From:	[Redacted]
To:	Sectoral Marine Planning
Subject:	Evidence submission for Sectoral Marine Plan: Study of seabird densities around wind turbines at Beatrice Offshore Wind Farm
Date:	31 January 2022 09:07:19
Attachments:	image001.png Study of seabird densities around wind turbines at Beatrice Offshore Wind Farm 27012022.docx

Hello

Please find attached a form for an evidence submission to the Sectoral Marine Plan, in regard to seabird monitoring at Beatrice Offshore Wind Farm. The form contains a link to a survey report document on the Marine Scotland website.

If you have any questions in relation to this submission please let me know.

Kind regards

Joe

[Redacted] || Environmental Advisor

SSE Renewables

M: [Redacted]

sserenewables.com

cid:image001.png@01D75B9B.87B2F5F0

Sectoral Marine Plan for offshore wind energy
iterative plan review process: form for submission of new evidence

Title of evidence submitted

Estimation of seabird avoidance distances around offshore wind turbines

Evidence category

Please tick relevant box

☐ scientific paper

☒ grey literature

☐ datasets

Please provide a summary on how this evidence is pertinent to the plan and if it links to any of the strategic ScotMER evidence maps. Max 500 words

This study relates to ScotMER evidence gaps OR.19, OR.20 and OR.21 (seabird displacement). Seabird locations within the Beatrice wind farm were recorded during the first full year of operation using digital aerial survey methods conducted during the breeding season (6 surveys, May-July). Analysis compared the observed seabird locations and calculated densities within 100m, 200m, 300m and 400m of turbine positions with the distribution of densities obtained around 1,000 simulated alternative turbine locations, using a randomisation approach. Polling the data across all surveys, the study found no indication that the species of interest (guillemot, razorbill, puffin, kittiwake and herring gull) avoided wind turbines, with their observed densities either consistent with chance distributions or in some cases suggesting a degree of attraction (i.e. higher densities near turbines than expected). Consideration was also given to whether seabird densities around turbines may be related to their operational status (using RPM at the time of the observations). There were no clear patterns of avoidance response in relation to turbine RPM, however since sample sizes were necessarily smaller for this analysis so the results were less conclusive. There were indications that some species (kittiwake and razorbill) were present in slightly lower densities near turbines (<200m) when RPM were high (>8). However, for guillemot (the most numerous species) there was no indication that the densities around turbines was affected by turbine RPM (i.e. densities were as expected by chance at all RPM).

Preliminary analysis of data collected in the same manner in a second breeding season of operation indicates similar results, however analysis is not completed so this result remains subject to confirmation.

Sectoral Marine Plan for offshore wind energy
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The full methods, results and discussion are provided in:

Beatrice Offshore Wind Farm, Year 1 Post-construction Ornithological Monitoring Report 2019 (MacArthur Green 2021)

https://marine.gov.scot/sites/default/files/bowl_2019_post-con_monitoring_report_v2.2_30042021.pdf

Main contact	[Redacted] (Beatrice Offshore Windfarm Ltd.) [Redacted]
Surveyor contact (where relevant)	HiDef (c/o [Redacted])
Analyst contact (where relevant)	[Redacted] (MacArthur Green) [Redacted]

Checklist for dataset

If datasets are submitted the following information must be submitted

☐ reason for collecting data

☐ analysis methods

☐ metadata included

Contact details

[Redacted] (Beatrice Offshore Windfarm Ltd.)

[Redacted]

[Redacted] (MacArthur Green)

[Redacted]

Please return this form accompanied with relevant documents to SectoralMarinePlanning@gov.scot by 28 February 2022.

From:	[Redacted]
To:	Sectoral Marine Planning
Subject:	Evidence submitted for the Sectoral Marine Plan on community benefits
Date:	28 February 2022 16:11:13
Attachments:	Sectoral+Marine+Plan+-+SEG+-+submission+form+3+November+2021 (1) Haggett community benefits.docx Haggett community benefits across the UK (final).docx

To whom it may concern,

I am attaching a cover sheet and evidence in response to the call for evidence on the Sectoral Marine Plan.
This evidence pertains to the aspects of the Plan that consider community impacts, engagement, and benefits.
With thanks,

[Reda
cted]

Senior Lecturer in Sociology and Sustainable Development
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[Redacted]

Please note I work part time (60%)

Sectoral Marine Plan for offshore wind energy
iterative plan review process: form for submission of new evidence

Title of evidence submitted

Haggett. C. (2022) Benefits, boundaries, and justice: defining the community for offshore windfarm projects (paper currently under review)

Evidence category

Please tick relevant box

☐ scientific paper

☒ grey literature

☐ datasets

Please provide a summary on how this evidence is pertinent to the plan and if it links to any of the strategic ScotMER evidence maps. Max 500 words

This evidence is pertinent to the consideration of community engagement, impacts, and benefits in the Sectoral Marine Plan.

Throughout the Plan there is recognition of the impact that offshore energy projects may have on communities, the need to effectively engage with those communities (section 2.7; section 4.3.4; section 5.1.1), and possible mitigation measures that might be taken (section 4.3.4). In section 4.6, there is discussion of the way in which negative impacts would exceed any positive effects from a particular project.

This evidence corresponds directly to these issues – the need to rebalance impacts and benefits, and the need to effectively involve communities throughout the planning and development process. The research on which this evidence is based aligns with the Scottish Government's emphasis on a 'Just Transition', and is conceptualised in terms of 'energy justice' – ensuring that the impacts and benefits of energy projects are evenly distributed, that those affected are recognised, and that there are fair, inclusive, and transparent processes for decision-making.

The evidence applies these principles to the issue of benefits for communities from offshore energy projects, reporting on case studies around the UK where benefit schemes are in operation. It demonstrates that there are different ways in which funds are being distributed, explores the different understandings of the 'relevant community' for the receipt of those benefits, and discusses how these have the implications for achieving energy justice.

This evidence strongly supports the delivery of localised, tangible, meaningful benefits for local communities in the design and delivery of offshore energy, and involving communities throughout the processes for determining to whom, what, and where those benefits should be delivered.

Sectoral Marine Plan for offshore wind energy
iterative plan review process: form for submission of new evidence

Checklist for dataset

If datasets are submitted the following information must be submitted

Main contact	
Surveyor contact (where relevant)	
Analyst contact (where relevant)	

☐ reason for collecting data

☐ analysis methods

☐ metadata included

Contact details

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Chrystal MacMillan Building

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[Redacted]

Please return this form accompanied with relevant documents to SectoralMarinePlanning@gov.scot by 28 February 2022.

Title:

Benefits, boundaries, and justice: defining the community for offshore windfarm projects

Author name and affiliation:

[Redacted]

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Abstract:

This paper focuses on community benefit schemes for offshore windfarm projects. It systematically analyses the way in which the 'community' to receive benefits has been defined at sites across the UK. Community is a complex concept, and identifying a relevant community for an offshore project is even more challenging. The paper explores the different understandings of the 'relevant community', and how these have the implications for achieving energy justice. There are three key findings. Firstly, there is a significant diversity in defining a 'community' currently being used, from single villages to whole regions. Secondly, this diversity connects to different understandings of both benefit and impact from offshore energy project. Thirdly, the way in which a community is defined has implications for all three aspects of energy justice, in terms of distributing benefits and addressing impacts, recognising those affected, and ensuring fair and open processes. The paper concludes with reflections on the value of flexibility in demarcating relevant communities for offshore projects, and the importance of reaching those definitions in conjunction with the people in each particular location.

1. Introduction

Offshore wind is experiencing unprecedented growth. The Biden administration has announced "a set of bold actions that will catalyze offshore wind energy" (The White House, 2021), and the European Commission has released an ambitious strategy to increase wind capacity from 12GW currently to up to 300GW by 2050 in efforts to achieve climate neutrality (European Commission, 2020). In the UK, many billions are being invested in the industry, and the government aims to generate a third of electricity from offshore wind by 2030 (UK Government, 2021). But energy policy has implications for those living with these new facilities (Owens and Driffill, 2008); and conflict over the siting of wind energy has stimulated increased interest in community benefits (Cowell et al, 2011).

Community benefit schemes have become well established for onshore renewables (Cass et al, 2010; Cowell et al, 2011; Bristow et al, 20112 Aitken, 2010; Munday et al., 2011; Walker and Baxter, 2017), and it is increasingly common for offshore windfarms to offer community benefit packages

(Walker et al, 2014). These are voluntary monetary payments from the developer to the community, usually provided via an annual sum.

The provision of such payments necessitates an identification of the 'relevant community'. This is not straightforward onshore: Bristow et al (2012:1108) argue that there is insufficient attention on "precisely who or what might constitute the 'affected community' entitled to receive these benefits", with arrangements varying and non-standardised (Kerr et al, 2017; Aitken, 2010; Markantoni and Aitken, 2016; Bristow et al, 2012). For offshore projects, such a task is even more challenging, where communities may be dispersed and distant from an offshore installation (Walker et al, 2014).

This paper examines community benefit schemes for offshore windfarms across the UK, and considers the way in which the 'community' has been defined in each case. It explores how this definition is related to the perception of the impacts and benefits of the project, and how this results in a particular spatial demarcation of the community. It then considers the environmental justice implications of the way in which these lines are drawn – who is recognised, who is excluded, and why this matters.

2. Approaching the concept of 'community'

'Community' is a complex and contested term. Various definitions are found within community studies (Crow 2002), and in relation to renewable energy (Walker, 2011; Rydin et al, 2018; Simcock, 2014; Cowell et al, 2011). But for developing a community benefit scheme, it is vital of course to be able to define that relevant community. A definition serves as a 'reasonable' device and a means of avoiding a 'chaotic' situation without clarity about who or what would be eligible to benefit (Devine-Wright and Sherry-Brennan, 2019:170).

Location dominates as a way of defining the community for energy projects – 'community' in this context refers to spatial locality, e.g. those living close by a project (Walker and Baxter, 2017; Bristow et al, 2012; Markantoni and Aitken, 2016; Kerr et al, 2017; Devine-Wright and Sherry-Brennan, 2019; Cowell et al, 2012). However this is not an uncontentious choice (Kerr et al, 2017: 204). Other understandings – including communities of place, communities of interest, and communities as networks – also exist (Walker, 2011). Indeed, proximity, whilst important, can be a crude indicator of impact. Drawing a geographic boundary around a community on the basis of proximity excludes those just on the other side (Simcock, 2014), and people may feel connected to a place beyond the basis of 'nearness' (Devine-Wright and Sherry-Brennan, 2019).

For offshore energy projects, this definition becomes even more complex. The proximity and connection between any community and a project may be loosened; and yet, as Cowell et al (2012:29-30) set out, the "number of communities that might feel in some way related to a stretch of coast, and thus affected by an offshore windfarm, may be larger, fall across administrative boundaries, and embrace towns with tens of thousands of inhabitants". Demarcating the community therefore is vital, but challenging.

3. Defining a community through the rationale for delivering benefits

One way to define communities is through the rationale for delivering benefits from projects. Rudolph et al (2017) set out a relationship between understanding what constitutes a community, an impact, and a benefit. This typology was the basis upon which the Scottish Government designed their Good Practice Principles (2015) for the delivery of benefits to communities from offshore renewables projects, and has been taken forward and used elsewhere, including the communities off the east coast of the US (Klain et al, 2015). Rudolph et al (2017) discuss the different rationales for providing a community benefit fund:

3.1 Spreading the positive benefits from a project

Such a rationale means a wide definition of a community, across which the benefits of an energy project can be spread. This perspective views renewable energy developments as harnessing a nation's natural resources and assets (Morgera, 2014; Wynberg and Hauck, 2014) and sharing the rewards from wind, a 'common' which no one owns (Cass et al, 2010:262). For example, the Scottish Government explicitly set out that developers offering benefits allows for 'communities across the country to share in benefits from its rich natural resource' (Scottish Government, 2015:3). This positive interpretation of impact leads to a wide definition of a 'community'; which could be a region, or even a whole country (Markantoni and Aitken 2016; Cowell et al, 2012:3).

3.2 Recognising hosts

Another rationale for providing benefits, which gives a very different definition of the 'community', is payments by developers to acknowledge those places which are 'hosting' a development. For offshore energy, this 'hosting' usually takes place onshore, with the location of the substation and associated cabling. The community is therefore a specific and very localised place. Under this rationale, developers may be seen as 'good neighbours', fostering positive relationships, and demonstrating concern and commitment to a local area (Aitken et al, 2016; Cowell et al, 2012). Cass et al note that stressing 'good neighbour' motivations and extolling discourses of corporate social responsibility at times mean "developers actively deflecting the language of impacts, which can imply either compensation or the expectation of decision rights over proposals" (2010: 271).

3.3 Accounting for impact in affected communities

A further rationale for providing benefits is to acknowledge and address tangible disbenefits (Markantoni and Aitken 2016; Walker et al, 2014; Devine-Wright and Sherry-Brennan, 2019). The 'community' to whom they are delivered is broader than just the hosts (Bristow et al., 2012); in Cowell et al's research, the 'community' was constructed as ''the group of people most affected by the wind farm'' (2011: 547). This discourse of impact is suggested to be one recognised by community members (Devine-Wright and Sherry-Brennan, 2019, p168) and in Simcock's (2014) research, drawing the boundary to define the 'local community' for benefit was innately bound up with the issue of impact.

3.4 Increasing local acceptance and support

Finally, benefits may be delivered on "an implicit assumption" that they will generate greater social acceptance of windfarms" (Walker et al, 2014:47). This rationale defines the relevant community as

one in opposition and assumes that "community benefit payments provide a means of closing the 'gap' between high societal support for wind energy but strong opposition to specific schemes" (Cowell et al, 2011: 541). However, where benefits are perceived to be 'bribes', projects may receive even less support (Walker et al, 2014; Aitken, 2010; Cass et al., 2010; Morgera, 2014); and this rationale assumes that any reasons for opposition can be mitigated through monetary payments, which is often not the case (Jørgensen et al, 2020; Devine-Wright and Sherry-Brennan, 2019). Indeed, Cowell et al (2011:539) suggest that focusing on this dominant, instrumental rationale for community benefits obscures other, equally important justifications: the role of community benefits in promoting environmental justice - to which this paper now turns.

4. Justice

Any work on community benefits is fundamentally about justice. As Sovacool (2014: 15) says, "how we distribute the benefits and burdens of energy systems is pre-eminently a concern for any society that aspires to be fair". Considering issues of energy justice is not to assume that all windfarms have negative impacts or that there is agreement about them – it to recognise that "there can be uneven social and economic consequences arising from low-carbon development", and that justice is a preferable rationale for providing community benefits than presenting it as a device for fostering social acceptability" (Cowell et al, 2012: 32).

A community benefit scheme can have implications for different aspects of environmental justice (Jenkins et al., 2016; Aitken et al., 2016; Simcock, 2014). Indeed, "different dimensions of justice are involved, as 'community' may have a substantive element, concerned with the area or social group that receive the benefits, a procedural element, in terms of who is involved in decision-making processes, and a recognition element, in terms of whose existence and interests need to be considered" (Cowell et al, 2011: 543-44). Each of these will now be considered.

4.1 Distributive justice

This aspect of energy justice seeks to address the uneven distribution of energy resources and their associated (positive and negative) impacts, to ensure fair and equitable outcomes (Jenkins et al, 2016; Eames and Hunt, 2013; Cowell et al, 2012). This perspective is focused primarily on material outcomes, identifying where and how injustices are experienced, and how they can be addressed (Sovacool and Dworkin, 2015:437). This can be framed as a spatial injustice; renewables may bring benefits in terms of clean energy, energy security, and investment, but immediate and more tangible burdens locally (Firestone and Kempton, 2007: Haggett, 2008; Eames and Hunt, 2013; Ellis et al, 2007; Devine-Wright and Sherry-Brennan, 2019; Gross, 2007). Cowell et al describe how the "distribution of economic benefits from windfarms falls unevenly. Beyond income streams to landowners or farmers, the conventional economic benefits to communities living with commercial wind energy schemes can be modest" (Cowell et al, 2012:6). Distributional justice therefore recognises both the physically unequal allocation of environmental benefits and impacts, and the uneven distribution of their associated responsibilities (Jenkins et al, 2016:176).

4.2 Recognitional justice

Recognitional justice considers whether sections of society are ignored or misrepresented, identifying those who are affected by injustice, and exploring how under-represented groups can be fully recognised and respected. It emphasises the importance of valuing local experience, attachment to place, and the cultural meaning of particular places (Jenkins et al, 2016). This perspective underlines that all members of a community should be enabled to participate or adequately represented in processes relating to community benefits (Rudolph et al, 2017). This matters because of the 'rights' that communities feel to 'their' environments (Cowell et al 2011). This includes marine environments; people often feel a sense of 'ownership' over natural resources (such as landscapes and seascapes), even while they realise that they do not own them in a material sense (Wright, 2016; Soma and Haggett, 2015).

4.3 Procedural justice

This aspect explores the ways in which decision-makers seek to engage with communities (Jenkins et al, 2016) and recognises that distributional injustices can arise from unfair processes (Rudolph et al, 2017). Sovacool and Dworkin (2015:437) outline four important elements to procedural justice: (1) access to information; (2) access to and meaningful participation in decision-making; (3) lack of bias on the part of decision-makers; and (4) access to legal processes for achieving redress. Procedural justice is therefore about including those affected, better representation, and valuing local knowledge with mechanisms that aim to achieve meaningful participation. This matters because issues of trust, legitimacy and fairness are likely to be paramount in determining community perceptions of benefit proposals and governance (Devine-Wright and Sherry-Brennan, 2019:174).

Each of these aspects of justice relate to how a 'community' is defined for the delivery of benefits. As will be demonstrated, the boundaries for inclusion in the relevant community – and the decision-making process about how this is done – affect the justice outcomes of any benefit scheme.

5. Taking forward research on communities, boundaries, and justice

On the basis of this review, this research addresses three key questions:

- **How are communities for benefit defined for offshore energy projects?**

Questions about how communities are defined for benefit funds are increasingly pertinent, with the expansion of offshore energy, increasing scale of community benefits, as well as the difficulties of the relevant community for an offshore project (Bristow et al, 2012: 1109). Devine-Wright and Sherry-Brennan (2019:166) suggest that "little research has investigated the spatiality of benefit provision – where boundaries are drawn that define the 'locality' of a project and who is eligible to benefit" (2019:166). They used a case study of high voltage power line in Ireland to investigate how the boundaries of the community fund were identified and negotiated, and suggest that understanding the spatiality of the 'community' in benefit provision requires greater scrutiny. This research addresses this "significant gap" (Devine-Wright and Sherry-Brennan, 2019:166) by collecting and analysing examples of community benefit definitions and boundaries.

- **What is the relationship between impact, benefit, and community in UK offshore windfarm benefit schemes?**

Rudolph et al's (2017) framework established that definitions of community relate to understandings of benefits and impacts. This research applies this theoretical framework and explores how the relationship between definitions of community, impact and benefit apply in practice. It takes a series of examples of community benefit schemes for offshore wind in the UK, and analyses how the geographical boundaries have been drawn, and what this means for conceptions of impact and benefit.

- **What implications do the drawings of these boundaries have for the different aspects of energy justice?**

Finally, why does this matter? – because of the "potential for the way the 'community' […] is defined spatially to be an important issue of justice for those living locally to such projects" (Simcock, 2014: 242). Determining the relevant community to benefit is a moral issue in terms of determining affect, impact, inclusion, and benefit (Bristow et al, 2012: 1110), and "studying boundary setting can build on insights from the environmental justice literature, where… boundaries should be viewed as social, political and discursive constructs that are continually made and remade through social practices" (Devine-Wright and Sherry-Brennan, 2019:168). However, Simcock suggests that there has been limited research on spatial boundaries, community benefits, and justice. This paper follows Sovacool and Dworkin's (2015:437) suggestion that energy justice can be a useful analytical tool for understanding how energy problems exist or are framed; and Jenkins et al (2016) on exploring the justice implications for demarcating communities in particular ways.

6. Methods

This paper investigates the way in which boundaries have been drawn for offshore community benefit projects across the UK, and considers the implications for energy justice of the way in which this has been done.

Other research on boundaries for communities has usefully explored single or a small number of case studies in depth (such as Simcock, 2014; and Devine-Wright and Sherry-Brennan, 2019). The intention in this paper is instead to provide a systematic overview, and collect data on a large number of cases, in order to draw out comparisons between them. The selection of cases was based on desk-based research and secondary analysis which strove to find the population of all current community benefit schemes in the UK. These cases identified are – as far as the searches revealed – the key cases of the development of community benefits from offshore renewables currenntly operating in the UK.

From this population, the particular cases presented here are those for which information about the community benefit scheme was accessible; in particular, the map showing the boundary of the relevant community, eligible for benefits. There are some community benefit schemes for which any eligibility criteria or detail are not publicly available. This may be for commercial confidentiality, or because schemes are not currently inviting applications. The cases discussed here represent all those benefit schemes in the UK for which data was available.

Each case was explored in detail, conducting a search and analysis of data related to it, such as planning documents, project websites, newspaper articles, and press releases that gave evidence of any community benefit efforts. Analysis was based on drawing out points of key significance and interest from across the case studies examined (Ely et al., 1991; Silverman, 2005). A content analysis (MacDonald, 2008) was conducted on the extensive set of documentary material, aimed at a systematic screening and organisation of the material and was guided by predefined categories: identifying the community benefit boundary that had been used; and understanding the context of this boundary (whether it followed any pre-existing institutional boundaries, what population was included, what area the boundary covered, what distance to the offshore project and onshore infrastructure). All of these data were then examined through the analytical framework set out by Rudolph et al (2015) of considering the relationship between the definition of communities, impacts and benefits; and the justice implications of drawing boundaries in particular ways were analysed.

7. Results

The first key finding is that there are a number of different ways in which the boundaries have been drawn for community benefit funds from offshore windfarms in the UK; some of which vary greatly from each other. As discussed in section 2, community is a contested term, used in different ways – this is evident in the way in which community has been interpreted for benefit schemes across the UK. Some schemes use a very broad definition of community; others a much narrower one. There are also differences in the way in which boundaries are determined; by developers, or through using (different) pre-existing demarcations, such as constituency borders.

The table below categorises the different schemes, and provides an overview of the justice implications, which will be further explored in section 9:

Rationale for boundary	Examples	Advantages	Challenges	Implications for justice
7.1 Spreading the positive benefits: drawing a boundary to select a whole region	EOWDC (Aberdeen Bay) community fund; The East Coast Community Fund	A very positive way of framing a whole project. Selecting regions can be mean a straightforward geographic boundary.	A region is likely to be a huge catchment; and any benefit fund may be inundated with applications. May lack a close connection between the project and the location of the beneficiaries. Those who feel directly impacted are not explicitly acknowledged.	Benefits can be *distributed* across a wide area, but having eligible applicants from a wide region loosens the connection between impact and benefit; and may mean that those who are most impacted do not feel *recognised*. It may be harder to find and engage community members from open and fair *procedures* from across a wide area.
7.2 Recognising hosts: selecting the onshore infrastructure host communities	Greater Gabbard Offshore Wind Farm Community Fund; London Array Community Benefit Fund; Dudgeon Offshore Wind Farm Community Benefit Fund	A benefit scheme is targeted on the particular places where any impacts will be most immediate, tangible and frequently experienced. Appreciable impact from a benefit fund could potentially be achieved, because it is targeted on a specific area. Hosting is specific and has geographically distinct boundaries than 'impacted' communities.	Others may feel affected by the project than just the host communities. The broader benefits that a scheme could have may be missed by specific targeting. A focus only on hosting can lead to a suggestion that this is a negative impact that is being countered; not the spreading of benefits.	Benefits can be directly targeted to address an uneven *distribution* of impacts for those living very nearby. Those who are beyond the particular boundaries of the 'host' communities, but who feel they experience the impacts from the project, may feel *unrecognised*. It may be easier to gain knowledge and understanding about small local communities, and build relationships for a positive *process* for designing a benefit scheme.
7.3 Accounting for change: selecting the closest places ('a line on a map')	The Tees Offshore Wind Farm Community Fund; Gwynt y Môr offshore windfarm fund	Drawing a new line on a map means no restrictions on how the line is drawn. 'Proximity' is a criteria for inclusion gives a sense of providing benefits to	The line defining the relevant community might seem arbitrary. Those just on the 'wrong' side of the line may feel that it is unfair.	Taking into account a wider area than just the 'hosts' means benefits can take address more impacts and *distribute* benefits to more of those who feel affected. The line of spatial proximity is a way to *recognise* those who are

		those who experience the most change. There is ability to control the approximate eligible population to be included.	'Proximity' as a criteria for inclusion gives a sense of needing to counter the (negative) impact of being near.	closest, which presumes that they are most affected. There may be issues for *procedural* justice in terms of how the line is drawn, and it does not *recognise* those on the 'wrong' side of it.
7.4 Accounting for change: Selecting coastal wards	Rhyl Flats Offshore Wind Farm fund	Straightforward to use pre-existing boundaries. Selecting coastal wards fits with projects being offshore. There is some ability to control the approximate population to be included.	The decision of which wards to include might seem arbitrary. Some parts of some included wards may be further away from the project than parts of wards not included.	Benefits can be *distributed* more widely than just for the 'host' communities. There is some clarity about *recognising* those who are in pre-existing areas; but it does not recognise those who may be nearer, or who may also be affected but not resident in those wards. Engagement *procedures* can be targeted on particular wards, as locations are pre-determined.
7.5 Accounting for change: Selecting the closest wards	Robin Rigg offshore wind farm fund	Straightforward to use pre-existing boundaries. There is some ability to control the approximate population to be included. Using proximity gives a sense of connection to the project.	Some parts of some included wards may be further away from the project than parts of wards not included. Including wards on the basis of proximity implies a negative impact which has to be countered. Some people living very close to the coast being excluded.	Benefits can be *distributed* more widely than just for the 'host' communities. There is some clarity about *recognising* those who are in pre-existing areas; but it does not recognise those who may be nearer, or who may also be affected but not resident in those wards. Engagement *procedures* can be targeted on particular wards, as locations are pre-determined.

Table 1: Summary of community definitions for offshore wind benefit schemes

The section will now discuss in more detail the different definitions set out in Table 1, and explore the implications of the differences in the 'community'.

7.1 Spreading the positive benefits: drawing a boundary to select a whole region

As discussed in section 3, there is a connection between the way in which impact, community, and benefit, are defined. If the impacts from an offshore windfarm are believed to be positive, then the relevant 'community' to which to provide benefits may be a wide region (Wynberg and Hauck, 2014; Morgera, 2014; Scottish Government, 2015).

There are examples of this rationale in the cases analysed. For example, the European Offshore Wind Deployment Centre (EOWDC) consists of eleven turbines in Aberdeen Bay. The developer states that the project is designed to have "a positive impact in the North East of Scotland" through "maximising the benefits that this innovative project brings to the area" (Vattenfall, 2020). Correspondingly, while 10% of the community fund is ring-fenced, applications to the benefit fund are eligible from anywhere across the local authority areas of Aberdeenshire and the City of Aberdeen (Foundation Scotland, 2020; Haggett, 2017).

Similarly, the Hornsea Project One offshore windfarm and Race Bank windfarm have a combined benefit scheme, the East Coast Community Fund. As the name suggests, this fund covers a large swath of the coastal community:

Figure 1: Map showing the areas eligible for community benefit from the Hornsea and Race Bank wind farms, Source https://www.grantscape.org.uk/fund/burbo-bank-extension-community-fund/

Such a boundary follows from the rationale of spreading the benefits of harnessing a nation's natural assets, suggesting a wide, regional, or even national distribution, and a 'community' in a very broad sense. In Scotland, the Government explicitly sets out this reason to provide benefits: "The Scottish Government believes community benefits are an opportunity to share the positive effects of renewable energy" (2015:7); and that these benefits are "encouraged by The Scottish Government from projects which exploit a national resource, including those which exploit a renewable energy resource" (2015:6). Additionally, the scale of funds that are available – for example, the Hornsea and Race Bank windfarms are, at the time of writing, the largest in the world and have an annual fund of

almost £500,000 – means that there may be pressure to broaden the geographical spread of the eligible community (Bristow et al, 2012:1112).

Such a broad definition of community allows the potential for capacity building and investment, and tackling structural vulnerabilities, across a wide area, with the opportunity to ensure that the most disadvantaged members benefit (Bristow et al, 2012:1112-13; Cowell et al, 2012: 3). Demarcating the community can be relatively straightforward. In the case of the EOWDC, this means using a pre-existing institutional boundary to include the whole Aberdeen City and Aberdeenshire. Such an interpretation of 'community' acknowledges those who use local resources but may not live locally (Cowell et al 2012:13; Devine-Wright and Sherry-Brennan, 2019:167)

However, there may not necessarily be a close connection between the project and the location of the benefit recipients. Parts of the defined 'community' may be many miles from the project, and may not necessarily experience any impacts from it. Devine-Wright (2012) notes that the geographical setting of offshore windfarms makes the relationship with 'the local community' complex and creates problems for effective public engagement; this may be amplified in such circumstances. Selecting a region as a community is likely to be a huge catchment; and a fund may be inundated with applications. These are time consuming to process, and may lead to a high rejection rate. Finally, even large funds may be comparatively small when spread across a large population, and feel 'diluted' (Cowell et al 2012:29-30; Devine-Wright and Sherry-Brennan, 2019:171).

7.2 Recognising hosts: selecting the onshore infrastructure host communities

Other communities in benefit schemes are defined in terms of 'hosting' a development. As discussed in section 3.2, this definition comes under the auspices of being a 'good neighbour', committed to a community, or demonstrating corporate social responsibility (Cass et al, 2010; Devine-Wright, 2012; Aitken et al, 2016; Kerr et al, 2017). Indeed, some developers do not employ the offshore windfarm location to define affected communities; instead they refer to the site of related onshore infrastructure, such as the substation (Rudolph, 2017), and those who live nearby.

A specific focus on onshore hosts is used in a number of UK offshore projects. For example:

***Example 1**: Greater Gabbard Offshore Wind Farm Community Fund*

Benefits are only available to community groups operating within the Town Council Boundary of Leiston and Sizewell; the benefit fund was established as a means of the developer thanking the local community for the siting of the substation in Sizewell. No other broader area is included in the scheme.

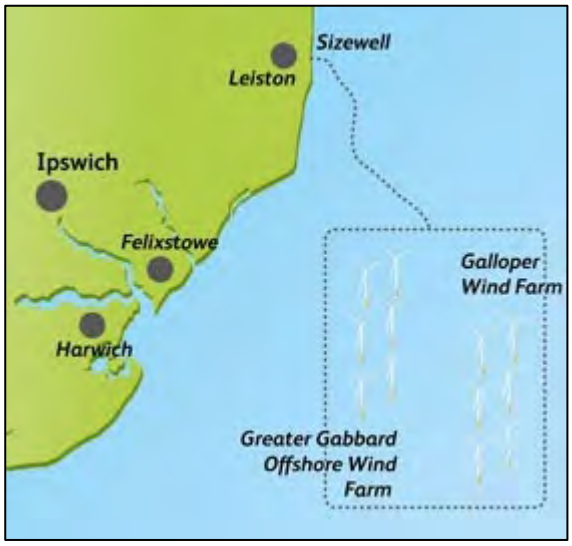

Figure 2: Map showing the location of the Greater Gabbard Offshore Wind Farm, and cable route onshore; Source: Greater Gabbard Offshore Wind Farm information http://www.collinssteeplejacks.com/greater-gabbard-offshore-windfarm/

***Example 2**: London Array Community Benefit Fund*

The substation for the London Array offshore wind farm is located in an area called Cleve Hill; the only eligible area for community benefit is the parish in which Cleve Hill is located. This is the Civil Parish of Graveney and Goodnestone, within the Borough of Swale. This is a very specific area; even the neighbouring wards are not included.

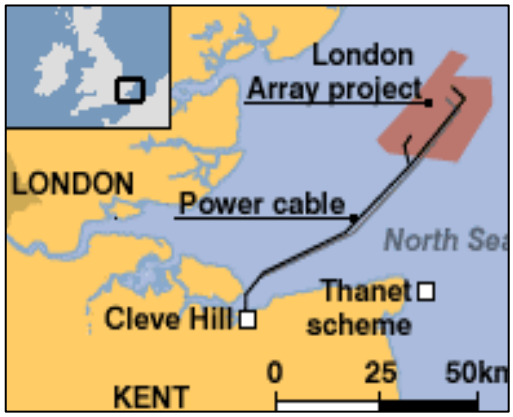

Figure 3: Map showing Cleve Hill and the cabling route from the London Array project

Source 'Green light for world's largest wind farm' People and the Planet, 12th May 2009, http://www.peopleandtheplanet.com/index.html@lid=29068&topic=23&section=36.html

***Example 3**: Dudgeon Offshore Wind Farm Community Benefit Fund*

The location of onshore infrastructure may mean that the relevant 'community' for benefits moves beyond existing boundaries, and is entirely determined by the specification of the project. For example, for the Dudgeon Offshore Wind Farm, the eligible community is very elongated, starting where the cable comes onshore and following it to the substation 31km away. Benefits are intended to "help community initiatives around the substation and along the onshore cable route" (Greater Gabbard Offshore Wind Farm project director, cited in Robinson, 2013).

Figure 4:
Showing the route of the cable from Weybourne to the substation at Necton from the Dudgeon Offshore Wind Farm;

Source Dudgeon Offshore Wind Farm community benefit fund information http://dudgeonoffshorewind.co.uk/community/community-fund.

These examples are a very specific approach to defining the relevant 'community'; benefit is targeted on particular places that host the onshore project operations. Any changes may be most immediate, tangible and frequently experienced in these communities. However, focusing on 'hosting' rather than 'impact' has a specific geographical sense. Impact is a pejorative term, open to different interpretations. Hosting is much more specific, with boundaries directly related to proximity.

Having a very focused fund presents the opportunity to make an appreciable difference in those communities, and can address specific local needs (Bristow et al, 2012:1112-13). Competition for funds may be reduced as only a small area will be eligible (Devine-Wright and Sherry-Brennan, 2019:171). Working alongside these specific communities could also provide the opportunity to build on any contacts and community liaison already established, and can help to build relationships between developers and local people – with distributing benefits widely sometimes seen as divisive and undermining community relations (Bristow et al, 2012:1112-13). However, offshore projects are often close enough to shore to be visible easily and frequently from across a large area (Haggett, 2010). Others may feel affected by the project than just the host communities, and the specificity of targeting the host communities may leave them unacknowledged (Rudolph et al, 2015). Small communities may lack the capacity to pursue more significant projects, attract match funding, or be able to meet the costs of management of the funds themselves (Cowell et al 2012:13).

7.3 Accounting for change in affected communities

A third way to define 'community' is by accounting for an impact, as ''the group of people most affected by the wind farm'' (Cowell et al, 2011: 547) or those experiencing place-related disruptions (Rudolph et al, 2017) (see section 3.3). In community benefit schemes around the UK, the 'community' is sometimes defined as larger than infrastructure hosts; but smaller than a whole region. These communities are demarcated in a number of ways.

The first of these is by 'drawing a line on a map' to include the geographically closest communities. For example, the Tees Windfarm turbines are between 1.5 and 1.8 km offshore. The relevant community broader is determined by a line on a map (which cuts across the borough and ward boundaries which are marked on the map). Those within the 'Area of Benefit' line are the eligible community; those on the other side are not.

Example 4: The Tees Offshore Windfarm Community Fund

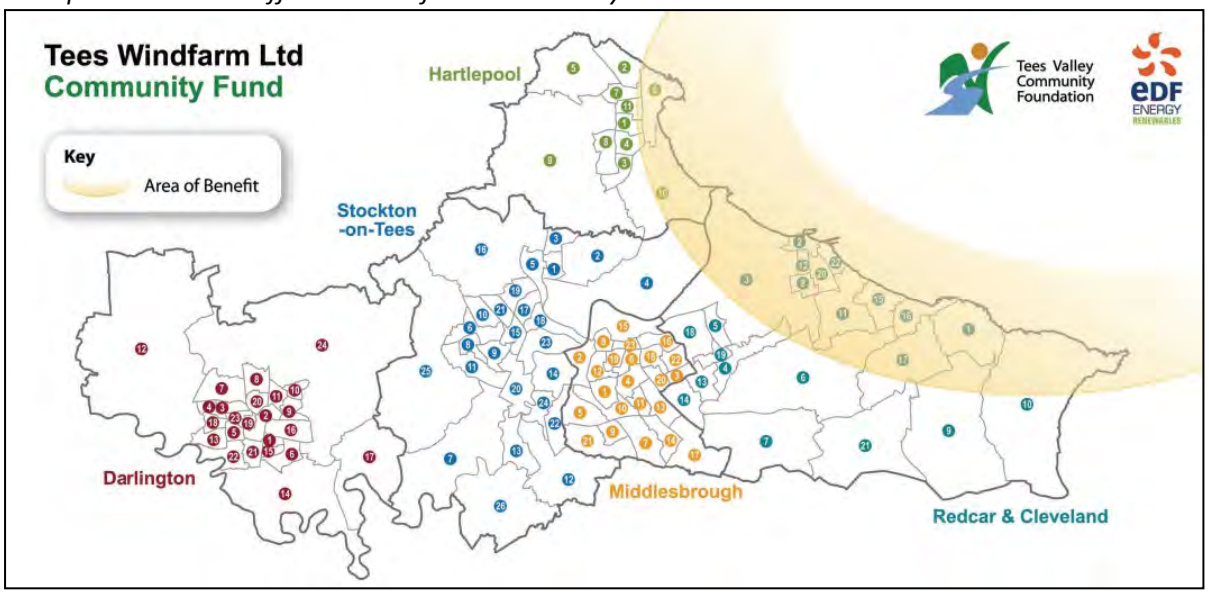

Figure 5: Map of funding areas used for the Tees Windfarm community benefit fund; source: Tees Valley community benefit fund information

Source:http://www.teesvalleyfoundation.org/assets_public/files/downloads/Tees_Offshore_Community_Benefit_Fund_Application_form.pdf

Another example of defining a relevant community – which includes but moves beyond the hosting of the substation and cabling – by drawing a line on a map is the Gwynt y Môr windfarm, off the coast of North Wales:

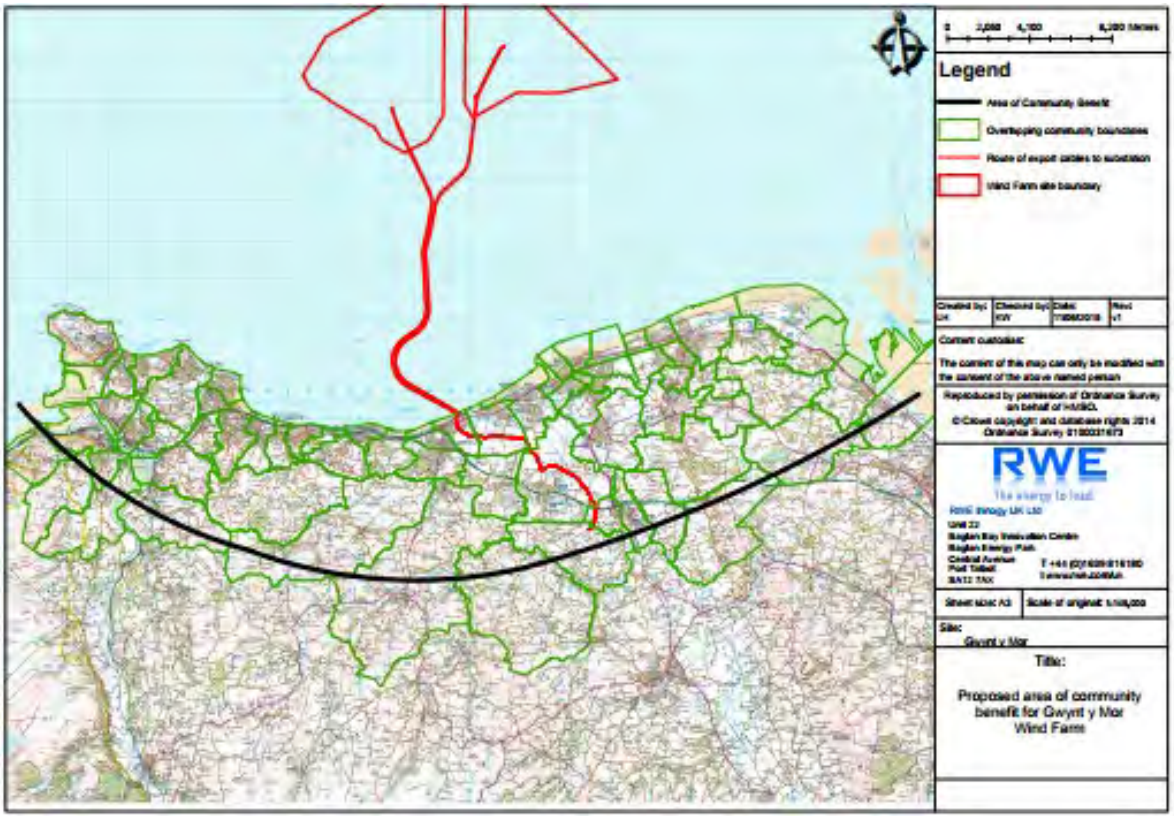

Figure 6: Map of funding areas used for the Gwynt y Môr offshore wind farm community benefit fund

Source: Gwynt y Mor offshore wind farm community benefit fund, http://cvsc.org.uk/wp-content/uploads/2015/03/Final-GyM-area-of-benefit.pdf

The black line demarcates the Area of Community Benefit. This Area includes the substation and cable (marked in red), and a much wider area also. The Area cuts across ward and borough boundaries, and mirrors the shoreline, representing a measurement of geographic proximity to the windfarm.

As will be discussed in section 8, this demarcation was opened up to public consultation; the most popular areas for benefit were zones 1 and 2 in the proposed map (Figure 8); zone 2 equates to the line that is now being used (and shown in the map in Figure 7):

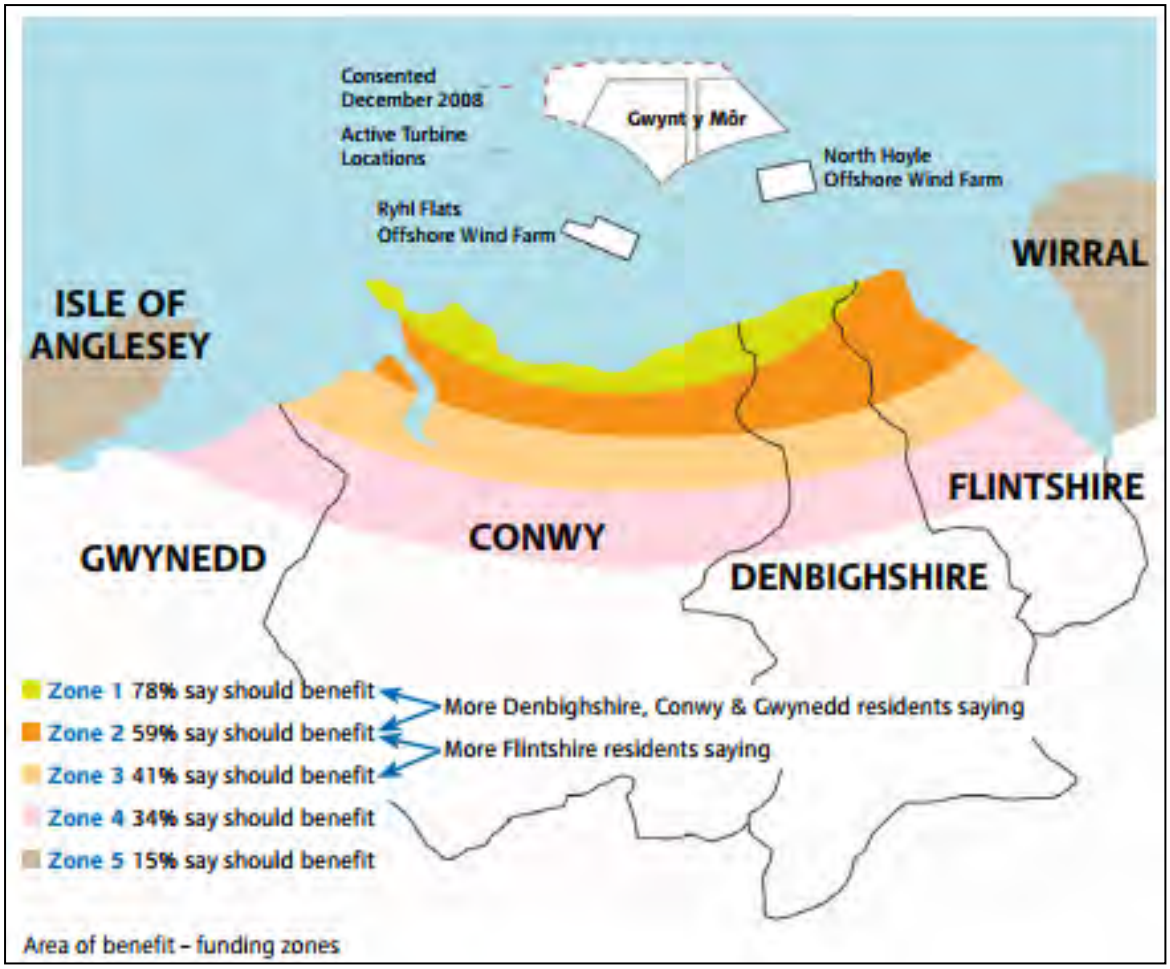

Figure 7: Map of possible funding areas used in the public consultation about the Gwynt y Môr offshore wind farm community benefit fund
Source: Consultation for the Gwynt y Mor offshore wind farm
https://www.innogy.com/web/cms/mediablob/en/3171454/data/3171366/1/rwe-innogy/rwe-innogy-uk/sites/wind-offshore/in-operation/gwynt-y-mr/investing-in-communities/diary-of-development-of-the-funding/13-February-2013-GWYNT-Y-MR-OFFSHORE-WIND-FARM-Project-Update-7-.pdf

Demarcating the community by drawing a line of geographic proximity allows control over the approximate size of population include. There are no necessary 'restrictions' on how the line is drawn, and 'proximity' is a criterion for inclusion gives a sense of providing benefits to those who experience the most change. It also provides the opportunity to include some constituencies that use local resources but would not be counted as 'hosts' (Cowell et al 2012:13).

However, this line might seem arbitrary; those just on the 'wrong' side may feel it is unfair, and that they are equally affected as those on the 'right' side (Devine-Wright and Sherry-Brennan, 2019). As Simcock (2014: 255) discusses, determining who is 'affected' can mean disagreement over the type of affect, and the distance over which it is experienced, and when it becomes harmful. It is not clear whether drawing a line on a map, which may seem subjective, helps to address this.

7.4 Accounting for change: Selecting coastal wards

An alternative way of accounting for change, rather than drawing a line, is to select particular wards as the relevant 'community'. There are examples of this in current practice. For example, the Rhyl Flats Offshore Wind Farm fund supports community organisations and voluntary groups based in the town of Rhyl and then a series of wards (electoral districts) with a coastal boarder:

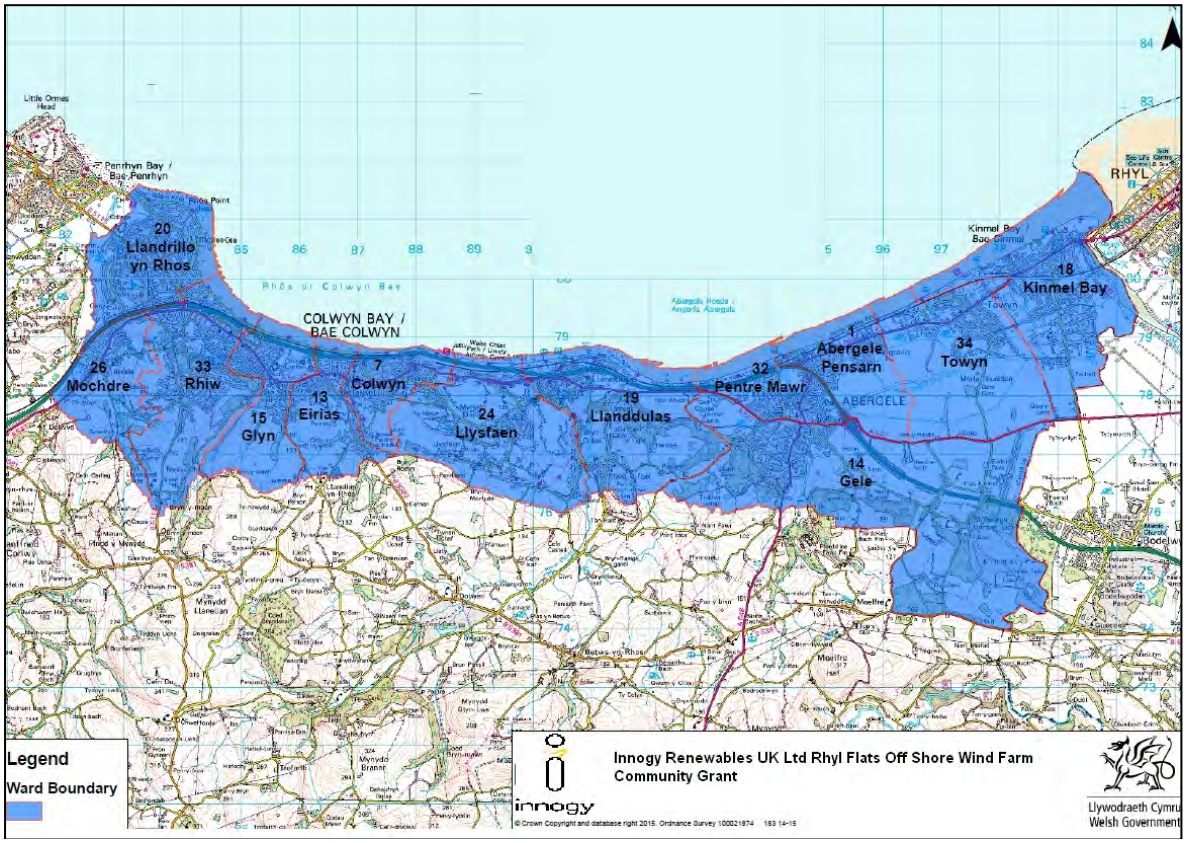

Figure 8: Map of the wards eligible for funding from the Rhyl Flats offshore wind farm fund, source: Welsh Government strategic areas, http://gov.wales/topics/housing-and-regeneration/regeneration/strategicareas/northwalescoast/communityfund/?lang=en

Demarcating the community by including particular wards gives an official and independent sense to the decision; these are pre-existing boundaries, and a 'community' defined in these terms merely follows these. Institutional or political boundaries are relatively straightforward and often used to define a "local community" (Simcock, 2014:248; Bristow et al, 2012:1112). Selecting wards with a coastal border fits with the project being offshore and provides a sense of connection to it; and there is an ability to control the approximate population to be included in the wards selected.

However, the decision of which wards to include might always be perceived as an arbitrary decision (although perhaps less so than drawing a line). Whilst everyone in a ward is included, the shape of some wards means that inclusion is not directly related to proximity. For example, for Rhyl Flats, people in the south of the Gele (ward number 14, shown on the map in Figure 10) are further from the windfarm than those in neighbouring wards which are not included. The criteria for ward selection is having a border with the coast, rather than nearness per se, and may mean some people living very close to the coast being excluded from the 'community'.

7.5 Accounting for change: Selecting the geographically closest wards

An alternative to selecting coastal wards is to select wards that are geographically closest to the windfarm. For example, the community for the English side of the Robin Rigg offshore windfarm is a boundary is drawn around the coastal district of Allerdale, one of six Cumbrian districts (others also have coastal borders, but are not included). Within Allerdale, some wards are deemed eligible, whilst others are not. The criteria for inclusion is based on proximity to the windfarm; some inshore wards are included, some coastal wards are not:

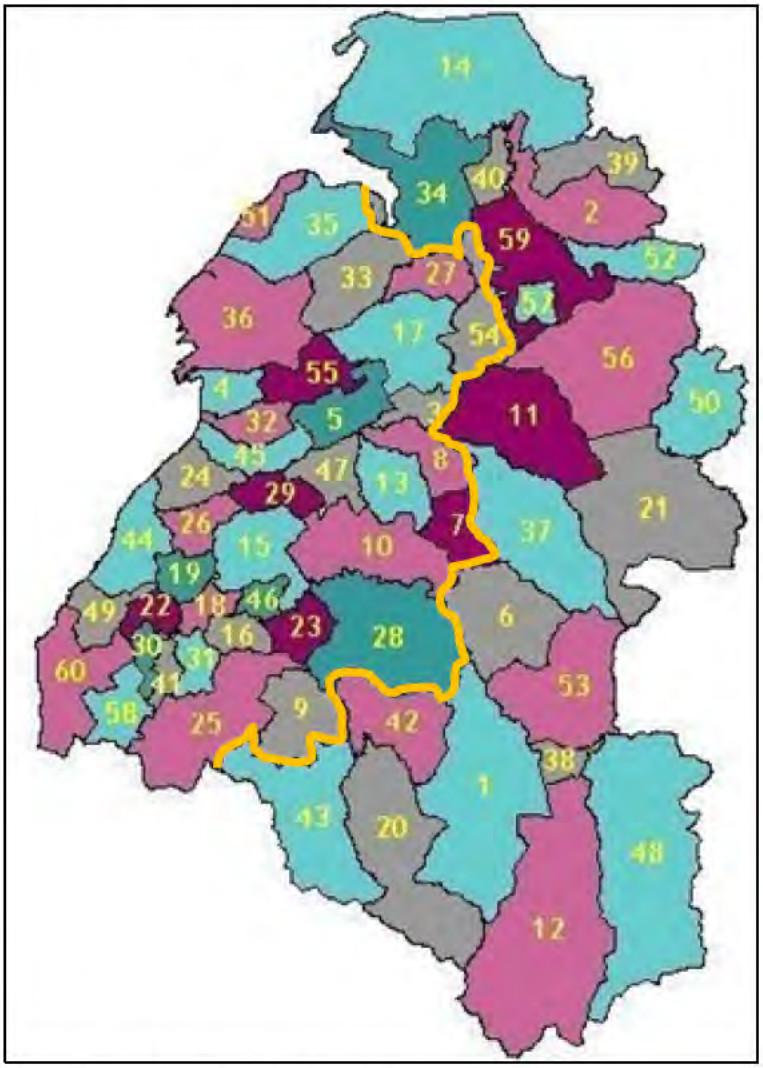

Figure 9: Map of parishes in the Cumbrian district of Allerdale

Source: Map of parishes in Allerdale http://www.calc.org.uk/search/allerdale_parishes.asp), with a line added to show the wards included in the Robin Rigg fund.

As before, defining the community by including particular wards gives an official and independent sense to the decision (Bristow et al, 2012: Simcock, 2014). There is ability to control the approximate population to be included; and using existing ward boundaries is more straightforward than demarcating with a line. However, including wards on the basis of proximity implies a negative impact which has to be countered; and to only include the wards that are measured to be near means some people living very close to the coast being excluded.

8. Discussion

This paper has demonstrated the variety of ways in which the 'community' for benefit from offshore windfarm project is demarcated. These vary from whole regions to small villages. These differences reflect, at least in part, the way in which impact from the project is perceived – as positive, as neighbourliness, or mitigating an impact. It will now consider the implications for energy justice of these different determinations.

Distributional justice: Delivering community benefits can be an attempt to provide a balance between the costs and benefits of projects. This acknowledges that there is often an uneven distribution of energy resources and their associated (positive and negative) impacts, and that these burdens are often immediate, tangible, and spatially concentrated in particular where energy resources can be harvested.

The different ways in which the boundaries around communities are drawn affect the distributional justice that might be achieved. This depends how impacts are perceived. If distributive justice is about rebalancing the broad benefits that come from renewables with the tangible and immediate impacts that are experienced, then drawing the boundary around the hosts may be a good way to distribute benefits. A broad region as 'community' doesn't have quite the same effect; the rationale of benefits to spread further the positive aspects of renewables doesn't take account of negative impact. This is not to say that there isn't a border sense in which benefits distributed widely can bring a sense of justice; but if distributional justice is concerned with the "even distribution of benefits and ills" – recognising that resources (such as wind) are unavoidably located in particular places, and arguing for fair treatment for those who live there – then this suggests a localised and specific definition of that community (Jenkins et al, 2016:176; Eames and Hunt, 2013).

Recognitional justice considers whether sections of society are ignored or misrepresented, and emphasises the importance of valuing local experience, attachment to place and the cultural meaning of particular places (Jenkins et al, 2016). It acknowledges the importance of ensuring that all members of a community are enabled to participate, or are adequately represented, in processes relating to community benefits (Rudolph et al, 2017).

Delivering benefits provides the opportunity to recognise those affected by new projects. The alternative ways in which communities are defined do this differently. Defining a community broadly in terms of 'spreading the benefit' may mean those who consider themselves directly impacted feel unacknowledged. Focusing on host communities may acknowledge people living very nearby, but ignore those beyond these particular boundaries of the 'host' communities who impacted by the project. Where communities are defined by drawing a line, this recognises those who are closest, which presumes they are most affected; but excludes those on the other side of the line. There is some clarity in using pre-existing demarcations such as electoral wards; but it does not recognise those who may be nearer, or who may also be affected but not resident in those wards.

Another key aspect to recognitional justice is respect for local knowledge, local circumstances, and local culture (Jenkins et al, 2016). Indeed, the Scottish Government (2015:4) states that "a fundamental principle of community benefit is that each package should be tailored to reflect the characteristics of the development". Each windfarm location has different needs and priorities; no 'one size fits all' (Haggett, 2008). This is highlighted by consultations for the benefit schemes for the East Coast Offshore Windfarm, Burbo Bank Extension, and Walney Extension, where the same question was asked about the types of projects that should be supported through a benefit find. Interestingly, the most popular answer in each location varied. For East Coast, the most popular response was job creation/apprenticeships; for Burbo Bank, it was community building provision and improvements, and for Walney it was environmental and wildlife projects (Grantscape, 2014; 2015). This demonstrates the differences between communities, and the importance of recognising that diversity.

Procedural justice explores how decision-makers engage with communities (Jenkins et al, 2016), and recognises that distributional injustices can arise from unfair processes through which they were created (Rudolph et al, 2017). The definition of 'community' has implications for distributional and recognitional justice. How this definition is determined can affect procedural justice. Research consistently suggests that the processes through which benefit schemes are enacted can be just as important as the benefits themselves (Parks and Morgera, 2015:3; Sovacool, 2014: 15; Aitken et al 2016; Jenkins et al 2016; Simcock, 2014); and can influence perceptions of procedural justice (Walker et al, 2014).

Procedural justice is more than simply inclusion, and involves meaningful participation and the mobilization of local knowledge (Jenkins et al, 2016: 178). The way in which a community is defined may affect the opportunities to engage with local communities. It may be harder to find and engage community members using open and fair procedures from across a wide area. It may be easier to gain knowledge and understanding about small local communities, and build relationships for a positive process for designing a benefit scheme. Engagement can be targeted on particular wards, as locations are pre-determined. Building good relationships, issues of trust.

There are examples of this in practice. As was discussed in section 7, the Area of Benefit for the Gwynt y Môr offshore windfarm was based on consultation responses, with the most popular response then applied. The definition of 'the community' for the European Offshore Wind Deployment Centre off the coast of Aberdeen was based on consultation responses from local community members, and the two fold definition reached was based on the responses given. There was also representation from a wide range of institutions including business, local government, community groups, charities, and key stakeholders (Haggett, 2017; Glasson et al, 2020), a finding echoed by Cass et al (2010).

9. Conclusions

This paper has explored the different ways in which the 'community' has been defined for the receipt of benefits from offshore windfarms across the UK. This has aimed to address "significant gap" (Devine-Wright and Sherry-Brennan, 2019:166) in understanding how communities are defined, and lines drawn to demarcate relevance and impact.

There are three key findings. Firstly, there is a significant divergence in how relevant communities are defined, and borders drawn to demarcate them. The current flexibility in policy about benefit funds has been interpreted differently by developers, from defining relevance as a whole region to a particular village. This divergence is noteworthy; there appears to be no common ground on what counts as the 'community' for an offshore renewables project. This is likely to become increasingly significant, as the offshore energy industry expands both in the UK, as well as the US and around the world. This flexibility may well be valuable – no one size will fit all, in terms of the location, needs, and cultural significance of any project site. But it also suggests the potential for contestation over such definitions in each location.

Secondly, this research finds that these divergent definitions of community can be categorised in terms of the relationship between impact and benefit. There are examples of 'communities' being drawn very widely where positive benefits are being spread; and of being drawn much more narrowly to acknowledge hosting or take account of impact. The way in which these communities are defined is not automatic or obvious; it is, as Devine-Wright and Sherry-Brennan describe (2019: 168) the result of social practices, and these definitions are social, political and discursive constructs. Illuminating the results of these practices is therefore a way to understand how benefits are conceived of and impacts perceived.

Thirdly, this matters, in trying to address the aims of energy justice. As Simcock (2014) says, decisions about boundaries are about understandings of justice. Determining a 'community' in different ways affects who is recognised. Distributing the benefits from energy projects to certain communities differentiates the way in which a balance between costs and benefits is achieved. This is not to suggest that there is a correct way to define communities, or that doing so certain way will achieve 'more' or 'better' justice. The concept of community will always be contested (Bristow et al, 2012), but decisions about who to include will always need to be made (Devine-Wright and Sherry-Brennan, 2019).

This research suggests that the most fruitful way to decide is through the involvement of those affected; by fostering an active role for communities in the 'co-production' of boundaries (Devine-Wright and Sherry-Brennan, 2019; Kerr et al., 2017). Effective and meaningful engagement has the potential to address each aspect of energy justice, by involving communities and enabling them to participate in decisions about who and where should benefit from the development of offshore wind.

References

Aitken, M. (2010) 'Wind power and community benefits: challenges and opportunities', *Energy Policy*, 38:10, 6066–6075. doi:10.1016/j.enpol.2010.05.062

Aitken, M., Haggett, C., and Rudolph, D. (2016) 'Practices and rationales of community engagement with wind farms: awareness raising, consultation, empowerment' *Planning Theory and Practice*, 17 (4): 557-576.

Bristow, G., Cowell, R., and Munday, M. (2012) 'Windfalls for whom? The evolving notion of 'community' in community benefit provisions from wind farms', *Geoforum*, 43:6, 1108-1120,https://doi.org/10.1016/j.geoforum.2012.06.015.

Cass, N., Walker, G., and Devine-Wright, P. (2010) 'Good neighbours, public relations and bribes: The politics and perceptions of community benefit provision in renewable energy development in the UK', *Journal of Environmental Policy & Planning*, 12:3, 255-275, DOI: 10.1080/1523908X.2010.509558

Cowell, R., Bristow, G., Munday, M. (2012) *Wind Energy and Justice for Disadvantaged Communities*, report for the Joseph Rowntree Foundation, York, available from: https://www.jrf.org.uk/report/wind-energy-and-justice-disadvantaged-communities

Cowell, R., Bristow, G., Munday, M. (2011) Acceptance, acceptability and environmental justice: the role of community benefits in wind energy development, *Journal of Environmental Planning and Management*, 54:4, 539-557, DOI: 10.1080/09640568.2010.521047

Crow, G. (2002) 'Community studies: Fifty years of theorization', *Sociological Research Online*, 7:3, 82-91, https://doi.org/10.5153/sro.742

Devine-Wright, P., and Sherry-Brennan, F. (2019) 'here do you draw the line? Legitimacy and fairness in constructing community benefit fund boundaries for energy infrastructure projects', *Energy Research & Social Science*, 54, 166-175, https://doi.org/10.1016/j.erss.2019.04.002.

Eames, M., and Hunt, M. (2013) 'Energy justice in sustainability transitions research' in K. Bickerstaff, G. Walker, H. Bulkeley (Eds.), *Energy Justice in a Changing Climate: Social Equity and Low-carbon Energy*, Zed books, London

Ellis, G., Barry, J., and Robinson, C. (2007) 'Many ways to say 'no', different ways to say 'yes': Applying Q-Methodology to understand public acceptance of wind farm proposals', *Journal of Environmental Planning and Management* 50(4), 517-551.

Ely, M., Anzul, M., and Friedman, T. (1991) *Doing Qualitative Research: Circles Within Circles*. London: Falmer Press

European Commission (2020) 'Boosting Offshore Renewable Energy for a Climate Neutral Europe Brussels', 19 November 2020, available from: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2096

Firestone, J., and Kempton, W. (2007) 'Public opinion about large offshore wind power: underlying factors', *Energy Policy* 35(3) 584-598.

Foundation Scotland (2020) Unlock our Future Fund: Fund Strategy, available from https://www.foundationscotland.org.uk/media/986386/Fund-Strategy-2020-update-FINAL.pdf (accessed 20/5/2020)

Glasson, J., Durning, B., Olorundami, T., and Welch, K. (2020) *European Offshore Wind Deployment Centre (EOWDC) (Aberdeen Offshore Wind Farm): Socio-Economic Impacts Monitoring Study*, Impacts Assessment Unit, Oxford Brookes University https://doi.org/10.24384/v8nf-ja69

Grantscape (2014) *Burbo Bank Extension consultation responses*, report available form http://www.grantscape.org.uk/stuff/uploads/Burbo-Extenstion-CF-Con-Survey-Summary-Dec-14.pdf

Grantscape (2015) *East Coast Offshore Wind Farm consultation response*, report available form http://www.grantscape.org.uk/stuff/uploads/ECCF-Consultation-Summary-Report-Final.pdf

Gross, C. (2007) 'Community perspectives of wind energy in Australia: The application of a justice and community fairness framework to increase social acceptance', *Energy Policy*, 35:5, 2727-2736.

Haggett, C. (2008) 'Over the see and far away? A consideration of planning, politics, and public perceptions of offshore wind farms', *Journal of Environmental Policy and Planning* 10(3) 289-306.

Haggett, C. (2017) *European Offshore Windfarm Deployment Centre: Community Benefits Baseline* Study, University of Edinburgh briefing paper, September 2017

Klain, S., MacDonald, S., and Battista, N. (2015) *Engaging Communities in Offshore Wind Case Studies and Lessons Learned from New England Islands*, The Island Institute, https://www.islandinstitute.org/wp-content/uploads/2020/09/Offshore-Wind-Report_v70918.pdf

Jenkins, K., McCauley, D., Heffron, R., Stephan, H., and Rehner, R. (2016) 'Energy justice: A conceptual review', *Energy Research & Social Science*, 11, 694-702.

Jørgensen, M. L., Anker, H. T., and Lassen, J. (2020) 'Distributive fairness and local acceptance of wind turbines: The role of compensation schemes', *Energy Policy*, 138, 111294, https://doi.org/10.1016/j.enpol.2020.111294.

Kerr, S., Johnson, K., and Weir, S. (2017) 'Understanding community benefit payments from renewable energy development', *Energy Policy*, 105, 202-211, https://doi.org/10.1016/j.enpol.2017.02.034.

MacDonald, K. (2008) 'Using documents', in: Gilbert N (ed.) *Researching Social Life*. Los Angeles: Sage, pp. 285–303.

Markantoni, M. and Aitken, A. (2016) 'Getting low-carbon governance right: learning from actors involved in community benefits', *Local Environment*, 21:8, 969-990, DOI: 10.1080/13549839.2015.1058769

Morgera, E., (2014) 'Conceptualizing benefit-sharing as the pursuit of equity in addressing global environmental challenges", Research Paper No. 2014/41, Edinburgh School of Law, University of Edinburgh, and part of the project "BENELEX: Benefit-sharing for an equitable transition to the green economy -the role of law", www.benelex.ed.ac.uk) funded by the European Research Council Starting Grant http://papers.ssrn.com/sol3/papers

Munday, M., Bristow, G., and Cowell, R. (2011) 'Wind farms in rural areas: How far do community benefits from wind farms represent a local economic development opportunity?', *Journal of Rural Studies*, 27:1, 1-12, https://doi.org/10.1016/j.jrurstud.2010.08.003.

Owens, S. and Driffill, L. (2008) 'How to change attitudes in the context of energy', *Energy Policy,* 36 (12), 4412–4418

Parks, L., and Morgera, E. (2015) 'An interdisciplinary model for mapping the normative diffusion of fair and equitable benefit-sharing', University of Edinburgh School of Law Research Paper 2015/22 and BENELEX Working Paper N. 7 part of the project ''BENELEX: Benefit-sharing for an equitable transition to the green economy – The role of law'', funded by the European Research Council Starting Grant, available at: http://papers.ssrn.com/sol3/papers

Rudolph, D., Haggett, C., and Aitken, M. (2017) 'Community benefits from offshore renewables: The relationship between different understandings of impact, community, and benefit', *Environment and Planning C: Politics and Space*, 10.1177/2399654417699206;

Rudolph, D., Haggett, C., and Aitken, M. (2015) *Community Benefits From Offshore Renewables: Good Practice Review,* Research commissioned for ClimateXChange for the Scottish Government, available: http://www.climatexchange.org.uk/reducing-emissions/community-benefits-offshore-renewables-good-practice-review/

Rydin, Y., Natarajan, L., Lee, M., and Lock, S. (2018) 'Local voices on renewable energy projects: the performative role of the regulatory process for major offshore infrastructure in England and Wales', *Local Environment*, 23:5, 565-581, doiI:10.1080/13549839.2018.1449821

Scottish Government (2015) *Good Practice Principles for Community Benefits from Offshore Renewable Energy Developments* Produced by Local Energy Scotland on behalf of The Scottish Government, http://www.localenergyscotland.org/good-practice/offshore-community-benefit/
Silverman, D. (2005) *Doing Qualitative Research: A Practical Handbook*. London: Sage.

Simcock, N. (2014) 'Exploring how stakeholders in two community wind projects use a "those affected" principle to evaluate the fairness of each project's spatial boundary', *Local Environment*, 19:3, 241-258, doi: 10.1080/13549839.2013.788482

Soma, K., and Haggett, C. (2015) 'Enhancing social acceptance in marine governance in Europe', *Ocean and Coastal Management*, 117: 61-69

Sovacool, B. K., and Dworkin, M. (2015) 'Energy justice: Conceptual insights and practical applications', *Applied Energy* 142, 435–444

Sovacool, B. (2014) 'What are we doing here? Analysing 15 years of energy scholarship and proposing a social science research agenda', *Energy Research and Social Science*, 1, 1–29.

UK Government (2019) UK Government press release, Offshore wind energy revolution to provide a third of all IK electricity by 2030, 7th March 2019, available from: https://www.gov.uk/government/news/offshore-wind-energy-revolution-to-provide-a-third-of-all-uk-electricity-by-2030

Vattenfall (2020) European Offshore Wind Deployment Centre https://group.vattenfall.com/uk/what-we-do/our-projects/european-offshore-wind-deployment-centre) accessed 27/5/2020

Walker, C., and Baxter. J. (2017) “It's easy to throw rocks at a corporation”: wind energy development and distributive justice in Canada, *Journal of Environmental Policy & Planning*, 19:6, 754-768, doi: 10.1080/1523908X.2016.1267614

Walker, B. J. A., Wiersma, B., and Bailey, E. (2014) ‘Community benefits, framing and the social acceptance of offshore wind farms: an experimental study in England’, *Energy Research and Social Science*, 3, 46–54.

Walker, G. (2011) ‘The role for “community” in carbon governance’, *Climate Change*, 2:5, 777–782.

Wright, G. (2016) ‘Regulating wave and tidal energy: An industry perspective on the Scottish marine governance framework’, *Marine Policy*, 65: 115-126.

The White House (2021) The White House Statements and Releases, ‘Biden Administration Jumpstarts Offshore Wind Energy to Create Jobs’, 29th March 2021, available from: https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/29/fact-sheet-biden-administration-jumpstarts-offshore-wind-energy-projects-to-create-jobs/

Wynberg, R., and Hauck, M. (2014) ‘People, power, and the coast: a conceptual framework for understanding and implementing benefit sharing’, *Ecology and Society* 19(1) 27; http://dx.doi.org/10.5751/ES-06250-190127

From:	[Redacted]
To:	Sectoral Marine Planning
Subject:	Evidence submitted for the Sectoral Marine Plan on engaging with commercial fisheries
Date:	28 February 2022 16:11:28
Attachments:	Sectoral+Marine+Plan+-+SEG+-+submission+form+3+November+2021 Haggett fishers.docx Haggett et al 2020 Oceanography paper.pdf

To whom it may concern,

I am attaching a cover sheet and evidence in response to the call for evidence on the Sectoral Marine Plan.
This evidence pertains to the aspects of the Plan that consider commercial fisheries, particularly engagement and impacts.
With thanks,

[Reda
cted]

Senior Lecturer in Sociology and Sustainable Development
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Please note I work part time (60%)

Sectoral Marine Plan for offshore wind energy
iterative plan review process: form for submission of new evidence

Title of evidence submitted

Haggett, C., T. ten Brink, A. Russell, M. Roach, J. Firestone, T. Dalton, and B.J. McCay (2020) 'Offshore wind projects and fisheries: Conflict and engagement in the United Kingdom and the United States', *Oceanography* 33(4):38-47, https://doi.org/10.5670/oceanog.2020.404

Evidence category

Please tick relevant box

☒ scientific paper

☐ grey literature

☐ datasets

Please provide a summary on how this evidence is pertinent to the plan and if it links to any of the strategic ScotMER evidence maps. Max 500 words

This evidence is pertinent to the consideration of commercial fisheries in the Sectoral Marine Plan. It supports the discussions in the Plan in two main ways.

Firstly, the Plan identifies the interactions between different marine users (section 2.6, page 16), and highlights the potential social and economic impacts on a range of sectors, including commercial fishers (section 3.2.4, pages 33-34).

This evidence draws on shared learning and experience from the UK and US. It provides analysis of the way in which potential negative impacts to fishers may be minimised, and potential benefits may be maximised. Whilst acknowledging that the coexistence of fisheries and offshore energy projects is not straightforward, options explored include co-location, the development of exclusion zones, and introducing no-take zones during different phases of construction and operation. The evidence discusses the ecological and environmental benefits of these options; for example, no-take zones providing refugia for target fish species. The evidence also discusses the opportunities that offshore energy projects can bring for fishers to diversify or supplement income.

Secondly, the Plan rightly notes the importance of maintaining and continuing stakeholder negotiation (section 5.1.1., page 59), including engagement with commercial fisheries.

The evidence supports the statements in the Plan that this communication should be ongoing, and it analyses the importance of negotiation with fisheries' groups at a strategic level, where impacts can be examined holistically. The evidence also supports the statements in the Plan that engagement should take place too at project-level. It strongly emphasises the value of discussions in local communities, which take account of the character and culture of those particular places. This may mean identifying trusted intermediaries, using innovative methods, tailored to local circumstances, with two-way discussions. This includes recognising where communication may need to be adapted, depending on local fishing community preferences. The evidence highlights the value of attempts to work alongside fishing groups, and providing opportunities for communities to have a role in influencing the outcome of the discussions that take place.

Sectoral Marine Plan for offshore wind energy
iterative plan review process: form for submission of new evidence

Checklist for dataset

Main contact	
Surveyor contact (where relevant)	
Analyst contact (where relevant)	

If datasets are submitted the following information must be submitted

☐ reason for collecting data

☐ analysis methods

☐ metadata included

Contact details

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Please return this form accompanied with relevant documents to SectoralMarinePlanning@gov.scot by 28 February 2022.

OFFSHORE WIND PROJECTS AND FISHERIES

Conflict and Engagement in the United Kingdom and the United States

By Claire Haggett, Talya ten Brink, Aaron Russell, Michael Roach, Jeremy Firestone, Tracey Dalton, and Bonnie J. McCay

> "A just energy transition requires agency as well as treating fishers with dignity and respect, as their places and livelihoods feel to them to be at risk from [offshore wind projects]—not to mention from overfishing and climate change."

ABSTRACT. A just transition to renewable energy requires accounting for the effects of offshore wind projects (OWPs) on the fishing industry. Research on the interaction of OWPs with coastal communities and fisheries in the United Kingdom and the United States offers insights into minimizing conflict and enhancing constructive engagement between fishers and wind energy developers. Recent innovations include earlier and more meaningful inclusion of fisheries representatives in planning and decision-making, involving fisheries liaisons in the process, and conducting more cumulative studies and taking collaborative approaches to considering the effects of OWP on fishing.

INTRODUCTION

Increasing evidence of global climate change and the depletion of fossil fuel stocks has led to greater pursuit of clean energy. Offshore wind is one such clean-energy source, and offshore wind projects (OWPs) promise social benefits in terms of decarbonizing energy supplies and hence mitigating climate change and pollution. OWPs also create risks and uncertainties. A "just" or fair energy transition means addressing several challenges that include taking account of how the burdens and benefits of energy systems are distributed, identifying and recognizing who is affected, and instituting procedural principles to remediate concerns (Sovacool, 2014; Jenkins et al., 2016; Friedman et al., 2018; Jasanoff, 2018).

In this paper, we outline how research on OWPs and their effects on coastal communities and fisheries offers insights into how to minimize conflicts and how to promote constructive engagement between fishers and wind energy developers as society transitions to greater use of clean energy. We review such efforts mainly from the perspectives and experiences of the United Kingdom (UK) and the United States. The UK is a valuable case study for several reasons. The OWP sector is championed as a "success story" by the government of the United Kingdom, which emphasizes "clean growth" and claims the largest installed offshore capacity in the world (UK Government, 2020; Figure 1). In addition, the Scottish government has passed "world-leading" climate change legislation, aiming to generate 50% of overall energy consumption from renewable sources (Scottish Government, 2017). At the same time, fishing is a key industry: marine fish worth almost a billion pounds were landed in the UK in 2019, with Scottish vessels accounting for nearly two-thirds of this catch (Marine Management Organisation, 2020). The socioeconomic importance of the commercial fishing sector in Scotland and on England's northeast coast is well established, and coastal communities historically and culturally shaped by fishing remain dependent upon it now (Brookfield et al., 2005; Stead, 2005).

FACING PAGE. Members of the Holderness Fishing Industry Group, Bridlington, UK, study shellfish in the Westernmost Rough Offshore Wind Farm, May 2020. Photo credit: Mike Roach

The United States also provides a useful case, boasting substantial offshore wind resources (Musial et al., 2016), though OWPs have been slow to develop there (Figure 2). Prior to 2005, the United States had no formalized legal structure for offshore wind and no implementing regulations until 2009. Moreover, early plans, including Cape Wind in Massachusetts and Bluewater Wind in Delaware, were unsuccessful, while others were delayed. The US Bureau of Ocean Energy Management (BOEM) regulates offshore wind development in federal waters and has made considerable progress in leasing sites off the East Coast to offshore wind developers (see Figure 2), with further potential evidenced by recent participation of European companies. But, the US OWP sector lags considerably behind that of the UK, with only 42 megawatts (MW) operational as of October 2020 from two sources, the Block Island project in Rhode Island state waters and a small pilot project in federal waters off the coast of Virginia. Commercial and recreational fishing are of sociocultural and economic importance to fishers and the communities in which they reside along the US East Coast (BOEM, 2018). The sessile Atlantic surf clam (*Spisula solidissima*), ocean quahog (*Arctica islandica),* and Atlantic sea scallop (*Placopecten magellanicus*) fisheries of this region are among the most valuable in the United States (NOAA Fisheries, 2020a), and fisheries for mobile species like Atlantic cod (*Gadus morhua*) are iconic along this coast.

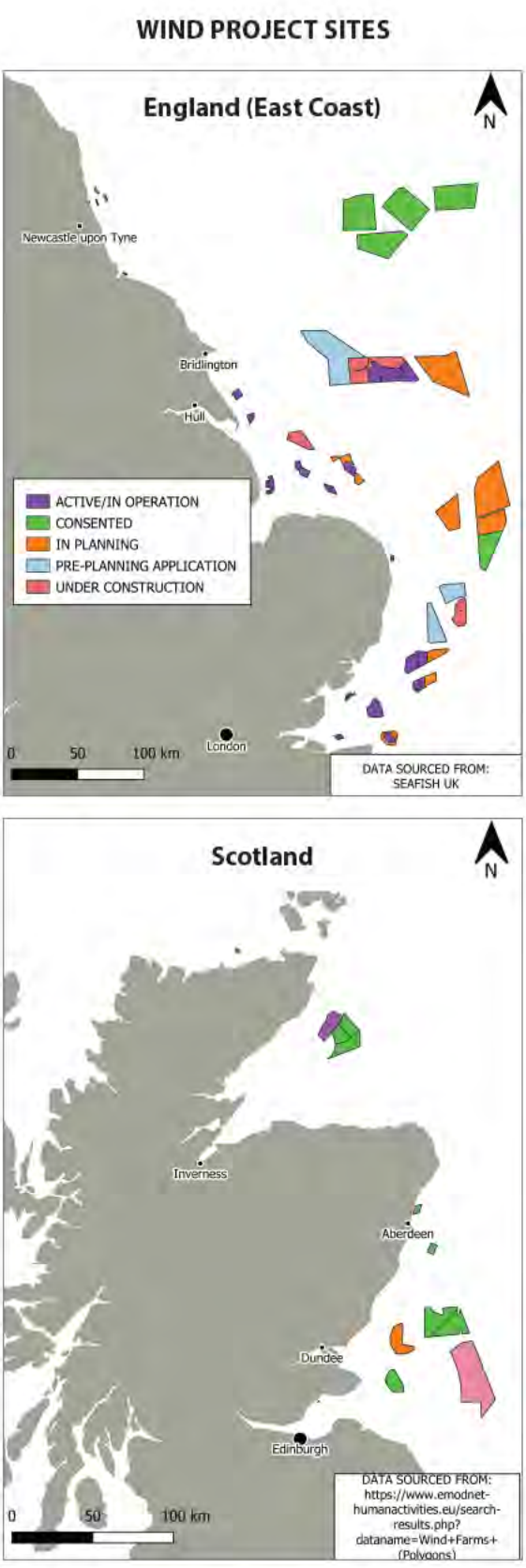

FIGURE 1. Offshore wind projects near the east coast of England (left panel) and Scotland (right panel).

UNDERSTANDING SUPPORT FOR AND RESISTANCE TO WIND ENERGY

A central question in research is why planning and construction of wind energy is often slow and costly, despite high levels of public support and backing by policymakers. A common explanation for this apparent "social gap" (Bell et al., 2005) is NIMBY (not in my backyard), but social scientists have shown this interpretation ignores complex factors that shape people's assessments of energy projects, both on- and offshore (Devine-Wright, 2005, 2009; O'Keeffe and Haggett, 2012; Bell et al., 2013).

For example, values and beliefs affect people's connections with the ocean, and their attitudes toward proposed changes. (Bidwell, 2013). In research about citizen responses to a proposed project off Cape Cod, Massachusetts, it became clear that seas are considered to be special places (Kempton et al., 2005). Consequently, wind development is often perceived as disruptive to people's relationships with "place" (Devine-Wright, 2009). From a social science perspective, place is not the physical environment alone, but rather a space imbued with meaning (Cresswell, 2014), which may be "something intangible, where all [one] sees is the ocean" (Firestone et al., 2018a).

The character of a particular place can matter greatly. Bates and Firestone (2015) compared responses of residents of Atlantic City, New Jersey, with those of coastal towns in the neighboring state of Delaware to proposed small-scale nearshore OWPs. Although wildlife/environmental issues were most frequently cited in both places, for Delawareans they were causally related to positive attitudes toward the project, but for Atlantic City residents they were not. For Delaware residents—many of whom were recent retirees to the coast—the project symbolized clean energy, consistent with values of nature and stewardship. For Atlantic City residents—many of whom were involved in ocean activities such as boating and fishing—it represented further industrialization of the ocean, conflicting with traditional uses of the ocean.

Place is therefore an important social construct in controversies about wind energy (Pasqualetti, 2011). The expectation that valued landscapes should not change ("immutability"), combined with limited space, reduces negotiating flexibility over project siting and design. For example, along the US East Coast, land-based wind resources are poor, leaving states with fewer options for decarbonizing electricity generation and improving health outcomes. Choosing alternatives that are a greater distance from shore and in deeper waters (Samoteskul et al., 2014), and perhaps have larger spacing among turbines to allow vessel movement, increases project costs and hence narrows the options. Such "immobility" runs head long into existing cultural, social, and economic aspects of the region, raising concerns about the way in which impacts and benefits of projects are apportioned.

OFFSHORE WIND PROJECTS AND FISHERIES

For people who work at sea, the idea of place is more complex. They have a multidimensional relationship with the ocean that extends to deeper and more distant waters, while for those who visit or live near the ocean, place often only incorporates the nearshore (McLachlan, 2009). Furthermore, the ocean, like seemingly undeveloped land, is

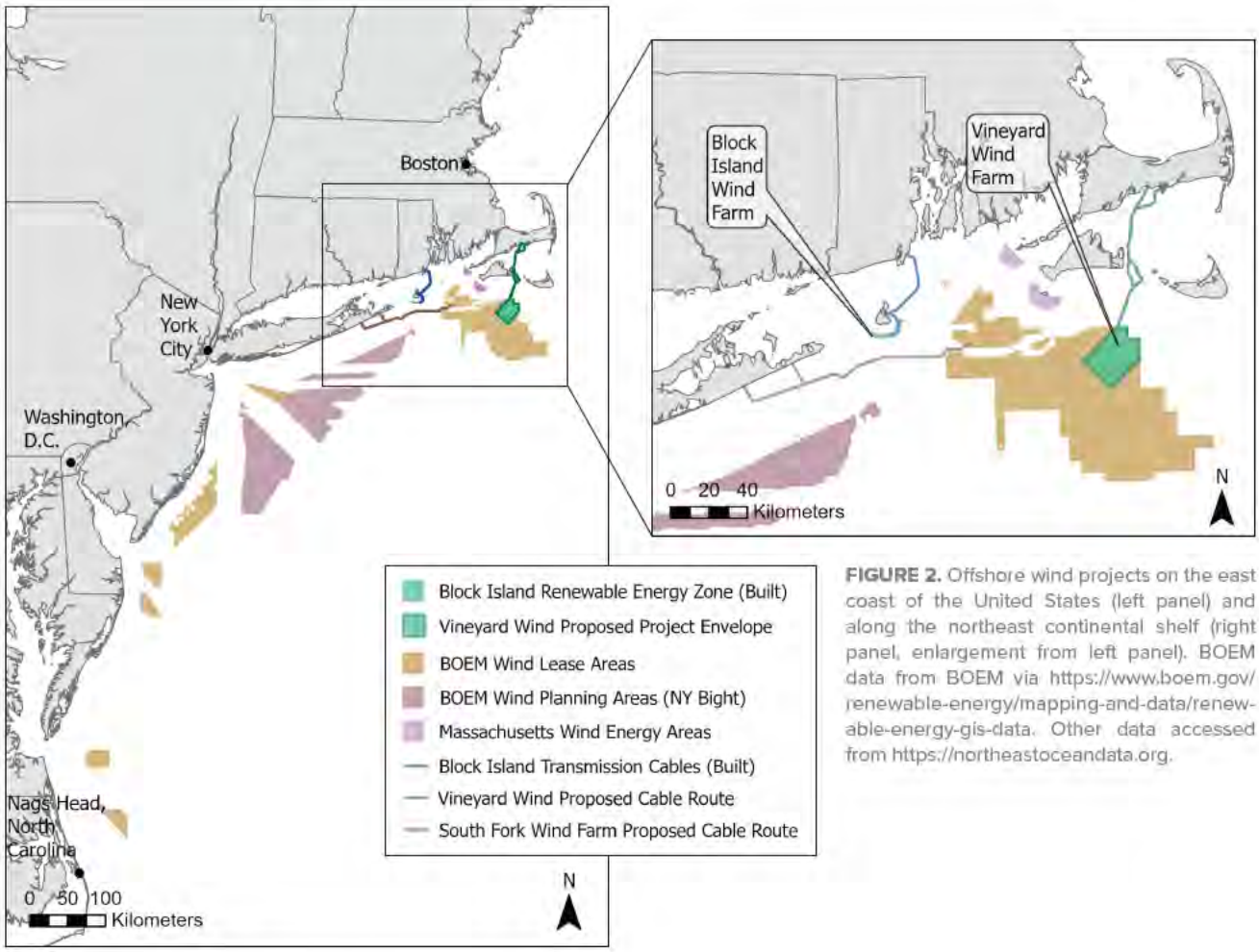

FIGURE 2. Offshore wind projects on the east coast of the United States (left panel) and along the northeast continental shelf (right panel, enlargement from left panel). BOEM data from BOEM via https://www.boem.gov/renewable-energy/mapping-and-data/renewable-energy-gis-data. Other data accessed from https://northeastoceandata.org.

more than "unoccupied swaths of nature" (Pasqualetti, 2011, p. 914); rather, it is a place where work is done and identities are fashioned. The people who fish for a living are not only defined by the communities where they reside, store their boats and gear, and sell their fish but also by where they spend much of their time working: at sea. The notion of "communities at sea" (St. Martin and Olson, 2017) is thus relevant for understanding the potential impacts of offshore energy facilities on the activities of fishers. It also highlights the knowledge and values they bring from and to the sea, and to negotiations over offshore wind projects.

Surveys conducted in the early stages of planning for OWPs show highly variable levels of fisher support. In Ireland, 40% of fishers surveyed backed the development of OWPs and marine energy projects, while 45% did not (Reilly et al., 2015). In Scotland, most fishers expressed positive or neutral attitudes toward wave and tidal energy extraction (Alexander at al., 2013b). Support varies in part due to differences of scale, methods, and other factors within the fisheries (Chen et al., 2015; Kularathna et al., 2019) and to experience. Scottish fishers who knew of nearby developments were five times more likely to have a negative attitude (Alexander et al., 2013b, p. 241). Likewise, Soma and Haggett (2015) found familiarity with projects and concerns about impacts can breed discontent and opposition to OWPs. Another concern is how OWPs will affect the quality of fisheries science used for managing stocks where the footprint of the OWP and of a managed stock overlap in ways that may limit monitoring and hence the reliability of data for stock assessment (Lipsky and Gabriel, 2019). This issue can have short-term economic effects on fisheries in systems where managers are required to take scientific uncertainty into account when determining allowable catches.

CO-LOCATION AND COEXISTENCE OF FISHERIES AND OWPs

To address these issues, studies have explored the potential of "co-location" of fisheries with OWPs, particularly passive gear fisheries (Stelzenmueller et al., 2016), aquaculture (Gimpel et al., 2015, Lacroix and Pioch, 2011), and recreational fisheries (Fayram and de Risi, 2007). For example, cooperation during planning processes has led to successful co-location of specific types of fisheries (especially those using static gear) and OWPs (Kafas, 2017; European Commission, 2019). However, there are barriers to co-location, including commercial fishers' resistance to set-

ting gear within OWPs because of safety, legal, and insurance issues; developers' demands for licensing; and concerns about losing access (Hall and Lazarus, 2015; Hooper et al., 2015). Recreational fishers have expressed similar concerns, especially related to navigational safety (Hooper et al., 2017; ten Brink and Dalton, 2018). Commercial and recreational fishers may also have different perspectives. Many recreational fishers were attracted to the environs around the Block Island Wind Farm, off the Rhode Island coast, for increased fishing (ten Brink and Dalton, 2018), especially spearfishing. However, commercial fishers were pushed into less productive areas due to crowding around the turbines and their placement along their route.

A recurring idea is to establish exclusion zones during or after construction. Such marine protected areas will potentially benefit fish stocks, and recreational fishers are more likely to be able to fish close to the structures (e.g., Hooper and Austen, 2014). Through restrictions on mobile gear (Vandendriessche et al., 2015; Bergman et al., 2015), creating these "no-take zones" during different phases of construction and operation can have ecological benefits, providing refugia for target fish species. During the latter phase of construction, when there is no disturbance to the benthos, an exclusion zone will allow recovery of macro-benthic species (Coates et al., 2014, 2016). A collaborative study involving the Holderness Fishing Industry Group (HFIG, based in Bridlington, UK), the local fishery, and the developer identified some positive benefits of temporary closures of European lobster (*Homarus gammarus)* fishing areas during construction (Roach et al., 2018), and as yet unpublished long-term monitoring indicates lobster population ecology similar to conditions prior to construction. There are also documented benefits from introducing hard structures; artificial reefs provide surfaces for colonization of sessile benthic species (Bergström et al., 2014; De Mesel et al., 2015; Degraer et al., 2020, in this issue). These benefits are enhanced in areas not characterized by hard substrata; for example, Krone et al. (2017) observed that scour stone protection offered additional habitat for juvenile brown crab (*Cancer pagurus)*, up to 5,000 juveniles per turbine, contributing significantly to the regional population.

Not all studies find benefits to co-location, however. Haraldsson et al. (2020) emphasize that socio-ecological complexity can provide unexpected outcomes, such as a decline in perceived environmental quality despite increases in biological productivity in situations where improved productivity increases predation on valuable species.

COMPENSATION AND PARTICIPATION

There are two key aspects to a just energy transition. First, ensuring distributional justice requires a fair accounting of the impacts and benefits from new projects. Accordingly, potential disruption to fishing effort and fish stocks has led to calls for compensation to commercial fishers (Hooper et al., 2015; Reilly et al., 2015; ten Brink and Dalton, 2018). In response, Vineyard Wind in the United States established fisher compensation funds to address losses, a trust fund to support fisher navigational and safety equipment and to deflect any increases in insurance costs, and an innovation fund with program and research project grants (BOEM, 2020). In the UK, several OWPs contributed to a fund to support fisheries in everything from research to a hatchery, life-saving equipment, and new tractors. HFIG has a developer's agreement to fund collaborative research projects and has used community funding for matching grants to help fisheries (Roach et al., 2018).

OWPs can also provide opportunities for fishers to diversify or supplement income. Some US projects have preferentially hired fishers displaced by oil and gas development or required developers to create plans to recruit local residents or businesses (Reilly et al., 2015). Scottish fishers noted that OWPs could provide alternative employment for fishers, to guard devices or exclusion zones or to provide survey assistance during construction (Alexander et al., 2013a,b).

There might also be entrepreneurial opportunities. For instance, a fishers' association in Ireland set a up a company that sold fuel to the developer (Reilly et al., 2016). In both the UK and the United States, fishers have either retrofitted or purchased new vessels to conduct work for the wind sector. Also, in the United States, fisheries business owners created a company, Fishermen's Energy Inc., for the express purpose of developing offshore wind. Moreover, while the effects of wind turbines on coastal tourism are uncertain, boat tours, with charter-fishing boat captains as nature guides, may prove popular as more projects become operational (Lilley et al., 2010; ten Brink and Dalton, 2018).

Focusing solely on economic opportunities and costs, however, limits understanding of fishers as individuals who ascribe meaning to their time at sea (Russell et al., 2020) and their identification as members of occupational and place-based communities on land and at sea. Studies in the UK document concerns about trade-offs for local communities where fisheries are strongly embedded in the local economy, including potential loss of skills, heritage, and ways of life due to OWPs (Brookfield et al., 2005; Gray et al., 2005; Mackinson et al., 2006; Reilly et al., 2015). Indeed, collaboratively negotiated community benefits were key to discussions about the Block Island OWP (Klain et al., 2017). It may be that fishers can find meaning in the work of building and maintaining OWPs; the Fishermen's Energy Inc. initiative may demonstrate such a possibility, even though it did not successfully complete an OWP project.

ENGAGING FISHERIES AND DEVELOPERS

The second key aspect to a just transition is procedural justice—ensuring that those affected are recognized and

can participate in decision-making. As demonstrated, the coexistence of fisheries and OWPs is not straightforward but rather challenges developers to integrate their industry into crowded offshore spaces (Marine Scotland, 2011; Hooper et al., 2015; Wright, 2016; Weir and Kerr, 2019). Effective engagement in the processes, with interaction between fishers and developers, can help (Alexander et al., 2013b; Reilly et al., 2015; Klain et al., 2017) when there are compromises (Wright, 2016) as well as clear protocols and communication (Hooper et al., 2015).

There are three points to make about this. First, discussions of fisheries and offshore energy are often in the context of marine spatial planning (MSP). This is particularly so in the European Union (Stelzenmueller et al., 2016) but also increasingly in the United States where MSP may need to follow formal requirements, such as the US National Environmental Policy Act's (NEPA) environmental assessment process. When designed to fully engage fishers and other stakeholders, MSP can advance trust and communication, as in the Block Island case (Dwyer and Bidwell, 2019). Broader questions of scale and cumulative effects from OWPs can be raised in MSP in addition to examining impacts (and conflicts) for specific projects and sites. A German study suggested that the cumulative effects on fisheries from OWPs are far greater than revealed in project-specific studies (Berkenhagen et al., 2010). BOEM has also begun to examine impacts more holistically, considering the environmental and social impacts from large-scale OWP (22 GW) buildout and differentiating between the impacts to sessile and mobile fisheries and gear (BOEM, 2020). MSP can therefore provide a way to consider and address impacts and benefits, moving beyond an "announce and defend" strategy. Indeed, when individuals perceive their community as having been able to influence the outcome (Firestone et al., 2018b), perceptions of process fairness and attitudes toward a project are enhanced.

The benefit of MSP has been demonstrated in practice. For example, based partly on a series of workshops conducted within an MSP process (Smythe and McCann, 2019), a Rhode Island state-based council developed a Special Area Management Plan (SAMP) that successfully outlined a location for the Block Island OWP. The US federal government runs the OWP leasing process for federal waters through BOEM. States run the leasing process in state waters and take the lead in determining renewable energy goals (Woods, 2019) and approving contracts and permitting for transmission, coastal impacts, and cable easements that come ashore (NYSERDA, 2020). Similarly, Scottish government-sponsored participatory fisheries mapping outputs were successfully used to inform MSP (Kafas et al., 2017).

Second, fisheries-led initiatives and "fisheries liaisons" can be key in effective engagement. For example, in 2002, the Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) was established by UK fishing groups to improve engagement between developers and fishers. Its guidance calls for an effective liaison to help identify potential impacts and co-existence opportunities, and guide mitigation (FLOWW, 2014, p. 1). A "fisheries liaison" is therefore someone hired by a developer to provide information to fishers, convey their concerns and issues to the developer, and convene meetings as appropriate.

The experiences of FLOWW and other groups in the UK have contributed to adoption of fisheries liaisons in the United States (Moura et al., 2015). In 2013, the inclusion of fisheries liaisons was adopted as part of "best practices" by BOEM and the state-based council that planned the Block Island OWP (McCann et al., 2013). It is now part of other US projects in the US northeast. Although similar in many respects to fisheries representatives or extension and outreach officers in fisheries and agriculture, the position is paid by the developer rather than by government or affected industries.

Those who serve as fisheries liaisons are usually well known within the fishing community even if they are not actively fishing. They are likely to seize opportunities for more collaborative processes, as was the case for the early days of the UK's Westermost Rough OWP (see Klain et al., 2017). For Block Island, the developer employed a respected local fisher as a fisheries liaison during the planning process, and then, as stipulated by the state of Rhode Island, a third-party fisheries liaison was used for communication during construction and operation phases. The wind project layout was altered by the developer in response to fisher feedback (Klain et al. 2017; Firestone et al., 2020). Block Island community members described a related community liaison as "critical" and making "all the difference" (Firestone et al., 2020, p. 7).

Third, the need to help fisheries engage effectively with OWPs has led to a range of new social arrangements of people, authorities, and organizations. For example, in the United States, the Responsible Offshore Development Alliance (RODA)—a coalition of approximately 170 fishing industry associations and fishing companies up and down the Atlantic coast—formed in early 2018 to interface with developers; regional fishery management councils; the National Oceanic and Atmospheric Administration (NOAA), a federal agency with a fisheries management oversight; and BOEM to ensure that OWP development is compatible with their members' businesses (Chase, 2020). RODA has worked for improved OWP layouts, increased spacing between turbines, and vessel transit zones (Barnes, 2020). It also partnered with the relevant regional ocean planning bodies to incorporate fishers' interests into their data portals (RODA, 2020). It is a founding partner of the Responsible Offshore Science Alliance (ROSA), which functions as a science forum designed to enhance understanding of the impact of OWPs on fisheries and to fill knowledge gaps. RODA brings the concerns, voices, and ideas of fishers to OWP develop-

ment and helps to address many issues raised above, such as collection of data, compensation, trust, power, and mitigation. In 2020–2021, it is partnering with NOAA and BOEM to synthesize knowledge pertinent to OWPs in US waters.

Such coalitions also operate in the UK. HFIG has developed an inclusive approach by creating a single point of contact for different offshore projects, enhancing consistency, and making it easier for these projects to get essential information disseminated. HFIG is also represented at planning meetings to ensure, where possible, minimum disruption to the fishery. Coexistence plans have also been developed for operational phases of different OWPs to enhance future viability of both industries.

Participation of all relevant stakeholders matters, and existing fisheries research and management organizations play important roles in this. In the United States, NOAA has established an internal working group (NOAA Fisheries, 2020b), and NOAA's Northeast Fisheries Science Center is conducting several research studies that include investigating habitats in OWP development areas, effects on port and fisheries revenue, and impacts on cod stocks (NOAA Fisheries, 2020b). These investigations will contribute to comprehensive environmental impact analyses of how OWPs will interact with fish, fisheries, and coastal communities and regions.

TOWARD MEANINGFUL ENGAGEMENT

Key lessons for effective engagement have emerged from UK and US experiences. Input from fishers at the early stages is more likely to result in their active participation (Reilly et al., 2016) and to capture their specialist knowledge (Alexander et al. 2013b). Moreover, engagement should be maintained throughout the environmental evaluation process and consent application (FLOWW, 2014; Aitken et al. 2016). Face-to-face meetings and personal interactions are preferred (Gray et al., 2005), and channels of communication may need to be adapted, depending on local fishing community preferences (Reilly et al., 2016). Port visits by developers are often the best way to establish local relationships, gain insights into the local fishing industry, and identify fishers to engage (FLOWW, 2014, p. 26). Few fishers are likely to read long technical reports, so outputs must be easily available and understandable (de Groot et al., 2014, p. 13).

Moreover, action matters (Aitken et al., 2016). Many of the fishers in Gray et al.'s (2005) study believed there was little *meaningful* discussion between fishing and energy representatives, that is was merely a box-ticking exercise. Alexander et al. (2103b, p. 8) highlight fishers describing consultation as "lip-service" and saying that "nobody listens," often assuming decisions having already been made. It is therefore crucial that engagement be effective (Reilly et al., 2015). Developers would best use two-way communication and methods of "suggesting, not telling" fishers (Alexander et al., 2103b), and deliver on promised outputs (de Groot et al., 2014). The Block Island experience shows that MSP, if designed carefully, can be considered more broadly to secure early fishery input, build trust, and facilitate dialogue (Klain et al., 2017; Dwyer and Bidwell, 2019). Another fascinating example, from Maine, concerns participatory mapping work undertaken to help coastal and island communities document community fishing areas and tell the story of their relationship with the ocean; it suggests that time and effort invested in high-quality engagement can yield rich and valuable resources on which to base decisions (Island Institute, 2009).

Although early, ongoing, and meaningful engagement has been found to be effective in attempts to reach mutually beneficial outcomes, their achievement is not straightforward. For instance, fishers are often hard to reach (Gray et al., 2005), and it can be difficult to identify who forms the "relevant community" (Rudolph et al., 2017)—seasonal island residents were not part of early outreach efforts for Block Island even though they were powerful stakeholders (Dwyer and Bidwell, 2019).

Facilitating collaborative consensus requires considerable time and commitment and may not be possible for all developers (Reilly et al., 2016) and fishers (de Groot et al., 2014). Fishers are not homogeneous; they engage in different types of activity and use various kinds of equipment, which may engender differing concerns about energy projects (Alexander et al., 2013b; Pita et al., 2013). Accurate and up-to-date information is key for effective engagement (Reilly et al., 2016) and evidence-based decision-making (FLOWW, 2014). Data gaps have been identified (Shields et al., 2009; de Groot et al., 2014) in such areas as effort and spatial displacement, economic losses, species impacts, social impacts, and cumulative effects. In addition, some available data may be commercially sensitive (Reilly et al., 2016), and fishers may be divided about data sharing (de Groot et al., 2014).

Other barriers to meaningful engagement relate to issues of compensation, trust, and power. Alexander et al. (2013b) found compensation raised questions about whether payments should be one-off or spread out, and, most importantly, how to prove or disprove claims (see also Gray et al., 2005). Alexander et al (2013b) revealed fishers' lack of trust in developers, government, and other authorities. Mackinson et al. (2006) suggest that fishers' mistrust was partly a result of previous negative experiences with offshore planning, leaving fishers alienated. In the US Block Island case, Dwyer and Bidwell (2019) document the importance of informal as well as formal processes in iterative development of "chains of trust." This concept is amplified by Firestone et al. (2020), who find perceptions of developer openness and trustworthiness to be the most important determinant of process fairness (see also Klain et al., 2017). In the UK, Gray et al. (2005) found evidence of some opportunities for fishers to influence the process

but that power ultimately remained with developers, while de Groot et al. (2014) noted fishers' feelings of powerlessness. In interviews with local residents about the Block Island OWP, Firestone et al. (2020) found a similar power differential, with an interviewee referring to the wind project as a "done deal." Institutions such as FLOWW, and organizations like HFIG and RODA, may exemplify innovations designed to help address such problems, but they are not necessarily always absolved from them.

CONCLUSION

The ocean commons is full of activity, supporting wildlife as well as human endeavors and needs such as transportation, fishing, energy production, and solitude (Russell et al., 2020). In this sphere, fishers should neither be privileged nor marginalized. They do, however, have unique interests. Offshore wind energy projects have a very direct and palpable relationship with those who fish in the region being developed. Reasons for conflict and resistance are clearly fear and uncertainty about the loss of income and livelihoods due to competition for important marine space and resources. Place, aesthetics, and identity are important as well.

A just energy transition requires agency as well as treating fishers with dignity and respect, as their places and livelihoods feel to them to be at risk from OWP—not to mention from overfishing and climate change.. Meeting that challenge involves establishing the kinds of institutions and processes discussed here that move beyond a model of consultation with stakeholders and toward one premised on dialogue among cohabitants. It is evident that fisheries, both commercial and recreational, have developed considerable heft in engagement with OWP developers and the authorities empowered to make policy decisions. More inclusive approaches will allow relationships among different interests to develop, ensuring a greater understanding of and accommodation to the needs and concerns of fisheries.

REFERENCES

Aitken, M., C. Haggett, and D. Rudolph. 2016. Practices and rationales of community engagement with wind farms: Awareness raising, consultation, empowerment. *Planning Theory and Practice* 17(4):557–576, https://doi.org/10.1080/14649357.2016.1218919.

Alexander, K.A., T. Potts, and T.A. Wilding. 2013a. Marine renewable energy and Scottish west coast fishers: Exploring impacts, opportunities and potential mitigation. *Ocean & Coastal Management* 75:1–10, https://doi.org/10.1016/j.ocecoaman.2013.01.005.

Alexander, K.A., T.A. Wilding, and J. Heymans. 2013b. Attitudes of Scottish fishers towards marine renewable energy. *Marine Policy* 37:239–244, https://doi.org/10.1016/j.marpol.2012.05.005.

Barnes, J. 2020. Fishermen call for 4-nautical-mile lanes between offshore wind turbines. *South Coast Today*, January 7, 2020, https://www.southcoasttoday.com/news/20200107/fishermen-call-for-4-nautical-mile-lanes-between-offshore-wind-turbines.

Bates, A., and J. Firestone. 2015. A comparative assessment of offshore wind power demonstration projects in the United States. *Energy Research & Social Science* 10:192–205, https://doi.org/10.1016/j.erss.2015.07.007.

Bell, D., T. Gray, and C. Haggett. 2005. The 'social gap' in wind farm siting decisions: Explanations and policy responses. *Environmental Politics* 14(4):460–477, https://doi.org/10.1080/09644010500175833.

Bell, D., T. Gray, C. Haggett, and J. Swaffield. 2013. Re-visiting the 'social gap': Public opinion and relations of power in the local politics of wind energy. *Environmental Politics* 22(1):115–135, https://doi.org/10.1080/09644016.2013.755793.

Bergman, M.J.N., S.M. Ubels, G.C.A. Duineveld, and E.W.G. Meesters. 2015. Effects of a 5-year trawling ban on the local benthic community in a wind farm in the Dutch coastal zone. *ICES Journal of Marine Science* 71:1,088–1,099, https://doi.org/10.1093/icesjms/fsu193.

Bergström, L., L. Kautsky, T. Malm, R. Rosenberg, M. Wahlberg, and N. Åstrand Capetillo. 2014. Effects of offshore wind farms on marine wildlife—a generalized impact assessment. *Environmental Research Letters* 9:034012, https://doi.org/10.1088/1748-9326/9/3/034012.

Berkenhagen, J., R. Doring, H.O. Fock, M.H.F. Kloppmann, S.A. Pedersen, and T. Schulze. 2010. Decision bias in marine spatial planning of offshore wind farms: Problems of singular versus cumulative assessments of economic impacts on fisheries. *Marine Policy* 34:733–736, https://doi.org/10.1016/j.marpol.2009.12.004.

Bidwell, D. 2013. The role of values in public beliefs and attitudes towards commercial wind energy. *Energy Policy* 58:189–199, https://doi.org/10.1016/j.enpol.2013.03.010.

BOEM (Bureau of Ocean Energy Management, US Department of Interior). 2018. Permit, port, and fishery revenue analysis. Presentation delivered at the Intergovernmental Renewable Energy Task Force Meeting, https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/NY/NMFS-NY-Press.pdf.

BOEM. 2020. *Vineyard Wind 1 Offshore Wind Energy Project: Supplement to the Draft Environmental Impact Statement*. 420 pp., https://www.boem.gov/sites/default/files/documents/renewable-energy/Vineyard-Wind-1-Supplement-to-EIS.pdf.

Brookfield, K., T. Gray, and J. Hatchard. 2005. The concept of fisheries-dependent communities: A comparative analysis of four UK case studies. *Fisheries Research* 72:55–69, https://doi.org/10.1016/j.fishres.2004.10.010.

Chase, C. 2020. RODA request pause in offshore wind development amid COVID-19 pandemic. *Seafood Source*, April 15, 2020, https://www.seafoodsource.com/news/supply-trade/roda-request-pause-in-offshore-wind-development-amid-covid-19-pandemic.

Chen, J., H. Liu, C. Chuang, and H. Lu. 2015. The factors affecting stakeholders' acceptance of offshore wind farms along the western coast of Taiwan: Evidence from stakeholders' perceptions. *Ocean & Coastal Management* 109:40–50, https://doi.org/10.1016/j.ocecoaman.2015.02.012.

Coates, D.A., Y. Deschutter, M. Vincx, and J. Vanaverbeke. 2014. Enrichment and shifts in macrobenthic assemblages in an offshore wind farm area in the Belgian part of the North Sea. *Marine Environmental Research* 95:1–12, https://doi.org/10.1016/j.marenvres.2013.12.008.

Coates, D.A., D. Kapasakali, M. Vincx, and J. Vanaverbeke. 2016. Short-term effects of fishery exclusion in offshore wind farms on macrofaunal communities in the Belgian part of the North Sea. *Fisheries Research* 179:131–138, https://doi.org/10.1016/j.fishres.2016.02.019.

Cresswell, T. 2014. *Place: An Introduction*. John Wiley & Sons, 232 pp.

Degraer, S., D.A. Carey, J.W.P. Coolen, Z.L. Hutchison, F. Kerckhof, B. Rumes, and J. Vanaverbeke. 2020. Offshore wind farm artificial reefs affect ecosystem structure and functioning: A synthesis. *Oceanography* 33(4):XX–XX, https://doi.org/XXXXX).

de Groot, J., M. Campbell, M. Ashley, and L. Rodwell. 2014. Investigating the co-existence of fisheries and offshore renewable energy in the UK: Identification of a mitigation agenda for fishing effort displacement. *Ocean Coastal Management* 102:7–18, https://doi.org/10.1016/j.ocecoaman.2014.08.013.

De Mesel, I., F. Kerckhof, A. Norro, B. Rumes, and S. Degraer. 2015. Succession and seasonal dynamics of the epifauna community on offshore wind farm foundations and their role as stepping stones for non-indigenous species. *Hydrobiologia* 756:37–50, https://doi.org/10.1007/s10750-014-2157-1.

Devine-Wright, P. 2005. Beyond NIMBYism: Towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy* 8:125–139, https://doi.org/10.1002/we.124.

Devine-Wright, P. 2009. Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *Journal of Community & Applied Social Psychology* 19(6):426–441, https://doi.org/10.1002/casp.1004.

Dwyer, J., and D. Bidwell. 2019. Chains of trust: Energy justice, public engagement, and the first offshore wind farm in the United States. *Energy Research & Social Science* 47:166–176, https://doi.org/10.1016/j.erss.2018.08.019.

European Commission. 2019. Offshore wind and commercial fisheries. European Marine Spatial Planning Platform Conflict Fiche 5, https://www.msp-platform.eu/sector-information/offshore-wind-and-fisheries.

Fayram, A.H., and A. de Risi. 2007. The potential compatibility of offshore wind power and fisheries: An example using bluefin tuna in the Adriatic Sea. *Ocean & Coastal Management* 50:597–605, https://doi.org/10.1016/j.ocecoaman.2007.05.004.

Firestone, J., D. Bidwell, M. Gardner and L. Knapp. 2018a. Wind in the sails or choppy seas? People-place relations, aesthetics and public support for the United States' first offshore wind project. *Energy Research & Social Science* 40:232–243, https://doi.org/10.1016/j.erss.2018.02.017.

Firestone, J., B. Hoen, J, Rand, D., Elliott, G. Hübner, and J. Pohl. 2018b. Reconsidering barriers to wind power projects: Community engagement, developer transparency and place. *Journal of Environmental Policy & Planning* 20(3):370–386, https://doi.org/10.1080/1523908X.2017.1418656.

Firestone, J., C. Hirt, D. Bidwell, M. Gardner, and J. Dwyer. 2020. Faring well in offshore wind power siting? Trust, engagement and process fairness in the United States. *Energy Research & Social Science* 62:101393, https://doi.org/10.1016/j.erss.2019.101393.

FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group). 2014. *FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison*. 74 pp., https://www.sff.co.uk/wp-content/uploads/2016/01/FLOWW-Best-Practice-Guidance-for-Offshore-Renewables-Developments-Jan-2014.pdf.

Friedman, R.S., E.A. Law, N.J. Bennett, C.D. Ives, J.P.R. Thorn, and K.A. Wilson. 2018. How just and just how? A systematic review of social equity in conservation research. *Environmental Research Letters* 13(5):053001, http://doi.org/10.1088/1748-9326/aabcde.

Gimpel, A., V. Stelzenmüller, B. Grote, B.H. Buck, J. Floeter, I. Núñez-Riboni, B. Pogoda, and A. Temming. 2015. A GIS modelling framework to evaluate marine spatial planning scenarios: Co-location of offshore wind farms and aquaculture in the German EEZ. *Marine Policy* 55:102–115, https://doi.org/10.1016/j.marpol.2015.01.012.

Gray, T., C. Haggett, and D. Bell. 2005. Offshore wind farms and commercial fisheries in the UK: A study in stakeholder consultation. *Ethics, Place & Environment* 8(2):127–140, https://doi.org/10.1080/13668790500237013.

Hall, D.M. and E.D. Lazarus. 2015. Deep waters: Lessons from community meetings about offshore wind resource development in the US. *Marine Policy* 57:9–17, https://doi.org/10.1016/j.marpol.2015.03.004.

Haraldsson, M., A. Raoux, F. Riera, J. Hay, J.M. Dambacher, and N. Niquil. 2020. How to model social-ecological systems? A case study on the effects of a future offshore wind farm on the local society and ecosystem, and whether social compensation matters. *Marine Policy* 119:104031, https://doi.org/10.1016/j.marpol.2020.104031.

Hooper, T., and M. Austen. 2014. The co-location of offshore wind farms and decapod fisheries in the UK: Constraints and opportunities. *Marine Policy* 43:295–300, https://doi.org/10.1016/j.marpol.2013.06.011.

Hooper, T., M. Ashley, and M. Austen. 2015. Perceptions of fishers and developers on the co-location of offshore wind farms and decapod fisheries in the UK. *Marine Policy* 61:16–22, https://doi.org/10.1016/j.marpol.2015.06.031.

Hooper, T., C. Hattam, and M. Austen. 2017. Recreational use of offshore wind farms: Experiences and opinions of sea anglers in the UK. *Marine Policy* 78:55–60, https://doi.org/10.1016/j.marpol.2017.01.013.

Island Institute. 2009. Mapping Working Waters: Maine's Commercial Fisheries. Available at https://www.islandinstitute.org/wp-content/uploads/2020/09/MWW_offshorefisheriespacket_july2012_rev2.pdf.

Jasanoff, S. 2018. Just transitions: A humble approach to global energy futures. *Energy Research & Social Science* 35:11–14, https://doi.org/10.1016/j.erss.2017.11.025.

Jenkins, K., D. McCauley, R. Heffron, H. Stephan, and R. Rehner. 2016. Energy justice: A conceptual review. *Energy Research and Social Science* 11:174–182, https://doi.org/10.1016/j.erss.2015.10.004.

Kafas, A. 2017. *MUSES [Multi-Use in European Seas] Project Case Study 1A: Offshore Wind and Commercial Fisheries in the East Coast of Scotland*. MUSES Deliverable: D.3.3, 38 pp., https://sites.dundee.ac.uk/muses/wp-content/uploads/sites/70/2018/02/ANNEX-1-CASE-STUDY-1A.pdf.

Kafas, A., A. McLay, M. Chimienti, B.E. Scott, I. Davies, and M. Gubbins. 2017. ScotMap: Participatory mapping of inshore fishing activity to inform marine spatial planning in Scotland. *Marine Policy* 79:8–18, https://doi.org/10.1016/j.marpol.2017.01.009.

Kempton, W.P., J.P. Firestone, J. Lilley, T. Rouleau, and P. Whitaker. 2005. The offshore wind power debate: Views from Cape Cod. *Coastal Management* 33:119–149, https://doi.org/10.1080/08920750590917530.

Klain, S.C., T. Satterfield, S. MacDonald, N. Battista, and K.M.A. Chan. 2017. Will communities "open-up" to offshore wind? Lessons learned from New England islands in the United States. *Energy Research & Social Science* 34:13–26, https://doi.org/10.1016/j.erss.2017.05.009.

Krone, R., G. Dederer, P. Kanstinger, P. Krämer, C. Schneider, and I. Schmalenbach. 2017. Mobile demersal megafauna at common offshore wind turbine foundations in the German Bight (North Sea) two years after deployment: Increased production rate of *Cancer pagurus*. *Marine Environmental Research* 123:53–61, https://doi.org/10.1016/j.marenvres.2016.11.011.

Kularathna, A., S. Suda, K. Takagi, and S. Tabeta. 2019. Evaluation of co-existence options of marine renewable energy projects in Japan. *Sustainability* 11(10), https://doi.org/10.3390/su11102840.

Lacroix, D., and S. Pioch. 2011. The multi-use in wind farm projects: More conflicts or a win-win opportunity? *Aquatic Living Resources* 24:129–135, https://doi.org/10.1051/alr/2011135.

Lilley, M.B., J. Firestone, and W. Kempton. 2010. The effect of wind power installations on coastal tourism. *Energies* 3:1–22, https://doi.org/10.3390/en3010001.

Lipsky, A., and W. Gabriel. 2019. Co-existence of sustainable fisheries & offshore wind: Fisheries science and fisheries considerations. Paper presented at the Northeast Regional Ocean Council Ocean Planning Committee Meeting, June 4, 2019, Gloucester, Massachusetts, https://neoceanplanning.org/wp-content/uploads/2019/06/Lipsky_NEFSC_NROC_OPC.pdf.

Mackinson, S., H. Curtis, R. Brown, K. McTaggart, N. Taylor, S. Neville, and S. Rogers. 2006. A report on the perceptions of the fishing industry into the potential socio-economic impacts of offshore wind farms on their work patters and income. CEFAS Science Series Technical Report no.133, 62 pp., https://www.cefas.co.uk/publications/techrep/tech133.pdf.

Marine Management Organisation. 2020. *UK Sea Fisheries Annual Statistics Report 2019.* 62 pp., https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2019.

Marine Scotland. 2011. Economic Assessment of Short-Term Options for Offshore Wind Energy in Scottish Territorial Waters: Costs and Benefits to Other Marine Users and Interests, https://www2.gov.scot/Publications/2011/03/22104736/8.

McCann, J., S. Schumann, G. Fugate, S. Kennedy, and C. Young. 2013. *The Rhode Island Ocean Special Area Management Plan: Managing Ocean Resources through Coastal and Marine Spatial Planning*. University of Rhode Island Coastal Resources Center/Rhode Island Sea Grant College Program, Narragansett, RI, 68 pp., http://www.crmc.ri.gov/samp_ocean/reports/Ocean_SAMP_Practioners_Guide.pdf.

McLachlan, C. 2009. 'You don't do a chemistry experiment in your best china': Symbolic interpretations of place and technology in a wave energy case. *Energy Policy 37*(12):5,342–5,350, https://doi.org/10.1016/j.enpol.2009.07.057.

Moura, S., A. Lipsky, and M. Morse. 2015. *Options for Cooperation between Commercial Fishing and Offshore Wind Energy Industries: A Review of Relevant Tools and Best Practices*. SeaPlan, New Bedford, Massachusetts,43 pp., https://www.openchannels.org/sites/default/files/literature/Options for Cooperation between Commercial Fishing and Offshore Wind Energy Industries - A Review of Relevant Tools and Best Practices.pdf.

Musial, W., D. Heimiller, P. Beiter, G. Scott, C. Draxl, 2016. *Offshore Wind Energy Resource Assessment For the United States.* National Renewable Energy Laboratory, Report NREL/TP-5000-66599, 88 pp., https://doi.org/10.2172/1324533.

NOAA Fisheries. 2020a. *Fisheries of the United States, 2018*. US Department of Commerce, NOAA Current Fishery Statistics No. 2018, https://www.fisheries.noaa.gov/national/commercial-fishing/fisheries-united-states-2018.

NOAA Fisheries. 2020b. Offshore Wind Energy Development in New England/Mid-Atlantic Waters, https://www.fisheries.noaa.gov/content/offshore-wind-energy-development-new-england-mid-atlantic-waters.

NYSERDA (New York State Energy Research and Development Authority). 2020. New York State Offshore Wind Master Plan Table of Permits and Approvals. NYSERDA Report 17-25x, https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Focus-Areas/Permitting.

O'Keeffe, A., and C. Haggett. 2012. An investigation into the potential barriers facing the development of offshore wind energy in Scotland: Case study of the Firth of Forth wind farm. *Renewable and Sustainable Energy Reviews* 16(65):3,711–3,721, https://doi.org/10.1016/j.rser.2012.03.018.

Pasqualetti, M.J. 2011. Opposing wind energy landscapes: A search for common cause. *Annals of the Association of American Geographers* 101:907–917, https://doi.org/10.1080/00045608.2011.568879.

Pita, C., I. Theodossiou, and G.J. Pierce. 2013. The perceptions of Scottish inshore fishers about marine protected areas. *Marine Policy* 37:254–263, https://doi.org/10.1016/j.marpol.2012.05.007.

Reilly, K., A.M. O'Hagan, and G. Dalton. 2015. Attitudes and perceptions of fishermen on the island of Ireland towards the development of marine renewable energy projects. *Marine Policy* 58:88–97, https://doi.org/10.1016/j.marpol.2015.04.001.

Reilly, K., A.M. O'Hagan, and G. Dalton. 2016. Moving from consultation to participation: A case study of the involvement of fishermen in decisions relating to marine renewable energy projects on the island of Ireland. *Ocean & Coastal Management* 134:30–40, https://doi.org/10.1016/j.ocecoaman.2016.09.030.

RODA (Responsible Offshore Development Alliance). 2020. Ocean Data Portals, https://rodafisheries.org/portfolio/ocean-data-portals/.

Roach, M., M. Cohen, R. Forster, A.S. Revill, and M. Johnson. 2018. The effects of temporary exclusion of activity due to wind farm construction on a lobster (*Homarus gammarus*) fishery suggests a potential management approach. *ICES Journal of Marine Science* 75(4):1,416–1,426, https://doi.org/10.1093/icesjms/fsy006.

Rudolph, D., C. Haggett, and M. Aitken. 2017. Community benefits from offshore renewables: The relationship between different understandings of impact, community, and benefit. *Environment and Planning C: Politics and Space* 36(1):92–117, https://doi.org/10.1177/2399654417699206.

Russell, A., J. Firestone, D., Bidwell, and M. Gardner. 2020. Place meaning and consistency with offshore wind: An island and coastal tale. *Renewable and Sustainable Energy Reviews* 132:110044, https://doi.org/10.1016/j.rser.2020.110044.
Samoteskul, K., J. Firestone, J. Corbett, and J. Callahan. 2014. Changing vessel routes could significantly reduce the cost of future offshore wind projects. *Journal of Environmental Management* 141:146–154, https://doi.org/10.1016/j.jenvman.2014.03.026.
Scottish Government. 2017. Scottish Energy Strategy: The Future of Energy in Scotland. 94 pp, https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/.
Shields, M.A., L.J. Dillon, D.K. Woolf, and A.T. Ford. 2009. Strategic priorities for assessing ecological impacts of marine renewable energy devices in the Pentland Firth (Scotland). *Marine Policy* 33:635–642, https://doi.org/10.1016/j.marpol.2008.12.013.
Smythe, T.C., and J. McCann. 2019. Achieving integration in marine governance through marine spatial planning: Findings from practice in the United States. *Ocean & Coastal Management* 167:197–207, https://doi.org/10.1016/j.ocecoaman.2018.10.006.
Soma, K., and C. Haggett. 2015. Enhancing social acceptance in marine governance in Europe. *Ocean & Coastal Management* 117:61–69, https://doi.org/10.1016/j.ocecoaman.2015.11.001.
Sovacool, B.K. 2014. What are we doing here? Analysing 15 years of energy scholarship and proposing a social science research agenda. *Energy Research and Social Science* 1:1–29, https://doi.org/10.1016/j.erss.2014.02.003.
Stead, S.M. 2005. Changes in Scottish coastal fishing communities: Understanding socio-economic dynamics to aid management, planning and policy. *Ocean and Coastal Management* 48:670–692. https://doi.org/10.1016/j.ocecoaman.2005.08.001.
Stelzenmüller, V., R. Diekmann, F. Bastardie, T. Schulze, J. Berkenhagen, M. Kloppmann, G. Krause, B. Pogoda, B.H. Buck, and G. Kraus. 2016. Co-location of passive gear fisheries in offshore wind farms in the German EEZ of the North Sea: A first socio-economic scoping. *Journal of Environmental Management* 183:794–805, https://doi.org/10.1016/j.jenvman.2016.08.027.
St. Martin, K. and J. Olson. 2017. Creating space for community in marine conservation and management: Mapping "communities-at-sea." Pp. 123–141 in *Conservation for the Anthropocene Ocean*. P.S. Levin and M.R. Poe, eds, Academic Press, London, https://doi.org/10.1016/B978-0-12-805375-1.00007-6.
ten Brink, T., and T. Dalton. 2018. Perceptions of commercial and recreational fishers on the potential ecological impacts of the Block Island Wind Farm (US). *Frontiers in Marine Science* 5:439, https://doi.org/10.3389/fmars.2018.00439.
UK Government (Department for Business, Energy, and Industrial Strategy). 2020. Policy Paper: Offshore Wind Sector Deal, https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal.
Vandendriessche, S., J. Derweduwen, and K. Hostens. 2015. Equivocal effects of offshore wind farms in Belgium on soft substrate epibenthos and fish assemblages. *Hydrobiologia* 756:19–35, https://doi.org/10.1007/s10750-014-1997-z.
Weir, S., and S. Kerr. 2019. Property, power and planning: Attitudes to spatial enclosure in Scottish seas. *Marine Policy* 108:103633, https://doi.org/10.1016/j.marpol.2019.103633.
Woods, B. 2019. US has only one offshore wind energy farm, but a $70 billion market is on the way. CNBC, December 13, 2019, https://www.cnbc.com/2019/12/13/us-has-only-one-offshore-wind-farm-but-thats-about-to-change.html.
Wright, G. 2016. Regulating wave and tidal energy: An industry perspective on the Scottish marine governance framework. *Marine Policy* 65:115–126, https://doi.org/10.1016/j.marpol.2015.12.014.

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From:	SPR Planning Policy
To:	Sectoral Marine Planning
Cc:	[Redacted]
Subject:	Sectoral Marine Plan – Offshore Wind Energy 1st Annual Call for Evidence: ScottishPower Renewables Response
Date:	28 February 2022 11:48:36
Attachments:	image001.jpg image002.jpg SMP-OWE Call for Evidence Cover Submission_FINAL.pdf SMP_OWE SEG Evidence Form_SPR_FINAL.pdf Scottish Offshore Wind Strategic Investment Assessment_Aug 2021.pdf

Dear Sir/Madam,

We write in connection with the Sectoral Marine Plan – Offshore Wind Energy 1st Annual Call for Evidence and are pleased to enclose a response from ScottishPower Renewables. We welcome the opportunity to respond and trust that our submission is helpful for initiating an Interim Plan Review.

Our submission refers and includes hyperlinks to two publicly available grey literature documents which we consider should be taken into account by the Sectoral Evidence Group. We have attached a copy of the Scottish Offshore Wind Strategic Investment Assessment (SOWEC, August 2021) whilst the UK Net Zero Strategy (HM Government, October 2021) can be accessed here (the file is too large to email):

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

We would appreciate acknowledgement of receipt of our submission and would be delighted to discuss any aspect of it in further detail. We welcome further dialogue on the identified issues.

Kind regards,

[Redacted]

For and on behalf of ScottishPower Renewables

2019_SPR_logo_email

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Sectoral Marine Plan for offshore wind energy
iterative plan review process: form for submission of new evidence

Title of evidence submitted

UK Net Zero Strategy (UK Government, October 2021)

Scottish Offshore Wind Strategic Investment Assessment (SOWEC, August 2021)

Evidence category

Please tick relevant box

☐ scientific paper

☒ grey literature

☐ datasets

Please provide a summary on how this evidence is pertinent to the plan and if it links to any of the strategic ScotMER evidence maps. Max 500 words

This submission is made to the Sectoral Evidence Group (SEG) in accordance with paragraph 24 of the Scottish Government's Offshore Wind Policy Statement (October 2020), which acknowledges the need for the Sectoral Marine Plan – Offshore Wind Energy (SMP-OWE) to remain up-to-date with "the political climate" as well as with scientific research. It is incumbent upon the SEG to take account of relevant policy developments when determining whether to initiate an Interim Plan Review (IPR).

In line with the evidence eligibility criteria, the SEG is referred to publicly available publications including the UK Net Zero Strategy (UK Government, October 2021) and the Scottish Offshore Wind Strategic Investment Assessment (SIA) (SOWEC, August 2021), which both support the achievement of 40GW deployment by 2030. As the ScotMER socio-economic evidence map is "undergoing review" and not available on the ScotMER website it is not possible to link directly to this. However, the Scottish Offshore Wind Strategic Investment Assessment demonstrates the significant economic potential of Scotland's offshore wind industry and the need for co-ordinated action, including reducing consenting barriers and deployment at scale, to deliver a step change in the ability of Scotland's supply chain to secure offshore wind work.

Announced in October 2020, the increase of the UK Government's target for offshore wind deployment by 2030 from 30GW to 40GW was captured within the final Offshore Wind Policy Statement (October 2020). However, unfortunately this 40GW target was not taken account of in the finalised SMP-OWE which continued to plan based on a 10GW "maximum development scenario" derived from 2019 evidence, including a now superseded 30GW UK-level ambition which reflected

limited deployment over the preceding decade. Strong competition evidenced through subsequent ScotWind and Round 4 leasing suggests this maximum development scenario may have underestimated market demand and thus deployment potential up to the early 2030's. Indeed, the Scottish Offshore Wind SIA (2021) concluded that "while Scotland has been slow to develop compared to projects in England and Wales, over the coming decade Scottish projects are expected to make up approximately 40% of the market". The importance of planning to achieve the 40 GW deployment target has now been strengthened by the UK Net Zero Strategy (2021), which for the first time commits to decarbonising the UK's electricity system by 2035.

The SEG is asked to make a representation to the SMP-OWE Technical Advisory Group and Programme Board to seek an early IPR in accordance with Section 2.4 of the Habitats Regulations Appraisal (HRA) Appropriate Assessment (AA) which accompanied the adopted SMP-OWE (2020). An IPR should be commenced to optimise Scotland's contribution to meeting the UK-level 40 GW offshore wind deployment target as well as the contribution of offshore wind to achieving Scotland's 2045 net zero target. An IPR is also required to reflect the implications of the ScotWind result, to provide clearer design, consenting and assessment frameworks for proposed offshore wind projects, and to address HRA weaknesses associated with the current SMP-OWE. These issues are outlined in the accompanying cover note.

Checklist for dataset

If datasets are submitted the following information must be submitted

☐ reason for collecting data

☐ analysis methods

☐ metadata included

Contact details

Sectoral Marine Plan for offshore wind energy
iterative plan review process: form for submission of new evidence

Please return this form accompanied with relevant documents to

Main contact	[Redacted] Senior Planning & Environmental Policy Analyst ScottishPower Renewables [Redacted]
Surveyor contact (where relevant)	
Analyst contact (where relevant)	As above

SectoralMarinePlanning@gov.scot by 28 February 2022.

Sectoral Marine Plan: Offshore Wind Energy Call for Evidence
ScottishPower Renewables Submission – Cover Note

The Scottish Government's Offshore Wind Policy Statement (October 2020) acknowledges the need for the Sectoral Marine Plan – Offshore Wind Energy (SMP-OWE) to remain up-to-date with "the political climate" as well as with scientific research. The SMP-OWE should therefore be subject to an IPR to reflect increased deployment targets since its development phase and the ScotWind result, as well as to inform project level HRAs and provide a clearer consenting framework. There are several issues with the SMP-OWE which necessitate an Interim Plan Review (IPR):

1. As detailed on the evidence submission form, the SMP-OWE (2020) is now out of date as its development was based on a 10 GW "maximum development scenario" (to 2030) informed by 2019 estimates of market demand and the UK Government's previous 30 GW by 2030 offshore wind deployment ambition, which has since been increased to a 40 GW deployment target. The importance of planning for rapid deployment has been strengthened by the UK Net Zero Strategy (2021) which commits to decarbonising the UK's electricity system by 2035 and identifies the growth of offshore wind capacity as being vital to achieve this;
2. Given the potential for in-combination effects on the qualifying interests of European Sites from projects across the North Sea, the ability of projects to pass HRA tests will be a critical consenting factor. To reduce consenting risks and facilitate proportionate assessments, the plan level HRA accompanying the SMP-OWE needs to be strengthened. Concerns include the absence of re-assessment between draft and final versions of the SMP-OWE despite notable changes (e.g. in development densities and area coverage) and the inclusion of circular references to a 10GW physical development limit as a "key mitigation measure" without a clear justification. As further ScotWind leasing rounds are planned, the rationale for applying either 10GW or any other fixed capacity limit as mitigation rather than simply as a planning assumption needs to be reviewed;
3. The purpose and role of highly constrained and regional survey classifications should be reviewed now that leases have been awarded in relevant Plan Options. As stated, the classifications simply mandate regional surveys and further research without identifying subsequent policy implications for design, impact acceptability, mitigation or consenting;
4. The SMP-OWE describes how Plan Options were selected and identifies relevant environmental issues but unfortunately does not provide a clear position regarding the principle of development being established within Plan Options. The SMP-OWE also does not explain how the acceptability of impacts or the adequacy of mitigation should be confirmed; and,
5. The SMP-OWE does not provide a consenting framework as it does not set out assessment or decision-making criteria. SMP-OWE defers to the National Marine Plan, (2015), but this pre-dates the Scottish Government's declaration of a climate emergency and is not aligned with the emerging National Planning Framework 4 (NPF4).

These issues are understandable as SMP-OWE was focused on establishing an effective leasing round and informing bidders of risks, but as a result the SMP-OWE provides little policy direction or assistance for developing and consenting ScotWind projects. Following the ScotWind result the focus has shifted to project development and consenting, so the SMP-OWE needs to be updated to keep pace. If identified issues are not addressed this could generate significant risks, uncertainties and resource pressures as the principle of development within leased Plan Options, requirements for surveys and assessments, thresholds for impact acceptability and the adequacy of mitigation and compensation would all need to be considered on a case by case basis without reference to clear policy requirements.

Whilst an IPR would be expected two years after plan adoption in any case (i.e. commencing by October 2022), there is merit in commencing an IPR earlier to:

- Align with policy priorities identified in other Scottish Government work, notably the emerging National Planning Framework 4 (NFP4) which identifies the need to give "significant weight" to tackling the climate emergency whilst addressing the nature crisis;
- Avoid delaying or increasing risks for the design, environmental assessment (including seasonal surveys) and consenting of ScotWind projects, which will rely upon the SMP-OWE to specify requirements. Given the need for consenting applications to be supported by multi-year surveys and assessments, even small delays and a lack of certainty regarding consenting requirements would increase development risks and could undermine the delivery of adequate projects by 2030 to meet both Scottish Government and UK sectoral targets; and,
- Allow evidence gathering and scoping phases to benefit from the current momentum and high public profile of the offshore wind sector generated by the ScotWind result.

Scottish Offshore Wind Strategic Investment Assessment

An independent report to the Scottish Offshore Wind Energy Council

SOWEC
Scottish Offshore Wind Energy Council

About this report

This Strategic Investment Assessment (SIA) of Scottish offshore wind opportunities is led by Professor Sir Jim McDonald, Principal and Vice Chancellor of the University of Strathclyde, with the support of an Executive Committee, Working Group and Project Team.

This independent assessment has been commissioned by the Scottish Offshore Wind Energy Council (SOWEC), a partnership between the Scottish public sector and the offshore wind industry. SOWEC's vision is of "an offshore wind sector that plays to Scotland's strengths, delivering jobs, investment and export opportunities in line with the UK Sector Deal as a key part of the path to net-zero."

The SIA sets out recommendations and investment priorities to scale up Scottish capacity and capability necessary to deliver a step change in the ability of Scotland's supply chain to grow and win offshore wind work. This includes:

- A summary of the status of the offshore wind supply chain in Scotland
- Map of future deployment and consideration of the current status of the offshore wind supply chain in Scotland, determining the supply chain and technology barriers and opportunities both domestically and globally, which provide longevity to the industry in Scotland
- Scenarios of potential economic impact associated with varying levels of investment
- Recommendations for immediate action through investment, including detailing means to support investor confidence, to support the industry in Scotland and to maximise economic value.

This assessment is published in line with the commitment of the Scottish Government to "set out a Strategic Investment Assessment, as we seek to better support the offshore wind supply chain." [i]

Published August 2021

Lead Author: Maf Smith (Lumen Energy & Environment)

Project Team: Joss Blamire, Rob Spice and Louise Wheeler (ITPEnergised)

Economic Analysis: Tom Quinn and Gavin Smart (ORE Catapult)

With additional thanks to ORE Catapult's Floating Offshore Wind Centre of Excellence; Scottish Enterprise; Highlands & Islands Enterprise, BVG Associates, ; Ironside Farrar and QMPF for providing access to expertise and relevant materials and to the many organisations and individuals who participated in study consultations or provided expertise and information.

Front Cover Image: Beatrice Wind Farm courtesy of Beatrice Offshore Wind Limited

Foreword

Our global energy system is in transition. As a nation which has been at the forefront of energy engineering, innovation and exploitation since the industrial revolution, this rapid shift in how we produce and consume energy as we address the real and present impacts of climate change is a significant challenge for Scotland. But of course, it is also an opportunity. This energy transition has been described as a "national mission" for Scotland, and offshore wind must play a major role.

This independent assessment looks at how best to support and grow a Scottish supply chain able to prosper and win work from a future pipeline of projects by focusing on what strategic investment is needed to capture these opportunities. There are no easy routes to success, so instead we need to be clear about priorities and how we organise and collaborate to maximise our chance of success.

Our particular focus is a coming pipeline of floating offshore wind projects. Floating offshore wind is a new industry, and Scotland looks set to be one of the first countries across the globe seeking to build at scale. Scottish learning can be sent around the world to address a growing global market. But that can only happen if Scottish companies play an important role in these early projects.

Our main ambition is that we nurture an active partnership between industry and government to foster better ways of working collaboratively that then help create an ecosystem into which investment into Scottish yards, ports and companies can be made in time to bid for and win high value work.

To build this partnership and support investment, the offshore wind industry needs to act first. It must recognise that the status quo will not deliver the value Scotland needs. Offshore wind needs to learn from other industries and look to collaborate. Taking this strategic approach gives us the opportunity to secure a bigger prize - a successful and sustainable Scottish supply chain able to win offshore wind work at home and abroad. Collaboration can better nurture Scottish based companies which are properly capitalised, well-resourced with excellent facilities, properly trained and truly competitive.

The proposed industry actions need to be matched by the UK and Scottish Governments. While the bulk of investment needed will come from the private sector, without government action and ambition, other ports in other countries may still trump Scottish aspirations by getting there first.

The value of offshore wind to Scotland is huge, yet Scotland will remain a small market in this growing global industry. Scottish success in offshore wind therefore cannot be taken for granted. So to succeed we must be better organised, and work as partners to build success here at home. Communities and companies across Scotland will benefit from this and indeed our energy transition and continued climate leadership will depend on it.

Scotland has a significant asset base currently in its business leaders and company base, strategic plans to address the growing international floating offshore wind market, ports and other facilities. By taking a collaborative approach to create a Port Cluster with complementary capabilities and capacity, Scotland will be better placed to attract national and inward investment, build a strong and competitive floating offshore wind supply chain, position us competitively within a large-scale global opportunity and secure the economic benefits of being seen as an international leader in this area.

Time though is of the essence, meaning it is vital that the offshore wind industry and government take on board the recommendations of this Assessment and focus action on their delivery.

Professor Sir Jim McDonald

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1. Executive Summary

Offshore wind is a young industry. It has been only 30 years since the world's first offshore wind farm was built at Vindeby in Denmark, 20 years since the UK's first offshore wind turbines were erected at Blyth, and 10 years since Scotland's first offshore wind farm, Robin Rigg in the Solway Firth, began operation. In that time the industry has truly come of age and is now at the heart of Scottish, UK and global action to transform and decarbonise our energy system.

This energy transition means rapid growth in low carbon technologies like offshore wind, other renewables, green hydrogen and carbon capture use and storage which will displace traditional activity in oil and gas. Ensuring a just transition has been described as a national mission for a fairer, greener Scotland. Part of this mission will be ensuring that we make the most of opportunities in offshore wind to support future prosperity in Scotland.[ii]

A Strategic Investment Assessment

This Strategic Investment Assessment (SIA) looks at what investment in capacity and capability will be necessary to deliver a step change in the ability of Scotland's supply chain to grow and win offshore wind work. It is an independent assessment, led by Professor Sir Jim McDonald, with the support of an Executive Committee and a Working Group.

This independent assessment has been commissioned by the Scottish Offshore Wind Energy Council (SOWEC), a partnership between the Scottish public sector and the offshore wind industry. SOWEC's vision is of "an offshore wind sector that plays to Scotland's strengths, delivering jobs, investment and export opportunities in line with the UK Sector Deal as a key part of the path to net-zero".[iii] More information about the SIA is set out in Annex A: About the SIA.

Looking back to look ahead

Looking ahead there is a clear pipeline of new Scottish offshore wind farms. 2.3GW of offshore wind capacity is in operation or under construction and a further 2.9GW consented. Up to 10GW of new projects are set to come out of the ScotWind leasing round. Each future GW will require 21,000 FTE job years (on average 700 full time jobs per year) to support development, construction and operation. Capturing an increasing proportion of this activity is vital for Scotland. That though requires focus and prioritisation.

Our assessment is confident for the future of offshore wind in Scotland. But over the last 10 years Scotland has delivered only one-tenth of projects forecast back in 2010. This means missed opportunities, though it is important to be clear that the overriding cause of this has been project delay and cancellation, not lack of focus on Scottish supply chain development.

Looking ahead though we see a large pipeline and better market conditions, giving us confidence in the future market. However, business as usual cannot be an option. UK and Scottish Ministers and the wider supply chain are clear that more ambition is required, and we have more experience and knowledge to draw upon. Leading industry players want to do more but are constrained in what they can do when acting alone.

The UK Government wants to see industry increase UK content from just under 50% to 60% by 2030.[iv] In Scotland, Ministers have made their ambitions clear, and are using the ScotWind leasing process to require projects to demonstrate best practice in supply chain engagement and to submit regular supply chain development statements.[v]

Looking ahead, we see rapid growth of offshore wind across the globe. This means that Scotland is only a small offshore wind market. Come 2030, Scottish capacity is forecast to be only 5% of the global total. In such a global market, Scotland facilities and suppliers will need to be world-class if they are to win work from offshore wind companies. This requires a shift in our mindset: Scotland's goal needs to be getting in shape ready to win a share of a domestic pipeline, as a springboard into this global market.

This SIA sets out recommendations that if delivered by industry and government will be transformative in how Scotland grows a world class supply chain active in offshore wind both at home and across the globe. Our focus is growing capability and expertise so that Scottish yards and Scottish based companies can win work in manufacturing and fabrication, and that Scottish subsea and engineering expertise is able to transition effectively from oil and gas into offshore wind.

To deliver higher ambition and secure greater benefit for Scotland from future offshore wind projects, effort is needed to build a more supportive ecosystem that enables earlier engagement between Scottish suppliers and the global wind industry, and which deepens relationships. Confidence and better outcomes can be built through strong partnership working between industry and government. A particular need is for industry to learn from oil and gas and other sectors to establish more collaborative models capable of securing inward investment outcomes that cannot be made on the back of an individual project's requirements.

This Assessment is clear that the primary responsibility for action is the offshore wind industry. It must come together and work in a more collaborative way, both to help focus activity and investment in Scottish ports, but also to facilitate more meaningful engagement between Scottish suppliers and tier one manufacturers and installers.

It is appropriate for Government support to be conditional on the development of this partnership approach. But Government also needs to be under no illusion as to the scale of infrastructure investment required and its role helping underpin investment ahead of the offshore sector's ability to contract with ports and suppliers so that Scottish infrastructure will be available when required.

Government needs to recognise that as part of its National Mission to build a fairer and greener Scotland it will need to support the development of new infrastructure through co-investment so that investment happens at the right time.

While the bulk of infrastructure investment needs to come from the private sector, public support will also be necessary. Government needs to understand the competitive nature of inward investment. Other countries are also active trying to secure anchor tenants and establish other ports as world class facilities. If industry is successful in establishing an effective collaborative framework, it would be appropriate for the Scottish Government to utilise a portion of the estimated £890m income from ScotWind leasing to support ports and Scottish supply chain development. As the UK Government has supported ports in Humber and NE England to help embed UK supply chain ready to serve current (fixed) offshore wind projects, it will be appropriate that it also looks at how to use equivalent funding to secure UK capability in floating fabrication at Scottish port locations.

Summary of Recommendations

Recommendation One: The offshore wind sector's priority must be the establishment of a collaboration framework focused on building confidence amongst Scottish ports, so that required investment is brought forward in time. The immediate priority of such a collaborative framework is supporting the creation of a Scottish Floating Offshore Wind Port Cluster

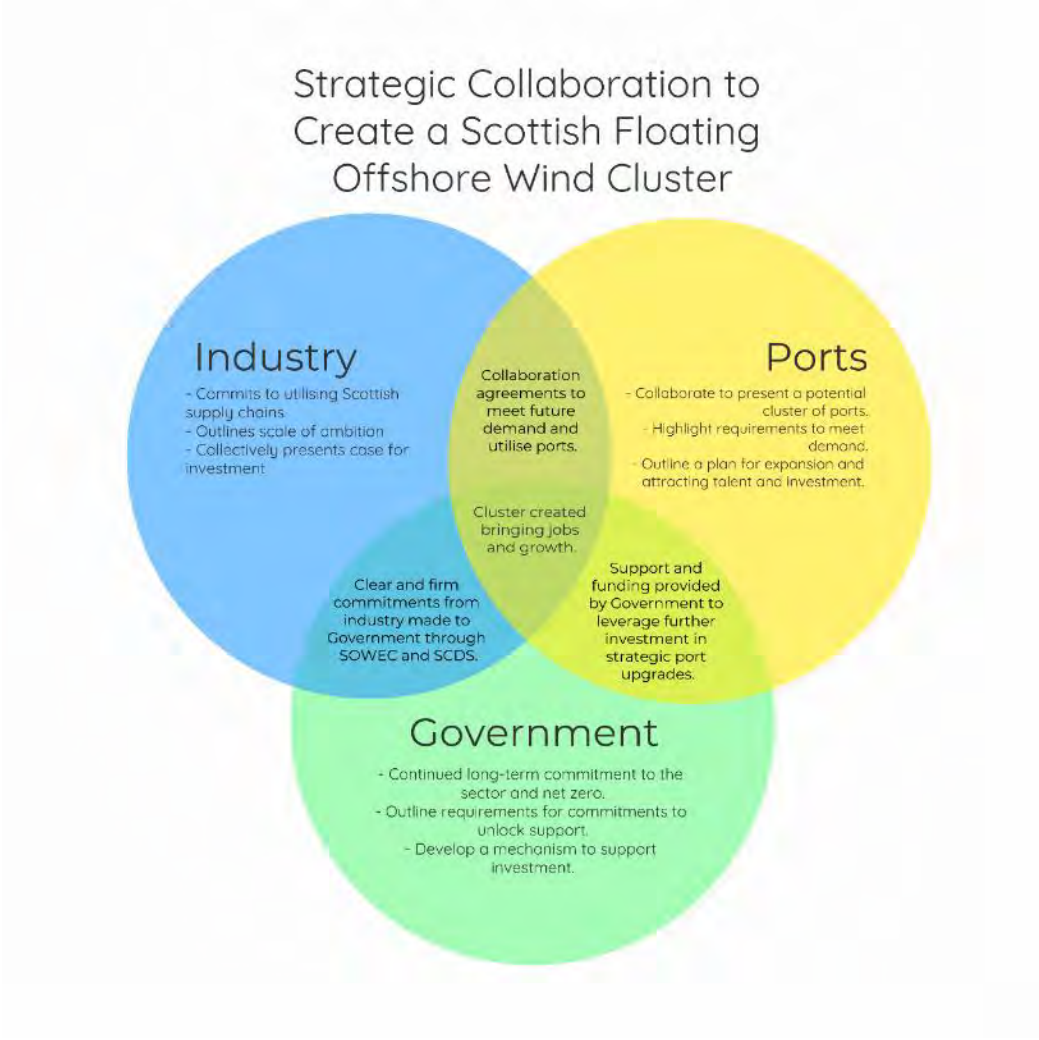
Without access to sufficient high quality port space, Scotland cannot hope to attract critical activities like manufacturing and may even be limited in the proportion of staging and assembly work that can be secured around the build out of Scottish projects. Focused effort is needed to bring fabrication and manufacturing of floating platforms into Scotland. To do this Scotland needs a world class port facility of sufficient size in the right location.

To enable this, offshore wind developers first need to work to identify port needs via a collaborative framework, which can then build port confidence and investment. Government support to underpin this industry effort will then be required.

We recommend bringing ports together to "move the fence" beyond their immediate boundaries. Doing this creates a Scottish Floating Offshore Wind Port Cluster suitable for floating platform fabrication and manufacture. An effective Cluster means multiple ports working together to provide capacity and capability required by industry but not available in a single location.

After commencing work to support investment in platform fabrication and manufacture, industry should then use its collaborative framework to help underpin other necessary investments, either growing out activities from the identified Cluster, or supporting engagement with a wider network of Scottish ports.

There are a wide range of significant activities and opportunities for floating offshore wind including further inward investment of component fabrication; turbine staging and assembly, moorings and anchors as well as ongoing operations and maintenance. Such activities can be based in a range of Scottish ports. While we recommend concentrating activities such as platform fabrication, space requirements for these different elements of offshore wind work means there are opportunities for many ports in Scotland to supply into future Scottish offshore wind projects, creating employment and economic activity.



A Collaborative Framework approach needs to work as follows:

1. SOWEC industry members to explore appropriate models and lessons from other sectors for adopting a collaborative framework in advance of ScotWind leases being awarded
2. Successful ScotWind leaseholders to be encouraged by SOWEC, industry and Crown Estate Scotland to participate in this collaborative framework
3. The priority infrastructure investment for this framework should be floating platform fabrication and manufacture. This Assessment is clear that this can best be done through a regional focus, investing in a Scottish Floating Offshore Wind Port Cluster
4. Once engagement between suitable ports and industry is underway, lessons should be learnt from this initial use of a collaborative framework and necessary adaptions made.
5. The collaborative framework should then be used to support wider engagement between the offshore wind sector and port providers, to help build the investment case for other inward investment in offshore wind component manufacture, as well as to support investment in necessary assembly facilities.

Scotland's enterprise agencies will need to play an important facilitation role to make this Collaborative Framework effective, but it is right that wider Government support is conditional on industry action. Used effectively this framework is seen as the best route to help bring forward investment in necessary port infrastructure to give ports and supply chain time to get ready for a future pipeline.

Once this Assessment settled on the priority of floating platforms as the priority investment opportunity, work then turned to using available evidence and industry input to consider suitable port capacity and capability.

As our analysis demonstrates, the Cromarty Firth emerges as the most suitable location in Scotland for platform fabrication and manufacture, with the two ports of Invergordon and Nigg acting as the focus of effort to secure platform fabrication and manufacture. These ports have sufficient capacity available or close to being ready as well as suitable quayside facilities for construction and movement of floating platforms. The wider Cromarty Firth offers space for wet storage of platforms and close access to many potential ScotWind sites. Close to these two ports sits the mothballed Ardersier port site, which could in future be made a part of this Port Cluster. Ardersier would need significant development and must resolve dredging and access but does offer the potential for large scale concrete platform manufacturing if these challenges can be overcome.

However, it will be for industry to follow this recommendation to establish a Collaborative Framework, and first scope out in more detail sector requirements re. fabrication and platform assembly, and to then engage suitable ports or groups of ports. If UK and Scottish Government funding is required to support investment in such a Cluster a more detailed set of criteria for funding will need to be developed to define the characteristics of a Floating Offshore Wind Port Cluster, and we recommend that Government makes use of this report in drawing up the requirements of a Cluster.

As noted above, a collaborative framework could have wider application. While this Assessment has identified platform fabrication and manufacture as a priority which requires a focus on building a regional port cluster, we wish to build a strong ecosystem across different locations in Scotland, with different ports and regions winning work both in supply chain and manufacture, assembly and in operations.

Around the Scottish coastline sit several ports also active or suitable for securing further offshore wind work, either as supply bases, for assembly or to support manufacturing and fabrication of other components. On the east coast Aberdeen South, Montrose, Dundee, Leith and Energy Park Fife/Harland & Wolff rightly all see offshore wind as an opportunity for high value manufacturing, assembly and R&D. To the west Arnish, Hunterston and Kishorn offer sites that could supply Scottish projects as well as future English, Welsh or Irish projects, while to the north different Orkney and Shetland ports offer deep water locations suitable for floating offshore wind assembly or as maintenance sites. These ports can be confident of securing offshore wind work and could either be brought into a Port Cluster, as volume requirements grow, or be supported by industry's collaborative framework and the better partnership working between the wind industry and government envisaged by this report.

Recommendation Two: Support Scottish suppliers and get them ready to bid for and win work

The working of the CfD process creates built in advantages for market incumbents so can make it hard for new entrants to break into the market. To address this specific support is needed to support Scottish suppliers get ready to bid for work. The offshore wind industry can help this by taking responsibility for opening up contracting activity, and in particular ensuring tier one contractors work with the Scottish supply chain. Government can help Scottish-based EPCI expertise in oil and gas transition into offshore wind.

Recommendation Three: Celebrate and sell Scottish success

If Scotland is to attract investment to build a successful Scottish Floating Offshore Wind Port Cluster, there is a need to better tell the story and build up Scotland's reputation for high quality engineering and sub-sea expertise. Scotland needs to be active selling Scotland as a leading floating wind market and as a market that can support other global markets as they embark on energy transition.

Recommendation Four: Plan for future growth and the next generation of innovations

While offshore wind is a mature technology, the market is still evolving and needs to innovate to stay competitive. However, more needs to be done to think more clearly about how the market in Scotland supports innovation in offshore wind and across the different stages of technology readiness. More support and focus are needed to allow near-commercial technologies to grow and succeed.

Recommendation Five: Plan for energy transition and a future of far-from-shore, mixed-use energy projects

Energy transition means that the distinction between offshore wind and oil and gas in Scotland will begin to blur, so we must also look ahead so that policy and regulation keeps up with the shape and needs of future projects.

Our three priority supply chain groups

Moving from 50% UK content to 60% content will not be easy. Increasing Scottish content by an equivalent amount will be harder still, as analysis by BVG Associates for SOWEC demonstrates[1] Scotland must therefore prioritise activities around where opportunity and the chances of influencing better outcomes are greatest. We have identified three priority supply chain groups for industry and government to partner and support.

Our first supply chain group are the Tier One suppliers seeking manufacturing locations. These suppliers will consider investment in Scotland. But first, Scotland needs to ensure it has suitable port and yard facilities able to compete with alternate locations across Europe and to attract such activities. Significant investment is needed to achieve this because these tier one companies require facilities adjacent to quayside with sufficient space and load out capability. Investing in these facilities will enable both marshalling and assembly and manufacturing and fabrication in Scotland.

Effort in Scotland should be focused on Tier One component providers that supply to developers and OEMs (though Scotland should keep an eye on opportunities for direct investment by OEMs themselves, and proactively continue discussions to understand their future needs). Priority needs to be given to supporting fabrication of floating platforms (steel and concrete), but also other components including cables and towers.

Developers and their EPCI (Engineering, Procurement, Construction and Installation) contractors have a critical role here to support investment in facilities able to manufacture platforms as well as cables and other critical components. OEMs have a role in supporting such investment by acting as anchor customers.

To support this first supply chain group, **our report's primary recommendation relates to the establishment of a *Scottish Floating Offshore Wind Port Cluster*** *that can focus on* floating platform fabrication and manufacture as well as assembly and large component manufacture.

Our analysis also highlights a clear **"least-regret" option** to support bringing an additional **22Ha** of capacity on-line via this Port Cluster would deliver **£1.5bn of GVA** benefit to Scotland from **floating offshore wind platform fabrication**. Further investment in fabrication capacity at Scottish ports could increase this economic benefit to £4.5bn.[2]

While this report is clear over the need to prioritise industry effort so that we can cluster activities, for this work to be successful Scotland needs to facilitate investment in a wider port network, with different ports around Scotland's coastline playing to their strengths.

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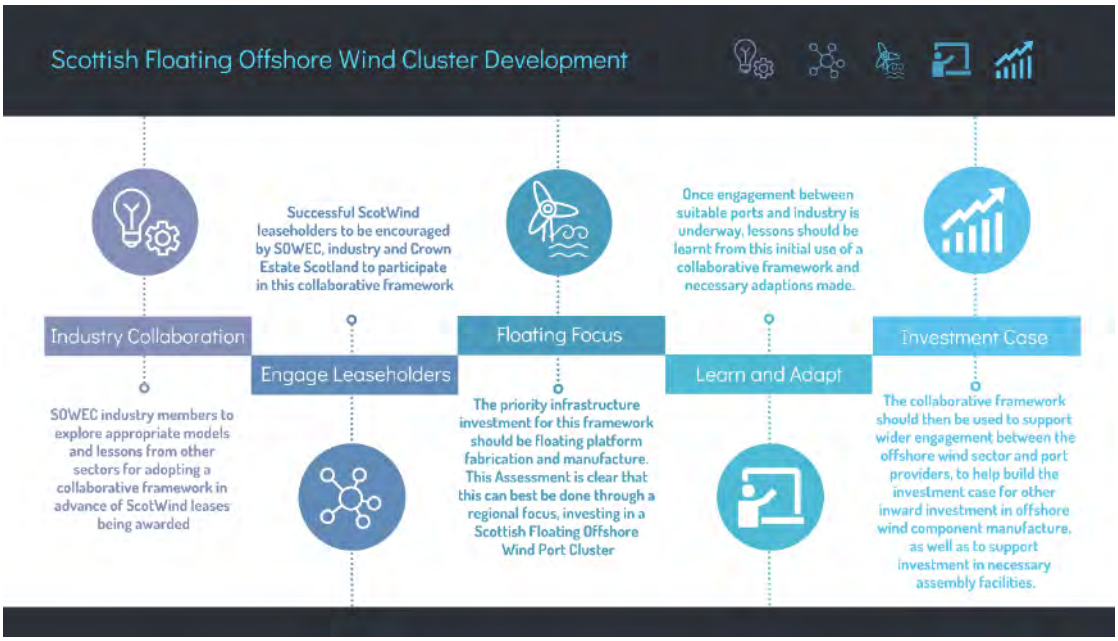
[1] See Chapter 3 for more details on our current baseline and opportunities for future jobs growth.
[2] See 6.1 on port development scenarios for fabrication.



The second group of companies that need support are an existing and active SME group of engineering companies focused on the subsea market. Many of these companies are successful in maritime and oil and gas. However, they have struggled to gain access to offshore wind or secure the right opportunity.

The quality, breadth of service and scale of these SMEs needs to be world-class so that Scotland creates a sector that can deliver across more key supply chain components. If the SME sector is not successful in also supporting developments, suppliers will have less interest in utilising the ports, even if they are upgraded.

SOWEC needs to draw on related work [vi] to ensure tender processes ensure these companies learn about opportunities and are ready to bid. But most important funding and support is needed to transition existing Scottish contractor and EPCI capability focused on oil and gas into offshore wind.

Our third and final group are suppliers in new and emerging markets. Our particular focus is supporting companies that supply into the rapidly evolving floating market. For example, Scottish anchor, mooring and shipping companies active in oil and gas can be supported to transition into floating offshore wind, and crane companies active in onshore wind and other civil engineering can be supported to bring forward investment in suitable crane capacity for onshore and quayside crane work. Such activities will be particularly important for future assembly work at ports across Scotland.

Moving beyond the status quo

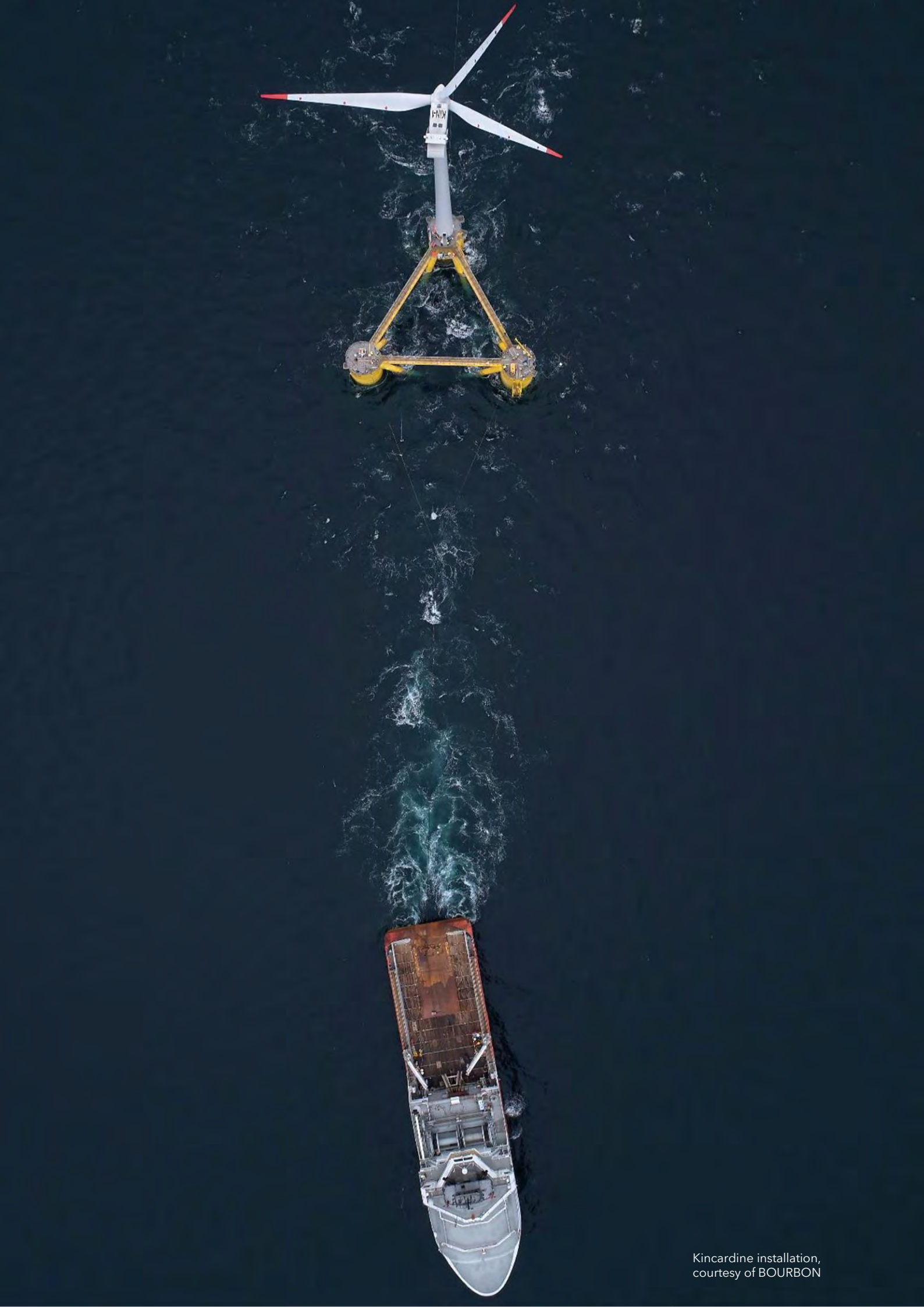
A critical point of this assessment is that business as usual will not deliver transformative outcomes, so we must move beyond the status quo in delivering this next generation of Scottish offshore wind projects. To do this a new partnership between industry and government is required.

This partnership approach is embodied in SOWEC, with an industry leader and Government Minister acting as co-chairs, but it needs to be present in the day-to-day working of offshore wind.

It is for the offshore wind industry to initiate this change and to demonstrate it can work together in a different way to better support supply chain growth. Above we have set out how a Collaborative Framework can help underpin earlier investment in necessary port infrastructure.

However, there is a second area we want to see more concerted industry action. Developers need to acknowledge that the CfD process works against bringing new supply chain entrants into the market. Our assessment agrees with the majority view in the developer community that it is right to leave the CfD structure broadly unchanged, so that future auctions select projects that best manage risk and complex infrastructure delivery in a low-cost way.

The quid-pro-quo to this is that developers must address the consequence of this, supporting new entrants to gain a foothold in the market. This report recommends the focus of this activity should be helping bring Scottish engineering and marine companies together with EPCI contractors and Tier One suppliers so they can assist in the energy transition, particularly by utilising and adapting Scotland's oil and gas expertise.



Kincardine installation,
courtesy of BOURBON

2. Offshore wind in Scotland

2.1 Development pipeline and potential

The Scottish Government's 2050 vision for energy in Scotland is to develop a 'flourishing, competitive local and national energy sector, delivering secure, affordable, clean energy for Scotland's households, communities and businesses', and to reduce emissions to achieve climate change targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045.[vii]

Scotland currently has six operational offshore wind farms with four in construction or pre-construction. An additional three sites have consent and a further six are at different stages of development and consenting.

Based on the Scottish Government's Sectoral Marine Plan,[viii] Crown Estate Scotland is currently reviewing applications for seabed leases for the new ScotWind leasing round.[ix] ScotWind aims to deliver up to 10GW of offshore wind, which will see the Scottish capacity increase to 17-19GW. The Scottish Government's Offshore Wind Policy Statement aims for 11GW of this to be delivered by 2030.[x]

Looking beyond 2030, to achieve a decarbonised energy system in line with targets, offshore wind will need to play a much bigger role in not only displacing current electricity use, but also in displacing the need for other forms of fossil fuels such as the electrification of heat and transportation and through production of clean hydrogen. For example, National Grid ESO's 2020 Future Energy Scenarios includes the potential requirement for 24GW of offshore wind capacity dedicated solely to hydrogen production.[xi]

Actions taken now will have an impact on Scotland's ability not only to reach these targets but also to ensure that Scottish businesses have an opportunity to be closely involved in the sector, scaling up as developments increase and creating employment opportunities and positive economic impacts to communities across the country.

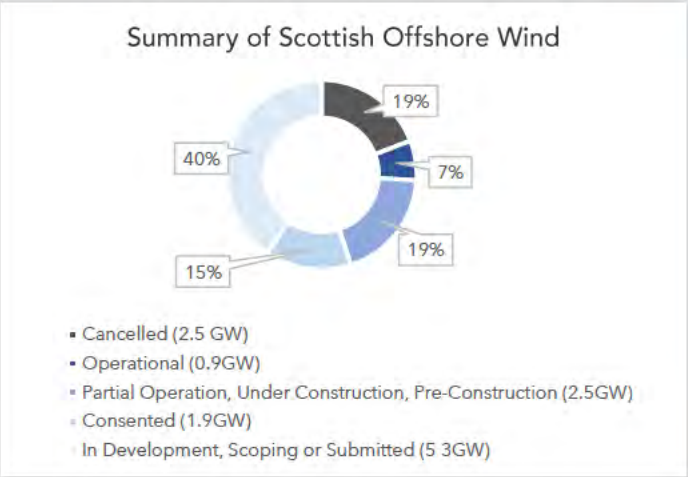
Furthermore, as Scottish firms develop and serve domestic markets, there is an enormous potential for these businesses to export goods and services to meet the needs of the rapidly growing global marketplace, working alongside global developers and suppliers.

2.2 Supply chain background

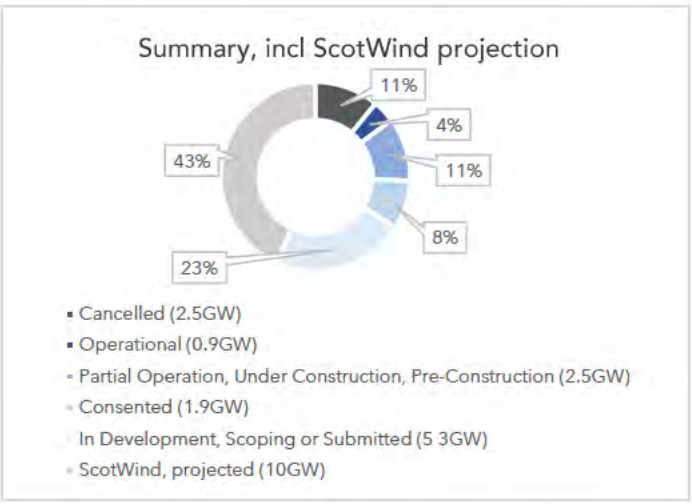
Scotland has a rich heritage in offshore engineering, manufacturing and development and has thousands of people currently employed directly in the offshore wind sector or in other industries, such in oil and gas and subsea sectors, that have skills that can be transferred to or already apply to the development of the offshore wind sector.[xii]

The offshore wind supply chain in Scotland supports the development, build, operation, maintenance of projects. In terms of project development in Scotland the offshore sector is well supported by professional, legal and financial services companies that can deliver the necessary support to the sector, and to be able to grow to meet future demand. However, there is always room to expand the potential reach of these businesses as offshore wind becomes more of a focus for the renewables sector and to expand a healthy level of economic activity and contracts into other parts of the economy.

Figure 1: Breakdown of Scottish offshore wind projects

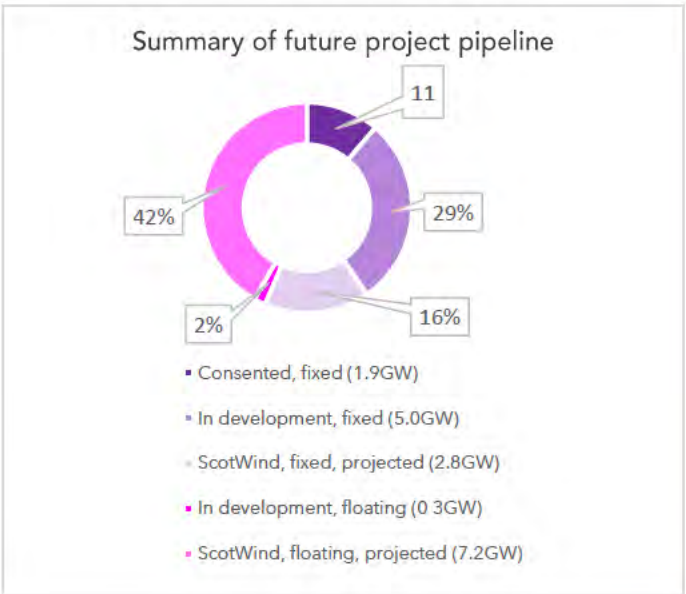


Top: based on known projects, there are 10GW of projects in operation or under development. 2.5GW has been cancelled or due to be decommissioned, equivalent to the amount under construction or in pre-construction. Operational capacity only represents 7% of this capacity, showcasing the future potential based on known projects alone.



Centre: adding in projected capacity expected via ScotWind highlights the higher volume of future capacity that comes into play. 10GW of additional projects via ScotWind would represent 43% of Scottish capacity and is 10x greater than the amount of existing capacity.

For a full list of known Scottish projects see Annex B: Scottish offshore wind projects



Bottom: looking at future projects alone, the growth and importance of floating offshore wind becomes clearer. Of this future pipeline, floating offshore wind could represent 44% of projects. Data here highlights projects which are consented or in development or projected based on assumptions over the split between fixed and floating offshore wind of future ScotWind leases.

ScotWind split between fixed and floating based on ORE Catapult analysis. See xxii.

2.3 Comparing past ambition with our current reality

This independent review is not the first undertaken about how to develop and grow offshore wind in Scotland. In 2010, the Offshore Wind Industry Group (OWIG), an earlier equivalent of SOWEC, published its own route map to 2020.[xiii]

Here in 2021, it is instructive to return to this and review what success we had in delivering against these previous aims.

2.3.1 Ambitions

In 2010, Scotland forecast rapid growth of its offshore wind sector. In February 2009 The Crown Estate issued exclusive rights to nine consortia to develop 6.4 GW of offshore wind power in Scottish Territorial Waters (STW) and in January 2010, it followed this up with the announcement of the UK Round 3 licensing programme for up to 32GW across nine offshore wind development zones including the Forth and Moray zones which together totalled 4.8GW.

Based on the high levels of ambition at the time OWIG reviewed the actions needed to maximise success and made use of four scenarios commissioned by Scottish Renewables and Scottish Enterprise which set out four potential growth trajectories ranging from an ambitious scenario of £7.1bn value by 2020 and 28,377 jobs, to a low scenario of only 224m in value by 2020 and under 1,000 jobs.

Alongside this, Highlands & Islands Enterprise and Scottish Enterprise jointly set out investment plans for required port infrastructure in two Scotland-wide National Renewable Infrastructure Plans. These N-RIPs set out investment priorities for ports and manufacturing hubs of £223m and estimated that this would support up to 5,180 jobs[3] and create an annual economic impact of up to £294.5m year on year. [xiv]

2.3.2 Actual Progress

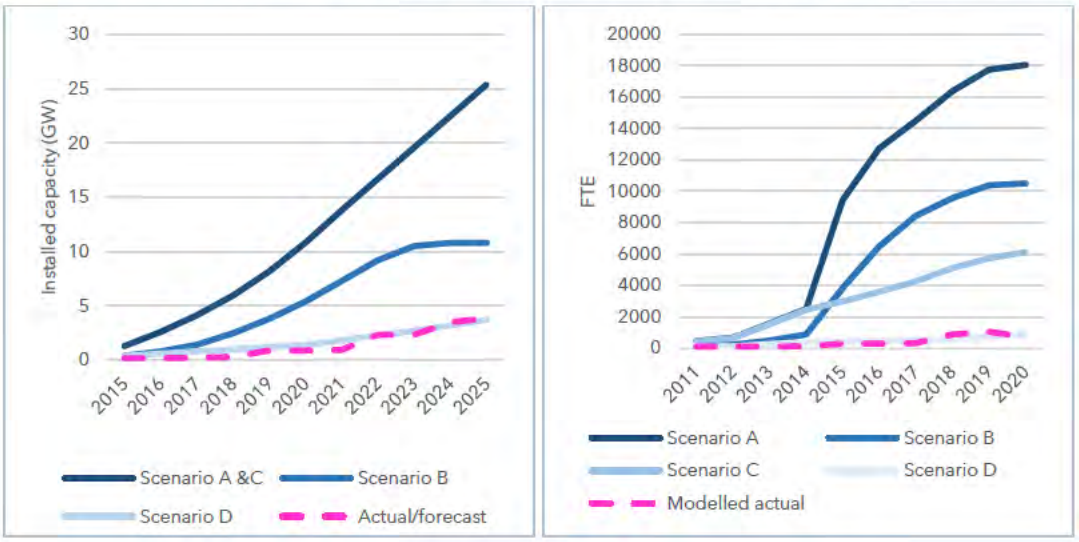
Analysis in Figure 2 by ORE Catapult for this project highlights that the actual level of GW (left) delivered in Scotland was just below the worst-case scenario developed in 2010. Therefore expected employment (right) was significantly lower than expected and slightly undershot the low benefits set out in the most negative scenario.

This original worst-case scenario was described as follows:

> *With so much activity across the UK and Europe, supply chain resources are drawn to near-shore sites first, leaving the bulk of Scottish generation undeveloped or lagging to post-2020. Much of the equipment and installation resource is brought in from outside of Scotland and economic benefits are largely unrealised. The industry only grows* ***to £224m in value*** *by 2020 and* ***additional jobs created fail to reach 1,000****.*

[3] Employment figures were based on bottom-up assessment of a mix of component manufacturing occupying the space identified as required and based on benchmark employment numbers of then existing component manufacturing facilities elsewhere (OEMs etc). They were gross figures and excluded direct and indirect multipliers.

Figure 2: 2010-2020 Scottish Offshore Wind Scenarios vs Actual (GW - left, FTE - right)



Unfortunately, this low achievement scenario describes the market conditions that Scotland has experienced with delays to projects leaving Scotland delivering low capacity while other markets have developed and embedded supply chain capability.

Looking back at industry forecasts at the time we can see how over time ambitions have fallen and forecasts revised downward. Our analysis of industry[4] forecasts for offshore wind deployment since 2010 are set out in Figure 3. This shows the scale of ambitions for what today's installed capacity would be versus what was delivered. A decade ago and up until 2012, expectations were that Scotland would have over 10x the amount of installed capacity that we see today. While forecasts between 2014 and 2016 were adjusted downwards, only after 2017 did industry forecasts shrink to reflect today's reality of projects delivered.

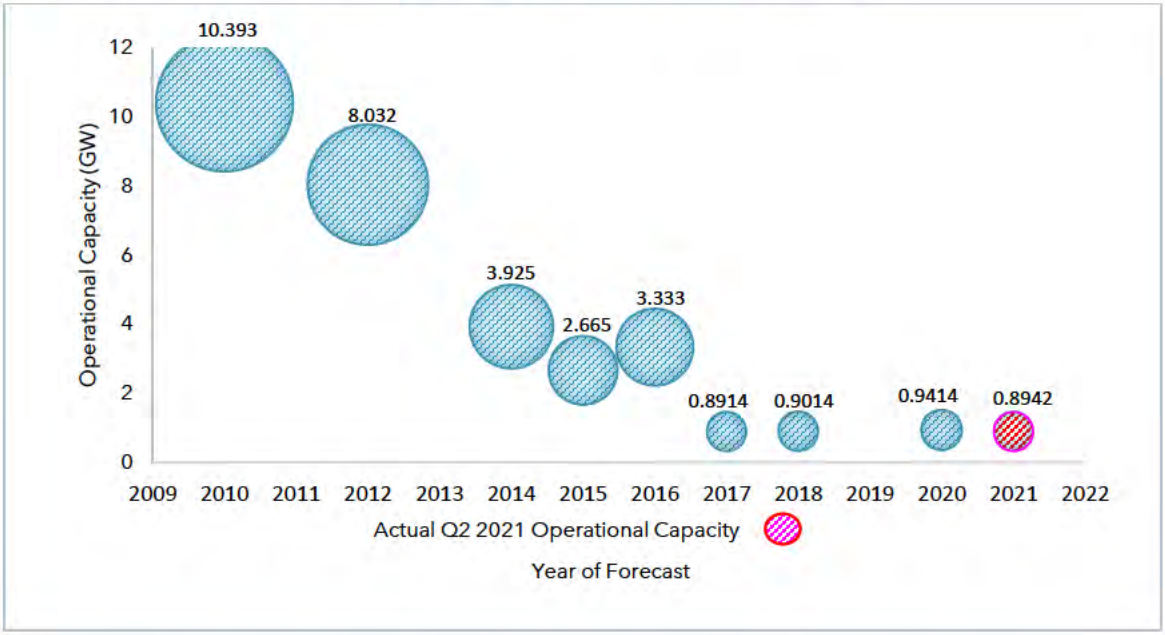
2.3.3 Reflections and lessons learned

The above analysis charts industry forecasts from OWIG and RenewableUK. It shows that Scotland has delivered to just beneath the low scenario envisaged back in 2010. 2010's OWIG forecast that poor delivery of projects would directly relate to a low number of FTE jobs has unfortunately proven accurate.

The accurate correlation between low GW delivered and low FTE generated shows clearly that that most significant reason that Scotland has yet to secure significant supply chain activity are delays and cancellation which have held back sector growth. Of the 10.3GW proposed via the Scottish Territorial Waters (STW) and Round 3 leasing programmes, as well as sites out of these formal rounds, only 892MW has been delivered. This is ten times less than envisioned back in 2010.

[4] Data gathered from successive RenewableUK Project Timelines documents

Figure 3: Forecast Operational Capacity by 2020 vs 2021 Actual Delivery



Scotland's offshore wind sector has seen planning and legal delays as well as delays in projects securing support under the UK Contract for Difference regime, owing to competition for the CfD and concerns about higher Scottish costs (particularly transmission charges).

Early industry estimates did not account for the relative cost effectiveness of projects in England versus Scottish projects, and the need for everyone to compete on a level playing field regarding the CfD.

However, activity is now finally beginning to accelerate. 2,948GW of offshore wind projects are now in construction and a further 1,942MW has consent.

Delays in Scottish projects have understandably held back the Scottish supply chain from gaining critical early experience to then use in winning work in the rest of the UK market or abroad.

Hindsight is easy to deploy. Foresight is harder but it is important to be clear about what a look back to 2010 aspirations tells us about supply chain growth.

- First, without project delivery there cannot be supply chain growth. As other work reviewed in this report shows, while Scotland has benefited from work in the projects that have come to fruition, the delays to securing a reliable pipeline have put Scotland behind. This delay cannot be allowed to happen again, though importantly our sector consultation shows high confidence in this new pipeline.
- Second, the offshore wind market is very, very competitive. The last decade was one focused on rapid scale up and rapid cost reduction. Insufficient thought was paid to the relative competitiveness of the Scottish supply chain, and what actions might be needed to increase this competitiveness.
- Third, pipeline delays stymie investment. Port investment was held back as forecasts were revised down. However, there are many positive examples of work secured in the offshore wind projects that have been delivered, particularly around the Moray

Firth and the Beatrice and Moray East projects, as well as proactive work by several ports to secure investment and win work from previous and current offshore wind projects. Private investment to sites like Nigg and Dundee has ensured that work has come to Scottish ports and valuable experience gained.

Since OWIG's 2010 work and Government's N-RIP programme, the offshore wind industry has grown up. It is now a mature sector that is at the heart of UK energy policy and industrial strategy. The knowledge base around offshore wind is strong. A look back at the important work around OWIG and N-RIP shows the importance of planning ahead. Today, we must plan again and be ready to invest and work to support the pipeline in delivering at scale.

Today focus is on building cost-effective projects and managing risks, while scaling up and moving onto more challenging sites, as found in Scotland. There are also opportunities to capture the next generation of floating projects, a new industry, where Scottish businesses will have less of an experience deficit against other markets and where strategic interventions now could have a major impact.

2.4 The global offshore wind market & the wider energy transition

2.4.1 Growth to 2030

The UK has been a leader in the delivery of offshore wind and remains the world's largest wind market and is forecast to retain a position as one of the world's biggest markets out to 2030.[xv] Scotland remains an important regional market within the UK. While Scotland has been slow to develop compared to projects in England and Wales, over the coming decade Scottish projects are expected to make up approximately 40% of the market.[xvi]

However, even as the Scottish market grows, in comparison to other markets, and the overall global market, it remains a relatively small opportunity. What is more, this global market is one dominated by international players who can leverage significant expertise to manage risks, secure funding and develop clusters of projects under large framework agreements. These developers face calls for local content in multiple markets. They can respond to these demands only where they find a competitive supply chain able to be nurtured and grown.

At end of 2020, 35GW of offshore wind was in operation around the globe, with the bulk in a small number of western European markets or China. By 2030, GWEC projects 234GW in operation, meaning eight-fold global growth in only ten years. For context, the 11GW target within Scotland's Offshore Wind Policy Statement represents less than 5% of global installations.

2.4.2 Growth to 2050

Later this year, the world's leaders will meet in Glasgow to hopefully come to a shared agreement on how to deliver the commitments made in the Paris Agreement to limit the impact of climate change to 1.5°C. To do that needs a radical transformation of our economy. Nowhere is this transformation so big than in the energy sector.

Forecasts show that offshore wind deployment will continue to accelerate beyond 2030. The Ocean Renewable Energy Action Coalition[xvii] is projecting 1,400GW by 2050, and recently the UN's International Renewable Energy Agency (IRENA)[xviii] and the IEA[xix] both forecast approx. 2,000GW by 2050 as part of global effort to remain in line with a 1.5°C climate pathway.

2.4.3 A global energy transition

In 2018, renewables provided only 6% world energy use (including 25% of electricity). However, the UN's International Renewable Energy Agency (IRENA) forecasts that by 2050 62% of global energy will be renewable. 90% of electricity will be renewable. Wind and solar become the fuels of this future and swap places in terms of scale and hierarchy with oil and gas.

Importantly this global shift sees offshore wind important in a much larger group of markets, opening up new opportunities to offshore wind experts. Also, as costs fall, it is expected that floating offshore wind will grow as a percentage of this market.

In our consultation it was repeatedly stressed that the aspiration for Scotland must be to get suppliers to a point where they are competitive, so that aspirations for local content are sustainable. But of course, given the global market growth expected over the next thirty years, it is clearly the pragmatic course of action as well. Scottish suppliers have struggled to win export work in offshore wind, or even to compete for work from English or Scottish projects. But this can and has to change.

Hywind Scotland,
courtesy of Equinor

3. Scottish baseline and future jobs growth

3.1 UK and Scottish content baseline

An important source of information for this Assessment has been the SOWEC commissioned baseline of Scottish and UK content[5] conducted by BVG Associates.[xx]

This work helps baseline what has been achieved to-date and clearly highlights the challenges and opportunities for the Scottish supply chain in growing Scottish (and UK) content. The baseline shows most success in securing work in operations and maintenance, but also some aspects of installation as well as development. Scotland currently provides no or very little content into turbines, foundations, cables, and most aspects of installation.

The rose diagrams below (Figure 4: Scottish content in UK offshore wind, in UK and Scottish only projects) set out these content levels graphically, highlighting the contribution of different phases/components to overall lifetime value, as well as the relative success in securing Scottish content.

3.2 UK and Scottish content baseline

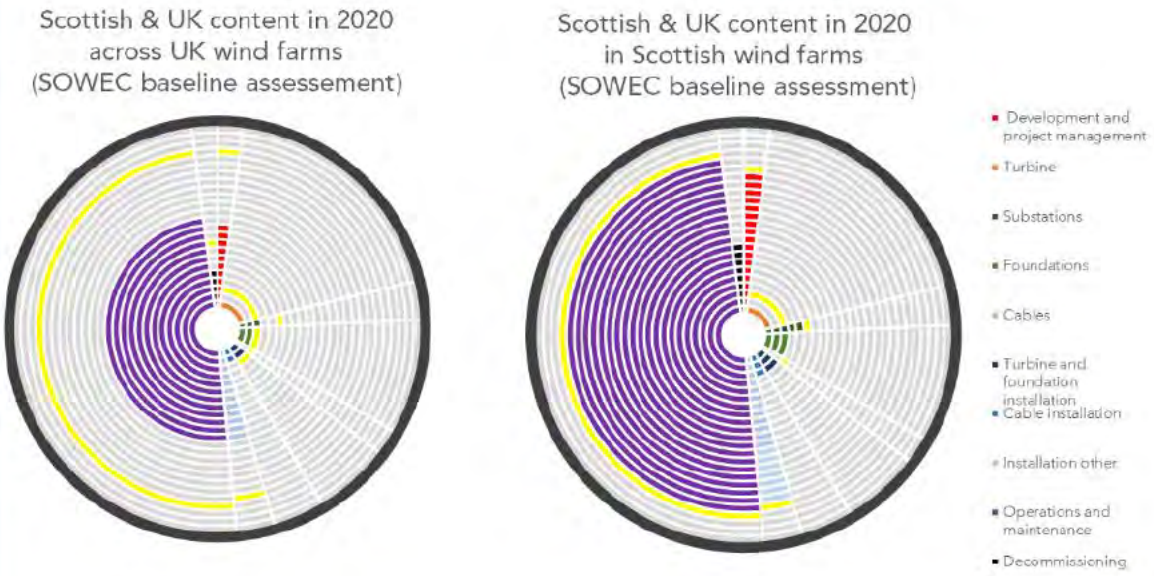
After calculating a baseline for SOWEC, BVG Associate looked at options for growing Scottish and UK content to meet higher content ambitions and prioritised a few options for inward investment or supply chain growth capable to grow UK and Scottish content. BVG Associates then mapped the number of investments that would be needed to achieve either a 55% UK/22% Scottish or 60% UK/24% Scottish Content figure. They estimate that up to 15 new manufacturing facilities will be required in the UK and estimated that up to 6 of these could be in Scotland. Scottish priorities were as follows:

- Turbine tower manufacture
- Floating foundation manufacture
- Jacket foundation manufacture
- Substation platform manufacture (x2)
- Substation foundation manufacture.

However, worth noting is that BVG Associates concluded that if a company first decided to invest into the UK and then looked at potential UK sites, in many cases there was not a compelling reason why a company would choose a Scottish location over a non-Scottish UK location. Scotland needs to be aware that while it is a location of growing importance within the UK wind market, Scottish locations remain in competition with other UK locations, as well as continental providers.

[5] This SIA has benefited from access and engagement with SOWEC and the BVG Associates team. Publication of this work is expected in due course after review by SOWEC.

Figure 4: Scottish content in UK offshore wind, in UK and Scottish only projects



Above: rose diagrams showing Scottish and UK content based on overall lifetime value. Each different colour segment shows levels of Scottish content. The relative size of each segment shows overall contribution to lifetime value. Movement from the centre to the outside shows success of Scottish suppliers in capturing a % of this segment of market (centre = 0% Scottish content, black circle = 100%). Yellow bars highlight equivalent UK content where different.

Left: BVG Associates baseline data for modelled UK wind farms. This shows Scottish content of 25% for all projects modelled. The most significant value stems from development (38%), installation, other (42%) and O&M (43%). As can be seen Scotland has secured very little value from turbine, balance of plant or installation work.

Right: baseline date shows content of modelled Scottish wind farms. This shows Scottish content of 44% and overall UK content of 48%. As in the overall UK picture, there has been little Scottish success in securing contracts from turbine, balance of plant or installation work.

Overall: this data shows that for Scottish wind farms, Scottish suppliers are successful at winning work in the O&M and installation (other) elements over suppliers from elsewhere in the UK. This highlights the importance of provision of services and expertise adjacent to a wind farm in the O&M phase. But there are currently low levels of UK content, and lower levels of Scottish content in turbine, balance of plant and most parts of installation.

3.3 ORE Catapult - economic impacts

As part of this assessment, ORE Catapult conducted GVA modelling to estimate the value of future offshore wind projects to Scotland.

Using published statistics,[6] analysis of estimated jobs and GVA in the sector for Scotland now and in 2030 for historical projects, projects in construction and value and jobs from future leasing rounds was carried out.

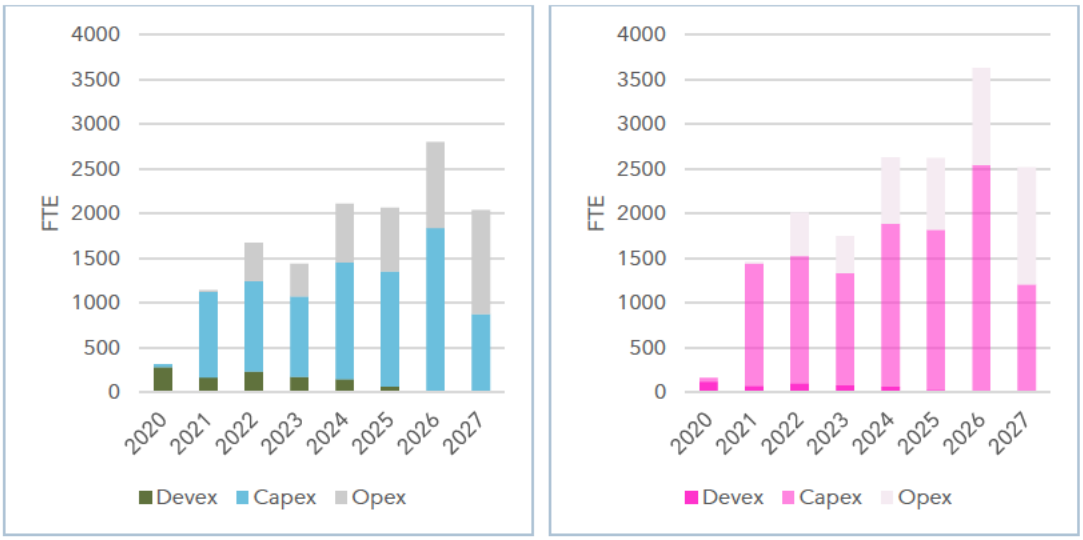
3.3.1 Economic impact of projects in construction

It is estimated that there is a combined 4.8GW of Scottish capacity is either in construction or set to be installed in the near term. Combining the ORE Catapult cost model and BVG Associates local content assumptions, total Scottish spending in the period 2020-2027 is estimated to be £2.9 billion (out of £13.2 billion total spend for these projects), comprising £2 billion capex (out of £11.9 billion total), £780 million opex (out of £970 million total), and £150 million in devex (out of £230 million total).

This level of expenditure results in an average of 1,700 direct FTE over the period, and 2,100 indirect and induced FTE (

Figure 5).

Figure 5: Scottish employment benefits (left - Direct FTEs; right – Direct & Indirect FTEs)



3.3.2 Economic impact of ScotWind leasing round

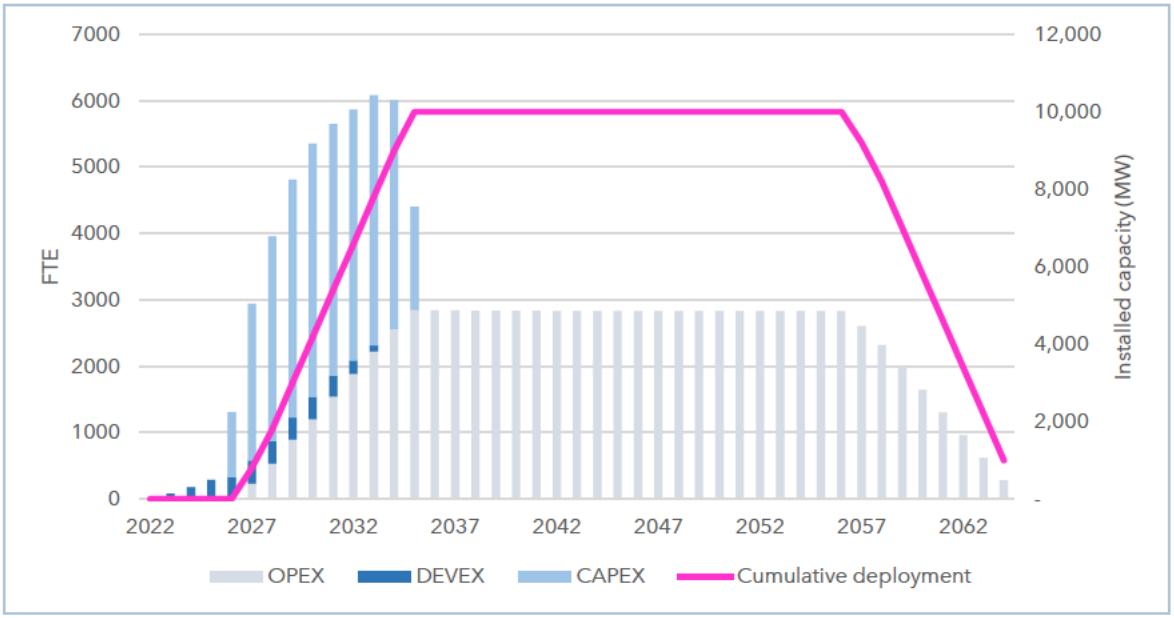
ORE Catapult then modelled future content and economic impact coming out of the current ScotWind leasing round Over the lifetime of these new windfarms it is expected a total of 118,000 direct FTE years of employment will result. These jobs are weighted to the

[6] Including the recent OWIC report on 'Offshore Wind Skills Intelligence' and the SOWEC commissioned BVG UK and Scottish content baseline roadmap, along with in-house ORE Catapult knowledge

near term (Figure 6), with total Scottish jobs peaking at 6,000 in 2032/33, when several projects are under construction alongside O&M jobs approaching a plateau.

Following the development and construction phases, O&M jobs are expected to remain flat at just under 3,000. Decommissioning or repowering jobs may extend the jobs profile as windfarms reach end of life, but these have not been considered for this analysis.

Figure 6: Scottish jobs created from 10GW of ScotWind installed capacity

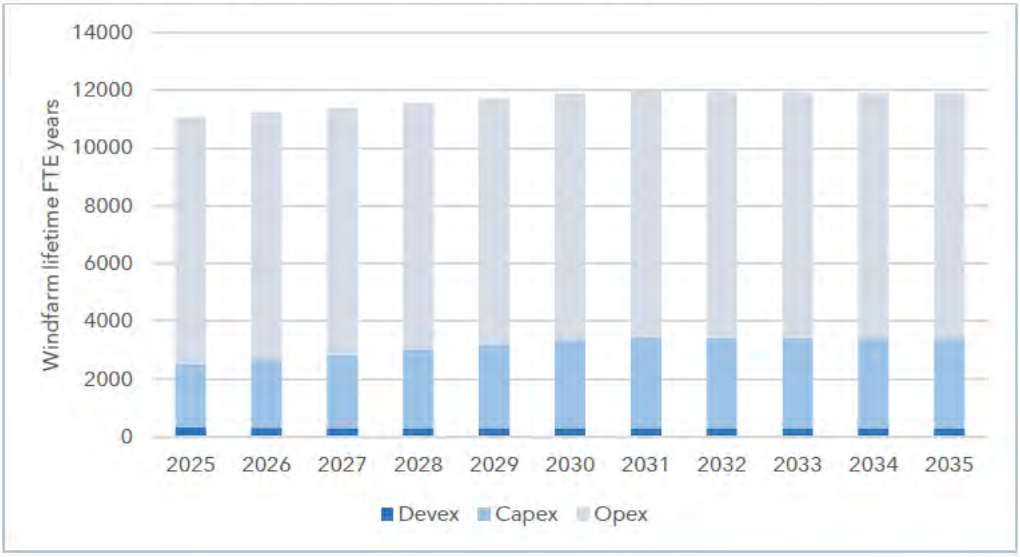


3.3.3 Future development

A 1GW wind farm deployed in Scotland after 2025 is expected to generate between 11,000 and 12,000 FTE years in Scotland. Most of these FTE years (71-77%) will be in operations and maintenance and exist to service the wind farm once operational (over a ~30-year lifespan). This equates to around 285 FTE jobs each year. Data is shown in Figure 7: Scottish FTE years over a 1 project lifetime, by year commissioned.

This analysis is very sensitive to local content. It also shows that while opex is forecast to provide the most jobs in Scotland, there is little future upside compared to the start of the forecast period as local content is assumed to be >80%. The largest gains can be made in capex with higher local content. Increasing Scottish share of capex would also provide the biggest employment benefits in the near term.

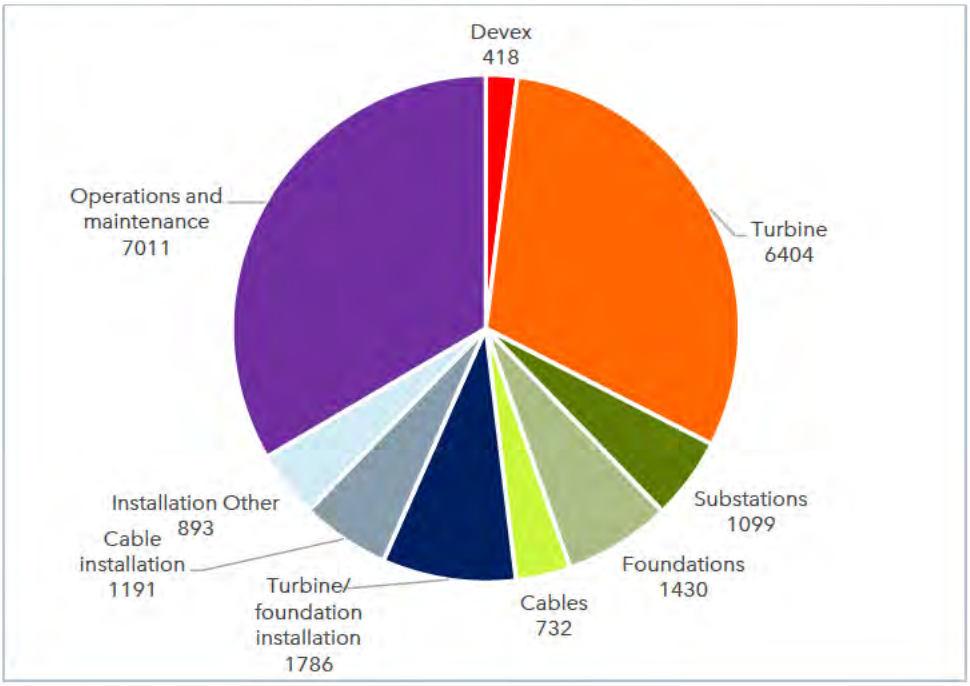
Figure 7: Scottish FTE years over a 1 project lifetime, by year commissioned



The model used this in this report estimates that a 1GW wind farm requires 21,000 FTE years to develop, build and operate. Approximately one third of these job years are in O&M over the life of the asset. Another third is estimated to be required for manufacturing of the turbine. This highlights the importance of developing manufacturing capabilities in Scotland to capture jobs to supply ScotWind developers. The data in

Figure 8 can be helpful in estimating the impact of an increase in local content e.g. a 1% (absolute) increase in turbine content adds ~640 FTE years.

Figure 8: Total FTE years required to supply a 1GW wind farm in 2030



Seaway 7 Strashnov carrying out installation work on Beatrice Offshore Wind Farm, courtesy of Seaway 7

4. Reviewing Scottish port capacity

4.1 Ports for offshore wind

In 2020 Crown Estate Scotland (CES) published its *Ports for offshore wind* report. [xxi] The report, delivered by Arup, concluded that while Scotland already has a strong and thriving ports sector, there are various steps that could be taken to maximise the future potential of Scottish ports to host the major offshore wind projects which are expected to come to Scotland.[7]

Relevant recommendations of the CES report include:

1. Scotland should collectively aim to increase large port capacity that is suitable for marshalling and assembly activities, acting as a key enabling action for growth of domestic manufacturing
2. Support strategic port planning for offshore wind
3. Encourage development of optimal O&M facilities.

The CES report highlights that Scotland has no major 'hub' port facilities of the scale present in other North Sea countries that offer marshalling/assembly alongside fabrication/manufacturing. Over the last ten years there has been significant investment into facilities such as Rotterdam, Vlissingen, Cuxhaven and Esbjerg in Europe, and there are also larger port facilities existing, or with investment planned, on the east coast of England than are available in Scotland.

The report identified a clear risk that successful build out of ScotWind may either be constrained or be led from outside Scotland without significant expansion of marshalling/assembly capacity, and foresaw a strong value case, given a more consistent stream of work ahead. The report also highlighted that marshalling/assembly should not be seen as a distinct opportunity to fabrication/manufacture. Provision of space suitable for marshalling/assembly can also attract fabrication and manufacture since prospective investors in fabrication/manufacturing facilities would logically be likely to favour locations with adequate port capability already available and there could be 'clustering benefits' for workforce and supply chain, as well greater efficiencies from sharing high-cost infrastructure.

A study of demand showed a need for between 100 and 200 hectares of space suitable for marshalling/assembly facilities in Scotland to deliver ScotWind, and between 175 and 300Ha to support deployment beyond the current ScotWind leasing round. Today, Scotland has an estimated 50 ha available[8] in the six largest facilities in Scotland. This capacity gap is shown in Figure 9: Projected port onshore area demand for foundation and turbine component marshalling, and cumulative installed capacity of offshore wind in Scotland.

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7 Scottish Enterprise, Highlands and Islands Enterprise and Transport Scotland worked with CES in the development of the report, the detailed research for which was carried out by Arup.

8 This 50ha equals half of available area of Nigg, Invergordon, Dundee, Methil, Arnish and the under-construction Aberdeen South Harbour.

Figure 9: Projected port onshore area demand for foundation and turbine component marshalling, and cumulative installed capacity of offshore wind in Scotland

Source: Crown Estate Scotland (2020) Ports for offshore wind

A review of ScotWind marshalling/assembly requirements for the forthcoming ScotWind round and continuing deployment. Future demand is projected at between 175 and 300ha compared with an existing 50ha.

4.2 Manufacturing requirements from ScotWind

ORE Catapult recently published an updated prediction on requirements for foundations and cabling likely to flow from ScotWind delivery.[xxii]

On the assumption that 10GW of capacity is delivered through ScotWind, ORE Catapult predicts a demand for 21 monopiles, 157 jackets and 469 floating structures. ORE Catapult also predicts that a minimum of 659 array cables will be required and a minimum of 1,295km of export cable. In addition it highlights the need for dynamic cabling variants for floating sites as well as mooring systems and anchors. This projection highlights that the single largest opportunity in foundations lies in floating platforms.

4.3 Reviewing existing and future assembly and marshalling capacity

Scottish Enterprise, Highlands and Islands Enterprise and Crown Estate Scotland recently commissioned consultancy Ironside Farrar to assess current and future marshalling and assembly capacity in Scottish ports, building on the recommendations of the CES report. [xxiii] It identified 52ha of available capacity and a further 62ha of latent capacity available subject to additional site works and preparation. In addition, there is a potential further capacity of some 64ha that could be developed and a further 25-139ha of future capacity with the potential for development for marshalling & assembly.

The report groups ports into the following clusters:

- ***North-East Scotland Cluster*** *– Nigg, Cromarty, Aberdeen and Orkney are all well positioned relative to ScotWind Leasing Zones across the North Sea and Moray Firth and benefit from feasible long-term expansion options. There will be high demand for marshalling & assembly laydown area in these locations.*

  Expansion at Ports of Montrose, Fraserburgh, Peterhead pose challenges but could be realised to further boost cluster capacity or continue to play supporting role in accommodating displacement activity and wider offshore wind servicing needs.

- ***Forth & Tay Cluster*** *- Leith and Dundee are well situated in close proximity to North Sea Leasing Zones and boast existing capacity for marshalling & assembly as well as future expansion opportunities. The Cluster can also benefit from support and additional servicing functionality from Forth Ports wider portfolio at Burntisland, Rosyth, Methil, Grangemouth.*

- ***West of Scotland Cluster*** *– A wider West of Scotland Cluster between Hunterston, Kishorn and Stornoway could emerge to meet demand from Leasing Zones W1, N1-4 and explore potential export opportunities to Irish Sea offshore wind. Campbeltown and other west-coast ports may also provide additional support services (O&M) within this cluster.*

- ***Shetland Cluster*** *– Despite relative remoteness from ScotWind Leasing Zones, Lerwick and Shetland (Sullom Voe) have potential to expand ports with deep-water access which is well-suited to floating wind and could provide specialist functionality.*

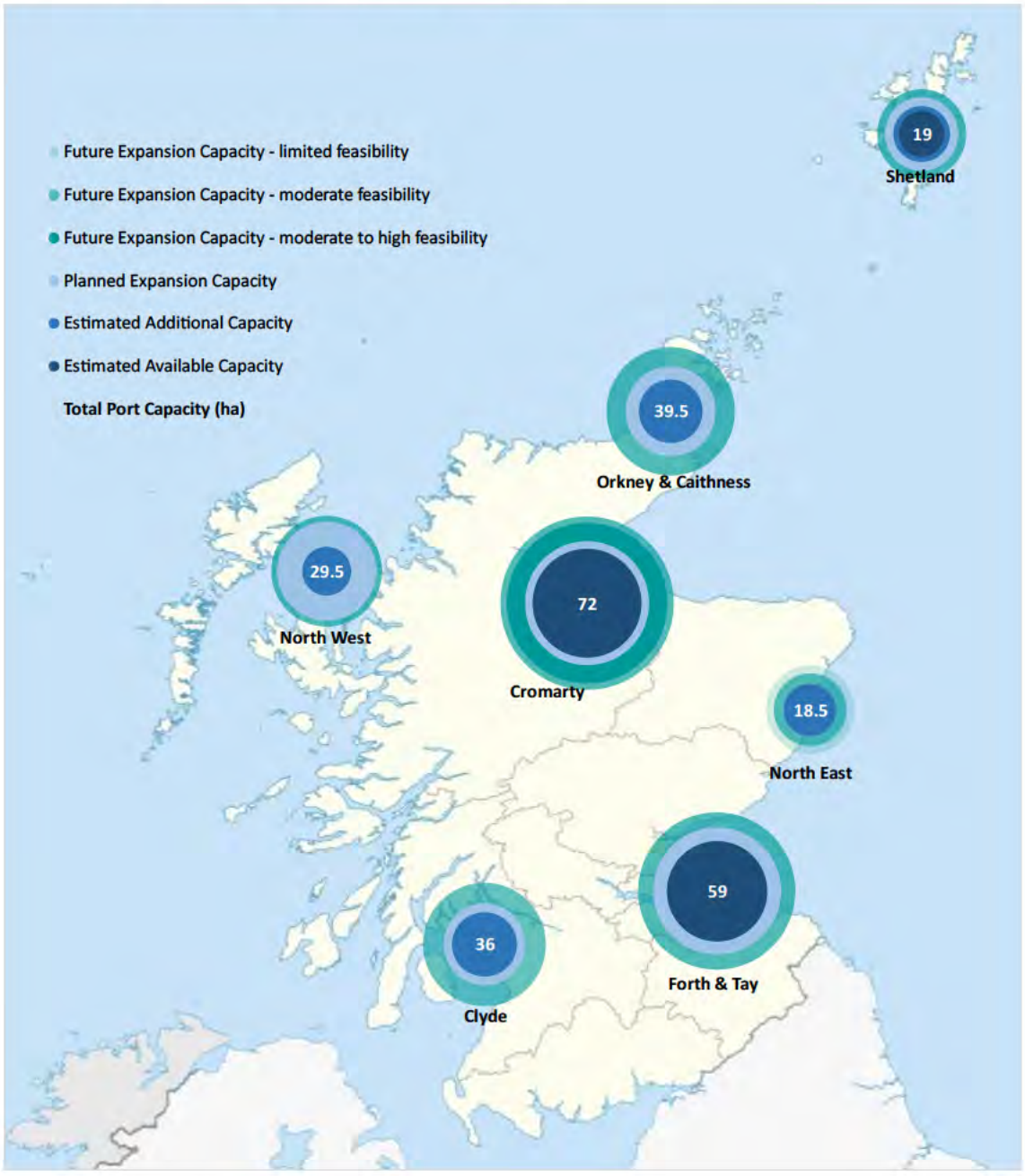
Ironside Farrar note that ""Optimising existing and future capacity should encourage both geographic 'cluster submissions' and 'port alliances' that deliver against the varied contract needs of industry (marshalling-assembly /pre-deployment services / storage- cabling /etc alongside skills, expertise, deployment track-record, relationships, etc."

Figure 10: Current & Potential Scottish Port Capacity available for offshore wind marshalling & assembly (existing port locations only) shows that a number of ports including those in the Cromarty Firth area and Forth and Tay have existing and planned capacity to support offshore wind marshalling & assembly. It is also worth noting that proposed port redevelopments such as Ardersier (110 Ha) [9] or new development

[9] Information on Ardersier proposals provided to the project team by HIE.

proposals such as the Scapa Flow Assembly Hub (200 Ha)[10] would offer additional site options for assembly and marshalling.

Figure 10: Current & Potential Scottish Port Capacity available for offshore wind marshalling & assembly (existing port locations only)



Data Source: Ironside Farrar

[10] Information on the proposed Scapa Flow Assembly Hub provided by Aquatera.

4.4 Assessing options for fabrication alongside marshalling and assembly

While the Arup/CES and Ironside Farrar reports are focused on space for marshalling and assembly, for ports with space suitable for fabrication, it could also be utilised for marshalling and assembly, though the former is likely to be the higher value activity.

To deliver a large pipeline of floating projects, developers and ports will need to work together and multi-port strategies should be expected. One benefit of a strategy that focuses on a Port Cluster is that a critical mass of activity can be created, which attracts further investment into participating or other ports.

While decisions regarding marshalling and assembly and individual components can take place on a unilateral basis, to establish capability and capacity to manufacture and fabricate platforms does require coordination to maximise success. As the focus of ScotWind will be floating offshore wind, priority needs to be given to port facilities suitable for component and platform fabrication alongside marshalling and assembly.

In support of this analysis, ORE Catapult has provided updated analysis of port capabilities to support floating substructure fabrication in Scotland. This builds on 2020 work by ORE Catapult looking at floating substructures, updated based on current understanding of Scottish port capabilities and future plans. This analysis assessed different ports to carry out the following activities:

- **Pre-fabrication –** Pre-fabrication of substructure components (steel or concrete).
- **Assembly –** Assembly of substructures using prefabricated substructure modules (steel or concrete)[2].
- **Wind Turbine Generator (WTG) staging –** Wind turbine staging and installation on substructures.
- **Mooring System Staging –** mooring line and anchor staging.

Ports were assessed using relevant information including characteristics such as:

- Navigational channel width, depth and ceiling (air clearance to bridges, transmission lines)
- Number of berths and their depth
- Maximum serviceable vessel length, beam and draught
- Available infrastructure – space (existing and for future development), road and rail access, cranes, dry dock
- Access to workforce.

Ports were qualitatively assessed using a red, amber, green scoring system, where red = port does not meet the majority or all criteria; amber = port meets some of the criteria; light green = port meets most primary criteria, but additional development required; dark green = port meets majority or all criterial with little or no development required.

The resulting review of port capabilities currently, by late 2020s and if future investment plans are realised are shown below in Table 1: Port Assessment on Capability for Floating Substructure Fabrication.

Based on this ORE Catapult assessment, the SIA project team then screened the above Ironside Farrar analysis, to identify those Scottish ports with marshalling and assembly