

OFFSHORE WIND ENERGY IN THE NORTH SEA

INDUSTRY RECOMMENDATIONS FOR THE NORTH SEAS ENERGY FORUM

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1 KEY MESSAGES

Maritime Spatial Planning (MSP)

1. WindEurope calls on the Support Group 1 of the North Seas MoU to collaborate with the industry in maritime spatial planning issues, particularly on assessing areas for building offshore wind projects.
2. Industry calls on the relevant authorities and regulators to consider how they apply the precautionary principle for multiple site development and no-go areas. Environmental impact assessments should be based on the latest scientific information available and regulators should be encouraged to share their results across borders to ensure lesson learnt are disseminated.
3. WindEurope calls on the European Commission to offer appropriate advice and guidance to the interpretation that Member States give to the Birds and Habitats Directive, the guidance document “Wind energy in Natura 2000 areas” and the definition of cumulative environmental impacts.
4. Governments should further support better marine data collection, management and coordination between the different European initiatives. They should also expedite the implementation of the INSPIRE Directive for the effective sharing of data sets and services between public authorities.
5. WindEurope calls on the European Commission to establish a MSP forum for offshore wind energy encompassing all topics discussed in other Support Groups like tender design, offshore grid development & technical standard, site investigation, handling of UXOs, park layout etc.

Offshore grid development

1. Electricity grid infrastructure should **anticipate the growth** of the offshore wind industry.
2. Hybrid projects, comprising offshore wind energy and grid interconnectors should **add volumes** to the existing pipeline.
3. Hybrid projects should be **subject to competition**, including project elements.
4. Pilot hybrid projects shall be carefully selected in such a way that they will not jeopardize current plans and investments and should benefit from compensations schemes.
5. Hybrid projects should build on **the short to medium term** development plans from governments.
6. Future framework should be clarified by designing a **European offshore grid blueprint** to 2030 and beyond.
7. Economically most beneficial sites should be developed first.

Support framework and finance

1. WindEurope calls on governments to **provide the industry with clarity on their post-2020 offshore wind plans**. To continue on the path of cost reductions, build on the current supply chain and continue to deliver significant economic benefits to Europe the industry needs a market with a volume of at least 4 GW/year of new deployment in the decade after 2020. A market volume of 7 GW will allow the industry to remain at the forefront of the offshore market globally.
2. This will only possible through:
 - A **higher frequency of tenders** (at least 3 per year) coupled with sufficient tendered volumes;
 - **Stable frequency of auctions** across the North Sea countries.
3. WindEurope calls for the **alignment of tenders timeline** to allow both flexibility and sustainability for the supply chain:

- **The time between awarding the winners of a tender and the deadline for full commissioning of projects should be between 3 to 5 years;**
 - **Short response time** from bid deadline to announcement of the winner(s).
4. WindEurope calls for coordination of future tender design to smoothen out bid deadlines. This should be in place post-2020. **Early information** and clarity on the bid deadlines for each of the various North Sea Countries will allow better planning, and encourage longer term investment within the supply chain.
5. WindEurope calls for the **alignment of pre-site investigation** requirements:
- **Authorities** should carry out studies that are **neither site nor technology specific;**
 - Developers should carry out **studies that have an important part in optimising the wind farm and that are specific to each project;**
 - **Opening certain studies to free market** to lower the costs and increase overall efficiency.

Technical standards

1. WindEurope calls for the mutual recognition and/or harmonization of certification standards for crew and technicians in the North Seas and the alignment of crew requirements.
2. WindEurope advocates for the definition, mutual recognition and/or harmonization of certification standards for waste maritime operations. (e.g. waste disposal, crane & lifting operations).
3. Regulatory requirements for park layout should allow a high level of flexibility to maximise the wind resource yield:
 - Straight lines of sight/orientation requirements should be avoided;
 - Turbine spacing requirements should be avoided;
 - Small vessels may be allowed within the park perimeter, while large vessels should not be for safety reasons.
4. The industry recommends to open up UXOs to competition when developers have to handle those operations for two main reasons:
 - Allow more flexible project execution;
 - Lower the cost.
5. The industry prefers aligned standards across countries, as long as the standards do not significantly add to project costs in individual countries.
6. WindEurope recommends that future (new) regulations should follow an aligned mechanism to ensure they are harmonised between member states.

2 INTRODUCTION

The North Seas Energy Forum brings together representatives of the public, private and non-governmental sectors from the Northern Seas countries to discuss challenges and opportunities for regional cooperation in energy topics, particularly for the deployment and use of offshore wind energy. In the context of the second stakeholder forum meeting on 29th November 2017 at WindEurope's Conference & Exhibition in Amsterdam, this paper brings together the industry position across many technical topics in order to inform participants and consolidate the key messages to communicate to policy makers.

On 6 June 2016 nine governments sharing the North Seas signed a historic memorandum of understanding (MoU) for regional cooperation on offshore wind energy. The UK signed shortly afterwards. Since then, considerable results have been achieved. Governments have directed significant resources to the implementation of the MoU and are taking forward the action it identifies through a series of expert Support Groups. They have defined specific measures, both on a practical and policy level, to implement by 2019. And they have engaged with stakeholders in a constructive and open approach.

In parallel, the offshore wind energy industry achieved some significant milestones in recent months. Notably it has met its cost reduction target of €100/MWh by 2020 ahead of time. In 2016 winning bids of auctions in the Netherlands and Denmark delivered up to 48% strike price reduction compared to projects just two years before. The recent auction results in April 2017 in Germany for projects to be delivered by 2025 confirmed the price reduction trend. Offshore wind has proven that it will be fully competitive on the market with other sources of energy generation during the next decade. The last round of CfD tenders in the UK has cemented the industry's commitment to deliver projects at a weighted average of £64.14/MWh, lower than new built gas or nuclear plant.

In light of this, the offshore wind industry is committed to being able to deliver further cost reductions, provided there is a future pipeline of at least 4 GW/year of new deployment in the decade after 2020. A market volume of at least 7 GW will allow the industry to remain at the forefront of the offshore market globally. Offshore wind has the ability to power the North Sea region. This will allow the industry to further invest in innovation across the entire supply chain. (It will also add grid capacity with view to country connections and like that support the liberalization of the European electricity market).

So far governments have announced 23.9 GW or 2.4 GW/year on average of indicative ambition for delivery in the post-2020 period. Including 6.2 GW are enshrined in national legislation. Considering the resource potential of offshore wind energy in the North Seas¹, this could be increased. Offshore wind is a reliable source of energy. Because of high full load hours and very constant power generation across the year, offshore wind energy can significantly contribute to lower system costs. A future energy mix based on renewables energies and including a large share of offshore wind energy would be more cost-effective in the long run. In addition, large cities and urban areas are often concentrated in coastal regions (e.g. 47% of UK population) and offshore wind power stations can be erected close to consumption centers, providing green and reliable energy.

As governments and European institutions enter into talks around the adoption of the Clean Energy Package, the North Seas Energy declaration's work programme has an increased in importance. First, regional cooperation could catalyse the deployment needed between 2020 and 2030 to continue to deliver cost reductions by encouraging ambition in Member States' National Energy and Climate Action Plans (NECAPs).

¹ [Unleashing Europe's offshore wind potential: a new resource assessment](#), WindEurope, June 2017

And second, by building on lessons learnt across the industry to streamlining technical standards and regulations that facilitate such deployment.

This paper gives key recommendations on:

- Maritime spatial planning, particularly on marine users engagement and environmental assessments;
- Development and regulation of offshore infrastructure, particularly on the construction of offshore wind farms and electricity grid interconnectors (hybrid projects);
- Support frameworks and finance for offshore wind projects, particularly on a project volumes timeline and auction design elements;
- Standards, technical rules and regulations in the offshore wind sector.

3 MARITIME SPATIAL PLANNING (MSP)

3.1 KEY MESSAGES:

1. WindEurope calls on the Support Group 1 of the North Seas MoU to collaborate with the industry in maritime spatial planning issues, particularly on assessing areas for building offshore wind projects.
2. Industry calls on the relevant authorities and regulators to consider how they apply the precautionary principle for multiple site development and no-go areas. Environmental impact assessments should be based on the latest scientific information available and regulators should be encouraged to share their results across borders to ensure lesson learnt are disseminated.
3. WindEurope calls on the European Commission to offer appropriate advice and guidance to the interpretation that Member States give to the Birds and Habitats Directive, the guidance document “Wind energy in Natura 2000 areas” and the definition of cumulative environmental impacts.
4. Governments should further support better marine data collection, management and coordination between the different European initiatives. They should also expedite the implementation of the INSPIRE Directive for the effective sharing of data sets and services between public authorities.
5. WindEurope calls on the European Commission to establish a MSP forum for offshore wind energy encompassing all topics discussed in other Support Groups like tender design, offshore grid development & technical standard, site investigation, handling of UXOs, park layout etc.

3.2 INTRODUCTION

The North Seas Energy MoU tasked a first Support Group (SG 1) to work on:

- Coordinating the planning and development of offshore wind and grid projects beyond national borders including area mapping;
- Developing a common environmental assessment framework;
- Increasing the availability and interoperability of marine data for planning, impact assessment, licensing and operations;
- Exchanging best practices on site preparation and the handling of unexploded ordnance;
- Exchanging best practices on permitting procedures and work on the modalities of a coordinated permitting process for concrete regional or sub-regional joint offshore projects

The group focuses on identifying challenges and opportunities for multiple use of space, cross - border and cross - sector maritime spatial planning to ensure human activities at sea take place in an efficient, safe and sustainable way. The main subjects of discussions within the Support Group are environmental standards and applied assessment methods, in particular in two areas: the German Bight and the NL-BE-UK cluster area. In collaboration with Support Group 2 (offshore grids), SG1 has developed a joint comprehensive scoping papers on aspects of planning and cooperation on infrastructure development. SG1 has also set up a subgroup on environmental assessment. This environmental subgroup is developing a common environmental assessment framework for offshore infrastructures.

3.3 CHALLENGES AND OPPORTUNITIES

Increased activity within Europe’s marine waters has led to increased spatial demands and therefore growing competition between sea users. Offshore wind energy projects are often caught between different sea users

and rules from different sectors and jurisdictions (both at inter-state and intra-state level). In addition, offshore wind sites may be located in environmental protected areas.

Therefore authorities need to consider the impacts of new development on multiple sea users and assessing possible impacts for offshore infrastructures development. Typically an offshore project developer would need 6 to 7 years to consent a new project and consideration of factors such as environmental impacts, mitigation, grid connection authorisation and social acceptance are key elements of this process.

Maritime Spatial Planning (MSP)^{2,3} is key to enhancing offshore wind development. It provides stability and clarity for the investors, can bring down the costs of wind energy through an optimum integration of the wind farms into the marine environment.

WindEurope calls upon the Member States to establish a MSP forum for offshore wind encompassing all the subjects tackled in other SGs. (e.g. tender design, offshore grid development & technical standard, site investigation, handling of UXOs, park layout etc.)

3.3.1 CROSS-BORDER COOPERATION

Each member state has its own planning regimes and regulatory processes to manage and coordinate marine activities, including the development of offshore wind energy infrastructure. Cross-border cooperation on MSP is key for building a common and streamlined planning approach and making optimal use of the maritime space.

There are potential cross-border synergies between large-scale offshore wind projects and interconnectors that could be taken into consideration in MSP regimes. Without cross-border coordination, grid investments in particular risk being sub-optimal because they will be made from an individual project and national perspective, rather than from a system and transnational perspective. This harms both the development of offshore wind energy projects and the development of a well-functioning Europe-wide market for electricity.

Cross border cooperation on MSP would aid projects crossing several Economic Exclusive Zones such as large-scale offshore wind projects, help developing interconnectors of a future pan-European grid and allow developing cluster projects.

3.3.2 DATA MANAGEMENT

While some European countries have defined dedicated offshore wind energy areas, most countries use existing marine planning laws. This can delay projects considerably as offshore wind is often not included in these laws. Integrated maritime spatial planning, based on good marine data management, could help reducing risks and delays in offshore wind projects. It could also help solving possible conflicts between existing sea users and wind farms.

Bringing down costs is a major challenge for the offshore wind industry and maritime spatial planning is an effective tool to address this issue by ensuring a smooth planning and consenting process, alongside technology developments and scaling up of the supply chain.

² Directive 2014/89/EU : "means a process by which the relevant Member State's authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives"

³ Com (2010) 771: "MSP is commonly defined as a process of public authorities of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives."

MSP could also reduce capital costs through an optimum integration of the projects in the marine environment. Many attractive zones for offshore wind farms (shallow waters, good wind conditions, attractive sea bed) are already occupied by other sea users. Offshore wind farms can be built alongside these other maritime economic activities. Moving further away from shore and into deeper waters not only increases the capital costs of the offshore projects but also raises the need for an offshore grid. An up to date GIS data management system, taking into account other sea users and development plans, would allow the designation of the most efficient/best areas and therefore reduce offshore wind development costs.

Good marine data management at European level will be key to support effective maritime spatial planning. WindEurope would support efforts to ensure better data collection and coordination between the different European initiatives such as EMODNET. It would also support the implementation of the INSPIRE Directive for the effective sharing of data sets and services between public authorities.

3.3.3 ENVIRONMENTAL ASPECTS

Wind energy can be developed in or adjacent to NATURA2000 areas provided that all appropriate impact assessments are done in line with European and national legislation. The European Commission's guidance document 'Wind energy developments and Natura2000' clearly states that the Birds and Habitats Directives do not *a priori* exclude wind farm developments in or adjacent to Natura2000 sites.

However, many Member States choose to assert that designated Natura2000 areas are per definition 'no-go areas' for the development of wind farms. The EC's guidance document does include assessing the potential impacts of wind farm developments in designated areas. In most cases this is dealt with at a country level and based on the relevant wildlife species.

Member States should reconsider how they interpret the EU Birds and Habitats Directive. Particularly, when applying a precautionary principle for halting wind energy deployment in Natura2000 or other designated areas. Moreover, Governments should not apply this precautionary principle when knowledge gaps exist on the potential impacts of a specific project or a series of projects. Particularly in the case of unknown cumulative or *in-combination* impacts. It should only be applied in the case that it is adequately and undoubtedly documented that there is an irreversible significant negative impact on the environment and biodiversity from the implementation of a wind energy project.

In this sense, cross-border collaboration between authorities is important to carry out overall assessment of cumulative effects across wider areas. The European Commission should therefore step up its efforts to offer appropriate advice on the interpretation that Member States give to its guidance document on wind energy and Natura2000. This would help in conciliating the achievement of climate, energy and biodiversity targets at national and EU-level.

4 OFFSHORE GRID DEVELOPMENT

4.1 KEY MESSAGES

6. Electricity grid infrastructure should **anticipate the growth** of the offshore wind industry.
7. Hybrid projects, comprising offshore wind energy and grid interconnectors should **add volumes** to the existing pipeline.
8. Hybrid projects should be **subject to competition**, including project elements.
9. Pilot hybrid projects shall be carefully selected in such a way that they will not jeopardize current plans and investments and should benefit from compensations schemes.
10. Hybrid projects should build on **the short to medium term** development plans from governments.
11. Future framework should be clarified by designing a **European offshore grid blueprint** to 2030 and beyond.
12. Economically most beneficial sites should be developed first.

4.2 INTRODUCTION

The North Seas Energy MoU tasked a second Support Group (SG 2) to work on:

- Improving the coordination of regional and point-to-point grid planning and development, promoting projects with regional benefits and exploring models of cost allocation (i.e. compensation), to help generate win-win options for concrete (sub)regional cooperation;
- Exploring options for developing hybrid projects linking offshore windfarms with interconnectors;
- Exploring potential synergies with the conventional offshore sector, including operational cooperation and the electrification of platforms.

SG2 developed a proposal identifying four geographic areas with a particular potential for the development of hybrid projects. It proposes the establishment of a regional cluster for each geographic area: the Irish Sea, the Dogger Bank, the NL-BE-UK area and the German Bight.

SG2 is aiming at identifying the first steps to enable the development of the cluster approach. The SG2 prioritised the assessment of the NL-BE-UK cluster.

4.3 CHALLENGES FOR HYBRID PROJECTS⁴

The offshore wind industry is expected to reach a cumulative installed capacity of 70 GW by the end of 2030. The development of electricity grid infrastructure in Europe should anticipate this growth and beyond.

However considering the timeline of consenting projects, industry has already sunk investment for project development in 35 GW expected in the first half of the 2020s. This pipeline of offshore wind projects and the volumes already planned for tenders to 2030 would risk changing its business case if grid connection

⁴ Hybrid projects referred to projects where offshore wind farms are linked to interconnectors and feed electricity to two different markets.

conditions or additional complexity is introduced. Industry recommends that these projects should not be considered to be part of any hybrid project. This is to avoid distorting investment decisions as there would be lack of certainty about future framework conditions of hybrid projects. Particularly, none of the projects foreseen to be commissioned before 2025 shall be targeted to be part of hybrid projects due to the costs already sunk for development studies. Pilot projects developed by the mid-2020s shall be carefully selected in such a way that they will not jeopardize current plans and investments. Such projects would need to benefit from compensations schemes and support.

Hybrid projects should build on the short to medium term development plans from governments, already defined in the Support groups. However, resources and focus need should not deviated from the existing plans and initiatives.

New initiatives of hybrid projects should account for the experiences gained in projects such as the Kriegers Flak CGS and the German HVDC clusters. These projects have been in development for over 10 years, indicating the lengthy process of setting sufficiently robust regulatory framework, demonstration of new technologies and likely delays in grid expansion. Lessons should be learned from those past project in order to avoid delays in future grid development.

4.4 OFFSHORE GRID DESIGN AND FRAMEWORK

There is a need for defining a European offshore grid blueprint to 2030 and beyond ahead of rolling out hybrid projects. This blueprint should clarify all future framework conditions for offshore hybrid projects and other infrastructure projects and ensure they are deployed using a bottom up, stepwise approach that ensure no-regret measures. A meshed grid should not necessarily be the end goal for such a blueprint. The aim should be to improve flows and deployment, and increase security of supply through a wider regional distribution of wind and power flows, even if it is done through a combination of radial and meshed offshore grids.

4.5 DESIGN CONSIDERATIONS OF HYBRID PROJECTS

Hybrid projects should have a minimum level of competition in order to foster cost reductions and innovation for offshore wind projects. This should include the separate project elements such as the grid connection to shore, the wind farm development and the technology procurement. Also, hybrid project should allow the free flow of electricity across borders, learning from the flaws of the model followed in the project Kriegers Flak CGS.

In Denmark, Belgium, Netherlands and Germany, hybrid projects cannot be developed by the same entity. TSOs develop the grid (export cable, interconnector) while developers develop the wind farms. This may hinders cost-efficiency of projects since each entity would look for individual profit margins, scope optimisation is reduced and there are increasing transactions costs and incentives for each entity. Member States should have clearer and more transparent regulations to allow more players to invest in interconnectors and hybrid projects. Member States should clarify national unbundling rules and create a regulatory frameworks for hybrid projects including financing.

Hybrid project should preferably be developed in a series of bottom-up steps to minimize the risk of stranded or under-utilised and under-performing assets. Ideally, more than one 'flagship' or 'headline' hybrid projects (either as a large scale 4/5 GW project or hybrid interconnected project) should be announced and selected at the same time. They should be developed on the economically most beneficial sites first. An area such as the Dogger Bank Island (120-200km away from shore), or any other extremely far from shore concept, may not necessarily be the first area to develop such projects. Sites closer to shore, with good wind resources and lower costs involved, might be more suitable for developing pilot projects. Sites nearer to shore may not

necessarily benefit from an island design such as the one proposed at Dogger Bank by Tennet. Other viable concepts such as radial, and clustered approaches might also be relevant.

5 SUPPORT FRAMEWORK AND FINANCE

5.1 KEY MESSAGES

1. WindEurope calls on governments to **provide the industry with clarity on their post-2020 offshore wind plans**. To continue on the path of cost reductions, build on the current supply chain and continue to deliver significant economic benefits to Europe the industry needs a market with a volume of at least 4 GW/year of new deployment in the decade after 2020. A market volume of 7 GW will allow the industry to remain at the forefront of the offshore market globally.
2. This will only possible through:
 - A **higher frequency of tenders** (at least 3 per year) coupled with sufficient tendered volumes;
 - **Stable frequency of auctions** across the North Sea countries.
3. WindEurope calls for the **alignment of tenders timeline** to allow both flexibility and sustainability for the supply chain:
 - **The time between awarding the winners of a tender and the deadline for full commissioning of projects should be between 3 to 5 years;**
 - **Short response time** from bid deadline to announcement of the winner(s).
4. WindEurope calls for coordination of future tender design to smoothen out bid deadlines. This should be in place post-2020. **Early information** and clarity on the bid deadlines for each of the various North Sea Countries will allow better planning, and encourage longer term investment within the supply chain.
5. WindEurope calls for the **alignment of pre-site investigation** requirements:
 - **Authorities** should carry out studies that are **neither site nor technology specific;**
 - Developers should carry out **studies that have an important part in optimising the wind farm and that are specific to each project;**
 - **Opening certain studies to free market** to lower the costs and increase overall efficiency.

5.2 INTRODUCTION

The North Seas Energy MoU tasked a third Support Group (SG 3) to work on:

- Sharing information on the likely offshore energy infrastructure needs of each country and the phasing of development, thereby providing predictability to the private sector as regards future aggregate demand for offshore energy infrastructure in the region;
- Increasing the coordination and alignment of national support schemes relating to offshore wind, inter alia auction design and planning, and possibly cooperation on the timing of tendering;
- Concepts for concrete joint (pilot) projects, and exploring opportunities for the opening of support schemes and joint tenders, ensuring win-win situations for all participating countries;
- The further mobilisation of investment capital for joint (pilot) projects, for instance through EU funds such as EFSI and CEF, and institutional investors.

Support Group 3 on support framework and finance, has been focusing its work on identifying different designs and results of offshore wind auctions, identifying similarities, differences and challenges. A paper on best practices and options for alignment of the key design elements (“toolkit”) of auctions is currently being drafted and is expected to be ready by end 2017.

The SG3 is developing an updated inventory of offshore wind deployment plans and a timeline of auctions. The timeline could contribute to the process of preparing and regionally consulting national climate and energy plans (NECPs) for 2030. SG3 also exchanged with relevant stakeholders on subjects such as coordination of tenders for offshore wind support, auction design (similarities, differences and challenges) pre-development roles and responsibilities and how to approach multi-site auctions.

SG3 would like to further discuss recommendations on tender coordination, time response between the bid deadline and the announcement of the winner(s) and pre-development roles and responsibilities (authorities and developers) with relevant stakeholders from the industry.

5.2.1 VOLUMES – PROJECT PIPELINE

Currently there are no national renewable energy plans for the post-2020 period. Germany is the only Member State that has commitments set in their legislations. This prevents timely investment decisions and puts the steady cost reduction path of the industry at risk. To ensure that the sector continues on a path of cost reduction, the industry needs to be able to plan ahead and installing 4 GW per year in Europe between 2021 and 2030 is the minimum required for offshore to build on the current supply chain and continue to deliver significant economic benefits to Europe. A market volume of 7 GW per year would allow the industry to remain at the forefront of the offshore market globally and it would deliver significant economic benefits to Europe.

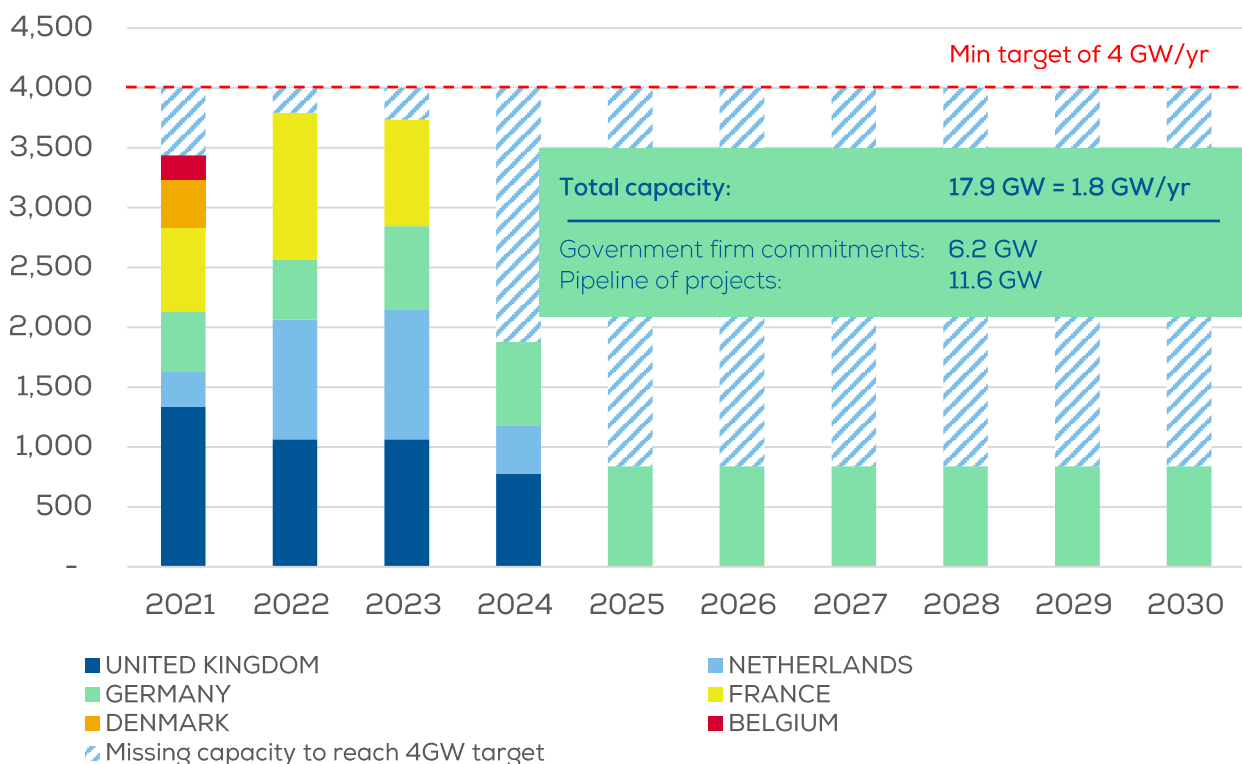


Figure 1: Offshore Wind market outlook: 2021 - 2030. Projection based on real project data and firm government commitments (set in legislations).

5.3 TENDERS DESIGN

In April 2017, the first offshore wind farms that might depend entirely on market prices instead of government support and subsidy were awarded through auctions in Germany. The results of the UK CFD2 auctions, which witnessed a fall in offshore wind cost of 47% compared the first UK CFD auction from 2015, proves that a competitively tendered long term contracting mechanism works to reduce costs and de-risks the projects.

Between 2017 and 2020 more than 8.5 GW have been set in the plans of four countries for auctions including offshore wind energy. The evolution of tender results for wind energy in Europe has recently shown drastic cost reductions, going forward auction design and planning will be key to the maturity of the industry.

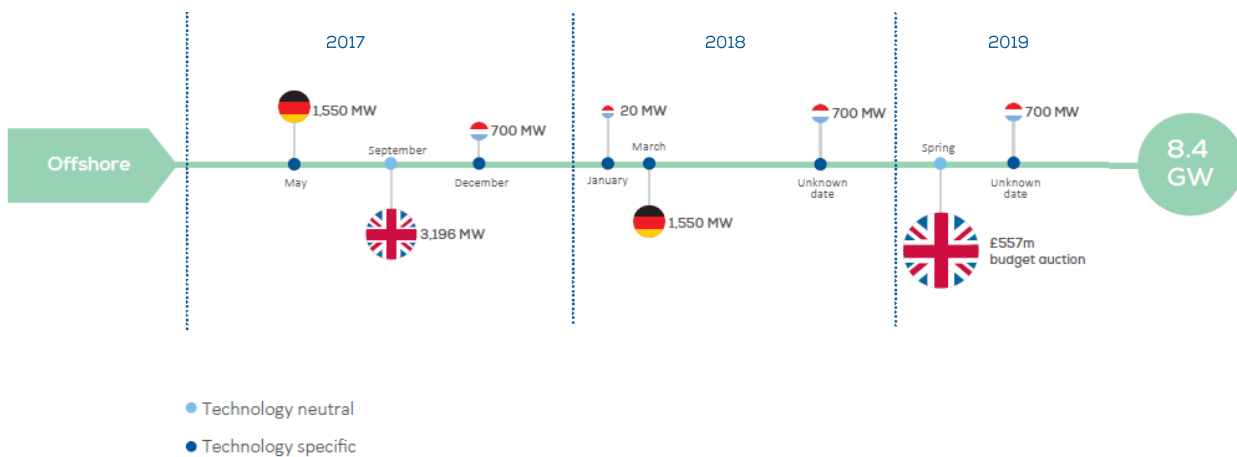


Figure 2: announced offshore wind tenders until 2020

5.3.1 PLANNING OF TENDERS

Knowing in advance the auction frequency, timing and volume that is planned on the long-term, or at least on the medium-term, is crucial for the industry. Developers need to be given sufficient notice prior the auction announcements while the industry and investors needs to be provided with a medium term volume intent to allow sufficient planning and secure investment. WindEurope calls member states to commit to have a higher frequency of tenders, at least 3 per year, coupled with sufficient tender volumes.

Coordinating the timing and frequency of tenders will ensure a smooth bidding profile and reduce lumps in the supply chain. Spreading bidding processes between Member States across the year will allow the bidding teams to prepare accordingly and conduct as few parallel bid processes as possible. This will increase their ability to make efficient bids at a lower cost but will also help avoid delays to the current pipeline.

None of the current planned auctions shall be affected by any regulatory changes in order to avoid jeopardizing current plans, ambitions and investments.

5.3.2 SHORTER BID DEADLINES AND ANNOUNCEMENT OF WINNER

The industry call for short response time from bid deadline to announcement of the winner(s). The earlier the developers knows which projects are going to be carried out, the better planning for those projects will be. To ensure delivery of projects pre-qualification criteria are critical, they ensure that the winning bidder(s) is/are capable to deliver the wind farm and could be used to avoid speculative bids.

5.3.3 FLEXIBILITY OF TENDERS

Offshore wind energy developers should have between 3 to 5 years to commission projects from the moment they win an auction. In this way, they could optimise their project execution and therefore lower costs. A tight deadline to commission projects could miss out opportunities for using innovative technologies. Nevertheless, deadlines for commissioning beyond 5 years may risk projects not materialising. It could also create risks for the supply chain as planning uncertainty would be too high. Finally, governments could risk not meeting their renewable energy targets.

5.3.4 LONG TERM STABILISATION CONTRACT

In countries where projects are de-risked projects are likely to reach zero-subsidy bids. However, long term CFD-type contracts could bridge the transition from supported projects to merchant ones. CfDs act as a protection against very low electricity prices in the absence of meaningful CO2 price.

The offshore wind energy sector will still need government's support in the coming years especially for wind farms to be delivered before 2025, and long term stabilisation contracts thereafter. The type of support required highly depend on the country. To secure investments, it is important to ensure that offshore wind farms can compete on the same ground with other generators and has access to all markets where the technology can deliver. To allow that, transmission assets should still be financed through the grid tariffs even when the transmission asset are fully handled and owned by the offshore wind farms owners. Decreasing the cost to society should take priority and Long term contracts are a win win solution for developers and the consumer.

5.4 PRE-SITE INVESTIGATION

For the sector, the important issue is to strike a balance between authorities and developers responsibilities. The necessity to identify what type of surveys authorities and developers should carry out to avoid duplicating surveys, to allow for more flexible project execution, to help driving cost reduction, to increase innovation and to reduce overall societal costs.

Studies that are neither site nor technology specific should be carried out by authorities, providing that they have the right tools and aids in place. Intervention from the authorities allow to de-risk consent approval by ensuring a broad consent envelop in terms of size and number of turbines and by providing the minimum data required to bid for developers. The results and methodology should be available to all stakeholders on a transparency basis. The authorities have the opportunity to carry out basic studies that could afterwards be completed by developers based on their specific needs. It is important that the basics requirements are defined by consulting the industry. Opening such studies to competition by inviting project developers and other parties to bid for certain pre-investigation studies (E.G: UXOs removals - see section 6.7) could allow to lower the costs and increase overall efficiency.

Individual developers have different needs, and in the case of the centralized model, authorities might have to carry out unneeded studies to provide sufficient data to all potential bidders, further increasing the societal costs. In case of multisite auctions, the needed resources from the authorities to carry out studies such as geotechnical and geophysical will be very high, especially when not all of the sites might be used. Studies that have an important part in optimising the wind farm and that are specific to each project should be carried out by developers, as they have the ability to execute them more efficiently. The involvement of high authority would by nature provide important information and help de-risking projects, however the winning developers will still need to carry out additional studies to complete the ones done by authorities in order to optimise their wind farm (e.g.: park layout). Furthermore, developers should be involved in selecting the sites, either through advising the authorities or by multisite auctions.

6 TECHNICAL STANDARDS

6.1 KEY MESSAGES

1. WindEurope calls for the mutual recognition and/or harmonization of certification standards for crew and technicians in the North Seas and the alignment of crew requirements.
2. WindEurope advocates for the definition, mutual recognition and/or harmonization of certification standards for waste maritime operations. (e.g. waste disposal, crane & lifting operations).
3. Regulatory requirements for park layout should allow a high level of flexibility to maximise the wind resource yield:
 - a. Straight lines of sight/orientation requirements should be avoided;
 - b. Turbine spacing requirements should be avoided;
 - c. Small vessels may be allowed within the park perimeter, while large vessels should not be for safety reasons.
4. The industry recommends to open up UXOs to competition when developers have to handle those operations for two main reasons:
 - a. Allow more flexible project execution;
 - b. Lower the cost.
5. The industry prefers aligned standards across countries, as long as the standards do not significantly add to project costs in individual countries.
6. WindEurope recommends that future (new) regulations should follow an aligned mechanism to ensure they are harmonised between member states.

6.2 INTRODUCTION

The North Seas Energy MoU tasked a fourth Support Group (SG 4) to work towards:

- The harmonisation of rules concerning aviation markings and lights;
- The harmonisation of health and safety requirements;
- The alignment of crew and vessel requirements;
- The mutual recognition and harmonisation of certification standards for components in offshore wind projects;
- Exchanging best practices on park layout constraints including line of sight requirements;
- The establishment of a common approach, for example by establishing facilities for innovation, testing and demonstration of new technology;
- Investigating a common approach to rules applicable to offshore turbines in territorial waters and exclusive zones.

Support Group 4 on technical standards comprises 6 technical subgroups on: innovation, health & safety, crew & vessel requirements, certification standards for components, park layout, rules on aviation markings and lights.

Technical Subgroup on innovation is developing an action plan on innovation with concrete initiatives should be ready by 2017. It requested stakeholders for a set of concrete cross-border actions on industrialisation (standardisation and regulatory harmonisation) for the offshore wind sector.

The technical subgroup on health & safety measures is working on

- Minimum levels of training required before an individual can work offshore in the industry;
- First aid provision; and
- Lifting operations and lifting equipment including certification.

They developed a paper that has been sent to industry stakeholders in the UK for comments.

The technical subgroup on crew and vessel requirements. The IMO, involved in the SG, invited governments to accept that industrial workers (e.g. technicians of windfarms) are not treated as normal passengers, but recommends to provide specified training to ensure safety. Ireland rejected this suggestion;

The technical subgroup on certification standards for components in offshore wind projects is developing a paper on mutual recognition and harmonisation of certification of standards;

The technical subgroup on park layout constraints produced a paper including line of sight requirements. They are also developing a paper on site investigation.

6.3 CROSS-BORDER ACTIVITIES

Regulatory barriers must be removed to realize the full potential of offshore wind. Facilitated and harmonized certifications for crew, technicians and vessels as well as clarified regulatory framework for offshore wind specific operations, such as lifting operations or waste disposal, can help unlock investments and help the sector to grow. Harmonized and/or mutually accepted standards, requirements and certifications are required to facilitate marine operations and cross-border shipping in the North Seas. Member states should support a structured cooperation between the national bodies regulating the regulations within territorial waters and exclusive economic zones (EEZ).

6.3.1 CREW CERTIFICATION

Differences in competence and training requirements and certifications for the sector exist between countries, for both marine crew and industrial technicians. European flag states have adopted different solutions and the established maritime standards for marine crew competence are interpreted differently in the offshore service craft sector - significant variations can be seen between jurisdictions. In this section, disparities between marine crew and technicians/contractors certifications and their effect on cross-border operations are explored

6.3.1.1 MARINE CREW

For marine crew on convention vessels in the North Sea, certification requirements are governed by the STCW convention. Every state is required to implement Certificate of Competency (CoC) for the members of the crew. The STCW is well established and is widely recognized within the North Sea countries – an STCW approved training course would generally be accepted by other states. However, the established maritime standards for marine crew competence are interpreted differently in the offshore service craft sector and there are some significant variations between national jurisdictions.

The main point of divergence between European flag states concern the definition of “near coastal voyage”. Since non-convention vessels are generally engaged on near coastal voyages, the competence requirements for crews of offshore service craft are covered by the most restricted categories of STCW certification. Flag

states have therefore developed additional certificates requirements to fit their national regulations, leading to disparities between EU member states.

6.3.1.2 TECHNICIANS AND CONTRACTORS

Technicians and contractors are expected to have followed safety training relevant to their activities and must be equipped with the relevant equipment. The application of the wind industry specific training standard developed by GWO is increasing and mutual recognition with other standards have been agreed. However, national health & safety regulations prevail and add some additional requirements to the GWO standards. As such, the safety requirements are often specific to each country.

The safety requirements are specific to the work activities and the status of technicians or contractors working on the vessel. The certification requirements for Industrial personnel, who are neither members of a vessel’s crew nor passengers, are not addressed by any of the international guidelines. To address the gap, states have developed their own guidance, leading to discrepancies in regulations among them.

For the offshore wind sector, one example of the regulatory differences existing between countries concern seafarer’s medical standards. The UK and Denmark have stated that the STCW requirement for seafarer medicals for the offshore wind sector were not suitable, especially for turbine technicians. In other EU member states, seafarer’s medical standards may be accepted depending on the nature of the work and companies policies. The table below highlights the applied medical standards in the offshore wind industry in the UK, Netherlands, Norway, Denmark and Germany.

Table 1: applied medical standards in the offshore wind industry in the UK, Netherlands, Norway, Denmark and Germany.

UK	Netherland	Norway	Denmark	Germany
Hardanger agreement: mutual recognition of Oil & Gas UK, Norsk olje & gass and Nederlandse Olie en Gas Exploratie en Productie Associate medicals standards.			Danish offshore medical	G41

6.3.1.3 CROSS-BORDER OPERATIONS AND MULTU-SERVICING OF OFFSHORE WIND FARMS

When no harmonization or mutual acceptances of crew certifications between two countries exist, there is a need for seafarers to have certifications for both countries in order to carry out cross-border operations. Clustering maintenance operations between offshore wind farms located in different territorial waters is then difficult to implement. Getting the certification for all crew members and technicians lead to additional cost and management issues. Mutual acceptance of certifications between EU member states would allow marine operators to carry cross-border servicing operations of multiple offshore wind farms with the same crew and the same vessel – increasing the efficiency of operations and decreasing the time spent at sea and thus overall maintenance and operation costs. This is illustrated in a simplistic way by the graph below. The optimal pathway, in green, represents what would happen if certifications were harmonized or mutually accepted. The current pathway, in blue, represents what vessels currently need to do to carry out cross-border operations.

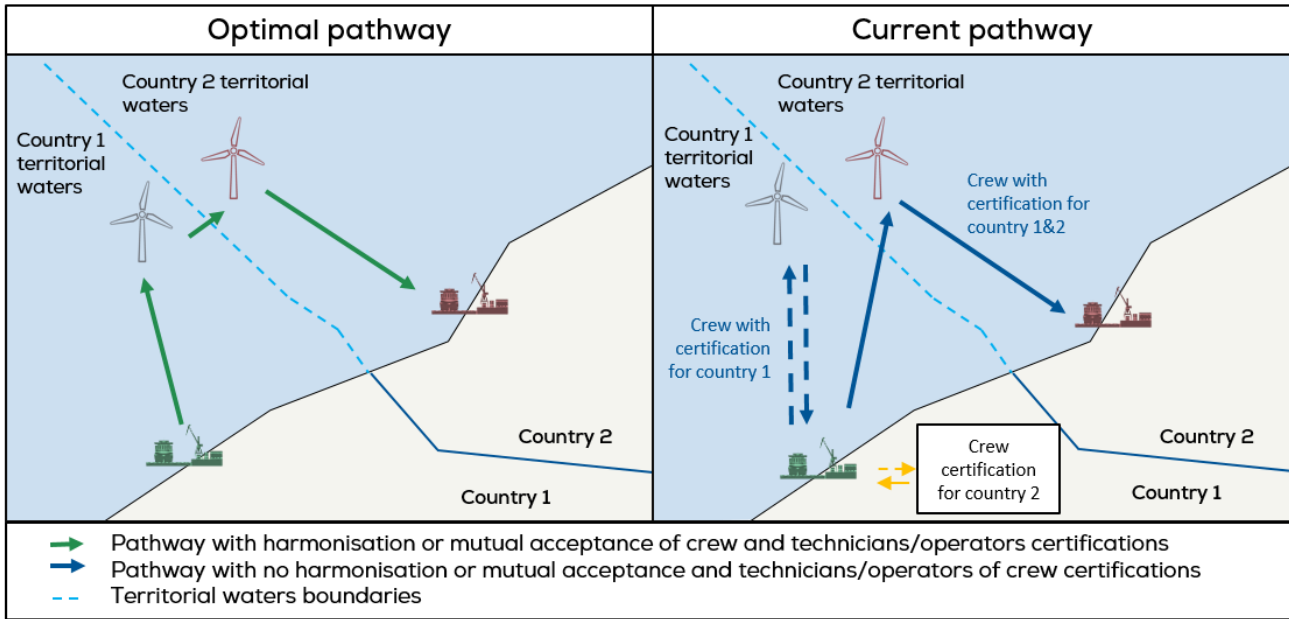


Figure 3: Technicians and marine crew certification issue for multi-servicing of offshore wind farms in different territorial waters.

6.3.2 MARINE OPERATIONS

6.3.2.1 WASTE DISPOSAL OPERATIONS

In accordance with international and European regulations, Shipowners and operators have an obligation to manage their waste appropriately (such as oil, noxious liquid substances, harmful substances, sewage and garbage). Waste can arise from the operation and maintenance of the vessel (especially oily and greasy waste from engines), the people on-board or servicing offshore wind farms. This could include hazardous wastes. For most vessels, the disposal of such items has to be done in ports and the national legislation for such operations varies considerably between countries. Marine operators often develop their own waste handling system that has to be approved by the local authority. The lack of regulations and certifications highlight one of the gaps of the existing regulations.

One of the main issue concern the handling of wastes from different territorial waters. Due to the discrepancies in regulation, wasted produced in a territorial waters have to be disposed in a port located in the corresponding states. This makes cross-border operations less efficient, especially when servicing offshore wind farms located in different territorial waters. In essence, without harmonization or mutual acceptance of waste disposal regulations and operational requirements, it is not possible to carry out successive cross-border maintenance operations of offshore wind farms as vessels need to discharge their waste before changing territorial waters.

The graph below gives a brief and simplistic overview of the issue detailed above. The blue pathway, shows the current distance travelled by vessels when servicing two wind farms in different territorial waters. The green pathway shows the optimal distance travelled by a vessel if waste disposal could be done at any port regardless of where they were generated.

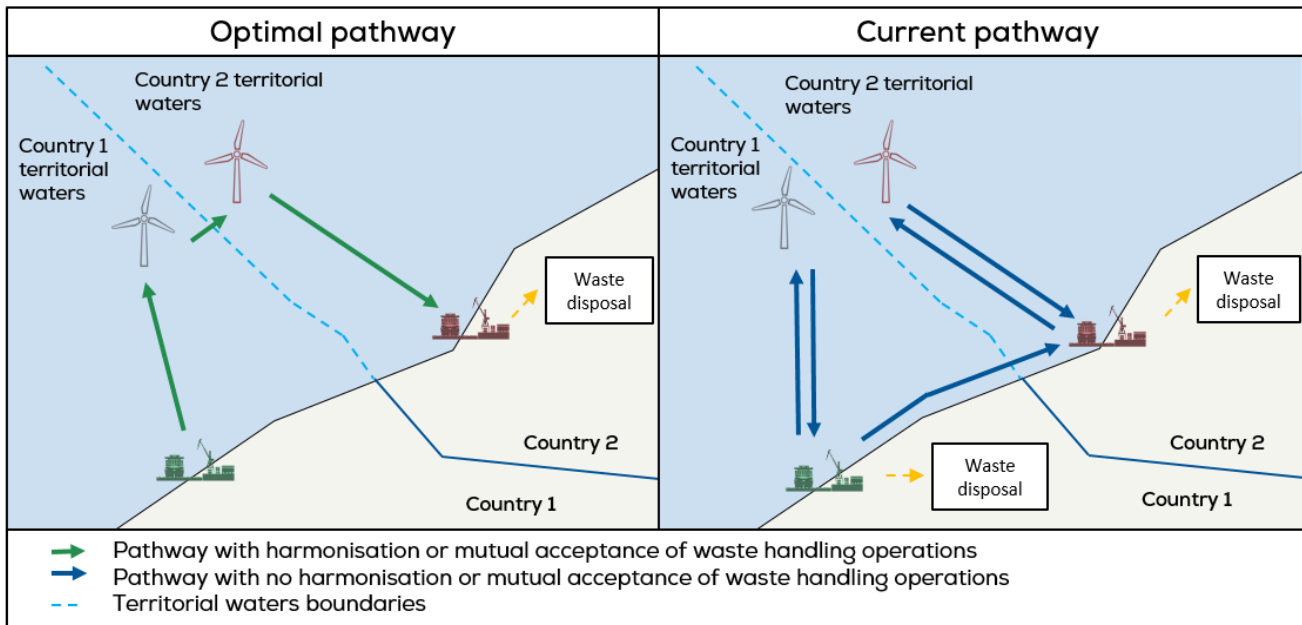


Figure 4: Waste handling issue for multi-servicing of offshore wind farms in different territorial waters

Harmonisation or mutual agreement on legislation concerning waste disposal will allow a more efficient multi-servicing of offshore wind farms located in different territorial waters. This would allow the clustering of offshore wind farm maintenance operations and thus help reduce the time spent at sea, the risk and the overall cost of operation and maintenance operations.

6.3.2.2 CRANE AND LIFTING OPERATIONS

Crane and lifting operations are one of the offshore activities where legal framework is better defined. A wide range of industry standards has been developed for lifting operations offshore. The European framework, set out by the EU Machinery Directive and Use of Work Equipment Directive, is variously interpreted and implemented by national legislation within EU members' states. The fact that different national legislative frameworks exist, and that there are a number of different guidance documents and codes of practice applied in flag states, makes cross-borders marine operations difficult. One of the main issues raised by the industry relates to the classification of a lifting operations, which are treated differently depending on the country. They may be treated as 'routine' operations when guidance would in fact suggest additional design or operational precautions for each new crane or lifting operation. The harmonization of lift and crane operations standards within North Sea countries would allow to carry out successive maintenance operations in different territorial waters.

6.4 PARK LAYOUT

When designing Offshore Wind Park layouts, many things need to be considered, including external aspects, such as shipping, search and rescue, helicopter flight corridors, resources etc. Optimising Wind park layout is one of the key factor that could help to drive down costs. Flexibility in the design of park layout is required to boost energy production, and provide the required safety standards in the farm.

6.4.1 MORE FLEXIBILITY TO DECREASE COSTS

Requirements for fixed turbine locations according to sediment sample locations should be avoided as fixed positions do not provide the flexibility required by developers to fully exploit the wind resource. By removing fixed position requirements developers will still seek to optimise foundation stability, meanwhile optimising the yield. When designing wind farms, maximising the wind resource yield should be the priority. As wind turbine technology is developing fast, fixing the park layout based on specific wind components available at the time of application will risk ruling out newer, larger and more cost-efficient technologies at the time of construction. Also, regulatory requirements for park layout should allow a high level of flexibility to enable developers to maximise the available wind resource, take account of seabed considerations, make the most suitable technology choice and comply with the necessary health and safety requirements.

Straight lines of sight/orientation requirements should also be avoided as they have the potential to increase wake effects and therefore decrease energy production. Developer-optimised turbine distances still accommodate high levels of safety. When required mandatory features still need to be applied, the industry needs to be consulted and they need to be implemented with a proportional rationale. The natural adoption of larger rotor diameters and the need to optimise the yield will naturally dictate an increase in spacing and therefore navigational visibility. As things stand, a distance of over 500 meters is applied and this will only increase in the future.

6.4.2 OFFSHORE WIND FARMS AND OTHER SEA USERS

The industry acknowledges that offshore wind farms coincide with other marine activities. Certain activities within the park perimeter should be accommodated where possible provided that it is safe to do so and does not jeopardise the structural integrity and operational activities of the wind farms. Small vessels may be allowed within the park perimeter, while large vessels should not be for safety reasons.

6.5 HANDLING OF UXOS

The handling of unexploded ordnances (UXOs) is regulated but the CIRIA guideline⁵. Those guidelines give guidance on the assessment and management of unexploded ordnance (UXO) risk in the marine environment (C754). The party responsible for organizing UXOs clearance differs from one country to another. In some markets, developers pay for assessing UXOs risks and for handling them while in others the national Governments handle it from the very beginning. Below a summary table extracted from the regulatory practices report that offers an overview of the different practices per Member State:

Table 2: Responsible party for organizing UXOs clearance in different Member States

Country	Responsible party for organizing UXOs clearance
Denmark	Danish military undertakes the work and the developer pays for it.
Germany	<ul style="list-style-type: none">• For Offshore Wind farms within Exclusive Economic Zones, it is the developers' responsibility, including the payment.• For OWFs within 12 nautical miles, the state takes the lead and pay for the clearance.
UK	Independent UXO clearance contractor is employed or UK military undertakes work. The developer pays for it.

⁵ CIRIA: Cooper and Cooke 2015. Assessment and management of unexploded ordnance (UXO) risk in the marine environment (C754), September 2015, pp. 180, CIRIA, ISBN 978-0-86017-760-9.

Belgium	The state undertakes the work. The developer does not pay.
France	French military undertakes the work and the developer pays for it.
Netherlands	The Royal Dutch Navy does it and the developer does not pay for it

It can be observed from the table above that currently just the UK market is open to free market competition when it comes to managing the risks associated with UXOs. In the UK, the government does not pay for it as it is not considered to be a national risk, developers have to pay for it and they usually ask a third party to carry out the work. In Denmark on the other side, the government carries this work as part of the site preparation. The army does the UXO clearance and at the end of the process handles the bill to the developer.

According to IMCA, the cost of handling UXOs in the UK when handled by the army is around £170.000/year. Carrying out the same operation by a third party the cost would allow to cut the halves cost, allowing to make significant savings.

The industry recommends to open up UXOs to competition when developers have to handle those operations to allow more flexible project execution and lower project costs.

6.6 MARKINGS AND LIGHTS FOR AVIATION AND NAVIGATION

Marking of offshore wind farms (by e.g. proper coating, navigation and aviation aids) is an important factor for ensuring safe aviation traffic, as well as safe operation of the assets of wind farms, thereby securing owner investments. The marking of offshore wind farms could be done by providing navigation and aviation aid through proper coating and lighting systems. Requirements are specified in international standards and regulations for the marking of wind turbines, offshore substations and other installations⁶. The most important international regulations include:

- The Convention on International Civil Aviation (Annex 14) released by the International Civil Aviation Organisation (ICAO) for marking of wind turbines with regard to safety of aviation
- IALA Recommendation O-139 On the Marking of Man-Made Offshore Structures released by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) for marking of wind turbines with regard to safety of nautical traffic.

In addition to those standards, each member states applies further specific requirements for the marking of offshore wind farms, creating discrepancies between aviation markings and lights between wind farms from different countries. Regulatory requirements for aviation markings and lights are an issue with important safety implications, and the fact that they are unaligned across countries lower their efficiency. The industry prefers aligned standards across countries as long as the standards do not significantly add to project costs in individual countries. Regulatory changes should not apply retrospectively and the current aviation markings and lights installed on existing wind farms should not be modify. Future changes in turbine design will warrant changes as overall offshore wind turbine heights increase, presenting an opportunity for alignment.

⁶ Certification of navigation and aviation aids of offshore wind farms, DNV-GL, <https://rules.dnvgl.com/docs/pdf/DNVGL/SE/2017-06/DNVGL-SE-0176.pdf>