisheries Act[9], stating that all fishermen who normally fish in the affected area must be compensated for the loss of income. As a result, developers must negotiate compensation with each affected fisherman and the license to generate electricity from the wind farm can only be issued once agreements with all affected fishermen are in place. In addition, the Danish model enhances fishermen participation from the early stages of the project (e.g., as guard vessels), trying to reduce impacts on fisheries and anticipate issues connected to the co-existence of such activities within the wind farm areas, rather than addressing them at the end of the process.

The last best practice concerned the strategies and programmes developed for the upskilling of the local workforce, particularly for the development of offshore wind farms. These measures include government initiatives, research projects, and collaborations between educational institutions and the industry, with the private-public partnerships driving the creation of testing facilities and specific courses. As an example, in 2023, the Ministry of Higher Education and Science allocated funds for projects which promote green transition, which included the development of competencies that support the green transition and educational offerings for educators in these areas, which were defined upon a consultation with private industry, operators and developers. In 2024, a new broad political agreement decided to furthermore strengthen vocational education and training in relation to the green transition. The main educational assets include: (i) future-oriented mindset to define industry requirements; (ii) collaboration between companies and educational institutions to ensure a competitive and skilled offshore workforce; (iii) advanced test and demonstration facilities to support continuous innovation and skills development. For instance, the Department of Wind and Energy Systems at Denmark Technical University (DTU Wind) is the largest public wind research institute, operating some of the world's most advanced research infrastructure and test facilities for wind and energy systems, which include: (i) the Test Centre in Østerild, where many full sized turbines are tested before they enter the market (e.g., the 15 MW Vestas turbine for offshore wind); (ii) the FloatLab, which is a project partnership between DTU, DHI, Siemens-Gamesa, Stiesdal Offshore, Stromning and Orsted, aiming at testing design and functionality of different floating wind turbine support structures and increasing industry knowledge to eventually reduce risks and costs for entrepreneurs.

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[9] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi-yr-P4omMAxXrXvEDHWmdAPIQFnoECBgQAQ&url=https%3A%2F%2Fens.dk%2Fmedia%2F5674%2Fdownload&usg=AOvVaw2EOzwV2ZsziP7ZO5H71uyU&opi=89978449

3.1.4 Session 4: The MARINEWIND Dialogue - Towards integrated policies for sustainable FOW deployment: social acceptance and environmental aspects

The session dedicated to the MARINEWIND Dialogue entitled "Towards integrated policies for sustainable FOW deployment: social acceptance and environmental aspects" revolved around three main topics, namely: (i) strategies to engage with the local communities and increase social acceptance of FOW; (ii) potential solutions to harmonise the Environmental Impact Assessment across Europe; (iii) policy actions for an integrated planning of FOW farms.

The session was moderated by Riccardo Coletta from APRE and involved two experts: Cristina Simioli, Director of Renewables Grid Initiative's portfolio of offshore activities, and Elena Ciappi, Senior Researcher at the Institute of Marine Engineering of the National Research Council of Italy and partner of the MARINEWIND project.

What could be key strategies from the policy perspective to successfully involve the local community in the planning and implementation of wind farms? How the potential socio-economic benefits stemming from floating offshore wind farms should be transferred to the local community?

During her intervention, Cristina Simioli highlighted the need to consider the energy system as a whole – including both the generation and grid components – as well as the importance of leveraging on a tool such as the Maritime Spatial Planning to de-risk the overall process. In fact, the MSP promotes an ecosystem-based approach, facilitating the identification of a balance between the different activities at sea, while considering the environmental aspects connected to its status. Moreover, many EU Member States are increasingly investing in the stakeholders engagement at the MSP level through the joint identification of areas to be dedicated to the construction of FOW farms, addressing beforehand issues that may arise at later stages of projects development, thus reducing the potential risks.

Figure 5 - MARINEWIND Webinar promotional card session 4

In this context, the French case can represent a best practice. First, in the update of its MSP, France committed to a meaningful stakeholder engagement process through the establishment of a public debate at the basis of all infrastructural projects, physically involving more than 20.000 people in more than 400 events, collecting more than 30.000 feedback to the MSP, looking at the different regions and sea basins. As main outcome of this process, new areas for FOW farms and production have been identified, showing the added value of involving the community from the early stages of the MSP process. The second good practice is represented by the Netherlands, where the government centralised the identification of the areas, thus taking the responsibility to conduct environmental studies and surveys, reducing the investments for developers. Moreover, they identified the so-called "multi-use passport", leveraging on the MSP to identify the activities that can be combined at an early stage.

Before looking at the strategies to involve the local community in the realisation of wind farms, it is crucial to consider three aspects. First, the fact that the definition of "community" is very broad and not straightforward when it comes to offshore wind, thus requiring flexible and project-specific solutions and strategies. Secondly, there is still a gap regarding metrics and methodologies to understand how the socio-economic benefits can be generated and to assess their effectiveness. Thirdly, needs and benefits should be defined together with the local communities. With this regard, the case of SSE Renewables, in the northern of Scotland, can be considered as a best practice. In fact, for the construction of the Beatrice offshore wind farm (600 MW)[10], they have developed a very meaningful process with the local community, investing more than £6 million for specific priorities and projects that have been identified with the local stakeholders, announcing more than 64 community assets.

To complement the first intervention, Elena Ciappi provided her perspective, based on the results of the literature reviews, national surveys, analysis, and co-creation activities performed within the MARINEWIND project. First, the need of educational campaigns organised by local governments and targeting local communities and citizens, with the aim to raise awareness about the importance of renewable energy to address the climate crisis and reduce the expenses for energy production, as well as how wind energy and biodiversity can co-exist, emerged as a key priority. In this regards, concrete examples are provided by the Hellenic Wind Energy Association, which run similar campaigns through a dedicated group site, as well as France and UK. Secondly, educational and training programmes – from pre-school, schools and up to high schools – are crucial to increase awareness and interest in the energy sector, possibly leading to the creation of specific professional figures in the future, to address the lack of adequate skills and trained workforce for renewable energy-related jobs, especially for offshore wind. Thirdly, in terms of benefits, economic incentives, investments in local infrastructure and job creation, both during the construction and maintenance phases and in the view of the creation of a value chain, as well as in the form of support to new start-ups based on green technologies, can be mentioned. For instance, in Denmark residents near project are offered a greater share in profits. In the Netherlands, local communities are incentivised from government to participate for 50% of the ownership in future wind projects. In Greece, the 3% of electricity from offshore wind farms returns to local communities in the form of extra funding to local administration or direct reduction of the electricity bills of the consumers. Lastly, the MARINEWIND results showed the need to establish a continuous dialogue through all life-cycle of the wind park and a continuous monitoring, as well as considering both non-price criteria and criteria based on socio-economic aspects as part of the auctions.

What could be the solutions to be implemented for the harmonisation of the Environmental Impact Assessment across Europe to reduce complexity and waiting times, while speeding up FOW deployment?

[10] https://www.beatricewind.com/.

The second question aimed at exploring potential solutions for the harmonisation of the Environmental Impact Assessment (EIA) process to accelerate FOW development. According to Elena Ciappi, common criteria for EIA are difficult to be provided, considering that it deeply depends on the specific basin area and is characterised by a general lack of data. In fact, most of the available data are related to bottom-fixed, with deep sea (>200 meters) remaining largely unknown. However, methodologies and mitigation measures can be generalised to further investigate the potential cumulative impact of offshore wind plants, together with the effects generated by other uses of the sea. To this end, all available data from EIAs already performed should be gathered in order to identify best practices, tools and methodologies that could be standardised. In addition, new specific data for offshore wind and the deep sea should be collected (e.g., from bottom-fixed monitoring campaigns realised in Denmark and in the Netherlands) to gather more knowledge on the biodiversity, to better understand some technological aspects (e.g., how the atmosphere in the ocean dynamics interacts) and how to integrate non-pricing criteria, especially related to the environment, in the auctions. By looking at the legislative level, two aspects could reduce the time to obtain the authorisation. First, Europe promotes the Renewable Acceleration Areas and Strategic Environmental Assessment, that means that countries have to identify large areas suitable for wind farm installation, perform a priori an EIA so that, when developer present a project, they do not need to perform it again, reducing the time. Moreover, in the future, there will be the possibility to apply for the so-called "28th Regime" [11]legal framework for large projects, leveraging on procedures defined by the European Union.

According to Cristina Simioli, the possible application of the EIA project by project is at the centre of the debate, especially considering the urgent need of the European Commission to accelerate the deployment of renewable energy. Member States are currently trying to understand how to possibly reduce the environmental studies afterwards, while fostering stakeholders engagement in all projects. To date, there are concrete opportunities for optimisation but still, the EIA should be at the core of all offshore wind farms projects due to their large dimension and to further investigate the impacts generated and the related mitigation measures. However, there are still significant bureaucratic and administrative burdens and bottlenecks linked to the EIA phase. In this regard, potential solutions to accelerate the communication between the different institutions and ministries that are involved in the procedure include the one-stop-shop and the opportunities offered by the digitalisation process. Moreover, the content and the scoping of the EIA require a wide collaboration, since there are cross-border cumulative impacts to be investigated and monitored with a long-term perspective because what will be developed by 2030 needs to be put in perspective of what will be deployed by 2050.

In this context, the creation of operational conventions working at the sea-basin level can drive the definition of clear guidelines for the EIA, as proven by the experience in the North and the Baltic Seas. For instance, the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)[12] has different Working Groups, including representatives of the Member States

[11] https://www.europarl.europa.eu/RegData/etudes/IDAN/2025/776311/IUST_IDA(2025)776311_EN.pdf.

[12] https://www.ospar.org/convention.

aiming at tackling different aspects of Offshore Wind development and leading to binding decisions. Another example is provided by the Convention on the Protection of the Marine Environment of the Baltic Sea Area (HELCOM Convention)[13]. In the Mediterranean area, although FOW is still at an early stage, such tables should be urgently established, especially to understand which kind of impacts need to be investigated and monitored, since they are negatively influencing the investment costs. Therefore, using the infrastructure as an open laboratory would close the knowledge gap and further reduce the precautionary approach, that sometimes bring the developers to study even more, as well as potentially decreasing timing and investments.

At the European level, the European Commission Implementing Act specifying the pre-qualification and award criteria for auctions for the deployment of energy from renewable sources[14] is mandating the Member States to consider the use of non-price criteria in auctions meaning that, as part of the award criteria, applicants can propose solutions dealing with the environmental and social performances of the project. However, it should be noted that auctions should then request applicants to propose something that goes beyond the EIA, because it will be mandatory performed by developers to understand, monitor and mitigate the impacts. Therefore, auctions can represent an opportunity to do the extra mile, either proposing something that is even more innovative than what is already foresaw by the law (e.g., innovative mitigation measures, ecosystem restoration).

Which actions could be undertaken at the policy level to foster a sustainable and integrating planning of FOW farms across Europe, including key aspects such as social acceptance, management of potential conflicts amongst different uses of the sea, and environmental and nature protection?

According to Cristina Simioli, although the MSP is a useful tool to identify the broader areas where offshore wind farms can be developed, it has its own limitations. In fact, the Member States are currently updating their MSP, trying to understand how offshore wind, intended as a new activity insisting on already degraded ecosystems, can be successfully integrated and combined with other uses of the sea. Since the EU adopted Directive 2014/89/EU on maritime spatial planning (MSP)[15] included the obligation to review these plans at least every 10 years, the refining of the areas that have been submitted and that at the moment are vague, is really important.

In the Northern seas, and especially in the Netherlands, auctioning is concerning bottom-fixed technologies, whose development started a long time ago, and resulting in lower costs and advanced level of knowledge. By contrast, in the Mediterranean area, where FOW is the main technology and where actually there are no major markets and an uncertain regulatory framework, Member States are expected to progressively approach auctions and the use of non-price criteria due to the challenging financial robustness of the developers and possibility to realise the projects. The picture is further aggravated by the overall increase of inflation that the industry has to face at the global level.

[13] https://helcom.fi/about-us/convention/.

[14] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202501176.

[15] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0089.

The experience in the Netherlands, where the first auction has been won by Ecowende[16] as a Consortium, represents a valuable example. Actually, they are creating a pilot project to advance knowledge about the potential impacts that can be generated. Similarly, in the Mediterranean area, it would be crucial for projects to start collecting information (e.g., pilots in Spain and France to better understand the impact of FOW on birds and mammals) and planning, in order to understand how this can become a way of developing, including all these different aspects.

From the CNR perspective, although the MSP is built on a robust methodology, there are additional technologies based on Artificial Intelligence and activities funded across Europe (e.g., the Digital Ocean and the Digital Twin of the ocean) which could generate new knowledge and enhance the planning of the maritime space. For instance, an innovative Digital Twin of a sea-basin or a sub-sea basin area could indeed represent a powerful tool to enhance the MSP and the general planning of anthropogenic activities at sea, enabling the visualisation of the effects of decisions and new activities on the marine environment. Furthermore, the areas designated for Offshore Wind farms could be possibly optimised, locating different activities in the same space exploring, for example, the possible co-location of wind turbines with wave energy converter or solar floating photovoltaic, to generate energy in different conditions. This idea has been already investigated in the so-called "Energy Island" or "Energy Archipelago" projects, in which feasibility has been already proven for instance in Denmark, Italy and Norway. Another solution is represented by the local production of energy. For instance, by producing green hydrogen that could be used as the fuel for the ships of the future, for the desalinisation of the water, or to give power to offshore aquaculture plants. This is another way to use the energy, but also to create possibilities, jobs and new business plan based on offshore wind and not only.

3.2 Co-creation activities

Prior to the main sessions of the webinars, participants were invited to join Mentimeter to provide their opinion on the core topics addressed by the event. Furthermore, the activity – mainly working as an ice-breakers – offered the opportunity to better understand the type and background of the audience attending the webinar.

The question regarding the category to which the participants belonged highlighted that the audience was mainly composed by industry professionals (13), followed by an overall balance amongst other categories, such as academia (6), green innovators (4) and civil society (3). To address the low number of policy makers and public authorities and low response rate, the MARINEWIND partners will implement targeted dissemination activities, as explained in the conclusions section. Furthermore, it should be noted that not all the participants joined the Mentimeter co-creation session, resulting in the aforementioned low response rate.

[16] https://ecowende.nl/en/.

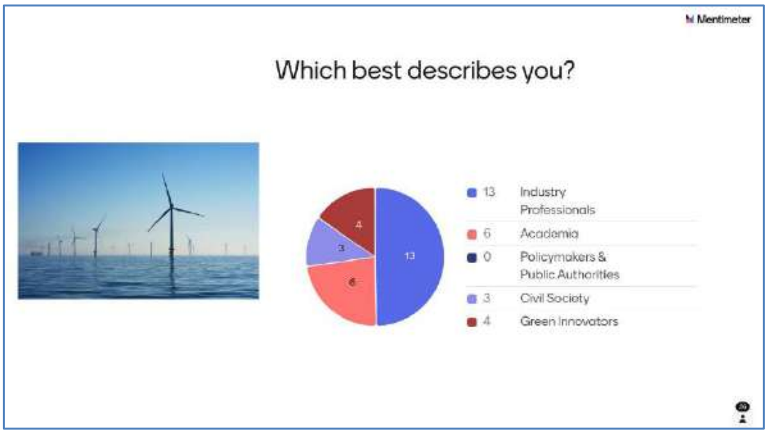

Figure 6 - Mentimeter Question 1 (1st Webinar)

For the second questions, participants were asked to prioritise a pre-defined list of environmental concerns typically associated with FOW. According to the respondents, habitat degradation or modification is the most pressing environmental concern to deal with, followed by impact on marine ecosystems (e.g., reduction of biodiversity); visual impact; noise, electromagnetic fields and heat pollution; collision with structures; hydrodynamic changes; possible spills and sediment resuspension.

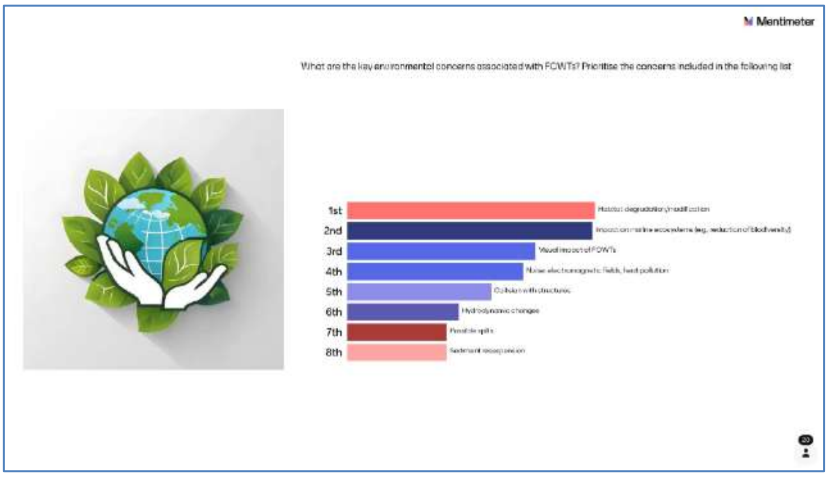

Figure 7 - Mentimeter Question 2 (1st Webinar)

The third question aimed at investigating the potential strategies to be implemented to build trust and enhance social acceptance within the communities where FOW plants are being deployed. By looking at the answers, the most effective strategies are, in order: foster public participation through inclusive decision-making processes, community engagement programmes and workshops (16); encourage and support local businesses to provide operations and maintenance solutions (15); increase environmental studies (11); implement benefit-sharing mechanisms, such as community investments funds or local job creation initiatives (11); minimise sea use and co-existing conflicts (9); clearly define fishing areas (7); develop metrics to assess participation to be included in project evaluations (5) and, finally, propose biodiversity recovery plans (3).

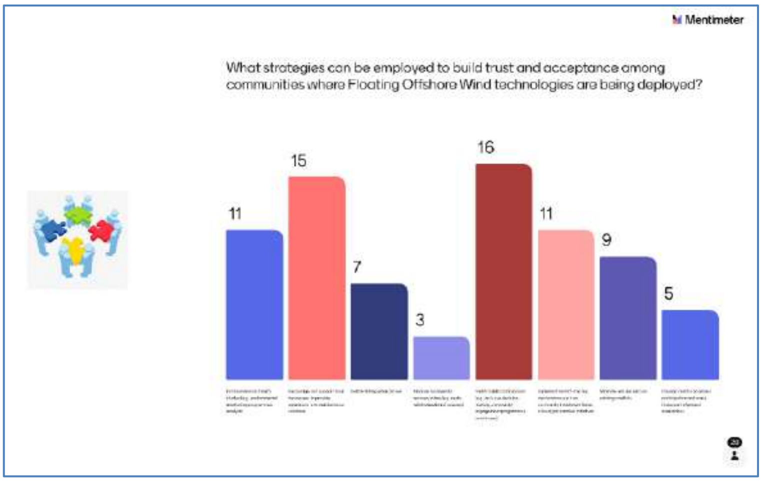

Figure 8 - Mentimeter Question 3 (1st Webinar)

Regarding the co-existence between the offshore wind sector and other sea uses, fishing was found to be the activity which is most in conflict with FOW, followed by: environmental protection (second place); navigation (third place); tourism (fourth place) and others.

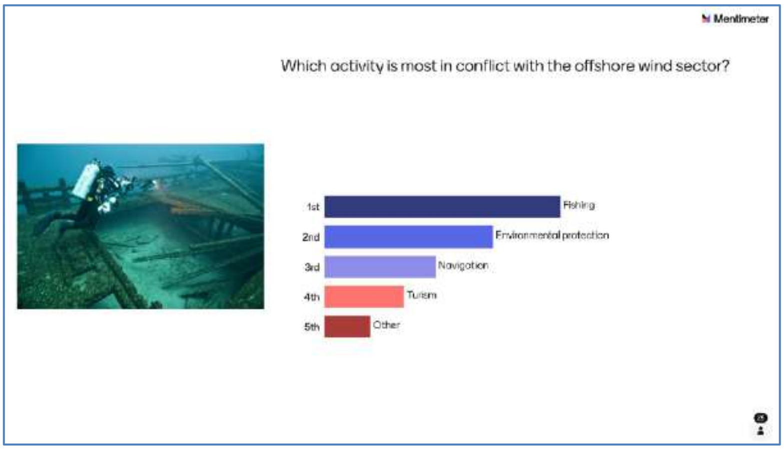

Figure 9 - Mentimeter Question 4 (1st Webinar)

In addition, participants were invited to rank the same list of activities highlighting the ones which are most compatible with FOW, which turned out to be: environmental protection (first place); tourism (second place); navigation (third place); fishing (fourth place) and others.

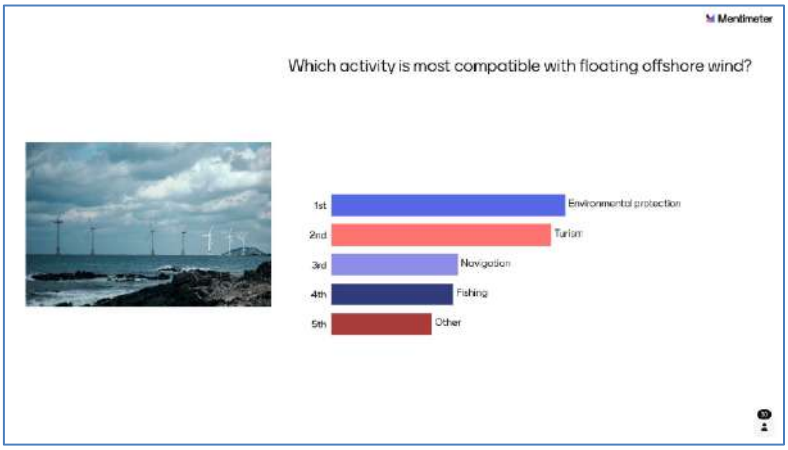

Figure 10 - Mentimeter Question 5 (1st Webinar)

To the open question "What are the pivotal aspects to be integrated in policies to FOW deployment?", the most interesting answers were: Maritime Spatial Planning; supply chain; improvement of the grid connection; community engagement; job creation, upgrades of ports and infrastructures; clear regulations; environmental impact assessment; local ownership; financial incentives; security; multi-use; speeding up the authorisation process.

Figure 11 - Mentimeter Question 6 (1st Webinar)

4 SECOND MARINEWIND WEBINAR

This chapter provides an overview of the second MARINEWIND webinar, entitled “Unlocking the potential of Floating Offshore Wind: Which opportunities for Europe?”, which was held on the 19th of May, from 11:00 to 13:00 CEST.

The webinar explored how key aspects connected to environmental impacts assessment and ongoing participatory processes to foster social acceptance and manage potential conflicts with other uses of the sea could be successfully integrated in a coherent framework generating more informed RES policies, with the ultimate goal to further accelerate the market uptake of FOW across Europe.

A total number of 112 stakeholders registered for the webinar, while 82 actively participated, representing different stakeholders categories, as described in Table 3.

Registered participants	
Industry representatives	49
Researchers / Academics	25
Policymakers / Public Authorities	5
Civil Society	4
Green Technology Innovators	5
Other	22
Prefer not to say	2

Table 4 - Registered participants' profiles

This chapter will present a summary of the content and highlights extracted from the speakers' interventions, while also providing an analysis of the results collected during the co-creation session, which was run through Mentimeter.

As shown in Table 4, the agenda of the webinar foresaw three thematic slots and two interactive sessions (Mentimeter and open Q&A), preceded by an introductory and closing sessions, delivered by the MARINEWIND Coordinator.

Time	Title of the Intervention	Speaker
11:00 – 11:10	*Welcoming session* **Presentation of the MARINEWIND Project and Introduction to the webinar**	Riccardo Coletta, *Agency for the Promotion of the European Research*
11:10 - 11:20	*Mentimeter Session* **Have your say on barriers and enablers for FOWTs**	All Participants
11:20 – 11:40	*The MARINEWIND Experience* **Leveraging technological and financial enablers for the market uptake of FOW**	Inès Tunga, *Energy Systems Catapult* Paola Zerilli, *University of York*
11:40 – 11:55	*Best practice* **First-hand Insights: The Renexia case**	Paolo Sammartino, *Renexia*
11:55 – 12:35	*MARINEWIND Dialogue* **Towards a European value chain for FOW: Bridging Policy with Competitiveness**	Tor Arne Johnsen, *Norwegian Offshore Wind* Monica Lucarelli, *NADARA* Filippo Barzaghi, *NADARA*
12:35 – 12: 55	*Interactive session* **Q&A with MARINEWIND experts**	All Participants
12:55 – 13:00	**Closing Remarks**	Riccardo Coletta, *Agency for the Promotion of the European Research*

Table 5 - Agenda of the second MARINEWIND Webinar

4.1 Overview of contributions and interventions by the speakers

4.1.1 Session 1: Welcoming session

Similarly to the first webinar, the "Welcoming session" served to set the scene of the webinar, briefly presenting the MARINEWIND project, outlining its objectives, results and impacts, as well as promoting the main ongoing activities.

The welcoming part was followed by an interactive Mentimeter session, working as an ice-breaker to introduce the content of the webinar and investigate the stakeholders' perceptions about key enabling factors to foster investments in FOW, the most significant risks for the supply chain, as well as collecting their opinions on key actions to be implemented for the creation of a European-based supply chain for FOW. The main results of the co-creation session are presented in section 4.2.

4.1.2 Session 2: The MARINEWIND Experience - Leveraging technological and financial enablers for the market uptake of FOW

The session entitled "The MARINEWIND Experience" aimed at presenting the main results stemming from the techno-economic and financial analyses performed within the MARINEWIND project, highlighting the main barriers and enablers to accelerate the FOWT deployment across Europe, as well as the financial incentives and funding mechanisms to be optimised to support FOWT projects.

The first intervention was provided by Inès Tunga, working for the Energy Systems Catapult, which is part of the Catapult network and partly funded by Innovate UK with the objective of accelerating the transformation of the UK energy systems, ensuring that businesses, innovators and consumers capture the opportunity for clean growth. Her presentation aimed at exploring the results of the techno-economic analysis for FOW, based on the surveys, workshops and modelling realised.

Figure 12 - MARINEWIND Promotional card sessions 1 & 2

Before delving into the main results, Inès provided an overview of the state of the art of the FOW sector. Data from 4C Offshore shows that there are about 40 MW plan for construction by 2040 in Europe, with each country having different capacity. However, FOW represents only one of the potential solutions to meet the demand for the net-zero targets, which require to scale up other renewables and to double the current electricity generation for the electrification of the transport industry and heat. In addition, the attractiveness of the global market in terms of its potential, regulation, and supply chain readiness and ambitious targets in all the different countries should be considered.

The overall picture seems to be quite positive, but there are still a lot of challenges as shown, for example, by the recent blackout in Spain which impacted Portugal and other countries and whose reasons have not yet been detected. However, as more renewables are put into the energy system, the integration challenges should be further investigated. The current system was designed for fossil fuels, thus requiring the update and the redesign of the infrastructure to cope with the specific properties of the renewables. Therefore, when developing FOWT, attention should be paid to the system as a whole, including its operability, the infrastructure, the transmission grid and the related emerging challenges. These challenges are coupled with a high level of uncertainty connected to the lack of a clear regulatory framework, unstable investments (e.g., Ørsted pulling out of one of the Hornsea 4, a big offshore wind farm in planning; US administration pulling out some of the investment into offshore wind) and to the need to get the local supply chain ready.

In this context, there are clear technological, non-technological and systems integration barriers for FOWT standing out. First, concerning the costs, there is need to get to a certain level of maturity readiness and standardisation in the design of FOWT components, which can generate a minor risk in investments and lower costs, but need to deal with the different characteristics of each site. Secondly, regarding grid constraints, there are dynamic cabling that provide that robustness and flexibility needed. A third challenge is represented by the management of the power transmission. For instance, the UK is facing challenges related to curtailments, meaning that there is not enough capacity for the grid to receive the produced energy, and for which there are already actions underway, such as connection reforms, studies for flexibility services and better forecasting using AI digitalisation control system to integrate and make the system more resilient. Then, maintenance challenges linked to how to get the right port and vessels, the logistics to support supply chain depots to manufacturing capabilities.

Looking at the non-technological barriers, the need for ad hoc training programmes to upskill and reskill the workforce, along with measures to streamline the regulatory process, speed up the digitalisation and to have clear market signals are key elements to be addressed to facilitate FOW deployment.

Then, the intervention highlighted the main enablers, which are closely linked to the aforementioned barriers and could be summarised as follows: (i) facilitating the remote monitoring through a standardised, scalable design attached on AI Digital Twin; (ii) infrastructures need to triple since, for example, in the UK, five times more infrastructures are needed to support the integration of renewables to reach the 2030 goals; (iii) reforming Contract-for-Difference, Power Purchase Agreements (PPAs) for revenue certainty, grid access, and shared infrastructure; (iv) streamlining the planning and permitting procedures; (v) enhancing system integration by reinforcing and modernising the existing grid through flexibility and stability solutions (e.g., High Voltage Direct Current (HVDC) links; smart grid supports and storage). However, the barriers cannot be successfully overcome without integrated policies, a clear strategy for long-term visibility, R&D fundings supporting pilot projects, and a skilled workforce to get to net-zero.

The last part of the intervention focused on the presentation of an assessment study on the co-location of FOW with other renewables (e.g., hydrogen) to reinforce the grid, which was carried out by Catapult in the framework of the MARINEWIND project to better investigate the business case for co-location, the techno-economic parameters and profile.

The second intervention was given by Professor Paola Zerilli, working in the Department of Economics at the University of York with an expertise in applied financial econometrics with a focus on energy derivatives. She is currently Director of the MSc in Sustainable Finance and Scientific Coordinator of the MARINEWIND project.

The presentation provided an overview of the main financial barriers and enablers affecting FOW deployment, focusing on the results of the MARINEWIND survey, which covered the five Labs (Greece, Italy, Portugal, Spain, UK) and involved a total of 540 participants, representing different stakeholders categories (e.g., academia, industry, investors, fishing sector).

The results of the survey highlighted a list of recurrent financial barriers, which include: (i) the high CAPEX premium increasing by 30% the costs of creating FOW technologies, including floating foundations, dynamic cables and bespoke port works; (ii) the constrained supply chain increasing costs as well; (iii) the expensive or scarce debt rising the price for borrowing money by 150-200 bps and cap maturities up to 10-12 years, which are not sufficient for this type of investment; (iv) permitting and grid bottlenecks, which are pushing up the cost and the wholesale-price volatility; (v) the volatility of the energy markets.

Moreover, the survey explored potential optimising incentives and funding mechanisms, such as up-front grants from the government, concessional loans to cut the cost of capital and Contract-for-Difference options. These contracts have been used a lot by the UK Government and are starting to be adopted also by other countries. Although they are very supportive for the investment in FOWT, their effectiveness often depends on the size of the plant and can be more effective if they are combined with supply chain co-investment funds. Moreover, the risk-sharing instruments are quite effective to decrease the risk in this type of investment. Therefore, Contracts-for-Difference options, also combined with long-term Power Purchase Agreements, are a revenue-stabilisation tool, since the government agrees to buy electricity from the producers for a defined number of years, ensuring a stable source of revenue for a long time. Additional co-financing mechanisms emerging as innovative and effective tools are: (i) the Innovation funding investment grants, which are supported by European Investment Bank; (ii) the supply chain accelerator fund, working well especially in the UK context; (iii) public-private blended-finance platforms and green and blue bonds; (iv) the Original Equipment Manufacturer performance warranties, which cover defects and assure a minimal availability level for the equipment.

Taking into account the main financial barriers emerged, the UoY, with the support from RSE, developed a **LCOE simulation tool**[17]. This tool provides an estimate of the overall cost of producing energy per MWh for floating offshore wind farms by forecasting future macroeconomic factors—such as inflation, interest rates, electricity bid prices, capacity factor, and operating hours in real-world future scenarios. The outputs of the tool are the median and the range for the following variables:

[17] https://marinewind-lcoe.hosted.york.ac.uk/MARINEWIND_LCOE_Simulation_Tool_York.html

LCOE (Levelised Cost of Electricity), sLCOE (Simplified LCOE by NREL), WACC (Weighted Average Cost of Capital) and ROE (Return on Equity). Additionally, the tool provides the *Financing solutions for the MARINEWIND labs* (UK, ES, IT, GR, PT).[18]

Session 3: Best practices - First-hand Insights: The Renexia case

For the *Best practices* session, Paolo Sammartino, Chief Operating Officer at Renexia, was invited to present the actions implemented by Renexia to support the creation of a national supply chain for FOW, starting from the concrete experience of the Med Wind project[19].

Med Wind is a 30 MW pilot project under development, that will be located in Taranto and divided into four sections, which are named after the winds (Scirocco, Grecale, Tramontana, Maestrale), due to technological aspects and to ensure the flexibility to develop the project in different ways. The Med Wind project will have up to 190 turbine generators, with an overall nominal power up to 18.8 MW and with an annual energy production within 8-9 TWh/y, depending on the turbine selection, on the power unit performance and other technological aspects. Even if the path towards the deployment of the plant is clear, there are many challenges conditions, such as the water depth, reaching 865 meters in some areas, and the distance from the coast, which is around 80 kilometres.

Figure 13 - Screenshot from the 2nd webinar

Renexia's project development has been guided by the active engagement of local stakeholders from initial phases of the project, as well as by the urgency to carry out preliminary analysis and surveys. First, Renexia conducted a series of surveys (e.g., Side-Scan-Sonar (SSS) and Sub-bottom-profiling (SBP) survey, magnetometry survey, bathymetric survey, acoustic monitoring, avifauna research, ROV transects and Archaeological Side Scan Sonar, magnetometer analysis, geotech activities) involving key stakeholders, such as the Italian Navy, the Zoological Station of Naples from Anton Dohrn and Fugro Italia. Moreover, Renexia is investigating the location of each single turbine using the Cone Penetration Testing (CPT) and the coring of the seabed. From their perspective, the preliminary surveys are crucial to substantiate the CAPEX. On top of that, Renexia surveyed North and South expert cables corridors and landings, to avoid not seeing potential threats for the project implementation or potential alternatives to be proposed to the stakeholders and governmental agencies, such as the Italian Ministry of the Environment (MASE), which is evaluating the project. In addition, Renexia carried out some surveys onshore, investigating important grid reinforcements needed to connect the project to the TERNA

[18] https://marinewind-lcoe.hosted.york.ac.uk/Financing_solutions_MARINEWIND.html

[19] https://medwind.it/en/.

Italian grid, which is the Italian Transmission System Operator (TSO). In this regard, some pictures about the technicians and vessels involved in the surveys have been showed, as well as activities for sampling and Remaining On Board (ROB) and shipwrecks that were identified, such as the so-called *Monte Pellegrino* vessel, which sank in the area from 50 to 60 years ago, and the US Navy fighter bomber. Furthermore, the Remotely Operated Vehicles (ROV) survey showed the trenches created by trawling fishing activities, which can damage the deep seabed life.

The results of the survey activities were promptly shared with all the stakeholders, enhancing their knowledge of the Mediterranean area, which was poorly investigated. For Renexia, the ongoing involvement of all the stakeholders relying on the sea for their economic sustenance was a cornerstone in the deployment of FOW. For instance, they established an ongoing dialogue with the representatives of the fishing sector, further investigating the compatibility between the Med Wind FOW project and fisheries. As an example, according to available official data, the development of FOW projects could improve value of landings and in the level of occupation for the fishing activities. Moreover, Renexia established strategic partnerships with key actors (e.g., *Italian Royal Navy, Legambiente*, *Kyoto Club*) and had a fruitful dialogue with all the trade unions in Sicily, where the Med Wind is located, with the aim to assess the project definition together, in order to implement concrete actions with clear benefits for the local communities surrounding the plant (e.g., modernisation of engines, improvement of the fishing gears).

4.1.3 Session 4: The MARINEWIND Dialogue - Towards a European value chain for FOW: Bridging Policy with Competitiveness

The MARINEWIND Dialogue organised during the second webinar was entitled “Towards a European value chain for Floating Offshore Wind: Bridging Policy with Competitiveness” and foresaw the involvement of Tor Arne Johnsen from Norwegian Offshore Wind (NOW) – the largest industrial cluster in Norway, and Filippo Barzaghi and Monica Lucarelli from Nadara, which brings together 30 years of combined industry experience with an installed 4GW portfolio of 199 plants including onshore wind, solar, biomass, and energy storage, and a pipeline of 18GW.

The discussion aimed at capturing their perspective on how to scale up a competitive and resilient European value chain for FOW, bridging market deployment, policy stability, and supply chain readiness. The dialogue delved into the following aspects: (i) the role of offshore wind in the energy mix to reach the decarbonisation objectives by 2030 and 2050 and solutions to mobilise public and private investments; (ii) exploring the existing gaps to enable the creation of a potential European-based supply and value chain for FOW; (iii) regulatory and policy interventions for establishment of a fair and sustainable environment for the European wind manufacturers.

Which share could be represented by Offshore Wind in the energy mix to reach the decarbonisation objectives by 2030 and 2050, considering the debate about its production performance? How to successfully mobilise public and private investments for existing plants or future plants to be developed?

According to Norwegian Offshore Wind, in a context where offshore wind competes with other types of renewables, the reduction of the Levelised Cost of Electricity (LCOE) is a major factor, along with the need to have strong business cases. To date, the LCOE for bottom-fixed is from €60 to €90 per MW, while floating offshore wind is in another scale, with a range from €120€ to €160 per MW. By 2030, lower rates are expected for bottom-fixed and floating technologies (respectively €40-60 and €70-100 per MW). By looking at the supply chain, it can be noticed that the development of a new wind farm requires loans, which are strictly connected to interest rates and inflation, which are crucial elements for the projects. In that regard, both governments and industry can act together. In fact, the industry can invest to overcome the constraints of the supply chain, especially in terms of vessels, cables, grid and capabilities for turbine fabrication, but a clear framework with a pipeline of projects is required.

Moreover, most of the risks connected to FOW derives from the technological aspect, which is constantly addressed by the industry (e.g., new industrial projects in Norway, UK, Italy) to achieve cost reduction for floating offshore wind through the application of a learning by doing approach, as happened for bottom-fixed technologies.

Figure 14 - MARINEWIND webinar promotional card session 4

Filippo Barzaghi complemented the first intervention by offering the developers' perspective on the topic. To understand the potential role of offshore wind, and especially floating, in achieving decarbonisation targets by 2030 and 2050, it is worth to look at the scale of the sector. To date, the global pipeline of new floating offshore wind projects has reached 266 GW and, even if not all these projects will be built due to a certain mortality rate, the scale highlights the sectors growing importance and its clear potential to contribute meaningfully to the future energy mix. For instance, in Italy, the offshore wind is expected to reach 10% of the energy mix by 2050. Moreover, the itself has already proven at the demonstrational level, being now ready to scale up to industry capacity. In this respect, 2024 was a turning point since five large-scale FOW projects (1.9 GW) secured off their contracts, marking an important step towards commercial maturity. However, while it is worth investigating in such technologies? First, FOW represents a strategic enabler for shaping the European energy system, to reinforce its sovereignty and security, as well as creating local economic value, which are key elements to be considered as a rationale when approaching the support frameworks and the market design. In this context, Italy stands out as a compelling case since, at the moment, there are no other credible alternatives to achieve the ambitious decarbonisation targets due to limited land availability and its windiest coastlines in the Mediterranean industrial network.

To unlock the full potential of FOW, there at least three enabling conditions to be implemented. First, there is the need for a stable and transparent regulatory framework, with timely and well-defined auctions, both in terms of volumes and calendar, to enable investors to plan, leveraging on clearer financing conditions and boosting market confidence. Secondly, a bankable revenue mechanism should be put in place. Although two sided Contacts-for-Difference (CfDs) are the standard mechanism to reduce the risks, they are not sufficient on the their own, especially for capital-intensive projects like FOW. Therefore, to be fully effective, CfDs should better reflect the real financial exposure faced by developers throughout the whole project life-cycle by adopting a more comprehensive indexation approach, not only to national inflation but also to global commodity prices. In fact, while the need for indexation during the development and construction phases is well understood, especially with regards to the sensitivity to materials (e.g., steel, copper), the operational phase is often underestimated. Moreover, these long-term assets still have significant cost pressures also into their operating life, which include elements which are subject to global market dynamics (e.g., inflation-driven increases in maintenance costs, spare parts logistics and labour). For these reasons, without a stable indexation through all the phases, CfDs alone risk offering only partial protection, leaving developers exposed to long-term financial uncertainty. Lastly, the large-scale deployment of FOW requires a long-term industrial strategy, which integrates industrial policy with coordinated infrastructure development. The integration of such elements is needed due to the fact that a clear national strategy can help aligning public and private efforts and promoting the localisation of manufacturing and services, while suitable port infrastructure and grid readiness are crucial to support project execution, since planning these elements in advance can maximise local economic benefits, as well as ensuring that projects are delivered efficiently and at scale. In an increasingly competitive global market, the pre-enabling conditions would allow to mobilise investments and build up world class supply chain, but costs should be driven down as fast as possible. For instance, in Italy, developers are ready to run, but a roadmap with clear policy signals is needed to do not lose market shares, supply chain controls and the chance to be price-setters instead of price-takers.

What are the main gaps to be filled in for the creation of a potential European-based supply and value chain for Floating Offshore Wind?

According to Monica Lucarelli, building a robust, scalable, and competitive European supply chain and value chain is the key challenge to be addressed to unlock the potential of floating offshore wind in Europe for the energy transition, beyond the technological readiness. To this end, three key gaps should be addressed: skills, infrastructure, and manufacturing capacity.

First, FOW requires a broad mix of expertise, not only linked to with energy but extended to offshore engineering, naval architecture or in system composite materials, and digital technologies, among others. Considering the existing mismatch between the available workforce and the skills needed to scale up the sector, three lines of actions should be implemented: (i) updating vocational and university curricula to support cross-sector retraining, especially from adjacent industries such as oil and gas or ship building; (ii) investing in lifelong learning; (iii) making the sector attractive to young talent and diverse profiles to build up a skilled multidisciplinary workforce.

The second major gap is represented by infrastructure, particularly the port infrastructure, since FOW demands large coastal areas for assembly and pre-commissioning of floating platforms, as well as heavy lift capabilities and deep water access. To date, few ports in Europe meet these logistics requirements (e.g., Port-la-Nouvelle) and, to enable industrial scale deployment, existing ports should be adapted and new hubs dedicated to floating wind should be developed, requiring long-term planning, public and private cooperation and significant investments. Moreover, the coordination across countries is a key element avoid potential duplication, planning investments and foster synergies.

The third gap is the manufacturing and industrial capacities. Despite Europe strong expertise in wind turbine technology, FOW introduces new components (e.g., floating foundations, dynamic cables, advanced anchoring systems) requiring different material, processes and scale. Today, the manufacturing capacity for these components remains limited and fragmented and, in some cases, reliant on non-European suppliers. For that reason, to establish a European-based value chain, the following actions should be implemented: (i) localising the production; (ii) investing in automation; (iii) developing standardised and scalable designs, while ensuring competitiveness, quality and sustainability.

Then, coordination represents a fourth cross-cutting gap. In fact, to fill in the identified gaps efficiently, a coordinated European industrial strategy for FOW is required, aligning national plans, de-risking private investments and connecting the dots between R&D, permitting, skills, infrastructures and procurement. Building a separate value chain in all the countries would result in a waste of resources, increased cost and a slower growth. On the other hand, if the European ecosystem acts together, it can lead to the creation of economies of scale, reinforce strategic autonomy and become global leaders in this field. In conclusion, the potential of FOW is very promising and the supply chain is a strategic asset. Europe has the talent, the technology and the ambition, but it needs to coordinate across government, industry and civil society to invest in people, in ports and in production.

To complement the previous intervention, Thor provided some concrete examples to further underline the main messages emerged before. In partnership with TGS 4C, NOW conducted an analysis of the European content in European offshore wind projects. According to the results, which are strictly dependent on the offshore wind segment under consideration, the European content ranges from 70-80% concerning turbines, decreasing to 50% for other segments. Thus, there is a significant potential for the development of a strong European-based supply chain, with European companies having a strong market share both within and outside Europe (up to 40-50% in some areas). In this global context, besides the high interest rate and inflation influencing negatively the business case for FOW, the trade-off between local production and costs is a key element to be considered when talking about the European supply chain. For instance, the creation of a local supply chain would be significantly more expensive compared to imports from China. In fact, to be more cost-effective, a European supply chain should be built, while keeping the economics of scale as a key objective. This means that not every European country should develop fabrication capabilities, with only few ports across Europe dealing with the assembly. For example, for some FOW projects in UK and Norway, most of the fabrication was realised in Spain, with floaters being towed up to the Norwegian coast, where they have been assembled and then took over to Denmark and UK. This could represent the way forward, with the creation of smart specialisation in Europe, with different countries specialising on different parts of the supply chain.

Moreover, the upskilling and reskilling of the workforce to address the needs of FOW represent a pressing challenge, due to the numerous bottlenecks and the length of the overall process. According to WindEurope, a total of 500,000 wind technicians will be needed by 2028. An additional challenge is represented by the limited availability installation vessels, in details there are 20 vessels globally to install more than 15 MW. But why vessels' owners do not invest to address such shortage? First, it is costly, with one vessel costing around €700 million. Secondly, the few projects in the pipeline are scattered all over Europe. Thirdly, there are uncertainties about the type of fuel that is going to be used in the future. The last challenge is the fact that ports require huge investment to be ready to support FOW deployment. However, such investments have the presence of a clear pipeline of projects and contracts as a prerequisite.

What interventions are needed from the policy and regulatory perspectives, especially in terms of incentives and protection measures, to enable the establishment of a fair and sustainable environment for the European wind manufacturers?

According to NOW, the establishment of a fair and sustainable environment for the European wind manufactures requires the implementation of joint and coordinated actions between industry and governments. First, regulatory and permitting processes must be accelerated, while the grid infrastructure must be update, especially in the North Sea, where it represents a significant challenge to overcome. Secondly, the need for a clear pipeline of projects and CfDs as a mechanism to ensure that costs are covered. Thirdly, deal with interest rate and inflation. The two last points are represented by supply chain development and technical aspects, which can be significantly advanced by the industry. In Copenhagen, WindEurope presented a kind of Green Sector Deal: if the European governments guarantee a pipeline of 15 GW of project per year, then the industry will reduce the costs by 30%. Therefore, if governments provide incentives, then the industry can deliver on costs. Finally, it would be crucial to adopt a pan-European approach for FOW deployment since most of projects will be installed in the same areas and years, creating a potential huge bottleneck in the Nort Sea and requiring a better system for the supply chain to deliver on 60 GW, which is the objective set in the North Sea by 2030.

To complement Thor's perspective, NADARA highlighted the need of two types of interventions. First, long-term visibility through stable and strategic auction design, both at national and European level, to address uncertainty for wind manufactures and developers, while fostering stability and clarity to give industry the confidence to scale. In fact, without a predictable multi-year auction schedule, companies cannot plan production, invest in new capacity or neither build up skill and workforce.

Moreover, the auction design should be improved since the current price-only logic is no longer sufficient (e.g., FER2 mechanism in Italy). On the contrary, auctions should introduce new non-price criteria rewarding sustainability, circularity, resilience and local economic benefits, as well as ensuring that they remain realistic and proportionate to preserve the bankability and the deployment timelines. If well implemented, the recent European Union guidance on non-price criteria[20] offers to the Member States the tools to incentivise local content, thus supporting the development of a European-based supply chain. However, it would be crucial to ensure that such criteria do intentionally aggravate existing supply chain bottlenecks for developers.

[20] https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act_en.

The second aspect is linked to a fair competition with targeted financial support, considering that the European manufacturers face an increasing pressure from global competitors, who often benefit from strong state support. To ensure a level playing field, the European Union must actively enforce trade rules, monitor unfair practices and demand reciprocity in the market access. At the same time, it should be acknowledged that the next generation turbines and FOW components involve upfront cost and come with risks, requiring targeted public support, such as grants, guarantees and access to low cost capital through instruments like the Innovation Fund or Net-Zero Industry Act, which can help manufacturers to unlock private investments. By doing so, the European Union can play a dominant role in strategic parts of the global value chain, including the final products. To make it happen, technology manufacturing projects which are in the European Union need shorter and predictable lead times.

Finally, FOW implies specific challenges, such as complex permitting, limited port infrastructure, longer development timelines and new grid requirements. Therefore, the regulation should reflect such complexity by streamlining the bureaucratic process, making it faster, clearer and better coordinated, approaching FOW as a core pillar of the industrial strategy. That implies other key actions to be implemented, such as: (i) investing in ports, grids and logistics; (ii) aligning the industrial, energy and environmental policies around a shared long-term vision that de-risks investments, scales up deployment and ensures a fair energy transition; (iii) investing innovation to reduce cost, improve the performances and bring new solution to accelerate the market. In conclusion, Europe has all the elements needed to lead in offshore and floating wind: an industrial base, skilled workforce and cutting-edge technology. However, European institutions, national governments, the industry and the civil society must be aligned and coordinated to deploy FOW and reshape Europe's energy future.

4.2 Co-creation activities

The question regarding the category to which the participants belonged showed that the audience was mainly composed by industry professionals (17) and academia (8), followed by green innovators (1) and policymakers and public authorities (1). To address the low number of policy makers and public authorities and low response rate, the MARINEWIND partners will implement targeted dissemination activities, as explained in the conclusions section. Furthermore, it should be noted that not all the participants joined the Mentimeter co-creation session, resulting in the aforementioned low response rate.

Figure 15 - Mentimeter Question 1 (2nd Webinar)

The following question aimed at investigating the most important enablers to invest in FOW. By looking at the answers, the most important factors are, in order: a clear regulatory framework (22); the potential for development of the local supply chain (17); technological maturity (13); the stability of the national transmission grid (11); the presence of incentives (8) and large market share and demand (4).

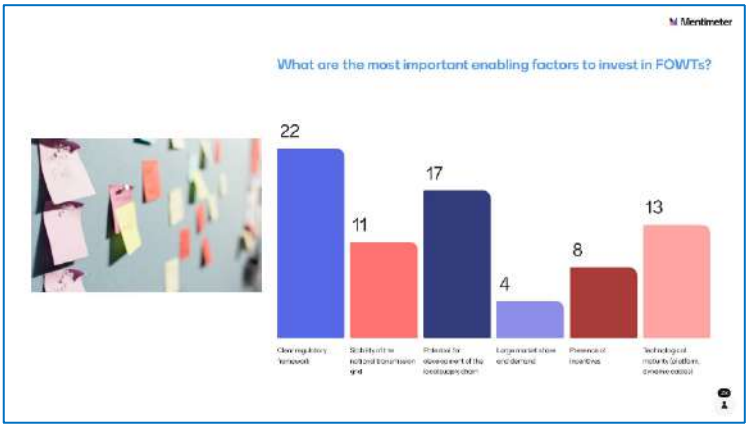

Figure 16 - Mentimeter Question 2 (2nd Webinar)

For the third questions, participants were asked to indicate the most significant risk in the supply chain. According to the respondents, the limited capacity of the supply chain at local level is regarded as the most risky element (15) as well as the lack of adequate port infrastructures (12), followed by the availability of ad hoc vessels for the installation of the turbines (1).

Figure 17 - Mentimeter Question 3 (2nd Webinar)

To the open question "What actions should be implemented to promote the creation of a European-based supply chain for FOW?", the answers included: clear regulatory framework and timelines; long-term strategies and planning; development of standards; system integration; re-industrialisation; trainings for the creation of a skilled workforce; research and development projects; adequate auction tariffs, technological advancement; pipeline of projects; resilience; investments; fabrication capability; offshore and ports infrastructures.

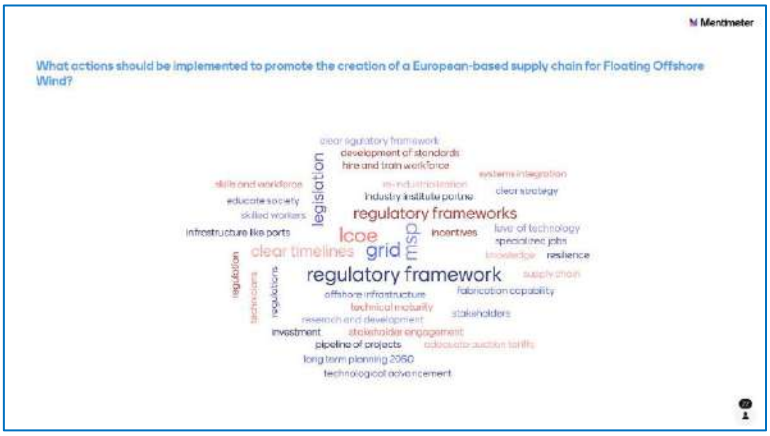

Figure 18 - Mentimeter Question 4 (2nd Webinar)

5 CONCLUSIONS AND KEY TAKEAWAYS

The MARINEWIND webinars turned out to be a valuable instrument for disseminating the main results, while fostering the dialogue amongst different stakeholders involved and providing key evidence-based insights to inform the decision-making process in the field of FOW. By involving both internal and external experts in the sector, the webinars promoted the exploration of regulatory, socio-environmental, financial, and technological dimensions that influence the deployment of FOW across Europe.

Since there was a limited participation from policy makers and public authorities, who were identified as main target groups of the informative webinars, the MARINEWIND Partners will implement a list of pre-defined targeted dissemination activities to have a wider outreach on these stakeholders categories. These actions include targeted e-mails to inform the policy maker and public authorities indicated in the MARINEWIND database about the main takeaways of the webinars and other policy-oriented actions, such as the set of recommendations and the Action Plan, as well as further spreading the recordings of the webinars in the national languages.

To align with the objective of the MARINEWIND project to guide the shaping of more informed RES policies and increase societal acceptance, the main outcomes emerging from the webinars have been translated into key takeaways to inform future actions in the sectors. Such takeaways have been divided into thematic areas, as described below.

Social acceptance and socio-economic dimensions

- The national co-creation workshops held in the five MARINEWIND Labs showed that the interests and concerns regarding FOW significantly vary according to the specific stakeholder category, thus requiring different approaches to raise awareness, with additional efforts required especially in the Mediterranean area, where the level of social acceptance is still a bit low. Secondly, the future deployment of FOW farms may face the opposition of the local communities due to various reasons, including tourism, environmental concerns, economic benefits and cultural values, thus requiring the planning of engagement pathways from the early stages of the project.

- The definition and impact assessment of the potential socio-economic benefits stemming from FOW farms face a gap regarding metrics and methodologies and require flexible and project-specific solutions and strategies. Furthermore, such needs and benefits should be defined together with the local communities.
- The launch of structured consultations with the fishing sector through its active involvement in the process should be at the centre of the FOW deployment, with the implementation of initiatives to support co-existence, which proactively address safety concerns and collect fishermen instances, and the optimisation of the MSP to reduce cumulative pressures. Systems like the Mariner Notices aimed at improving the communication between fisheries and wind developers, reducing gear conflicts and enhancing safety throughout all the construction phases of FOW farms.
- Key actions to raise awareness amongst local communities about the importance of renewable energy include: (i) targeted educational campaigns organised by local governments; (ii) educational and training programmes – from pre-school, schools and up to high schools to increase interest in the new jobs opportunities offered by the energy sector; (iii) highlighting socio-economic benefits, namely investments in local infrastructure, job creation and support to new start-ups based on green technologies; (iv) establishing establish a continuous dialogue and monitoring through all life-cycle of the FOW farms. Best practices are represented by Greece and the Netherlands.

Policy-oriented actions, auction design, regulatory and authorisation processes

- A unified and standardised authorisation process for the development of FOW farms across the EU is crucial to stimulate the investments in the sector, thus accelerating the deployment of the technology.
- Improving the auction design to overcome the current price-only logic by introducing new non-price criteria rewarding aspects related to the environmental and social performance of the projects (e.g., sustainability, circularity, resilience and socio-economic benefits), while preserving their bankability and deployment timelines, in alignment with the European Commission Implementing Act specifying the pre-qualification and award criteria for auctions for the deployment of energy from renewable sources. The introduction of non-pricing award criteria would incentivise local content, further contributing to support the development of a European-based supply chain.
- The specific gaps linked to FOWT requires the implementation of a coordinated European industrial strategy, which can bring together the whole ecosystem (including governments, industry and civil society) to align national plans, de-risk private investments and connect the dots between R&D, permitting, skills, infrastructures and procurement. By acting together, Europe will avoid national fragmentation amongst government, industry and civil society, while maximising economies of scale and reinforce its strategic autonomy.
- Regulatory frameworks should reflect the complexity of FOW by streamlining the bureaucratic process, making it faster, clearer and better coordinated, while also supporting long-term planning by aligning the industrial, energy and environmental policies around a shared vision that de-risks investments, scales up deployment and ensures a fair energy transition.

- Policies strategies should foster investments in ports, grids and logistics, as well as in key innovation to reduce cost, improve the performances and bring new solution to accelerate the market.
- National long-term industrial strategies, which integrate industrial policy with coordinated infrastructure development, would help to align public and private efforts and to mobilise investments towards ports and grid readiness in advance, thus accelerating project execution, maximising local economic benefits, reducing costs, as well as ensuring that projects are delivered efficiently and at scale.
- A harmonised and simplified permitting process is essential to attract investment and accelerate FOW deployment.
- To unlock the full potential of FOW, a stable and transparent regulatory framework, with timely and well-defined auctions, both in terms of volumes and calendar, is a key enabling condition to foster investments, leveraging on clearer financing conditions and boosting market confidence.
- To build a European-based supply and value chain for FOW, Europe must address the following gaps: (i) fostering the reskilling and upskilling of a multidisciplinary workforce from adjacent industries to address the skills mismatch and scale up FOW by updating university curricula and making the sector attractive; (ii) adapting existing port infrastructure to address FOW demands through long-term planning, public and private cooperation and significant investments; (iii) developing manufacturing and industrial capacities, which is currently fragmented and reliant on non-European suppliers, by localising the production, investing in automation, developing standardised and scalable designs, while ensuring competitiveness, quality and sustainability.
- The MSP is a strategic tool to support the integrated planning of FOW by promoting an ecosystem-based approach, facilitating the identification of a balance between the different activities at sea, while considering the environmental aspects. Best practices from France demonstrate the value of stakeholder-driven MSP processes to address concerns beforehand and de-risk the overall process, while the centralised identification of the FOW areas promoted by Dutch government helps to reduce the investments for developers, taking the responsibility to conduct environmental studies and surveys.
- Although the MSP is built on a robust methodology, there are additional technologies based on Artificial Intelligence and Digital Twins that could generate new knowledge, enhance the planning of the maritime space and visualise the effects of decisions and new activities on the marine environment.
- Although ports require huge investment to be ready to support FOW deployment, the presence of a clear pipeline of projects and contracts are key prerequisites.

Financial, techno-economic and technological dimensions

- Recurrent financial barriers include: (i) the increase of the high CAPEX premium; (ii) the constrained supply chain increasing costs; (iii) the expensive or scarce debt rising the price for borrowing money by 150-200 bps and cap maturities up to 10-12 years, which are not sufficient for this type of investment; (iv) permitting and grid bottlenecks, which are pushing up the cost and the wholesale-price volatility; (v) the volatility of the energy markets.

- The effectiveness of co-financing mechanisms depends on the capacity of the plant and their combination with supply chain co-investment funds. Innovative financial instruments include up-front grants from the government, concessional loans, Contract-for-Difference options combined with long-term Power Purchase Agreements as a revenue-stabilisation tool, the Innovation funding investment grants, the supply chain accelerator fund, working well especially in the UK context, public-private blended-finance platforms and green and blue bonds, the Original Equipment Manufacturer performance warranties.
- The calculation of the Levelised Cost of Electricity (LCOE) and the Return on Investment of FOWT should consider the fluctuations in macroeconomic variables and in the energy market, including the fluctuation in interest rate and in the inflation together with climate variables such as wind speed and volume.
- To accelerate the uptake of FOWT, there are technological and system integration barriers to be addressed, which requires actions to: (i) decrease risks in investments and lower costs by getting to a certain level of maturity readiness and standardisation in the design of FOW components, which are at the same time adaptable to the different characteristics of each site; (ii) enhance robustness and flexibility to address grid constraints; (iii) manage the power transmission to make it more resilient through connection reforms, studies for flexibility services and better forecasting using AI digitalisation control system; (iv) maintenance challenges linked to how to get the right port and vessels and the logistics to support supply chain depots to manufacturing capabilities.
- Key technological enablers to support the uptake of FOW are: (i) facilitating the remote monitoring through a standardised, scalable design attached on AI Digital Twin; (ii) developing infrastructures to support the integration of renewables to reach the 2030 climate goals; (iii) enhancing system integration by reinforcing and modernising the existing grid through flexibility and stability solutions (e.g., High Voltage Direct Current (HVDC) links; smart grid supports and storage). However, these barriers can be successfully overcome only if coupled with integrated policies, a clear strategy for long-term visibility, R&D fundings supporting pilot projects, and a skilled workforce to get to net-zero.
- Considering that FOW projects are capital-intensive, a bankable revenue mechanism should be put in place. Although CfDs are the standard mechanism to reduce the risks, they should be indexed to inflation and global commodity prices across the project life-cycle to reflect the real financial exposure faced by developers, thus ensuring project long-term viability.
- Contract-for-Difference and Power Purchase Agreements (PPAs) should be reformed for revenue certainty, grid access, and shared infrastructure.
- The potential for optimisation offered by the co-location of FOW farms by locating different activities in the same space (e.g., wave energy converter, solar floating photovoltaic) should be further explored to generate energy in different conditions.

Environmental dimension

- To tackle the lack of specific data, Existing information from EIAs should be gathered to identify best practices, tools and methodologies that could be standardised, in combination with new data for offshore wind and the deep sea to generate knowledge on the biodiversity and to better understand some technological aspects and to monitor the cumulative impacts in the long-term.

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- To reduce the time to obtain the authorisation, the Renewable Acceleration Areas and Strategic Environmental Assessment ask countries to identify large areas suitable for wind farm installation, perform a priori an EIA so that, when developer present a project, they do not need to perform it again. Furthermore, the possibility to apply for the so-called "28th Regime" legal framework for large projects, leveraging on procedures defined by the European Union, should be further explored.
- The current debate revolves around the possible application of the EIA project by project. Although EIAs could be optimised, especially by reducing the environmental studies afterwards, they should be at the core of all offshore wind farms projects due to their large dimension and the need to further investigate their impacts and identify potential mitigation measures. To overcome the existing bureaucratic and administrative burdens and bottlenecks linked to the EIA phase, potential solutions are represented by a one-stop-shop and the opportunities offered by the digitalisation process, with the ultimate goal to accelerate the communication between the different institutions and ministries that are involved in the procedure.
- The creation of operational conventions working at the sea-basin level can drive the definition of clear guidelines for the EIA and the identification of which kind of impacts need to be investigated and monitored, since they are negatively influencing the investment costs. Therefore, using the infrastructure as an open laboratory would close the knowledge gap and further reduce the precautionary approach, thus decreasing timing and investments.

Best practices across Europe

- The holistic approach adopted by the Danish Energy Model represents a best practice, combining energy transition with economic development to reach the ambitious climate targets and being built on four main pillars, which include: (i) long-term energy policies based on the public-private partnership and stable regulatory frameworks; (ii) supply chain and infrastructure development; (iii) stakeholder engagement, and (iv) upskilling. In addition, the Danish model is based on an effective one-stop-shop model and foresees market dialogues before tenders, to ensure transparency, feasibility, flexibility, and fair competition.
- Key success factor for the workforce development in Denmark include an active support of the local authorities, who leveraged on the strong involvement of private companies and cluster organisations, targeted efforts (e.g., tailored trainings and capacity building activities) and on local stakeholders networks, which played a critical role in fostering growth and employment opportunities.
- The deployment of the Italian Med Wind farm, guided by Renexia, can be considered as a best practice, which is based on the active stakeholders engagement from the early stages of the project, especially the representatives of the fishing sector, and the urgency to realise preliminary environmental studies, which are crucial to substantiate the CAPEX and enhance the knowledge of the Mediterranean area.