



Supporting  
Implementation of  
Maritime Spatial  
Planning in the  
Celtic Seas

### Component 1.2.1

Spatial Demands and  
Scenarios for Maritime  
Sectors and Marine  
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# Offshore Wind



## *Maritime Sector Briefing Note*

This briefing note summarises the current status of offshore wind energy in the Celtic Seas project area. It looks ahead to upcoming projects and analyses the implications for expansion of the sector in relation to Maritime Spatial Planning.

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**About SIMCelt:** SIMCelt is a cross-border project involving partners from the UK, Ireland and France. It aims to support cooperation between Member States on the implementation of the Maritime Spatial Planning Directive in the Celtic Seas. The SIMCelt project is aimed specifically at the OSPAR Region III Celtic Seas area in accordance with a proposed extension of this region.

<http://www.simcelt.eu/about/celtic-seas-area/>

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# KEY POINTS

The development of Maritime Spatial Planning (MSP) will be critical to planning future renewable energy development to meet renewable energy targets such as those set by the 2009 EU Renewable Energy Directive (2009/28/EC). As part of this, MSP should provide the certainty necessary for a favourable climate for investment in offshore wind energy, by ensuring appropriate location of offshore wind farms, taking into account ecological effects, onshore ancillary facilities and potential conflicts with other sea users.

- Offshore wind farm construction in the Celtic Seas is largely driven by international commitments to carbon reduction, such as the UN Framework Convention on Climate Change and the achievement of higher shares of renewable energy in final energy consumption (as part of the EU's Renewable Energy Directive). At the national level, the administrations of the Celtic Seas have more variable targets for renewable energy generation within their overall energy mix.
- Within the Celtic Seas, offshore wind farm development has been most intense in the waters of north west England and in the short term this will continue to be the case as projects that are planned or under construction progress to the operational phase, whilst a limited number of projects in French and Irish waters are in the planning stage.
- Key environmental impacts of offshore wind energy include creation of underwater noise in the construction period, potential loss of habitats, and threats to the integrity of designated sites such as Marine Protected Areas (MPAs), Ramsar and Special Areas of Conservation (SACs). However, if appropriate mitigation measures are put in place these can be minimised.
- Offshore wind is compatible with a number of other marine uses that may take place in the same space. Therefore future co-location with activities such as fisheries and aquaculture to maximise spatial efficiency should be considered.
- Considering the transboundary implications of additional wind farm development in the Celtic Seas, the provision of infrastructure such as submarine cabling, location of support services for operation and maintenance and risks to navigational safety are key issues that require cooperation at a cross-border level.

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# EXISTING DISTRIBUTION OF OFFSHORE WIND FARMS

Within the Celtic Seas, the majority of operational wind farms are located along the eastern side of the Irish Sea in English and Welsh waters (See Figure 1 and Table 1 of operational wind farms below). Currently the largest of these wind farms in terms of potential energy generation is the Gwynt y Môr wind farm with a generation capacity of 576 MW.

Figure 1: Distribution of Operational Wind Farms in the Eastern Irish Sea

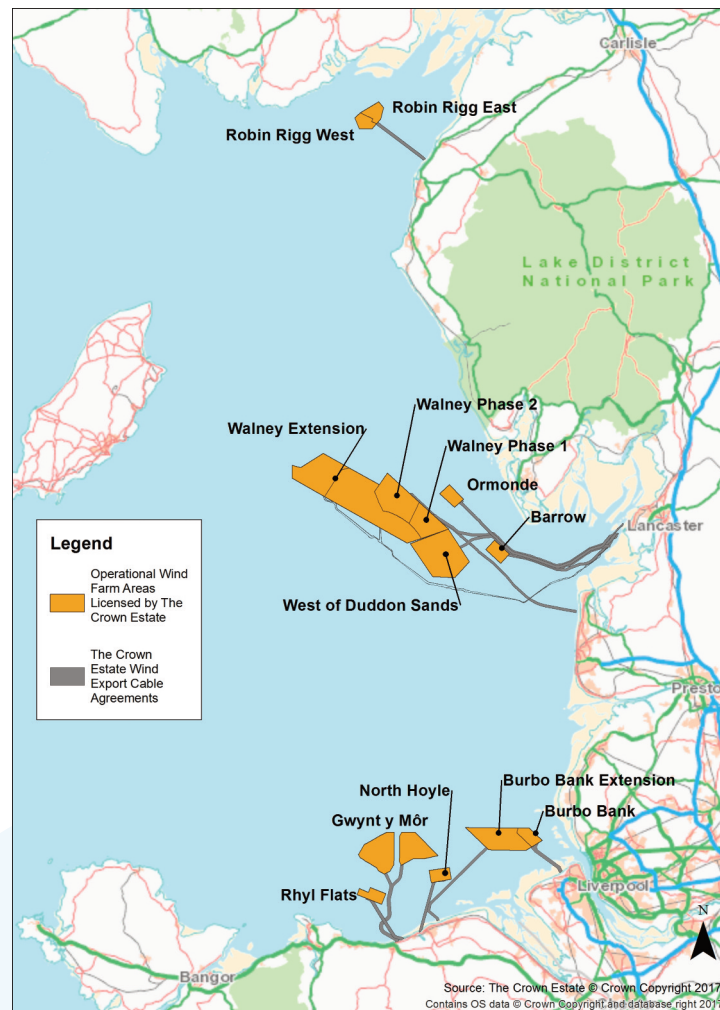


Table 1: Operational wind farms

| Country      | Development                          | Capacity (MW) | Country       | Development                         | Capacity (MW) |
|--------------|--------------------------------------|---------------|---------------|-------------------------------------|---------------|
| UK - England | <a href="#">Barrow</a>               | 90            | UK - Scotland | <a href="#">Robin Rigg</a>          | 174           |
|              | <a href="#">Burbo Bank</a>           | 90            | UK - Wales    | <a href="#">North Hoyle</a>         | 60            |
|              | <a href="#">Burbo Bank Extension</a> | 258           |               | <a href="#">Rhyl Flats</a>          | 60            |
|              | <a href="#">Ormonde</a>              | 150           |               | <a href="#">Gwynt y Môr</a>         | 576           |
|              | <a href="#">Walney (Phase 1)</a>     | 184           | Ireland       | <a href="#">Arklow Bank Phase 1</a> | 25.2          |
|              | <a href="#">Walney (Phase 2)</a>     | 184           |               |                                     |               |
|              | <a href="#">West of Duddon Sands</a> | 389           | France        | N/A                                 | -             |
| UK - NI      | N/A                                  | -             |               |                                     |               |

# FUTURE DEVELOPMENT OF OFFSHORE WIND FARMS

In addition to existing offshore wind farms, many developments are in the planning or construction phase, listed in Table 2. Some Celtic Seas countries have identified areas particularly suitable for development.

**Table 2: Offshore Wind farms in development**

| Country      | Development  | Capacity (MW)              | Status   |
|--------------|--|----------------------------|--|
| UK - England | <a href="#">Walney Extension Phase 1</a>   | 330                        | Under construction   |
|              | <a href="#">Walney Extension Phase 2</a>   | 330                        | Under construction   |
| Ireland      | <a href="#">Dublin Array</a>   | 364-520                    | Consent application submitted  |
|              | <a href="#">Oriel</a>  | 330                        | Conditional foreshore lease offered 2010; but not consented. Grid connection offered by Eirgrid 2011 |
|              | <a href="#">North Irish Sea Array</a>  | 870 (15 for Demonstration) | Demonstration project in development   |
| France       | <a href="#">Projet éolien en Mer de la Baie de St Brieuc</a> (1st round)                 | 496                        | Consent granted  |
|              | <a href="#">Parc éolien en Mer de St-Nazaire</a> (Parc du Banc de Guerande)* (1st round) | 480                        | Consent granted  |
|              | <a href="#">Parc éolien de Fécamp</a> (1st round)  | 498                        | Consent granted  |
|              | <a href="#">Parc éolien de Courseulles-sur-Mer</a> * (1st round)                         | 450                        | Consent granted  |
|              | <a href="#">Parc éolien des îles d'Yeu et de Noirmoutier</a> * (2nd round)               | 496                        | Site under investigation   |
|              | <a href="#">Les éoliennes flottantes de Groix</a> (pilot project - floating turbines)*   | 24                         | Consent granted  |
| Isle of Man  | <a href="#">Isle of Man Offshore Wind farm</a>   | 700                        | Site under investigation   |

*\*Outside SIMCelt area*

## England

Offshore wind farm development in the English waters of the Celtic Seas has so far been limited to sites off the coast of north west England that were consented under Rounds 1 and 2 of the UK Government's offshore wind programme. As part of Round 3 The Crown Estate identified a zone suitable for wind farms in the Irish Sea covering a small area of north west England's offshore waters (beyond 12M) and Welsh waters, however no projects in this zone have progressed to the planning stage.

## Wales

The Welsh [Draft National Marine Plan](#) notes that offshore wind currently provides the single largest contribution to marine renewable energy in Wales, with three commercial scale wind farms located in North Wales. Plans for other wind farms in Swansea Bay, the Bristol Channel and off the coast of Anglesey have not progressed due to commercial concerns. No Strategic Resource Areas for offshore wind have been identified in the Draft Plan because the resource is so broad based, but The Crown Estate, developers and government will work to understand future, especially offshore, opportunities within developing technologies (such as floating and fixed structures) which are both technically and economically viable. Further evidence needs have also been identified on opportunities for co-location of offshore wind with aquaculture technologies.

## Scotland

Following public consultation, the [Blue Seas, Green Energy](#) Sectoral Marine Plan (2011) was based on six short term development sites and 25 medium term areas of search. The six short term sites are Islay and Argyll Array, both within the Celtic Seas area, and Beatrice, Inch Cape, Neart na Gaoithe and Forth Array on the North Sea coast. Plan implementation requires integration of a number of key considerations, actions, mitigation measures, guidance for future assessments and review.

Although in the short term, the east coast is better suited to large development due to more favourable geomorphological (seabed) conditions, technologies are emerging that may support turbines off the west coast, including floating turbines and fixed (steel jacket) structures.

## Northern Ireland

The [Offshore Renewable Energy Strategic Action Plan](#) (ORESAP) (DETI, 2012) identified potential development of up to 900 MW of offshore wind energy in NI waters by 2020, based on two wind resource zones – the North West (adjacent to County Derry) and the East (adjacent to County Down). During drafting and publication of ORESAP, The Crown Estate undertook its first round of offshore renewable energy leasing for NI. In the East a lease was granted, however in December 2014, the First Flight Wind consortium announced it would not proceed with the development. The area to the North West was not offered for leasing as it is in deeper waters where the technology is not sufficiently advanced to operate, and also due to sensitivities around the Giants Causeway World Heritage Site. At the moment there are no plans to re-offer the East coast site for leasing.

## Ireland

The development of offshore wind has developed more slowly in Ireland than in the UK due to the abundance of cost effective onshore wind sites and other land-based renewables such as biomass increasing their share in Ireland's renewable energy mix. A number of sites have been proposed for new offshore wind farms along the east coast (as in Table 2), however the high cost of support for offshore wind has prevented some schemes taking off (such as Arklow Bank Phase 2 which was cancelled in 2007). The 2014 Offshore Renewable Energy Development Plan (OREDPA) sets out the Government's policy in the ocean energy area. The OREDPA identifies the potential for 4500MW of offshore wind development within Ireland's maritime area without significant environmental impact.

## France

The first offshore wind turbine, Floatgen, a floating device for demonstration will be installed near Le Criosic, close to Nantes. Floatgen is expected to be commissioned in mid-2017. Two larger wind farms, in the Baie de Saint Brieuc and Parc du Banc de Guerande (off the coast of Saint Nazaire) are expected to be fully operational by 2020.

## Isle of Man

The IoM Government has signed an Agreement to lease an area 6-12M off its east coast to DONG Energy to investigate potential sites for a wind farm (potential output 700 MW) which will export energy to the UK. After investigating the area to determine its suitability DONG have the option to execute a lease and submit an application, subject to Planning Consent.

# KEY POLICIES: INTERNATIONAL AND EU

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## UN Framework Convention on Climate Change (Kyoto Protocol and Paris Agreement)

The [Kyoto Protocol \(1997\)](#) includes binding targets for greenhouse gas reduction. The EU-29 (including Iceland) are committed to 20% carbon reduction below 1990 levels from 2013-2020, building upon the 11.7% reduction achieved from 2008-2012. This is in line with the Union's own climate 2020 package.

The [Paris Agreement \(2016\)](#) commits Parties to limit global temperature rise this century to 2°C. Parties are encouraged to limit it further to 1.5°C and report on 'Nationally Determined Contributions' to achieve this every 5 years.

### **Renewable Energy Directive 2009/28/EC**

National binding targets % renewables in energy consumption by 2020

23% France, 16% Ireland, 15% United-Kingdom

No obligation to include offshore wind

### **Europe 2020 and 2030 Energy Strategy**

[Energy 2020](#) combined climate change and energy targets into the 20:20:20 package:

20% cut in greenhouse gas emissions (relative to 1990)

20% of EU energy from renewables

20% improvement in energy efficiency

[2030 Energy Strategy](#) sets new targets for achieving decarbonisation by 2050:

40% cut in greenhouse gas emissions relative to 1990 levels

≥ 27% share of renewable energy consumption

≥ 27% energy savings compared with business as usual

### **EU - Energy Roadmap 2050**

Sets out key challenges for Europe to deliver 80-95% reduction emissions by 2050.

Explores different routes to decarbonisation - all scenarios involve proportion of renewable energy rising to at least 55% compared 10% in 2011.

Ocean energy can provide an important contribution to electricity supply (p11), but acknowledges the need to improve existing technologies.

### **Atlantic Strategy and Atlantic Action Plan**

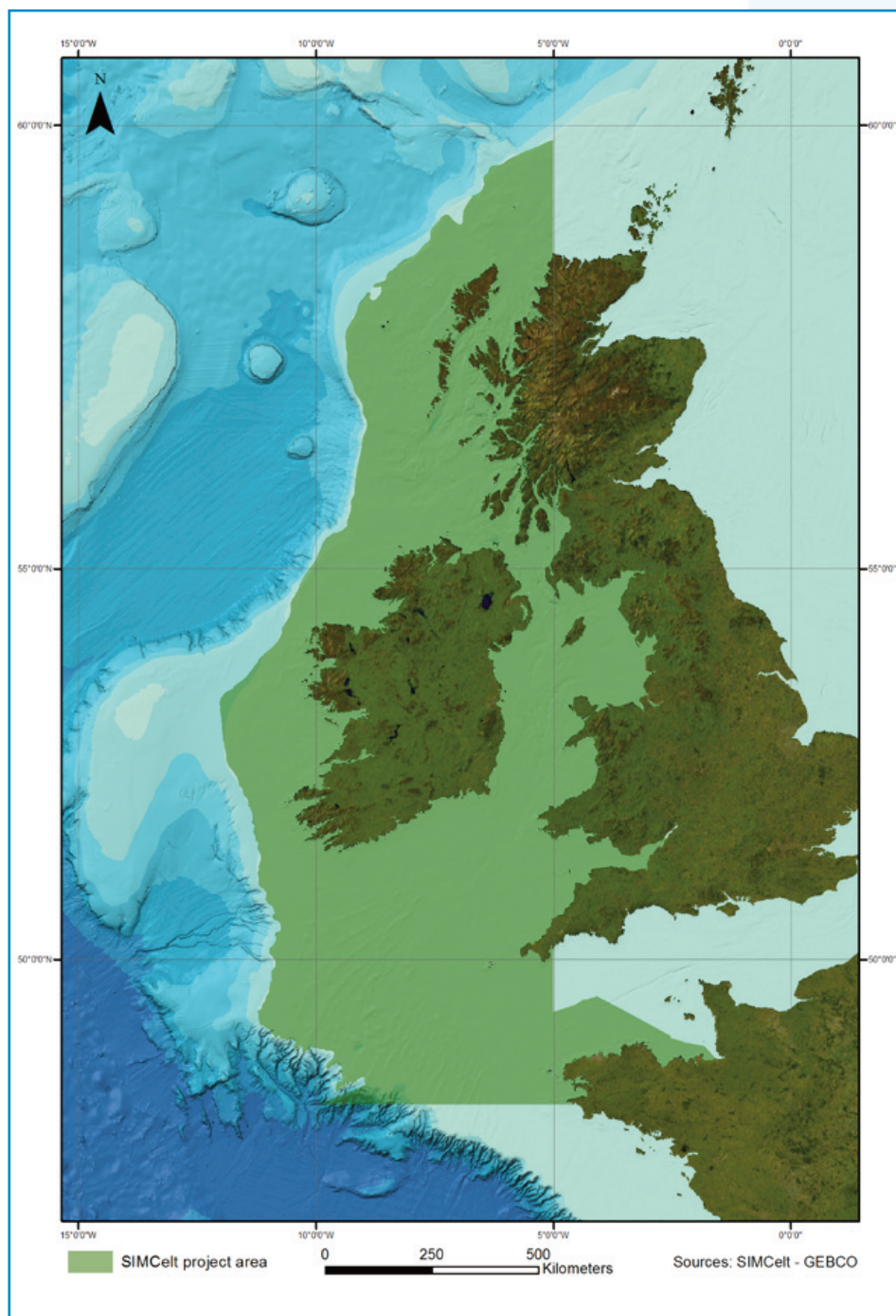
[Maritime strategy for Atlantic EU Member States](#) (UK, Ireland, France, Spain and Portugal).

Expansion of offshore wind can help reach Europe's renewable energy targets and extend benefits to ports.

[Atlantic Action Plan](#) sets out research and investment priorities to drive the Atlantic Strategy

**National Policy and Legislation**

# KEY POLICIES: NATIONAL



**Scotland:** Energy production and climate change policy is set by the Energy and Climate Change Directorate. Scotland has around a quarter of Europe's potential offshore wind energy resources and has more ambitious targets than the UK as a whole, aiming for 100% of its own electricity demand from renewable energy by 2020.

**Northern Ireland:** Energy policy is set by the Department for the Economy and the Strategic Energy Framework (2010) is currently under review. An Offshore Renewable Energy Strategic Action Plan (ORESAP) was published in 2012.

**Isle of Man:** Energy policy is set by the Council of Minister's Environment and Infrastructure Committee. IoM owns its territorial seas and seabed out to 12M and can benefit from offshore renewables for its own energy needs and by leasing areas for offshore energy developments.

**France:** Energy policy is set by the Ministry for an Ecological and Solidarity Transition

**Ireland:** Energy policy is set by the Department of Communications, Climate Action and the Environment. The Department published an Offshore Renewable Energy Development Plan in 2014.

**Wales:** Energy production and climate change policy are reserved to the UK government so no specific Welsh renewable energy targets drive the development of the offshore wind sector.

**UK:** Energy production and climate change policy is set by the Department of Business, Energy and Industrial Strategy.

In addition to this UK-wide policy framework, the Devolved Administrations of Scotland, Wales and Northern Ireland have additional policy initiatives.

## UK

The development of offshore wind and other renewable energies is encouraged through:

- [Efforts to achieve international and national targets for carbon reduction and energy efficiency;](#)
- [Providing financial incentives to energy producers for increasing renewables production, and;](#)
- [Promoting the renewables sector as an emerging industry with great potential for jobs and growth.](#)

As a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), the UK's energy policy supports renewable energy production and carbon reduction through the following legislation:

[Climate Change Act 2008](#) – the Climate Change Act committed the UK government to ensuring that by 2050 greenhouse gas emissions are reduced by 80% against 1990 levels.

The [Energy Act 2008](#) strengthened the Renewables Obligation (derived from the Utilities Act 2000) to drive further and more rapid deployment of renewable energy production. The [Energy Act 2013](#) replaced the Renewables Obligation for offshore wind with Contracts for Difference. The government-operated Low Carbon Contracts Company (LCCC) now pays producers the difference between the 'strike price' – a price for electricity reflecting the cost of investing in a particular low carbon technology – and the 'reference price' – a measure of the average market price for electricity (Department for Business, Energy and Industrial Strategy, 2017).

The Government's 2011 [UK Renewable Energy Roadmap](#) set out ambitions for renewable energy deployment up to 2020. For offshore wind, the Roadmap identified various challenges including delays to planning and consenting and the need to develop cost effective, coordinated transmission and grid connections.

The third [Offshore Energy Strategic Environmental Assessment \(OESEA3\)](#) published in 2016 considers the implications of strategic plans for offshore energy and informs leasing and licensing decisions. It recommends that future offshore wind farms are sited beyond the 12 nautical mile limit given the relative sensitivity of receptors in coastal waters whilst recognising that development in coastal waters can be assessed on an individual basis considering cumulative impacts of other operational or construction phase wind farms.

The Crown Estate has a key role in the development of offshore renewable energy operating as an independent commercial business managing the land and holdings of the Sovereign in right of the Crown. This includes around half the UK's foreshore and virtually all of the sea bed out to the 12 nautical mile limit. As owner of the sea bed and manager of rights in relation to renewable energy under the 2004 Renewable Energy Act, it is involved in key stages of the development of offshore wind energy including optioneering and leasing agreements. So far The Crown Estate has undertaken three 'Rounds' of leasing areas of seabed that have been identified as potential sites for offshore wind generation to commercial wind farm developers. The Crown Estate is actively involved in research on the environmental and socio-economic impacts of offshore renewables, promoting the industry as a significant and growing economic sector with great potential to help the UK meet its carbon reduction and renewable energy targets. Since 1<sup>st</sup> April 2017 The Crown Estate's management duties for Scotland have been devolved to the Scottish Government (as part of the Scotland Act 2016). The Crown Estate Scotland will discharge functions in relation to offshore renewable energy in Scottish waters.

## England

Besides UK policies, in England the development of the offshore wind energy industry is guided by a range of other policy documents and initiatives. The [Overarching National Policy Statement for Energy \(EN-1\)](#) which covers England and Wales reiterates the need to increase renewable energy generation capacity to meet its commitments under the EU Renewable Energy Directive (2009), with offshore wind expected to provide the largest single contribution to 2020 targets. The National Policy Statement also points out that new low carbon energy sources such as wind energy may be located much further away from centres of electricity demand where there is no existing infrastructure (p32).

The [National Policy Statement for Renewable Energy Infrastructure \(EN-3\)](#), which covers offshore wind energy developments greater than 100 MW (virtually all commercial wind farms), sets out the process for consenting and licensing of wind farms and the infrastructure required to link them to the National Grid. These projects are considered Nationally Significant Infrastructure Projects (NSIPs) and as such any proposals will be examined by the Planning Inspectorate who makes a recommendation to the Secretary of State for Business, Energy and Industrial Strategy to take the decision whether to grant or refuse a Development Consent Order. In addition to a Development Consent Order. Offshore wind farms will require a licence from the Marine Management Organisation (wind farms receiving a Development Consent Order may be deemed to have this licence) and an Agreement for Lease of the seabed from The Crown Estate.

## Scotland

Marine Scotland's [Blue Seas – Green Energy](#) (2011) set out ten short term options for where offshore wind leases could be awarded up to 2020, which were subject to Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal and a socio-economic assessment. A further 25 areas were identified in the SEA for medium term development up to 2030.

Scotland's [Offshore Wind Route Map](#) (updated 2013) sets out strategic plans for the development of the offshore wind energy sector including opportunities, challenges and recommendations for action.

## Wales

In 2011 the Welsh Assembly Government published its [Marine Renewable Strategy Framework - Approach to Sustainable Development](#). This sought to investigate the potential marine renewable energy resource of Welsh Territorial Waters (TWs) and to consider potential scenarios for the sustainable development of that resource.

The economic and environmental benefits set out in [Energy Wales: a Low Carbon Transition](#) (2012) and its [Delivery Plan](#) (2014) require offshore wind energy to be part of the energy transition.

## Northern Ireland

A [Strategic Environmental Assessment of Offshore Wind and Marine Renewable Energy in Northern Ireland](#) (2009) accompanied work on [Northern Ireland's Offshore Renewable Energy Strategic Action Plan \(ORESAP\)](#) (2012).

NI committed to 40% electricity consumption from renewable sources by 2020. Other goals contribute to driving the offshore wind sector – increasing competitiveness, ensuring security of supply through indigenous resources and developing robust, flexible infrastructure. To support future offshore wind developments, key actions are cited:

- Work with Grid operators and agencies to ensure infrastructure supports integration of new renewable sources;
- Consider the feasibility of a regional offshore marine energy grid between NI, Ireland and Scotland;
- Build on progress of UK - Ireland Memorandum of Understanding for offshore renewables (in the absence of agreed maritime borders between NI and the Republic of Ireland);
- Develop streamlined guidance for officials and developers on consenting and licensing procedures;
- Continue to incentivise offshore renewable energy, for example through NI Renewables Obligation.

## Isle of Man

The [Marine Infrastructure Management Act](#) 2016 sets out a streamlined process for consenting development within the Isle of Man's territorial sea whilst requiring a sustainable approach through proportionate Environmental Impact Assessment.

The [Strategy for Offshore Energy Production](#) 2014, notes that the EU Renewable Energy Directive allows energy projects in third countries (including Crown Dependencies) to be co-financed by Member States if the resulting energy is imported into the EU.

## Ireland

In its [Wind Energy Roadmap 2050](#), the Sustainable Energy Authority of Ireland (SEAI) concluded that given favourable policy and infrastructure development, Ireland could achieve deployment of 30 GW of offshore wind by 2050 (p3). The Roadmap estimates the sector could create approximately 16,000 direct installation, operation and maintenance jobs. Electricity from offshore wind has a potential economic value of approximately €11 billion on the basis of fuel substitution (barrels of oil equivalent). To achieve these potential figures, financial support is required to incentivise the deployment of new technologies and scaling up to large scale commercial operation.

Due to high offshore installation costs, in the short term onshore wind will be used to meet Ireland's energy targets. The White Paper, '[Ireland's Transition to a Low Carbon Energy Future 2015-2030](#)' produced by the Department for Communications, Climate Action and Environment suggests in the medium to longer term the offshore sector may offer opportunities for export and eventually domestic use.

Ireland's Integrated Marine Plan '[Harnessing Our Ocean Wealth](#)' reinforces Ireland's commitment to the development of offshore wind as an export opportunity through cooperation mechanisms established via the British Irish Council, North Seas Countries Offshore Grid Initiative and EU Renewable Energy Directive.

The 2014 [Offshore Renewable Energy Development Plan \(ORED\)](#), covers the sustainable exploitation of Ireland's offshore wind and ocean energy resources up to 2030 and outlines ways to support the sector including:

- A robust governance structure supporting existing initiatives to deliver [Harnessing Our Ocean Wealth](#) goals;
- Increase financial support for research and development;

- Introduce an initial market support tariff for ocean energy;
- Develop renewable electricity export markets;
- Develop the supply chain for the offshore renewable energy industry;
- A new planning and consent architecture for marine development through the Maritime Area and (Foreshore) Amendment Bill and implementation of MSP;
- Environmental monitoring to assist mitigation for new ocean energy developments;
- Ensure appropriate infrastructure development, including grid and port facilities.

A review of activities supporting the aims of *Harnessing Our Ocean Wealth*, found good progress was made on all actions outlined in the OREDP. In particular, an amended Foreshore Act is progressing and draft guidance on Environmental Impact Statements and Natura Impact Statements, prepared by DCCAE, are currently under review following a public consultation stage.

In January 2013 a [Memorandum of Understanding on Energy Cooperation](#) was signed between the Irish and UK Governments. It outlines how both countries could develop Irish renewables to their mutual benefit and together exploit larger markets connected to the large scale exploitation of renewables. Both governments have committed to exchange information and cooperate with their respective energy regulators and system operators to identify issues and develop solutions e.g. regulation of connecting electricity lines.

## France

After the UK, France has the [second highest offshore wind resource in Europe](#) and has a target to install 6 MW of offshore wind energy capacity by 2020. The French government published its [Roadmap](#) for the development of offshore wind, following two rounds of tendering, to reflect on and improve the process for future developments. Investigations into the technical and economic potential of sites and grid connections revealed some areas suitable for a third round of tendering. Public consultations in December 2014 aimed to find sites for wind farms that were acceptable to all stakeholders.

In 2013 the *Comité National Des Énergies Renouvelables En Mer* (CNEM) was established as a forum for dialogue between key stakeholders such as government, energy companies, NGOs and local authorities. The Comité meets annually to discuss the diversification of France's energy supply and the opportunities related to industrial development and growth presented by the offshore energy sector.

Although deployment of offshore wind is extremely limited in French waters, an 'Offshore Wind Tax', currently set at €15.094 per MW of installed capacity, applies to electricity production facilities using wind energy from inland waters or the Territorial Sea. The proceeds are shared between coastal communities, projects contributing to sustainable fisheries and other sustainable maritime activities such as leisure boating, recreational fishing and aquaculture<sup>1</sup>.

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<sup>1</sup> <https://www.ecologique-solidaire.gouv.fr/eolien-en-mer#e6>

# INTERACTIONS WITH OTHER SECTORS AND THE ENVIRONMENT

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Whilst offshore wind farms have tangible benefits in terms of producing low carbon energy and providing socio-economic benefits related to research and development, manufacturing, installation and operation, there are a number of potential impacts related to their situation in the marine environment and their interactions with other marine users.

In terms of the environmental impacts of offshore wind farms, Strategic Environmental Assessments (SEAs) such as OESEA3 and studies such as the OSPAR Commission's [\*Assessment of the Environmental Impact of Offshore Wind Farms\*](#) have determined a range of direct and indirect impacts on the environment.

At a general level, environmental impacts may include:

- Direct positive contribution to renewable energy production targets and reduction in carbon emissions caused by energy production from fossil fuels;
- Turbine foundations may provide shelter and new habitats for species that colonise hard surfaces;
- Loss of, or impeded access to, feeding or breeding grounds for certain species;
- At a more local level, offshore wind may threaten the integrity of certain designated sites, e.g. Ramsar sites, SACs, SPAs, or Marine Protected Areas;
- The potential for barriers to movement of migratory species;
- Increase in underwater noise, especially during construction periods, although this may depend upon the construction method used;
- Increase in ambient noise from operational wind farms;
- Negative effects on hydrographical conditions, e.g. altering patterns of water movement;
- Changes to seascape given the visibility of turbines; however this may also create some benefits as discussed below.

Despite potential threats to the environment, SEAs of offshore wind such as that accompanying the Offshore Renewable Energy Development Plan for Ireland (SEAI 2010) point out that with appropriate mitigation measures in place, it is still possible to achieve relatively high capacities of wind power generation without leading to adverse effects.

The interactions between offshore wind developments and other maritime sectors are an important consideration for decision making about the location of individual wind farms and in MSP more generally as it seeks to minimise conflict between users of the sea. The Celtic Seas Partnership's [\*Future Trends Analysis Report\*](#) sets out the broad positive and negative interactions between offshore wind and other sectors.

- Direct positive interactions with ports (sites of wind turbine manufacture and maintenance) and tourism (for example, boat trips to see wind farms in operation);
- Indirect positive interactions with aquaculture due to potential for co-location, and conservation as wind farm areas act as 'closed' zones to other types of activity;
- Indirect negative interactions may occur between wind farms and tourism due to loss of visual amenity;
- There may be competition for space between offshore wind and other renewable energy sources such as tidal lagoons;
- Depending on the siting of turbines, they may have impacts on and coastal defences due to erosion risks;
- Major negative interactions include competition for space with fisheries, aggregates, oil and gas and cables/pipelines;
- Cabling for offshore wind farms may also compete for space on the sea bed and with land-based activities where they reach landfall;
- Conservation may also be incompatible if there is loss of subtidal habitats.

Additional compatibility issues include:

- Development of wind farms may create choke points for shipping routes – this can lead to risks such as the displacement of vessels from shipping lanes, reducing navigational safety and increasing risks of collision;
- There is potential for positive interactions between wind farms as they may be seen as a tourist attraction in their own right or offer experiences through information centres, boat tours and educational events (Stiftung Offshore Windenergie, 2013);
- Floating wind turbines constructed as multi-use platforms in the future could offer additional opportunities for aquaculture, marine monitoring, transport and energy generation through wave power, however this type of development is still at a very early stage (i.e. demonstration projects).

# POTENTIAL DRIVERS OF CHANGE

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Looking to the future of the offshore wind energy sector in the Celtic Seas, the following drivers of development have been identified.

## **Socio-political:**

- Potential increase in exporting offshore wind energy to help neighbouring countries meet renewables targets; requires appropriate transmission infrastructure to be put in place;
- Changes to national or European renewable energy targets may affect the development of new sites for offshore wind energy.

## **Economic:**

- A downturn in the economic climate could affect banks or other investor's willingness to finance large scale projects;
- Reduction or removal of incentives for renewable energy production (e.g. Contracts for Difference) may make offshore wind energy less economically viable.

## **Technological:**

- Increasing size and capacity of wind turbines producing more energy whilst maintaining a more efficient spatial footprint;
- Continued investment in Research and Development to develop more new technologies;
- Deployment of floating wind turbines will enable energy generation at greater depths and further out to sea. This may reduce visual impacts and public opposition to offshore turbines.

# KEY MSP AND TRANSBOUNDARY CONSIDERATIONS

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As the development of offshore wind farms in the Celtic Seas continues, this raises some potential issues about how offshore wind farms and related infrastructure should be considered in maritime spatial plans. Whilst individual countries and administrations will continue to implement their own procedures for the planning of offshore wind, changing technologies and patterns of development may have implications that have a particular cross boundary dimension. These may include:

- Development of turbines suitable for deeper waters; these turbines could be sited in areas close to marine borders and have greater cross-border impacts than currently experienced;
- Connecting infrastructure: cross-border cabling already exists for some wind farms that are close to land within other jurisdictions, for example including those from Robin Rigg (Scotland-England) and Burbo Bank Extension (England-Wales). More of this type of infrastructure may be required in the future;
- Cumulative impacts arising from the development of several wind farms in a relatively small area may have a transboundary nature;
- Proposed new interconnections including Isle of Man wind farm to mainland UK and North Seas offshore grid electricity interconnection linking Scotland, the Republic of Ireland and Northern Ireland;
- With regards to navigational safety, a harmonised approach to the marking of offshore wind farms (and other offshore structures) will be required. Recommendations by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) may provide some guidance on this;
- Both Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) require that transboundary effects should be taken into consideration. Article 7 of the Strategic Environmental Assessment Directive (Directive 2001/42/EC) makes provision for Member States to enter into consultation with other Member States to discuss transboundary effects of a plan or programme before it is adopted.

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