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by iea

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Offshore Wind Project Consenting

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Online Meeting

iea wind

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For more information about the IEA Wind TCP please visit www.ieawind.org.

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The International Energy Agency (IEA) is an intergovernmental organization that works to shape a secure and sustainable future for all, through our focus on all fuels and all technologies, and our analysis and policy advice to governments and industry around the world. The Technology Collaboration Program (TCP) is a multilateral mechanism established by the IEA with a belief that the future of energy security and sustainability starts with global collaboration. The programme is made up of thousands of experts across government, academia and industry in 55 countries dedicated to advancing common research and the application of specific energy technologies.

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Executive Summary of TEM #103

Introduction

Offshore wind energy is the major growth sector in both wind energy and marine renewable energy. Policy support helped the European Union reach over 35 GW of offshore wind capacity by the end of 2020. Offshore wind is set for robust growth in the EU, with current policies aiming to multiply offshore wind capacity by 10 by 2030. Historically, the majority of installed global offshore wind power capacity was concentrated in six European countries, but in 2020 China accelerated its offshore wind deployment, installing 3.85 GW of offshore wind, and reaching a total of 11 GW connected. This means that six countries now have more than 1 GW offshore wind installed: China, United Kingdom, Germany, Netherlands, Belgium and Denmark.[1] The United Kingdom, has a target of 50 GW of offshore wind by 2030, including 5 GW of floating wind.[2] Germany has set a target of 30 GW of offshore wind by 2030 and 40 GW by 2035.[3] In the United States, the government set a target of 30 GW of offshore wind to be installed by 2030.[4] India, Korea and Chinese Taipei also have ambitious targets, while other countries, including Japan and Canada, are laying the groundwork for future offshore wind development. The global offshore wind market is set to expand significantly over the next two decades, growing by 13% per year in the IEA Stated Policies Scenario. Bolstered by policy targets and falling technology costs, global offshore wind capacity is projected to increase fifteen-fold to 2040, becoming a $1 trillion industry over the next two decades. This level of investment would mean that offshore wind will account for 10% of investment in renewables-based power plants globally.[5] The growth in offshore wind is also leading to developments in offshore grids, with the inauguration of the world's first hybrid offshore interconnector in 2020 between the Danish Krieger's Flak and the German Baltic 1 and 2 offshore wind farms, plus the announcement of plans for offshore energy islands in the North Sea and Baltic Sea.[1,6]

This level of global growth must be underpinned by appropriate offshore consenting policies and processes. To date, a variety of approaches to consenting offshore wind energy developments have been adopted in the leading countries, and consenting policies have evolved over time, with some significant changes by key jurisdictions in recent years. To keep pace with the rapidly evolving landscape for this industry, it will be important for consenting practices to be forward-facing, leveraging lessons learned from the nearly three decades of experience in the sector to accommodate and sustain future growth. Offshore consenting is very different from onshore consenting, due to the greater average size of projects, the different scope of projects, the interactions with different economic sectors and unique environmental factors. The path to consenting can include, but is not

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[1] IEA Wind TCP Annual Report (2020) https://www.epaper.dk/dtupaper/rapport/iea-wind-a-rsrapport-2020/

[2] British Energy Security Strategy https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

[3] Germany's Easter Package https://windeurope.org/newsroom/press-releases/germany-gets-ready-to-deploy-more-than-10-gw-of-new-wind-per-year-with-historic-package/

[4] FACT SHEET: Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/29/fact-sheet-biden-administration-jumpstarts-offshore-wind-energy-projects-to-create-jobs/

[5] IEA (2019), "Offshore Wind Outlook 2019", IEA, Paris https://www.iea.org/reports/offshore-wind-outlook-2019

[6] Declaration of Energy Ministers on the North Sea as a Green Power Plant of Europe https://www.bmwk.de/Redaktion/DE/Downloads/Energie/20220518-declaration-of-energy-ministers.pdf?__blob=publicationFile&v=10

limited to, strategic environmental assessment, space-use planning, geotechnical, environmental and species surveys, grid connection allocation, project-level environmental impact assessment, site licensing, auctions for sites or support, permitting of onshore project elements and planning for port and harbor development. In countries that have installed significant offshore wind power capacity, the consenting processes have generally evolved from discrete separate steps to more centralized processes incorporating several of the previously separate steps. But, even in Europe, where individual country arrangements are shaped by EU legislation, these centralized consenting processes still vary widely from country to country. This variation in consenting processes represents a cost and a risk to the offshore wind industry. Experience from and processes developed to deliver projects in one jurisdiction may not be transferrable to another. There would therefore be a benefit to the sector from developing a report detailing current and foreseeable challenges faced by both regulators and industry, as well as consenting best practices to help inform regulators and policymakers, which could be used to guide them in developing or refining consenting arrangements in their countries.

Meeting Overview

TEM #103 on Offshore Wind Project Consenting was organized by representatives from the Sustainable Energy Authority of Ireland, the US Bureau of Ocean Energy Management and the US Department of Energy as a virtual meeting over four days: 8-11 February, 2022. Across the four days, there was a total of 120 participants from 28 countries.

The structure of each day comprised an introduction from a member of the organizing committee, followed by short presentations from experts in specific topics, and then open discussion. Each day a different topic related to project consenting was discussed. Day 1 provided a global overview, focused on planning, leasing and consenting, and barriers to growth. On Day 2, attendance was restricted to government representatives, presenting information on different leasing and consenting systems, sharing insights into the challenges, lessons learned and best practices. Day 3 considered offshore wind and other ocean users, and how this is navigated in different regulatory regimes and what can be learned from these different approaches. Finally, Day 4 focused on the research opportunities and needs for offshore wind, including an overview of two complementary IEA Wind Tasks: 34 – Working Together to Resolve Environmental Effects of Wind Energy (WREN), and 49 – Integrated Design of Floating Wind Arrays (IDeA).

Based on the presentations given and the open discussion that was had each day, this document will identify key themes, and discuss the potential for a new task specifically focused on project consenting.

Main Results

The IEA Wind TEM #103 brought together different perspectives on offshore wind consenting (or permitting). With regulators, researchers and industry attending, it highlighted the diverse range of regulatory practices across the world, presenting lessons learned and existing barriers to development.

The offshore wind industry is growing rapidly, with more countries starting to develop offshore wind, and other countries setting more ambitious targets. Despite this, the pace of development needs to accelerate and the installed capacity increase four-fold by 2030 to align with the broader climate change goals of limiting warming to under 1.5°C. To achieve this, countries need more certainty in their development pipeline to ensure a robust supply chain develops, and regulatory processes need to be streamlined and efficient. According to WindEurope, on average, an offshore wind farm takes 11 years to develop from leasing a site to commissioning, and with increased competition for marine space, and new technologies such as floating offshore wind, measures need to be taken to reduce the regulatory timeline while maintaining consent integrity.

There were several themes that were discussed over the four days:

- There is significant variation in the consenting practices used in different countries, due to their existing regulatory systems and cultures
- A consenting one-stop shop can be advantageous to streamline consenting and give clarity to offshore wind developers
- Marine spatial planning is critical to successful deployment and enabling co-use of the marine resource, which is increasingly in demand
- There needs to be appropriate allocation of risks and investment between industry and government through the development process
- Early and meaningful community engagement and involvement is key to successful development

It was recognized that all stakeholders need to co-operate and work together to accelerate responsible offshore wind development, and that there needs to be clarity and flexibility within the consenting process. It was also highlighted that more data sharing, particularly of environmental data, would help regulators make faster and more informed decisions, while enabling developers to be more prepared when approaching new sites.

The conclusion of the meeting was that there was interest in investigating consenting processes further, particularly in relation to ocean data access and sharing, and climate-smart marine spatial planning.

Day-by-Day Summary

Day 1: Setting the Scene

Day 1 Overview

Day 1 provided an introduction to IEA Wind Technology Collaboration Program (TCP) and Overview of TEM Objectives and Agenda.

Stage Setting: Global Offshore Wind Overview

Day 1 set the global context for offshore wind leasing and consenting with presentations from global and regional organisations on the policy impetus and prospects for a major expansion in offshore wind energy in the primary existing and emerging global markets. The presentations illustrated the challenge that the anticipated rapid growth of offshore wind farms will present for governments and regulators across the globe in developing leasing and consenting systems for the sector.

Offshore Wind - An IEA Perspective, Dr. Paolo Frankl

IEA modelling shows that solar PV and wind energy will be the major near-term drivers of expansion of renewable energy to 2026. Offshore wind deployment will grow steadily, the balance of activity moving eastward, with China overtaking the EU, and significant growth in other Asia-Pacific countries and the USA.

A higher growth rate than currently predicted is possible, as IEA "accelerated case" projections show that offshore wind growth to 2026 could be 21% higher if policy support were expanded, addressing main barriers to deployment. In the medium term, solar PV and wind energy additions would need to quadruple by 2030 to adhere to a pathway to net-zero emissions by enabling electrification of new sectors.

In the longer term, nearly 90% of electricity will come from renewables to meet a 2050 Net Zero Emissions goal. Offshore wind may be a major contributor in achieving this goal.

Global Offshore Wind Overview, Alastair Dutton

The total offshore wind resource globally is estimated to be 71 TW. China alone has already deployed 16.9 GW. The World Bank has issued a report that looks at the key factors for developing offshore wind, covering strategy, policy, frameworks and delivery. This is important to ensure success as more countries start to develop offshore wind. The importance of marine spatial planning is key to successful development, ensuring that offshore wind is developed in conjunction with environmental factors, seabed constraints, shipping routes and military needs, as well as other potential marine users.

The leasing and licensing for offshore wind varies considerably around the world, as different countries have used different legal bases to develop the process. From these different approaches, there are many lessons to be learned, including some key points:

- Offshore wind farms provide economic benefits as well as energy
- There is a need for long-term, stable targets
- Government/industry partnerships are important for successful development

There are also barriers to deployment that have been identified, including an insufficient number of projects, lack of regional coordination, and delays to permitting. Learning from the lessons to date can help overcome these barriers as more countries move forward.

Offshore Wind Planning in Europe, Iván Pineda

There are currently 5,785 offshore wind turbines, in 122 wind farms, with a total of 28.3 GW in installed capacity, connected to the grid across 12 countries in Europe. This is projected to grow to 135 GW installed capacity by 2030.

Offshore wind farm development in Europe typically involves a total time period of 11 years, comprising 2 years for the leasing process, 4 years for the consenting process, 2 years thereafter to reach financial close and 3 years for construction. This may vary from country to country with the average time between award of support to commissioning ranging from 4 years in Belgium to 9 years in France.

Marine Spatial Plans are required for all countries under an EU Directive, but many coastal countries have yet to comply with this requirement. There is a diversity of approaches among EU member states to seabed and support allocation for offshore wind projects including joint tender/auctions, open door, seabed lease + auction and, again, many countries have yet to put in place arrangements.

Offshore Wind in the US, Josh Kaplowitz

The USA currently has a very small share of offshore wind operations, with 42 MW installed at the end of 2020 compared with 35 GW globally. To date, state-level action is driving demand in the offshore wind sector, with 40 GW of state level offshore wind procurement targets being set through legislation, conditional targets or executive orders in east coast states. There are two wind farms operational, with an additional 18 projects that have secured a buyer, totaling over 17.5 GW capacity. Lease sales in the New York Bight in February 2022 add an additional 7 GW potential capacity.

The BOEM Path Forward outlines plans for lease sales in 7 regions by 2025. These include the NY Bight lease sale in February 2022; the Carolina Long Bay lease area in summer 2022; and then additional lease areas in Northern and Central California, Gulf of Mexico, Central Atlantic, Oregon and Gulf of Maine. An American Clean Power (ACP) study found that these leases could generate US$4.5bn[7] in revenues and support 128,000 jobs.

There are various leasing and permitting challenges within the USA, including the lack of a 'one-stop shop' for permitting. While BOEM is the lead federal permitting agency, permits from other agencies are required, including those for the Army Corps, the National Oceanic and Atmospheric Administration (NOAA) (e.g., the Marine Mammal Protection Act), the Environmental Protection Agency (EPA), and the Federal Aviation Administration (FAA), plus various state and local permits.

Other issues include the lack of agency resources to support the application reviews, regulatory uncertainty, and a lack of clarity in future grid interconnection methods, transitioning from radial connections to a possible regional transmission mesh. Industry also faces potential lawsuits from offshore wind industry opponents, but believes offshore wind permits are being thoroughly vetted and will stand up to legal scrutiny.

There has been a strong response to infrastructure development and other investments, with industry committing billions of dollars to US jobs, manufacturing and infrastructure. These include port upgrades, new facilities, and the construction of US flagged installation vessels, crew transfer vessels and service operation vessels. If enacted, clean energy provisions formerly in the Build Back Better Act would provide domestic content tax credits that would significantly accelerate such investments. Vessels could be a key limiting factor to offshore development worldwide, and it is anticipated a new market for US flagged vessels will grow with more regulatory certainty and incentives, along with the development of the whole offshore wind supply chain.

[7] This estimate was made before the NY Bight auction, which alone raised $4.37bn in lease sales.

Offshore Wind in Developing Countries, Mark Leybourne

The World Bank Group (WBG) Offshore Wind Development Program aims to accelerate the adoption of offshore wind in emerging markets and provide support to build pipeline and bankable projects. Developing countries have different challenges to developing offshore wind than established markets, including considerations such as the technology having a greater complexity than other renewables, and being deployed at a larger scale. Often new policies and regulations are needed, in regions that often have a lack of existing data, and a lack of government resources to support the development. In addition, coastal communities have a different relationship with the sea, and regard the coast and sea in high value for sustenance, livelihoods and culture.

Planning is therefore very important for these countries, and while locations can be suggested by developers, it is helpful to have government guidance for siting, particular in relation to grid planning. Marine spatial planning is key to this process but often takes a long time and other planning frameworks are needed to inform decisions. The WBG is developing an Environment and Social Framework for Offshore Wind Spatial Planning as a flexible approach to identifying areas that should be avoided, and those that have the lowest risks.

Emerging markets also need to establish which leasing approach to use, and how much is government- or developer-led. Environmental and social aspects are critical to successful development, and the assessment needs to follow best practice guidance. International financing is often required, which means that projects have to meet Good International Industry Practice standards. This includes comprehensive stakeholder engagement and public consultation that start early in the process and continue throughout the development so concerns can be identified and addressed.

Day 2: Regulatory Perspectives

Day 2 Overview

Day 2 focused on leasing and consenting systems from diverse government perspectives. Regulatory approaches for authorization of offshore wind energy were discussed at a high-level, which illustrated key differences between different regulatory systems, challenges encountered, and best practices.

Offshore Wind Consenting in the Netherlands, Ruud Oerlemans

Until the Energy Agreement of 2013, offshore wind development in The Netherlands was largely developer-driven. This former system was more expensive for both government and industry and caused delays in development of offshore wind in the Netherlands. The Energy Agreement established a new tendering regime modeled on the "one-stop shop" concept. The Netherland's government instituted a number of reforms under the new model where the government allocates areas for offshore wind and is responsible for marine spatial planning, the Environmental Impact Assessment, project consenting (i.e., permitting), and site surveys and pre-development work. The government also is responsible for transmission, including the substation and export cable. The approach has been found to minimize project risk and is provided by the government at no cost to industry.

The Netherlands holds about one tender per year. Until 2016, the tenders were awarded with subsidy where the lowest base amount would be awarded the tender. Since 2017, the tenders have been awarded without subsidy, and are evaluated through comparative assessment (e.g., best in risk mitigation). A consent is given for a project design envelope that addresses the primary technological characteristics of a project, with flexibility provided for modifications after award (e.g., optimization in choice and number of wind turbines). In the past, award to a project was very prescriptive and provided no flexibility for project modification after award.

The one-stop shop model provides a single government interface for industry during the planning and development cycle. All developers in competition for the site have the same information ahead of the competition, including site data packages, in order to minimize early development risk and cost. The government's tendering decision serves as the basis for the consenting to construct, operate, and decommission an offshore wind farm.

Developers use the government-provided data packages to inform the submission of plans for development, operation, and decommissioning, as well as optimize the design and business case. Since 2017, plans have been chosen on transparent comparative assessments that consider risk minimization. Information requirements to inform the comparative assessment may include electricity yield, financing, feasibility, overview of costs, experience of parties involved in construction, and environmental hazard and mitigation strategies. The wholesale price is determined per year by the government, and subsidies can be provided by the government on an individual contract-basis.

Planning and Permitting Procedure for Offshore Wind Energy in Germany, Nico Nolte

The German parliament has set renewable energy goals through the 2021 Renewable Energy Act. **This goal includes currently 65 % but will be lifted soon to** 80% renewable energy generation by 2030. Currently, 42% of German energy is renewable, including 10% generated from offshore wind power. Germany has a legal framework in place for offshore wind to produce 20 GW by 2030 and 40 GW by 2040. A draft bill is in parliament with the goals 30 GW by 2030, 40 GW by 2035 and 70 GW by 2045. However, the greatest challenge to offshore wind development is finding space at sea within the German EEZ. Windfarm sites in the German EEZ include the North Sea and the Baltic Sea, though the Baltic Sea space is limited. Current wind sites are nearshore, though plans are in development to site future windfarms up to 200-300 km from the coast.

Germany currently utilizes a central system of windfarm development planning, which includes marine spatial planning (MSP), site development planning, site investigation, assessment of suitability, tendering of sites, application for plan approval, and planning approval for projects. The winner of an offshore wind auction for a specific site is given the above information and data by the government. Tendering is awarded by the lowest cost. In instances when winners have offered Zero-Cent-bids, no financial support was awarded by the government. The planned new system will introduce in 2023 an additional track. Specific sites identified in the site development plan will be auctioned without a state-run pre-assessment which means the winner has to carry out assessments of the site on his own before applying for a permit. Part of the permitting procedure are several consultation rounds with stakeholders. A plan may only be approved if there is no threat to the marine environment, no threat to shipping or national/allied defense, and meets other public law requirements (such as MSP). Germany has a firm five-year timeline for windfarm construction after the auction, whereby the windfarm and grid connection must be complete.

The update of the marine spatial plan within the German EEZ has been in force since September 1, 2021—this mandates that no installations are allowed in priority areas for shipping, and in nature conservation areas only if this is in line with the conservation goals. Germany published a draft update for the site development plan in December 2021, which proposed additional sites for offshore wind energy based on the marine spatial plan. This draft plan gives information on potential installed capacity on proposed sites and outlines the synchronization of the parallel development of offshore wind and grid connection. The construction of the grid connection is built by the Transmission System Operator, and not by the wind developer. It is anticipated that the final plan will be released early 2023.

The primary challenges remaining for offshore wind energy in Germany include developing grid connection and feeding electricity into the grid on land. Cable routes must cross national parks in the territorial sea in Germany, and the building of new overhead lines is not popular with the local communities inhabiting those areas. Environmental effects, such as the noise of piling the foundations, also continue to be a challenge for offshore windfarms and must be mitigated. Incorporating new innovations such as offshore hydrogen is also an ongoing challenge.

Through the development of the offshore wind program, the permitters have acknowledged other lessons learned. It is important to procure international consultation early on in the process, especially with neighboring countries. The marine spatial plan must be coherent and address major concerns (such as with shipping, offshore wind energy connection, and nature conservation). Additionally, marine protected areas must be coherent. Environmental assessments must take into account cumulative effects and transboundary conditions.

Outer Continental Shelf Renewable Energy in the US, James Bennett

The Bureau of Ocean Energy Management (BOEM) serves as the lead US regulator for offshore wind on the US Outer Continental Shelf (OCS). Energy and mineral resource development activities on the US OCS are governed by the US OCS Lands Act, which was amended in the Energy Policy Act of 2005 to address forms of energy from sources other than oil and gas. In 2009, the Department of the Interior announced the finalization of regulations for BOEM's OCS renewable energy program, *Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf*. These regulations have since been updated in 2011 and 2014, and will be updated again in the future through public rulemaking to address lessons learned and stakeholder feedback. BOEM carries out its regulatory responsibilities in a regional capacity, with operations located in Washington, DC, Virginia, Louisiana, California, and Alaska.

On the US OCS, the federal government is responsible for offshore wind seabed site allocation, which is managed through a competitive auction process. Arranging for power offtake from a project is the responsibility of the project lessee (i.e., leaseholder). Several coastal states have established

Renewable Portfolio Standards that set targets for renewable energy supply in those states. These RPS targets have, in several cases, driven demand on the part of electric utilities to enter into offtake agreements for the future purchase of offshore wind generation. Offtake agreements are typically the result of a utility-led competitive solicitation and award process. Demand for seabed site access for offshore wind on the US OCS has grown over the past several years, evident in the high winning bids of recent lease auctions. A domestic supply chain to support the offshore wind sector in the US is also quickly developing through port and infrastructure development, most visible to date along the US Atlantic coast.

BOEM's current authorization process for offshore wind occurs in four distinct phases: planning and analysis; leasing; site characterization and assessment; and construction and operations. Environmental review is conducted by BOEM to inform government decision-making regarding seabed site allocation and plan approval. BOEM engages the public and key stakeholders throughout the authorization process, as early communication with interested and potentially affected parties is critical to managing potential conflicts. While the activities in the planning and analysis stage largely align with the activities carried out at this stage in other jurisdictions, one unique feature of the US approach is the utilization of Intergovernmental State Task Forces, which are forums established by BOEM on a state-specific or regional level to coordinate with multiple levels of government, including federal, state, tribal, and local governments. These task forces complement rather than replace other legal and statutory requirements pertaining to consultation. Another notable characteristic of the US approach to authorization pertains to the site characterization and assessment work (i.e., pre-development), which are responsibilities of the project lessee rather than the federal government, although the federal government and state governments often work together to conduct studies that inform the review of proposed activities. Seabed site allocations are awarded through a competitive auction process, which uses an ascending clock auction format that results in a winner based on highest bid price, although the regulations provide some flexibility to consider factors other than price. All criteria for a lease sale, including the auction format, lease conditions, and fiscal terms, are provided in the Final Sale Notice for that sale.

Offshore Wind Power in Korea, Park Seong-Woo

Korea aims to have net zero carbon emissions by 2050, and the development of offshore wind is necessary for Korea to meet this goal. As of 2021, three offshore wind projects are in commercial operation with 55 additional projects in the pipeline. Korea's goal is to have fixed offshore wind supplying 10 GW by 2030. Furthermore, 1.4 GW of capacity will utilize floating offshore wind technology in deeper waters. For farshore wind sites, the Ministry of Oceans and Fisheries (MOF) has the authority for seabed area identification and the consenting process. For nearshore areas, the local government is responsible for these activities.

The current process of authorizing offshore wind farms includes a mix of responsibilities on the part of the developer and the government. The developer is responsible for the analysis of wind resources, screening for suitable sites, feasibility studies and assessments, applying for and obtaining a power generation business license and designing the execution plan for the wind farm. The government is responsible for the EIA, various licenses, and carrying out the consenting process. The local government and the Ministry of Trade, Infrastructure, and Energy (MOTIE) are responsible for authorization of the occupation and use of public waters and the approval for execution plan. MOTIE oversees the approval for the construction plan of the wind farm.

Korea is moving towards a one-stop shop system through a special act proposed in May 2021. The one-stop shop system is intended to promote a competitive market as the current process for offshore wind consenting is fragmented in different parts of the government. There will be new incentives for integrated wind farms (e.g., facilities that are co-located with other uses). This revamped plan for offshore wind includes government-led site identification and a simplified permissions process to shorten the timeline for wind farm development, the enhancement of resident acceptance and

environmental values, and the reinforcement of industry competitiveness with big projects. Currently, guidelines are being prepared by the government for public-private consultation, resident acceptance, grid connection sharing, and profit sharing.

The government-led identification of sites and public engagement on these sites are important elements of future wind development in Korea. One challenge that faces future growth of the offshore wind sector is a general lack of social acceptance. The identification of sites involves public meetings and discussions to inform the revision of plans to incorporate community feedback. However, the current permission process is complex and lacks direct incentives for local governments.

Summary Table

Considering the variation across different countries, the following table summarizes the different responsibilities between government and the developer.

High-level Overview of Government and Developer Responsibilities in Speaker Jurisdictions

Responsibilities by Country				
	Netherlands	**Germany**	**USA**	**Korea**
Site allocation/ investigation	Government	Government	Federal government provides lease; developer responsible for investigation	Currently developer-led, plan for government to take the lead for upcoming sites
Data collection	Government	Government, given to all competitors for leases. Winner must reimburse government for data	Developer	Currently developer-led, plan for government to take the lead for upcoming sites
Substation/ electrical connection	Government led	Substation within the offshore wind project built by windfarm developer, converter and export cable built by Transmission System Operator	Developer	Plans for government to implement grid sharing
Centralized system, or "one-stop shop"	Yes	Yes	No	No, but transitioning to a one-stop shop model
Tendering/ leasing competition	Based on comparative assessment, risk mitigation	Lowest cost	Lowest cost	Currently reviewing merit criteria
Stakeholder engagement	Government	Government	Both government and developer have roles	Both government and developer; needs to be strengthened

Key Perspectives: Leasing and Consenting

Leasing and consenting practices vary widely by country due to legal, legislative, and regulatory mandates.

- Regulations regarding site allocation and investigation, data collection and management, and substation and electrical connection vary by country and there is no "one size fits all". However, certain practices can be incorporated irrespective of system.
- Tendering and leasing competition vary due to individual government mandates; a best practice is to be transparent and consistent with merit criteria.
- A government-led planning and consenting model provides certainty and reduces risk and cost for both government and industry.
- Many countries have adopted a "one-stop shop" system, which may involve multiple parts of government but provides a single interface for developers.
- A major area of risk reduction can be achieved when government undertakes site surveys and data collection and provides this data to industry to inform plan development.
- The evaluation of project design envelopes during consenting can provide greater flexibility to both government and industry to apply design modifications to address advancements in technology, design, and mitigation.
- Stakeholder engagement is paramount to the success of offshore wind development. Many countries manage stakeholder engagement at the government level, with minimal responsibilities on the part of the developer.

Day 3: Key Stakeholder Perspectives on Leasing and Consenting Systems

Day 3 Overview

Day 3 focused on industry and other stakeholders' perspectives. It provided an overview of different consenting regimes and informed the audience on various risks and challenges that industry is facing as well as recommendations and lessons learned. It also showcased Maritime Spatial Planning and public acceptance as key success factors in the consenting process.

Offshore Wind Consenting- Equinor Perspective, Scott Lundin

Consenting is an integral part in the early phase of project development, whose objective is to find the best technical concept that can be permitted and that generates lowest levelized cost of energy (LCOE). The permitting and consenting process starts with field surveys and technical studies, where all the data collected is aggregated into impact assessments and applications. These are submitted for regulatory and public review, after which there is an examination period in which the findings of these studies are challenged. The final step is decision making where developers make plans and answer the following questions:

- What can we build?
- Where can we build it?
- How will we build it?
- When can we build it?
- What mitigation actions are required?

There are differences between different consenting regimes, illustrated by comparing the UK and USA. The UK has a one-stop shop system in place, where developers engage with only one government body – Planning Inspectorate, which manages the entire process. The process has defined milestones and durations, and it takes around 16 months to reach the final decision and get the consent. In contrast, USA has the opposite system in place, where the developer needs to engage with many different government agencies, as there is an overlapping jurisdiction (federal, state and local).

The fundamental component(s) of the consenting process are stakeholders. It identified commercial fisheries as one of the key stakeholders when it comes to sharing the ocean resources. It highlighted the importance of engagement in initial stages of the project (as soon as the lease is approved) using multiple communication channels (in person dock visits, dedicated fisheries liaison officer, e-mail lists, newsletters, developer and fisheries forums etc.).

Perspectives on Permit and Development Processes – Emma Hospes

Generally, it takes a minimum of 7 years to develop and build an offshore wind farm, and each step in the process (environmental and geological studies, wind farm design, manufacturing, and installations) takes one to three years. Site selection or identification is the first step in offshore wind site development. Marine Spatial Planning is a critical factor in this phase as it affects developer's timescales significantly; a comprehensive MSP (Maritime Special Plan) may help to de-risk the consenting process. Other important components are the regulatory frameworks and authorities, that vary from country to country (from one-stop shop to multiple authorities), and their timelines for certain phases of development (fixed or flexible). Also, developers need to consider the legislation around other ocean users and how it affects the consenting process. Supply chain is another critical factor and developers need to know that the components are available and can be permitted.

Many other risks and uncertainties affect the consenting process:

- Timescales and certainty of the process

- Alignment of all the components in the process (grid, EIA, development permit)
- Other stakeholders and their role in the process
- Flexibility in the technology choice, given the timelines and technology development
- Certainty of the environmental mitigation measures (fixed country standards and/or international standards, limits of developer's impact)

All these risk factors affect not only the developer but cascade down to supply chain, contractors and investors and ultimately have a direct impact to job creation and cost of energy. There is no solution that fits all, but the key measures needed to mitigate these risks are co-operation and joint effort of all stakeholders and a much-needed clarity and flexibility in permitting/consenting processes.

Western Star Floating Offshore Wind Project in Ireland – Case Study, Patricia Comiskey

The Irish planning and consenting system is still evolving, with a lot of processes and timelines still being established. The Maritime Area Planning Act was completed in December 2021 and there is a target of 5GW ocean renewable energy (ORE) by 2030. The current and future projects in Ireland will be assessed and approved in two phases, and Offshore Renewable Energy Support Schemes (ORESS) auctions are planned in 2022 and 2024/2025.

The consenting system in Ireland still has a lot of constraints – the applications process for a Site Investigation License is extensive with a duration of 12 -18 months. Survey works beyond 12 nautical miles are not currently eligible for a license, which represents a significant barrier for a number of offshore projects. Key agencies and sector bodies still need to be established, along with the processes and timeframes. Stakeholder engagement is managed project by project and there is a need for a coherent communication strategy on a national level.

Recommendations:

- Streamline application process and provide more certainty around timelines
- Significant scale up of resources needed in the system to accommodate applications
- Provide clarity on plans to resource and upskill the consenting regime and bolster competency in the system
- Develop a more responsive, agile and collaborative approach between government, industry and key stakeholders
- Establish a coherent communication strategy and planned approach to promote benefits of ORE for Irish society and sustainable enterprise development

Climate – Smart Marine Spatial Planning, Martha Selwyn

A recent UN Roadmap showed how to integrate clean offshore renewable energy into climate-smart marine spatial planning.

Climate-smart MSP (Marine spatial planning) is a new systems-level approach to MSP, that incorporates climate change mitigation and adaption measures and supports the development of ocean climate solutions (including offshore wind).

This is an adaptive, data driven and dynamic system that uses real time and up-to date data to designate management areas and that includes climate changes in spatial use scenarios. Another key feature of this MSP is climate change mitigation i.e., it prioritizes space for mitigation activities and encourages multi use combinations and smarter use of ocean space with the support of various modelling tools (for example Symphony tool in Sweden). Climate smart MSP also has the objective to build climate literacy with use of economic models which convert climate change impacts into tangible metrics (jobs, revenue).

As a result, climate smart MSP should ease and support the consenting processes with building

widespread social acceptance and by providing certainty, transparency, and predictability for private investments. It also stipulates more strategic spatial allocation of already limited ocean space that will maximize ocean user synergies and will mitigate risks to infrastructure damage and human operations.

The present-day MSPs are not necessarily fit for the climate emergency, as they allocate space using maps rather than data and are usually not up to date. The presentation showed the current state of MSPs across the world and highlighted that only 25 countries have plans in place with only 7 who have undertaken one or more revisions of their MSP.

A key recommendation that came out of the Roadmap is that there is a need to strengthen data sharing and harmonization across borders (possible solutions: an agreed evidence base and common monitoring protocols, incentives for industry data sharing) together with stakeholder engagement (possible solutions: informal engagement approaches, setting up realistic liaison groups, using neutral brokers, fostering co-location between different ocean users etc.).

Public Acceptance: Stakeholder Engagement & Community Benefits, Garry Keegan

Offshore wind projects experience resistance among costal and port communities and various other stakeholders (aviation, fisheries etc.). There is a little evidence of coordinated communication campaigns to educate and inform the public, from both the developer and regulatory side.

There are a number of criteria that should be considered in relation to public acceptance of offshore wind. First is Social Acceptance Strategy, that needs to be developed by the relevant national authorities in co-operation with industry with the objective of providing consistency in the process of the development of FOW project. Consenting Regime is another key factor, which ought to provide clarity at each stage of the project lifecycle so that local stakeholder engagement plan can reflect the type and intensity of stakeholder engagement during every stage of project lifecycle. Project Ownership is also crucial component in social acceptance; a stable and continuous stakeholder engagement in case of changing ownership is essential for the success of the project. Stakeholder Engagement Plans, another important criteria to consider, bring high value to the project and without these, there is high likelihood for project failure and/or perceptions of injustice.

Stakeholder mapping and engagement is quintessential part of consenting process, and all relevant stakeholders need to be identified and consulted, early and throughout the project. There are many stakeholders that developers need to consider from shipping and fisheries to aviation, tourism, heritage, and environmental protection groups. Depending on national legislation, some countries have official stakeholders' lists, which distinguish between statutory and non-statutory stakeholders.

Community benefit schemes are now integral part of international infrastructure developments. Each scheme should be tailored to reflect the characteristics of the development and the local social and economic environment. When designing community scheme, developers should take into account the scale of the project and the technology deployed, the distance of project site from the shore and its proximity to local port and coastal communities. It is vital that a governance and administration structure is selected on a site-by-site basis.

Key Perspectives: Industry and Other Ocean Users

The following findings and key recommendations were proposed to enhance the consenting and permitting process:

- Streamline the consenting procedures and provide more certainty around the timelines
- Provide more flexibility around design modifications and technology
- Implementation of climate –smart, adaptive and data driven MSP

- Strengthen data sharing and harmonization across borders
- Improve stakeholder engagement through developing more responsive and agile communication between government, industry and other stakeholders
- Develop and implement effective social acceptance strategies and stakeholder engagement plans

Day 4: Key Perspectives from R&D Organizations

Day 4 Overview

Day 4 focused on the role research and development (R&D) has in both informing and advancing regulatory approaches, including lessons learned to date, and sharing best practices.

Research and Development Needs to Advance US Regulatory Effectiveness, Walt Musial

Research is critical throughout the regulatory process, informing multiple aspects such as: site suitability, pace of technological change, data sharing, cumulative impacts, resource modeling, structural reliability, standards development and integration, worker safety, and wind farm life extension. It also informs future plans, determining the amount of offshore wind development that is needed to meet targets, identifying future sites, and developing advanced technologies. In particular, floating offshore wind is a new market, and understanding the technologies suited to different conditions, the potential for cost reductions, and the resource that is available are all critical to establish the industry. Fundamentally, more data sharing is needed to better inform research, accelerate the regulatory process, and to set standards for future development to ensure best practices are followed.

Participants were asked to submit poll responses to questions about data sharing. Just over half the participants responded (52%, 27 people) with unanimous agreement that if developers could share some of their site-specific data, the regulatory process could be accelerated.

The least sensitive data, and therefore the most likely to be shared, was considered to be the environmental/wildlife/conflicting use data. This was also considered to be the most useful type of data to be shared if a program were developed.

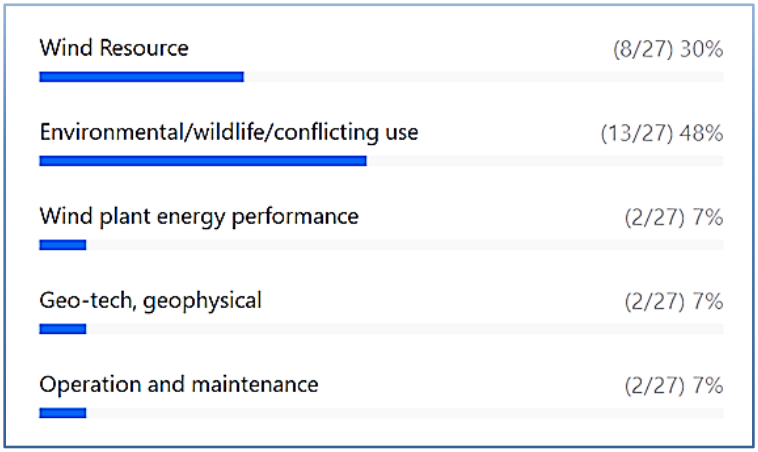


Figure 1 What data would be the least sensitive if a data sharing program were developed?

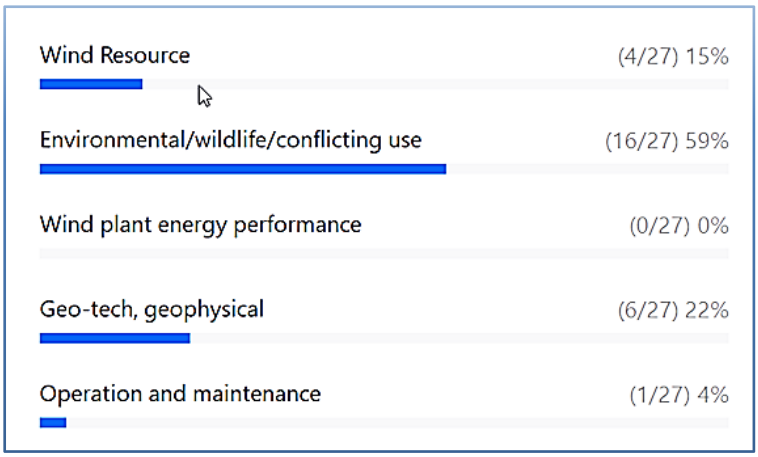


Figure 2 What data would be the most useful to developers and regulators if a data sharing program were developed?

Floating Offshore Wind, Luke Eatough

Specifically focusing on floating offshore wind, the UK, through ORE Catapult, has set up a Floating Offshore Wind Centre of Excellence (FOW CoE) to drive forward commercialization of floating wind. Various risks have been identified, associated with the current lack of specific leasing arrangements for floating offshore wind (FOW), a reliance on technologies that are currently unproven at commercial scale, higher costs for site surveys due to deeper locations, and the potential displacement of existing users. There are also opportunities related to the greater available wind resource in deeper waters that FOW can provide access to, transferable skills from other sectors (such as oil and gas), potentially reduced environmental impacts compared to fixed bottom structure, and the economic benefits of building the supply chain to support the delivery of a future pipeline of commercial FOW farms. To manage the risks while realizing the opportunities, a series of recommendations has been developed that include: changes to marine policy planning, broadscale site characterization, technology innovation, supply chain development and investment, specific guidance and outreach, and effective consultation. A priority area is consultation with the fishing industry, to identify the challenges and opportunities of co-existing offshore and to develop a plan with the fishermen to move forward. The FOW CoE is currently developing a long-term strategic programme of collaborative research to address the specific environmental interactions of FOW.

WREN Task 34 Overview, Cris Hein

A major component of the consenting process is understanding and assessing the potential environmental effects. This aspect is the focus of IEA Wind Task 34 (Working Together to Resolve the Environmental Effects of Wind Energy – WREN), which identifies priority research gaps, assesses technical readiness and effectiveness of solutions, and synthesizes information on the state of the science globally. To disseminate the environmental research done to date, the Tethys website maintains a knowledge base of literature and recorded webinars for wind and marine renewable energy. In addition, a linked technology database is being developed for monitoring and minimization technologies to evaluate their readiness for use in different situations. The Task 34 team is also developing a global assessment of key environmental issues to address within the next 5 to 10 years. Feedback from multiple stakeholders rated cumulative effects as the largest concern. One focus area is to understand the behavior of different species as it is difficult to interpret direct cause and effect, and this needs further research to inform decision making and design.

Of those who responded to the poll (56% of participants) regarding which environmental effects were

of primary interest, 39% responded with changes in ecosystems, while 34% were interested in seabirds.

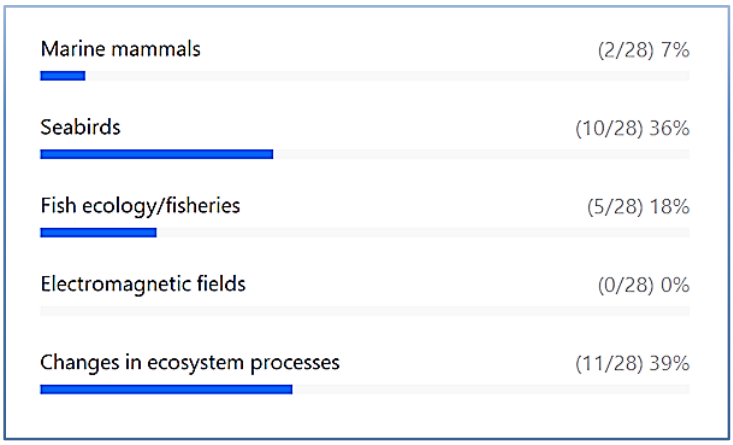


Figure 3 What is your primary interest regarding the environmental effects of offshore wind (OSW)?

IDeA Task 49, Cian Desmond

Considerations for floating wind are also the focus for IEA Wind Task 49, which started in 2021 and investigates the challenges and opportunities for the development of floating wind at commercial array scale. The structure of the task is split into five packages: management and communication, reference sites, reference farms, risk assessment, and research requirement classification. Through these packages the Task will ensure it stays aligned with industry, research and policy needs, and support the sustainable development of floating wind arrays.

Key Perspectives: R&D Organizations

There were various themes that came out through the presentations and then the discussion afterwards:

- Need effective consultation at all scales, with meaningful engagement
- Look at regional cumulative effects – need studies that are larger than a single development to really understand broader-scale impacts.
- As FOW is so far offshore other mechanisms can be used to avoid transmission costs and losses. There are various offshore wind farms now being coupled with hydrogen, but hydrogen markets are nascent, and it may be too early for significant investment. At present, most offshore wind-hydrogen projects also want a grid connection as hydrogen is not the sole output, but existing projects are considering how to build on this.
- Transfer of workforce skills from oil and gas to floating offshore wind will be important for the growth of the industry.

Participants were also specifically asked about technical interests, 60% of participants responded (30) and the majority were interested in consenting for floating wind.

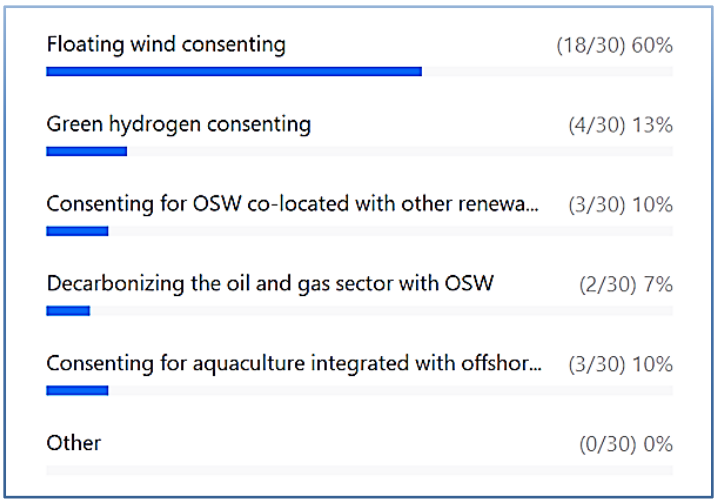


Figure 4 What tech frontier in offshore wind (OSW) consenting are you most interested in?

Conclusions & Next Steps

The TEM #103 meeting highlighted the rapid growth of offshore wind in the coming decades to meet global climate change goals. Offshore wind has the resource and flexibility to meet these needs, and technology is advancing to maximize this opportunity.

Key Challenges, Opportunities, and Best Practices

This TEM #103 was an excellent opportunity to bring different countries together to discuss offshore wind project consenting. It was clear that there is a wide variety of consenting regimes used in different countries, stemming from different cultures and legal systems. This makes it particularly difficult for multinational developers who have to adapt to each regime and set of practices in each country. This emphasizes the need for clear and consistent consenting practices and guidance in each country.

Another key challenge is the rate of growth of offshore wind development that is needed to reach individual country targets. To succeed with these targets, the consenting process needs to be more streamlined and coordinated to reduce the time from site identification to commissioning. This growth also highlights the greater demands for ocean use, and the importance of developing marine co-use strategies.

Several countries have adjusted their consenting regimes over time, illustrating the need for flexibility as the industry matures in a particular country, but also reflecting the difficulties in setting up and maintaining an efficient regulatory system. Lessons can be learned from these changes, and applied to emerging markets and countries that are reforming their existing systems.

There were several key takeaways related to best practices:

- A one-stop shop system helps maintain a streamlined and efficient consenting system for both regulators and developers.
- There needs to be clear and consistent guidance for navigating the consenting system.
- Marine spatial planning is critical for siting offshore wind and enabling suitable marine co-use.
- Government-industry partnerships are necessary for accelerating deployment.
- Increased data sharing between industry and regulators, particularly for site surveys and environmental studies, would enable a more effective and faster consenting process.
- The technical and financial risks at each stage need to be allocated appropriately to those who are best able to manage them (i.e., government or industry).
- Stakeholder engagement and involvement needs to start early in the process and be meaningful to all parties involved.

Next Steps

Throughout the meeting there was recognition that knowledge sharing is needed to accelerate offshore wind deployment and streamline consenting worldwide, both for countries that are just starting to deploy offshore wind and the more mature markets. The lessons learned to date are key to improving the processes for the future.

On the final day, there was a discussion as to whether there was support for developing an IEA Task focused on leasing and consents. Of those attending, 72% responded to this poll, with 65% of those supporting a specific task, 32% undecided, and only 3% (1 person) who did not support it.

Regarding potential follow-on topics, the top two were data sharing and climate smart marine spatial planning, but other areas were also strong. Two new ideas for topics were ecological compensation and cluster wakes.

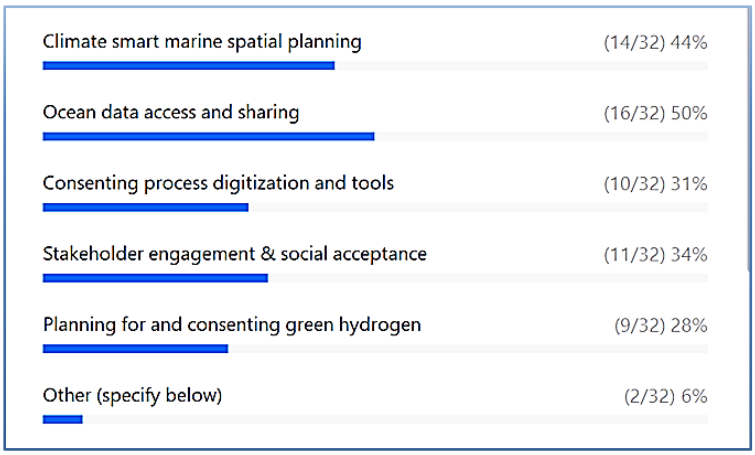


Figure 5 Which potential topics for follow-on work would be of most interest to you (choose 2)?

The next steps are therefore to investigate further the interest in a new task, and scope out exactly what that would cover. In the meantime, members can continue the dialogue on improvements that can be made to the various consenting regimes to ensure the accelerated deployment of offshore wind that is needed.

APPENDIX ONE – TEM #103 Introductory Note

INTRODUCTORY NOTE

IEA WIND TASK 11 TOPICAL EXPERT MEETING

ON

OFFSHORE WIND PROJECT CONSENTING

John McCann, Ana Sladic – Sustainable Energy Authority of Ireland

Jocelyn Brown-Saracino, Bret Barker – US Department of Energy

Emily Lindow, Erin Trager – US Bureau of Ocean Energy Management

A. VALUE FOR IEA WIND TCP

BACKGROUND

Offshore wind energy is the major growth sector in both wind energy and marine renewable energy. Policy support has helped the European Union reach nearly 20 GW of offshore wind capacity by the end of 2018. Offshore wind is set for robust growth in the EU, with current policies aiming to multiply offshore wind capacity by 4 over the next decade. To date, the majority of installed global offshore wind power capacity has been concentrated in six European countries. This is set to change. In 2018, China added 1.6 GW of offshore wind capacity, the most of any country. In the United States, state-level targets set the course for rapid growth over the next decade. India, Korea and Chinese Taipei also have ambitious targets, while other countries, including Japan and Canada, are laying the groundwork for future offshore wind development. The global offshore wind market is set to expand significantly over the next two decades, growing by 13% per year in the IEA Stated Policies Scenario. Bolstered by policy targets and falling technology costs, global offshore wind capacity is projected to increase fifteen-fold to 2040, becoming a $1 trillion industry over the next two decades. This level of investment would mean that offshore wind will account for 10% of investment in renewables-based power plants globally.[1]

This level of global growth must be underpinned by appropriate offshore consenting policies and processes. To date, a variety of approaches to consenting offshore wind energy developments have been adopted in the leading countries, and consenting policies have evolved over time, with some significant changes by key jurisdictions in recent years. To keep pace with the rapidly evolving landscape for this industry, it will be important for consenting practices to be forward-facing, leveraging lessons learned from the nearly three decades of experience in the sector to accommodate and sustain future growth. Offshore consenting is very different from onshore consenting, due to the greater average size of projects, the different scope of projects, the interactions with different economic

[1] IEA (2019), "Offshore Wind Outlook 2019", IEA, Paris https://www.iea.org/reports/offshore-wind-outlook-2019

sectors and unique environmental factors. The path to consenting can include, but is not limited to, strategic environmental assessment, space-use planning, geotechnical, environmental and species surveys, grid connection allocation, project-level environmental impact assessment, site licensing, auctions for sites or support, permitting of onshore project elements and planning for port and harbor development. In countries that have installed significant offshore wind power capacity, the consenting processes have generally evolved from discrete separate steps to more centralized processes incorporating several of the previously separate steps. But, even in Europe, where individual country arrangements are shaped by EU legislation, these centralized consenting processes still vary widely from country to country. This variation in consenting processes represents a cost and a risk to the offshore wind industry. Experience from and processes developed to deliver projects in one jurisdiction may not be transferrable to another. There would therefore be a benefit to the sector from developing a report detailing current and foreseeable challenges faced by both regulators and industry, as well as consenting best practices to help inform regulators and policymakers, which could be used to guide them in developing or refining consenting arrangements in their countries.

MOTIVATION

In the coming decades, offshore wind power will be deployed on a large scale in a growing number of countries. There is an opportunity to both influence consenting policies in countries new to offshore wind and to provide examples of best practices to influence the evolution of arrangements in countries with existing deployment. In some jurisdictions, legacy marine consenting arrangements have evolved for different offshore economic sectors and may not be readily applicable to the offshore wind sector. Decisions made by countries transitioning from discrete legacy processes to an increasingly centralized consenting process may bring attendant risks for the offshore wind sector with the potential for knock-on effects on project costs, the cost of finance and the cost of energy. Further, due to national legal and regulatory limitations, it may not always be possible for a jurisdiction to adopt a more centralized consenting regime. Thus, identifying consenting best practices that could be applicable irrespective of national consenting frameworks could be beneficial to both mature and emerging markets.

Further, floating technologies may have very different consenting or environmental considerations than fixed bottom technologies. Consenting frameworks must anticipate the requirements of these technologies if there is to be a smooth transition to commercialisation.

ADDED VALUE OF COLLABORATION

The development and/or evolution of consenting arrangements for offshore wind energy will be a global challenge. The IEA TCPs are unique in their global reach and ability to convene relevant government actors. This TEM will work collaboratively with the Global Offshore Wind Regulators Forum, and outcomes of this meeting will be provided to that group to further their efforts. Where applicable, the products of this TEM could also be beneficial to jurisdictions involved in the North Sea Energy Cooperation, which could serve as another avenue for collaboration where appropriate.

ALIGNMENT WITH IEA WIND STRATEGY

This topic has good alignment with the IEA Wind TCP strategy under Strategic Objective 2, "Lower the cost of land-based and offshore wind energy industry", and is also well aligned with Objectives 1, 3 and 4. In terms of priority areas, it may primarily come under IEA Wind Priority Area 2, "Advanced Technology", but will also deliver upon Priorities 3 and 4, as moving towards a common framework of offshore consenting arrangements could lower costs while minimising social and environmental impacts. A TEM that brings policymakers, regulators and experts on offshore consenting together will foster the exchange of best practice, as well as steer collaborative research, the other aim of IEA Wind TCP.

B. MEETING FORMAT AND GOALS

OBJECTIVES

This topical expert meeting will bring together international experts on offshore wind energy consenting to initiate a discussion on the key considerations for a guiding framework for consenting arrangements for offshore wind energy. Discussion will centre on those elements of consenting that are fundamental and common across jurisdictions in order for the end result to benefit the broadest number of jurisdictions.

While the objective of the meeting will be to publish proceedings for dissemination to policy makers, it is likely that follow-up action such as a new research task proposal could be called for based on discussions at the meeting and level of interest from the TCP. The ultimate objective is the identification and synthesis of current global consenting challenges, lessons learned, and best practices in order to provide a resource usable across agencies, jurisdictions, and technologies.

The meeting will include presentations from participants on their experience of consenting regimes internationally, including the perspectives of government regulators, industry, and key non-governmental stakeholders from both mature and less mature jurisdictions. The presentations will highlight challenges encountered during the consenting process, including knowledge gaps or procedural difficulties, as well as positive experiences. Time will be allocated following the presentations for questions and discussion with the goal of identifying lessons learned and best practices. The meeting proceedings will be summarized in a report to form the basis for a draft consenting best practices document, which could specify potential follow up activities such as further, more in-depth work on key aspects of the synthesis and regular updates to the document.

SPECIFIC OUTCOMES

The expected outcomes would be a synthesis discussion of overarching consenting best practices for offshore wind energy projects and identification of challenges for further consideration. Dissemination may be achieved through presentation at offshore industry conferences and in the production of a high-level briefing for policymakers and regulators.

INTENDED PARTICIPATION

Consenting authorities, expert consultants on offshore consenting, marine sector bodies and authorities, non-governmental stakeholders, environmental regulators, and offshore wind developers or national/international developer industry associations.

The effectiveness of this effort will be highly dependent on the willingness of lead regulatory agency for offshore wind consenting to engage and assimilate the information gathered through the TEM. We also suggest that these organizations play a central role in planning this TEM.

TENTATIVE PROGRAM

The meeting would be held virtually in first quarter of 2022, tentatively during the week of February 7-11, 2022. Given the virtual medium, it will be held over the course of three to four days for a period of no longer than four hours per day, to accommodate multiple time zones.

APPENDIX TWO – Meeting Agenda

IEA WIND TASK 11 Topical Expert Meeting #103

ON

OFFSHORE WIND PROJECT CONSENTING
8-11 February 2022

MEETING AGENDA

8 February 2022: Setting the Scene
12:00–14:00 UTC / 13:00-15:00 CET [2 hours total]

1. Welcome and Introduction – Introduction to IEA Wind Technology Collaboration Program (TCP) and Overview of TEM Objectives and Agenda [25 min.]

Description: The Operating Agent for Task 11 will open the meeting, followed by a welcome and an introduction to IEA Wind from the TCP Chair. The TEM organizing team will provide an overview of the meeting objectives, agenda, and concept note, and convey why a review of consenting challenges and best practices is important to facilitating the safe and orderly development of offshore wind across the globe. This session will set the scene for the full multi-day TEM.

Speakers:

Stephan Barth, Managing Director, ForWind, and Chair, IEA Wind TCP – 10 min.

John McCann, Programme Manager, Sustainable Energy Authority of Ireland (SEAI), and Vice Chair, IEA Wind TCP, and

Erin Trager, International Relations Specialist, Bureau of Ocean Energy Management (BOEM), and TEM #103 Technical Lead – 15 min.

2. Stage Setting: Global Offshore Wind Overview [80 min.]

Description: Intergovernmental and nongovernmental speakers will provide an overview of the development of offshore wind globally and in key regions, including providing focused observations related to planning, leasing and consenting, and barriers to growth. Discussions will be moderated by John McCann, SEAI.

Speakers:

Paolo Frankl, Head of the Renewable Energy Division, International Energy Agency (IEA) – 10 min.

Alastair Dutton, Chair, Global Offshore Wind Task Force, Global Wind Energy Council (GWEC) – 10 min.

Ivan Pineda, Director of Public Affairs, WindEurope – 10 min.

Josh Kaplowitz, Vice President, Offshore Wind, American Clean Power Association (ACP) – 10 min.

Mark Leybourne, Senior Energy Specialist on Offshore Wind, Energy, World Bank Group – 10 min.

Message: The offshore wind sector is growing rapidly across the world in both mature and emerging markets. What activity is predicted and what level of development is necessary to reach nationally-set targets and meaningfully contribute to global greenhouse gas reduction?

Q&A / Discussion: The presentations will be followed by a 30-min. Q&A session during which the organizing team will ask prepared questions and facilitate questions and discussion among the speakers and with other TEM participants.

3. Day 1 Wrap Up [15 min.]

9 February 2022: Regulatory Perspectives – GOVERNMENT ONLY
12:00–14:00 UTC / 13:00-15:00 CET [2 hours total]

1. Welcome and Introduction – Overview of TEM Day 2 Objectives and Agenda [10 min.]

Description: The TEM organizing team will provide an overview of the Day 2 meeting objectives and agenda, which will focus on the regulatory perspective. The day's discussions will be moderated by Erin Trager, BOEM.

2. Leasing and Consenting Systems [95 min.]

Description: Government regulators will deliver presentations introducing participants to different leasing and consenting systems employed across the world. Speakers will provide an overview of their regulatory scheme and share insight on challenges encountered, lessons learned, and best practices.

Speakers:

Ruud Oerlemans, Senior Advisor on Offshore Wind, Netherlands Enterprise Agency (RVO) – 15 min.

Nico Nolte, Head of Department, Management of the Sea, Federal Maritime and Hydrographic Agency (BSH), Germany – 15 min.

James Bennett, Program Manager, Office of Renewable Energy Programs, BOEM, U.S. – 15 min.

Park Seong-Woo, General Manager, Wind Power Division, Korea Energy Agency (KEA) – 15 min.

Message: Several different approaches are employed across the world to lease and authorize offshore wind. What lessons have regulators taken away from their experiences? What was the model for the design of their approach? When changes have been made over time, why were the changes made and have they been successful?

Q&A / Discussion: The presentations will be followed by a 35-min. Q&A session during which the organizing team will ask prepared questions and facilitate questions and discussion among the speakers and with other TEM participants, with the goal of identifying lessons learned and best practices.

3. Day 2 Wrap Up [15 min.]

10 February 2022: Key Stakeholder Perspectives on Leasing and Consenting Systems
12:00–14:25 UTC / 13:00-15:25 CET [2 hours, 25 min. total]

1. Welcome and Introduction – Overview of TEM Day 3 Objectives and Agenda [10 min.]

Description: TEM organizers provide an overview of the Day 3 meeting objectives and agenda, which will focus on the perspectives of key non-governmental stakeholders of the offshore wind sector. The day's discussions will be moderated by Ana Sladic, Programme Executive for the Ocean Power Innovation Network, SEAI.

2. Key Perspectives: Industry and Other Ocean Users [2 hours]

Description: Industry representatives that have navigated different leasing and consenting schemes in the offshore wind sector and organizations with experience considering the needs of ocean user groups during offshore wind planning and consent will present on their experiences and observations of various approaches employed globally, providing their unique perspectives on challenges encountered, lessons learned, and best practices.

Speakers:

Scott Lundin, Head of U.S. Permitting and Environmental Affairs, Equinor Wind U.S. – 15 min.

Emma Hospes, Head of Strategic Permitting, Ørsted – 15 min.

Patricia Comiskey, Consenting and Government Relations Manager, Simply Blue Group – 15 min.

Break – 10 min.

Martha Selwyn, Manager, UN Global Compact Sustainable Ocean Business Action Platform – 15 min.

Garry Keegan, Joint Operating Agent, IEA Wind Task 28 on Social Science of Wind Energy Acceptance – 15 min.

Message: Several different approaches are employed across the world to lease and authorize offshore wind. What lessons have industry taken away from their experiences? What observations have been made regarding practices by other ocean users? What aspects of a regulatory system would be considered best practices? How have these consenting approaches affected supply chain and business decisions?

Q&A / Discussion: The presentations will be followed by a 35-min. Q&A session during which the organizing team will ask prepared questions and facilitate questions and discussion among the speakers and with other TEM participants, with the goal of identifying lessons learned and best practices.

3. Day 3 Wrap Up [15 min.]

11 February 2022: Key Stakeholder Perspectives (continued), TEM 103 Review, and Looking Forward
12:00–14:00 UTC / 13:00-15:00 CET [2 hours total]

1. Welcome and Introduction – Overview of TEM Day 4 Objectives and Agenda [10 min.]

Description: The TEM organizing team will provide an overview of the Day 4 meeting objectives and agenda, which will include the perspectives of key research organizations in the offshore wind sector and a review of the TEM proceedings and next steps. The day's discussions will be moderated by Bret Barker, Senior Advisor, Distributed Generation and International Affairs at General Dynamics Information Technology.

2. Key Perspectives: R&D Organizations, including Operating Agents for Other Wind TCP Tasks (e.g., academia, national laboratories) [1 hour, 5 min.]

Description: Research organizations that have studied or contributed to the knowledge base for the offshore wind sector will present on their observations of various regulatory approaches employed globally, providing their unique perspectives on challenges encountered, lessons learned, and best practices. In addition, these research organizations will share their thoughts on barriers and opportunities for growth in the sector.

Speakers:

Walt Musial, Principal Engineer, National Renewable Energy Laboratory (NREL), U.S. – 10 min.

Luke Eatough, Analyst - Floating Offshore Wind Development and Consent, ORE Catapult – 10 min.

Cris Hein, Operating Agent, IEA Wind Task 34 – Working Together to Resolve Environmental Effects of Wind Energy (WREN) – 10 min.

Cian Desmond, Joint Operating Agent, IEA Wind Task 49 on Floating Wind – 10 min.

Message: Several different consenting approaches are employed across the world to lease and authorize offshore wind, which has predominantly been fixed-bottom. What challenges and emerging opportunities have been observed in this sector and what aspects of existing regulatory systems would be considered best practices for future growth?

Q&A / Discussion: The presentations will be followed by a 25-min. Q&A session during which the organizing team will ask prepared questions and facilitate questions and discussion among the speakers and with other TEM participants, with the goal of identifying lessons learned and best practices.

BREAK [15 min.]

3. TEM Wrap Up: Review of TEM Objectives and Expected Outcomes [30 min.]

Description: TEM organizers will provide a high-level review of the meeting objectives, common themes from the sessions, and planned next steps.

Q&A / Discussion: The review will be followed by an open-floor discussion during which the TEM organizing team will solicit input from TEM participants and facilitate discussion on key themes and next steps. In addition, the organizers will share thoughts on and solicit input about additional avenues for international collaboration on key themes from the TEM.

4. Meeting Adjourns

APPENDIX THREE – Survey Results

Meeting polls

Day 1

TEM103 - Day 1 - Poll

1. What country are you attending from? (Réponse courte) *

100% a/ont répondu

2. What target does your country have for offshore wind in 2030? (Choix unique) *

No target	46%
0-10 GW	17%
10-100GW	38%
>100GW	0%

3. What are the leasing and consenting arrangements for offshore wind energy in your country (Multiple Choice)

General offshore leasing and consenting system not specific to offshore wind	59%
Transitioning from general system to specific, discrete (one at a time), offshore wind leasing and consenti...	5%
Specific, discrete, offshore wind leasing and consenting system	18%
Transitioning from discrete to centralised consenting system	5%
Centralised system fully implemented	5%
Other	18%

4. If you answered "Other", please specify (Long Answer)

17% answered

Day 2

TEM 103 - Day 2 - Poll

1. What is your top known challenge in authorizing/consenting offshore wind projects as a regulator? (Single Choice) *

Addressing other ocean users in planning and review (e.g., fisheries, navigation)	19%
Government capacity/capabilities (e.g., staffing, funding)	52%
Transitioning from a discrete (i.e., one project review at a time) to a centralized (i.e., programmatic) conse...	11%
Social acceptance / perceptions of offshore wind	7%
Other – please specify below	11%

2. if "Other", please specify (Long Answer)

15% answered

3. As a regulator, would you participate in a global forum for governmental bodies on the topic of offshore wind planning, leasing, and consenting? (Single Choice) *

Yes, I would like to	74%
I already do – the Global Offshore Wind Regulators Forum	22%
No	4%

Day 3

TEM103 - Day 3 - Poll

1. What do you see as the greatest challenge in authorizing/consenting offshore wind projects ? (Single Choice)

Engagement with other marine stakeholders: obtaining constructive input that is relevant to each stage...	28%
Delays and project risks due to insufficient government capacity/capabilities to resource the consentin...	34%
Coping with uncertainty created by changes in/evolution of national leasing and consenting systems, e....	10%
Educating the public about national, regional and local offshore wind development objectives so that ...	21%
Other – please specify below	7%

You did not answer this question

2. if you answered "other" : (Long Answer)

7% answered

3. What do you consider to be most impactful improvement that could be made to responsibly accelerate the consenting process in order to achieve national targets? (Single Choice) *

Site assessment/investigation carried out by the government	28%
More effective and fewer opportunities for public consultation	14%
Clear processes and timelines for issuing site access, consents, & grid connection	21%
Creation of a "one-stop-shop" consenting system (e.g., establish a single government interface with th...	34%
Other - please specify	3%

4. if you answered "other" : (Long Answer)

Day 4

TEM103 - Day 4 - Poll 1

Poll | 3 questions | 27 of 51 (52%) participated

1. If developers agreed to share some of their site-specific data, it could result in a faster regulatory process. (Single Choice) *

27/27 (100%) answered

Agree	(27/27) 100%
Disagree	(0/27) 0%

2. What data would be the least sensitive if a data sharing program were developed? (Single Choice) *

27/27 (100%) answered

Wind Resource	(8/27) 30%
Environmental/wildlife/conflicting use	(13/27) 48%
Wind plant energy performance	(2/27) 7%
Geo-tech, geophysical	(2/27) 7%
Operation and maintenance	(2/27) 7%

3. What data would be the most useful to developers and regulators if a data sharing program were developed? (Single Choice) *

27/27 (100%) answered

Wind Resource	(4/27) 15%
Environmental/wildlife/conflicting use	(16/27) 59%
Wind plant energy performance	(0/27) 0%
Geo-tech, geophysical	(6/27) 22%
Operation and maintenance	(1/27) 4%

TEM103 - Day 4 - Poll 2

Poll | 1 question | 28 of 50 (56%) participated

1. What is your primary interest regarding the environmental effects of offshore wind (OSW)? (Single Choice) *

28/28 (100%) answered

Marine mammals	(2/28) 7%
Seabirds	(10/28) 36%
Fish ecology/fisheries	(5/28) 18%
Electromagnetic fields	(0/28) 0%
Changes in ecosystem processes	(11/28) 39%

TEM103 - Day 4 - Poll 3

Poll ended | 2 questions | 30 of 50 (60%) participated

1. What tech frontier in offshore wind (OSW) consenting are you most interested in? (Single Choice) *

30/30 (100%) answered

Floating wind consenting	(18/30) 60%
Green hydrogen consenting	(4/30) 13%
Consenting for OSW co-located with other renewa...	(3/30) 10%
Decarbonizing the oil and gas sector with OSW	(2/30) 7%
Consenting for aquaculture integrated with offshor...	(3/30) 10%
Other	(0/30) 0%

TEM103 - Day 4 - Poll 4a

Poll ended | 1 question | 33 of 47 (70%) participated

1. How familiar are you with the IEA Wind TCP task structure and operations? (Single Choice) *

33/33 (100%) answered

My country is not a member and this is my first IEA Wind TCP ev...	(11/33) 33%
My country is not a member and I am interested in joining the TCP	(3/33) 9%
My country is a member but I am new to the TCP	(14/33) 42%
My country is a member and I actively participate in the TCP	(5/33) 15%

TEM103 - Day 4 - Poll 4b

Poll ended | 1 question | 34 of 47 (72%) participated

1. Are you interested in seeing a new task proposal on OSW consenting result from TEM 103? (Single Choice) *

34/34 (100%) answered

Yes	(22/34) 65%
No	(1/34) 3%
Undecided	(11/34) 32%

TEM103 - Day 4 - Poll 4c

Poll ended | 1 question | 29 of 47 (61%) participated

1. What is your level of interest relative to a new task proposal on OSW project consenting? (Single Choice) *

29/29 (100%) answered

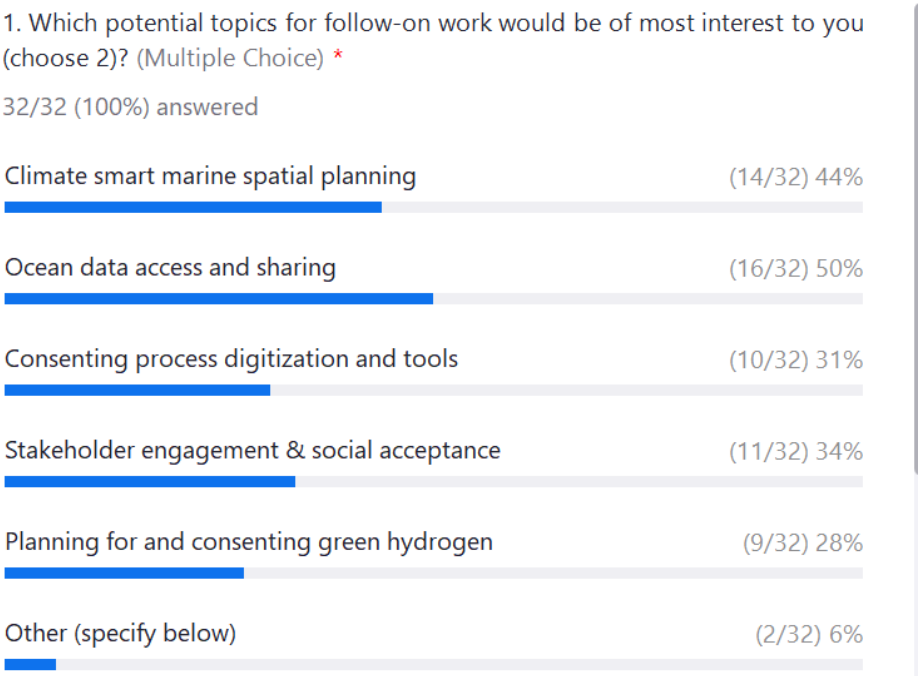
Not interested	(3/29) 10%
Willing to contribute to developing a new task proposal	(15/29) 52%
I don't want to support proposal development, but I want to join ...	(9/29) 31%
Lead a work package within the task	(1/29) 3%
Coordinate the task as Operating Agent or Cooperating Agent	(1/29) 3%

TEM103 - Day 4 - Poll 4d

Poll ended | 2 questions | 32 of 47 (68%) participated

1. Which potential topics for follow-on work would be of most interest to you (choose 2)? (Multiple Choice) *

32/32 (100%) answered



Other responses were:

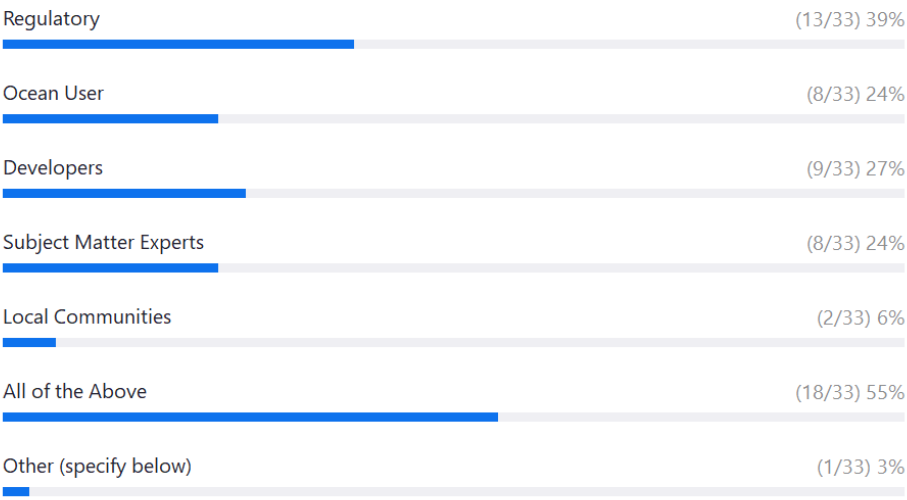
- Ecological compensation
- Cluster wakes

TEM103 - Day 4 - Poll 4e

Poll ended | 2 questions | 33 of 47 (70%) participated

1. Which organization types could be included in follow-on work? (Multiple Choice) *

33/33 (100%) answered



Other response was:

- R&D institutes

TEM103 - Day 4 - Poll 4f

Poll ended | 2 questions | 33 of 46 (71%) participated

1. What would be the best format for collaboration on OSW consenting? (Single Choice) *

33/33 (100%) answered

Research and development focused working groups	(4/33) 12%
Series of workshops and seminars	(5/33) 15%
Combination of both	(24/33) 73%
Other (specify below)	(0/33) 0%

2. If you answered "other", please specify : (Long Answer)

0/33 (0%) answered

TEM103 - Day 4 - Poll 4g

Poll ended | 2 questions | 35 of 46 (76%) participated

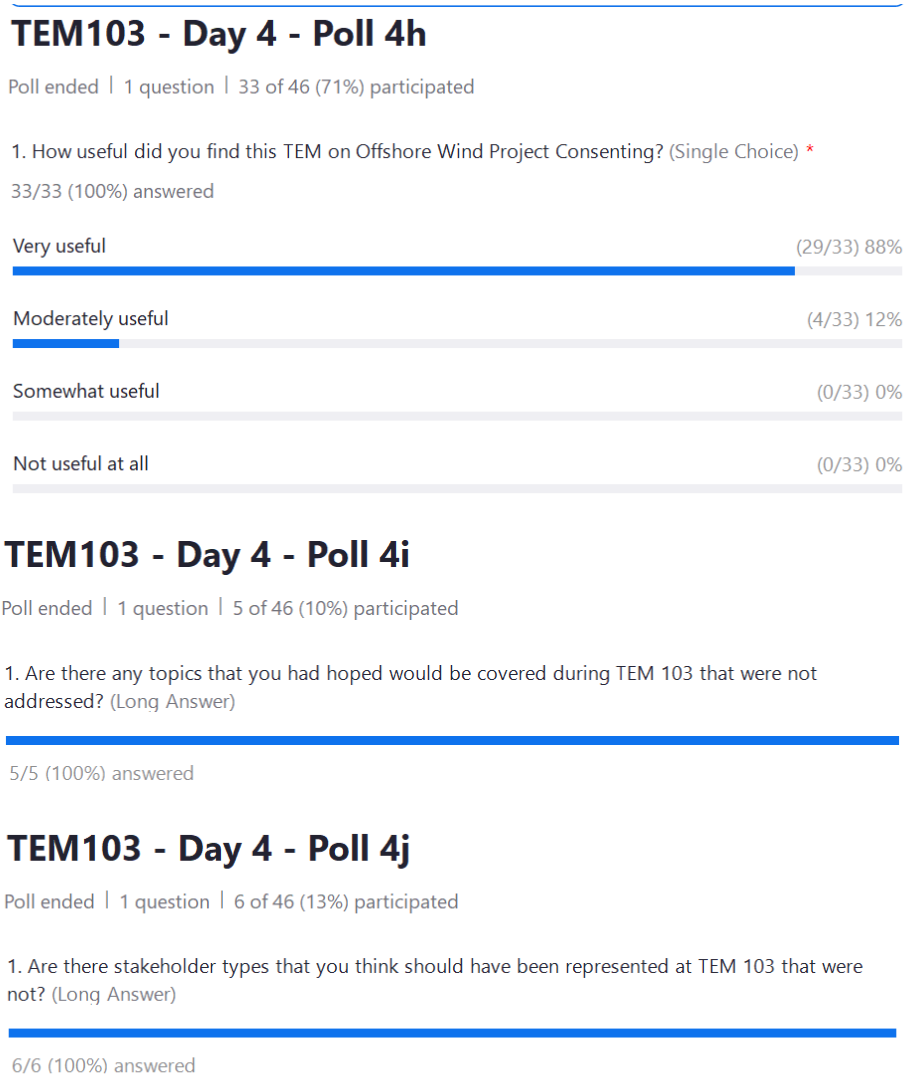
1. What could be the most impactful outputs from a task on OSW project consenting? (Multiple Choice) *

35/35 (100%) answered

Best practices & process harmonization across jurisdictions	(13/35) 37%
Policy recommendations	(10/35) 29%
Network expansion	(3/35) 9%
Data sharing	(12/35) 34%
All of the above	(15/35) 43%
Other (specify below)	(1/35) 3%

Other response was:

- A platform to improve best practice



Poll 4i:
Responses were (of the 5 responses, 2 were just 'no'):

- Great coverage - looking forward to building on the shared experience gathered in this TEM - e.g bridging MSP and regional dev planning
- Non member country examples of regulation
- Regulatory treatment of the distance between parks owned by different owners

Poll 4j:
Responses were:

- Senior policy makers
- Shipping, fishing and O&G representatives
- Commercial fishing and /or shipping representative
- Other marine users

APPENDIX FOUR - Meeting Participants

A total of 120 participants and observers from 28 countries were registered to TEM #103, which is a record participation for an IEA Wind TEM to date. On average, approximately 85 participants attended each day.

iea wind

Participants to TEM#103 on Offshore Wind Consenting

February, 8-11th, 2022

First Name	Last Name	Country	Affiliation
Abderrahim	JAMRANI	Morocco	MASEN
Adriana	Gracia Bonil	Colombia	National Environmental Licensing Authority (ANLA)
Adriana	Aguirre	Colombia	ANLA
Alastair	Dutton		Global Wind Energy Council (GWEC)
Alden	Lundy	USA	BOEM, Pacific Region
Aliona	Osmolovska	Ukraine	Ministry of Energy, Reform Support Team
Ana	Sladic	Ireland	IEA Wind TCP Task 11 TEM organiser
Ana Maria	Niño Apolinar	Colombia	ANLA
Anca	BUJOR	Romania	Ministry of Energy, Directorate SRNTH
Andrew Richard	Prior		World Bank
Anh Hoang	Le		World Bank
Annelies	Bobeldijk-Warning	The Netherlands	Ministry of Economic Affairs and Climate Policy
AnneMarie	Clancy	Ireland	Dpt of Environment, Climate and Communications
Annemarie	Smyth	Ireland	SEAI
Åsa	Hedman	Finland	Flexens
Asma	Mahmoudi	Tunisia	University
Bård	Aarbakke	Norway	Norwegian Directorate of Fisheries
Berndt	Schalin	Finland	Flexens
Birte	Holst Jørgensen	Denmark	DTU, Department of Wind Energy
Bret	Barker	USA	IEA Wind TCP Task 11 TEM organiser
Brian	Smith	USA	IEA Wind TCP Task 11 TEM organiser
Carolina	Perilla Cambio	Colombia	ANLA
Catalina	Quinche Cano	Colombia	ANLA
Chloe	Constant	USA	NREL
Christine	Birkeland	Norway	Water Resources and Energy Directorate (NVE)
Cian	Desmond	Ireland	Gavin & Doherty Geosolutions Ltd.
Conor	McCabe	Ireland	Dpt of Housing, Local Government and Heritage
Cris	Hein	USA	NREL, IEA Wind Task 34
Cristian	Peraza	Costa Rica	Polytechnic University of Valencia
D. Eugenio Jesús	Domínguez Collado	Spain	The Ministry of Ecological Transition
Darlene	Macy	Canada	Natural Resources Canada
Davide	Magagna	Italy	Ministry of the Ecological Transition (MITE)
Deepa	Kurup	India	National Institute of Wind Energy (NIWE), Offshore Wind
Diana Patricia	Baez Sandoval	Colombia	ANLA
Eamonn	Foley	Ireland	Dpt of Housing, Local Government and Heritage
Eileen	Murphy	Ireland	Dpt of Environment, Climate & Comm., Offshore Energy
Emer	Dennehy	Ireland	SEAI
Emily	Lindow	USA	Bureau of Ocean Energy Management (BOEM), SPIA
Emma	Wildeboer	Canada	Natural Resources Canada
Emma	Hospes		Orsted
Eoin	McShane	Ireland	Dpt of Environment, Climate and Communications
Erin	Trager	USA	BOEM, Office of Strategic Policy and International Affairs (SPIA)
Flavio Alberto	Figueredo Rosa	Brazil	EPE (Empresa de Pesquisa Energética)
Franciska	Klein	Germany	Forschungszentrum Juelich GmbH
Gareth	Erfort	South Africa	Council for Scientific and Industrial Research (CSIR)
Garry	Keegan	Ireland	Dpt of Housing, Local Government and Heritage
Genevra	Harker	USA	PNNL
Gundula	Hübner	Germany	Medical School Hamburg, Sozialpsychologie
Gunnstein	Bakke	Norway	Norwegian Directorate of Fisheries
Hana	LEE	Korea	Korea Energy Agency (KEA)
Heike	Winkler	Germany	WAB e. V.
Heymi	BAHAR		IEA/EMS/RED
Ignacio	Marti	Denmark	DTU, Secretariat IEA Wind TCP

First Name	Last Name	Country	Affiliation
Ignacio	Cruz	Spain	CIEMAT
Ivan	Pineda		WindEurope
JAIME	PLANAS	Philippines	PDOE, REMB-SWEMD
Jamie	Baxter	Canada	Western University, London, ON, Dpt Geography & Environment
Jan	Ramos	Philippines	PDOE, REMB-SWEMD
Jan-Hendrik	Grobler	South Africa	Council for Scientific and Industrial Research (CSIR)
Janine	Sänger-Graef	Germany	Federal Maritime and Hydrographic Agency (BSH)
Jean-Pierre	Roux	Ireland	SEAI
Jennifer	Kenyon	USA	BOEM, SPIA
Jessica	Motok	Argentina	Ministerio de Ambiente y Desarrollo Sostenible
Jim	Bennett	USA	BOEM, Office of Renewable Energy Programs (OREP)
Jocelyn	Brown-Saracino	USA	Department of Energy (DOE)
Jochen	Patt	Germany	Fed. Network Agency for Electricity, Gas, Telecom, Post &Railway
John	Twomey	Ireland	Dpt of Environment, Climate and Communications
John	McCann	Ireland	IEA Wind TCP Task 11 TEM organiser
John	Aston	Ireland	IEA Wind TCP task 28
Jonas	Bjärnstedt	Sweden	Swedish Energy Agency
Jonas	Axelgaard	Denmark	Danish Energy Agency
José	Ambia	Peru	Servicio Nacional de Certificación Ambiental – Senace
José Rodrigo	Rojas	Costa Rica	Planificacion y Desarollo Eléctrico, Planeamiento Ambiental
Josh	Kaplowitz		American Clean Power Association (ACP)
Josina	Saraiva Ximenes	Brazil	EPE (Empresa de Pesquisa Energética)
Kadhirvel	Boopathi	India	National Institute of Wind Energy (NIWE), Offshore Wind
Kaja	Mathisen	Norway	Ministry of Petroleum and Energy
Kannan	Balaraman	India	Ministry of New and Renewable Energy
Karina	Fitzgerald	Ireland	Dpt of Housing, Local Government and Heritage, Marine Planning
Kerrie	Sheehan	Ireland	SEAI
Khadija	TAHRI JOUTEI	Morocco	MASEN
Laura	Bastone	Italy	Ministry of the Ecological Transition (MITE)
Lisa	Underwood	Ireland	Dpt of Environment, Climate & Communications, Offshore Energy
Lizet	Ramirez		WindEurope
Luis Renato	Calmet Ormeño	Peru	Int. Coop. Office, National Environmental Certification Service
Luke	Eatough	UK	Offshore Renewable Energy Catapult
Manfred	Zeiler	Germany	Federal Maritime and Hydrographic Agency (BSH)
Marco	Tello	Peru	Environmental Assessment Directorate
Margie	McCharty	Ireland	SEAI
Marie	Duffin	Ireland	Dpt of Housing, Local Government and Heritage
Marielle	de Sain	The Netherlands	IEA Wind TCP task 28
Mariselle	Guerrero	Costa Rica	Secretaría Técnica Nacional Ambiental – SETENA
Marissa	Cerezo	Philippines	PDOE, Renewable Energy Management Bureau (REMB)
Mark	Leybourne		World Bank
Marta	STURZEANU	Romania	Ministry of Energy, Dir. Strategy, Renewables, New Techs & Hydrogen
Martha	Selwyn		UN Global Compact Sustainable Ocean Business Action Platform
Martin	Finucane	Ireland	Dpt of Environment, Climate and Communications
Martina	Hennessy	Ireland	Dpt of Environment, Climate and Communications
Matt	Collins	Ireland	Dpt of Environment, Climate and Communications
Mattia	Cecchinato		WindEurope
Maureen	Clapper	USA	DOE
Melissa	Pauley	USA	DOE
Mussie	Kidane	Germany	Federal Waterways Engineering and Research Institute (BAW)
Mylene	Capongcol	Philippines	Philippine Department of Energy (PDOE), REMB
Nafaa	Baccari	Tunisia	National Agency for Energy Management
Nico	Nolte	Germany	Federal Maritime and Hydrographic Agency (BSH)
Nikos	Stefanatos	Greece	Ministry of Environment & Energy, CRES
Ninh Hai	Nguyen	Vietnam	Electricity and Renewable Authority
Owen	Wilson	Australia	Nat. Offshore Petroleum Safety & Env. Manag. Authority
Panagiotis	Ladakakos	Greece	Hellenic Wind Energy Association (HWEA)
Paolo	Frankl		International Energy Agency/EMS/RED
Patricia	Comiskey	Ireland	Simply Blue Group
Piotr	Bojek		IEA
Rachel	Power	Ireland	SEAI
Rebecca	Green	USA	NREL
Robert	McGuinness	Ireland	Dpt of Environment, Climate and Communications

First Name	Last Name	Country	Affiliation
Ronaldo	Angeles	Philippines	PDOE, REMB-SWEMD
Ruud	Oerlemans	The Netherlands	Netherlands Enterprise Agency
Ryan	Kilpatrick	Canada	Natural Resources Canada
Sagrario	Arrieta Algarra	Spain	The Ministry of Ecological Transition
Scott	Lundin		Equinor
Seong-Woo	Park	Korea	Korea Energy Agency (KEA), Wind Power Division
Sergio	Sanhueza Triviño	Chile	Servicio de Evaluación Ambiental
Shadi	Kalash	Ireland	SEAI
Sonja	Hemke	Germany	The German Wind Energy Association (BWE)
Stefanie	Wehkamp	Germany	The German Offshore Wind Energy Foundation
Stephan	Barth	Germany	Chair IEA Wind TCP and ForWind Managing Director
Stuart	Smith	Australia	Nat. Offshore Petroleum Safety & Env. Manag. Authority
Suchaet	Bhardwaj	Canada	Canada Energy Regulator (CER)
Svein Grotil	Skogen	Norway	Norwegian Environment Agency
Sven	Utermöhlen	Germany	Federal Association of Wind Farm Operators Offshore e. V. (BWO)
Tershara	Matthews	USA	BOEM, Gulf of Mexico Region
Thuy Dung	Pham	Vietnam	Electricity and Renewable Authority
Tom	Woolley	Ireland	Dpt of Housing, Local Government and Heritage
Trevor	Criswell		IEA
Uwe	Tzschach	Germany	Federal Waterways Engineering and Research Institute (BAW)
Walter	Musial	USA	NREL
Wright	Frank	USA	BOEM, OREP
Yasmina	Benmessaoud	Morocco	MASEN
Zak	Jacques	Canada	Natural Resources Canada

APPENDIX FIVE - IEA Task 11 Participation

Countries Currently Participating in Task 11 (2022)	
COUNTRY	**INSTITUTION**
Belgium	Government of Belgium
Canada	Natural Resources Canada
Denmark	Danish Energy Authority
Finland	Business Finland
Germany	Federal Ministry for Economic Affairs and Climate Action (BMWK)
Ireland	Sustainable Energy Authority of Ireland (SEI)
Italy	Ricerca sul sistema energetico (RSE S.p.A.)
Japan	New Energy and Industrial Technology Development Organization (NEDO)
Norway	The Norwegian Water Resources and Energy Directorate (NVE)
Republic of China	Chinese Wind Energy Association (CWEA)
Republic of Korea	Korea Institute of Energy Technology Evaluation and Planning (KETEP)
Spain	Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas (CIEMAT)
Sweden	Energimyndigheten - Swedish Energy Agency
Switzerland	Swiss Federal Office of Energy (SFOE)
The Netherlands	Netherlands Enterprise Agency (RVO)
United Kingdom	Offshore Renewable Energy CATAPULT
United States	The U.S Department of Energy (DOE)