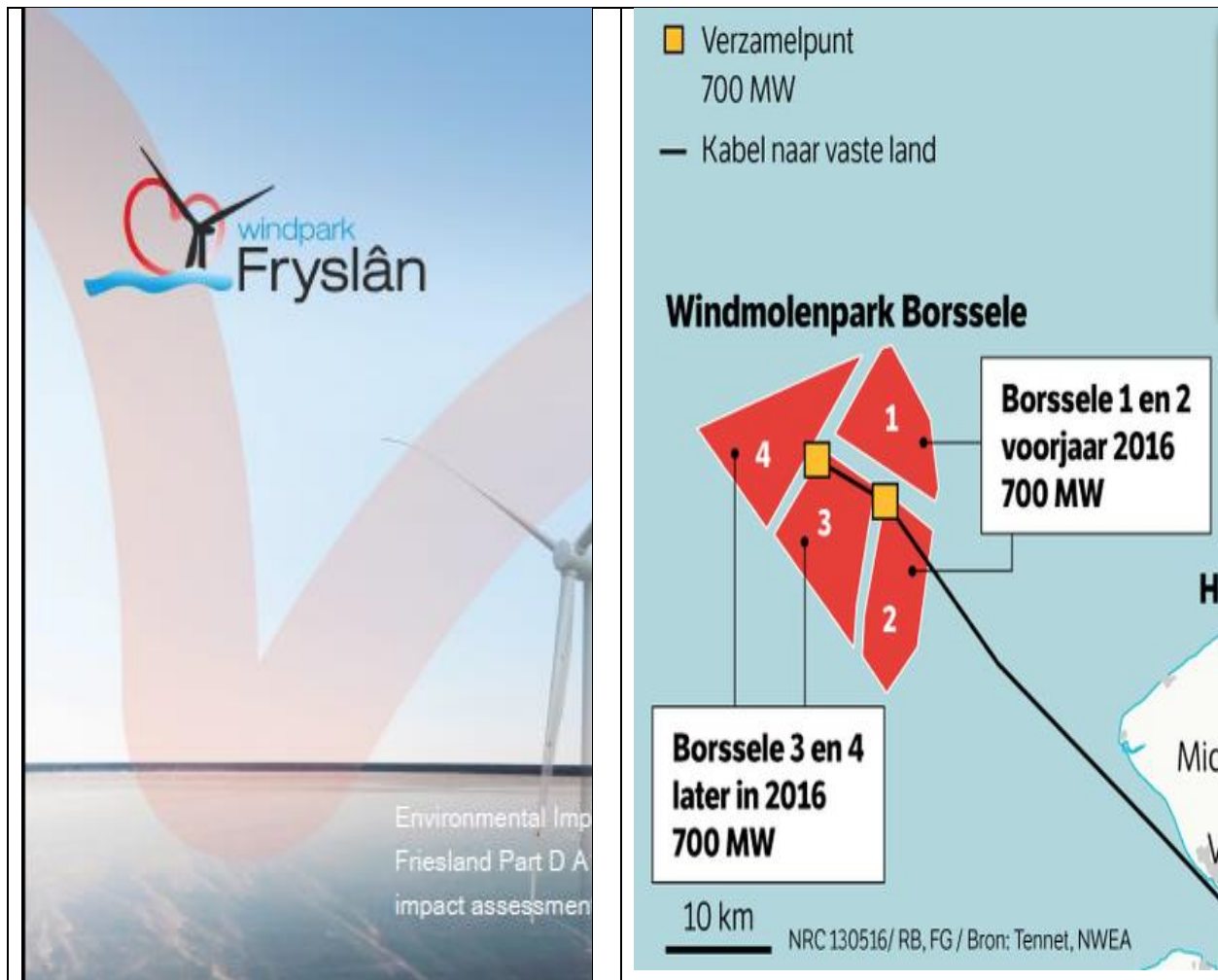


Technical Report 3: Socio-economic Impacts of Offshore Wind Farms (OWFs) – non-UK EU member states studies



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Executive summary

Research aims and methods: The review of Environmental Statements (ESs) sought to determine the socio-economic content of EU member state offshore wind farms (OWFs). This was part of a project funded by the European Offshore Windfarm Development Centre research programme (EOWDC). It parallels a similar study of ESs for UK OWFs. The aim of the EOWDC project is multifaceted: explore methods used to predict socio-economic impacts of OWFs, to enhance understanding of OWF socio-economic impacts (SEI), highlight best practice in how to maximize local benefits and compare predicted impacts with actual impacts. This report includes two elements. The first explores the extent of coverage of socio-economic impacts (SEI) in Environmental Statements (ESs) for recent large OWF projects across a range of European countries. The second element reviews the legislation and policy behind OWFs for EU member state countries to determine how different approaches impact on the socio-economic content of ESs and methodology employed.

The review concentrated on OWFs of c50MW and over undertaken from 2010 onwards. The review included 13 projects, in five countries (Denmark, the Netherlands, Belgium, Sweden and

Ireland), ranging in size from 50MW to 752MW. Researchers translated relevant chapters in the ESs were ESs into English using an online translation tool. There was an assessment of ES chapters against a 9-point template covering the research aims, including to: document the extent to which SEI are covered in the ESs, identify the relative coverage of social, economic and other impacts (e.g. cumulative), and identify the relative coverage of SEI in the various stages of the OWF lifecycle. The research also seeks to identify trends over time and to explain variations in ES consideration of impacts (e.g. more coverage for larger projects; any variations according to distance from shore). There is also a consideration of evolving approaches to methodology, mitigation, enhancement and monitoring, and to overall good practice.

Brief summary of findings:

- Overall, the depth and focus on socio-economic impacts covered in the EU ESs appears less than that observed in the UK examples. All ESs contained greater coverage of economic impacts than social impacts. The key economic topics considered were tourism (onshore and offshore); commercial fishing, shipping; traffic, plus employment to varying degrees. There was little use of quantitative methods, such as input-output analysis.
- The coverage of social impacts in the ESs was minimal. Recreation was one focus, along with changes in ferry trip duration and noise levels. As observed with the UK ES reviews there was a lack of depth with respect to impact of projects based on: community demographics, wellbeing, and cohesion. Methodology used was a combination of use of existing data, academic papers and reports from previous wind farm projects; consultation with stakeholders was highlighted in Denmark.
- The focus of the ESs was on the impacts related to the construction and 'operation and maintenance' phases. Decommissioning was largely unaddressed or anticipated to be the same as the construction stage.
- A major consideration in the EU analysis is whether the ES includes the onshore element of the project. This was not easy to determine in all the ESs reviewed nor from looking at country policy. The Belgian ESs did not include an onshore element; and stood out as lacking in socio-economic detail. In general, for the ESs studies, there does appear to be greater focus on onshore socio-economic impacts for nearshore windfarms (distinct from offshore). There was a lack of final plan information regarding construction port base(s) and cable landing points/ports; these sometimes hindered the depth at which impacts could be analysed.
- Typical mitigations for economic impacts included timing of work to avoid the tourist season; financial compensation (fishing and agricultural) and turbine placement to allow fishing boats and recreational boats access; plus restricted working hours during construction and traffic management. There was little or no monitoring for socio-economic impacts.
- All EU countries have a legal requirement to create marine spatial plans (MSP) which may include renewable energy plans and can be subject to SEA. The content of EIAs carried out at project level do vary in content and this may be attributable to the strategic context and process leading up to their production. Belgium is a good example where a royal decree has determined and considered the impacts prior to setting the locations of the windfarms in their EEZ.
- Typically, the UK covered socio-economic topics in more detail than those reviewed for the other EU States. This may be a function of the more all-encompassing integrated approach of EIA topics in the UK, and the perceived importance of such projects to economically problematic coastal areas.

1. Background/context

A review of Environmental Statements was carried out to determine socio-economic content of EU member state offshore wind farms. This is part of research for a larger project funded by the European Offshore Windfarm Development Centre research programme (EOWDC). The aim of the EOWDC project was multifaceted: explore methods used to predict socio-economic impacts of OWFs, to enhance understanding of OWF socio-economic impacts, highlight best practice in how to maximize local benefits and compare predicted impacts with actual impacts.

This report includes two elements. The first explores the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects across a range of European countries; it was reviewed in parallel with an in-depth review of UK OWSs. The second element looks at the legislation and policy behind OWFs for EU member state countries to determine how different approaches impact on the socio-economic content of ESs and methodology employed.

2. Research aims and approach

2.1 There was a dual focus to the Non-UK EU member states studies

1. ES comparison

- to provide a wider EU review of ES practice and to provide comparators to UK ES practice
- to consider, document and explain any international variations in experience from comparison between UK and EU cases

2. Spatial/strategic planning

- to investigate the procedural aspect of non UK offshore wind farms
- to determine the similarities and differences in strategic elements of planning between UK and of non UK EU offshore wind farms.

2.2 Wind farm selection

The review of European OWF ESs concentrated on OWFs of c50MW and over and those undertaken from 2010* onwards. In total, the EU wind farm review included 13 projects, in five countries, that ranged in size from 50MW to 752MW.

Table 1: Overview of the offshore wind farms reviewed

Country	Date of ES	Wind Farm Name	Project Status	Output of Wind Farm (MW)	Distance from Shore (km)
Denmark	January 2010	Anholt	Operational	400	15-20
	April 2014	Horns Rev 3	Under Construction	406.7	20
	April 2015	Vesterhav South	Consent authorised	200	4
	June 2015	Kriegers Flak	Under Construction	600	15
Netherlands	June 2015	Borssele I & II	Under Construction	380	24
	July 2015	Fryslan	Consent application submitted	338-374	6.5 (0.5 from dam)
	May 2016	Hollandse Kust Zuid I	Consent authorised	700	20
Belgium	July 2011	Norther	Pre construction	369	24
	June 2012	Rentel	Under construction	309	34
	July 2013	Seastar/Seamade	Consent authorised	239	40
Sweden	February 2015	Marviken	Failed Proposal	36-50	1.2
Ireland	January 2007	Oriel Windfarm	Consent application submitted	330	5
	January 2012	Dublin Array	Consent application submitted	364 - 520	10

2.3 ES Review Framework

Eleven of the European OWF ESs were translated into English using an online translation tool. The chapters/sections selected for translation were determined using the following procedure: (i) translation and review of chapters/sections of documentation referencing socio-economics, and (ii) translation and review of chapters/sections referencing key issues such as employment, tourism and fishing. The EU ESs were reviewed against the same framework developed for the UK wind farm reviews (Table 2). An additional spreadsheet/ was developed, inclusive of all the EU (non-UK) wind farms reviewed, to help draw conclusions (Appendix 1).

Table 2: Template used for the UK and EU case studies

Review steps	Focus
1. Specify project	Attributes of project as set out in ES; eg— <ul style="list-style-type: none"> • name • location • developer and socio-economic consultant • MW size • distance from coast • current development stage (planning, consented, under construction, operational etc) • offshore and onshore elements • others
2. Scope of coverage of socio-economic impacts	<ul style="list-style-type: none"> • sections in ES (eg chapter and/or technical appendix) • depth of coverage (eg from mere mention of socio-economic impacts to in-depth coverage) • stages of development covered –construction, O&M, decommissioning • location of impacts—offshore and onshore • scale of analysis of impacts—local, regional, national
3. Key impacts assessed -- economic	Which of following considered and to what depth? Key issues in examination etc <ul style="list-style-type: none"> • direct employment effects, including employment generation, local content and safeguarding of existing employment; • indirect employment effects; • other labour market effects, such as changes in wage levels or commuting patterns; • expenditure and income effects, including the use of local suppliers, rates and rental payments and other types of project-related expenditure; • economic effects on existing commercial activities (including tourism, agriculture and fishery); • effects on the development potential of the area, including changes in the image of the area or in investor confidence; and • effects on property values. Significance of impacts: <ul style="list-style-type: none"> • no • minor • medium • major
4. Key impacts assessed -- social	Which of following considered and to what depth? Key issues in examination etc <ul style="list-style-type: none"> • effects on population and demographic structure; • effects on accommodation and housing; • effects on community facilities or services; • changes in community character or image; • changes in community stability or cohesion (e.g. due to in-migration); • changes in the incidence of social problems such as crime; • community wellbeing; and • distributional effects, i.e. effects on specific groups in society (e.g. women, the elderly and ethnic minorities).

	<p>Significance of impacts:</p> <ul style="list-style-type: none"> • no • minor • medium • major
5. Key impacts assessed—others	<p>To add as appropriate, eg</p> <ul style="list-style-type: none"> • cumulative • others
6. Methods used for identifying, predicting and evaluating socio-economic impacts	<p>Including for example:</p> <ul style="list-style-type: none"> • baseline studies • secondary data (statistics, literature) • primary data collection – qualitative, quantitative and how collected • stakeholder analysis • scenario approaches • modelling (eg input–output studies) • causal analysis • others
7. Mitigation and enhancement measures	<ul style="list-style-type: none"> • mitigation measures • enhancement measures • monitoring provisions
8. Organisation and presentation of socio-economic information	<p>For example:</p> <ul style="list-style-type: none"> • logic of organisation • clarity of presentation • acknowledgement of difficulties/limitations of approach
9. Others	<ul style="list-style-type: none"> • some lessons for good practice

2.4 Comparing cases: some fine tuning of the review research method

1. To facilitate comparisons across ES cases, there was some sharpening of the focus on some key elements in the ESs, including construction stage vs O&M and the distinction between onshore and offshore elements.

2. A more quantitative approach was also sought, wherever possible, to complement much of the qualitative information, and to facilitate cross comparisons. To compare across the ES cases, the research employed a number of approaches, including specification of:

- predicted local jobs created, in both construction and O&M stages, in relation to MW size of project. For the O&M stages, the jobs are determined by the location of the O&M ports;
- ditto for some expenditure measures (e.g. GVA; ratio of Direct: Indirect + Induced expenditure); and

- significance assessments by level (e.g. None >Major).

The nature of the assessments undertaken and the uncertainties associated with not knowing the primary port of construction and operations have reduced the utility of quantitative methods.

2.5 Limitations of approach

- Number of reviews per country and a wider geographical spread of countries e.g. Spain, Germany
- Relevant parts of the ESs were transcribed but not some of the surrounding documentation, for instance, scoping reports and onshore related information
- Variability in the quality of the translation tool, depending on language
- The selected OWFs cover a short time period that restricts identification of trends
- Wind farm distances from shore nearshore and offshore differentiations
- Separation of ESs for the onshore and offshore elements of the project
- Variations in the proximity and size of local settlements to the wind farm and onshore connection
- Changes to wind farm legislation/policy over time (e.g. Denmark, 2010)

2.6 Case study approach

Each country case study has three sections:

- (i) Overview of the findings from the OWF reviews
- (ii) Summary review in brief
- (iii) Country wind farm regulations

3. Summary of findings for Denmark

3.1 Overview of the findings from the Danish Offshore Wind Farm reviews

Table 3: Danish offshore wind farms reviewed

Date of ES	Wind Farm Name	Output of Wind Farm (MW)	Distance from Shore (km)	EIA consultant
January 2010	Anholt	400	15-20	Energinet.dk
April 2014	Horns Rev 3	406.7	20	Energinet.dk Terrestrial & OrbiconA/S Ringstedvej etal offshore
April 2015	Vesterhav South	200	4	Niras
June 2015	Kriegers Flak	600	15	Niras and Cowi

Outline of the findings for Demark

Purpose of the ES reviews	Findings
To document the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects	<ul style="list-style-type: none"> All four ESs reviewed included a section or report covering socio-economic impacts. With the exception of Anholt, the ESs were carried out post 2012. For these, separate offshore and onshore elements were separated but inclusive in the ES. In two instances two different consultancies carried out the ES each taking either offshore or onshore aspects. Across the four ES's there was variation in page number allocated to socio-economic aspect. Accurate calculation to determine (%) of ES proved difficult to estimate. Vesterhav South separated Health, Population and Recreation impacts from Socio-economic impacts. Kriegers Flak ES included a separate Population, Health & Socio-economic report (69 pages) as did Horns Rev (35 pages). <p>Procedural information:</p> <ul style="list-style-type: none"> <i>'The specific procedure for the EIA regarding offshore wind farms is described in Executive Order no. 68 of January 26th 2012. The EIA statement must include the entire offshore wind turbine project, i.e. also plants and installations offshore and onshore.</i> <p>This may explain why the Anholt EIA supplied for review specifically for offshore.</p> <ul style="list-style-type: none"> The developers included major international energy companies such as DONG (now Orsted), Vattenfall, Energinet.dk, Niras, Cowi and OrbiconA/S Ringstedvej carried out roles in roles the production of the ESs.

<p>To identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (esp cumulative and monitoring)</p>	<p>There was greater coverage of economic impacts than social impacts.</p> <p>Kriegers Flak was an exception went into more detail regarding social impacts and included barrier effect in their report.</p> <p>There is recognition of variations in socio-economic impacts between the construction and the operation and management (O&M) stages, the decommissioning stage was often looked at in less detail or predicted to have the same impact as construction. The most detail is centred on the construction stage.</p> <p>Cumulative impacts were covered to different degrees across the four ESs. The focus was largely based on other wind farms, with the exception of Kriegers Flak which considered joint construction issues with a motorway development. In the Kriegers Flak ES potential cumulative effects were determined by sending enquiries to relevant municipalities, authorities, Rail Net Denmark, the Danish Road Directorate and others.</p> <p>The consideration of residual socio-economic impacts is limited particularly in the Anholt ESs. No residual impacts were identified.</p>
<p>To identify key elements within economic broad headings, and specify the methodology used</p>	<p>The key economic topics considered were: tourism (onshore and offshore); commercial fishing, shipping; traffic; mining; agriculture/forestry.</p> <p>Employment was addressed to varying degrees; for Anholt and Horns Rev employment was largely neglected. Vesterhav South addressed employment in their marine report; Kriegers Flak was more thorough .GVA (Gross Value Added) and input output studies were not included in any of these ESs'</p> <p>Background information data had been obtained from a range of sources e.g.: public records, official catch statistics, academic articles and Statistics Demark. This was often used in conjunction with data and information based on experience from established wind farms. There was a lack of any analysis of the above data to determine implications or make predictions.</p> <p>Limited studies for the project in hand based on demographics, potential saturation of tourist market etc. However, Vesterhav South included recent figures for tourism development in the area, including the number of nights spent on holiday.</p> <p>There were instances where lack of final plan information regarding cable landing points/ports hindered the level at which impacts were analyzed in the ES.</p> <p>Local impacts were the primary consideration in these studies. Regional implications where typically focused on commercial fishing and nationally the content was based around energy policy and renewable targets.</p> <p><i>Employment</i></p> <ul style="list-style-type: none"> • Where present (2/4 reviews) employment figures were largely obtained by looking at previous established wind farms. Construction and operation figures were present together with separation of direct, indirect and induced employment numbers. Figures for decommissioning had not been determined (lack of knowledge/evidence in this area?).

	<ul style="list-style-type: none"> • These Denmark ESs reviewed did not provide a significance assessment of the potential employment impacts. Where stated employment was generally assessed as having a positive impact. • The identification of potential wider economic/GVA impacts associated with OWFs was not covered in these ESs
<p>To identify key elements within broad social headings, and methodology used</p>	<ul style="list-style-type: none"> • Across the ESs the key social considerations were impacts associated with: recreation, noise and changes in distance for ferry routes. • The coverage of social impacts and impacts on local quality of life (QoL) in the ESs reviewed was minimal and appeared prescriptive across groups of windfarms (<i>copy and paste</i>). Recreation was a key focus, along with changes in ferry trip duration and noise levels. Kriegers Flak proved an exception covering social impact more broadly and did address the effect on accommodation and housing. • As seen with the UK reviews there was a lack of depth with respect to impact of projects based on: community demographics, cost of housing, community wellbeing (increased vehicular movements, diversions etc), crime and community cohesion. There was no disaggregation of distributional impacts on various community groups (e.g. young/old; M/F). • There were examples of using the public consultation phase to help determine impacts of the prospective windfarm. Based on the topics in the ES the emphasis is centred on economic implications. Use of existing data and surveys (Anholt) were noted.
<p>To identify the relative coverage of socio-economic impacts in the various stages of the OWF lifecycle</p>	<ul style="list-style-type: none"> • The main focus of these ESs are on the impacts related to the construction and operation phases. Decommissioning is frequently anticipated to be same as the construction phase.
<p>To identify trends over time.</p>	<ul style="list-style-type: none"> • Limitations in the number of studies covered for Denmark makes trends difficult to determine. The best ESs with regards to socio-economic inclusion appear to correlate with use of a consultancy over Energinet DK. Depth of research appears related to whether the wind farm is the first of a group. Other factors should also be considered such as distance to shore and single wind farm vs. a wind farm zone.
<p>To explain variations in ES consideration of impacts (e.g: more coverage for larger projects; any variations according to distance from shore?)</p>	<ul style="list-style-type: none"> • The lack of specificity of project details such as the construction port base(s) location of landing cables detracts from the accuracy and value of the ES. • Sample number restricts correlation of wind farm size or distance from shore of with coverage of socio-economic content.

<p>Mitigation, enhancement and Monitoring</p>	<ul style="list-style-type: none"> • From a purely social perspective prediction of impacts were largely missing and where they were recognized they were largely seen as having no effect or a positive effect (needing no mitigation). • Mitigation measures were typically aimed at: reducing the visual impact via appearance of the turbines and noise reduction and out of season activities. Positive landscaping to reduce the impact on the population was mentioned in the Vesterhav South ES. • There was little or no monitoring for socio-economic impact. Horns rev 3 recognized possible impact on cottage rental due to visual impact covered in a study for Horns Rev 1. There was reference to likely impacts based on experiences from Horns Rev 1 and 2 in relation to tourism. • Enhancement measures were based around financial compensation for example: Kriegers Flak -there will be compensation (loss of earnings) for landowners if the work or storage areas destroy crops during construction phase. This is regulated by the State Agreement for high-voltage switchgear (Danish Energy Association, 2014).
<p>To consider, document and explain any international variations in experience from comparison between UK and Danish windfarms</p>	<ul style="list-style-type: none"> • Socio-economic impacts, especially employment, GVA, wider economic development and supply chain, demography, housing, local services and community wellbeing are discussed more fully in UK ESs than in these representative ESs for Denmark.
<p>Best practice — learning from current ES practice to improve future practice.</p>	<ul style="list-style-type: none"> • Public participation; the Danish Energy Agency assembled ideas and suggestions on the EIA for the onshore plant. The consultation responses highlighted topics on which the EIA report should focus (no further detail available). • Efforts to gather concerns from summer home owners included: separate communication letters, notices in local newspapers, exhibits at local venues and timing public meetings appropriately. • Kriegers Flak ES included thorough background research using: publications from WHO; population statistics; potential cumulative effects were determined by sending enquiries to relevant municipalities, authorities, Rail Net Denmark, the Danish Road Directorate and others. • Comprehensive baseline information using National Statistics and Tourism figures (Vesterhav South)

3.2 Review in Brief

- Socio-economic impact was addressed in more depth from 2012 with two of the four ESs having a separate socio-economic report

- Human health impacts were largely addressed as a separate topic separate from socio-economic.
- Key topics addressed under socio-economic were: tourism, commercial fishing and agriculture.
- Effects on: crime, pressure local services, change of demographics, changes to houses prices were not addressed.
- Employment figures associated with the wind farm development (when supplied) were lacking in detail and lacked implications based on the demographics.
- In two studies onshore and offshore impacts were looked at separately (presented together) using two consultancies. The Anholt ES, carried out by Energinet, did not include onshore impact. This may be due to it being produced prior to 2012 (Executive Order no. 68 of January 26th 2012)
- Although baseline information was often thorough, this was not used to increase understanding of the potential impact. One exception was commercial fishing, this was typically well researched and negative impacts mitigated where possible.
- Routes for cables, substation location and ports were often stated as undetermined. Regulations state that screening or supplementary EIA may be required due amendments in the project that may result in an environmental impact.
- Assessment of impacts, such as changes to tourism numbers, were largely based on experience from previous projects. This resulted in the potential cumulative impact being unaddressed.
- The deconstruction stage (and prospective up scaling/upgrading of wind farm) was largely unaddressed.
- There was no indication of plans to monitor impacts or determine indicators with action points to address issues if they arise.

3.3 Danish Wind Farm Regulations

Regulatory requirements are divided into 4 areas:

- Spatial planning (e.g. SEA/ Maritime Spatial Planning (MSP))
- Environmental assessment requirements (EIA where required)
- Permit requirements
- Noise requirements

There is a split in the legal framework for the siting of onshore and offshore wind turbines.

Danish Energy Agency (DEA) are responsible for:

- the siting of offshore wind turbines regulated under the Renewable Energy Act
- the complete chain of tasks related to production, supply and consumption of energy as well as transport and buildings
- offshore wind farms from tenders and open door applications
- case-by-case screening to determine whether a wind turbine project shall be subject to an EIA

- implementing four policy measures that were introduced by the Promotion of Renewable Energy act 2009 to enhance local acceptance of wind turbine projects (onshore, nearshore and offshore)
 1. Compensation scheme to neighbours (adjustments in 2013)
 2. A co-ownership scheme
 3. A community benefit scheme (onshore only)
 4. A guarantee fund for local ownership initiatives

Schemes 1 and 2 are only available to nearshore and offshore wind farms that are not subject to a tender.

Table 5: EIA initiation for onshore and offshore wind farms ‘Mapping of the legal framework for siting of wind turbines - Denmark (2015)’

Onshore	Offshore
<ul style="list-style-type: none"> • Mandatory (unless < 80m or < 3) • Prior public consultation • EIA statement (authority) • Public consultation • EIA permit 	<ul style="list-style-type: none"> • Screening • EIA statement (developer or Energinet.dk) • Public consultation • Establishment permit

Energinet.dk is an independent state-owned enterprise responsible for Danish electricity and gas transmission system. If an EIA is required the developer or Energinet.dk draw up an ES; this can be outsourced to consultancies. It is stated in Annex 2 of the ‘Status quo report on offshore energy planning provisions in the North Sea Region (April 2018) that *‘The specific procedure for the EIA regarding offshore wind farms is described in Executive Order no. 68 of January 26th 2012. The EIA statement **must include the entire offshore wind turbine project**, i.e. also plants and installations **offshore and onshore**. Realization of the offshore wind turbine project requires an expansion of the electricity grid onshore, as well as coordination between planning authorities onshore and offshore (the Danish Nature Agency and the Danish Energy Agency) as early as possible in the process. The EIA includes a public hearing process, where authorities, neighbouring countries and other stakeholders can be heard.’*

Nearshore/offshore wind farms: in Denmark, a distinction is made between near-shore wind farms and large-scale offshore wind farms. There appears to be differences in the legal and regulatory framework (specific policy measures) when comparing nearshore and offshore sitings

Spatial Planning: in 1995, a spatial planning committee, led by the Danish Energy Agency for offshore wind was established. In 2007 the commission presented a sectorial plan on ‘Future Offshore Wind Turbine locations – 2025’ based on the examination of 23 specific possible locations each 44km². A further strategy was launched in 2011 ‘Status quo report on offshore energy planning provisions in the North Sea Region (April 2018)’.

Strategic planning: the Danish Strategic Research Council (2014-2017) funded the following report: *'Mapping of the legal framework for siting of wind turbines - Denmark (2015), as part of the Wind 2050'* project. This report highlights the following:

- That strategic planning for offshore wind turbines is not a formal legal requirement. Areas may be designated for tender by the Minister for climate, energy and buildings for both large scale offshore wind turbines and nearshore turbines. It is also possible to apply for permits outside the designated areas.
- Potential wind turbine areas, offshore and nearshore, have been designated by the Danish Energy Authority DEA including designation of six nearshore sites through an informal planning process.
- It is thought likely that implementation of the EU Maritime spatial planning directive will lead to the establishment of formal strategic planning requirements for offshore wind turbines.
- The reports states that the Maritime Spatial Planning directive would be transposed into national legislation by Sept 2016
- 4COffshore (Sept, 2019) 'The Danish Energy Appeal Board decision of 20 December 2018 concerning the Vesterhav Syd offshore wind farm has resulted in an adjustment of the approach for undertaking environmental assessments for Thor (Horns Rev 4). The DEA will be using an approach based on a Strategic Environmental Assessment (SEA) prior to final bids on the offshore wind farm plan. The plan to be assessed consists of the political decisions regarding the Thor offshore wind farm project - namely, the Energy Agreement 2018 and related decisions concerning the tender (the selected site, capacity of the wind farm in MW, and the decision to include the grid connection in tender). At the operational level, Energinet will be responsible for carrying out the SEA-process by order from the DEA'

Marine Spatial Plan (MSP): Marine spatial planning (MSP directive (2014/89/EU) requires spatial plans for marine areas to be in place by 2021

4. Summary of findings for the Netherlands

4.1 Overview of the findings from the Dutch Offshore Wind Farm Reviews

Table 6: Dutch offshore wind farms reviewed

Date of ES	Wind Farm Name	Output of Wind Farm (MW)	Distance from Shore (km)	EIA consultant
June 2015	Borssele I & II	380	24	Pondera Consult
July 2015	Fryslan	338-374	6.5 (0.5 from dam)	Pondera Consult
May 2016	Hollandse Kust Zuid I	700	20	Pondera Consult

Outline of the findings for the Netherlands

Purpose of the ES reviews	Findings
To document the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects	<ul style="list-style-type: none"> All ESs reviewed were produced between 2015 -2016. Fryslan wind farm is located nearshore (next to a dam) and the ES covers onshore and well as offshore impacts. There was direct reference to socio-economic impacts in the Fryslan ES, this was not the case for Borssele I or Hollandse Kust Zuid I. With regards to Borssele I or Hollandse Kust Zuid I, it was difficult to determine if separate EIAs had been carried out to look at the on shore impacts; I was not able to find clear evidence online. The ESs for the Netherlands EEZ windfarm zone (Fryslan is not in this zone) fell under the responsibility of the State rather than individual developers and windfarm zones were looked at strategically in the National Water Plan. This led to all the ESs taking the same topics and format. The developers included major international energy companies including: Orsted and Ventolines BV. Pondera were responsible for all the ESs reviewed.
To identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (esp cumulative)	<p>There was greater coverage of economic impacts than social across all the Netherland ES's reviewed. Employment was addressed in the Fryslan ES; though not very thoroughly. GVA (Gross Value Added) and input output studies were not included in any of these ESs.</p> <ul style="list-style-type: none"> Cumulative impacts of additional wind farms on fishing, sailing safety and landscape were key. Fryslan also included other structural requirements on going on the dam. Hollandse Kust Zuid I included interesting research on the cumulative impact of the windfarms on weather and cloud movement. No residual socio-economic impacts were identified in these ESs

<p>To identify key elements within economic broad headings, and specify the methodology used</p>	<p>The key economic topics considered were: tourism, commercial fishing and shipping/sailing.</p> <p>Background information data (largely qualitative) had been obtained from a range of sources mainly information from other windfarms, related studies and academic articles. Determining the economic impacts on tourism was key for all ESs and Fryslan has its own study carried out: Research by European Tourism Futures Institute Knowledge Institute (ETFI). Use of SAMSON and MARIN tools.</p> <p>Local impacts were the primary consideration in these studies. A transboundary issue was highlighted around fishing and proximity to the Belgian windfarm zone.</p> <p><i>Employment</i></p> <p>Only the Fryslan ES addressed employment. The ES gave minimal figures which were not broken down in to the project phases nor rated for impact significance.</p>
<p>To identify key elements within broad social headings, and methodology used</p>	<p>Potential impacts on recreation featured in all three ESs. Fryslan included noise and shadow, electromagnetic radiation as well as impacts associated with housing. A positive impact on local accommodation due to increased employment was anticipated.</p> <p>With regard to the windfarms in the Dutch EEZ coverage of social impacts and impacts on local quality of life (QoL) in the ESs reviewed was minimal and focused on recreation</p> <ul style="list-style-type: none"> • There was a lack of depth regarding the impact of these wind farm projects on: local community demographics, community wellbeing (increased vehicular movements, diversions etc), crime and community cohesion. There was no disaggregation of distributional impacts on various community groups (e.g. young/old; M/F). • It was not possible to find any information from a public consultation phase to help determine impacts of the prospective wind farm. This may be due to the strategic level plan for the area in the case of the EEZ windfarms.
<p>To identify the relative coverage of socio-economic impacts in the various stages of the OWF lifecycle</p>	<ul style="list-style-type: none"> • Significance of impact on socio-economic topics was primarily focused on the operation and management (O&M) phase of the project. The Fryslan ES did include significance of impact for some topics the construction phase as well. • Decommissioning phase was largely unaddressed for socio- economic impact.
<p>To identify trends over time.</p>	<ul style="list-style-type: none"> • All studies reviewed were published within two years this makes trends over time difficult to determine.

<p>To explain variations in ES consideration of impacts (e.g: more coverage for larger projects; any variations according to distance from shore?)</p>	<ul style="list-style-type: none"> • Pondera were responsible for all ESs reviewed, yet there was a difference in socio-economic content. This may indicate a change of strategy depending on distance of windfarm to shore. • To an extent the low sample number (windfarm ESs) restricts correlation of size of impacts with size of projects.
<p>Mitigation, enhancement and monitoring measures</p>	<p>Mitigation for social impact was largely based on minimizing the visual impact of the wind farm by optimizing blade colour, their movement and lighting.</p> <ul style="list-style-type: none"> • No enhancement measures were stated however, economic mitigation measures included array design to minimize ferry/sailing disruption. • There was little or no monitoring for socio-economic impact. There was reference to continued monitoring (in place prior to wind farm construction) in the Fryslan ES.
<p>To consider, document and explain any international variations in experience from comparison between UK and Netherland windfarms</p>	<ul style="list-style-type: none"> • Socio-economic impacts, especially employment, GVA, wider economic development and supply chain, demography, housing, local services and community wellbeing are discussed more fully in UK ESs than in these representative ESs for Netherlands.
<p>Best practice — learning from current ES practice to improve future practice.</p>	<p><i>Example of best practice seen in the Netherlands ESs</i></p> <p>Fryslan ES included a wider range of socio-economic issues/topics and was far more conclusive. Research surrounding impacts on tourism was well addressed.</p>

4.2 Review in Brief

Fryslan wind farm appears to be regarded as nearshore, whereas Borsell adollans is offshore and has been looked at differently to the other wind farms (separate procedure) this may accounts for the inclusion of onshore impacts.

Fryslan Key findings:

- Emphasis on economic impacts rather than socio-economic
- Key topics addressed were: tourism, recreation and commercial fishing
- Employment implications and figures were minimal and lacking information most notably for construction and deconstruction stages
- Effects on crime, pressure local services, change of demographics, pressure on local services were not addressed
- The deconstruction stage, in general, was largely unaddressed
- Impacts on tourism and recreation were addressed comprehensively in a study conducted by the European Tourism Futures Institute (ETFI)

Borssele I&II and Hollands Kust Zuid - both in the Exclusive Economic Zone (EEZ)

- Emphasis on economic impacts rather than socio-economic.
- With regard to the windfarms in the Dutch EEZ coverage of social impacts and impacts on local quality of life (QoL) in the ESs reviewed was minimal and focused on recreation.
- No employment predictions could be found.
- First reference seen in an EIA to SEA actions. The SEA required mitigation measures to be implemented (e.g. bandwidth)
- There appeared to be an assumption that the choice of the windfarm location through spatial planning/SEA had ruled out or mitigated for significant impacts.
- Significance of impact on socio-economic topics was primarily focused on the operation and management (O&M) phase of the project.
- The deconstruction stage, in general, was largely unaddressed
- Lack of use of prediction models
- Ease of ferry routes for passenger crossings a concern

4.3 Dutch Wind Farm Regulations and Additional Findings

The State arranges all the conditions required to build wind farms, including the offshore EIA, precise location, permits, and the connection to the electricity network. This is stipulated in legislation and a bill on offshore wind energy- 'Offshore Wind Energy Act' (Wet windenergie op Zee), which came into force in July 2015.

The Regulatory system: Policy Document of the North Sea (2016-2021) is the Netherlands MSP. The Netherlands also has a National Water Plan.

1. The National Water Plan (2016-2021) designates areas of the North Sea where the construction of wind farms is permitted. The Policy Document of the North Sea (2016-2021) states: 'On the 2nd June 2014 a memorandum on scope and detailing for the SEA was made available for public consultation for the purposes of revising the NWP. A SEA and appropriate evaluation of the NWP assessed the policy decisions pertaining to the North Sea on the bases of a number of topics (nature, water, soil, landscape, cultural history, archaeology, designated uses and sustainability)'

2. Within the designated areas the State takes 'wind farm site decisions'. The State will draw up an EIA for each site - no additional EIA required by companies bidding to develop projects. Before the call for tenders can be issued, a site decision must be taken that defines the exact location and preconditions for the wind farm. The same applies for the integration plans for the connections of the offshore grid to connect the wind farms with the high voltage grid on land.


3. A government department (Rijkswaterstaat) will coordinate the monitoring of the expected impacts, in order to learn for future EIAs (adaptive management).

Figure 1: From Netherland's Ministry of Infrastructure and the Environment Seminar Offshore wind farms and Environmental Impact Assessments (2016)

Main discussion/issues in EIA

ZONES: what are reasons to choose for this area? Taken into account:

- all relevant factors for offshore wind energy? (wind, safety)
- existing functions of this area (f.e. mining activities, shipping)
- other developments in this area (spatial, economic)?
- environmental and ecological effects?
- naval safety
- unknown effects on ecology
- Visibility (from beach)



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5. Summary of findings for Belgium

5.1 Overview of the findings from the Belgian Offshore Wind Farm Reviews

Table 7: Belgian offshore wind farms reviewed

Date of ES	Wind Farm Name	Output of Wind Farm (MW)	Distance from Shore (km)	EIA consultant
July 2011	Norther	369	24	BMM and IMDC
June 2012	Rentel	309	34	BMM and IMDC
July 2013	Seastar/Seamade	239	40	BMM and IMDC

Outline of the findings for Belgium

Purpose of the ES reviews	Findings
To document the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects	<ul style="list-style-type: none"> • All ESs reviewed were produced between 2011- 2013. For each Windfarm two ES's had been produced due to a retrospective change in windfarm area. • There was direct reference to socio-economic impacts associated with commercial fishing in all three ESs reviewed. • Potential onshore impacts were not addressed in the ESs beyond visual impact from shoreline points with subsequent reference to research and monitoring. • A Royal Decree established a Marine Spatial Plan for this wind farm zone. All ESs followed the outline of topics for consideration based on guidance from this Spatial Plan and had the same format. The decision regarding acceptable impacts had largely been addressed at strategic level. • Management Unit of the North Sea Mathematical Models and the Scheldt estuary (MUMM) issue environmental permits and have a data base of information on a range of socio-economic issues (not able to access this for research). • The developers were consortiums, for example, Eneco Wind Belgium. • Beheerseenheid van het Mathematisch Model van de Noordzee (BMM) and International Marine and Dredging Consultants (IMDC) were responsible for all the ESs reviewed.

<p>To identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (esp cumulative and monitoring)</p>	<p>There was greater coverage of economic impacts than social across all the Belgian ESs reviewed.</p> <p>GVA (Gross Value Added) and input output studies were not included in any of these ESs.</p> <p>Cumulative impacts of ‘many’ wind farms and commercial fishing were addressed.</p> <p>No residual socio-economic impacts were identified in these ESs.</p>
<p>To identify key elements within economic broad headings, and specify the methodology used</p>	<p>The key economic topics considered were: commercial fishing, mariculture, shipping, aviation, sand and gravel extraction, military use, gas pipelines, telecommunications and power lines, tourism and recreation and scientific research.</p> <p>Methodology</p> <ul style="list-style-type: none"> • Use of the Marine Spatial Plan guidance and MUMM data • A high number of research papers were referenced. <p>The economic impacts on tourism was determined largely by referencing the socio-landscape study carried out by Grontmij Vlaanderen, 2010.</p> <ul style="list-style-type: none"> • Use of SAMSON and MARIN tools. <p><i>Employment</i></p> <ul style="list-style-type: none"> • Employment was not addressed
<p>To identify key elements within broad social headings, and methodology used</p>	<p>There was a lack of information regarding the social impacts that might arise as a result of these wind farm projects. The potential impacts on socio-landscape was the only social topic featured in all three ESs. This may be due to the large distance to shore.</p> <p>Methodology: The ESs referenced a wind farm socio-landscape study carried out in the summer of 2009 (Grontmij Vlaanderen, 2010). A significance impact rating was stated only in relation to tourism which was ‘limited negative impact’.</p> <p>For Seamade OWF the following report was referenced ‘<i>Environmental impacts of offshore wind farms in the Belgian part of the North Sea: Learning from the past to optimise future monitoring programmes, (Degraer et al, 2013)</i>’</p> <p>A public consultation phase was highlighted as part of the Marine Spatial Strategy -- not able to access the comments.</p>
<p>To identify the relative coverage of socio-economic impacts in</p>	<ul style="list-style-type: none"> • Significance of impact on economic topics was covered for the construction and operation/management (O&M) phases of the project.

the various stages of the OWF lifecycle	<ul style="list-style-type: none"> Decommissioning phase was largely unaddressed.
To identify trends over time.	<ul style="list-style-type: none"> All ESs reviewed were published within three years; this makes trends over time difficult to determine. A larger sample number would be needed to draw a conclusion.
To explain variations in ES consideration of impacts (e.g: more coverage for larger projects; any variations according to distance from shore?)	<ul style="list-style-type: none"> A larger sample number would be needed to draw a conclusion.
Mitigation, enhancement and monitoring measures	<ul style="list-style-type: none"> Mitigation was based around reducing visual impact of the wind turbines and informing residents and tourists of the project activities. There was to be continued monitoring of seaview impacts and commercial fish numbers..
To consider, document and explain any international variations in experience from comparison between UK and Netherland windfarms	<ul style="list-style-type: none"> Socio-economic impacts, especially employment, GVA, wider economic development and supply chain, demography, housing, local services and community wellbeing are discussed more fully in UK ESs than in these representative ESs for Belgium.
Best practice — learning from current ES practice to improve future practice.	<p><i>Example of best practice seen in Belgium ESs</i></p> <ul style="list-style-type: none"> High level of reference to research papers addressing impacts to fishing/aquaculture. Surveys surrounding impacts on sea view.

5.2 Review in Brief

- There were two EIAs for each of the wind farms reviewed - this appeared to be due to changes in the area/size of the wind farms.
- The onshore impacts were not addressed in any of these ESs beyond visual impact from shoreline points with subsequent reference to research and monitoring.
- There was very little difference in socio-economic content between the two consultancy ESs. Potential job losses were not determined in relation to commercial fishing, nor revenue loss/gain for tourism; there was acknowledgement of a lack of information to help determine the likely impact in these areas.
- Onshore cabling landing points were addressed in separate ES - not available/linked.
- The new onshore power station and cable points were not addressed under cumulative impacts. Cumulative impact was solely focused in relation to the other 'licensed' windfarms.

- The EIA states that the concession zone for the windfarms (by Royal Decree) outweighs other impacts to human activities in this area.
- Interaction with the public is highlighted as a mitigation measure to help ease the acceptance of the project.
- High reliance on research papers (some specific to the windfarm site), and future monitoring.

5.3 Overview of Belgian offshore wind farm regulations/procedure

Permission to build and operate a wind farm is based on two royal decrees and several permits, including a domain concession and an environmental permit for the construction and exploitation of the wind park. Environmental permits are delivered by the Management Unit of the North Sea Mathematical Models and the Scheldt estuary (MUMM), which is a department of the Royal Belgian Centre for Natural Sciences. The building permit is given by the Public Service for Economy.

- Firstly, an external consultant undertakes an EIA on behalf of the applicant. This is assessed by MUMM along with the application
- There is a 45 day public consultation period, if impacts could cross international borders consultation with the concerned country is arranged..
- MUMM is also responsible for law enforcement in the marine environment, and carries out environmental monitoring programs during the construction of offshore installations

To support the planning process in Belgium, MUMM developed an online spatial analysis portal called Marine Management atlas. There is another procedure for the installation of the cables (Royal Decree, 12 March 2002, published in the Belgian Official Journal 9 May 2002). Applications are made to the General Energy Directorate of the Federal Public Service Economy, SMEs, Self-Employed and Energy, which advises the Minister for Energy.

Marine Spatial Plan

The Royal Decree establishing a Marine Spatial Plan is in place (MSP 2016-2020); this is due to be updated in 2019. Annex 2 appears to be the basis for the topics addressed in the EIAs. This document does make passing reference to onshore impacts (p51) which then evolves into the vision of the Blue Economy maxims (economic sectors and activities that make significant use of marine resources are referred to as the "blue economy").

'2.2.2.2 Four maxims for the future vision of the blue economy and innovation. Maxim 1: social well-being is essential - Social well-being is created by the sum of all the ecosystem services provided by the Belgian North Sea'

In March 2014 there was an initiative to devote an area of 238 km² in the Belgian part of the North Sea to the production of renewable energy under the Marine Spatial Plan (MSP). Stakeholder engagement: on accordance with the Royal Decree on November 2012 on the procedure for

adoption of a Marine Spatial Plan, the public was consulted between July and September 2013 on the draft marine spatial plan and on the EIA. The MSP for the period 2020-2026 is subject to an SEA. Stakeholder involvement began in 2017. The received reactions were transformed into a first draft of the new plan and the revision process entered into its formal phase (European MSP Platform, 2018).

6. Summary of findings for Sweden

6.1 Overview of the findings from the Swedish Offshore Wind Farm Review

Table 8: Marviken offshore wind farm

Date of ES	Wind Farm Name	Output of Wind Farm (MW)	Distance from Shore (km)	EIA consultant
February 2015	Marviken	36-50	1.2	Windform AB

Outline of the findings for Marviken

Purpose of the ES reviews	Findings
To document the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects	<ul style="list-style-type: none"> • One ES (2015) was reviewed. • Onshore and nearshore socio-economic impacts were considered. It has been difficult to determine if the land aspects of offshore windfarm projects are legally required to be included in one single EIA (it would appear so judging by the permits - KW). • No direct reference to 'socio-economic' as a topic. • Employment details were not present • Significance of impact mainly addressed for economic impacts • Wind Farm AB were the authors of the ES – no details of the company found
To identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (esp cumulative and monitoring	<ul style="list-style-type: none"> • This windfarm was proposed in an area without a local population. • There was greater coverage of economic impacts than social. • GVA (Gross Value Added) and input output studies were not included. • Social impact topics addressed: health and comfort, visual impact and recreation. • Any cumulative impacts were not stated.
To identify key elements within economic broad headings, and specify the methodology used	<ul style="list-style-type: none"> • The key economic topics considered were: commercial fishing and shipping/sailing. <u>Examples of methodology used:</u> • Risk analysis – shipping • Air barrier analysis
To identify key elements within broad social headings, and	<ul style="list-style-type: none"> • The key social topics considered were: Visual impact, Health and comfort, recreation <u>Examples of methodology used:</u>

ES review of socio-economic impacts content—Non-UK EU countries

methodology used	<ul style="list-style-type: none"> Norrköping municipality commissioned a landscape analysis as a basis for its wind energy plan Land properties analysis for planning of wind power in the Municipality of Norrköping, Östergötland
To identify the relative coverage of socio-economic impacts in the various stages of the OWF lifecycle	<ul style="list-style-type: none"> Significance of impact on socio-economic topics was primarily focused on the construction and operation phases of the project. Decommissioning phase was considered
To identify trends over time.	<ul style="list-style-type: none"> Not possible due to limited number of ESs reviewed
To explain variations in ES consideration of impacts (e.g: more coverage for larger projects; any variations according to distance from shore?)	<ul style="list-style-type: none"> The low sample number (windfarm ESs) restricts correlation of impacts with size of projects or distance from shore.
Mitigation, enhancement and monitoring measures	<ul style="list-style-type: none"> Mitigation for social impact was largely based on minimizing the visual impact of the wind farm by making rotor blades anti-glare colour, uniform design with subtle colours. Mitigation measures put in place to reduce the impact of noise, e.g. working hours limited. Shadow life should not exceed eight shadow hours per year on a relevant property.
To consider, document and explain any international variations in experience from comparison between UK and Swedish wind farms	<ul style="list-style-type: none"> Permit based!
Best practice learning from current ES practice to improve future practice.	<ul style="list-style-type: none"> No actions stand out but difficult to address with just the one ES reviewed.

6.2 Review in Brief

- Lack of detail or emphasis on the socio-economic impacts. This may have been due to the remoteness of the area?
- Information on demographics, population of nearest built up area etc was not present
- Employment numbers were not supplied
- There was a lack of information regarding the impact of wind farm construction workers (e.g. numbers of workers and where they would live)
- Proportion of the wind farm energy output was to be allocated to local residents and businesses
- Local ownership and direct use of wind farm energy was planned
- Communication/consultation with local groups (sailing etc) was thorough
- There was detailed information regarding the procedure/timelines for decommissioning

(Additional reviews are needed to give a more robust reflection of Swedish EIA practice)

6.3 Overview of Swedish EIA procedure for offshore wind farms in the North Sea/Baltic Sea

Responsibilities

- The Environment Authority is responsible for the EIAs, and the Swedish Energy Agency for grid consents
- Municipalities and National/County Administration Boards for spatial planning and on-land cabling
- Central Government for offshore cable permits, use of territorial waters, EEZ and Marine spatial planning

Permitting: Legislation is differentiated between: coastal areas, territorial waters and the EEZ (Exclusive Economic Zone). Within territorial waters licenses for offshore windfarm installations are granted by the Swedish Land and Environmental Court. Within the EEZ, the National Government is the licensing authority. The following assessments and permits are required in order to build an offshore wind farm:

- EIA
- Grid connection
- Building permit from the local municipality
- Cable laying permission
- Permission for the use of territorial waters approved by Swedish Government and dealt with at regional level
- Permission for the use of the EEZ from the Swedish Government

Marine Spatial Plans (MSP): The Swedish Agency for Marine and Water Management is the authority in charge of the development of the MSP. In 2015 the Agency put forward a proposal for the MSP called “*Proposal for the direction of the marine spatial planning and the delimitation of the environmental assessment*”. This is a scoping report of the proposed areas for the implementation of MSPs which discusses the issues to address within each plan. It includes a discussion on the MSP process.

The following quotes were taken from the consultation phase website:

A marine plan is a strategic plan, with great features and details. Sweden's marine plans shall show the state's overall view of the use of the sea. The maritime plans should combine business, social and environmental objectives. Planning is about controlling the future we want.

The public is rarely affected directly by sea plans, partly because the sea plans in most places start a bit out of the coast. But everyone can make suggestions for improvements to the proposals for sea plans.

MSPs will be implemented regionally by giving responsibility to groups of municipalities. Regional and city councils will be working together to implement the marine plans within regions. The new regulation introduced in the Environmental Code means that the Swedish Agency for Marine and Water Management and the municipalities have overlapping responsibilities in the territorial seas. To overcome this problem, The Goteborg Region Association of Local Authorities which is a regional planning body appointed by the government, has initiated a preliminary study on inter-municipal coastal planning. Three plans covering the territorial sea and the EEZ are under preparation: Skagerrak/Kattegat, Baltic Sea and Gulf of Bothnia. An SEA was found for the MSP proposal for the Baltic Sea (2018); this was contracted out to Cowi by the Swedish Agency for Marine and Water Management.

The Swedish Environmental Protection Agency provides information regarding Socio-economic Impact Assessments (link in Appendix 2). The guidance does not marry up with the information provided in the Marviken Windfarm ES.

National Maritime Strategy (NMS)

In parallel with the development of MSPs, the Swedish government put forward a National Maritime Strategy (NMS). This was adopted in 2015 and was used as a tool to implement MSPs in Swedish waters. The NMS includes policies for regional economic growth, sectoral policies for the use of marine space, and environmental policies.

7. Initial summary of findings for Ireland

7.1 Overview of the findings from the Irish Offshore Wind Farm Reviews

Table 9: Irish offshore wind farms reviewed

Date of ES	Wind Farm Name	Project Status	Distance from Shore (km)	EIA consultant
January 2007	Oriel Windfarm	Consent application submitted	5	Aqua-Fact International Services Ltd Plus a socio-economic appraisal (KHSK Economic Consultants)
January 2012	Dublin Array	Consent application submitted	10	MRG Consulting Engineers Ltd

Outline of the findings for Ireland

Purpose of the ES reviews	Findings
To document the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects	<ul style="list-style-type: none"> • Two ESs were reviewed (2007 & 2012) • Onshore and offshore economic impacts were addressed • A socio-economic appraisal was completed by KHSK Economic Consultants • Report IWEA; Jobs and investment in Irish Wind Energy (Deloitte & Touche, 2009) • The number social topics addressed was limited, there was greater focus on economic impacts. • Local impacts were the primary consideration in these studies
To identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (esp cumulative and monitoring)	<ul style="list-style-type: none"> • There was greater coverage of economic impacts than social across both Irish ES's reviewed. • Employment was addressed in both ESs for construction and operation. • GVA (Gross Value Added) data was included in Oriel ES. • Social impact topics addressed: noise, traffic, visual impact and recreation. • Cumulative impacts considered were aviation (air space management) and visual impact. • No residual socio-economic impacts were identified in these ESs
To identify key elements within economic broad headings, and specify the methodology used	<ul style="list-style-type: none"> • The key economic topics considered were: employment, tourism, commercial fishing and shipping/sailing. <p><u>Examples of methodology used:</u></p> <ul style="list-style-type: none"> • Socio-economic appraisal (KHSK Economic Consultants) Volume III, Appendix IVc • A report by Deloitte ("Jobs and Investment in Irish Wind Energy, 2009")

	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>EWEA analysis found that wind turbine and component manufacturing provides the majority of employment opportunities at circa 59% of direct employment. These elements represent 12.5 of the 15.1 jobs created in the EU for every MW installed. Ireland has largely missed the initial opportunity to build a significant wind turbine and components manufacturing industry and the majority of turbines and components are being imported from the continent. It has also been found that typically the wind turbine manufacturers use their own teams for the installation of turbines in Ireland; installation represents another 1.2 of the 15.1 jobs created in the EU for every MW installed. Therefore, it can be said that Ireland has not capitalised on 13.7 of the 15.1 jobs created in the EU for every MW installed like some of its European neighbours to date.</p> </div> <p>Deloitte (“Jobs and Investment in Irish Wind Energy, 2009”)</p>
<p>To identify key elements within broad social headings, and methodology used</p>	<ul style="list-style-type: none"> • The key social topics considered were: visual impact, noise, recreation and traffic <p><u>Examples of methodology used:</u></p> <ul style="list-style-type: none"> • Socio-economic appraisal (KHSK Economic Consultants) Volume III, Appendix IVc • MosArt Ltd carried out a Landscape Impact Assessment • Baseline traffic counts • Construction Noise Propagation Model -Woelfel IMMI 5.2
<p>To identify the relative coverage of socio-economic impacts in the various stages of the OWF lifecycle</p>	<ul style="list-style-type: none"> • Significance of impact on socio-economic topics was primarily focused on the construction and O and M phases of the project. There was a lack of significance supplied, particularly in the Dublin Array Wind farm. • Decommissioning phase was largely unaddressed for socio-economic impact.
<p>To identify trends over time.</p>	<ul style="list-style-type: none"> • Not possible with two reviews
<p>To explain variations in ES consideration of impacts (e.g: more coverage for larger projects; any variations according to distance from shore?)</p>	<ul style="list-style-type: none"> • The low sample number (windfarm ESs) restricts correlation of impacts with size of projects or distance from shore.

Mitigation, enhancement and monitoring measures	<ul style="list-style-type: none"> • Mitigation for social impact was largely based on minimizing the visual impact of the wind farm by optimizing blade colour and aesthetic appeal of the wind farm layout • Traffic Management Plan was in place during the construction • Mitigation measures put in place to reduce the impact of noise, e.g. working hours limited.
To consider, document and explain any international variations in experience from comparison between UK and Irish windfarms	<ul style="list-style-type: none"> • The Irish windfarm ESs showed greater similarity to the UK ES output than those on mainland Europe.

7.2 Review in Brief

- Onshore and offshore economic impacts were addressed
- There was greater focus on economic impacts than social in both ESs reviewed
- A socio-economic appraisal was produced by KHSK Economic Consultants for Oriel. This had a greater focus on the economic aspects than the social topics. The appraisal lacked modelling and not all information reached the ES.
- Employment numbers were supplied based on findings from Denmark.
- GVA were supplied in the KHSK report
- As with the other ESs reviewed local impacts were the focus over region and national.

7.3 Overview of Ireland EIA procedure for offshore wind farms

Table 10: Current EIA consent regime for Ireland (Guidance on ES Preparation for Offshore renewable energy projects, 2017)

Statutory Provision	Application Type	Area	Competent Authority
Foreshore Act 1933 (as amended) EIA and AA requirements apply	Foreshore licence and lease	High water mark to 12nm from the baseline referred to in section 85 of the Sea Fisheries and Marine Jurisdiction Act 2006.	Department of Environment, Community and Local Government
Planning and Development Act 2000 (as amended) and Regulations under the Act EIA and AA requirements apply	Planning permission (including strategic infrastructure development)	Jurisdiction of planning authority (usually to high water mark) and on the foreshore, where such development would adjoin the functional area of the planning authority	Planning Authority and/or An Bord Pleanála

MSP: Ireland is currently implementing MSP, working initially towards the production of a single plan for Irish waters.

Table 11: Project milestones- stages in the plan making process

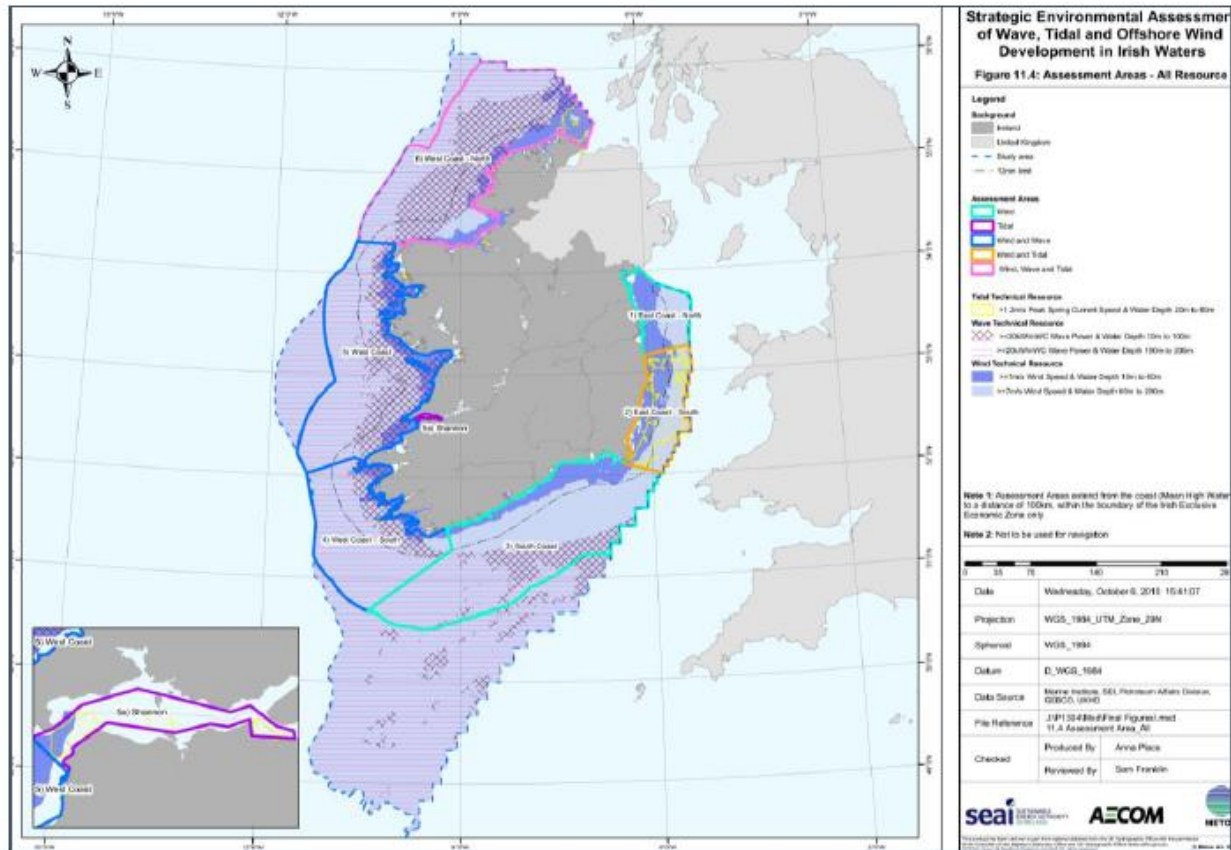
Stage	Milestone	Timeframe
Activation Stage	Establish and resource MSP function in Department of Housing, Planning and Local Government	Immediate – complete
	Identify and initiate contact with key stakeholders	Now – end 2017
Development Stage	Establish MSP Inter Agency Group	End November 2017
	Develop road map – <i>Towards a Marine Spatial Plan</i>	Publish before end 2017
	Initiate contact with broader external stakeholder group (e.g. energy industry reps, fisheries, coastal communities etc.)	<ul style="list-style-type: none"> ● In writing before end 2017 ● Regional workshop/stakeholder fora Q1 2018
	Prepare issues paper (this phase includes collection, mapping and analysis of data on current conditions)	<ul style="list-style-type: none"> ● Publish September 2018 ● 2 month consultation
	Prepare draft MSP (including Environmental Assessments)	<ul style="list-style-type: none"> ● To Minister/Government Q2 2019 ● 3 month consultation
Finalisation Stage	Prepare final MSP (including Environmental Assessments)	<ul style="list-style-type: none"> ● To Minister/Government Q2 2020 ● Publish and notify European Commission – Q3 2020
Implementation and Review Stage	Implementation and review	2020 onwards

Currently in place ‘*Harnessing Our Ocean Wealth*’ – an Integrated Marine Plan for Ireland was adopted in 2012. It sets out the Irish Government’s vision, high-level goals, and key ‘enabling’ actions to put in place the appropriate policy, governance and business climate to enable Ireland’s marine potential to be realised. In 2013 the government approved a General Scheme of a Maritime Area and Foreshore (Amendment) Bill⁵. The scheme aims to:

- Align the foreshore and terrestrial planning consent systems and reduce duplication of assessment in consenting process
- Set a coherent mechanism to manage development in the EEZ and on the continental shelf. It is proposed to define in Irish law n Irish Maritime area, which would encompass the foreshore, EEZ and designated pars of the continental shelf
- Enable the designation of offshore renewable energy zones and het granting of licences by the minister of Communications, Climate Action and Environment for offshore renewable energy projects

In February 2014 Ireland published their Offshore Renewable Energy Development Plan (OREDPA). This plan underwent SEA, Figure 2 below shows the OREDPA SEA areas.

Figure 2: Irish Offshore Renewable Energy Development Plan (ORED) SEA areas.



Source: Strategic Environmental Assessment of the Offshore Renewable Energy Development Plan (SEAI, Aecom, Metoc, 2010)

Project level guidance was published in May 2018, a key objective was to provide a policy framework for the assessment of applications for planning consents and the carrying out of EIAs. The following had socio-economic relevance: archaeology, commercial fisheries and aqua-culture, ports shipping and ferries (collision risk) recreation and tourism (access restrictions, noise, safety) Seascape.

8. UK Offshore Wind farm Process – for comparison

8.1 Strategic overview

The Crown Estate manages the seabed around England, Wales and Northern Ireland. In 2017 Crown Estate Scotland was formed to manage the seabed in Scottish territorial waters.

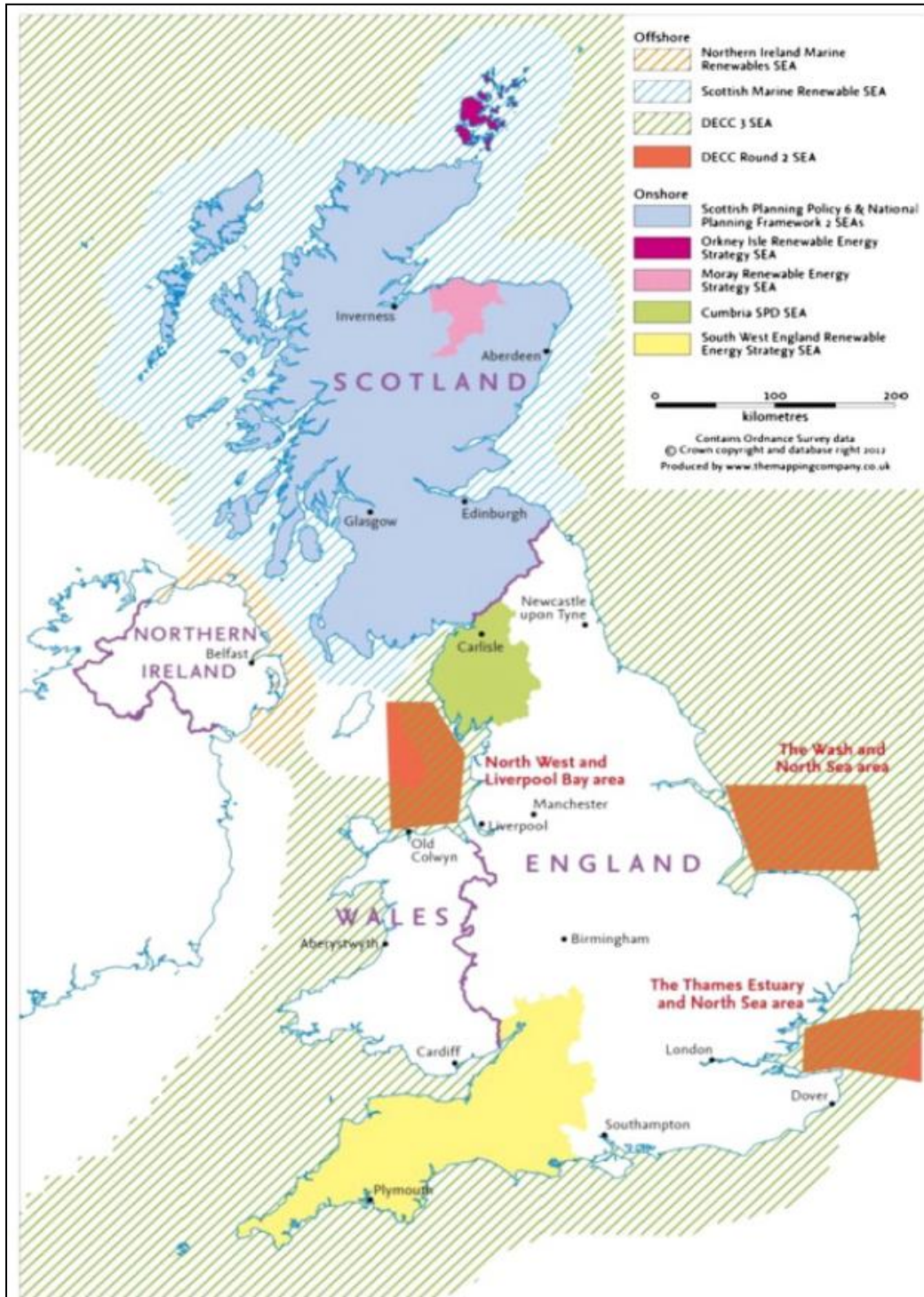
Before the consenting process begins for an offshore wind farm a sea bed lease must be secured from The Crown Estate or Crown Estate Scotland for offshore. Wind projects generating greater than 100 MW are defined as NSIPS. In England these are examined by the Planning Inspectorate; a Development Consent Order (DCO) needs to be submitted which includes a marine license and onshore consents. Onshore consent is awarded by the Local Planning Authority, unless the project is an NSIP. In Wales the marine license is determined by Natural Resources Wales. In Scotland, Marine Scotland examines applications for the offshore works. Two Acts cover different geographical regions: up to 12nm from shore –the Marine Scotland Act 2010; 12-200nm from shore – Marine and Coastal Access Act 2009. Marine Scotland regards coastal management as being part of marine planning and ensures plans for both are compatible.

The UK has a Marine Policy Statement. This provides the policy for all UK marine plans and decisions with the potential to impact on the marine area. These are subject to directive 2001/42/EC (SEA). In England and Northern Ireland, the Department for Environment, Food and Rural Affairs (DEFRA) is the statutory body for marine planning, and the Marine Management Organization is responsible for preparing marine plans. The organizations responsible for marine planning in Scotland and Wales are Marine Scotland and The Welsh Government, respectively.

Scotland

Suitable areas for offshore wind farms were identified in 2011 in the scoping report for offshore wind farms in Scottish Waters. Regional Locational Guidance documents were created in 2012 for offshore wind in order to capture local issues relating to these developments. The offshore wind energy plan for Scotland is called Blue Seas Green Energy; this was adopted in 2013. The Scottish Government initially carried out an SEA to evaluate the impact of offshore renewable on the marine environment. Scotland has its own Renewable Energy Zone and a National Marine Plan (2015), this focused on the development of the marine renewable energy sector that is composed of a network of offshore wind farms and other renewable energy sites.

Figure 3: Geographical Coverage of SEAs around the UK in 2012 (Phylip-Jones & Fischer, 2015)



8.2 Conclusions: comparison of UK with non UK EU offshore wind farm ESs

(Drawing on content in parallel UK ES review report)

Findings using the Country Framework headings:

(i) To document the extent to which socio-economic impacts (SEI) are being covered.

There are a number of similarities between the UK and reviewed non UK EU offshore wind farms ESs in terms of the socio-economic topics addressed. As seen with the UK reviews, key topics include tourism; commercial fishing; seascape/landscape and visual; shipping. From a social aspect the EU reviews appear to have a greater focus on impacts to recreation often linked with tourism than the UK.

Overall, the depth and focus on socio-economic impacts covered in the EU ESs appears less than that observed in the UK examples which had a ratio of about c 5:1 economic: social. As only socio-economic sections of EU documents were translated it proved problematic to accurately calculate ratios for the EU reviews. One example where it was possible was is Vesterhav South (2015). The Marine Environment document was 211p of which 6pp based on socio-economic impact) Environmental Conditions on Land 238p (10pp based on socio-economic impact).

Below are 5 examples where socio-economic topics had been addressed in greater detail:

- Both Kriegers flak and Horns Rev 3 have individual social-economic focus- report).
- Belgium - report – another good example? In the summer of 2009 (June-September), a survey was conducted on the coast that was part of a socio-landscape study about wind farms (Grontmij Vlaanderen 2010).
- Ireland (Oriel): a socio-economic appraisal (KHSK Economic Consultants)
- Ireland Dublin array
- Denmark - Marine employment "Commercial potential in Region Zealand at a wind farm at Kriegers Flak '(NIRAS, 2013),

There was minimal evidence of subcontracting socio-economic research; but one example is Ireland's Oriel OWF where a socio-economic appraisal was carried out by KHSK Economic Consultants. Consultancies have been involved in undertaking many of the ESs and in some instances two consultancies have been used to produce the ES -- one for land one for offshore. Major developers include Dong (now Orsted A/S), and Vattenfall AB.

(ii) To identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (esp. cumulative, and monitoring).

All ESs were found to contain greater coverage of economic impacts than social impacts. The key economic topics considered were: tourism (onshore and offshore); commercial fishing, shipping; traffic. Employment was addressed to varying degrees. The two Danish ESs from 2015 were inclusive of employment figures based on research carried out by NIRA. GVA (Gross Value Added) and input output studies could only be found in the Oriel ES.

As observed with the UK studies, the consideration of residual socio-economic impacts was limited in all the ESs reviewed. Several ESs addressed cumulative impacts; these were largely associated with fishing, and other OWFs within a zone; for instance, Horns Rev 3 looked at cumulative impacts with Horns rev 1 and 2. There is little evidence of socio-economic monitoring. In the Horns Rev 3 ES there was reference to monitoring for Horns Rev 1 and for Oriel wind farm noise monitoring was highlighted. Some data sets could not be followed up either due to translation difficulties or unable to trace online (e.g. Belgium's spatial analysis portal: Marine Management Atlas).

(iii) To identify key elements within broad 'economic' headings, and specify the methodology used

Background data had been obtained from a range of sources such as public records, statistics, and academic articles. This was often used in conjunction with information based from established wind farms. Generally there was a lack of any analysis, e.g. potential saturation of tourist market, of the above data in relation to the actual wind farm being developed. There were exceptions e.g. Vesterhav South included recent figures for tourism development in the area, including the number of nights spent on holiday. There was little use of quantitative methods, such as input-output analysis.

(iv). To identify key elements within broad 'social' headings, and specify the methodology used

The coverage of social impacts and impacts on local quality of life (QoL) in the ESs reviewed was minimal. Recreation was a key focus, along with changes in ferry trip duration and noise levels. Kriegers Flak proved an exception covering social impact more broadly by addressing the effect on accommodation and housing, employment, Area Recovery and Barrier Effect.

With regards to methodology two of the three Dutch ESs incorporated studies and research from a wide range of sources e.g. Nature & Environment and GFK, 2015. Attitude & perception of German tourists in relation to windmills on the Dutch coast, a review of study carried out in 2009, 2013 and 2014 looking at house prices changes in areas near wind farms.

As observed with the UK ES reviews there was a lack of depth with respect to impact of projects based on: community demographics, cost of housing, community wellbeing (increased vehicular movements, diversions etc), and crime and community cohesion. There was no disaggregation of distributional impacts on various community groups (e.g. young/old; M/F). Very little quantitative social impact information was found.

Methodology used was a combination of use of existing data, academic papers and reports from previous wind farm projects; consultation with stakeholders was highlighted in Denmark. And professional opinion was noted in one Dutch review. There was some evidence of public participation in the consultation phase. Vesterhav south ES stated that 'Consultation responses from citizens and organizations from the first public phase were involved in scoping and thus determining the content of the EIA report' Horns Rev 3 states interviews with local fishermen. MARIN and SAMSON (modelling tools) were commonly used to determine potential shipping safety issues.

(v) To identify the relative coverage of socio-economic impacts in the various stages of the OWF lifecycle

The main focus of these ESs is on the impacts related to the construction and ‘operation and maintenance’ phases. Decommissioning is largely unaddressed or anticipated to be same as the construction phase.

(vi) To identify trends over time

Limitations in the number of studies covering a wider time period makes identifying trends difficult to determine, however, there are indications of Improvement in ES over time. From 2012, Denmark made it compulsory to cover offshore and onshore aspects in one ES. This coincided with the use of consultancies which appears to have improved depth of coverage of social economic aspects. There are examples where information gained from earlier wind farms was used to help with research for later ones e.g. Horns Rev 1 research helping for Horns Rev 3 (Denmark). However, when looking at zones where a number of WFs are planned, the ESs that are produced for the later farms can perhaps rely over-heavily on the original and in the case of Belgium become very prescriptive, almost pre-determined.

(vii) To explain variations in ES consideration of impacts (e.g: more coverage for larger projects; any variations according to distance from shore?)

A major consideration in the EU analysis is whether the ES includes the onshore element of the project. This was not easy to determine in all the ESs reviewed nor from looking at country policy. The Belgian ESs did not include an onshore element; and stood out as lacking in socio-economic detail. There does appear to be greater focus on onshore socio-economic impacts for nearshore windfarms (distinct from offshore). This said, a number of offshore studies also included thorough socio economic content -- for instance, two out of the four Danish ESs had separate socio-economic reports associated (2014 and 2015 both were offshore!). The differences in level of coverage could be due to regulations/policy (where responsibility lies for the onshore element); further research is needed in this area. There was a lack of final plan information regarding construction port base(s) and cable landing points/ports which sometimes hindered the depth at which impacts could be analysed in the ES.

(viii) To identify evolving approaches to methodology –e.g. from expert opinions to more modelling approaches; and limitations of such approaches

There was variation in quality based on the consultancy used and methodology employed. More information such as how consultancies tender and where their guidance comes from would be interesting. From the evidence of these studies, there is only very limited use of modelling approaches.

(ix) Mitigation, enhancement and monitoring

Typical mitigations for economic impacts:

- timing of work to avoid the tourist season
- financial compensation (fishing and agricultural) and turbine placement to allow fishing boats and recreational boats access
- restricted working hours during construction and traffic management was also highlighted in the ES for Oriel WF

There was little or no monitoring for socio-economic impacts. Horns rev 3 recognized possible impact on cottage rentals due to visual impact covered in a study for Horns Rev 1. There was reference to likely impacts based on experiences from Horns Rev 1 and 2 in relation to tourism. Low significance of social impacts largely ruled out the need for mitigation; where they were considered they were mostly aimed at reducing the visual impact, via appearance of the turbines and to a lesser extent noise and landscape. For instance positive landscaping to reduce the impact on the population was mentioned in the Vesterhav South ES.

Good practice —learning from current ES practice to improve future practice

Denmark

Vesterhav South: Supplementary information from interviews/comments collected from third parties (such as estate agents and 'other knowledgeable people')

Denmark's ESs 2012 onwards improve with regards to depth of research and consideration of social-economic aspects. This falls in line with the legislation change to make the ES inclusive of onshore aspects and use of consultancies.

International Involvement: Denmark had consultation phases allow neighbouring countries to be involved.

Netherlands

Fishing and shipping were considered from a cumulative/transboundary perspective. The following was also highlighted related to gaps in knowledge: *'Uncertainties remain about the effects for instance, on the cumulative effects of multiple wind farms on- and in- mutually overlapping with other activities in the North Sea'*.

A government department (Rijkswaterstaat) to coordinate the monitoring of the expected impacts, in order to learn for future EIAs (adaptive management).

The impact on weather and cloud movement from multiple turbines was studied.

Belgium

In the summer of 2009 (June-September), a Belgian survey was conducted on the coast that was part of a socio-landscape study about wind farms (Grontmij Vlaanderen 2010).

Ireland

A separate socio-economic report was outsourced for Oriol WF which may demonstrates the recognition of a need for specialist input.

9. Conclusions - EU country discussion on policy re spatial plans and strategic planning

Current difficulties

All EU countries have a legal requirement to create marine spatial plans (MSP) which may include renewable energy plans and can be subject to SEA. The content of EIAs carried out at project level do vary in content and this may be attributable to the strategic context and process leading up to their production.

Scoping Reports and SEAs have been carried out in the UK and other EU member states. MSPs can drive and influence the topics covered in the EIA and the resulting ES. The government guidance documents observed have set topic areas which covered some socio-economic aspects (e.g fishing and tourism) but do not indicate the depth to which the topics should be addressed nor detail the extent to which purely socio-economic aspects should be considered.

A further consideration is how effective SEA impacts are on spatial plans. A report by Phylip-Jones & Fischer (2015) highlights the limitations of SEA influence on decision making. Based on a review of 18 SEAs, the report determined that:

- Over a third of the SEAs were unsatisfactory with regards to quality of SEA documentation
- SEA processes were conducted to varying degrees of effectiveness, with scoping a strength but impact prediction and mitigation weaknesses.
- Substantive outcomes of SEA were not always clear and the influence of SEA on decision making was said be limited in many cases.
- A lack of effective tiering between SEA and project level EIA was observed.

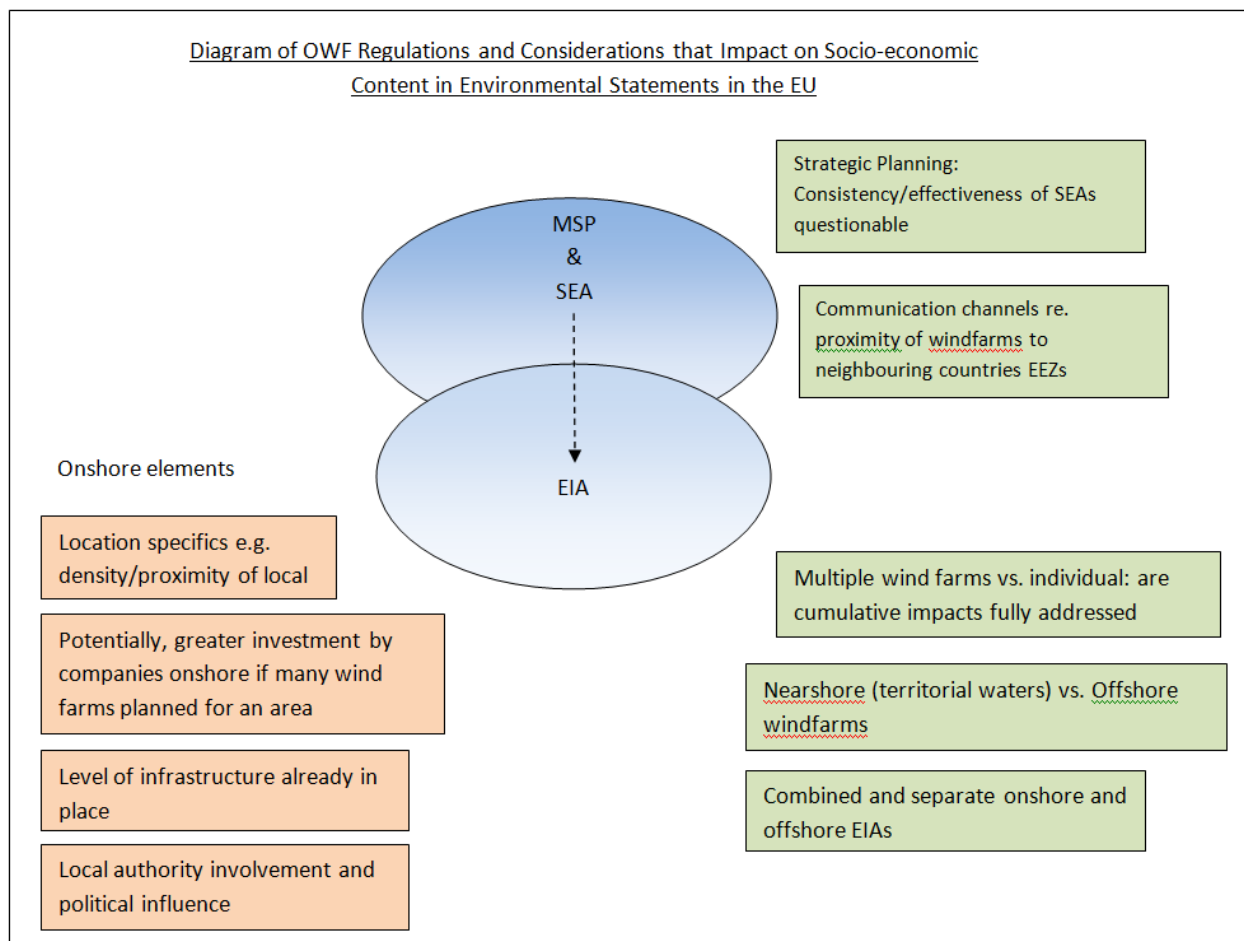
Belgium is a good example where a royal decree has determined and considered (weighed up) the impacts prior to setting the locations of the windfarms in their EEZ.

Typically, all ESs reviewed had an economic over social focus and the UK in particular covered socio-economic topics in much greater detail than those review for the EU. Why might this be? Could it be a function of the more all-encompassing approach of EIA topics in the UK, and the perceived importance of such projects to economically problematic coastal areas? However, due to the UK being a forerunner in offshore wind farms and the growing trend to allocate larger wind farms further offshore, might there be some diminution in such considerations? An added difficulty in making more generalised comment is the number of variables that need to be taken into consideration. As far as possible the diagram below outlines the different factors that ultimately impact on the content of final ES produced.

Figure 4 below aims to illustrate that the socio-economic content in a country's ESs may be a function of both strategic/policy factors and more local/locational factors:

- strategic: includes the country's MSP, MPs, and any zonal allocation strategies, and the extent that they have undergone rigorous SEA
- local: location of OWFs, their size and clustering; local agency input etc and the nature of their EIAs and resultant ESs
- the relationship between strategic and local, and the extent to which strategic (ie SEA) provides a higher guiding tier for the local (i.e. EIA)

Figure 4: Context of strategic and local factors which may influence social economic content in a country's OWF ESs



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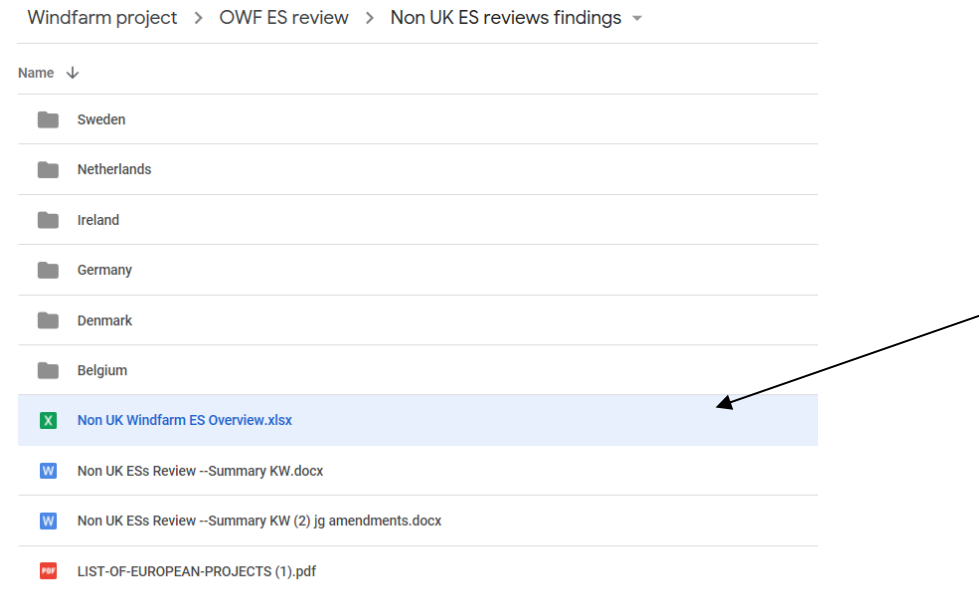
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Appendix 1

Excel spreadsheet – is on the Project Team Drive at Oxford Brookes University :



Appendix 2

Socio-economic impact assessment (Swedish Environmental Protection Agency)

The following is general information on Socio-economic Impact Assessment in Sweden (not specific to windfarms). The guidance below is very different from the information provided for the Marviken Windfarm EIA.

<http://www.swedishepa.se/Environmental-objectives-and-cooperation/Swedish-environmental-work/Work-areas/Socio-economic-impact-assessment/> (Access no longer available K Welch November 2019)

(Last updated: 18 September 2017, Content editor: Hans Hjortsberg)

A socio-economic impact assessment is a structured way of showing a proposal's advantages and disadvantages for society as a whole and for various parties. A socio-economic impact assessment is therefore an important part of the reports that we conduct.

An impact assessment is a way of structuring both the analysis and the underlying information for decision-making. It identifies and analyses the objective of a proposal as well as the likely impacts on society from the proposal.

A socio-economic impact assessment weighs the socio-economic cost against the socio-economic benefit. As far as possible, the analysis includes the consequences for all participants in society and all kinds of impacts, for example:

- *Social impacts (e.g. health)*
- *Economic impacts (can include effects on employment)*
- *Environmental impacts*

The impacts should, if possible, be described in economic terms. Thus, a socio-economic impact assessment differs from, for example, an environmental impact assessment, which focuses on the environmental and health-related effects from a scientific perspective.

A socio-economic impact assessment may have different ambition levels, depending on the scope of the environmental problem and availability of data. The choice of the ambition level principally affects how thoroughly the various stages of the impact analysis are described



Exclusive Economic Zones in the North Sea (version 10, 2018) Author De Hauwere, Nathalie

Definition: An Exclusive Economic Zone (EEZ) is a concept adopted at the Third United Nations Conference on the Law of the Sea (1982), whereby a coastal State assumes jurisdiction over the exploration and exploitation of marine resources in its adjacent section of the continental shelf. The EEZ comprises an area which extends either from the coast, or in federal systems from the seaward boundaries of the constituent states (3 to 12 nautical miles, in most cases) to 200 nautical miles (370 kilometres) off the coast.

KW final draft Nov 2019; JG final edit Jan 2020

