Co-designing opportunities towards the development of Irish offshore wind

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Deliverable D4.3 Regulatory Report – A Comparative Insight of Irish and Scottish Regulatory Frameworks for Offshore Wind Energy – An Expert Perspective

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Executive Summary:

Sources of marine renewable energy, are of significant importance in achieving energy efficiency and transitions to sustainability. Of these marine innovations, offshore wind energy is growing at unprecedented levels, driven by technological maturity, cost reduction and political will. Ireland is significantly behind on European Union decarbonisation objectives, with a paucity of offshore wind development in Irish waters. Occupying a vast marine resource, Ireland has the potential to tap into this growing global marine market and set the trajectory toward sustainability. This analytical policy research investigates the key enablers and constraints to achieving that growth, using Scotland as a jurisdiction for comparative analysis. Scotland was chosen due to its advances in the deployment of floating offshore structures and the operation of Marine Scotland as a 'one-stop-shop' for project consenting. Using Scotland for comparison provides critical insight into experiences learned in an international context and how these may be applied to Ireland. The research utilises a qualitative method through 24 semi-structured interviews with experts selected from industry and policy.

Enablers of offshore wind in Ireland were identified as opportunities to be addressed in the enactment and implementation of the Maritime Area and Foreshore (Amendment) Bill; and the development of a policy statement specific to offshore wind, to accelerate sector development. Key constraints identified included a lack of government commitment and appropriate legislative instruments, inefficient policy support and issues with fragmentation across various government departments.

Enablers of offshore wind in Scotland were noted as government commitment, clear policy support and the Contracts for Difference (CfD)[1] electricity price support mechanism. The importance of transitional based skills from the oil and gas industry was recognised as aiding sector progression. The importance of Scotland's 'one-stop-shop' consenting process was also discussed, and the implementation of technology specific auctions to allow development of offshore wind was deemed favourable. Key constraints identified for Scotland related to the

[1] See https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference

future political stability of the sector in light of devolved UK government functions; delays caused by lack of knowledge of environmental impacts, and the current political climate surrounding Brexit.

The research notes four recommendations for progressing the Irish offshore wind sector, which include: - i). a government policy statement on offshore wind, ii). enactment of foreshore legislation to enable project development, iii). increased integration and resourcing across government departments, and iv). increased capacity building (knowledge generation and engagement of stakeholders).

List of Abbreviations

ABP – An Bord Pleanála

CfD – Contract for Difference {UK}

CES – Crown Estate Scotland

DCCAE – Department of Communications, Climate Action and Environment

DHPLG – Department of Housing, Planning and Local Government

EEZ – Exclusive Economic Zone

EIA – Environmental Impact Assessment

EU – European Union

FLOOW – Fishing Liaison with Offshore Wind and Wet Renewables Group {UK}

GHG – Greenhouse Gas Emissions

MAFA – Maritime Area and Foreshore (Amendment) Bill {IE}

MCG – Marine Coordination Group {IE}

MMO – Marine Management Organisation {UK}

MRE – Marine Renewable Energy

MSP – Maritime Spatial Planning

NECP – National Energy and Climate Plan

NSIP – Nationally Significant Infrastructure Project {UK}

ORE – Offshore Renewable Energy

OREDP – Offshore Renewable Energy Development Plan {IE]

OSS – One-Stop-Shop

OWE – Offshore Wind Energy

PINS – The Planning Inspectorate {UK}

R&D – Research and Development

RLG – Regional Locational Guidance {UK}

RESS – Renewable Electricity Support Scheme {IE}

RO – Renewables Obligation {UK}

ROC – Renewables Obligation Certificate {UK}

SEA – Strategic Environmental Assessment

SID – Strategic Infrastructure Development {IE}

UK – United Kingdom

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1 Introduction

European Union (EU) targets are set to reduce carbon emissions to 80-95% below 1990 levels by 2050 (European Commission, 2014). Continuing at the present rate of economic growth, world energy demands are predicted to rise significantly by this time also (Moriarty and Honnery, 2012). At the confluence lies the drive toward alternative sources of energy, precipitating the industrialisation of the oceans (Wright, 2015). The EU is observed to be at the forefront of development in this emerging sector, reaching 18,499 MW cumulative offshore wind capacity by 2018 (Wind Europe, 2019). Ireland's ability to capitalise on this opportunity is limited by marine regulation which remains 'historically fragmented' (ICLRD 2013, pp.6). The Offshore Wind Energy (OWE) sector has stagnated with no operational developments since the completion of Arklow Bank windfarm demonstration project in 2004 (Murphy et al., 2016). A number of OWE projects are at the planning and development phase including the Codling Wind Farm and Oriel Wind Park in the Irish Sea (Figure 1). Other projects are in the early planning or consenting stages. In contrast, Scotland has numerous offshore sites in various development stages (Figure 2) and is pioneering operations in floating offshore structures (Legorburu et al., 2018). Strategic operational sites include the European Offshore Wind Deployment Centre (EOWDC) and Hywind pilot park. The Beatrice windfarm with a capacity of 588 MW has also begun partial generation as of 2018 (4C Offshore, 2019). Once fully operational in 2019, the Beatrice wind farm will become Scotland's largest offshore wind farm.

The research has been developed as part of an MSc dissertation and supported through the Eirwind project. The hypothesis was that Scotland has a perceived advantage over Ireland, in the development of offshore wind, due to a more sophisticated regulatory framework. Scotland was chosen for comparative analysis due to the presence of Marine Scotland as a 'One-Stop-Shop' (OSS) for project consenting, its track record in scaling and growing the offshore wind sector, especially in the last decade, and innovative advances in the generation of floating wind. The aim of the research was to examine key enablers and constraints for the offshore wind sector and to make recommendations on strategic areas of learning for Ireland going forward. Key questions to be answered by the research were:

- What do experts from industry and policy perceive as the main enablers and constraints within the Scottish and Irish regulatory systems for the development of the offshore wind sector?
- Outside of regulation, what offers a competitive advantage or disadvantage for OWE in both jurisdictions?
- In light of this, what recommendations for Ireland can be given?

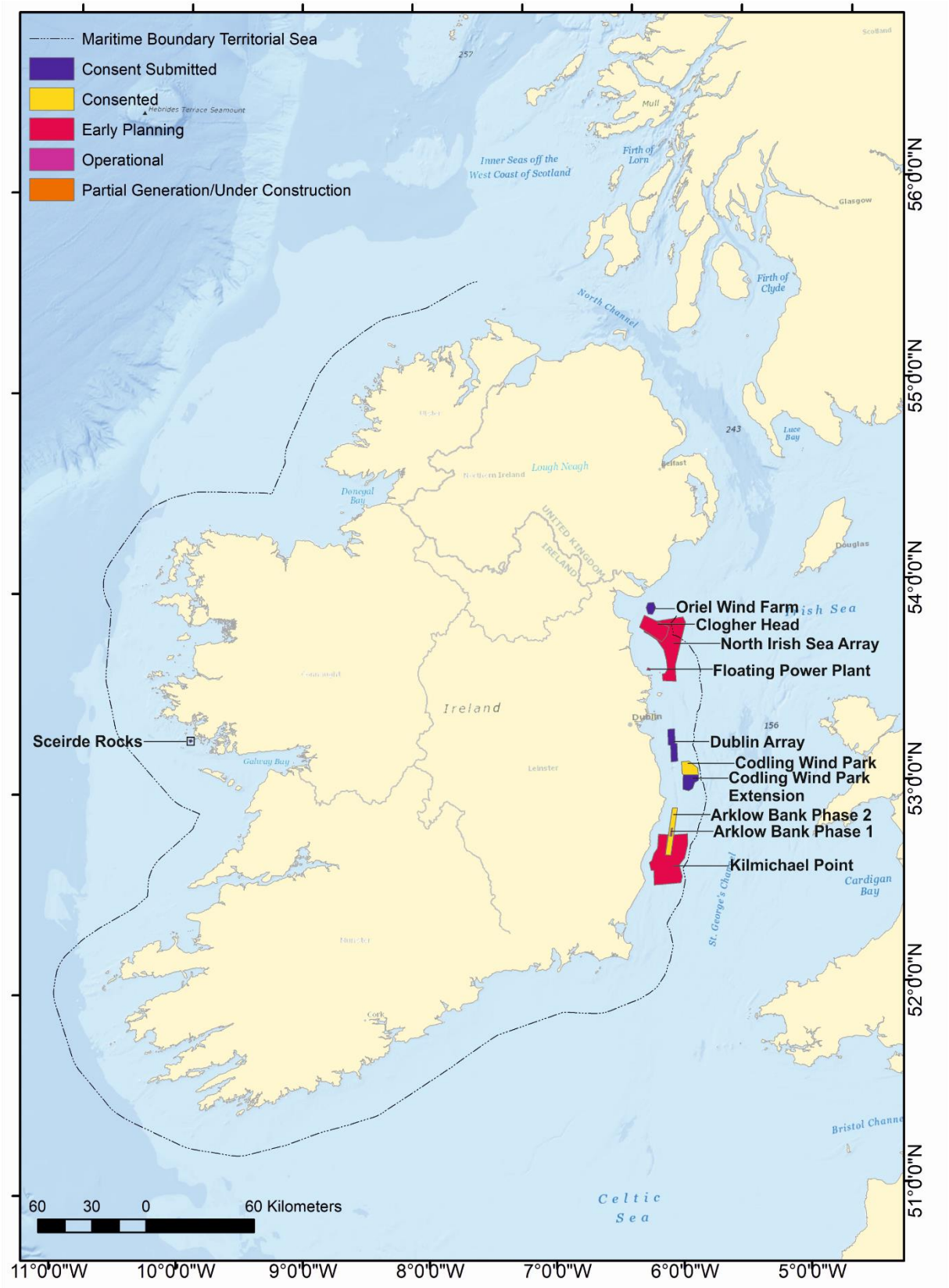

Figure 1 – Offshore wind sites in Ireland at various stages of development. Adapted from 4C Offshore, (2019)

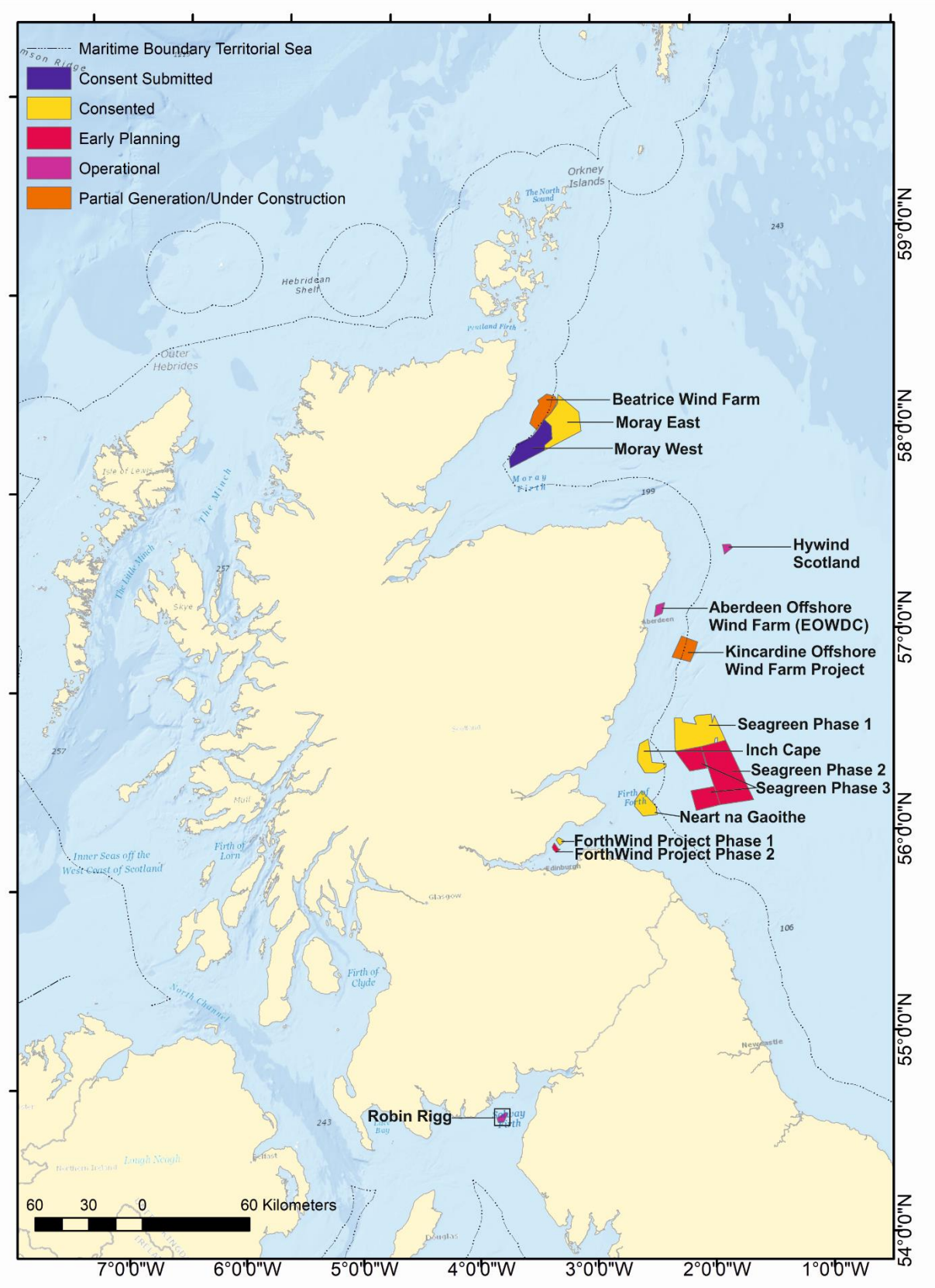

Figure 2 – Offshore wind sites in Scotland at various stages of development. Adapted from 4C Offshore, (2019).

2 Materials and Methods

2.1 Desktop Study and Data Gathering

This research is set against the conceptual backdrop of good environmental governance (Heldeweg, 2005; Lockwood et al, 2010; Bennett & Satterfield, 2018). The focus of this research is limited to one aspect of governance: namely the public policy and decision-making processes within government. A desktop study and semi-structured interviews were used to provide an evidence-based and data-led approach to the recommendations arising from the research. A desk-based policy review was conducted to provide an insight into the regulatory processes and policy structures within the OWE sector in Ireland and Scotland. This aimed to highlight respective governmental support for the offshore wind sector across both jurisdictions and provide a knowledge base prior to interviews. The literature review was designed to facilitate the identification of key principles across the literature which constitute an effective regulatory framework. These can be observed from Table 1. Second, a qualitative approach was used as a basis to explore phenomena in a real-world setting, using semi-structured interviews with experts, to provide an in-depth insight to the governance issues under consideration. This research approach has been found beneficial in similar studies (e.g. Wright, 2016).

Interview questions were framed under three broad themes encompassing: personal profile and experience, enablers/constraints to developments, and immediate/long term change. A combination of both a stratified purposeful sampling and snowball sampling approach was utilised. The target sample population included 16 project developers with informed views based on their experience of the sector, and eight interviewees from regulatory bodies with good knowledge and experience of industry requirements. Access to Scottish interviewees was provided through the 'All Energy' conference and exhibition held in Glasgow, Scotland from the 2nd to 3rd May 2018. In Ireland, data were acquired at conferences and meetings in Dublin and Cork where interviewees were approached to engage in the research. These conferences included the GDG Offshore Wind Event (May 2018, Dublin), MRIA Council Meeting (May 2018, Dublin), and Eirwind consortium meetings (February 2018, Cork and May 2018, Dublin). Contact was also made via email and LinkedIn. In total 90 interviewees were invited to take part in the interviews, of which 24 responded. Interviews were in the duration of 40 minutes in length with five in-depth interviews of one hour in total.

2.2 Data Processing and Analysis

Data processing and analysis was performed through transcription of interview data and a structural coding process. This took place across a number of stages as identified below.

Stage 1: Transcribed interviews were re-read with important information marked within the text in order to deconstruct the main areas emerging from the dataset.

Stage 2: Data was coded according to the main research themes introduced in the interviews. Initial coding of the dataset yielded 644 data points.

Stage 3: Each identified coded data point were re-evaluated against each other once all interviews were analysed. This allowed the adoption of a more comprehensive approach and grouping of similar codes in order to create unique data points under each theme.

Stage 4: Interviewee responses to each piece of coded data were organised based on the nature of participant responses. A positive response to a particular code was given the letter 'A' and a negative response 'B'. In this way, enablers and constraints were identified. In some instances, a response highlighting both a positive and negative response was expressed via 'A/B'.

3. National Framework for Offshore Renewable Energy

At a strategic level the EU sits at the forefront of developing a long term framework for climate and energy policy for renewable energy including Offshore Renewable Energy (ORE) development nationally across Member States (4Power, 2014). The Renewable Energy Directive 2009/28/EC sets the current legislative basis of meeting the electricity demand with renewable sources. This is set with a binding EU-wide target of 20% of the total energy mix by 2020 (European Commission, 2009). The 20% targets include a 20% reduction in Greenhouse Gas (GHG) emissions from 1990 levels, a 20% market share for renewable sources and an increase in energy efficiency levels by 20%. A revised renewable energy directive (EU) 2018/2001 through the Clean Energy for All Europeans Package, sets a new binding EU target of 32% of the total energy mix by 2030 (European Commission, 2018). This is accompanied by an upward review of increasing this figure in 2023. Key targets required by the Directive for 2030 include a 40% reduction in GHG emissions from 1990 levels and a 32.5% increase in energy efficiency levels (European Commission, 2014). Scenarios provided within the Energy Roadmap 2050 also set out how the EU will achieve long-term decarbonisation objectives (European Commission, 2011).

3.1 Ireland

Ireland has an obligation to achieve a nationally binding target of 16% renewable energy contribution in the energy mix and a 10% binding transport objective under EU 2020 targets (DCCAE, 2010). Renewable heat and electricity sub-targets have been set nationally at 12% and 40% respectively by 2020. The Irish framework however, has no dedicated legislation and limited policy, particularly for OWE. As set out by the CCAC, (2017) Ireland is set to significantly miss its targets which will have implications both for 2020 and realisation of 2030 decarbonisation objectives. Current estimates by SEAI, (2018) place Ireland's renewable consumption at 10.6% in 2017 relative to the 2020 target. Looking past this 2020 horizon to 2030, the EU faces a binding renewable energy target of 32% introduced through the EU climate and energy framework with an upward revision clause in 2023. To deliver on 2030 and long-term 2050 targets, both bottom-fixed and floating offshore wind are likely to be the prime technologies to deliver to the scale of capacity required.

In terms of departmental responsibility, the key departments with a remit for the marine environment include the Department of Communications, Climate Action and Environment (DCCAE) and the Department of Housing, Planning and Local Government (DHPLG). DCCAE holds responsibility for energy policy and the DHPLG retains the remit for foreshore legislation and terrestrial planning. Numerous other departments retain some influence over the marine environment creating a piecemeal approach to policy and decision-making. A key example of this is the division of responsibilities of fisheries and aquaculture which are in the remit of the Department of Agriculture, Food and the Marine. In order to address fragmentation issues, an

inter-departmental Marine Coordination Group (MCG) was established in 2009. The MCG maintain responsibility for the delivery of 'Harnessing our Ocean Wealth', an integrated marine plan however, its effectiveness is constrained due to a lack of strategic decision-making power and governance complexity (Lange et al, 2018). Although the importance of Marine Renewable Energy (MRE) is highlighted, the outlook for offshore wind development is stated as dependent on the commercial viability of the technology. Secondly, the potential development of the offshore wind industry is linked to the export opportunity (Marine Institute, 2012). Key pieces of legislation housed within DHPLG and DCCAE respectively, are the Foreshore Acts, 1933-2011; Planning and Development Acts, 2000-2018 and the Electricity Regulation Act, 1999. The Foreshore Acts, as amended, are currently in the process of reform through the drafting of the Maritime Area and Foreshore (Amendment) Bill (MAFA) 2013. This seeks to reform the consenting process so as to better align terrestrial and marine planning. MAFA aims to provide a legislative basis for development beyond the territorial sea limit of 12nm, as is defined by the 1982 United Nations Convention on the Law of the Sea (UNCLOS). Forthcoming foreshore legislation is yet to be enacted at the time of writing. The DHPLG are also in the process of developing a Maritime Spatial Plan (MSP) for Ireland. This is in line with the EU MSP Directive (2014/89/EU) and must be implemented by 2021 (DHPLG, 2017). The consultation on the National Marine Planning Framework baseline report (DHPLG, 2018) set the basis for the decision on how to develop a marine plan for Ireland. Questions posed within the baseline report surround how to align the plan with the National Planning Framework, transboundary concerns, necessary infrastructure investments, marine zoning and environmental issues to be addressed. The method of implementation of this plan and the coherency it may provide for offshore development, will prove vital going forward in establishing a framework for offshore renewables. Additional constraints are discussed in the literature in terms of grid development in particular connection delays of circa 10 years increasing project risk and cost significantly (Healy, 2017).

'Ireland's Transition to a Low Carbon Energy Future 2015-2030', a Government White Paper, sets the energy policy context to 2030 (DCENR, 2015). The importance of onshore wind in meeting short term targets is reflected within energy policy with offshore wind as a possible long-term option for both domestic use and export opportunity. Specific policy direction for ORE is contained within the Offshore Renewable Energy Development Plan (OREDP) (DCENR, 2014). The Strategic Environmental Assessment (SEA) of the OREDP found that 4500 MW of offshore wind could be deployed without 'significant environmental impact' (DCENR, 2014). The OREDP states the importance of onshore wind in the achievement of short-term targets. An interim review of the OREDP in 2018 indicated that it was 'generally still fit for purpose' given the limited activity in the sector, technology progress and anticipation of 2020 activity levels (DCCAE, 2018(a)). The Renewable Electricity Support Scheme (RESS), announced in 2018, introduced a high level design towards the implementation of a technology neutral auction approach with a single technology cap. Although a vital step toward realising offshore wind, this technology cap is not being proposed until the second auction tentatively scheduled for 2020. In the meantime, onshore wind is likely to be successfully promoted through the RESS. The RESS outlines a new renewable electricity ambition of up to 55% by 2030 (DCCAE, 2018(b)). Auction quantities and ambition within the RESS will be a function of trajectory targets and cost effectiveness set out in Ireland's 'Draft National Energy and Climate Plan (NECP) 2021-2030' (DCCAE, 2018(c)). The draft NECP has completed public consultation as of February 2019 and is due for release no later than December 31st 2019.

3.2 Scotland

The UK has a binding target under the EU Renewable Energy Directive of obtaining 15% of final energy consumption from renewable energy sources by 2020. As outlined by BEIS, (2018) the UK is currently short of this target, achieving 10.2% final renewable energy consumption by 2017. The UK operates a strategic focus toward offshore wind developments with the largest offshore wind capacity in the world (HM Government, 2019). CfD are the UK Government's main support mechanism to facilitate low carbon electricity generation. CfD facilitates investment in low carbon technologies and was introduced to replace the previous non-competitive Renewables Obligation (RO) scheme which closed to new electricity generation in 2017. CfD operate by mitigating against the full exposure to wholesale electricity prices and was introduced as a means of electricity market reform through the Energy Act 2013 (DECC, 2015). In 2019, the UK government introduced the first offshore wind sector deal through the UK's industrial strategy. The offshore wind sector deal provides for £250 million in investments to strengthen the UK supply chain and gives visibility of future CfD rounds with committed support of £557 million (HM Government, 2019).

At a devolved level, the Scottish Government maintains the remit, for the promotion of renewable energy, electricity generation consents and policies surrounding energy efficiency (Reid, 2017). Although heavily intertwined with both UK and wider EU legislative and policy actions, Scotland has maintained ambitious support for renewable energy and development of the offshore wind sector through regulatory and policy initiatives. In a wider context, the Scottish Government introduced a new Climate Change Bill in 2018, a revision to the Climate Change (Scotland) Act 2009 (The Scottish Government, 2019). The Bill proposes to achieve a 54% reduction in GHG emissions by 2020, and a 90% reduction by 2050. Interim targets of 66% in 2030 and 78% in 2040 are also set within the bill (The Scottish Government, 2019). Scotland has ambitious domestic targets of meeting 100% of its electricity generation from renewable energy sources by 2020 (The Scottish Government, 2017(a)). Scotland has made progress in achieving this target with over 70.1% contribution from renewable electricity being recorded by 2017. Scotland's Energy Strategy states this figure could rise to 140% which would further this vision out to 2030 (The Scottish Government, 2017(a)). There is a clear regulatory basis for the sector supported through key legislation and accompanying strategic policies. Key legislative pieces include the Marine (Scotland) Act 2010 and the Climate Change (Scotland) Act 2009, of which, an updated act with ambitious GHG emission reduction targets of 90% below 1990 levels by 2050 is forthcoming (The Scottish Government, 2017(b)). Policy documents including a Sectoral Marine Plan for Offshore Wind Energy (The Scottish Government, 2018(a)), Scotland's Offshore Wind Route Map (The Scottish Government, 2013) and Scotland's National Marine Plan (The Scottish Government, 2015), create the visibility for OWE. The National Marine Plan adopted in 2015 sets both high-level and sectoral driven policies for the marine environment. A review plan has been released in 2018 in accordance with both Scottish and UK legislation. The national marine plan review evaluates both the success of plan policies and identifies areas of constraints. Key findings within the review highlight that it has proven useful amongst regulatory authorities and non-statutory bodies. It has done this through setting a national context and fitting well with existing statutory functions and legislation. Particular constraints highlighted in the review include a lack of awareness and resources and consistency issues in adopting the plan across public authorities. Due to current uncertainty surrounding Brexit, replacing or amending the National Marine

Plan has been deemed unsuitable until clarification is provided. (The Scottish Government, 2018(b)).

The key bodies with a remit for the marine environment in terms of consenting and leasing of OWE projects are Marine Scotland and Crown Estate Scotland (CES). The Scottish Government has established a OSS for project consenting through the Marine (Scotland) Act 2010. The Act sets the legislative basis for Scottish marine licensing carried out by Marine Scotland's Marine Licensing and Operations Team (Marine Scotland, 2015). In this respect, Marine Scotland are responsible for development in Scottish waters out to 12nm under the Marine (Scotland) Act 2010 and 12-200 nm under the UK Marine and Coastal Access Act 2009 (Marine Scotland, 2015). Developers applying for section 36 consent under the Electricity Act 1989 for an offshore project are subject to a streamlined process. To that end, a section 36 and Marine Licence under the UK Marine and Coastal Access Act 2009 can be granted together by Marine Scotland providing a holistic management approach (Le Lièvre & O'Hagan, 2015). This aids in organisational integration of consenting for offshore projects, purported to give increased certainty and ease of development. CES aid in the designation of leasing zones for offshore renewable energies and work collaboratively with Marine Scotland granting a seabed lease once consents have been granted to the developer (Crown Estate Scotland, 2018). A discussion document outlining new offshore wind leasing zones in Scotland was published by CES in 2018. This document gives a potential new leasing structure for offshore wind in line with option agreements which grant site exclusivity to the developer for 10 years (Crown Estate Scotland, 2018). This leasing will be in line with identified locations within Marine Scotland's Sectoral Marine Plan which identifies both shallow and deep-water offshore wind sites. The Scottish Crown Estate Act 2019 allows the management of assets at a Scottish level, whilst introducing the transfer of management to a more local scale. Functions that could potentially be transferred more locally to councils and communities include foreshore rights and the rights to wave and tidal energy leasing to 1nm, 3nm or 12nm. Transfer of Scottish marine assets beyond the foreshore will be subject to parliamentary scrutiny prior to devolution of assets (Scottish Crown Estate Act, 2019).

Further to the policy context, Scotland's Climate Change Plan 2018 sets the trajectory toward sustainable transitions. The plan reflects how emissions will be reduced by 66% of baseline levels by 2032 with a proposed 28% reduction between 2018-2032 (The Scottish Government, 2018(c)). Recognition within policy documents of the importance of renewable energies in achieving EU targets and domestic opportunity is notable. Scotland's Energy Strategy sets a combined target of reaching 50% of energy generated from electricity, heat and transport to be supplied by renewable sources by 2030 (The Scottish Government, 2017(a)). The Scottish Government also has an objective to phase out new petrol and diesel vehicles by 2032 to decarbonise the transport sector. In terms of regulatory constraints, Scotland faces an inability to set energy policy pricing which gives Scotland a lack of control on renewable energy support mechanisms. Scotland faces uncertainty due to the UK leaving the EU and the political instabilities which may arise. Should the UK Government's direction on energy policy change following Brexit this will have implications for Scotland going forward and is likely to cause significant investment uncertainty for industry. Scotland also faces infrastructural constraints in particular, development of the national electricity grid to support increased levels of offshore wind generation. Expansion of Scotland's offshore wind capacity requires improved connectivity both within Scotland and between Scotland and England to facilitate the export of electricity (The Scottish Government, (2018(c)).

4 Results

4.1 Key themes and principles arising from the literature and from the data

Through a review of available literature, a number of key principles were noted as essential components of a regulatory framework. These are expressed below and include Stability, Integration, Long-term Visibility, Support and a Proactive/Ambitious Government. Table 1 highlights the key literature from which respective principles were identified.

Table 1: Key literature on Regulatory Frameworks for Offshore Renewables including key principles to be incorporated to ensure a fit-for-purpose structure

Principle	Description	Research
Stability	Regulatory stability with low risk of political upheavel & change to ensure developer certainty	Wright (2016), Klessmann (2011), Higgins & Foley (2014), Wieczorek et al (2013), Foxton et al (2005)
Integration	Organisational integration to streamline offshore development	Lange et al (2018), Salvador (2018), O'Hagan (2016), Klessmann (2011)
Visibility	Policy which takes a long- term view to ensure clarity for developers in making investment decisions	Wright (2016), Salvador (2018), Mani & Dhingra (2013), Foxton et al (2005)
Support	Governmental commitment and underpinning supports in place	Lange et al (2018), Salvador (2018), Kern et al (2014), Ochieng et al (2014), Dawley (2015)
Proactive/Ambitious Capacity	Proactive and ambitious government capacity in delivering regulatory initiatives	Kern et al (2014), Ochieng et al (2014), Dawley (2015), Higgins & Foley (2014)

Table 2 provides an overview of the nine most significant themes to emerge from the data. These reflect the issues of most concern to interviewees in Scotland and Ireland. Some of the factors are concerned with natural assets, such as environmental or site conditions, or with enabling critical infrastructure such as grid. However, most of the themes relate to the decision making process, ranging from the consenting regime in each jurisdiction, to planning and management of marine space. These enablers and constraints are presented according to these themes in more detail for each jurisdiction below.

Table 2 - All identified themes during data processing

No.	Identified Theme	Description
1	Regulatory and Policy Initiatives	Legislative and policy structures for the offshore wind sector. Strategic consenting and leasing bodies, timelines, auction process and issues surrounding clarity and resourcing
2	Infrastructure	Infrastructural components including grid, storage and port availability
3	Marine Space and Ownership	Interaction with marine space involving competing use, maintenance and access constraints, resource size, rights and ownership including engagement and acceptability
4	Environmental Interaction	Environmental Impact Assessments, biodiversity impacts, guidance documentation, knowledge generation
5	Organisational Supports	Supply chain, available skill set, research and development capacity
6	Site Conditions	Offshore site conditions and resource viability
7	Brexit	The consequence of Brexit on offshore wind developments
8	Other Jurisdictions	Other jurisdictions outside of Ireland and the UK
9	Additional Comments	Additional comments raised by interviewees

4.2 Expert Perspectives on Key Enablers and Constraints for the Offshore Wind Sector

Ireland Key Enablers

Table 3: Key Irish enablers

Identified Theme	Enabler
Regulatory and Policy Initiatives	· Government Policy Statement · Maritime Area and Foreshore (Amendment) Bill · Ministerial Championing · Technology Specific Auction · Marine Scotland's 'OSS'
Marine Space and Ownership	· MSP as a Management Approach
Site Conditions	· Site Viability/Cost Reduction · Marine Resource
Brexit	· General Advantage
Other Jurisdictions	· Germany · The Netherlands

Additional Comments	· Lessons-Learned Approach

Regulatory and Policy Initiatives

The narrative on Irish regulatory and policy initiatives focused on *pending* initiatives as key enablers, rather than regulatory or policy measures or strengths currently in place (Table 3). Interviewees identified a need for enactment of MAFA as soon as possible as a priority, to reduce complexity and to make progress with the decision making process. This sense of urgency is reflected in the statement that the, *"MAFA Bill has to be brought in ASAP so there's a clear and fair process for consenting in the offshore environment" – IRE Interviewee 9*. The data largely reflected a high degree of frustration with the significant delays associated with the introduction of this new legislation. The need for Ministerial championing of the offshore wind sector was expressed, accompanied by clear policy support, in order to drive willingness of industry to enter the Irish marketplace.

In terms of support mechanisms, interviewees positively discussed the introduction of a technology specific auction to deliver offshore wind. The recently announced Renewable Electricity Support Scheme (RESS) however, promotes a technology neutral auction approach. Developers largely criticised the introduction of a technology neutral process with one interviewee stating, *"A technology neutral approach is not the way to go for offshore wind. Many of the countries which have deployed offshore wind will have specific auctions and support for offshore wind"* – IRE. Interviewee 11. The need for incentive mechanisms to recognise the cost of offshore wind developments was discussed, and it was suggested that this be tailored to offer specific support for the sector. Interviewees criticised the current focus on onshore wind developments in the RESS. Nonetheless, the commentary signalled an expectation that the RESS would serve as an important vehicle toward the realisation of offshore wind development in Ireland. This is relevant given the introduction of a single technology cap through the RESS, tentatively scheduled for the 2020 auction, to facilitate nascent technologies.

Interviewees indicated strong support for Marine Scotland's OSS model, which was perceived as essential in driving the Scottish offshore wind sector. The need for a similar body to address the level of fragmentation within the consenting framework in Ireland was also noted, with one interviewee stating that, "*Having one marine consenting body and not just for offshore wind would be a useful idea because it allows consistency and allows different government departments to align better particularly for competing interests*" – IRE. Interviewee 11.

Marine Space and Ownership

Progress towards the implementation of MSP in Ireland was flagged as a positive signal. It is anticipated that MSP will provide clarity on where offshore wind developments can potentially be situated. Interviewees felt that this could alleviate concerns about competing use constraints across the marine space.

Site Conditions

The expansive Irish marine resource was discussed as a key enabler for development and an area of competitive advantage over Scotland. Interviewees discussed viable site conditions as a critical enabler for development of the sector in Ireland. Site conditions on the south and west coasts of Ireland were noted as significant for the development of floating wind

opportunities. There was also positivity with respect to the offshore wind sector becoming increasingly cost effective and competitive relative to other energy alternatives. The east coast of Ireland was noted as a prime area for cost effective developments due to shallow water conditions and site availability.

Brexit

Interviewees agreed that Brexit could create an opportunity to make the Irish market more attractive for international investment, stating, for example, that, *"In a post-Brexit environment where we have a lot of wind which is under developed we could be an attractive option"* – IRE. Interviewee 13. Agreement on the perceived advantage of Brexit for offshore wind developments however, was not uniform. Significant uncertainty as to the future of the Irish sector was noted, with interviewees discussing the possibility of increased tariffs on trade as a potential downside of Brexit.

Other Jurisdictions

Some interviewees noted that Germany and The Netherlands provide examples of best practice in the development of offshore wind in those jurisdictions. It was stated that both models provide ease of development for offshore wind farms due to streamlining of consents to be attained by the developer. Interviewees were positive with respect to the government-led approach and the presence of sectorally driven legislation for the offshore wind sector in both jurisdictions.

Additional Comments

The opportunity to take a lessons-learned approach was also raised. Some interviewees felt that this would allow for quick-paced development, by avoiding replication of the mistakes of other countries and facilitating lower cost developments as a result.

Ireland Key Constraints

Table 4: Key Irish constraints

Identified Theme	Constraint
Regulatory and Policy Initiatives	· Government Commitment · Government Policy Support · Foreshore Legislation · Lack of Clarity · No Competent 'Marine' Body
Environmental Interaction	· Knowledge generation – Baseline Data
Infrastructure	· Grid development, capacity constraints
Marine Space and Ownership	· Managing competing interests · Public Acceptance
Site Conditions	· Increased Development Cost

Regulatory and Policy Initiatives

Interviewees noted the lack of government commitment for the offshore wind sector, lack of sufficient policy support and significant issues surrounding the absence of foreshore legislation (Table 4). Ireland's slow pace of development, and the absence of an effective regulatory regime was criticised as not providing a clear route to market for developers. This point was reflected by one interviewee stating, *"I used to think Ireland had such an opportunity to tap into, but there's no one there taking the plunge"* – SCOT. Interviewee 11. At the time of writing, Ireland has made some progress towards implementation of policy measures through the RESS, however, foreshore legislation through MAFA is yet to be enacted. Irish interviewees felt they were at a disadvantage with the current level of support for offshore renewable energies in comparison to Scotland with one interviewee stating, *"In terms of policies and things Ireland is so far behind Scotland and everywhere else in Europe in support for deploying offshore wind"* – IRE. Interviewee 11. The need for a government policy statement and for progress to be made with foreshore legislation was raised as necessary in order to create positive market signals. This was reflected by: *"The first thing which is required by government is to put a policy statement out there to say we support offshore wind and are working on getting a framework which properly incentivises the industry to make it move forward" – IRE. Interviewee 8.* In evaluating differences between the policy and regulatory approach across both jurisdictions, one Scottish interviewee attributed this to: *"The main difference is that Scotland has seen offshore wind as an important technology and developed the policy and ambition level for that and they have that clear ambition to develop it. Ireland are perhaps getting to that now but are lagging behind time" – SCOT. Interviewee 1.*

With respect to consenting authorities, interviewees criticised the fragmentation occurring across various government departments in Ireland. The lack of clarity within the process acts as a barrier for entering the Irish market. Interviewees frequently discussed the need for integration across government departments through enacting a competent marine body for marine consenting. The Scottish consenting process through Marine Scotland's OSS was noted by Irish developers as a mechanism for consideration in the Irish industry.

Environmental Interactions

The need for increased baseline knowledge on the offshore environment was noted in the research. One interviewee discussed the requirement for increased spatial data collection particularly in relation to the fisheries industry, *"There's some data collected for larger fishing vessels but for the smaller vessels and inshore fishing fleet there's no spatial data saying where are the key areas that you should try and avoid and if you don't have that people will end up picking projects which could conflict with those industries" – IRE. Interviewee 11.* Interviewees noted that responsibility for acquiring baseline data to facilitate Environmental Impact Assessments (EIA) is with the developer. One interviewee suggested looking at the Scottish Natural Heritage model: -, *"What Scottish Natural Heritage have done is they have commissioned consultants themselves to develop a huge baseline of information that can be used and that would be very beneficial" – SCOT. Interviewee 9.*

Infrastructure

Interviewees felt that there was little insight into planning for strategic grid connection points. They also highlighted the need for future visibility for developers on where connections could be made and the need for upgrades to the grid in the short term. It was noted that offshore wind sites are located where the grid is at its weakest which is particularly concerning for west coast developments. *"Connection points coming onshore from offshore are always going to be coming onshore at a point where the grid is designed to be at is weakest. Significant upgrades are required from a grid connection perspective as this is an issue"* – IRE. Interviewee 10. Some interviewees discussed port availability constraints which would impact on delivering an offshore industry at the low costs being observed in the UK market. Requisite port facilities on the east, south and west coasts which have the ability to service developer needs in offshore wind projects was cited as a constraint.

Marine Space and Ownership

Criticism of the MSP process related to a perception of its delaying the introduction of critical foreshore legislation. When discussing rights and ownership of the marine space, public acceptance for the sector arose on a number of occasions. This was sometimes linked to the question of political support. *"We need a champion in government to promote and change the minds of the people to see the good of renewable energy development in Ireland. Because if we have a consenting process, grid and route to market but if all development is held up with judicial reviews in the European commission with objections, that could hold up projects for years"* – IRE. Interviewee 2. Interviewees expressed the need for increased engagement and co-operation to drive public support with one interviewee stating, *"There needs to be strong public consultation and not just in terms of at the time of an application but sectors themselves need to have an ongoing campaign to set out what they are doing"* – IRE. Interviewee 13.

Site Conditions

Interviewees noted that whilst the south, and particularly the west coast of Ireland, offer significant opportunity for development, the associated costs are yet too high due to deeper site conditions, and there are maintenance and access concerns in harsh weather conditions. Interviewees also noted issues of visual impacts, particularly when discussing bottom-fixed developments on the east coast within the 12nm limit. The opportunity for floating wind was discussed positively in the context of reduced visual obstruction.

Scotland Key Enablers

Table 5: Key Scottish enablers identified by Interviewees

Identified Theme	Enabler
Regulatory and Policy Initiatives	· Government Commitment · Government Policy Support · Revenue Support · Marine Scotland · UK Planning Inspectorate Process · Crown Estate Scotland
Organisational Supports	· Supply Chain · Skills

Regulatory and Policy Initiatives

Key regulatory and policy enablers (Table 5) identified were: - government commitment toward developing the offshore wind sector, as evidenced in Scottish policy; as well as the CfD revenue support mechanism. Interviewees were positive with respect to the CfD system due to its competitive and technology specific auctions, which have significantly aided cost reduction in the offshore wind sector in Scotland. The evolution from previous, non-competitive Renewables Obligations certificates[2] (ROCs) to CfD was generally perceived as favourable. Marine Scotland's OSS for project consenting also emerged as a key enabler for offshore developments. Enhanced integration and streamlining of government functions through the OSS system has increased developer confidence in the functionality and responsiveness of the regulatory system. The effectiveness of CES was perceived positively. Interviewees were favourable with respect to both Marine Scotland and CES strategically working together. This was considered to have facilitated ease of development. According to one interviewee: *"You have two agencies to deal with. In that respect we are pretty good and I haven't come across another country as easy to operate in" – SCOT. Interviewee 8.*

The research also identified that the consenting process via the planning inspectorate in English and Welsh waters for Nationally Significant Infrastructure Projects (NSIPs) was even more favourable than the Marine Scotland system. The UK Planning Act 2008, outlines the role of the Planning Inspectorate in granting consents for NSIPs over 100 MW in English and Welsh waters (Planning Inspectorate, 2012). The Planning Inspectorate process (PINS) follows a structured and formalised procedure involving six defined stages, pre-application (variable timeframe due to project scale), acceptance (28 days), pre-examination (3-month guideline but no statutory approach), examination (6 months), recommendation and decision (3 months) and post decision (6-week period to challenge decision). The clarity offered by this approach, was considered favourably by both Irish and Scottish interviewees who had been involved in UK developments. *"You are going to know it's so many months before or after you have submitted your application to when you get a decision so that's really beneficial for developers having that clear transparent timescale" – IRE Interviewee 11 and "Looking at the track record of PINS (The Planning Inspectorate), I would go for PINS every time" – SCOT. Interviewee 6.* Applications for consent below this threshold are considered by the Marine Management Organisation (MMO) under section 36 of the Electricity Act 1989. The MMO is actively involved in the process with the Planning Inspectorate when making applications for development consent orders and in granting marine licences. The MMO was established under the Marine and Coastal Access Act 2009. This provided for a revised process of marine management through new planning architecture, delegation of conservation zones, changes to national and local level management of marine fisheries and facilitated the establishment of an Exclusive Economic Zone (EEZ) for the UK and Welsh marine zone. (Marine and Coastal Access Act, 2009).

Organisational Supports

The maturity of the supply chain and availability of skills emerged as a unique enabler in Scotland with particular regards to the opportunity for knowledge transfer from the established offshore oil and gas industry. Interviewees were strongly aligned in the view that transitional based skills including knowledge generation and technical expertise in operating

[2] https://www.ofgem.gov.uk/publications-and-updates/renewables-obligation-guidance-generators (Accessed 23.05.2019)

in harsh conditions had aided sector development significantly. This was supported by one interviewee who stated that: *"Scotland has a huge invested base in oil and gas with all the skills and expertise in that and lots of knowledge and energy professionals which is another advantage" – SCOT. Interviewee 6.* Transitional mechanisms provided through Scottish Enterprise Oil and Gas Diversification Guides (Scottish Enterprise, 2016) were mentioned as aiding the exchange of skills from the oil and gas industry toward renewable energy alternatives. This guide identifies strategies for market entry and areas within the offshore wind supply chain where high potential synergy exists between the oil and gas and offshore wind industries.

Scotland Key Constraints

Table 6: Key Scottish constraints identified by Interviewees

Identified Theme	Constraint
Regulatory and Policy Initiatives	· UK Remit · Marine Scotland
Environmental Interaction	· Knowledge Generation baseline data
Infrastructure	· Grid development, transmission costs, capacity
Organisational Supports	· Local Content
Site Conditions	· Site Viability
Brexit	· Uncertainty · Increased tariffs

Table 6 summarises the breadth of constraints raised by interviewees, which included negative perspectives on issues previously raised (e.g. regulation and policy), and concerns such as Brexit. These are described in more detail below.

Regulatory and Policy Initiatives

With respect to devolution, which grants certain transferred matters to the Scottish Government, energy largely remains a reserved function, controlled by Westminster. This limits the ability of the Scottish Government to fully promote renewable energies and energy efficiency. Westminster retains the remit in setting Scottish financial support mechanisms for offshore wind. Interviewees raised concerns about the future stability and visibility of the offshore sector including floating wind, in this apparently less than ideal geo-political setting. In terms of the consenting and leasing process, Scottish interviewees expressed concern over the lack of a clear line of sight through the CES allocation process. In order to maintain consistent levels of deployment, interviewees stated the need for regular seabed leasing rounds in order to avoid 'feast or famine' practices: - "We need visibility of projects to come at the same time at regular intervals so that we are not flooding the system. It's not a feast or a famine it's all about balance" – SCOT. Interviewee 2. Currently, the next leasing round is scheduled for 2019 with no designated leasing during 2018.

In consenting projects, Scottish interviewees expressed concern with the timeline for processing applications, and resourcing constraints within Marine Scotland. This cohort felt they were at a competitive disadvantage in comparison to the Planning Inspectorate process operational in England and Wales. Marine Scotland aims to determine Section 36 and marine licence applications for offshore generating stations within nine months, however, this is not strictly formalised and many projects suffer increased waiting periods far past this nine-month timescale. One interviewee stated: - "The only thing may be to reconsider the consenting process in Scotland with Marine Scotland, because if you put something in the system you don't know when it's going to come out and that's a big problem" – SCOT. Interviewee 6. The lack of resourcing within Marine Scotland was criticised as a cause of delays in consenting of offshore projects. Interviewees called for increased resourcing capacity within the consenting authority, to facilitate the timely processing of large volumes of applications. It was identified that significant improvements in terms of resourcing constraints in recent years had been made, in comparison to early stage barriers.

Environmental Interaction

Environmental uncertainty was a notable constraint discussed by all interviewees with regards to Scotland. There were a number of negative comments with respect to judicial review proceedings in particular. Judicial review proceedings occur when a court reviews administrative actions taken by a public body. These actions surround the lawfulness of a decision or action to determine if correct legal procedures have been followed. It became apparent that it was not the judicial review procedure itself that was cause for concern, but the lack of available information to assess impacts on birds, that gave rise to these proceedings in the first instance. One interviewee discussed the significant pace of progression within the sector, as possibly contributing to these concerns: - "*I don't know if Scotland tried to go too big too fast, rather than demonstration projects to understand the environmental effects. We're getting to the point now that there has been research and development to show these environmental impacts have been conservative*" – SCOT. Interviewee 4.

With regards to the lack of information on environmental impacts one interviewee observed: - "*The key issue is as a new activity we don't have good evidence for what the impacts are. We need to be better informed to make better decisions in future instead of basing things on models unlikely to be accurate*" – SCOT. Interviewee 9. A lack of baseline data has also contributed to increased cost within the industry. Interviewees discussed expensive collection of environmental data and costly aerial surveys, with another interviewee commenting: "*Two years of bird data you know that is vastly expensive. You need deep pockets and patience*" – SCOT. Interviewee 6. The need for increased knowledge and baseline data relating to impacts of offshore wind on seabirds was flagged. The need for early engagement with consultation bodies to avoid lengthy judicial review proceedings was also identified

Marine Scotland's precautionary approach to development was noted as stifling implementation of projects. Interviewees made reference to this particularly in discussing the consenting process and levels of environmental uncertainty in relation to possible impacts to development. Comments such as a, "*Section 36 consent is nice if the government have the guts to put it through*" – SCOT. Interviewee 6 and "*There will always be scientific uncertainty but people still need to make decisions*". – SCOT. Interviewee 9 reflect this.

Infrastructure

Grid infrastructure was noted as an issue of concern in Scotland, with grid development, transmission cost and capacity constraints frequently discussed. Scottish interviewees felt at a disadvantage due to current grid availability. *"The best resource is where the least people are. South of England is easier to get grid as there are more people there"* – SCOT. Interviewee 8. In relation to electricity transmission costs, charges payable to the National Grid have a locational element. A key issue raised was that Scotland is penalised and subject to higher costs due to its position far north of the demand centre of London.

Organisational Supports

The importance of increased local benefits to the Scottish economy with domestic growth of the supply chain in the construction of offshore projects was noted. However, some interviewees were sceptical about the extent of local benefits. One participant stated, *"I think they (The Scottish Government) need to work harder in making sure that the benefits really do come to Scotland, we want to see local benefits" – SCOT. Interviewee 6.* The potential to create a more prescriptive local supply chain can be at odds with cost competitiveness *"They have to go where they get it cheapest and that may not be the local market so that's a bit tricky" – SCOT. Interviewee 6.*

Site Conditions

Scotland is constrained due to the lack of available shallow water sites, which facilitate ease of development and lower associated costs. Sites for bottom-fixed technology are not as readily available to developers and are less cost competitive as those in competing CfD auctions in England. Developers, however, acknowledged that the deeper site conditions will allow Scotland to become an innovation hub in the construction of floating wind.

Brexit

Uncertainty over Brexit is impacting on developer confidence, as developers perceive a risk to development. One interviewee stated, *"I struggle with what Brexit even is. Is there a transition period or do you just fall off a cliff?"* – SCOT. Interviewee 4. Interviewees also expressed disquiet arising from possible increased costs of supply chain components. For example, it was stated that Brexit may facilitate a change in focus toward developing a local supply chain, in light of the perceived increase in tariffs etc., France was mentioned as an example of best practice for local supply chain content in offshore projects.

5 Discussion

The results are discussed below according to regulation and policy; infrastructure; integration; and knowledge building and stakeholder engagement. These factors are prioritised in the framing of the discussion because they have been identified as critical components in delivering an offshore wind industry in Ireland. These factors can be mapped, to a greater or lesser degree, to the principles identified in the literature, that represent an effective regulatory system (as expressed in Table 1). The approach to the discussion focuses on lessons that can be learned for Ireland, arising from the comparative analysis of the two systems.

5.1 Regulatory and Policy Initiatives

Evidence of a long-term regulatory framework with a low risk of political upheaval and change, to ensure developer certainty, was identified as a prerequisite to enable offshore wind (Wright, 2016; Klessmann, 2011; etc.). Ireland appears to display a deficiency with regards to fit for purpose policy and consenting structures. There are lessons to be observed from Scotland on its approach to policy and regulation. In particular, it can be said that Scotland stands apart because of the ambitious nature of its approach, organisational integration and underpinning supports (Kern et al., 2014; Lange et al., 2018). The question of Brexit introduces uncertainty to the future outlook for both jurisdictions, undermining the potential for the stability (Wright, 2016) and visibility (Foxton et al., 2005 etc.) required to make long term investments.

5.1.1 Planning and Policy

The data arising from the interviews indicates that Ireland falls short in delivering the necessary regulatory and policy instruments to provide developers with the certainty they require to enter the Irish market. The research shows a strong perception that the Irish government is not doing enough to demonstrate support for offshore wind. The lack of a dedicated policy statement for offshore wind is a key gap, which was frequently highlighted. While Ireland's energy policy provides a policy direction to 2030, the strategic focus is orientated toward onshore wind. Offshore wind technology is slated for future potential domestic use, and noted as an area of export potential. However, no distinction is made between the future potential of bottom-fixed and/or floating foundations. Even though the OREDP (DCENR, 2014) identifies the potential for 4500 MW of offshore wind development there is little distinction between bottom-fixed and floating wind opportunities, and new data and trends have yet to be taken into consideration

At the time of writing, the MAFA Bill has not been enacted in law. This delay has significantly constrained the development of the offshore industry. The issue was highlighted as a serious cause for concern among interviewees. It fundamentally calls into question the level of government commitment and support, and requires a political champion to drive it through. By comparison, Scottish interviewees were relatively positive with respect to the level of political support and government commitment for the offshore wind sector, aligning well with key principles identified in the literature. The 'Scottish Energy Strategy 2017-2050' (The Scottish Government, 2017(a)) is supportive of both established and emerging technologies with the importance of offshore wind recognised in reaching short and long-term emission reduction targets. Scotland aims to achieve sustainable inclusive growth through the

implementation of both bottom-fixed and floating offshore wind and a number of renewable energy alternatives including the focus toward electrification of heat and transport sectors (The Scottish Government, 2017(a)). Scottish energy policy has ambitious renewable electricity objectives aiming to provide 100% of renewable electricity by 2020.

A key feature of the Scottish energy policy, in strong contrast to Ireland, is ambition (Dawley et al. 2015). Results reflect positivity towards this ambition, which cements governmental commitment toward decarbonisation of the economy. Scotland's ambitious policy development aligns with one of the key principles identified in Table 1.

5.1.2 Marine Spatial Planning

One of the support mechanisms that was considered positively in Ireland was MSP. There is an expectation that the MSP process in Ireland will give developers an insight into future development zones, however, if the government adopts a policy led, rather than a zone led approach to MSP, these expectations may not be realised. The zone-led approach appears to work well in Scotland, ensuring good visibility of sites for prospective developers.

A spatial approach for offshore wind development is provided for in the 'Sectoral Marine Plan for Offshore Wind Energy (encompassing Deep Water Plan Options) 2018' (The Scottish Government, 2018(a)). Marine Scotland aim to identify new shallow and deep water site locations for both bottom-fixed and floating foundations and will work with CES to deliver these sites to developers (The Scottish Government, 2018(b)). Identification of areas of 'best opportunity and reduced constraint' on a large scale by Marine Scotland avoids excluding potentially suitable sites. Once areas have been refined, Marine Scotland will focus in more detail on concerns surrounding existing use and other site specific issues (The Scottish Government, 2018(d)). Regional Locational Guidance (RLG) provided by Marine Scotland sets out technical, environmental and socio-economic aspects within search areas. This allows the evaluation of sites on a regional level.

Policy makers in Ireland could learn from Marine Scotland in the form of a 'Marine Licensing manual' and RLG documents which provide consenting, EIA guidance and spatial information for ORE. Spatial guidance documentation on a regional level, accompanied with marine licensing guidance, could prove beneficial for developers to ensure clarification and coherency. Ireland currently has guidelines on the preparation of Environmental and Natura Impact Statements for offshore renewable energy, and guidelines on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects, released in 2017 and 2018 respectively (DCCAE, 2017 & DCCAE, 2018(d)). These documents aim to facilitate ease of development in the offshore sector with respect to environmental considerations. Wind energy guidance was released in 2006, however, it is tailored toward onshore developments. Revised guidelines have been under development since 2013 (DECLG, 2013), and updates are proposed to be in place by 2019 (DCCAE, 2018(c)). Guidelines specific to offshore wind, are needed, as onshore wind guidelines are not readily transferable to an offshore environment.

5.1.3 Revenue Supports

In relation to revenue support, the introduction of CfD from the previous Renewables Obligation (RO) system was considered to be a relatively effective mechanism in Scotland. ROs were introduced in 2002 as a renewable electricity support mechanism[3]. In 2009 the mechanism was banded to include various support levels with respect to technological differences in terms of cost and market readiness (Grimwood & Ares, 2016). ROCs were issued to operators of accredited renewable generating stations for the eligible renewable electricity they would generate[2,3]. Costs have fallen from £150/MWh under the previous RO system to strike prices below 50% to £57.50/MWh for the 2022/2023 delivery year (KPMG, 2017). Visibility of support for future CfD auctions was considered to be an essential enabler in Scotland. This is outlined through the offshore wind sector deal with investments of up to £557 million being provided by the UK government (HM Government, 2019). However, it is not a panacea. A lack of specific floating offshore wind support, and the requirement for floating wind to sit within a specific 'pot' to avoid competing with established bottom-fixed wind technology, is an area of concern. The initial transition from RO to CfD support, created significant uncertainty at the time. CfD is considered to provide less flexibility than the banded approach in the RO system which gave Scottish Ministers the opportunity to include support for various technologies, which is not a feature of the current CfD support (Wood, 2017). The uncertainty with which future support mechanisms may operate and the reliance on UK regulatory support following Brexit places Scotland at a disadvantage currently.

In Ireland, policy makers will need to ensure that support mechanisms provide sufficient visibility and support (Table 1) as the RESS is rolled out. The fact that the RESS is initially designed to provide a technology neutral auction process was an issue for Irish interviewees. Developers felt that a technology neutral process would serve to optimise benefits to onshore wind, at a cost to more nascent technology alternatives. Although the RESS has proposed a single technology cap for the second auction scheduled for 2020, there is no distinction between bottom-fixed and floating offshore wind support potentially being provided. There is a need to recognise the higher costs associated with floating wind, and for government to roll-out incentive mechanisms to reflect those costs. Results highlight that tailored support is essential for the industry going forward. Scottish interviewees also agreed that the best way forward for Ireland would be to follow a technology specific approach, allowing offshore wind to sit within a specific 'pot' or auction round to ensure fair competition across established and emerging technologies.

5.1.4 Best practice examples

Discussions on regulatory and policy initiatives outside of Ireland and the UK highlighted the Netherlands and Germany as examples of best practice. The Netherlands Offshore Wind Energy Act 2015 provides the legislative basis for offshore wind developments (Noonan et al., 2018). Legislation implements a 'government-led' approach, whereby project risks, including offshore grid connection, spatial planning and environmental assessments, are dealt with solely on a governmental level. The process was introduced to accelerate the realisation of

[3] https://www.ofgem.gov.uk/environmental-programmes/ro/about-ro (Accessed 23.05.2019)

2020 targets, aimed at increasing offshore wind development from 1000 to 4500 MW (Noonan et al., 2018). This approach provides less associated development risk and was found favourable across interviewees.

The German offshore wind sector has also been catalysed significantly through the introduction of political and regulatory measures. The Renewable Energy Supply Act 2000 provided precedence to renewable energy generation including priority access to the grid which was deemed favourable. Revisions to the Act in 2014, provided for sectoral targets toward renewable generation including an offshore target of 6.5 GW by 2020 (MacKinnon et al, 2018). The current 2017 version of the Renewable Energy Act facilitated offshore wind energy through the introduction of government support and incentive mechanisms implemented in Germany through the Renewable Energy Supply Act. This has provided growth of the offshore sector through increased investment security and long-term confidence. Germany currently represents the second largest market behind the UK for offshore wind. The research identifies positivity towards this sectoral legislative approach and governmental support for offshore wind both in the Netherlands and Germany.

5.2 Integrative Structures

Enhanced integration (Lange et al., 2018 etc.) allows the opportunity for more streamlined decision-making processes. The value of a 'one stop shop', relating to organisational structure, was a significant topic raised in the interviews. Correlated with this, is the question of organisation efficiency. While the OSS mechanism in Scotland was flagged as an opportunity for Ireland, the actual effectiveness of the process, and its potential transferability, are discussed in greater detail below.

5.2.1 A 'One Stop Shop'

In an Irish context, management of the marine resource is fragmented with responsibilities dispersed across numerous governmental departments as highlighted in section 2. As results show, there is a strong demand for an integrated marine body to be enacted on an Irish scale. Integrative structures in a Scottish context highlighted positivity toward the devolution of Crown Estate functions to Scotland via the Scotland Act 2016. Devolution of Crown Estate functions enables a degree of flexibility in relation to management of Scotland's marine resource out to 200 nm. The OSS consenting mechanism, Marine Scotland, came about through the merging of two executive agencies; notably the fisheries protection agency and the fisheries research services, and the Scottish government marine and fisheries policy divisions (Audit Scotland, 2012). The strong emphasis on a traditional based fisheries component was not discussed by interviewees. Marine Scotland facilitates clear lines of contact for developers, operates a networked approach to marine management, and extends this network to include marine sectors outside of the offshore renewables sphere. In this way licensing and consents for fishing vessels, freshwater fish, marine licensing, seal licensing (culling of seals with respect to aquaculture and fisheries stocks protection), European protected species (listed in Annex IV of the Habitats Directive) and basking sharks (currently not included in the Habitats Directive) are provided. It should be noted that Marine Scotland

is not a panacea. Issues of timelines and resources, including Human Resources capacity constraints, were highlighted as cause for concern in the interviews.

A 'Marine Ireland' equivalent was envisioned by numerous interviewees to deal with current deficiencies in the regulatory process. However, questions remain as to the potential transferability of the model. Ireland has gone through a process of 'deconstructing' a coherent organisational approach to marine policy and planning. In 1987, a dedicated Department of the Marine was established. However, this has been consistently eroded over the course of the last 30 years, to the point where marine functions are dispersed among multiple government departments. Based on party manifestos, and the current programme for government, the political appetite for re-establishing a Department of the Marine is non-existent. If considered as an incremental, rather than as a radical point of departure, a OSS in Ireland may need to operate a networked and holistic approach to marine consenting in the first instance, and perhaps not exclusively to the ORE industry. Drawing from Scottish concerns of resourcing capacity constraints within Marine Scotland causing an early stage barrier for the industry, strengthening the resource base of current or future decision support organisations, is critical. This was identified as necessary from both Irish and Scottish interviews to avoid delays in the processing of offshore applications.

In the absence of the creation of a Marine Scotland equivalent in Ireland, a virtual OSS may be worth considering in the short term. The Ocean Energy Ireland Portal currently provides marine spatial data to end users. A linked online service could host the multitude of application forms currently dispersed across a multitude of government departments and agencies in a more integrated fashion. A one stop shop for guidance documentation, for example, pertaining to obtaining a foreshore license, EIA reports and engagement principles, could be housed within this type of facility. It could be supported by an advisory function that connects users with the requisite decision-makers. However, pathways and timelines to decisions would still need to be addressed, requiring a transformative public sector approach.

5.2.2 Pathways and timelines to decisions

Many interviewees were concerned with timelines and pathways to development. High variability in the timelines and pathways within the UK were flagged. There was a suggestion that the Irish regulatory process is particularly time consuming and complex. In an effort to better understand these perceived issues, Figures 3 to 5, map out the development processes in the separate jurisdictions of Scotland, England and Wales, and Ireland. (Northern Ireland was not discussed extensively by interviewees).

Figure 3 is indicative of pathways and timelines to development for an offshore wind project in Scotland. Offshore wind leasing is operated through CES. The timeline of granting an offshore wind lease is variable however, a lease must be granted within the 10-year option agreement. Marine Scotland operates a 9-month determination process once an application is submitted to the final ministerial decision. Timelines prior to this stage are largely developer-led and dependant on sufficient information being provided prior to application submission. In England and Wales, key stages within the planning inspectorate system are

attributed to a statutory or targeted timeframe (Figure 4). This provides developers with good visibility of each stage of the development consent order process and confidence in the timeline to which consents are secured. Currently there are no timelines associated with both Irish and Scottish legislation within which applications must be determined however, timelines associated with EIA are incorporated.

In Ireland, exclusive rights to occupy the foreshore are granted through a foreshore lease. For site investigation purposes and temporary activities, a foreshore licence will also need to be granted by DHPLG. Within the forthcoming MAFA legislation, An Bord Pleanála (ABP) under the Planning and Development (Strategic Infrastructure) Act 2006, is the proposed competent authority for consenting of Strategic Infrastructure Development (SID) and developments requiring an EIA (DECLG, 2013). SID decisions are those which provide strategic economic and social importance to the State. The process envisaged through ABP is that ORE will become SID (Figure 5), an equivalent process to the NSIP's in the UK. However, although MAFA provides a certain insight into the process, timelines are only suggested in certain stages with a lack of clarity within phrases such as 'it will be the objective' and 'at least six weeks' failing to provide a sense of formalised clarity (DECLG, 2013).

In line with the best practice approach observed through the UK NSIP process, the research identifies the need for implementation of statutory consenting timelines within planning and licencing architecture in Ireland. This would serve to decrease application processing times. Associated timelines are to be addressed in Irish legislation under the forthcoming planning architecture outlined in the general scheme of the bill released in 2013. Adopting statutory timeframes were necessary and providing clarity to each stage of the consenting process in Ireland, may provide increased visibility of project progression for developers. This is dependent on addressing the skills and resourcing gap in the interim to ensure a robust process is in place.

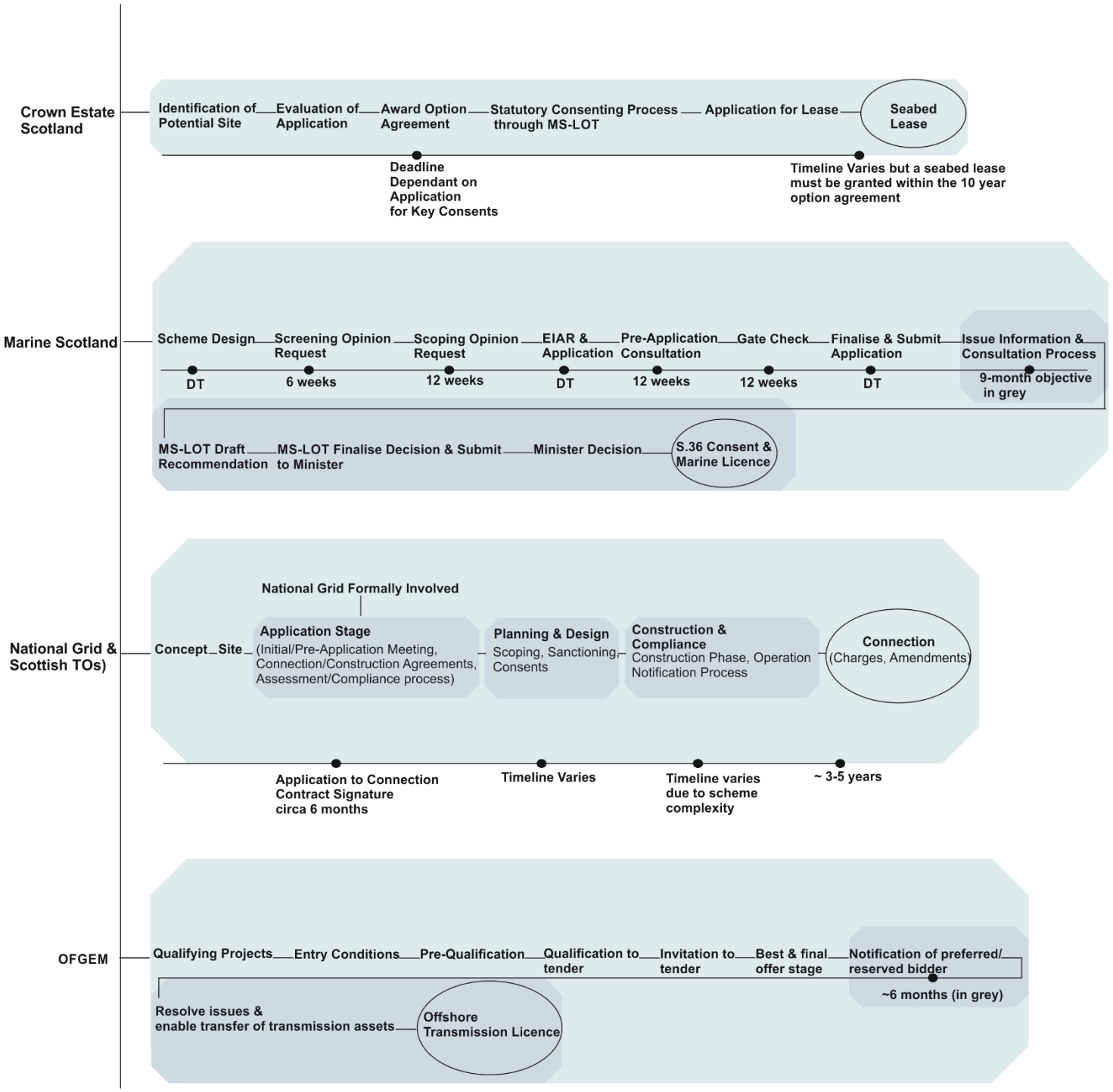

Figure 3 Timeline graphic indicating key processes for consenting an offshore wind project in Scotland. 'DT' is indicative of a developer-led timeline.

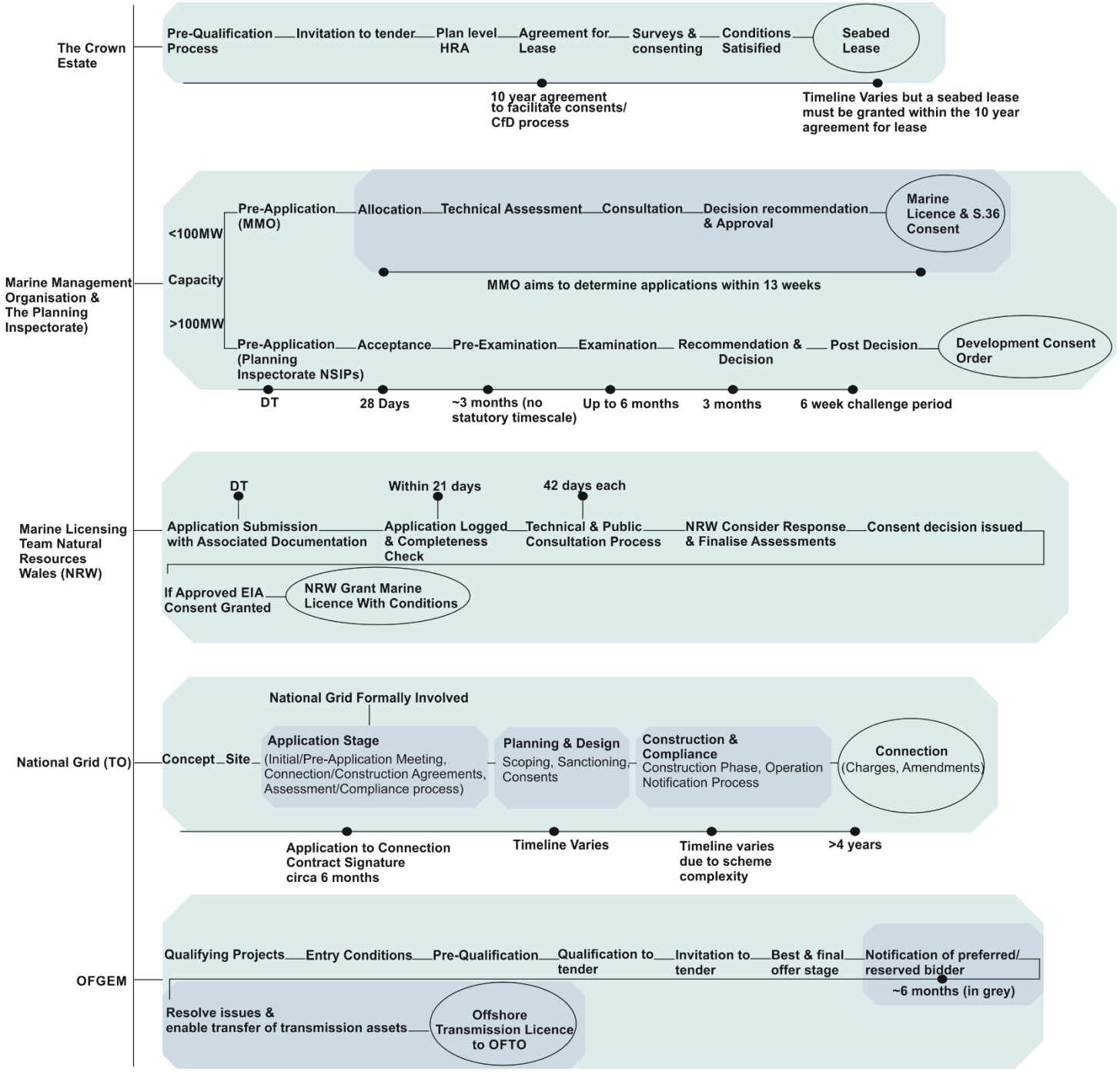

Figure 4 Timeline graphic indicating key processes for consenting an offshore wind project in England and Wales. 'DT' is indicative of a developer-led timeline. This illustration does not include the CfD process which is enacted once all necessary consents are in place.

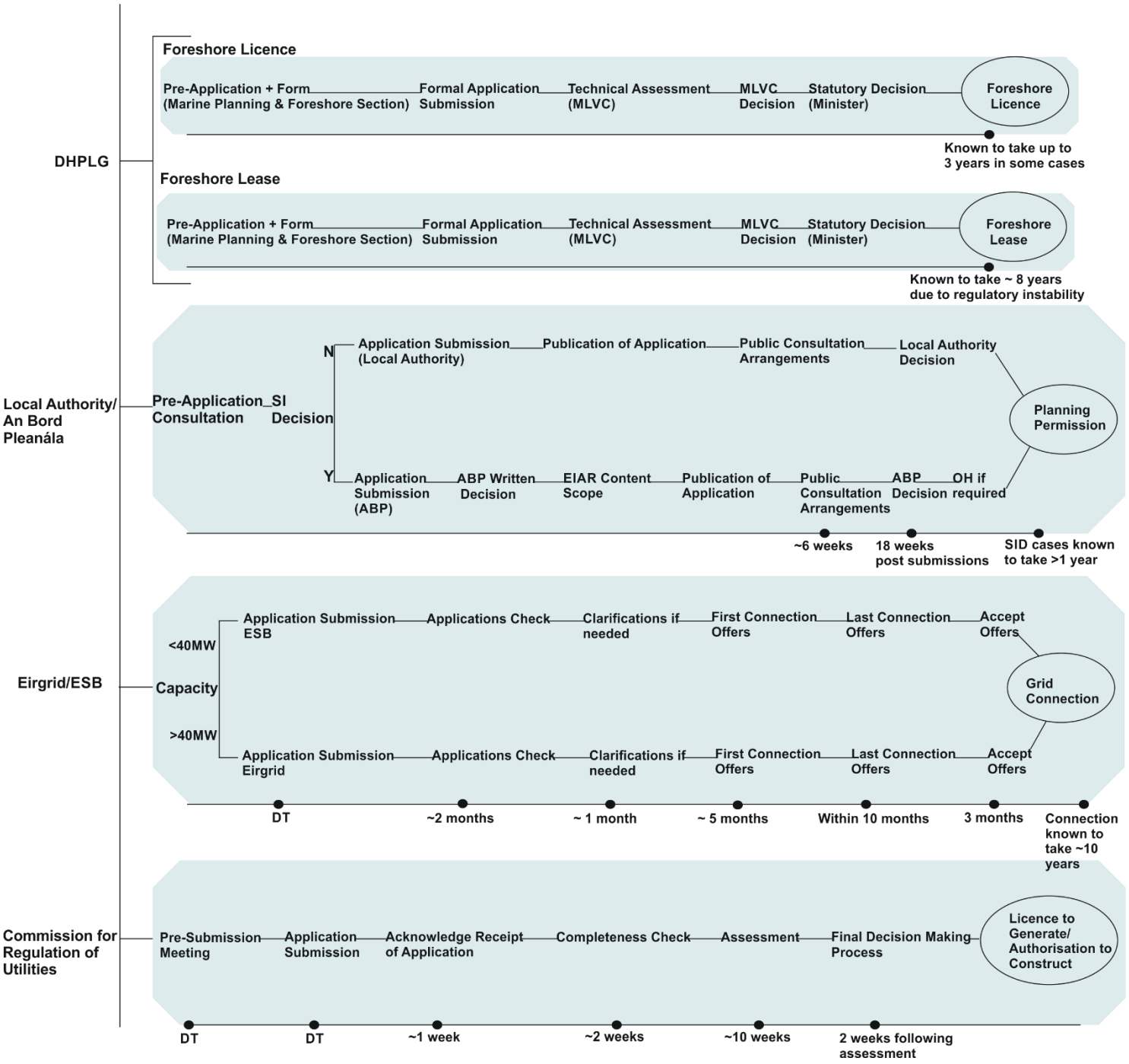

Figure 5. Timeline graphic indicating key processes for consenting an offshore wind project in the Republic of Ireland. 'DT' is indicative of a developer-led timeline. Planning permission is granted by Local Authorities for onshore and not offshore works.

5.3 Infrastructural constraints

The provision of key enabling infrastructure to the offshore wind sector corresponds with the principle of support (Table 1). On the topic of grid, Scotland does not appear to maintain a perception of advantage over Ireland. This is discussed further below in the context of the research findings.

Grid development is outlined in Eirgrid's 'Ireland's Grid Development Strategy, Your Grid, Your Tomorrow 2017' (Eirgrid, 2017). Irish grid policy specifies maximising use of the existing electricity grid to avoid new construction. Results of the research show that a strategic review of the available capacity and feasibility of short term grid upgrades is required. The sector would benefit from a separate connections policy for the connection of offshore projects separate to the current onshore regime. This would seek to tailor grid connections to the requirements of large offshore wind structures and provide clarity on where these connections can be made onshore. This will aid in delivering the certainty required for industry, that grid connections will come on stream for offshore projects. Key infrastructural constraints in particular include the lack of existing capacity on the west coast of Ireland. There is also a need for interconnection to facilitate access to export markets. Currently, Eirgrid is in the process of examining future interconnection prospects through the Celtic interconnector to France (currently undergoing consultation), North Connacht 110 kV project, and the North-South interconnector between Northern Ireland and the Republic (Eirgrid, 2017). The Greenlink Interconnector to Wales project is being led by Statkraft with the intention of construction in late 2020 (Connolly, 2019).

Whilst there appears to be positivity towards the Eirgrid strategy, a 'chicken and egg' scenario exists, whereby government commitment to offshore wind, is required as a precursor to infrastructural components coming together. In any case, sufficient clarity is required by the Irish industry in connecting offshore wind projects to the onshore grid. In Scotland, a competitive disadvantage was noted concerning capacity and the cost of electricity transmission. Scotland, in its position of net exporter of electricity to the rest of the UK, faces higher associated transmission charges than generators closer to the demand centre. The high volume of contracted generators in Scotland is particularly concerning for the future capacity of the grid with limited capacity recognised across a number of areas (National Grid, 2017). National Grid is actively consulting on this with a number of proposed reinforcement options (National Grid, 2018) and the construction of recent infrastructure most notably the Beauly-Denny Line (National Grid, 2017).

5.4 Knowledge Generation and Stakeholder Engagement

5.4.1 Skills

Knowledge generation in Scotland has largely been accumulated through operating a lessons learned approach and through the established oil and gas industry. In this way, Scotland maintains a competitive advantage over Ireland outside of the regulatory structure, due to the transferability of marine based skills, in particular skills gathered from offshore operations. Scotland's established oil and gas industry provides this skilled work force with bodies

including Scottish Enterprise providing diversification guides in transitioning these skills into renewable alternatives. While not at the same level, Ireland has an opportunity to design training programmes through national facilities such as the National Maritime College of Ireland (NMCI). NMCI currently operate programmes on health and safety training catered for the offshore wind energy sector (NMCI, 2019).

5.4.2 Baseline data and information

Delays in consenting in Scotland are linked to the lack of sufficient baseline information regarding impacts of offshore turbines on birds, resulting in judicial review proceedings against a number of Scottish offshore wind projects. The knowledge gap is being addressed through dedicated studies including the Offshore Renewables Joint Industry Programme Bird Collision Avoidance Study, conducted from 2014-2017, and published in 2018 (Skov et al, 2018). The results of the study discuss the high avoidance rate of bird species in relation to offshore wind turbines.

Rigorous and comprehensive baseline studies, confidence in technology, and early engagement are required to provide assurance to stakeholders. In Ireland in particular, there is a requirement to determine data availability and address quality and knowledge gaps for the offshore wind industry to progress with increased clarity. This is being conducted as part of a comprehensive data review in the Eirwind project. Significant investment in gathering data and making sure this data is both robust and up to date, is required in the sector going forward, including better information on the viability of sites. The interviews highlighted that knowledge generation is of significant importance to Irish interviewees for both bottom-fixed foundations on the east coast and in developing the south and west coast for floating wind. Data and information to mitigate against the impact of OWE technology is also needed. The importance of coherent knowledge development has been discussed previously by O'Hagan (2016) who identified lack of knowledge as a constraint on the development of the ocean energy industry.

Building on this knowledge gap, the Marine Institute has funded up to €200,000 per project for a number of offshore wind initiatives (Marine Institute, 2019). This, together with funding from agencies such as the Sustainable Energy Authority of Ireland (SEAI) and Science Foundation Ireland (SFI), will help to increase knowledge of the offshore environment and drive R&D capability through facilitating technological innovation and data collection to understand future seabed changes. Ireland could also learn from Scotland in terms of site allocation in the form of RLG. This provides Scottish developers with good visibility of the zones of interest for development of both bottom-fixed and floating offshore wind. Guidance such as this on an Irish scale would help create clarity on strategic development zones where potential investments could be made. Forthcoming MSP may also aid in generating this degree of clarity for developers.

5.4.3 Stakeholder engagement

It was suggested that public acceptance in Scottish offshore wind projects has been driven by the familiarity of offshore projects and the location of projects far offshore which avoids visual obtrusion. Research by O' Keeffe & Haggett (2012) on the Forth of Firth, Scotland, indicated positivity towards an 'out of sight, out of mind' concept, due to developments at a distance of 80 km offshore. On an Irish level, results show that developers wish to transition from onshore

to offshore to eliminate visual constraints and gain public support. However, this is not a panacea. Acceptability issues do not simply disappear when moving offshore, as seen when challenges arose with the Scottish fishing industry, due to impacts on viable fishing grounds, a lack of early engagement, and a lack of communication to avoid misinformation (O'Keeffe & Haggett, 2012).

Increased transparency and early engagement with stakeholders to ensure trust in offshore developments is an imperative for capacity building. Examples from Scotland show partnerships built through initiatives including the Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW). FLOWW was established in 2002 with the aim of ensuring co-operation between fisheries interests, offshore renewable energy developments and liaison with other marine sectors (FLOWW, 2015). Ireland has the opportunity to implement strategic working groups such as FLOWW to drive transparency and build relations across a diverse level of marine stakeholders. This will also be vital for efficient implementation of MSP legislation.

Issues of transparency have been noted in previous developments (e.g. Aitken, 2010) whereby community benefit funds became an unintended source of conflict. A lack of discussion on the nature, scale and content of such benefits were the cause of public suspicion in one case. Research on social licence to operate persistently shows that, rather than the 'decide, announce, defend' development process; - early engagement, transparency in decision making, and local community involvement is critical to build public support (e.g. Hall et al, 2013). Community co-ownership of renewable energy projects has been shown to have significant benefits to the acceptance of offshore wind energy in Germany (Musall & Kuik, 2011). The Community and Renewable Energy Scheme in Scotland provides for community grant support, advice and guidance for renewable energies (Local Energy Scotland, 2015). The RESS (DCCAE, 2018(b)) provides for community co-ownership in Ireland for onshore wind developments, but it remains to be seen how this may manifest offshore. This is a parallel area of research in the Eirwind project, where the Scottish case, and other European and international cases are being examined.

6 Conclusion and Recommendations

It can be concluded that there was a strong perception that Scotland has an advantage over Ireland, in the development of offshore wind, due to a more sophisticated regulatory framework, but that this is not across the board. Scotland's ambitious policy environment is in stark contrast to the lack of policy specific to offshore wind in Ireland. The Scottish regulatory environment, designed to underpin policy, has some notable highlights, such as the OSS. However, the OSS is not a panacea, and issues exist with human resources and the timelines involved in decision making. Regulation alone does not set Scotland apart. Scotland also has the advantage of being able to build on the capacity developed for the offshore oil and gas sector. However, there are challenges that need to be overcome by Scottish policy makers, including managing impacts of development to maintain public support, and infrastructural issues such as grid connection. There are concerns that new policies are not evolving apace, because of Brexit.

The issues that emerged from the research, whilst classified and presented according to the data analysis, resonate with the key factors that emerged from the literature review: Stability, Integration, Long-term Visibility, Support and a Proactive/Ambitious Government. It came across strongly that there is a need to not only communicate, but to actively demonstrate, that Ireland is open for offshore wind business. Ireland has gained a reputation at an EU level as a 'climate laggard' in transitioning toward renewable alternatives. However, there is an opportunity to communicate the positive developments which have been made in the sector, particularly from a R&D capacity. Ireland has the opportunity to position itself as both a hub for bottom-fixed wind on the east coast, and an early mover in floating wind given the expansive nature of the marine resource on the south and west coast. A decisive shift must be taken into how Irish policy makers are pursuing that potential and particularly so when looking to attract investment overseas from opportunities which may arise from Brexit.

The research was limited to the governmental pillar of governance. While some insights were obtained on the relationships between government with industry and civil society, the approach did not provide for an understanding of the norms and values that influence the interplay between these key stakeholder groups. An opportunity to do a more holistic look at governance exists in order to identify how commercial and regulator interests could be better aligned going forward. Deepening the balance between industry and regulators involved in this research could have provided increased insight into such relationships and influences. This is a potential area of synergy for future research to take place.

6.1 Recommendations

This research notes four key recommendations for Ireland to drive the realisation of offshore wind. Implementation of these key recommendations should be further complemented by financial investment to address infrastructural constraints (grid and ports), and revenue support, which recognises the increased costs of developing floating wind in particular.

Firstly, Ireland will need to implement strategic policy for offshore wind, stating explicit support and commitment for developing initial levels of both bottom-fixed and floating technology. This policy statement, as discussed by interviewees, need not be an extensive document, as long as it provides clarity and highlights the governmental commitment in developing the offshore wind sector to its full potential both domestically and for export potential. There is a need for significant ministerial championing to bring this policy statement forward for the sector. The research notes the importance of a defined ambition level greater than the current 'up to' 55% capacity for renewable electricity contribution.

The second key recommendation is for the enactment of effective and efficient consenting legislation (i.e. MAFA or equivalent) as soon as possible. This is needed to provide developers with a fit for purpose licensing architecture. The new foreshore legislation should include statutory consenting timeframes, as per the UK Planning Inspectorate process. Any legislative change must be supported with key resourcing competencies, to avoid the early stage barriers observed in the implementation of Marine Scotland. This is not just a change management requirement. Human resource capacity needs to be addressed in the short term also.

Third is the need for increased integration in the decision making process. In lessons learned from the Scottish context, implementation of Marine Scotland as a OSS for project consenting has considerably aided in streamlining the process for developers. However, the OSS model is not a silver bullet. Lessons need to be observed and adapted for the context specific to Ireland. A OSS is needed, however, any effort to achieve better organisational integration is meaningless without adequate resources and the introduction of statutory timeframes. The issue to be addressed in Ireland, may be less an issue of restructuring in the short term, and more of an issue of human resources in existing government agencies and departments. This includes the resources needed to get MAFA over the line, so that a fit for purpose consenting framework can be set in place. Low hanging fruit also exists in the form of improvements in the production and distribution of guidelines, and an opportunity for a virtual OSS for application forms. In the medium to long term (3 to 5 years), a more root and branch review of organisational structures would make sense.

Finally, the need for increased knowledge generation and partnership building between stakeholders including community participation and ownership is essential. In terms of lessons learned, Ireland should implement strategic working bodies such as those observed in Scotland through organisations such as FLOWW and coastal partnerships. Knowledge generation through both research and capacity building will prove essential in addressing data gaps and data quality in order to build critical baseline data. This will involve increased data collection and demonstration projects in order to build technological and environmental certainty particularly for floating wind on the south and west coast. Knowledge building and increased early engagement across strategic working groups will aid in addressing constraints likely to be experienced in the sector from both a community and environmental perspective. Initiatives being addressed in the governance work within the Eirwind project need to be strongly linked to policy.

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