The social impact of marine developments

A report for The Crown Estate

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THE CROWN ESTATE

University of Exeter

Acknowledgements

The basis of this report was research undertaken by Pamela M. Buchan of the University of Exeter. Commissioned by Helen Elphick (former Senior Development Manager) and Jack Price (Nature and Environment Advisor) from The Crown Estate who have been exploring themes of social value and community impact through research and engagement. This report is one of a number of studies that may help inform their onwards plans.

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About this report

University of Exeter

The University of Exeter is a Russell Group university that combines world-class research and education. Exeter sits within the Top 15 universities in The Guardian University Guide 2023, and in the top 150 globally in both the QS World Rankings 2022 and THE World University Rankings 2023. In the 2021 Research Excellence Framework (REF), more than 99% of our research was rated as being of international quality.

As the world faces an environment and climate emergency, the University of Exeter is focused on the relentless pursuit of solutions through Green Futures. For more than twenty years, our experts have been conducting world-leading interdisciplinary research and translating it into real-world impact that is making a difference. We do this by collaborating with business, influencing national and international policy, and by engaging directly with people and communities who are being affected by environment and climate change to co-create solutions.

The THE Impact Rankings are the first, and only, global performance tables that assess higher education institutions against all 17 SDGs. In 2024, the University of Exeter has been ranked 6th globally for Life Below Water – SDG 14 and 12th globally for Climate Action – SDG 13.

Dr Pamela Buchan is an interdisciplinary marine scientist within the Environment & Sustainability Research Group in Geography. Dr Buchan's research brings her natural and social marine science expertise together with her practical experience in marine governance in local government, inshore fisheries, and ports. In 2022, Dr Buchan won the ESRC's Celebrating Impact Prize for Outstanding Early Career Research.

About The Crown Estate

The Crown Estate is a significant national landowner with a diverse £16bn portfolio that includes urban centres and development opportunities; one of the largest rural holdings in the country; Regent Street and St James's in London's West End; and Windsor Great Park. We also manage the seabed and much of the coastline around England, Wales and Northern Ireland, playing a major role in the UK's world leading offshore wind sector.

We are a unique business established by the Crown Estate Act 1961, operating independently, and tasked with growing the value of the portfolio for the nation and returning all of our net profit to the Treasury for the benefit of the nation's finances. This has totaled £3.2bn over the last ten years.

Through addressing our strategic objectives, The Crown Estate delivers financial value to the Treasury and creates wider environmental, social and economic value for the nation, both for now and into the long term. This includes:

Playing a significant role in unlocking renewable energy for millions of homes through sectors such as offshore wind and creating opportunities for new technologies like CCS and hydrogen to deliver the UK's energy security transition, resulting in thousands of jobs for communities across the UK.

- Supporting the sustainable transformation of land use in the UK through diversified, regenerative agricultural and environmental best practice alongside a thriving natural world.
- Becoming recognised as a centre of excellence for environmental and ecological best practice across the Windsor Estate.
- Identifying and creating opportunities for thriving and resilient communities across the country to support regeneration, housing and innovation.
- Ensuring London retains its global city status, by fostering a more vibrant, greener and inclusive destination for millions of visitors and businesses.

Executive Summary

Introduction

Marine governance in the UK is delivered through a complicated web of statutory and non-statutory agencies and organisations, which include The Crown Estate (TCE) as a national landowner with responsibility for leasing the seabed of England, Wales, and Northern Ireland for a range of marine industries. The UK's marine governance is particularly focused on technical feasibility of development, economic efficiency and value, and environmental impacts.

In line with The Crown Estate's strategic objective to help create thriving communities and take a leading role in stewarding the UK's natural environment and biodiversity, it has commissioned this evidence review of how the social impacts of marine developments are being researched and how they are understood and measured by industry.

There is currently little regulation for social impact assessment in the UK, yet coastal communities have particular connections to their local place and environment, which includes the coast and sea. These connections are composed of complex interactions between the natural and built environment; community cultures and traditions; employment, skills, and the local economy; and local infrastructure and public services. Social impact assessment is therefore complicated, and the social impacts and values of a marine project can span time and place throughout the lifecycle of the project.

Approach to the evidence review

The study reviewed research and theory from academic publications and social value and impact assessment practices in marine industry documented within industry literature. The review focused on core The Crown Estate-relevant marine industries: offshore wind and other renewable energy generation; sub-sea power and telecommunication cables; marine aggregate extraction; and carbon capture and storage. To enable learning from other sectors and contexts, relevant information was also included from other marine sectors where they emerged through the literature selection process. This included: ports; mariculture; marine conservation and restoration.

The collection of academic publications analysed came from searching scientific databases using keywords that reflected a range of marine industries together with social factors. Publications analysed came from around the world and across disciplines and industry focus. The collection of industry documents were identified from public documents published by key industry bodies and their relevant members, and resources shared on the websites of leading marine developers active in the UK. Additionally, the review engaged with the regulatory context of social impact assessment in England, Wales, Northern Ireland, and company law and Environmental Impact Assessment on a transnational basis.

The publications were read and analysed to draw out evidence in response to the following research questions:

Research theme	Research questions
Motivations and trends in social impact	Which types of organisation are measuring social impact and why?
	Are some marine sectors appearing more commonly in the industry and/or academic literature on social impact, and has this varied over time?
	Are there particular framings of social impact appearing in practice or research?
	Which social issues are highlighted as key concerns for specific sectors, and for the marine industry as a whole?
Social impact assessment tools	What metrics or frameworks are currently being applied in marine governance in practice in the UK?
	What metrics or frameworks are there within the academic literature, or international frameworks, that could be applied in practice?
Coastal community empowerment and participatory governance in the UK	Where there are active attempts to increase participation, who is being invited and/or participating and why?
	Are there evident missed opportunities for more participation in current practices?

The evidence review used the framing of the three social justice pillars to interpret the evidence in terms of how effectively current research and practice are delivering for coastal communities:

Recognition

Recognition refers to **who is identified as a stakeholder** and thus who has a say. As well as different groups of people, this includes the kinds of information, knowledge and evidence that is recognised as legitimate and taken into account in the decision-making process. **Stakeholder identification** fits into this pillar.

Representation

Also known as procedural justice, representation refers to **how stakeholders are involved** in a decision-making process. This includes formal and informal processes of engagement and consultation, the timing of involvement of different stakeholders, and how those engagements are used to inform and influence the decision. Formal and informal **stakeholder engagement** fits into this pillar.

Distribution

This is the fairness of how **benefits and costs** resulting from a decision are distributed. Although this might include adaptation and mitigation as well as changes to the plan, to be fair it is necessary to work with stakeholders to consider how the development affects different stakeholders differently and to ensure fairness.

Analysis of the evidence was also supported by the International Association of Impact Assessment's Social Impact Assessment principles:

1. Respect for human rights should underpin all actions.
2. Promoting equity and democratisation should be the major driver of development planning and impacts on the worst-off members of society should be a major consideration in all assessment.
3. The existence of diversity between cultures, within cultures, and the diversity of stakeholder interests need to be recognised and valued.
4. Decision making should be just, fair and transparent, and decision makers should be accountable for their decisions.
5. Development projects should be broadly acceptable to the members of those communities likely to benefit from, or be affected by, the planned intervention.
6. The opinions and views of experts should not be the sole consideration in decisions about planned interventions.
7. The primary focus of all development should be positive outcomes, such as capacity building, empowerment, and the realization of human and social potential.
8. The term, 'the environment', should be defined broadly to include social and human dimensions, and in such inclusion, care must be taken to ensure that adequate attention is given to the realm of the social.

Findings of the evidence review

Motivations and trends in social impact

The evidence review found that trends in research and industry practice around social impact are most focused on socio-economic impacts and mitigation, e.g., job creation forecasting and community benefit schemes. Offshore development is commonly seen as irrelevant to communities on land. The language of social value is most commonly used to demonstrate benefit, and more complex social impacts, such as changes to place, community cohesion, and equity, are not engaged with.

Motivations for practice are driven by compliance and thus regulation, which does not draw on the IAIA SIA Principles nor the social justice pillars. Research is dominated by efforts to understand and promote acceptance, particularly of renewable energy, not fairness of impacts.

There is a wide variation in research and practice engagement with social impact between sectors, with offshore wind far ahead of subsea cables and aggregates. In general, social issues appear to date to be of low priority in marine development.

Which types of organisation are measuring social impact and why?

Researchers, industry bodies representing single sectors, and companies are all engaged in forms of social impact assessment but there are wide variations between sectors and in approach to the social domain. There is a general motivation to predict economic value and perceived economic impacts, with a strong focus on community benefit schemes. The Crown

Estate is a key partner in many of the industry reports reviewed, showing a sustained interest in leading on social value and impact assessment.

Research:

- Strong focus on understanding and tackling barriers to projects, and to inform siting decisions, particularly for renewable energy.
- Smaller and more diverse research effort on more complex, non-economic social factors such as perceptions of participation in decision-making.
- No evidence of systematic investigation of the social impacts of specific types of marine development and limited engagement with the social justice pillars.

Companies/Industry:

- At the company level, responding to pressure to deliver on ESG sustainability with their social focus being on their workforce, supply chain, human rights and environmental impacts.
- At the project level, social impact assessment is driven by the regulatory requirements of the host nation, e.g., EIA.

Are some marine sectors appearing more commonly in the industry and/or academic literature on social impact, and has this varied over time?

The dates of academic publications reviewed indicate an increasing interest in social impact assessment for marine industry. However offshore wind is a leading sector for both research and practice, particularly in the UK, whilst aggregates was sparsely represented, and subsea cables nearly entirely absent from the evidence obtained. Differences between sectors relate to how developed they are, with emergent sectors more focused on technical feasibility, and how much a development is perceived as being offshore and thus assumed not to be impactful upon coastal communities.

Are there particular framings of social impact appearing in practice or research?

The evidence indicates that economic and socio-economic framings of social impact are most common in both research and industry practice. Regulatory impact assessment requirements also focus on socio-economic impacts and outcomes. These are typically predictions during project design and consenting rather than ongoing monitoring and assessment. Within the socio-economic framing, community benefit schemes are dominant as a means of effecting positive social impact in communities with proximity to developments. At-sea interactions are also commonly considered as part of impact assessment at the design and consenting stages. Influence upon place relationships is increasingly considered within offshore wind research and siting.

The socio-economic framing is influential within the focus on acceptability, which features strongly in research. Economic stimulation, job creation, community benefit, and mitigation of sectoral conflict are seen as key for community acceptance.

Which social issues are highlighted as key concerns for specific sectors, and for the marine industry as a whole?

The evidence review indicates a widespread presumption that marine developments are 'out of sight and therefore out of mind' for the communities on land. Social issues being highlighted therefore are those relating to construction of a development and how its

operation will benefit communities, in keeping with the dominance of socio-economic framings.

There is limited engagement with social justice principles at any decision-making stage in the marine context, and research engaging with these principles is limited or hard to find. Likewise, the SIA principles are rarely mentioned in the academic publications reviewed and not at all in the industry literature.

Social impact assessment tools

Tools used in practice are driven by regulation and compliance and thus use indicators which typically have a socio-economic framing, since that is the primary emphasis in current regulations at national and global scales. There is a key opportunity for practice, and regulation, to draw on the SIA principles and social justice pillars to support development of social impact assessment, having an international impact on emerging sectors globally.

What metrics or frameworks are currently being applied in marine governance in practice in the UK?

Social impact measurement in practice in the UK and internationally is largely driven by regulatory requirement and utilises standard socio-economic models and metrics. At project and industry scale these are geared towards standards and the prescriptions of Environmental Impact Assessment. Typically, these relate to factors of environmental health such as air quality and noise.

What metrics or frameworks are there within the academic literature, or international frameworks, that could be applied in practice?

Researchers support social impact practice with data and evidence gathering around existing frameworks and metrics. However, there are also novel metrics being devised but not applied. Social factors in the research often consider individuals and miss the community scale. A key gap is the lack of application of the SIA Principles and the social justice pillars. Both have the potential to open up the scope of how social impact is understood in practice and how to ensure fairness and justice in development of the marine environment.

Image by Pamela Buchan

Coastal community empowerment and participatory governance in the UK

Participation in marine governance is controlled by regulatory requirements. Developers variably engage in additional community engagement with some efforts to empower the local community in respect of community benefit schemes. Communities of place, interest and livelihood are variably implied when community engagement is described in research and practice, despite the often quite different timescale of engagement, and thus influence, in relation to project development. Change in this domain needs to be led by regulatory change within existing procedures such as Environmental Impact Assessment and terrestrial and marine planning.

Where there are active attempts to increase participation, who is being invited and/or participating and why?

Participation is predominantly through formal consultation as stipulated in the processes of consenting/leasing/planning. There are different tiers of stakeholders in the decision-making process, with decision-makers, regulatory bodies, and those with economic interests being the earliest and most meaningfully engaged through opportunity to shape the plan. Local community engagement typically comes after consenting, and as such, is largely centred around objections to fully formed plans coming to the local planning authority. Even in research, 'stakeholder' often means business or economic stakeholder.

Outside of statutory processes, informal community engagement is the primary approach used, aiming to improve dissemination of information about projects and construction. In practice, communities are often asked to give feedback, e.g., on disruption caused by construction, but there are no formal participatory processes around this and little recognition of local knowledge that could support decision-making and inform project development. There is growing interest in community governance of community benefit schemes.

Are there evident missed opportunities for more participation in current practices?

A key gap in research is to investigate actual social impacts from real-life projects, rather than perceptions of potential impacts. Guidance has been produced to support developer-led community engagement and participation, for example from the Environmental Research and Monitoring Programme at the Vattenfall supported European Offshore Wind Deployment Centre (EOWDC). However, without regulatory imperative this remains voluntary.

There are key opportunities during marine planning, leasing and consenting, and project planning regulatory stages to better engage coastal communities in decision-making, and to require developers to engage in more effective procedures of participation, such as early community participation so that it can meaningfully influence the development of the project. Programmes such as Contracts for Difference are driven by the cheapest price which might dissuade strong and just approaches, however these could be used to drive forward innovation in social sustainability.

Sector overview

A brief overview of key findings by sector.

Sector	Extent of evidence	Social impact approach	Extent of participation in decision-making
Aggregates	Limited	Economic appraisal. Sectoral interactions at sea. Local community engagement centred on land-based sites.	Little to no public participation in processes relating to offshore activity.
Cables (power and telecoms)	Minimal	Single industry report focused on economic value of power and telecommunications. Research linked to power cables from offshore wind.	Uncertain – likely to be through the planning framework.
Carbon Capture and Storage	Minimal	Technical feasibility as an emerging industry. Communications to promote public acceptance.	
Ports	Limited	Local community engagement. Limited evidence around the role of ports in connecting offshore industry and communities socially.	
Renewable energy, particularly offshore wind	Extensive	Dominated by visual and noise impacts, acceptability, willingness to pay, attitudes, and place attachment. Socio-economic value at range of scales, particularly community benefit schemes. Key knowledge gaps around social impacts and public participation in the processes persist over time. Requirements of EIA, namely local socio-economic impacts and sectoral interactions at sea.	Research into perceptions of decision-making processes. Decision-making processes somewhat compartmentalised to offshore and onshore with different public participation.
Cross-sector company level	Extensive	Alignment with non-financial reporting requirements and ESG pressures. Focus on workforce and supply chain impacts.	Stakeholder engagement frameworks prioritise financial relationships.

Recommendations

The evidence review has resulted in three core messages:

1) All people are a stakeholder in the management and exploitation of the marine environment, but coastal communities have a particular claim due to the geographical distribution of marine connected infrastructure and their direct cultural relationship with the sea. However, neither scale is currently well-served by centralised marine decision-making. Offshore development can and does impact coastal communities socially. More evidence is needed to interrogate the claims of community benefits and to identify or exclude potential social harms, and this must be place-based, recognising the important connection between the marine environment and coastal communities.
2) There is a need for a clearer terminology defining social factors and impacts to support communication and application of evidence. This will help develop standardisation that can be more readily taken up across sectors. This is particularly the case for defining stakeholders and what is meant by community, disaggregating between communities of geography, interest, and economics. It is easy to hide actual

practices behind these terms and good governance requires transparent processes and definitions to enable scrutiny, challenge and improvement.

3) The review found that benefit / social value are defined in very limited terms, primarily concerning job creation and GVA. Financial and economic impact and benefit are not the only impact and benefit. It is difficult to quantify and measure other kinds of impact and benefit, but distributive justice demands a more wide-reaching evaluation which embraces the full scope of the social impact assessment principles.

Additionally, a set of more detailed recommendations are proposed for research, regulation, and industry. The Crown Estate and other decision-makers are encouraged to consider these recommendations and how they might support their application.

Research gaps	**Location for more detail**
Systematic review is undertaken on a sector-by-sector basis with defined social impact assessment criteria and examining the pillars of social justice.	4.2.5
More research is needed to deliver better baseline data on actual social impacts experienced from existing marine developments, offshore and onshore elements, across the life-cycle, and with a wide understanding of the term social impacts and recognition of place-based impacts.	4.2.5
Offshore wind: Research into interactions between offshore wind and tourism/fishing should extend its reach into communities where these are a significant part of the economy and community identity.	4.2.5
All sectors: The evidence base for other marine sectors should be grown by building on the groundwork laid by the offshore wind sector.	4.2.5
To address evidence gaps, more research is needed on the social impacts of CCS, cables, aggregates and, across marine sectors, onshore infrastructure.	4.2.5
Research diversification from acceptability and attitudes into actual social impacts and how these relate to predictions, where these exist (e.g., work by Glasson) across sectors.	4.2.5
More replication of frameworks proposed to test their efficacy in practice.	4.2.5
Clarification and transparency of who stakeholders are (place, interest, demographic, other?), why they are selected, and who is not being recognised as a stakeholder.	4.2.5
Action research to develop good participatory governance methodologies.	4.2.5
Need for social baseline indicators which extend beyond socio-economic framings for example, values, place relationships, community cohesion.	4.2.5
Deeper insight is needed into how planning (marine and terrestrial) and EIA, as the key formal routes to development, integrate with governance at the community level.	4.2.5
Sector	
Aggregates: There is a need for baseline evidence about social impacts, positive or negative, of marine aggregate activity upon coastal	4.3.1

communities. This must extend to onshore infrastructure to give an holistic overview.	
Cables: There is a significant gap in the evidence surrounding social impacts of subsea cables. Viewing cables as a sector may support evidence-gathering and enable assessment of compounded impacts through concentrated geographical spread of landing points.	4.3.1
CCS: Although a focus on technical feasibility is unsurprising for an emerging industry, the CCS industry has the opportunity to innovate in social impact assessment by embedding holistic thinking at this early stage, building on evidence from the offshore wind sector.	4.3.1
Ports: Engagement with the port sector is needed to support holistic social impact assessment of marine industries.	4.3.1
Offshore wind/renewables: The more established offshore wind and renewable energy sectors can continue to lead in the social domain by applying the SIA principles and social justice, putting research evidence into practice.	4.3.1
All sectors: Strengthening motivation for Social Impact Assessment with connection across the scales of company performance and project basis.	4.3.2
All sectors: Regulation at national and international scale needs to incorporate stronger requirements on social impact assessment and mitigation of negative social impact, drawing on the IAIA principles.	4.3.2
Company level	
Research into gaps in how human rights legislation is responded to by the marine sector, with particular attention to the new recognition of participatory environmental rights.	4.3.2
Regulatory guidance for participatory human rights within ESG and non-financial reporting context.	4.3.2
Development of standards (or encouragement to adopt existing standards) on social impact assessment, as distinct from the solely positive framing of social value.	4.3.2
Impact Assessment methodology revisions	
Need for more detailed guidance on scoping social impact to redress existing power imbalances between stakeholders.	4.3.2
More holistic approach to offshore marine sector conflicts and impacts. E.g., how dispersed are the impacts of a newly closed fishing are; will some communities be particularly affected due to the fishing ground used by fishermen in their community; what will the scale of the fishing industry impact be for that community more widely.	4.3.2
Broaden the scale of visual impacts out from designated landscapes/environments/buildings/routes, by including targeted evidence gathering of what/where is valued/used by the communities and why, in addition to formally designated sites and routes. And extend beyond visual to less tangible changes to character and sense of place.	4.3.2
More interrogation of social impacts at sea, such as changing access to archaeological sites.	4.3.2
The focus of cumulative impact assessment should centre communities at a range of scales to examine not only the cumulative impacts of like-	4.3.2

developments, but other compounding factors influencing the community unit.	
Further research, particularly action research which occurs in practice, is required to develop an holistic and integrated ESIA framework for marine developments.	4.3.2
Recommendation: IAIA SIA principles should be used to inform impact assessment in practice.	5.1.4

TCE is encouraged to lead from the front by supporting the development of a community of practice on social impact assessment, across marine sectors.

Guide to the report

This is a wide-ranging review which covers multiple marine industries and engages with evidence from research and from practice. It will therefore be of interest to a wide range of sectors and professionals. Although the report is written with a view to being as accessible as possible, as an academic evidence review, it nonetheless contains detailed methodology and scientific concepts. This section is to help guide the reader in understanding and using the report.

Section 2: Setting the scene provides an overview of the purpose of the study, a brief introduction to the regulatory context The Crown Estate is working in and introduces social impact and the social justice pillars.

Section 3: Rationale and approach contains detail about how publications were identified and the search terms being used. Complete lists of the documents reviewed are in Appendices 2 and 2. Technical information about the use of software to analyse relationships in the academic literature can be found in Appendix 3.

Section 4: Evidence review findings presents all the results from this review. This is the most technical section but should be accessible for most readers. It is organised with an industry reader in mind, presenting a breakdown of findings by sector where applicable. 4.1 introduces and explains the section. 4.2 presents the analysis of the academic publications. 4.3 presents the analysis of the industry publications. Each recommendation is presented in this section alongside the findings to which it relates.

Section 5: Discussion and implications brings together all the findings and presents the answers to the research questions. This is the easiest way to capture an overview of the findings.

Section 6: Recommendations is a stand-alone section giving the recommendations, which are also presented above. These include numbers to the section where the findings are discussed that relate to each recommendation.

1. Project Vision

The Crown Estate is a national landowner, responsible for leasing the seabed of England, Wales and Northern Ireland for a range of marine industries with the purpose to create lasting and shared prosperity for the nation. It does this through three strategic objectives:

1) Be a leader in supporting the UK towards a net zero carbon and energy secure future.
2) Help create thriving communities and renew urban centres in London and across the UK.
3) Take a leading role in stewarding the UK's natural environment and biodiversity.

The Crown Estate has identified knowledge gaps that are important for sustainable seabed and foreshore management. Sustainability has three pillars – economic, environmental and social – which must all be considered and integrated into regulation and governance processes for marine sustainability.

There is currently little regulation for social impact assessment in the UK. In some marine sectors, such as offshore wind, standard practice tends to be limited to visual or noise impacts and socio-economic factors, particularly job creation and financial community benefits. These factors can be used to inform siting and development design, and to get local community consent, or social licence, for a development to go ahead. In other offshore marine sectors, such as aggregates or telecommunications cables, the impacts of the industry on coastal communities are often not recognised at all, with decision-making occurring at national and strategic levels that do not enable local community representation.

Coastal communities have particular connections to their local place and environment, which includes the coast and sea. These connections are composed of complex interactions between the natural and built environment; community cultures and traditions; employment, skills, and the local economy; and local infrastructure and public services. Often previously dismissed as NIMBYism (Not In My Back Yard), place relationships are becoming increasingly recognised for their complexity and importance for industrial development, particularly in rural and coastal places.

For coastal communities to thrive, a more holistic understanding is needed of how they are impacted by marine industries, including those considered to be too far away to have an impact. This means looking at the whole life of a development, from early strategic or local development of a plan, through operation, and into decommissioning. It also means recognising that a development and its infrastructure can physically and economically span an area that incorporates marine, coastal and terrestrial areas. This breadth of geography spans multiple decision-making authorities and processes through which there are very different opportunities and barriers for community engagement in and influence of the process. This is particularly acute for coastal communities, where national and strategic decision-making for offshore developments might only reach local communities via local planning consultation for associated onshore infrastructure, coming after the bulk of the development has already been decided.

This holistic consideration of social impact assessment can be approached through a framework of social justice, which has three pillars: recognition, representation and distribution. The definitions of these below are provided throughout the report to help the reader:

Recognition

Recognition refers to **who is identified as a stakeholder** and thus who has a say. As well as different groups of people, this includes the kinds of information, knowledge and evidence that is recognised as legitimate and taken into account in the decision-making process. **Stakeholder identification** fits into this pillar.

Representation

Also known as procedural justice, representation refers to **how stakeholders are involved** in a decision-making process. This includes formal and informal processes of engagement and consultation, the timing of involvement of different stakeholders, and how those engagements are used to inform and influence the decision. Formal and informal **stakeholder engagement** fits into this pillar.

Distribution

This is the fairness of how **benefits and costs** resulting from a decision are distributed. Although this might include adaptation and mitigation as well as changes to the plan, to be fair it is necessary to work with stakeholders to consider how the development affects different stakeholders differently and to ensure fairness.

It can be seen from these descriptions how each element informs the next and how a decision-making process which does not adequately consider each element risks an unjust outcome for some groups of people or being derailed entirely at a later stage of the development planning. The key to fair and just decision-making is to include people in the process through participatory governance from the earliest stage of gathering evidence, right through to the final decision.

To help the Crown Estate to understand its role in developing a just and participatory marine governance, it has commissioned this review of the evidence on how the marine activities which The Crown Estate interacts with have social impacts and value for coastal communities.

Image by Pamela Buchan

2. Setting the scene

Marine governance in the UK, like other parts of the world, is delivered through a complicated web of statutory and non-statutory agencies and organisations[1]. These include the Government, the Marine Management Organisation (MMO), The Crown Estate (TCE), Inshore Fisheries and Conservation Authorities (IFCAs), and Local Authorities (LAs). Each decision-making body has its own specific geographic and/or sectoral remit, and decision-making is conducted through a range of formal strategic, planning, licensing, permitting, and leasing processes.

TCE fits into the UK marine governance system as a seabed landowner, leasing the seabed in waters around England, Wales and Northern Ireland for offshore wind, tidal/wave energy, marine minerals, cables/pipelines, coastal management, and aquaculture. Carbon, Capture and storage (CCS) is joining the portfolio[a] as the industry develops (CCS) is expected to join the portfolio as the industry develops. For energy, minerals and cables in particular, the strategic oversight sits at national Government level, with other decision-making bodies engaged at specific stages as the plans develop towards implementation. The administrative boundaries of LA's are typically at mean low water, meaning that LA planning is often the end-point of offshore and coastal developments as their onshore infrastructure reaches communities in the places where they live, whilst strategic offshore development bypasses local planning completely, limiting opportunities for members of the public to participate in wider scheme decision-making[2,3]. For organisations operating at high levels of the process of marine development, such as TCE, it can be a challenge for decision-making processes to be sensitive to the impacts that coastal communities will feel once a project is operational.

2.1. Seabed leasing and processes

TCE's seabed leasing process is a core part of the governance system that enables marine developments to be established. TCE conducts a marine spatial planning process which considers both technical and environmental feasibility, to identify sites for marine development. TCE also has a statutory responsibility to undertake a plan level Habitat Regulation Assessment (HRA) of its seabed leasing activity. Using offshore wind as an example, the Government has a strategic objective to deliver up to 50GW of energy through offshore wind by 2030[4].

In 2022, TCE released its proposed methodology for Round 5 site selection of floating offshore wind in the Celtic Sea, providing 4.5GW. The process comprises of five stages:

1. Key resource area mapping – to identity areas where wind resources are feasible.
2. Feasible Area 'Exclusion Model' mapping – to identify areas with existing infrastructure, rights, policy or health and safety conflicts.
3. Practical Area 'Restrictions Model' mapping – to identify areas of 'soft constraints'.
4. Areas of Search – Feasible areas identified through the combination of steps 1-3 undergo more detailed consideration with inclusions of stakeholder engagement and internal expertise to produce the Areas of Search.

[a] https://www.thecrownestate.co.uk/news/landmark-agreement-provides-platform-for-delivery-of-major-carbon-store-in

5. Project Development Areas – Further stakeholder engagement and detailed considerations to identify the final sites to be included in the leasing offer. This stage includes statutory processes such as Habitats Regulation Assessment which consider environmental protections and impacts.

The TCE Round 5 Leasing (Box 1) is an example of the opportunity TCE has to use its seabed processes to influence financial and non-financial outcomes in awarding leasing rights. This recent leasing round has proven its ability for TCE to use its authority as a landowner to influence more conscious behaviour by a marine sector, whilst aligning to commitments of maximising its financial, social and environmental value nationally and locally.

Box 1 TCE Round 5 Leasing

In awarding seabed rights to suppliers and developers to develop, build and operate floating offshore wind farms in the Celtic Sea, TCE launched its seabed leasing Round 5 in December 2023. This process involves four separate stages to understand the suitability of developers to be allocated Project Development Areas. Questions in each stage investigate the position of the potential bidders in the offshore wind market, alongside their environmental, social, financial and technical eligibility and experience.

Specifically relevant to this research, is the Round 5 Invitation to Tender – Stage 1, which, within the broader technical criteria for developers, requested demonstration of commitment to social value as part of a successful application. Within their response, bidders were required to describe their detailed plans for delivering on topics of social value such as: apprenticeships, skills development, NEETs plan, community impact assessment and engagement plan, volunteering and a method statement for such delivery.

The Crown Estate (2023)[5]

However, it is clear that national policy is a significant and formative driver of how social value and impact are measured and weighted in this crucial bidding stage. For example, once awarded, the process for project development moves to the MMO from whom a licence must be obtained in order to install and operate energy generating stations, except for projects larger than 100MW where approval is at the level of the Secretary of State. An integral part of setting the scene for this study, is therefore the overarching UK marine policy set by national Government.

2.2. Marine Regulation and Planning in the UK

At the highest level, decisions in the UK that result in public spending and Regulatory Impact Assessments of new policy are based upon Social Cost Benefit / Effectiveness Analysis. An impact appraisal framework and indicative costs are laid out in HM Treasury's Green Book (2022)[5]. Through this process, social value and impact indicators such as water quality and noise are quantified into monetary value. For example, land-use value is considered to be a useful proxy for social value, and the physical health benefit from nature is priced between £3.36 and £14.34 per visit. The Green Book gives brief guidance on how non-monetisable social value can be incorporated into decision-making, and suggests multi-criterial decision analysis (MCDA) through facilitated workshopping with "top level decision makers, senior

experts and stakeholders". This process is thus focused on significant and strategic proposals.

The appraisal process notes place-based effects where alternative sites are considered and distributional effects, both recognising that decisions can impact different groups of people in different ways. However, it also states "*It is not proportionate to calculate all distributional effects. The appraisal method employed for considering distributional effects should be proportionate to the likely consequences for those affected*" [5], indicating a degree of pre-determination of impact by the knowledge and procedural culture of decision-makers, before stakeholders are engaged.

The influence of this framework is seen in the research and policy activities of UK marine governing bodies, for example in the MMO study[6] of social impacts and interactions between marine sectors. Although focused on sector interactions, the study recognises that these have direct and indirect social impacts outside of the interacting sectors. The study draws on the Green Book for definitions around employment, culture and community, and environment and health. The report also highlights key gaps in the literature and social impact assessment processes such as a lack of evidence post-development about what social impacts occurred, and narrow assessment scope, for example limited to job creation or loss without consideration of how livelihood changes impact people and communities in terms of social identity and ways of life.

In addition to the general impact assessment framework within the Green Book, UK marine decision-making falls under the overarching Marine Policy Statement (MPS)[7] which serves as the primary legislation for marine planning, with marine plans being established in English regions and the devolved nations. In England, Wales, and Northern Ireland, a Statement of Public Participation must be produced to indicate how marine plans will be developed. The MPS sets out a range of core objectives, of which some have specific relevance to this study:

- Ensuring a strong, healthy and just society
    a. Appreciation of marine diversity, seascapes, heritage and resources
    b. Societal benefit from marine use, resilient and cohesive communities, physical and mental wellbeing
    c. Equitable access to use and enjoy the coast, seas and their wide range of resources and assets, recognition of coastal identities in some communities
- Promoting good governance
    a. All those who have a stake in the marine environment have an input into associated decision-making
    b. Integrated coastal zone management
    c. Marine businesses regulation

In England, the MMO's Marine Plan Policy Assessment guidance[8] sets guidance for how marine plans should be considered in proposals. This outline guidance illustrates the policy focus on minimising conflict between sectors with MMO support given to proposals which do not interact with existing licenses or sites, for example aggregate extraction or aquaculture, avoid navigation routes, and minimise impacts on recreation and tourism. In contrast to these tangible policy statements, social benefits (knowledge, understanding, appreciation and enjoyment) are less clearly specified, and it is left to the developer to make the case for how public benefit trade-offs are managed.

Although the Welsh Marine Plan[9] has a strong narrative around societal benefit and economic, social, environmental and cultural wellbeing, it similarly is stronger on its support for developing marine sectors and a sustainable marine economy, than on social factors. Its governance criteria relate to cross-border/plan coordination and cumulative impacts, with no criteria about inclusive governance. Indeed, the Welsh Government has produced a comprehensive overview of marine governance[10] which makes no mention of participation by people or communities.

The Northern Ireland Marine Plan has yet to be formally adopted. Its Statement of Public Participation does not list relevant stakeholders, however the draft Marine Plan has a short list topped with statutory agencies and decision-makers, followed by business and industry, and with communities being listed as "other interested parties" (p18)[11].

Image by Kirsty Andrews/UPY 2022

2.3. Environmental and Social Impact Assessment

It is not only the public sector which has power in marine governance as public-private partnerships and wholly private sector projects often implement and deliver on national and local government strategy. Private marine developments are thus influenced by both general corporate regulation at the company level and specific project-scale regulation, such as the leasing processes of TCE described above and Environmental Impact Assessment (EIA).

In contrast to EIA which became embedded in regulation, Social Impact Assessment (SIA) became embedded into the landscape of Corporate Social Responsibility (CSR)[12]. CSR frameworks are typically at the corporate governance level and are focused on compliance with relevant financial and non-financial reporting requirements. In contrast, regulations and frameworks such as EIA, are responded to on a case-by-case project basis. Regulation therefore has a very important role both for the scoping, assessment, monitoring and

mitigation of social impacts in projects that involve private developers, and for the overarching values of those organisations.

Although beyond the scope of this report to explore the differing trajectories of EIA and SIA, it is important to note here that although not regulated in the same way as EIA, SIA has a core set of principles laid out by the International Association for Impact Assessment (IAIA)[13]. The core values clearly relate to the justice pillars and human rights as laid out above (see Box 2).

Box 2 The core values of SIA

1. There are fundamental human rights that are shared equally across cultures, and by males and females alike. *Distribution.*

2. There is a right to have those fundamental human rights protected by the rule of law, with justice applied equally and fairly to all, and available to all. *Distribution.*

3. People have a right to live and work in an environment which is conducive to good health and to a good quality of life and which enables the development of human and social potential. *Distribution.*

4. Social dimensions of the environment – specifically but not exclusively peace, the quality of social relationships, freedom from fear, and belongingness – are important aspects of people's health and quality of life. *Distribution.*

5. People have a right to be involved in the decision making about the planned interventions that will affect their lives. *Representation.*

6. Local knowledge and experience are valuable and can be used to enhance planned interventions. *Recognition.*

Adapted from International Association for Impact Assessment, 2003

The IAIA SIA Principles were set out to inform development of sector and national guidelines within EIA practice more generally[14]. The aim of the Principles was to support universal understanding of social impacts and practical application of assessment methods. The principles set out the definition of social impact which we adopt in this study, as follows[14]:

Changes (positive, negative or neutral) to one of more of:

- people's way of life – how they live, work, play and interact with one another on a day-to-day basis;
- their culture – their shared beliefs, customs, values and language or dialect;
- their community – its cohesion, stability, character, services and facilities;
- their political systems – the extent to which people are able to participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose;
- their environment – the quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resources;
- their health and wellbeing – health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity;

- their personal and property rights – particularly whether people are economically affected, or experience personal disadvantage which may include a violation of their civil liberties;
- their fears and aspirations – their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

This comprehensive approach to SIA diverges from typical contemporary practices of measuring social value which often seek to quantify in financial terms the social benefit of a project. It also differs from integrated water and coastal management approaches which seek to improve social welfare by solving water-related problems rather than to measure and mitigate the social impacts of plans, policies or projects[15]. Responding to the SIA principles requires not a calculation of the overall net value gain, but a nuanced understanding of the range and types of changes and processes in order to adapt the plan to maximise the positive impacts and minimise the negative ones. A participatory approach becomes a pre-requisite for best practice SIA in order to gather the right evidence and to reach equitable solutions to conflicts and trade-offs through the whole life of a development from planning to decommissioning. A key challenge is the relative lack of professional and policy expertise in understanding and implementing SIA[15].

Although this study looks at social impacts beyond just the offshore wind sector, there is a large body of established evidence relating to renewable energy technologies and offshore wind in particular. The current UK government has a target of 50GW of UK offshore wind by 2030[16]. Additionally, the UK Government seeks to reduce consenting time from four years to one[16], a sentiment echoed by the Labour Party[17]. Offshore wind therefore is a particularly important and urgent sector for this area of work. A review of the evidence around social impacts from renewable energy in general by Boudet[18] indicates how research has focused on public and social acceptance, producing evidence particularly about the influence of shared financial benefits of developments, attitudes, socio-demographics, noise and visual impacts, and how place relationships can influence acceptance. Additionally, the review indicates a persistently traditional approach to public engagement that resists devolution of decision-making and limits participation to reduce the power of oppositional voices. This study therefore will support marine industry and decision-making to widen the scope of SIA.

2.4. Social value, impact and justice

To deliver on its objectives of lasting and shared prosperity and thriving communities in the marine and coastal context, TCE is interested in better understanding the social value and social impacts of marine developments, and social justice in the context of the sustainable future the TCE wishes to play its part in delivering.

Within the energy sector, there is a keen interest in energy justice and what this looks like at different scales. This represents a spectrum of social impacts from the energy sector, reaching from national energy generation and distribution, through to individual household fuel poverty and associated health and wellbeing implications, with consideration about fair distribution of industrialisation and infrastructure within the energy network. Beyond the energy sector, there is increasing critical reflection of the rapid acceleration and expansion of

marine industries globally[19] and the ability of this blue growth to become to a sustainable and equitable blue economy which is sensitive to the impacts upon coastal communities[20].

Given the infinite range of potential impacts upon individuals, communities and society, it can be helpful to consider these as outcomes of decision-making processes which can be improved by making those processes more open, more inclusive and fairer. If the marine decision-making process is just, then the best outcome will be achieved. Understanding how just a process is can be helped by drawing on the three pillars of the justice framework: Recognition, Representation (also referred to as Procedural Participation), and Distribution (or sometimes Redistribution). These pillars of justice map conveniently to the three core pillars of human rights: Civil, Political, and Societal.

In simple terms, justice in marine decision-making will depend upon who is considered to be a relevant stakeholder; how and when they are able to participate in the process, formally and informally; and how fairly the positive and negative impacts of the decision are traded off. Examples for the marine planning context are given in Table 1.

Table 1 From Buchan et al., 2024[21]. Framing social impact, justice, and sustainability in marine decision-making. Categories and application to Marine Spatial Planning after Saunders et al., 2020[22]; rights framework after Marshall, 1950[23]; additional evidence from Buchan et al, 2023[24].

Recognition: socio-cultural diversity, group identity, rights, needs, livelihoods, lifestyles, and knowledge. **Civil rights:** Liberty, freedom of thought, property ownership, justice.
• Which groups / communities have claims to marine space and resources? • How are stakeholders differentiated in the process – statutory and non-statutory? • Are some stakeholders not recognised as legitimate, why? • What relevant legislation, policy, and court decisions might impact recognition? • Can excluded groups be better recognised to increase legitimacy, trust, compliance, system stability?
Representation: Who is included / excluded; how and when included in decision-making process. **Political rights**: Participation in the exercise of political power.
• How do procedures translate recognition into participation? • Do stakeholders know they are stakeholders and how do processes seek to maximise participation? • How does the decision-maker partner with other organisations to increase representation? • At what point are different stakeholders brought into the decision-making process and does this influence how able they are to influence the decision? • Is the scale of the decision-making process appropriate for the nature of the development, noting local processes are more accessible and visible? • Do processes seek to mitigate existing imbalances in distribution that alter the ability to be represented? • Have the environmental participatory rights of the Aarhus Convention[25] been considered? (Access to environmental information, participation in environmental decision-making, environmental justice.)
Distribution of goods and bads: Risks, benefits, pollutants, capacities, resource/experiential access. **Social rights**: Welfare, security, share in social heritage and standards of society.
• How equitable is the decision-making process and the outcome? (Equity acknowledges that individuals and social groups start from different places, histories, inheritances, social status, worldviews, social resources and capital, positions of discrimination, power, marginalization, advantage, and so on.) • Good marine governance means balancing planning outcomes fairly. • How are trade-off decisions made? • How are 'bads' mitigated or compensated against and how are affected groups prioritised in the process to ensure the mitigation is appropriate and adequate?

In onshore community renewable energy, social acceptance is found to decrease as the distance between the site and communities reduces, and when project decision-making and ownership are further away from the community[26]. This suggests a particular challenge in the marine context due to the distance between offshore sites and the coastal communities who might be impacted. It may be difficult to identity the coastal community culture, traditions and identities that are centred upon the marine environment, let alone quantify them in economic terms.

A key issue therefore is the disconnection of marine decision-making from individuals and communities[24] with the people who are the most interested and actively engaged in marine matters often having little influence. This may be related to the nature of how marine decisions are taken, who is actively encouraged to participate, and how connected the processes of marine decision-making are to local people. Marine citizenship, defined as exercising the right to participate in the transformation of the human-ocean relationship for sustainability[24], specifically articulates the environmental participatory rights enshrined in the Aarhus Convention[25] and the national legislation it informs, now recognised by the UN Human Rights Council[27]. These participatory rights seem to be less strongly enforced in the marine context, where offshore marine industry is often out of sight of coastal communities and the wider public. The processes of marine policy and strategic development, leasing, and licensing are often completed before coastal communities have had an opportunity to participate. By the time coastal communities begin to feel social impacts, there is no opportunity to change the plan or embed mitigation.

2.5. Filling the evidence gaps

The backdrop presented here sets the scene for the culture of decision-making in the UK, from which flow the various frameworks for decision-making by other bodies. The current national approach to social impacts prioritises quantitative economic measures of value, utilises monetary conversions, often derived from national contexts, is heavily influenced by ecological impacts due to the strength of the Environmental Impact Assessment legislation, and tends not to include communities or the general public in a meaningful way until the onshore elements are being delivered.

Various attempts have and are being made to strengthen how social impacts are understand, considered and mitigated in marine governance. For example, in 2023 the University of Exeter partnered with the Marine Management Organisation (MMO)[21] in a knowledge exchange project to consider social impacts within the context of marine planning Qualitative and quantitative evidence from academic investigations of social impacts, in marine sectors and more generally, is uncovering the complexity of social impact and challenging decision-makers to look more closely at justice and a just transition to our future green economy. In the UK, UKRI has initiated numerous interdisciplinary research funds focused on coastal community resilience in the context of climate change and there is increasing awareness that coastal communities face particular challenges from environmental change compounding existing socio-economic inequities[28].

TCE is sensitive to this growing awareness and its responsibility to coastal communities through its purpose and strategic objectives. This study has been commissioned alongside

others seeking to provide evidence to support TCE's ongoing ambition to create the world's most sustainable marine economy. The understanding that this work provides will be of benefit to TCE itself, its customers, and stakeholders of its marine and coastal portfolios. The study builds on past research, such as understanding the wellbeing impacts of offshore wind from the perspective of the five capitals – financial, manufacturing, human, social and natural[29]. It differs from the previous work in its cross-sector focus on social impacts.

This study specifically responds to the deficits in current social impact assessment and the call from communities, researchers, and decision-makers for clearer and more comprehensive methods of SIA. Although focused on the marine sectors and geography that TCE engages with, and the urgency of the growth in the offshore wind sector in particular, the research questions support review of evidence more widely to see what can be learnt from other sectors and countries **Table 2**.

Table 2 Research questions use in this evidence review.

Research theme	Research questions
Motivations and trends in social impact	Which types of organisation are measuring social impact and why?
	Are some marine sectors appearing more commonly in the industry and/or academic literature on social impact, and has this varied over time?
	Are there particular framings of social impact appearing in practice or research?
	Which social issues are highlighted as key concerns for specific sectors, and for the marine industry as a whole?
Social impact assessment tools	What metrics or frameworks are currently being applied in marine governance in practice in the UK?
	What metrics or frameworks are there within the academic literature, or international frameworks, that could be applied in practice?
Coastal community empowerment and participatory governance in the UK	Where there are active attempts to increase participation, who is being invited and/or participating and why?
	Are there evident missed opportunities for more participation in current practices?

Image by Pamela Buchan

3. Rationale and approach

This study is a form of scoping review, reviewing research and theory from academic publications, and social value and impact assessment practices in marine industry documented within industry literature. This approach also brings in the regulatory landscape for marine development. While it is never possible to identify and read all relevant literature, by drawing on both research and industry practice, it becomes possible to understand the landscape of social impact evidence. The findings in this report should be considered as a starting point for future research and practice change.

The aim of the evidence review was to map out current research and practices on social impact and its assessment in the marine space; the regulation that developers must comply with; their practices within and beyond compliance; and how different marine sectors

approach the issue of social impact. Through this, the opportunities and need for change in research, policy, and practice can be identified.

Summary of methodology (Figure 1):

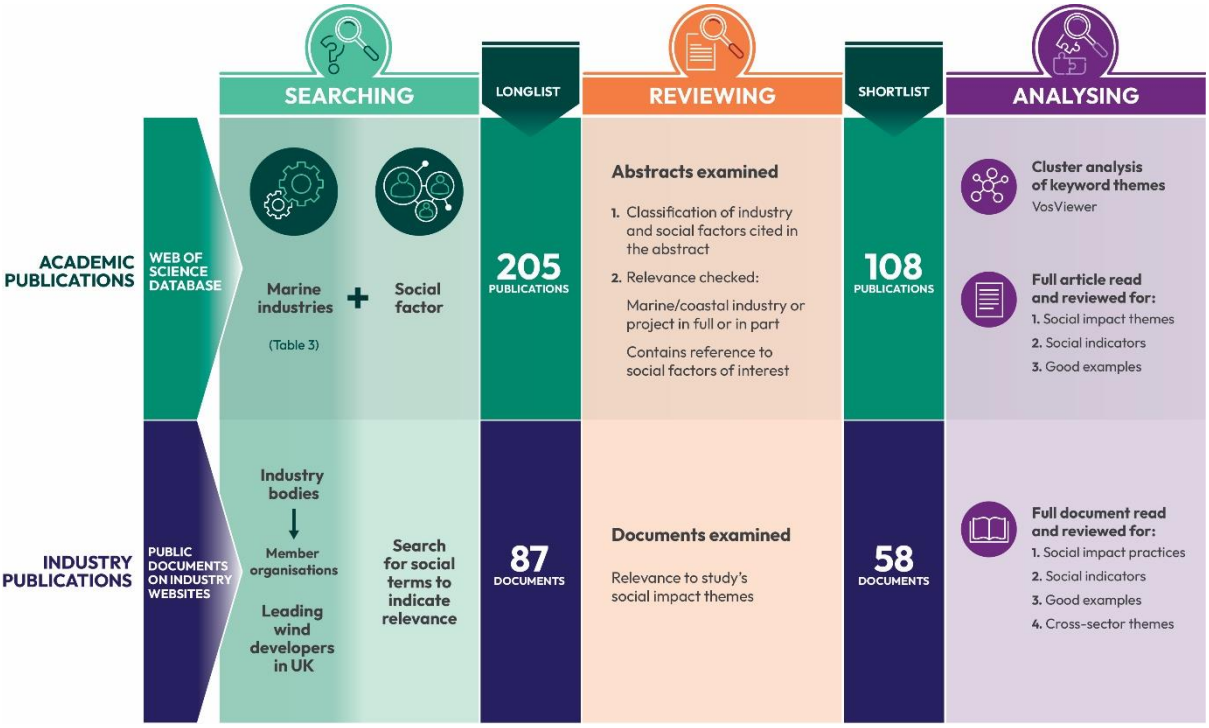


Figure 1 Summary of the research approach used in this study. Both academic and industry literature was reviewed in parallel to understand evidence on social impacts of marine industries and how evaluation and measurement of social impact is approached in research and practice.

3.1. Document identification and selection

3.1.1. Academic literature

Academic publications were sought that referred to social variables in the context of marine sectors. Academic literature was identified by strategic searching using all databases within the academic platform Web of Science. For practical purposes, only one database was drawn on for this study.

Scoping searches were used to first test the best search terms for social factors. These were conducted only with offshore wind as the marine industry, knowing there is a lot of academic research on this sector. Relevance of social factor search terms were predominantly tested against *offshore wind*, with those yielding the most relevant results then used alongside other marine sector terms, to create a longlist of literature. The key social terms deployed alongside other sectors were *social impact* and *community benefit*. However, where these did not create hits with a given marine sector, additional terms were used to try to identify articles.

The study searches were conducted in October and November 2023. A list of marine sectors and key social factor search terms was drawn up using the expertise of the research team in marine industry and social research (Table 3) and deployed using the standard search formula: (ALL=(*sector*)) AND ALL=(*social factor*). The hits from the searches therefore

contained both a marine sector and some form of social factor in their title, abstract or key words. Searches were conducted iteratively by sector, with additional social factor terms used where hits were few or none.

Table 3 Search terms used to identify literature relevant to the social impacts of marine developments.

Sectors	Social factors
foreshore	coastal communit*
interconnector AND landing AND points	community benefit
landing points AND cables	community value
landing points AND interconnectors	governance AND communit*
landfall points AND cables	local AND community AND social AND impact
landfall points AND interconnectors	place AND community
marine aggregates	social
marine AND industr*	social evaluation
marine cables	social impact
marine decommissioning	social impact assessment
marine dredging	social justice
marine energy	social outcomes
marine industries	social sustainability
marine industry	social value
marine interconnectors	
marine minerals	
marine telecommunications	
maritime industr*	
offshore infrastructure	
offshore wind	
oil and gas	
sand and gravel	
submarine cables	
subsea cables	
tidal energy	

Additional articles were added to the short list that were identified through other means, such academic IEA Task 28 publications on 'Social Science of Wind Energy Acceptance', where these hadn't been picked up in the literature searches. The final longlist had 205 articles. Articles without full text availability or English language were removed (four in total). The abstracts of the remaining 201 articles were examined for relevance.

The conditions for inclusion in the evidence analysis were:

1) Article refers to a TCE-relevant marine industry either in full or amongst other industries (e.g., comparison of onshore and offshore wind, or articles covering renewable energies generally but with specific mention of a marine or coastal form).
2) Contains reference to social factors of interest (e.g., justice, participatory governance, defining and measuring social impacts, inter alia).

Where relevance was still not clear from the abstract, the full text was briefly inspected. This process enabled simultaneous general categorisation of the articles according to social factors, marine industry, geography and elements of social justice (Table 4). The final short list for the evidence review contained 108 articles (Appendix 1).

Table 4 Thematic coding of the abstracts of 108 academic papers selected for review of evidence relating to social impact of marine industries at the local scale.

Abstract codes	**No. papers****
Social factors	
Acceptance/Objection/Social licence	48
Perceptions/Preferences	28
Values/cultural	9
Attitudes	21
Visual/noise	12
Engagement	18
Place (attachment, scale etc)	22
Benefit sharing	25
Socio-economic (including jobs)	28
Social sustainability (or general social elements)	11
Governance/processes:	
Justice	17
Reference to Marine Spatial Planning	9
Elements of planning	39
Reference to specific regulations/frameworks (Common Heritage of Mankind (CHM); EIA; SEA; NSIPs)	4
Stakeholders	
Communities – affected, coastal, local, indigenous, island, minority, schools	48
Sectors – tourism, fishing, traditional industries, sea users, general stakeholders, conflicts between	14
General – society/public, populations at different scale, and identification of stakeholders	19
Industries	
Offshore Wind (siting, operation, decommissioning, comparisons and conflicts with other marine industries etc)	66
Wave/tidal/Marine Renewable Energy*	13
Renewables generally	8
Marine Protected Areas	5
Mariculture/aquaculture/seaweed farming	4
Deep Sea Mining	3
Oil & Gas	3
Cables	3
Aggregates	1
Dredging	1
Man-made marine structures	2
Carbon Capture and Storage	2
Desalination	1
Floating solar	1
Water resource management	1
Notes *MRE primarily used for tidal/wind but sometimes includes offshore wind. **Single papers may cover more than one industry/factor.	

3.1.2. Industry literature, regulations, and policies

To inform understanding of the industry literature, internet searches were undertaken to identify **relevant regulation and policy** within England, Wales and Northern Ireland.

Regulations and policies broadly fell into three categories: 1) National procedures (UK, England, Wales, Northern Ireland) for marine planning and spatial analysis of marine resources; 2) National procedures for leasing/licensing/consenting at project level including impact assessment; 3) International guidelines and frameworks for companies relating to social sustainability, largely identified through reference within other documents and informed by previous research into board engagement with company sustainability[30]. The intention was not to map the full regulatory landscape, but to understand where TCE could influence the process and the kinds of pressures and compliance expectations that different sectors within the marine economy are subjected to.

In addition to documents provided by TCE, the industry literature was identified by directly targeting **key industry bodies and their relevant members** from across marine industries relevant to TCE. Where there were large numbers of reports, for example through BMAPA, these were searched for the following keywords to screen for initial relevance: *Social; Impact; Communit*; Participat*; Stakeholder; Public*.

Additionally, a set of **leading marine developers active in the UK** were identified through the expertise of the research team, which were centred around offshore wind. Developer websites were then searched for publications that might be relevant to the research area. This process yielded a variety of documents including annual reports, stakeholder and sustainability strategies and policies, scoping and project development reports, and research reports.

There were 87 documents included in the long list of industry literature. To be included in the shortlist, publications had to meet all the following criteria:

1) Publicly available report;
2) Offshore wind developer active in UK or marine industry body and their member companies;
3) Keyword search highlighted relevance;
4) Most recent version of the report (e.g., annual report, sustainability report) to capture the most up to date practices and compliance.

The final set of documents numbered 58. The full list of documents reviewed can be found in Appendix 2.

3.2. Analysis

Qualitative review of both academic and industry literature was conducted according to the following categories:

- Social impact practices/research
    - Motivations for social impact assessment
    - Practices in social impact assessment
    - Any social impact assessment frameworks, guidelines, regulation, methodologies cited in the document
    - What specific factors were measured
- Social justice dimensions
    - Recognition: what groups and stakeholders are mentioned.

- Procedurality/representation: how are those stakeholders participating in the research/project and differences in participation between named groups.
- Distribution: what is the narrative around distribution in terms of what is distributed (e.g., financial benefit), how and to whom.

The methods of analysis for the academic and industry literature were different due to analytical tools being only available for academic literature, and the different contributions the two literature collections each made to the overall research questions (repeat of Table 2):

Research theme	Research questions
Motivations and trends in social impact	Which types of organisation are measuring social impact and why?
	Are some marine sectors appearing more commonly in the industry and/or academic literature on social impact, and has this varied over time?
	Are there particular framings of social impact appearing in practice or research?
	Which social issues are highlighted as key concerns for specific sectors, and for the marine industry as a whole?
Social impact assessment tools	What metrics or frameworks are currently being applied in marine governance in practice in the UK?
	What metrics or frameworks are there within the academic literature, or international frameworks, that could be applied in practice?
Coastal community empowerment and participatory governance in the UK	Where there are active attempts to increase participation, who is being invited and/or participating and why?
	Are there evident missed opportunities for more participation in current practices?

3.2.1. Academic literature

The review of the shortlisted academic literature was focused on understanding the breadth of research into marine social impact assessment and practices through which could be identified: i) evidence related to social impacts as the consequence of relevant marine industries; ii) trends in practices and research; and iii) best practices in what factors of social impact should be measured and methodologies for measuring them.

The 108 shortlisted academic papers were analysed as follows:

1. Web of Science's built in analysis was used to understand publication trends such as country and discipline.
2. VosViewer, a programme which statistically analyses relationships between key words, was used to understand key themes across the shortlisted publications (see Appendix 3 for methodology).
3. The 108 papers were then briefly read to identify frameworks and metrics for social impact assessment and specific social dimension variables being investigated; and to give a broad overview of the shortlisted articles giving more depth and context to the cluster analysis.

3.2.2. Industry literature

The 58 documents comprising the industry literature was then reviewed to understand: i) how marine industries approach the issue of social impact within and between industries and across scales; ii) the relationship between these approaches and regulation; and iii) the commonalities and differences between practice and research. Additionally, the industry literature was searched for case studies of social impact assessment in practice.

Image by Ben Barden Photography Ltd.

4. Evidence review findings

4.1. Introduction to the findings

This section presents the findings of the evidence of review. It is divided into two key sections, reflecting the two different approaches to the academic and industry literature collections. The core purpose of this section is to bring out patterns and trends in research and industry practice, highlight gaps, and map the social justice pillars onto the evidence to help explain them and highlight areas for development.

4.2 presents an overview of evidence from the academic literature. This includes trends in publication and keywords (4.2.1); findings from the cluster analysis and how the research themes relate to individual marine industries (4.2.2); social impact assessment frameworks and metrics used in research (4.2.3); and how social justice pillars and participatory decision-making are presented in research (4.2.4). 4.2.5 gives an overview of the key findings. This section might be of particular interest to researchers, consultants, and companies who are interested in discovering what can be learnt from academic research. It also points to some key gaps in research by sector and by types of social impact.

0 presents the evidence from the industry literature. Here the findings are organized with marine sectors in mind. 4.3.1 organises the evidence on social impact assessment according to key sectors. 4.3.2 shares evidence on motivations for SIA, and the standards, regulations and measurement approaches at company and project scales, with a particular focus on the role of Environmental Impact Assessment. In 4.3.3, the industry evidence is described as it relates to the social justice pillars. Finally, key findings from the industry literature are shared in 4.3.4. This section will be of particular interest to companies who wish to see how their sector is addressing this issue and compare it to others. It also gives insight into how justice is being thought about in the private sector. It also will be thought-provoking for consultants in impact assessment, policy-makers and researchers.

Section 0 brings together the findings presented in this section to respond directly to the research questions set out in this report.

4.2. Social impact assessment in research

4.2.1. General academic themes[b]

Publication trends

The academic research into social impacts of marine industry is showing rapid growth in publication and citation number in recent years (Figure 2) and is dominated by technical and environmental approaches. The majority of the analysed publications are from within *environment sciences and ecology* research area (60%), with *energy fuels* (24%) and *science technology* (18%) also prominent. *Geography*, *social sciences* and *psychology* are less represented (12% collectively). The UK (38%) and USA (29%) dominate publication origin. Analysis of study location from the abstracts shows that out of 32 identifiable

[b] Certain data included herein are derived from Clarivate™ (Web of Science™) and Clarivate *InCites*. © Clarivate 2023. All rights reserved.

countries/regions/continents, 18 only appear once, whilst there are 26 studies based in the USA and 22 in the UK.

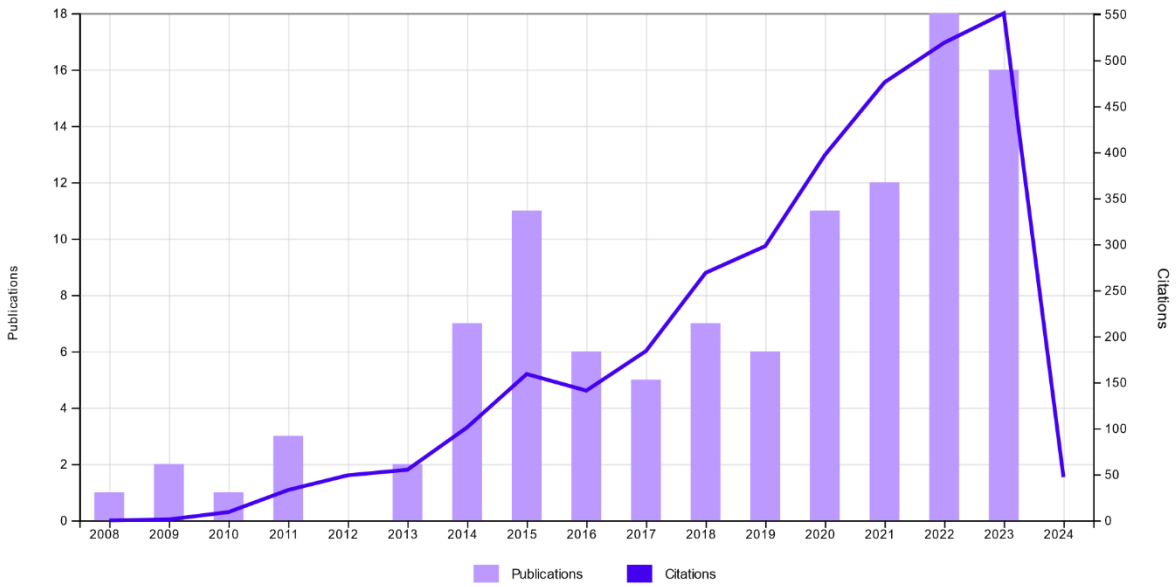


Figure 2 Publication and citation number by year for 108 academic publications relating to social impacts of marine industries. Citation Report graphic is derived from Clarivate *Web of Science*, Copyright Clarivate 2023. All rights reserved.

Of interest, and pertinent to corporate focus, where Sustainability Development Goals (SDGs) were mentioned, these were as follows:

70

17

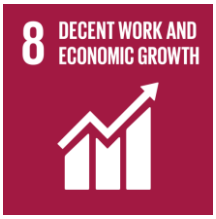
16

9

3

2

2



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Keyword consistency

There is variable consistency in terminology across the range of marine industries and factors[c]. For example, fisheries and wind energy have much less variation in the number of keywords than do wave and tidal energy. Similarly, acceptance has less variation amongst keyword choice than do social factors and impact assessment, and justice and trust themes. Although this interpretation should be taken with some caution due to the method of classification and the wide variation in publications across the themes, the data suggest that more mature areas of research have greater consistency in use of language with shared use of common keywords. The social factors theme is notable in having a different keyword for almost every occurrence. It is difficult to interpret this conclusively, but it is likely to be a reflection of a wider variety of disciplinary approaches to social research; the breath of social factors available for investigation; and the juvenility of research into social factors related to the marine industries this study focuses on.

4.2.2. Marine industries and their social impacts – research trends

Academic publication keywords were analysed to examine at a high level how marine industries and topics are being investigated in research. VOSviewer was used to cluster the keyword themes according to their association with one another. Table 5 lays out the clustering of keywords with each cluster named according to the themes it contains. These factors are presented in a visual map in Figure 3, which shows the total strength of links between keywords, and **Figure 4**, which indicates the density of the themes organised by cluster.

The following findings demonstrate that the energy sector dominates research interest in the marine context. The least common energy forms are also the least researched and the siting of each energy type in relation to coastal communities is relevant as to what is researched. Newer marine industries and those least visible from land have much more limited social research than do more mature and coastal industries.

There are dominant areas of research focus for specific industries. Tidal and wave energy and CCS associate most with information and communication themes; Oil & gas with economic impacts, siting issues and management; and aggregates and ports/shipping with environmental impacts. Place factors are dominant in general energy research and for offshore wind, together with attitudes and acceptance. There is an intersection between community stakeholders, marine conservation, and those industries often associated with coastal communities – fishing, aqua- and mariculture, and tourism.

Social impact assessment specifically groups with nuclear and deep-sea mining, which might be considered more socially controversial industries. Whilst the social factors of benefits and justice do not associate with any specific marine industry.

[c] See Appendix 4 for data illustrating consistency of keyword terms.

Table 5 Clustering of association between author keywords and Clarivate's Keyword Plus from 108 relevant academic publications. Analysis was conducted using VOSviewer. Cluster heading colour matches cluster colour in Figure 3 to help relate the two diagrams. Keyword themes are organised into overarching categories to help interpretation of the clusters. The number in brackets is the total link strength for each theme; a higher number means a stronger link which comes from the keywords appearing frequently with others in the cluster. The cluster numbers 1-9 do not indicate any kind of rank.

Theme categories (No. of articles in cluster by author keyword)	**Industries and energy**	**Management, procedure, and governance**	**Impact assessment**	**Social**	**Environment and ecology**	**Stakeholders**	**Place**
Cluster 1 Industry interactions	Marine energy theme (111) Marine structures (42) Oil gas fossil fuels (43) Life cycle (29) Energy – salt gradient (13) Solar energy (12) Offshore – general (4)	Management of marine resources (182) Sector conflicts and colocation (44) SES (social-ecological systems) and ecosystem services (24)	Economic factors (39)				
Cluster 2 Environment impact	Aggregates (5) Ports and shipping (5)		Impacts unspecified (124) Impacts and their assessment – environmental (99) Sustainability – general (41) Impacts and their assessment – economic (34)		Marine biodiversity, ecology, ecosystem and species (97)		
Cluster 3 Ecosystem services	Fisheries industry (81) Tourism industry (59) Aquaculture & mariculture (44) Marine industry and economy (23) Diving (8)				Marine protection conservation (59)	Community stakeholders (121)	
Cluster 4 Emerging energy	Energy – tidal (69) Energy – wave (43) CCS (carbon capture storage) (23)	Information, knowledge and communication (65)	Assessment unspecified (41) Impacts – visual (36)				

Cluster 5 Energy acceptance and attitudes	Energy theme (395) Wind energy – offshore (364) Cables (4)			Attitudes theme (369) Acceptance, opposition and social licence (345)			Place factors (188)
Cluster 6 Wind and planning	Wind energy – general (269) Wind energy – onshore (11)	MSP (marine spatial planning) and planning (110) Decision making processes (69) Siting (53)			Environment general (18)		
Cluster 7 Governance, stakeholders and SIA	Nuclear energy (6) DSM (deep sea mining inc. seabed mining) (4)	Governance theme (207)	Impacts and their assessment – social (88)			Stakeholders, engagement, and participation (200)	
Cluster 8 Social justice	Infrastructure – onshore (2)	Justice and trust (167)		Social factors (199)			
Cluster 9 Benefits				Benefits (48)			

Figure 3 The keywords of a set of academic publications focused on social impacts associated with marine industries were analysed using the programme VOSviewer. After grouping similar keywords into themes, the programme analyses the relationships between each theme to produce a diagram of association. The diagram represents total link strength.

Lines represent association between keywords.
Node size indicates how common the theme is. The larger the node, the more articles there are featuring this theme.
Colours represent clusters of themes that are most closely associated together.

Note: The labels for some of the weakest themes do not appear in this image, though their nodes do.

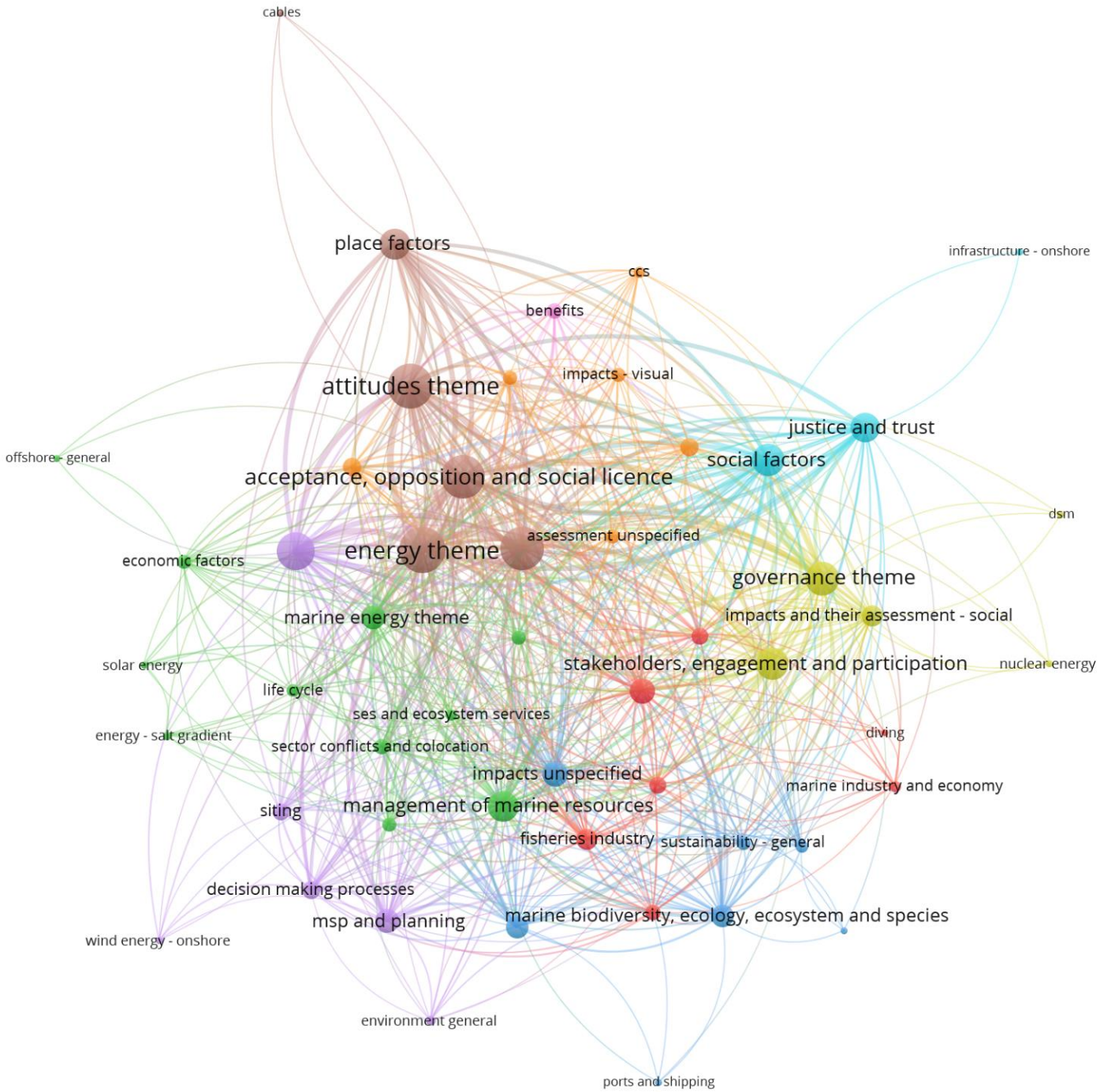

Figure 4 Total link strength density of themes in the academic literature. Bigger and more intense colour areas indicate higher density, which means higher use of these keywords and in relation to one another.

Each cluster from the analysis is now discussed in more detail:

Cluster 1: Industry interactions is primarily focused on general marine industry interactions. A range of industries and associated structures are associated, particularly, general marine energy, marine structures, and **Oil & Gas**. **Solar** and **Salt-gradient energy** are also in this cluster. This broad marine industry cluster associates with marine resource management, sector interactions, and economic factors. Though this is a broad and dominant cluster, there are no specific environmental, social or place themes, with these being subsumed into broader management and systems thinking. This cluster appears technologically and spatially focused.

Cluster 2: Environment impact centres around environmental and economic impact assessment, bringing economic, environmental and general impact assessment together with themes relating to marine wildlife and conservation. It is notable that the strength of economic impact assessment is reduced compared to environmental and sustainability themes. The cluster draws in **aggregates** and **ports/shipping** though these are minor parts of the cluster due to lack of articles. Despite extensive targeted literature searching for the aggregate sector, there was only one study, concerned with sand extraction in Asia. It is difficult therefore to understand what the social implications of aggregate extraction in UK waters might be due, but evident that there is a need to fill this gap in the literature.

Cluster 3: Ecosystem services unites key community relevant marine industries, **fishing**, **tourism**, and **aquaculture/mariculture**, with community stakeholders and marine conservation. The community stakeholder theme comprises named public communities such as coastal communities, local residents, Indigenous peoples, and communities comprised of key demographics. This cluster can be seen as the coastal interface, where marine industry meets people, and highlights that this is primarily understood through the lens of interaction with natural resource dependent industries and communities via impacts upon marine biodiversity and habitats. None of these industries was sought for in the search criteria, demonstrating how community-focused marine research is dominated by these industries, and how research centres these industries in investigating impacts from other marine activities. Beyond the articles included in this analysis, there is a very large body of literature from the UK and globally relating specifically to fishers and the fishing industry. Considering **mariculture** specifically as a TCE industry, there is only one article on seaweed farming[31]. This study is concerned with legitimacy in decision-making processes to develop social licence to operate.

Cluster 4: Emerging energy demonstrates the research focus for the more emerging marine renewable energy (MRE) sectors of **tidal and wave energy** and **carbon capture and storage (CCS)**. These are most closely associated with information, knowledge and communication, which is logical for new and less well understood technologies. The clustering suggests impact research into these industries is more general, and often concerned with visual impact. There are no governance, social factors, nor place themes in this cluster suggesting limited engagement in the literature with the social justice context. The single article solely on **CCS** comes from Japan and is however strongly focused on social impact assessment reflecting strong community connection to the marine environment in the case study site[32]. The **MRE** literature is larger and fairly diverse, influenced somewhat by whether MRE is present or not in the country of study. Where there is no MRE, studies are concerned with feasibility and

potential environmental impacts (noting here the social criteria for literature selection). Other studies are concerned with community benefit schemes (CBS) and primarily these have **offshore wind** included in their analysis.

Cluster 5: Energy acceptance and attitudes represents the great breath of **offshore wind energy** research within the wider energy literature, and its strong focus on acceptance and attitudes/perception/values/beliefs. **Cables** cluster here due to the research being solely in connection to power transmission rather than telecommunications. There is a clear gap in research investigating social impact and value of subsea cables, this is also reflected in the limited availability of industry literature for this sector. Place factors associate in this cluster, reflecting how place attachment research has developed around onshore and offshore wind energy siting. Around half of the literature analysed features **offshore wind** either solely or in combination with other marine industries. This is certainly the most advanced sector for consideration of social impacts. There is a mixture of literature investigating general perceptions of offshore wind (often in comparison to onshore) in the general public or smaller communities, and perceptions and experiences of planned or delivered projects within local communities or stakeholder groups, including CBS and place factors. Much of this research is aimed at understanding acceptability. However, there are also case studies which dig deep into public participation in decision-making and other governance features, giving insight into the effectiveness of engagement methods. This is discussed in more detail in the Social Justice section.

Cluster 6: Wind and planning brings together general **wind energy** research with siting and marine decision-making, primarily through planning. The association with planning recognises the key formal role it plays as a decision-making vehicle for marine and terrestrial development, particularly for spatial allocation. It is interesting however that marine decision-making and planning do not cluster with stakeholder or governance themes.

Cluster 7: Governance, stakeholders and SIA encompasses key social themes of interest to this study. These associations suggest that there is integration between who and how in social impact research, and that this is an issue with which governance is concerned. **Deep Sea Mining (DSM)** and **nuclear** are included here but are very minor features of this cluster, though notable as industries that can be controversial. Three articles were concerned with deep sea mining from an international perspective. There is a significant body of DSM research which is strongly concerned with justice, as an activity most likely to occur in areas beyond national jurisdiction. However, as this was not a target industry only three papers were included due to their particular relevance to the community scale.

Cluster 8: Social justice is another key group for the social impact and value of interest in this study bringing together justice and the very mixed grouping of social factors. Importantly, it did not contain any specific industry, but from Figure 3 can be seen to associate with a wide set of other themes including most energy sectors, fishing and aquaculture. Although a very small factor within the literature analysed, indicating a key research gap, **onshore infrastructure** clusters here. It should be expected that these social themes are cross-sectorally associated, but it is notable that justice and social factors did not associate with **aggregates, cables**, **CCS, salt-gradient energy** or **solar energy**.

Cluster 9: Benefits contains only this single factor. This might suggest that benefits are more evenly spread through the literature analysed and therefore links are not dominated by

associations with other themes. However, the benefits theme in fact only associated with **energy** and **wind** themes, and **aquaculture/mariculture,** and therefore is not well spread across marine sectors. This can be interpreted rather as a discrete area of research which is clearly defined in terms of keywords and focus.

4.2.3. Frameworks and metrics in academic research

One of the study's research questions was: *What metrics or frameworks are there within the academic literature, or international frameworks, that could be applied in practice?* While it is beyond the scope of this study to describe and evaluate the myriad frameworks and methodological approaches, here is provided an overview of the use of frameworks and variables included in the academic studies reviewed.

Frameworks

The literature demonstrated a wide range of approaches in tackling the challenge of marine social impact. A number of novel frameworks or specific metrics were used without particular repetition across the literature. These include:

- Social Licence to Operate and Action Situations[33]
- Local place attachment metric[34]
- World Bank poverty framework[35]
- Social amplification of risk framework (SARF) – to bring social science into risk research[36]
- Social construction of technology (SCOT)[37]
- Post-Normal Science framing for MSP[38]
- The Gini coefficient[39]
- Integrated Assessment using United Nations definition[40]

Surprisingly, only five articles explicitly referred to Social Impact Assessment (SIA), which were either recognising the IAIA principles[13,15,32,41], or novel frameworks devised by the author included above.

Five articles directly referred to Environmental Impact Assessment or Strategic Environmental Assessment. This was typically in reference to citizens using these formal processes as a means of participation in marine decision-making. However, it should be noted that this was primarily to express concern about environmental impact, for example for environmental rights of Indigenous peoples[42,43]. Related to this, three articles drew on Social-Ecological Systems models and frameworks for integrating ecological and social factors.[44–46]. These were not standardised frameworks with practical application potential.

A number of researchers developed novel frameworks bringing together various collections of variables often from across economic, environmental, social and governance dimensions:

- Meaningful Marine Renewable Energy (MRE) Development Framework, integrating social justice with Social Life Cycle Assessment and Social Framework for Projects to create a novel assessment protocol for marine renewable energies[47].
- The Cooperative Participatory Evaluation of Renewable Technologies on Ecosystem Services (CORPORATES) applying a post-Normal Science framing for MSP[38].

- Drivers – Activities – Pressures – State Changes – Impacts (on human Welfare) – Responses (DAPSI(W)R) framework, for future decommissioning of offshore wind farms[48].
- Integrated framework of use, community and environmental values for informing policy-making [49].

Overall, there was a lack of consistency and replication in approach to frameworks for social impact assessment. For this reason, the individual variables used in the literature were collated.

Assessment Variables

Baselines and factual variables

Reflecting the breadth of articles included in this review, a wide range of factual data are collected to enable baselines with which to measure change against, or to assess differences in impact between. For example:

- Demographics – age, sex/gender, educational level/type, income, voting/politics, income, poverty, social security receipt/welfare programme, property, location ownership/status, population dynamics
- Employment – status, occupation, within specific sectors, place of work, connection to specific project/company, community industry/employment profile
- Wellbeing measures – life satisfaction, happiness, anxiety, feeling worthwhile
- Social capital – volunteering, community cohesion
- Intersection between industry and nature: (tourism and natural assets)
- Spatiality and occurrence of human economic activities (for MSP)

Some studies investigated community knowledge about local ecology and change, general knowledge about marine sectors and their impacts, and marine governance procedures, such as siting. They also sought to assess project specific awareness and knowledge. A few studies investigated behaviours and actions taken by residents including knowledge acquisition, action based on support/opposition, and experiences or leisure activities in the locality. Overall, where social factors were being measured as a baseline they tended to relate to the individual scale (e.g., wellbeing) and did not often focus on the community scale (i.e., social capital).

Economic/Socio-economic

In terms of measuring actual economic impacts (or forecasting them), there was only a limited range of variables concerning the local community which included: jobs (creation/change, direct/indirect/induced); community investment; property valuation; GVA; cost of electricity locally; and cost to taxpayer locally. More generally at sector-level, assessments also measured government consumption and exports; household consumption expenditures, government expenditures; investments to the production side of GDP; and positive indirect economic impact on sectors. These were typically embedded into models and metrics. For example, two articles made use of Input-Output models to calculate potential economic impact[50,51]. Mathematical modelling was also used for a novel social equity score, linking together socio-economic factors such as access to energy, health, employment and environmental improvement[39].

Studies also examined Community Benefit Schemes (CBS) specifically, in terms of both application and investigating preferences amongst communities and stakeholder groups. CBS variables broadly group as follows:

- Community financial benefits – shares/revenue, energy discounts, and community funds; and how these were distributed across the community or specific groupings
- Infrastructure development – such as tourist facilities or fibreoptic installations
- Energy supply coming from the new installation
- Community ownership of the project
- Training and education
- Supply chain
- Governance of community benefit arrangements through agreements

The literature included interesting analyses of CBS through the lens of social justice. Boomsma et al.[3] conducted a literature review specifically of community benefit and compensation schemes with a view to understanding their potential application to CCS. The authors stated a need for recognition of community values and impacts; community representation through meaningful participation; and fair distribution to ensure economic legitimacy and secure social licence. However, in order to achieve this, community must be first be defined. The authors identified community of place, which is not homogenous; of interest, which may not be co-located; and of impact, where impact is also not homogenous.

Johnson et al.[2] drew a comparison between contemporary MRE and oil development in Scotland in the 1970s. In the latter, local authorities were given special powers to enable more local control over financial distribution and inshore waters to 12nm. The authors considered the technical and political nature in which MRE industries are being established, and their centralised control, will make local distributive justice more difficult to achieve.

Finally, Rudolph et al.[52] identified a relationship in the wind sector between the motivation for community benefit, the beneficiaries, and the understanding of impact. For example, communities of locality being recognised as the host of the project (recognitional justice) connected with the developer as a 'good neighbour'. Compensation approaches were aimed at accounting for specific negative impacts on impacted or affected communities. Where CBS was motivated for creating positive perceptions of the developer or project, CBS was more spatially detached with a wide range of beneficiaries. This latter case more clearly associates with corporate social sustainability approaches discussed in Section 0. Where Contracts for Difference is driven by cheapest price, this might dissuade strong and just approaches to CBS.

In addition to impact assessment and CBS, there were a large range of variables related to economic impact in the studies of attitudes and acceptance. Primarily, perceptions were investigated about local socio-economic risks and negative impacts – such as workforce skills, tax, potential harmful impacts on the local economy and local sectors, electricity costs and reliability, and potential impacts on local infrastructure resilience. Also, about potential socio-economic benefits, including various CBS options, project ownership models, and infrastructure development.

Fundamentally, the economic approach underpinning many studies focused on acceptance of a development or industry sector and how economic factors influence, for example,

perceived risk of property devaluation. Typically, this was seen in the use of willingness to pay methodologies. Various studies incorporated choice experiments with the limitation that often the choices are identified via literature review, resulting in amplification of commonly researched themes. In some studies, there was an interest in grouping people by place or demographics, for the purpose of predicting attitudes and acceptability or to inform or streamline communication and engagement strategies[53,54]. But studies show that different divisions (geography, sector, stakeholder group etc) show different preferences (e.g.,[55]), so such segmentation is a risky shortcut. Given the breadth of other variables influencing attitudes and perceptions, this might be considered too narrow to be reliable.

Place

Studies used place metrics to investigate local place attachment and place identity (local or other scales) and investigated place factors as variables that influenced attitudes[56–58] or acceptance[56]. For example, the influence of location on attitudes through regional identity[59] and place attachment[57]. Additionally, some studies sought to understand places themselves and how their characteristics influenced attitudes. Such place identifications included symbolic meanings of place[57], aesthetics[56], and characteristics affecting choice to live in a place[60].

One interesting study investigated how perceptions of place as industrial or natural influenced attitudes towards wind siting in the Channel Islands [34]. Here, more industrialised locations were viewed more positively for offshore wind by those who didn't live there, but for those who did, there was a risk of distributional injustice, with heavy industry becoming concentrated in one location. Similarly, a study in North Wales compared the attitudes of two different town communities facing the same offshore wind farm, finding considerable variation in acceptance and attitudes towards it that were linked to the socio-economic, community and environmental context of each town[57].

A common place factor in the literature was visual impact and attitudes about scenic amenity. This was approached both socially, in terms of perceptions of impacts, sometimes using computer generated images to convey potential view[61], and mathematically with calculations of turbines height, density, distances etc[61,62].

Social

Actual social impacts, beyond socio-economic factors discussed in the Economic section, were not much assessed. Where they were they related to the following:

- Landscape – identity, religious/cultural/spiritual value, landscape quality, view
- Human wellbeing – health, safety, human rights, working conditions and job quality, quality of residential life, poverty, livelihoods
- Company sustainability

The majority of studies were concerned with measuring attitudes and perceptions with a view to understanding how to increase acceptability of projects. Although some studies looked more widely at public narratives around developments, primarily attitudes and acceptance were conducted on local communities or the general public depending upon whether the study was considering a project or sector. Such studies at the community scale are mostly applicable to the siting stage, whilst those at the sector/national scale are geared towards

how well received a certain industry might be. There is a well-known gap between local siting acceptability and general acceptability of wind energy. Attitudes and acceptance were considered according to their direction and intensity, together with general emotional responses, and general values and beliefs. A large range of different variables are used in these studies.

Environmental attitudes were assessed to understand how acceptance and attitudes towards a sector or project are influenced by how people relate to the local environment, their general environmental and climate change beliefs, and their opinions of specific marine environments of wildlife. Additionally, concerns and beliefs about pollution and other environmental impacts were considered for both ecosystem and human health, including noise and air quality.

Unsurprisingly, given the set of articles investigated, attitudes towards energy were a prominent field of research. A range of studies prospectively investigating new energy forms in a given nation and those looking across energy forms, surveyed general attitudes around specific energy types, energy independence and policy, siting preferences, and current energy system. Studies more focused on case studies investigated attitudes towards energy siting, transmission, and power cables, together with perceived risk of impacts.

Case studies considered a wide range of attitudes towards the specific project. More qualitative studies asked generally about perceived benefits, impacts or threats, and these were often according to specific stakeholder groups or in relation to other marine industries that the project might have interaction with, and how the project would influence local community reputation. Blending into governance themes, factors of procedure were sometimes investigated, including trust in the developer, perceptions on how the project is delivering on aspirations, potential benefit for future generations, interpretations of the project outcomes, and perceptions about community participation in the process.

Governance

The governance theme can be broadly consolidated into governance procedures, perceptions of governance, and participatory actions by research respondents. At the highest level, the literature gives critical consideration to marine legislation, such as the Law of the Sea[63], and how existing procedures (namely EIA and MSP) might be improved. There are reflections, within case studies in particular, about governance and management of different scales of social conflicts and stakeholder engagement. These consider variables such as trust in process leaders, timing of engagement, methods of engagement, and genuine opportunities for stakeholder input.

Perceptions of governance are most focused on experience of participation in project consultation and planning processes, particularly fairness, transparency, truthfulness and inclusivity. Investigations of trust consider authorities, developers, utility companies, energy companies, and the range of government scales.

A small number of studies investigated specifically what participatory (or citizenship) activities have been undertaken by respondents. Cited activities were attending and speaking at government-led or advocacy group public meetings; contacting government or public officials about the development or signing petitions; public lobbying through letter-writing to

newspaper editors, contributing to online information or displaying signs. The deepest kind of participatory activities were donating to campaigns or organisations or joining advocacy groups.

4.2.4. Social justice and participation in decision-making

In the introduction to this report, the three pillars of social justice have been invoked as justification for a wide-ranging evidence review of social impacts. These pillars refer to who is **recognised** as a stakeholder, how people are **represented** in the decision-making processes, and how fair is the **distribution** of the costs and benefits of the decision or project. As a framework of analysis, this is focused on considering how just a decision or project is, but it also has benefits for industrial practice by reducing the risk of conflict and unintended negative consequences throughout the lifecycle of a project.

Within the literature, only three articles were explicit about using a social justice framework. In two of these studies, the pillars were used a lens through which to understand marine governance in a case study[64,65]. To quote from one study, the relative absence of social justice framings is made clear: "*In the context of planning, perceptions and attitudes are relevant because of their impact on societal acceptance or resistance against decisions in planning and management.*" (p2147)[44] This instrumental motivation for understanding people, concerned only with the potential barriers to development that they might pose, is in direct contradiction to the principles of social justice and the often cited just transition. Here, consideration is given to the three pillars of social justice and their implications for the procedures involved in marine decision-making.

Recognition

Recognition – who is identified as a stakeholder and thus who has a say.

The first pillar of social justice concerns who is recognised as having a stake in the decision or policy. This is important because it determines who can feed into procedures and when. It invokes reflection about how stakeholder groups are differentiated, for example as statutory or non-statutory consultees, which is particularly important when different participatory rights are afforded to different groups. The requirement to consult and engage with affected or relevant stakeholders is present across marine planning and EIA policy, though it is also a somewhat subjective process, which is often in the hands of developers rather than regulators. The terminology and choice of participants and targeted communities within the literature give some indication as to how this requirement is understood in research:

- Local people: Geographical communities, Indigenous groups, community services, island communities, residents, coastal populations, local communities.
- Representatives of local people: Coastal civic leaders, community NGOs, protest groups, representatives of communities.
- The public: General public, representative citizen samples, citizens.
- Business: Industry representatives, sector representatives, seaweed cultivators, supply-chain services, marine recreationists, fishers, aquaculture farmers, traditional ocean users, commercial lobstermen, fishermen, local fishery union, business stakeholders, MPA Network Managers, dive operators, conservation stakeholders, recreational/tourism stakeholders, MRE stakeholders, recreational boating and sailing, recreational fishing, charter excursions.

- Experts: Sector experts, scientists, environmental researchers, relevant University department respondents.
- Decision-makers: Local government, regulators, decision-makers (public sector, industry), project developers, local government agencies, planners/planning authorities, government representatives.
- Representatives of interests: NGOs, environmental organisations, regional associations.

It was notable both how often 'stakeholder' meant industry or business stakeholder, and how often experts or industry stakeholders were brought in to discuss potential impacts across whole communities. Given the context of this literature review, it is worth reflecting on how research itself, the findings of which influence practice, is enabling different voices to be heard.

A small number of international studies focused on Indigenous peoples in colonised nations, and how developments might impact upon their cultural connection with natural environment. In developed nations without overt colonial history, such as the UK, there is less exploration of historical, cultural connection to place in coastal communities, with the marine environment seen more as a national commons with minimal local claim.

Representation

Representation – how stakeholders are involved in a decision-making process.

Procedural justice builds on recognition by considering how people can participate in decision-making. It includes not only the timing of participation for specific groups, but also the design of engagement, and how views are considered in the actual decision. For those stakeholders who have been recognised and invited into the process there may be barriers to participation in the scope, timing and mechanisms of participation, through technical language or the means through which responses are accepted. Additionally, perceptions of how responses will influence the decision[66] and how much trust people have for the process leaders[67] influence participation.

EIA associated consultations are a common way that many communities get to participate[43], but this limits the narrative to direct or indirect consequences of environmental impact and somewhat limited understandings of social impact (see Section 4.3.2 for more discussion on EIA). Without a regulatory SIA framework for decision-making, it is likely that influencing developments on the grounds of social impact will be very hit and miss. It will be difficult for developers and decision-makers alike to weigh up relative impacts without clear social framing within regulation.

The evidence around procedural justice cannot easily be reduced to a neat list, but there were some key themes and examples of how projects have been successful. Common recommendations for publication engagement and participatory governance to develop trust and deliver just decisions include[42,68,69]:

- Prioritising the local community as central stakeholder.
- Funding for engagement activities.
- Local Community Liaison Officer (LCLO) or equivalent community entrepreneurs/champions.

- Whole-of-life project design which reflects community values and vision:
    - Systematically listen to and document concerns for future feedback.
    - Public engagement and participation early and often at all stages of the project development to scope issues and community values.
    - Open and inclusive dialogue with time committed to communicating complex arrangements.
    - Not assuming that ignorance means incompetence
    - Visualisations of the project to convey look and feel.
- Involve boundary-spanning organisations e.g., non-profits and community organisations.
- Deep engagement with industry and government to harness corporate capabilities and financial incentives that will deliver holistic benefits and consideration of how meaningful the benefits are for communities.
- Produce regular publicly available monitoring reports on the project and its local and regional impacts.

There is a need for further research on the planning and decision-making procedures for marine developments and how people can influence these decisions at the different scales of decisions. For example, the differences in meaningfulness of stakeholder engagement in national strategic decisions, offshore and onshore components of the same development, and shoreside industry development to support new offshore activity.

Distribution

Distribution – the fairness of how **benefits and costs** resulting from a decision are distributed.

The third pillar of social justice is distribution of 'goods' and 'bads', which includes benefits, capabilities, and impacts. There are particular challenges for renewable energy projects with trade-offs between global carbon reduction and local impact, and existing energy distribution injustice between and within nations. Marine industries also face the challenge of perceptions that the marine environment is out of sight and therefore the 'bads' are not felt locally. One of the key considerations for this study was to uncover how social impact of marine industry is felt through changes to onshore infrastructure in coastal communities, but there was very little research application to this question within the identified literature.

The literature acknowledges the issue of local communities being sacrificed for the good of others[59,65], for example through concentration of industry and the health and wellbeing impacts the confers. However, in terms of detail, distributive justice is mostly being considered through the lens of community benefits, particularly compensation, local investments and funds, or ownership of the project, as discussed in more detail above (Section 4.2.3).

Overall, there appears to be a fundamental lack of research looking at whole-project and whole-life assessment of social impacts of offshore marine industry upon coastal communities. There is a need for a broadening out from socio-economic framings, to better reflect the wide list of potential social impacts in the IAIA SIA principles[13], and a more targeted investigation of the impacts of onshore infrastructure and the governance procedures that surround marine developments.

4.2.5. Key findings from the academic literature review

Through the evidence reviewed in the academic literature, a series of observations and some recommendations can be made:

1. The study has identified a notable variance in available evidence between marine sectors, and identified social impacts which are much more or much less understood and researched. Recognising the potential limitations in time and methodology of this study, it is likely that some literature has been missed in this review.
   Recommendation: Systematic review is undertaken on a sector-by-sector basis with defined social impact assessment criteria and examining the pillars of social justice.
2. There is an overall lack of research evidence on potential and realised social impacts of offshore developments and activities, with research dominated by work examining perceptions of potential impact, as seen in 4.2.3 – Assessment variables: Social.
   Recommendation: More research is needed to deliver better baseline data on actual social impacts experienced from existing marine developments, offshore and onshore elements, with a wide understanding of the term social impacts and recognition of place-based impacts.
3. Offshore wind is the most advanced sector for social impact research, as shown by the relationship between offshore wind and place and social variables in the cluster analysis. It provides examples of good practice, particularly around community benefit schemes (4.2.3 – Assessment variables: Economic/Socio-economic), but is strongly focused still on acceptability (4.2.3 – Assessment variables: Social). There is potential to extend the scope of research investigating interactions with fishing and tourism/recreation sectors further into the communities which rely on or have identities connected with these industries.
   Recommendation: Research into interactions between offshore wind and tourism/fishing should extend its reach into communities where these are a significant part of the economy and community identity.
   Recommendation: The evidence base for other marine sectors should be grown by building on the groundwork laid by the offshore wind sector.
4. Sub-sea cables, aggregate extraction, and CCS are the least researched for social impact and its assessment (4.2.2).
   Recommendation: More research is needed on the social impacts of CCS, cables, aggregates and, across marine sectors, onshore infrastructure.
5. The majority of social research is focused on developing acceptance for marine developments through understanding attitudes that influence acceptance (4.2.3 – Assessment variables: Social).
   Recommendation: Research diversification from acceptability and attitudes into actual social impacts and how these relate to predictions, where these exist (e.g., work by Glasson).
6. There is little research consistency in social impact assessment in the marine context (4.2.3 – Frameworks).
   Recommendation: More replication of frameworks proposed to test their efficacy in practice.
7. There is little overt social justice research for marine industries of interest to TCE (4.2.4).

a. Recognition: Primarily communities of geography and of business interests are recognised.
   Recommendation: Clarification and transparency of who stakeholders are (place, interest, demographic, other?), why they are selected, and who is not being recognised as a stakeholder.
b. Representation: Research into governance and participation is mostly commonly concerned with perceptions of procedures rather than how the procedures are designed or run. Again, this links to generating acceptance of developments.
   Recommendation: Action research to develop good participatory governance methodologies.
c. Distribution: Distributional justice is driven by financial benefits and costs rather than wider social factors.
   Recommendation: Need for social baseline indicators.

8. Planning and EIA are the key routes for formal public participation in marine decision-making (4.2.3 – Assessment variables: Governance).
   Recommendation: Deeper insight is needed into how planning (marine and terrestrial) and EIA, as the key formal routes to development, integrate with governance at the community level.

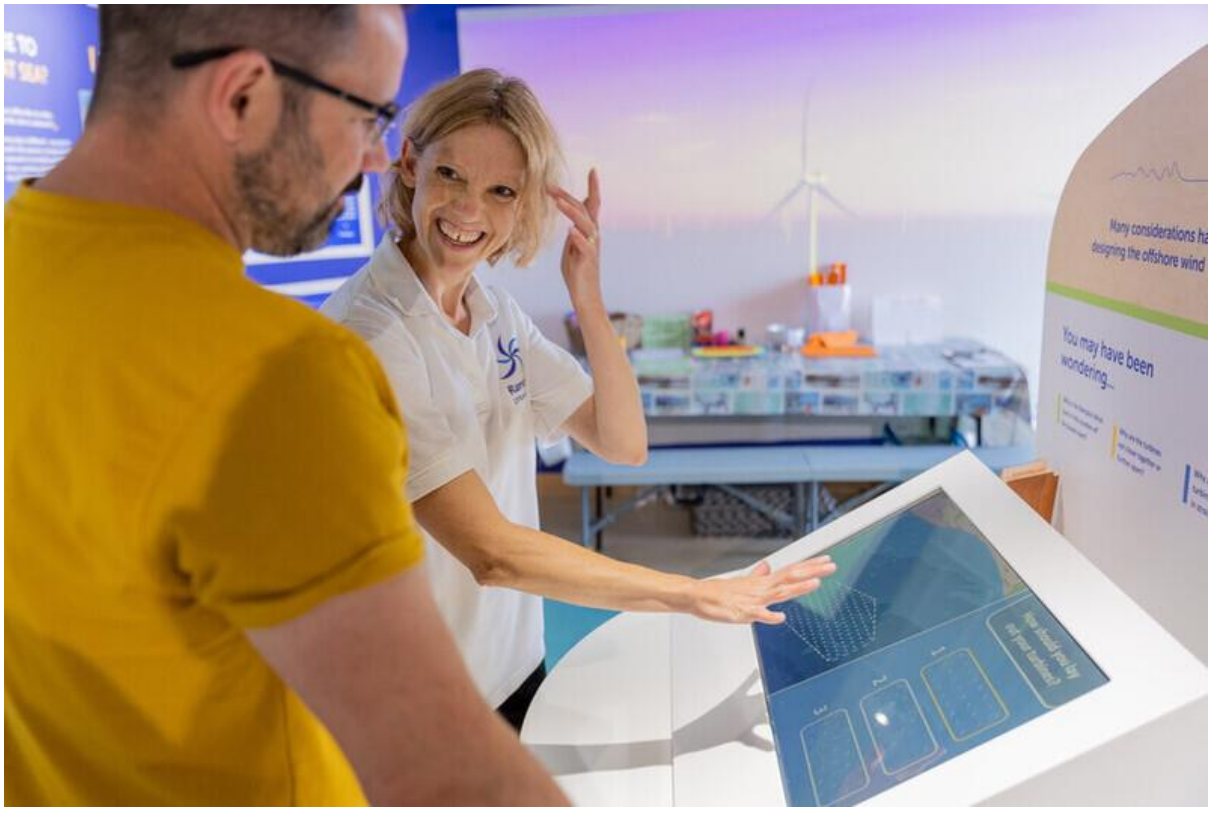

Image by Ben Barden Photography Ltd.

4.3. Social impact assessment in industry

In this section, the findings of the review of the industry literature, drawn from across marine sectors and industry organisations, are presented. The section is organised to first give an overview of the literature by sector, then to draw out key themes from across all sectors, giving examples to illustrate key themes in practice.

4.3.1. Sectors

Here findings from the literature are grouped into sector themes. As well as company reports and policies, and reports and studies from industry organisations, the findings of the ABPMer-Seabed User and Developer Group (SUDG) report on the socio-economic benefits of marine industries are also included[70]. Although the focus is specifically on socio-economic factors and benefits rather than impacts, the study gives interesting insight into sector assessment at the time of publication[d]. The study identified the following themes: employment and skills; consumers; community; regeneration; environment; and health.

Aggregates

Reflecting the gap in academic research, very limited industry literature was identified in this sector. In addition to the SUDG assessment, only two sector-wide documents were identified, both commissioned by TCE and BMAPA. The first was a 2013 overview of aggregate dredging in the marine environment[71]. In the social domain, this study included a socio-economic appraisal through the framing of ecosystem services. The work identified employment, cultural heritage, and the natural environment as relevant services. It did not however include public services, education, community cohesion/integration, social capital, political empowerment, crime, or health as relevant[72]. However, according to the more recent SUDG report, the aggregate sector, relative to other industries in the report, has a relatively low direct employment contribution, but is recognised as underpinning the construction sector and as such has considerable societal benefit[70].

A key gap in both these studies is the social implications of this industry for communities during marine mineral extraction processes. Currently, this appears to be viewed as relevant only for employment and for coastal defence through, for example, beach nourishment. Indeed, in the second TCE/BMAPA document – a guidance note on marine aggregate dredging and the coastline[73] – though an emotional connection to the sea is noted, the focus is entirely on physical impacts to the coast and the lack of perceived relevance to coastal communities is reflected in stakeholder engagement as an optional and informal step immediately prior to submitting the Coastal Impact Study as part of the licencing process. Where offshore operations are considered, the regulation emphasis is on environmental impact, sea users, and interactions with marine archaeology[74], i.e., other activities occurring spatially offshore.

Through the BMAPA membership, a range of aggregate companies were identified, and their website searched for relevant public documentation. This was principally in the form of annual reports, policies and strategies. Across this literature, at company level which, in some cases, was international, there was a general sense of responsibility to be a good neighbour to communities hosting company sites. This was borne out in KPIs and sustainability narrative

[d] Note this report is currently undergoing a refresh.

relating to community complaints, sponsorship of community projects and activities, and local supply chain and employment and training. Stakeholder/community engagement was noted by all companies reviewed but without detail as to how this is conducted. Similarly, there were narratives about supporting resilient communities and developing shared values, but the documents reviewed did not expand on methodologies to do so. In common with all the company reports reviewed in this study, aggregate companies had a strong focus on employment including health and safety, pipeline, and training. None of the documents referenced social impact or communities in relation to marine extraction nor did they identify coastal communities as a specific stakeholder group.

Recommendation: There is a need for baseline evidence about social impacts, positive or negative, of marine aggregate activity upon coastal communities. This must extend to onshore infrastructure to give an holistic overview.

Cables (subsea telecommunications and power)

Only one report was identified that considered subsea cables as a sector, which again was one commissioned by TCE. This report approached the social and economic impact of cables through an economic valuation of benefit to the economy and to the energy sector[75]. Given the framing of the analysis, only industry stakeholders were identified and engaged with. Likewise, potential negative impacts were outside of the report remit. A participant quote within the article identified a lack of perception of subsea cables as a sector. This perhaps underlies the lack of data for the SUDG assessment to draw on, which was limited to highlighting the importance of cables for national infrastructure. It was also noted that most landing points are in the South West of England (Figure 5) which raises questions about distribution of the apparently unknown and unassessed social impacts upon coastal communities. Cabling and landing points are expected to increase into the future, reflecting the growth in offshore energy production in particular, which makes this a more urgent issue.

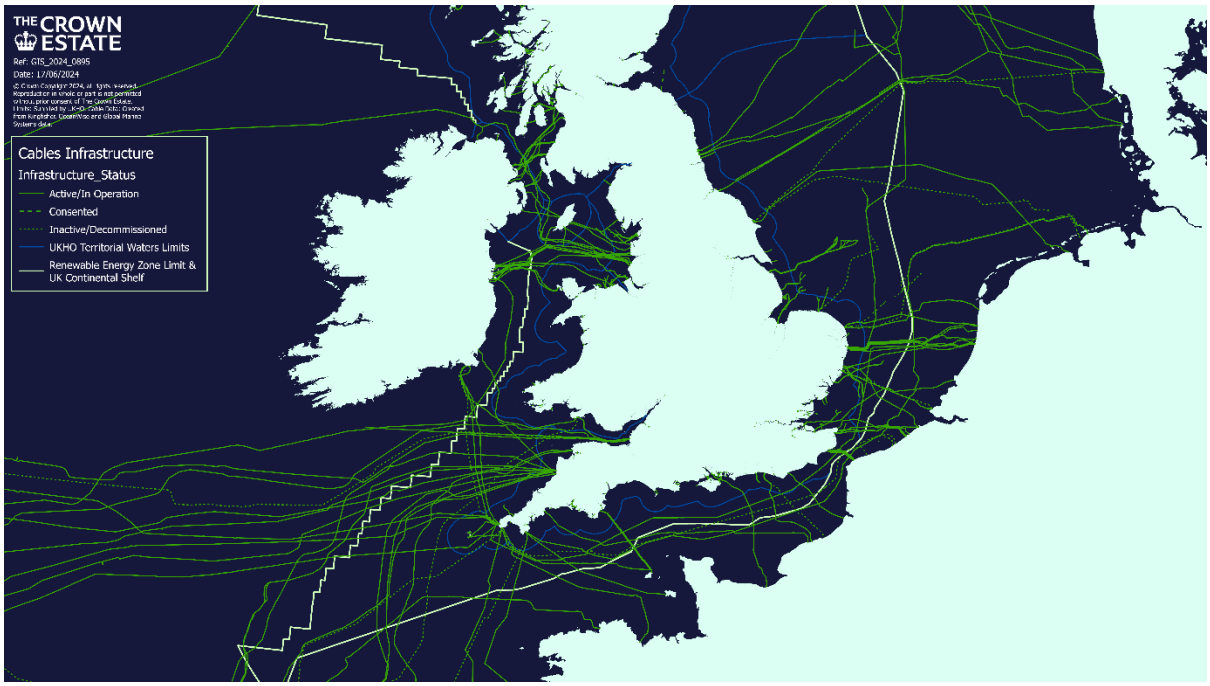

Figure 5 Map of subsea cabling around England, Wales and Northern Ireland. Source: The Crown Estate.

There were no publicly available documents available through the Suboptic Association, nor the European Subsea Cables Association (ESCA). It was not practical to work through the ESCA membership to identify further documents due to the vast range of companies and company types listed.

Recommendation: There is a significant gap in the evidence surrounding social impacts of subsea cables. Viewing cables as an industry may support evidence-gathering and enable assessment of compounded impacts through concentrated geographical spread of landing points.

Carbon Capture and Storage (CCS)

As an emerging industry with no operational projects in the UK, CCS is extremely limited in publicly available information. The SUDG report notes the lack of data and is limited to highlighting its potential for cardon reduction. The 2022 Carbon Capture and Storage Association Delivery Plan[76] shows a primary focus on technical delivery. Social targets included in the plan relate to evidence gathering on risks, socio-economic benefits, and communication of effectiveness. Although the report includes an action on dialogue with the public, the principle motivation of this is to feed into a communications strategy to generate public acceptance.

As an industry without active operation in the UK, there is a significant opportunity for the CCS sector to be at the forefront of social impact assessment, both working with communities prior to deployment and during operation of test sites as they develop. Noting from the academic literature that there is potential overlap with decommissioning of oil and gas sites, it is surprising that the delivery plan does not recognise the socio-economic impacts of transition at these sites.

Recommendation: Although a focus on technical feasibility is unsurprising for an emerging industry, the CCS industry has the opportunity to innovate in social impact assessment by embedding holistic thinking at this early stage.

Ports

Although not a target industry for TCE responsibilities, onshore infrastructure related to marine industries includes port facilities and these are expected to meet considerable growth in demand as the offshore wind energy sector grows. The SUDG report[70] identifies ports as a significant employer and provider of important infrastructure underpinning a range of industries including coastal tourism and recreation, and crucial transport links for island communities. Likewise, the UK Major Ports Group (UKMPG) notes the importance of ports as transport hubs, and their significant presence in the local community and economy in its Development Policy[77]. It notes that many ports are now developing port master plans that will typically include stakeholder engagement, but it is unclear to what extent the plans will consider social impact assessment in practice. This question might be informed by looking at examples of community engagement in the British Ports Association (BPA) membership. The BPA has 253 member organisations listed on its website and in 2022 released a report sharing good practice examples of coastal community activity by 17 ports[78]. Although not intended as a comprehensive catalogue of activity, the document gives good insight as to how the sector considers social and community factors.

The most common forms of community engagement were financial support through port-run community funds, ad hoc donations, and sponsorship by twelve of the ports. These included local competitions, community events, sports clubs and arts projects. Five ports described direct environmental action through plastic-reduction campaigns and beach cleans. There was also a strong focus on education around sea safety, future careers, and skills developments, noted for eight ports. Alongside programmes for water safety in schools and student placements were established industry training centres such as at Blyth and PD Ports in Middlesbrough.

More general community engagement was described for four ports, including young people, ex-offenders, tourism businesses, and general community use of the port. Additionally, some ports made financial investment in local facilities and access such as accessible changing places and improvements to coastal and cycle paths. The most striking engagement activities however were Port of London's participation in developing local cultural strategy with the local authority and the community owned hub port at Tobermory Harbour: community owned hub port.

Although this is a snapshot focused on community engagement, it mirrors that seen more widely in this report across marine sectors, where focus is on financial contributions to communities or place or interest and nurturing a labour force. More strategic engagement is much rarer.

Ports are a shore-based hub for marine industry and activity, yet as a sector it is not clear what work is being undertaken to consider this role in social impact assessment. Particularly with the planned major developments in offshore wind, port industrialisation will increasingly be a factor in local social impact. Additionally, other marine sectors and marine decision-makers are potentially overlooking the significance of port industrialisation and change for coastal communities[79].

Recommendation: Engagement with the port sector is needed to support holistic social impact assessment of marine industries.

Renewable and other energy generation

A large number of the documents reviewed were obtained from the public documentation of the major developers TCE engages with. For this reason, the majority of documents reviewed concern energy generation and, most relevant to this study, offshore wind. Company documents reflect the full company portfolio which typically includes a mix of wind energy (on and offshore), solar, nuclear, and, in some cases, oil and gas. Sector-based documents are concerned with offshore wind.

The UK is a leader in offshore wind both in terms of energy production and in driving innovation in community engagement and benefit sharing. The SUDG assessment[70] describes the high employment offer in the sector, particularly for technical and professional roles and for local roles, though stops short of being able to evidence these are the same roles, which is of relevance to distributive justice. Wave and tidal marine renewable energy generation is much less well established in the UK but likewise has the potential to boost employment, particularly in deprived areas of the UK.

A 2015 TCE commissioned report examined the socio-economic impact of offshore wind[80] using a review of academic and industry literature, similar to this present study. There has been little change in the breadth or depth of evidence over the intervening near-decade. The study used the five capitals approach aligned against ONS human wellbeing domains. Although organised across the *financial*, *manufactured*, *human*, and *social* capitals, and responding to the wellbeing domains of *economy*, *what we do*, *education and skills*, *personal finance*, *where we live*, and *our relationships*, identified impacts are predominantly socio-economic: jobs, investments, markets, supply chain, energy security, port infrastructure, training, education, wages, knowledge, R&D, CBS schemes, changes to marine industries, and stronger industry networks. There are no material changes in these themes identified in 2015, to those uncovered in this study.

Also little changed, is the evidence for social impacts with the report finding the following are all of mixed or uncertain impact:

- Lack of data on construction impacts on coastal communities.
- Concerns about offshore worker safety and unknown impact on local mental health from economy/industrial changes.
- Uncertain impacts on social capital in terms of community cohesion formed through support or opposition.
- Uncertainty about impact of changes to view or access to restorative effects of nature.
- Public distrust in institutions; discontent with consultation processes.

This study highlighted key knowledge gaps, amongst which was difficulty in assessing how well-matched are forecasts and reality for socio-economic benefits in communities, and the need for much more evidence on social factors such as sense of place, subjective wellbeing, and relative importance of different wellbeing elements.

These data gaps are acknowledged at international level through the International Energy Agency's work on Task 28 'Social Science of Wind Energy Acceptance'. Through this work, academic social scientific research meets the energy sector at international level. An examination of the Phase IV Work Programme[81] demonstrates the motivation for Task 28 is to generate evidence that will help reduce the barrier to wind development that opposition can pose, reflecting the finding of the academic literature review of a strong focus on acceptance. However, there has been development in scope "*acknowledging that the goal is not for societies to accept all new wind power development, but for the wind power deployment process to include proactive community-focused strategies based on numerous systems (economic, cultural, political, ecological, technical, etc.) working together to reach agreement on energy planning for the good of the host communities and others.*" (p3). In relation to the present study, work package 5 seeks to attend to the need for best practice guidelines for offshore community engagement. The work package identifies key gaps in evidence around identifying social impact and stakeholders in the offshore context, highlighting the procedural gap, in terms of participation, and challenges in the distribution of benefits.

Turning to the core company reports, there is little to be gleaned about on-the-ground social impact assessment for marine projects. Sustainability is largely presented through the lens of ESG, as a global issue being addressed in the core of the company and its supply chain. Some

reports include brief case studies, on community engagement for example, but it is difficult to pick the marine context out of these reports for the purposes of this study. Reports comply to corporate standards, and these are discussed in more detail in the following section (4.3.2).

Beyond company reporting however, renewable energy companies are engaged in a range of project level assessments and activities, and research into the offshore wind sector in particular. There are a range of documents from energy developers relating to social impact assessment for offshore wind from SSE, Vattenfall and Ørsted. These broadly fall into three categories: resilient communities through community benefit funds; consultation strategies; and a range of socio-economic studies relating to specific wind farm projects. There is an indication in the industry literature that was reviewed that the UK is further ahead on community benefit and social impact than other nations, even in the EU. Although some studies are pan-European, the majority of examples from these mostly international companies, come from the UK. There are suggestions within company reports that reinforce this, for example, RWE's Sustainability Management Report 2022 celebrates a total £37m investment in UK communities (offshore and onshore) but makes no similar statement for other nations it operates in. It is SSE which operates only in the UK and Ireland which has extensive discussion of community funds and benefits established alongside its projects.

There is a comprehensive body of research being developed by the European Offshore Wind Deployment Centre connected with Vattenfall's Aberdeen offshore windfarm and Oxford Brookes University. This programme of research and monitoring, funded by Vattenfall, is leading advances in socio-economic impact assessment within the EIA framework. The programme has produced a guide to assessing offshore wind socio-economic impacts[82]. The guide draws on the SIA work of Vanclay (which underlies the SIA Principles). It distinguishes between economic and social impacts and provides an overview of the challenges in assessment of these, together with methodologies and techniques for assessment. It is aimed at technical practitioners and stakeholders engaged in impact assessment. Here, the issue of offshore development being seen as removed from onshore social impact is challenged and stakeholders are encouraged to consider community issues such as community cohesion and place attachment and identities.

Recommendation: The more established offshore wind and renewable energy sectors can continue to lead in the social domain by applying the SIA principles and putting research evidence into practice.

4.3.2. Cross-sector social themes

Given the shared corporate practices of developers, this section looks at the trends in social impact assessment across sectors. Due to the range of energy developers, it should be borne in mind that this section also transcends the marine and terrestrial contexts.

Motivations

A common motivation for social impact assessment is compliance with corporate regulation and social responsibility expectations, reflecting trends in more sustainability focused voluntary and mandatory reporting[83]. Social impact is largely seen through the lens of corporate governance and takes a familiar shape across the different companies. This includes workforce consideration in diversity, equity, and inclusion, and ESG standards. Standards and regulations are discussed in more detail in the following section.

Beyond compliance, at sector level there was more of a focus on evidencing the value to society of that sector, hence a strong socio-economic focus. A small number of documents referenced marine specific legislation, such as the production of a Coastal Impact Study as part of the licencing process for marine aggregate dredging, alongside more general planning and EIA requirements. Whilst at company level, documents and policies responded to a company ethos around sustainability, trust building, being a good neighbour, strategy delivery, and delivering a just energy transition which responds to Government carbon reduction targets. Recognition of social impacts as a risk appears in some risk assessments, though these are primarily related to indirect consequences such as reputational damage or financial loss, only occasionally being considered a risk to operations when community opposition can impact upon permitting and potentially lead to construction delays or project abandonment.

Recommendation: Regulation needs to keep pace and incorporate stronger requirements on social impact assessment and mitigation of negative social impact.

Recommendation: Strengthening motivation for Social Impact Assessment with connection across the scales of company performance and project basis.

Standards, regulation and measurement of social factors
Company scale

Reflecting trends in ESG metrics and company compliance, the primary driver for social impact assessment and mitigation is international human rights law. Companies cited a range of guidance that they use to deliver on human rights, including the UN Global Compact, International Bill of Human Rights; EU Taxonomy (EU Regulation 2020/852), ILO Just Transition Guidelines, UN Guiding Principles on Business and Human Rights, OECD Guidelines for Multinational Enterprises; ILO Declaration on Fundamental Principles and Rights at Work. High-level human rights laws drive compliance in employment, operations, and supply chain, right across the company, regardless of their host nation and sector.

At a more national scale, a number of standards were cited by companies in the context of sustainability:

- BS EN ISO 9001 Quality Management
- BS EN ISO 14001 Environmental Management
- BS ISO 45001 Occupational Health & Safety
- BRE BES 6001 Framework Standard for Responsible Sourcing
- BS 8902 Responsible sourcing sector certification
- ISO50001 Energy Management
- National Highway Sector Scheme 16 Quality Management of Asphalt Laying
- CE certification (“relevant”)
- AA1000 AccountAbility Principles
- AA1000SES Stakeholder Engagement Standard

Standards were most commonly cited by companies in the aggregates/construction sector, influenced by UK operational requirements, and these drive KPIs and targeted actions. However, from the documents reviewed, there was an emphasis on social KPIs/actions for onshore site operations rather than marine operations through, for example, community

liaison, traffic management and pollution. For the marine aggregates context, the driver was fulfilment of regulatory and licensing requirements through the Marine and Coastal Access Act 2009, the Marine Policy Statement, the Welsh dredging plan, the Marine Aggregates Levy, and EIA.

A range of UN SDGs were cited. Companies find these a useful framing that encompasses all aspects of sustainability from which they can select the areas they consider most relevant to their business and ethos. Those that did not appear in the documents were 1 (poverty), 2 (hunger), 4 (education) and 16 (institutions). SDGs were used at a high company level for aligning strategy and governance. In only one case were SDGs differentiated by scale, which was in Vattenfall's 2022 Annual and Sustainability Report[84]. At global level, Vattenfall includes SDGs 7 (energy), 9 (industry), 11 (cities/communities), 12 (consumption/production), 13 (climate), and 17 (partnerships). Whilst locally, the focus was on 3 (health/wellbeing), 5 (gender), 6 (water), 8 (work), 10 (inequality), 14 (ocean), and 15 (land).

The literature was examined for specific metrics and approaches to measuring social impact being deployed in practice. The findings of this examination are summarised in **Table 6** where they are organised into three core themes: stakeholders, communities, and wider society; workforce; and human rights. Workforce statistics appear to be the most consistent and easily measured components, with neat quantitative data readily collected and available. In contract, both human rights (beyond labour rights) and community factors are much less clearly defined and, in some cases, companies explicitly state they do not collect indicators or set targets on certain themes. There was one reference to the Business for Societal Impact (B4SI)[85] model which gives a framework with three channels: Community Investment, Business Innovation for Social Impact, and Procurement for Social Impact. However, the aim of this scheme is to support companies to "articulate and measure the positive impact they have in the world"[86] (p5) which is not synonymous with social impact assessment that considers positive, negative and neutral impacts.

Table 6 Summary of social measures being deployed in practice across marine sectors.

Category	Measures in practice (or stated absence or measures)
Stakeholders, communities, and wider society	
Consultation	Optional / informal stakeholder consultation Formal stakeholder engagement
Engagement	Community engagement case studies Qualitative performance evaluation Community liaison activities (number per site) Stakeholder dialogue - No indicators) Stakeholders engaged in double materiality analysis Indigenous peoples as specific stakeholder group
Social responsibility	Corporate volunteering
SIA	Number of community complaints Impact assessment of affected communities Impact upon Indigenous peoples as specific group Thriving communities - Targets are currently being developed
Vulnerable people	Electricity for All program beneficiaries Rural electrification

Societal value	Energy production Energy supply (inc. supply points, quality, smart grids) Smart meters Research & Development (investment) Taxes paid
Community benefit / investment	Job creation Investment in community education / art / culture Number of projects supported Local supply chain proportion Community donations / sponsorships / community funds Local procurement
Workforce	
Skills and training	Employees trained for specific standards/compliance Skills and talent for the green transformation - Targets are currently being developed. Number of apprentices Number of training sessions/opportunities booked/taken up Training days
Health & Safety	Reportable Injuries, lost time, serious incidents, fatalities, health / sickness QHSE performance
DEI	Age, years of service, women, women in various positions, disabilities, pay
General	Employee number, FTE number, turnover, fines, contract, payscale, executive, dismissal, external Employee satisfaction via Engagement Index (annual employee survey; earnings; benefits; pensions; collective agreements)
Human rights	
Non-specific	Human rights indicator Analysis of potential impacts on human rights Human rights management system Right to safe, clean, healthy and sustainable environment Right to social order Right to an adequate standard of living
Customer/privacy	Customer data used for secondary purposes
Labour rights	Employees with collective bargaining rights / agreements Grievance and remedy procedures Supplier and contractor labour conditions Just transition and responsible decommissioning (redeployment/reskilling)
Civil and political rights	Human rights defenders
Corruption/supply chain	Corruption cases Procurement from 'risk' countries Responsible sourcing Human rights audit of suppliers / contracts

There were no examples of specific SIA frameworks or tools being deployed in practice in any of this general company literature. However, there was a clear indication that project-scale impact assessment (environmental and social) is led by national regulation for these activities. There is a striking divergence in the more global drive for company ESG

performance, and the much more diverse and patchwork approach to project planning, construction and operation. This highlights how crucial national regulation is for ensuring both assessment and mitigation of social impacts.

It is clear from the evidence review that companies are responding to human rights legislation and that this is driving ESG evaluation. In 2022 the right to a clean, healthy and sustainable environment was formally adopted by the UN Human Rights Council[27]. This contains within it the more familiar substantive environmental rights (safe climate, clean air, healthy ecosystems and biodiversity, safe and sufficient water, healthy and sustainable food, non-toxic environment) which are also strongly recognised within the SDGs. Additionally, it recognises the procedural environmental rights of access to information, access to justice, and public participation in environmental decision-making which, for the UK and Europe, is the basis of the 1998 Aarhus Convention[25]. Clearly this recognition is too recent for the annual reports and other documents included in this review, but as this filters through into corporate governance, it will be important to monitor how it is responded to at the different scales of the company and the project.

Recommendation: Research into gaps in how human rights legislation is responded to by the marine sector, with particular attention to the new recognition of participatory environmental rights.

Recommendation: Regulatory guidance for participatory human rights within ESG and non-financial reporting context.

Recommendation: Development of standards (or encouragement to adopt existing standards) on social impact assessment, as distinct from the solely positive framing of social value.

Project level

It has been seen throughout the academic literature that the role of formal EIA is a core driver of impact assessment for marine development at the project level. In the UK, the primary requirement for social consideration within EIA regulations are impacts upon human health and cultural heritage. Here, two EIA scoping reports, which emerged through the industry literature search, have been reviewed to understand how social impact is approached in practice through EIA. The two reports are: Equinor's Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions[87] in England; and Ørsted's Salamander Offshore Wind Farm[88] in Scotland. They cover two legislative landscapes in the UK and represent the two differing conditions of a new offshore wind farm and extension to an existing one.

Topics included in the scoping reports are led by legislation and guidance from authorities. The scoping reports extend from construction through to decommissioning and distinguish between offshore and onshore impacts/components. This section of the report focuses on scoping for social impacts and excludes discussion of those which are based directly upon measurable environmental quality (e.g., pollution).

Impacts identified as being in or out of scope for EIA are determined by the developer/consultant producing the report. For example, in the Ørsted report, EIA human health impacts are stated to include:

- Environment (noise, air quality, visual);
- Employment and income;
- Education;
- Housing;
- Lifestyle;
- Physical activity;
- Access to services, amenities and social networks;
- Community severance or cohesion;
- Transport;
- Social networks and connectivity;
- Community identity; and
- Access and accessibility.

Of these, the scoping report identifies only environment, transport, and socio-economics as being in scope. Justification is not provided.

Commercial fishing impacts are considered primarily in the marine space, i.e., through spatial conflict and changes to fish stocks. These impacts are assessed using landings data and evidence around fishing vessels and gear. In the Equinor report, a consultation with the fishing industry is specifically noted as part of the evidence base. Though the Equinor report notes that most vessels are UK registered, a core gap in both reports is the socio-geographical connection between vessels operating in the area and their landing or home ports and communities. In other words, how marine industry impacts can be translated to the community level. 'Other users' are considered, and these are largely based upon marine sectors. Ørsted consider recreation and tourism within this section, whilst Equinor devote a section to this sector, bringing together marine and terrestrial impacts.

Seascape / landscape character and visual amenity is primarily considered through designations of environment, buildings, and recreational routes such as cycleways. In the Ørsted report, there is consultation with public authorities/agencies to provide evidence on this and impacts are described according to the offshore or onshore location of infrastructure. The Equinor report commits to a Seascape, Landscape and Visual Impact Assessment (SLVIA) which crosses the land-sea interface. Both the farm and the onshore infrastructure are considered for visual impacts in the reports. It does not appear that non-designated routes and sites of value locally are considered for changes in character/visual amenity. Identification of non-formal sites or use and value as well as risk of impact to these would need deeper community engagement.

Alongside sea/landscape, archaeology is the other main scoping factor for the cultural heritage aspect. In the marine context, this refers to wrecks and considers loss, damage and long-term change to settings. Onshore, impacts upon listed buildings are noted. There is a lack of narrative about impact to access to such sites (whether on or offshore) and about non-designated or listed sites which might yet be valuable to communities. This is reflected also in how land-use is impacted where outside of private landowner and sector impacts, only formal routes such as cycle ways are recognised for their recreational value.

Socio-economic impacts are broadly focused on demographics (including changes from in-migration in the Equinor report), labour supply, job creation, local business base and supply chain, GVA, housing availability, infrastructure disruption and upgrade potential.

From this brief overview, there are some clear points to be raised about EIA and its current suitability for SIA:

1) Where does the power lie in who decides what is scoped in or out and what evidence they draw on? For example, it was notable in the Ørsted report that for "*Socio-cultural effects cover any potential impacts on lifestyle, family structure, social problems (such as crime deprivation), human rights, community character etc.*" (p276)[88], the impact was viewed as highly limited due to being offshore and therefore was scoped out. Likewise, distributional effects were also scoped out because of being offshore.
2) There is a distinct lack of reference to consultation with affected stakeholders throughout these reports, with few exceptions, and a heavy reliance on existing datasets and public authorities/agencies.
3) Relying on already designated assets or environments provides a limited framing of the social value of heritage.
4) The regulatory framework is fundamental to the scoping approach, particularly guidance produced by government agencies. For example, in the Equinor report it is stated that there is no formal guidance for recreation and tourism impact assessment leading the consultants to devise metrics based on what data was available. This shows how important regulatory requirements are for impact assessment.
5) Finally, cumulative impact assessment appears to be limited to other energy projects. Whilst important, there is the potential for cumulative impacts for communities of geography that are cross-sector.

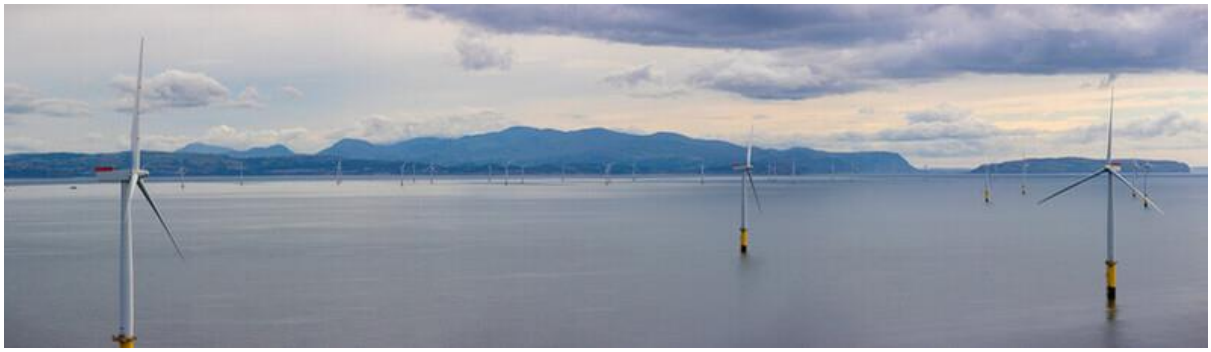

Image by Ben Barden Photography Ltd.

In the European Offshore Wind Deployment Centre programme of research and monitoring (see 4.3.1 – Renewable and other energy regeneration), socio-economic within EIA is viewed very broadly (**Table 7**). As well as targeted reviews, such as evidence around the impact of offshore wind on the tourism and recreation sector, there are additional studies examining the breadth of social and economic factors being assessed through EIA for offshore wind, and the evidence around how those factors are measured, how mitigation is planned, and what monitoring is being undertaken.

Table 7 Classification of socio-economic factors. From Glasson et al., 2020[82]

1. Direct economic
Employment, including employment cohort and safeguarding of existing employment Unemployment and underemployment Characteristics of employment (e.g. skill group) Labour supply and training Other labour market effects, including wage levels and commuting patterns
2. Indirect/induced/wider economic/expenditure:
Employees' retail expenditure (induced) Linked supply chain to main development (indirect) Labour market pressures Wider multiplier effects Effects on existing commercial activities (e.g. tourism; fisheries) Effects on development potential of area GVA and GNP
3. Demographic
Changes in population size; temporary and permanent Changes in other population characteristics (e.g. family size, income levels, socio-economic groups) Settlement patterns
4. Housing
Various housing tenure types Public and private House prices and rent / accommodation costs Homelessness and other housing problems Personal and property rights, displacement and resettlement
5. Other local services:
Public and private sector Educational services Health services Social support Others (e.g. police, fire, recreation, transport) Local authority finances
6. Socio-cultural:
Lifestyles/quality of life Gender issues Family structure Social problems (e.g. crime, ill-health, deprivation) Human rights Community stress and conflict Integration, cohesion and alienation Community character or image
7. Distributional effects
Effects on specific groups in society (e.g.: by virtue of gender, age, religion, language, ethnicity and location) Environmental justice

Through this programme, Environmental Statements for UK offshore wind have been analysed.[89] This study confirms the findings of these scoping report cases and more widely across the evidence review, that EIA is extremely limited in which social impacts are considered and the focus is strongly on job creation and local supply chain. The review does note that UK Environment Statements are doing a more thorough job of socio-economic impact assessment than are other European countries.

Given the responsiveness of companies to both voluntary and mandatory standards and evaluations, the following recommendations are made:

Recommendation: Need for more detailed guidance on scoping social impact to redress existing power imbalances between stakeholders.

Recommendation: More holistic approach to offshore marine sector conflicts and impacts. E.g., how dispersed are the impacts of a newly closed fishing area; will some communities be particularly affected due to the fishing ground used by fishermen in their community; what will the scale of the fishing industry impact be for that community more widely.

Recommendation: Broaden the scale of visual impacts out from designated landscapes/environments/buildings/routes, by including targeted evidence gathering of what/where is valued/used by the communities and why, in addition to formally designated sites and routes. And extend beyond visual to less tangible changes to character and sense of place.

Recommendation: More interrogation of social impacts at sea, such as changing access to archaeological sites.

Recommendation: The focus of cumulative impact assessment should centre communities at a range of scales to examine not only the cumulative impacts of like-developments, but other compounding factors influencing the community unit.

Recommendation: Further research, particularly action research which occurs in practice, is required to develop an holistic and integrated ESIA framework for marine developments.

4.3.3. Social justice pillars in industry practice

Recognition: Stakeholder mapping and identification

Recognition – who is identified as a stakeholder and thus who has a say.

The first social justice pillar concerns who is recognised as being a stakeholder, i.e., having an interest in, being affected by, or affecting a project, policy, or plan. Company annual plans typically list their core stakeholders, and their materiality analyses indicate how important those groups are considered in terms of their influence upon the company and the company's impact upon them. Although a wide range of specific stakeholders were identified in the literature (explicitly or implicitly – see Table 8), they were not equally represented. For example, local communities rarely appeared in the main company stakeholder map and community engagement consistently appeared in the materiality quadrant of least influencing/affected.

Table 8 Stakeholder identification within industry literature

Stakeholder group	Named stakeholders
Direct company	Workforce (inc. specific groups e.g., parents/caregivers) Trade unions Company partners
Financial	Shareholders and the financial community / debt providers Investment partners
Regulatory	Regulatory entities Local authorities Government
Supply chain	Supply chain / suppliers Contractors Supply chain employees
Partners and peers	Industry peers Academia
End-users	Customers / consumers (including vulnerable)
Communities	Local communities Local host communities (site, or along line of industrial influence) Voluntary groups Charitable and social enterprise organisations NGOs Minorities Indigenous peoples Affected communities as determined by national law
Society and planet	The media Society at large The general public The environment

No literature specifically recognised coastal communities, these presumably being subsumed in the idea of local or host community. Reference to Indigenous groups was primarily in a global context, but also specifically in Sweden. Indigeneity is often linked to colonial histories, so it was notable that SSE used the term to refer to the proportion of offshore wind manufacturing activity that was occurring within Scotland rather than overseas. This contrasts with the academic literature reviewed which did not recognise any kind of UK Indigeneity.

It is important to remember however, the scope of the industry literature search and the availability of public information relevant to this topic. Though local communities do not feature heavily in company reporting and strategies, aligned as they are to specific ESG reporting, some companies had publicly available policies and strategies focused specifically on stakeholder engagement.

Representation: Participatory decision-making

Representation – how stakeholders are involved in a decision-making process.

The second social justice pillar refers to the procedurality of decision-making, including how different recognised stakeholder groups are represented within decision-making processes and when. In the context of marine development, this pillar is reflected in the human right to participate in environmental decision-making. Evidence pertaining to the detail of

community participation in marine decision-making is extremely limited in the general industry literature. Although production of a Statement of Community Consultation is a requirement of the Planning Act 2008, these were not readily available on the company websites that were searched. This may be due to the requirement to make the Statement available for the geographical community but not more widely, and similar planning documents did not emerge in the search. Despite these limitations, some general themes can however be drawn from the literature.

First, engagement and procedural mechanisms differentiate between stakeholder groups. This is both explicit and implicit. Whilst shareholders have the benefit of participation via relevant Company law, other stakeholder groups are distinguished according to assessments of their relevance. For example, Iberdrola[90] explain how the Board of Directors identifies stakeholder groups and how these are prioritised according to impact and influence upon value creation. Four engagement channels of information, consultation, interaction and collaboration are then applied differentially. For example, society in general receives constant information via media, whilst interaction through working groups and events are periodic.

Second, local communities are often included in stakeholder groups but are poorly defined which has an impact on procedurality for this group. Noting the discussion on communities of geography and interest in the academic review, there is a lack of transparency in how industries are defining communities, with insufficient steer from national regulation. Generally local communities and NGOs are *engaged with* or involved in *dialogues* but the specifics of these processes and how their outcomes and local knowledge are used in operational and strategic decision-making is not defined. However, there are some exceptions. For example, in the Iberdrola example above, affected communities are not included in the prioritised list of stakeholders but are identified at the project scale for consultation and impact assessment. Vattenfall in its latest annual report included a full suite of stakeholder engagement in its materiality analysis[84,91] and shares publicly the community engagement plan for construction of its Norfolk Offshore Wind Farm[92] (see Box 3). Cemex produce Community Engagement Plans and state that community consultation is used to develop these, however the purpose and nature of the Plans was not explicit. SSE[93] has the most comprehensive description of its approach to procedurality out of all the annual reports reviewed, referring to community consultation on plans and projects throughout the year; early engagement with communities; partnerships with NGOS to deliver social and environmental benefits in the community; and board-level engagement with community interests for large capital projects.

Box 3 Community consultation case study

The Vattenfall community engagement plan for the construction of the Norfolk Offshore Wind Zone.

The plan responded to the construction of the development, so was post-planning and core decision-making. It formed an appendix to the Code of Construction Practice and thus was developed in the context of considerate construction and planning requirement. Vattenfall defined community stakeholders as "*inclusively…[encompassing] local residents, businesses and groups, as well as local representatives, such as Parish Councils, who have an interest in the project*" (p3). The primary consultation zone was parishes that fall along the cable corridor and near the onshore infrastructure, going some way inland but not extending far along the waterfront. Stakeholders therefore appeared to be those considered impacted by the onshore infrastructure rather than the offshore development. The plan cited a range of additional documents such as the Transport Management Plan and Travel Plan.

The plan adopted a model of informing, responding, and involving. *Informing* through a wide variety of mediums including in person and digital community meetings, workshops, drop-in sessions and exhibitions; provision of core contact details; webpage, newsletter, and e-news bulletins; letters, emails, and notices of works; broadcast media where possible; emails to councillors, MPs, and emergency services with dates of works and events.

Responding through commitments to hear community feedback, deliver additional meetings if requested, and potentially to make small changes to construction timetabling to reduce impacts. Both informing and responding approaches were delivered through a dedicated Community Liaison Team composed of contractor communication officers and Vattenfall's Stakeholder and Community Engagement team. Additionally, there was a separate Land Team for landowner engagement.

Involving included the themes that are familiar from this evidence review, namely education and career opportunities for schools and young people; dedicated local supply chain engagement; advertisement of job opportunities; engagement with political representatives and local authorities; and a community benefit fund which included a panel of local people in order to involve them in its governance.

Vattenfall, 2023[90]

Finally, impact assessment and consultation for communities are conducted in accordance with national regulation. This appears to be the most common approach across marine sectors and is the likely explanation for the lack of discussion about this within the wider company literature given national variation in EIA requirements. It is notable that it is companies with a more confined geographical reach (e.g., SSE in UK and Ireland) that provide the most detail about social action in their company reporting, presumably able to focus more closely on action that aligns with the national regulatory and voluntary frameworks.

The divergence of requirements for planning and development between nations is likely to make it more challenging for companies to set a clear policy approach to procedural justice, particularly for communities, at the project scale. With some marine industries new and developing and other marine operations seen as not relevant to coastal communities, there is a gap in regulatory requirements about who should be involved in decision-making, when and how.

Although nuclear is not a TCE relevant industry, the guidance on geological waste disposal[94] makes for an interesting comparison (Box 4). Whilst it may not be fair to weigh the social impacts of a geological disposal site with those of offshore aggregate dredging, for example, and investment in decision-making should be proportionate, it nonetheless sheds light on the ability of regulators to give a strong steer in leading public participation in environmental decision-making. Given the lack of evidence collected about social impacts of many marine industries with which to consider what a proportionate participatory process might be, it becomes all the more clear that investment in evidence gathering is needed.

Box 4 A case for comparison:
Implementing geological disposal – Working with communities

The geological disposal guidance details a comprehensive siting process that is expected to last for more than ten years.

The process begins with a working group set up to gather information about people and organisations who will be interested or affected by the proposal. This information should be wide-ranging, covering geographic, social, economic, environmental, cultural, and administrative factors, and engaging directly with community issues and local authorities.

From this, a community partnership is set up, the purpose of which is to lead community discussion, identify investment priorities, develop a community vision and so forth.

The guidance additionally gives examples of engagement practices, media, and addressing accessibility/inclusion concerns.

Crucially, there is government funding to deliver the community engagement plus additional community investment funding for economic and infrastructure development throughout the process of siting. This is increased should a candidate site move the final stage of deephole boring.

The process culminates in a Test of Public Support which is binding, and prior to which the host community can withdraw at any time.

BEIS[92]

Distribution: fair distribution of costs and benefits

Distribution – the fairness of how **benefits and costs** resulting from a decision are distributed.

The third pillar of social justice is fair distribution of resources and impacts, good and bad. The academic literature demonstrated a strong socio-economic focus and the industry literature demonstrates the same. Within the industry literature, measurement of distributive justice is largely confined to positive impacts, namely socio-economic benefits within local economies and supply chains, and community investments and benefits, which vary in how geographically tied they are to a site or project.

Cited issues and activities include community shares (typically in accordance with recent German legislation for energy projects); mandatory and voluntary community benefit

schemes (largely in the UK and Ireland, and an example in Poland); fairness in the energy transition for workers in sectors being phased out; energy poverty; employment (local and general); local supply chain and procurement; and paying tax. To fulfil global corporate ESG requirements, many companies have schemes aimed at certain SDG themes, such as empowerment of women or cultural heritage, which may or may not be in countries they operate in, and when they are, may not be connected with sites of operation.

This small number of examples highlights the commonalities in approach across sectors but also national divergence in approach. These differences mirror the assumptions made about who is affected by or has interest in different marine activities and regulatory divergence.

Whilst community benefit schemes are mandatory for onshore wind, they are largely voluntary for offshore wind, leaving community identification and scheme design open for developers to decide upon. Here distributive justice crosses paths with motivations such as being a good neighbour or compensating host communities. Community benefit scheme practices for offshore wind projects in the UK and Europe were evaluated in 2014[95] producing some guidance on what good practice looks like (summarised in Box 5). The guidance includes elements responding to all three pillars of social justice. It would be beneficial to review community benefit approaches that have developed in the intervening decade for evidence of change in practice and reflection on what good practice looks like.

Box 5 Good practice for Community Benefit Schemes

- The current [2014] framework of non-restrictive guidance should be maintained to retain a high degree of flexibility for developers and communities.
- Developers and local authorities should clarify the meaning and limitations of community benefits when entering negotiations with relevant communities.
- Consideration should be given to the emerging state of the industry.
- The preparation of particular benefit models should be undertaken at the earliest possible stage.
- The determination of potential beneficiary communities should be carried out in a joint process with local stakeholders.
- Early community consultation should be undertaken regarding how community funds should be delivered and managed.
- Early and thorough engagement with local communities should be a first step for assessing the needs and concerns of communities, but also for discussing appropriate and desired benefit models.
- Local authorities can play a useful role in linking the needs of communities with the willingness of developers to provide benefits.
- Communities should be supported to build capacity needed for maximising benefits:
- The choice of benefit models should remain open and flexible to achieve greater effectiveness in providing benefits.
- Indirect benefits should be pursued as well as establishing direct community benefits.

Rudolph et al., (2014)[85]

Coming again from the offshore wind sector, the supply-chain benefits focus can be clearly linked to the processes of project development and approval processes, for example through the Contracts for Difference requirements. In 2014, Rudolph et al. [95] stated that within the UK and Europe, only the Scottish government was considering factors beyond supply chain benefits. The most recent UK Government consultation on Contracts for Difference Allocation Round 7[e] suggests there has been little movement on this front.

Within the industry literature reviewed, there were three examples of community investment. The first was SSE Networks' Resilient Community Fund that was set up in 2015 in response to the regulator OFGEM identifying substantial amounts of unpaid compensation. As this does not relate to marine industry but rather the electricity network, this will not be further discussed. Specifically relating to offshore wind were SSE Renewable's Community Investment Review 2022/23[96] and Vattenfall's consultation process developing a new Community Benefit Fund (CBF) for the Norfolk Offshore Wind Zone[97]. Together, these give insight into both the process of design and the nature of operation of UK community benefit funds, albeit from different developers and are presented in more detail in Box 6.

Looking across sectors, the primary narrative around distributive justice was support for DEI, particularly gender equality, typically within the workforce and sometimes through corporate sponsorship or projects. This again ties in with SDG and ESG reporting pressure. Another dominant narrative was the social value of providing energy and carbon reduction, dominant in the energy sector. Overall, it was very difficult to get a sense of how distribution in the marine context is understood or practiced by industry.

Distributive justice is the foundation of social impact assessment and as part of the analytical process references easily relatable to key themes of social impact assessment[12] were noted (see Section 3.2 for list). This was not a rigorous process of qualitative evaluation, but an attempt to garner an overall impression of how much different factors are taken into account. Most commonly referenced were local procurement/supply chain, stakeholder engagement, community engagement, due diligence, human rights and gender issues. This is in keeping with the discussions about company reporting and, as we have seen, the depth to which these factors are considered/mitigated is highly variable. At the other end of the scale, factors rarely or not mentioned at all included themes relating to psychosocial impacts, displacement/resettlement, in-migration, social impact management plans, community resilience, empowerment, and mitigation of social impacts. Taking into account all the factors discussed, there is a clear need for methodological and regulatory support and guidance for social impact assessment to be developed.

[e] https://www.gov.uk/government/consultations/introducing-a-contracts-for-difference-cfd-sustainable-industry-reward

Box 6 Community benefit design and implementation

Design of Vattenfall £15m Community Benefit Fund, Norfolk Offshore Wind Zone:
An ongoing project of multiple phases. First, Norfolk region wide survey, comprising closed questions: what people value in Norfolk, what they think is needed in their area, and what support is needed for the green transition locally. As multiple selection questions, the range of options was limited to those pre-determined by the developer (see Table). The survey elicited responses from a range of demographics across the area, though there were clusters of responses in urban centres not along the cable corridor.

Survey options and workshop themes from Vattenfall's Community Benefit Fund consultation.[96] Options and themes are presented in high to low order of rank according to the responses.

Phase 1 survey responses		
Valued locally	Wanted locally	Needed for green transition
The landscape	Environment/ nature projects	Green heating for homes
Norfolk way of life	Community events and action	Community-led design
Heritage and culture	Education and life-long learning	Rural connectivity
Things to do	Climate smarter towns	Connecting to nature
The people	Jobs	Green jobs
Affordable living	Climate smart rural living	Helping to enhance "living locally"
Life chances	Opportunities to thrive	Re-thinking local resources
Transport connections	Energy efficiency schemes	Help with energy saving

Phase 2 workshop themes	
Transport and Connectivity	Community Facilities
Green Jobs	Advice and support
Nature and Gardens	Climate Adaptation
Community Hubs	Lighting
General comments/questions about fund/governance	

Second, consultation through community workshops in parishes along the cable corridor itself. These were used to elicit concerns, needs and priorities in the immediately impacted communities. Although it is not clear from the report how the workshops were structured, they produced a set of themes (see Table). The themes and ideas were analysed from a multi-disciplinary perspective through an internal team workshop. Phase 3 is reported online[a] to have been a set of further workshops delivered on a district-by-district basis, to build these themes into potential projects.

This case study exemplifies how communities of place might be engaged with to determine CB design and priorities. It reflects elements of good practice (see Box 5) such as early and thorough community consultation on delivering the funds and assessing needs and concerns. However,r it is not clear how the CBF model was arrived at in relation to other structures, for example, shared ownership, and any capacity building activity to support the community in the process. The community engagement occurs after the CBF model and fund size have been determined.

Implementation of SSE Renewables Community Investment:
SSE Renewables' stated principles for community investment are: value based; community focus; transparency; lasting legacy; good governance; place-based; flexible funding; social impact aligned with SDGs. It is difficult to fully review the claim without examining each of some hundreds of projects funded. However, examples given in the latest report do indicate a strategy that has some breadth to it. For example, funds are made available at local and regional scales, and specifically for skills and scholarship, reflecting some flexibility in who the beneficiaries are. Example funded projects include themes of fuel poverty; low carbon community buildings; innovative green projects; arts and recreation; inclusive opportunities (e.g., autism); community development (capacity building/empowerment); apprenticeships; warm community places; facilities for children/families; schools programme; safeguarding local assets. The schemes are predominantly grants, but the report also notes SSE working on a community ownership scheme for a new site, and company engagement with the Scottish Government working group updating Good Practice Principles for Community Benefits from Offshore Renewables.

4.3.4. Key findings from industry literature

This section has considered a range of ways in which industry and industry bodies approach social impact assessment. There is a wide variation in why, what and how social impacts are measured between different marine industries. Offshore wind and renewable energy are leading the way in SIA, although still has room for development in the social domain. Assessments within aggregates and cables are particularly disconnected from social impact, especially for coastal communities, focusing instead on at-sea interactions.

The motivations for considering social impact are found to be primarily led through the pressures upon companies to demonstrate good performance in ESG sustainability and the regulatory environment around both company performance and project delivery.

These motivations have led to a consistency in approaches to what social factors are measured and how, as are prescribed particularly through national regulation. Variation between countries' regulation means that approaches to social impact assessment at the project level are not necessarily consistent even within a single company. There is also a disconnect between the company-scale of social sustainability evaluation and on-the-ground project SIA. EIA is seen to be particularly important for project impact assessment and as this is focused on environmental impacts and their consequences for human health, there is a lack of requirement for broader social impact assessment and a lack of methodologies for developers to draw on.

The pillars of social justice should be familiar to industry in the context of stakeholder identification and mapping and stakeholder engagement, and, through EIA, distribution of benefits. However the gap between company and project is evident, and the core driver of regulation leads to narrow interpretations or even scoping out of some of these justice factors.

Image by Dan Bolt/UPY 2023

5. Discussion and implications

The purpose of this study was to review the evidence on how the marine activities which the Crown Estate interacts with have social impacts and value for coastal communities. Section 4 has set out a wide range of findings from the evidence review considering how academic research and industrial practice understand and approach the issue of social impact. Here in Section 5, these findings are brought together to directly respond to the research questions (see Table 2).

The questions are taken in turn, highlighting the key relevant findings from the evidence review. First we look at motivations and trends in social impact (5.1); then the tools that are being applied in social impact assessment (5.2); and finally we consider what the evidence has shown about coastal community empowerment and participatory governance (5.3). The recommendations based upon the review are then presented in Section 6.

5.1. Motivations and trends in social impact

5.1.1. Which types of organisation are measuring social impact and why?

Social impact is being measured by researchers, industry bodies, and companies at both company and project scales. The ways in which social impact is defined and approached reflect the motivations for measurement which in turn vary according to who is doing the measuring.

Research institutions are engaged in measurement of social impact across a range of marine industries, though not with equal effort. Offshore wind and other renewable energies are the main focus of research, and there is a strong motivation to understand social barriers to deployment of these technologies, driving research efforts to investigate perceptions and attitudes associated with acceptance of these technologies prior to and post-deployment, and spatial conflicts with other marine uses. In this way there is a strong focus on informing how siting decisions are made. Within this body of research, are approaches to marine social impact assessment seeking to understand how communities of geography are impacted by individual projects, including perceptions of participation in the decision-making process. Overall, the main motivation of the research effort appears to be around acceptance and attitudes to predict and reduce opposition to developments. SIA principles and social justice pillars are much less present in the research.

Researchers are also working in partnership with companies and industry bodies, much like how this present study has been conducted. **The Crown Estate** is leading the way in sector-level industry research, with a track record of reports gathering evidence about multiple sectors either alone (e.g., offshore wind) or collectively (e.g., seabed use). Such reports have been produced with research organisations and industry bodies, such as **BMAPA** and the **Seabed User & Developer Group**. Over time, the focus of these reports has developed from efforts to account the social value in socio-economic terms, to increasingly consider positive and negative impacts with a wider understanding of what constitutes social impact.

Companies are very strongly engaged in social impact assessment at both company and operational levels. At company level, the primary motivation is compliance with mandatory

reporting requirements and external pressure for more engagement with sustainability. A benefit of engaging with social sustainability is that it supports a good reputation. Many companies state an ethos reflecting sustainability principles that includes being a good neighbour and contributing social value through their operations. At the operational level, compliance with regulatory requirements, particularly through planning and Environmental Impact Assessment, are powerful drivers of social impact assessment. In most cases, the approach to social impact assessment is shaped by the guidance for these regulatory mechanisms. These drivers transcend national boundaries.

A motivation for all those engaging in social impact assessment is to measure and evidence economic impacts in particular. This includes evidencing social value, such as job creation; investigating perceived economic impacts, such as property price effects; and evaluating the economic impacts of Community Benefit Schemes. In many cases, the aim is to sell the positives, mitigate or evidence away the negatives, and support design of effective CBS.

The evidence review shows there is a willingness and appetite for social impact assessment but that narrow understandings of social value and social impact are limiting the extent of current activity.

5.1.2. Are some marine sectors appearing more commonly in the industry and/or academic literature on social impact, and has this varied over time?

There is a clear pattern of sector engagement in social impact assessment with energy sectors, especially offshore wind, at the forefront of research and practice. The methodology of this study did specifically include investigation of offshore wind developers for sourcing industry literature, but considerable effort was made to find both academic and industry literature from other sectors. In both sources, **sub-sea cabling was the least represented sector, with carbon capture and storage (CCS) and marine aggregates not far behind**. For CCS, the main focus seems currently to be on technical feasibility and acceptability; and for aggregates, the main focus is on the social impacts associated with shore-based operations.

There is an overall increase in research publications about marine industry and social factors over time, showing that generally there is more interest and engagement with social dimensions. Industry publications reflect the growing interest in ESG and non-financial reporting requirements.

5.1.3. Are there particular framings of social impact appearing in practice or research?

The evidence review highlights some very strong framings of social impact that consistently appear in both research and practice. **Socio-economic** framings dominate all social impact assessment approaches. Most commonly, this is interpretated as contribution to the local or wider economy through job creation and supply chain. The scale of these assessments varies, to include sector-wide, national scale evaluations and predictions, down to the impacts for local communities of place. Predictions and evaluations are used to evidence the positive social value created by sectors or projects. At the project scale these are **not typically monitored to connect predictions with real-life outcomes**, for example, how many of the jobs created are long term, or are filled by local people, particularly the higher-skilled and higher-paid roles.

A strong theme within socio-economic assessment is the design and effectiveness of **community benefit schemes**. As a specific area of impact, research and practice around CBS extends from monetary evaluations of investment to much wider considerations of CBS design and delivery. These include co-design with communities, participatory governance of schemes, and a range of types of social value, such as community resilience to climate change, inclusion of people with certain disabilities, arts and sports, and so on. **Without formal requirements for offshore wind and no requirements for any sectors, this is highly variable in practice, in both monetary and social terms.**

Within the socio-economic framing, there is also a strong focus on **interactions between marine industries at sea**, most particularly between structures, such as turbines, and fishing and tourism/recreation industries. Usually this is spatially and economically segregated from the place-based communities that are supported by and identify with these industries. As a hypothetical example, examining the economic consequences for fishermen who are displaced from an area for construction or operation of a new project, but not extending assessment onshore by considering that the majority of those fishing in that area may live and land in a single coastal community which is highly dependent upon the fishing sector within its economy and cultural heritage. Research and practice both often frame this as a community focus, with a distinct focus on stakeholder engagement that is often limited to industry stakeholders.

Beyond socio-economic framings, the next most common framing is of **acceptability**. This of course also links to and is informed by socio-economic assessments, but there is an underlying motivation to reduce opposition to enable development to occur with minimal conflict. Within this framing, perceptions are heavily researched, including **perceptions of risk of impact rather than evaluation of actual impacts**. This can be viewed as a knowledge deficit where 'incorrect' perceptions need to be corrected so that opposition is removed. For example, acceptance and attitude approaches sometimes segment people into groups of particular values/attitudes which can be predicted using demographic data. The aim is to predict potential responses in a given site, or to devise communication and engagement strategies to reduce opposition in specific groups.

A particular challenge for such acceptance-focused research and practice, is that people may not know how they might be impacted by a project until after the project is constructed. They might view it as more impactful, or less, or be impacted in ways that were not anticipated. Notwithstanding the limitations of some acceptance-focused research discussed above, **this field would benefit from expansion into whole of life approaches that deliver monitoring and enable opportunity for mitigation or compensation during the operational phase**.

At its most cynical, acceptance research approaches this as how much financial investment can be given to a community to appease them, or how can people be educated to hold the 'correct' perceptions. At its most sophisticated, research investigates the nuances of place and community to uncover how projects might be best sited or designed to remove these potential harms to communities. How people and communities are positioned within research substantially alters how acceptability is approached. How can we make them accept this, versus how can we identify the best location socially for this project.

This difference in community position is particularly evident in the research framing around **place**. The wind energy sector in the UK, onshore and offshore, has moved from the Not In My Back Yard (NIMBY) framing of local opposition, to a much more nuanced understanding of place attachment and place identity and how this influences people's response to change in place. **Coastal communities are no less attached to their seascape and coastal towns than are rural communities** and this has been embraced within offshore wind development in respect of visual impacts.

The review has found that **emergent sectors** are typically not advanced in social impact assessment. Indeed, it is understandable that a focus on technical feasibility comes first, since other consequences are moot if the project never happens. But it is important that such sectors **engage at the earliest opportunity with social impact assessment**, learning from more established sectors and current research and evidence, and not bypass through to acceptability without engaging in nuances of place and community that are increasingly better understood.

In practice, social impact framings are guided by the requirements of regulatory frameworks and the technical expertise of those doing the assessments. However, in research there is a breadth of research investigating a much wider range of social impacts at case study scales. These studies use social justice framings, investigate nuances of participatory governance, consider social impacts on specific groups of people in specific contexts, and cross boundaries between land and sea to recognise whole site/operation/project impacts, though often without sufficient replication by other researchers. Often, these are extending the reach of the research into marine energy projects, and such **creative approaches to social impact assessment** in less well-researched sectors would be hugely beneficial. There is however a question around how such research is able to impact upon practice. Partnerships such as the Vattenfall research programme may have more direct application than entirely academic outputs, but it is the latter than are likely to push at the boundaries of common practice.

5.1.4. Which social issues are highlighted as key concerns for specific sectors, and for the marine industry as a whole?

This is one of the most difficult research questions to address with this evidence review. The reason for this is the narrow set of framings for social impact assessment both in research generally, and in practice. There are some themes that have emerged. Socio-economic factors of job creation and supply chain impacts, together with local infrastructure investment are the key concerns of all industries. Visual impact is a key concern for developments visible at the shore, such as renewable energy structures. As is spatial conflict with other marine activities. The design and delivery of CBS for offshore wind projects, mirroring onshore wind regulatory requirements and developing expectations around community benefit. Acceptability appears to be a key concern for CCS.

The pattern of available information about marine sector engagement with social impacts clearly follows an out of sight, out of mind culture, that reflects both the visible and physical presence of the marine activity, and the regulatory requirements to engage with coastal communities. Marine operations to a considerable extent are segregated into offshore and onshore. Offshore social assessment is focused on spatial interactions and conflict between

marine industries at sea. Onshore social assessment is concerned with community benefits schemes and investments, and labour and supply chain factors.

Currently, sectors are not required to consider the whole geographical scale of operations, bringing together offshore operations with onshore processes, or connecting impacts occurring at sea with their indirect implications for onshore communities. There is also a **disconnect between offshore operations and the onshore infrastructure** that supports them. Not only new structures such as substations and landing points, but also changes to ports and industrial infrastructure. This segregation of offshore and onshore operations is potentially the reason why aggregates and subsea cables receive much less attention than do wind farms.

The IAIA SIA principles and research focused on SIA highlights a large range of potential impacts and in 4.3.3 the following were noted as missing from the evidence reviewed: psychosocial impacts, displacement/resettlement, in-migration, social impact management plans, community resilience, empowerment, and mitigation of social impacts. The review therefore has highlighted the scale of the challenge for holistic social impact assessment of marine industries, integrated across sectors and boundaries.

Recommendation: IAIA SIA principles should be used to inform impact assessment in practice.

5.2. Social impact assessment tools

5.2.1. What metrics or frameworks are currently being applied in marine governance in practice in the UK?

There is a clear link between regulatory requirement and social impact assessment methods in practice. At the company scale, compliance with non-financial reporting requirements, human rights legislation and associated corporate frameworks, drives what is evaluated and how. Clear quantitative metrics are reported, such as the proportion of women in the workforce, or the monetary investment in social responsibility projects. The metrics are broadly standard across company reporting, whether mandatory or voluntary evaluations.

At the project level, compliance is directed towards industry standards and Environmental Impact Assessment (EIA) and associated guidance. Standards inevitably vary by industry, for example as they relate to traffic management or construction health and safety. EIA sets a consistent framework for those projects which require it, and there is broad consistency across EIA scoping and Environmental Statements, due to the technical expertise of companies which deliver EIA services. Social/economic metrics which always feature relate to environmental impacts which affect human health, such as air and water pollution; interactions with other industries, namely fishing and recreation; and economic contribution. Metrics deployed might be at local, regional or national scale, depending on the impact being assessed and the availability of baseline data. Additionally, metrics relating to visibility of infrastructure are deployed using geographical proximity and sight lines from designated land and buildings to underpin assessment of potential change.

No metrics or frameworks were identified in practice that engage with the Social Impact Assessment Principles or which were cognisant of the social justice pillars. Distribution

does feature as an element to be scoped in EIA, however this seems typically to be scoped out for offshore projects.

5.2.2. What metrics or frameworks are there within the academic literature, or international frameworks, that could be applied in practice?

The academic literature broadly had two approaches to this topic. Some academic studies mirror the kinds of social impact assessment being done in practice already, particularly invoking socio-economic metrics relating to job creation and supply chain, or assessing potential benefits and outcomes of case studies in those terms. These tended to assess more clearly social impacts (such as changes to place) in economic terms, such as willingness to pay or through choice experiments.

Within this context, some studies used social marketing approaches to segment communities or general public into groups with identifiable characteristics associated with their acceptance or opposition to a project or sector. Whilst there is certainly utility to understanding relationships between attitudes and other factors, if applied in practice there is always a danger of reducing people to a type of person which might both alienate them and risk inciting more conflict by reducing the space for them relate to the issue through multiple aspects of their personal identity[f]. This also tends to neglect the influence of place relationships which mean that people with a shared value set in one place may not respond the same way in another place.

The other academic approach explores a much wider set of potential social impacts, and in some cases seeks to develop novel frameworks to enable a replicable methodology for assessment. The review suggests that **in the context of marine industry, the research is still relatively immature in most social domains** (with the exception of place) to enable confident application to practice. Novel frameworks are not often replicated in the research and no evidence was found of them being applied in practice.

Most clearly applicable to practice are the evaluations of community benefit schemes, and there is evidence that these findings are being adopted. For example, through co-design and community governance of funds. Similarly, the research on place is coming through in practice with more recognition of the touch-points between a project and place character, beyond simply households with sight of the development. Some studies used visual aids to convey the look of a future development to support community engagement, which has seen application in practice.

There remains a large gap between academic theories around social justice and social impact assessment, and their application in practice, and thus an opportunity to learn from the growing social scientific evidence. The application of academic evidence in practice must perhaps go through the intermediary step of being built into regulatory requirements. If regulators ask for a wider set of social impact assessment criteria, and if they ask for developers to apply thinking and transparency to who will be recognised as stakeholders, what procedural engagement that will confer on them, and how impacts will be distributed, beyond financial benefits, then developers will comply and technical consultants will develop

[f] See for example the UK marine conservation zone consultation process[98].

the skills required. These principles should therefore be mirrored in the work of public bodies and decision-makers also. Some key factors that could be most readily adopted might be, for example:

- Stronger guidance on different types of communities and stakeholders and how and when they should be engaged with.
- Requirements for more community co-design from the earliest stages.
- Mandatory community benefit schemes for marine developments with guidance on who should benefit from them.
- Requirement for more qualitative assessments of social impacts, such as sense of place.
- Requirement for clearer plans for mitigation and how these have been co-developed with affected people.

5.3. Coastal community empowerment and participatory governance in the UK

5.3.1. Where there are active attempts to increase participation, who is being invited and/or participating and why?

Stakeholder engagement is a mandatory part of project development, and this is largely done with local communities (defined by place) and those with an economic or regulatory interest, such as business sectors and local authorities. The review gave the impression that **economic interests are prioritised over local community interests in terms of earlier and more targeted engagement**. These activities are motivated by EIA requirements, efforts to secure consent, and technical and spatial feasibility at sea.

Community engagement ramps up post-consenting and especially during the construction phases of projects. One area where there is particular attention to communities is the design of community benefit schemes. Once the type of scheme is decided, communities are encouraged to inform the design of it, such as criteria and prioritisation, and its governance, through representation on community decision-making panels.

5.3.2. Are there evident missed opportunities for more participation in current practices?

The evidence indicated a common practice in academic research to ask experts about what potential social impacts might be rather than measuring social impacts in real-life projects and engaging with those who experienced them directly. There is therefore a gap and an opportunity to **extend the evidence base into more concrete evaluation of actual social impacts**. The Environmental Research and Monitoring Programme being delivered by the Vattenfall supported European Offshore Wind Deployment Centre (EOWDC)[89] is a strong example of how academics and industry can work together to develop the evidence base on social impacts.

The evidence review also generated some key themes about what good participation might look like. This included **early and funded engagement, centring the community, dedicated community liaison, open and inclusive participation which spans boundaries, and participation which is meaningful, influencing the decision-making process**, rather than

tokenistic and limited to communications and focused on acceptance. Marine industries who are conscious of social sustainability have the opportunity at any time to reflect on these themes and look to incorporate them voluntarily in their practice.

The most powerful opportunity for participation however, comes through regulatory change since this would apply to all industries and developments. There are a number of stages of a marine development process where participation could be changed to better inform the planning process about social impacts and to deliver procedural justice.

The first opportunity is the zoning of sea areas through marine planning both by TCE and by MMO. Currently dominated by technical feasibility according to physical and biological conditions, and existing industrial use, there is opportunity to incorporate key social indicators into marine planning. This might be informed by existing evidence, like this study, or targeted new research including that engages directly with coastal communities. **Viewing coastal communities as Indigenous to their local area would empower them** and enable learning from other countries in their approach to Indigeneity. TCE is already exploring the potential of social indicators in their Whole of Seabed programme, understanding the social sustainability implications of allocating seabed resources under different scenarios.

However, we do know from MMO marine plan processes that it can be challenging to engage people directly in offshore matters. Whilst the impact of building a house on a patch on green by one's home is very easy to imagine, the further away a project is or the less clear it is how it will connect with land and local communities, the more difficult it is to imagine what impact it might have. Similarly, different adjacent communities can have different responses and attitudes towards the same marine project due to factors of place identity and community (see 4.2.3 Assessment variables – Place). **Evidence gathering about realised impacts from existing projects is therefore crucial to support this stage of the process.** Understanding how marine projects have impacted upon communities – the positive, the negative, and the neutral – is the only way to develop confidence that social impact assessment is adequate and comprehensive. This evidence is needed across marine sectors, not only for offshore energy generation.

Another early opportunity is in the design of leasing competitions, and later through incentives such as Contracts for Difference and other such schemes aimed at improving social value of marine developments. Currently the social focus is limited to jobs and supply chains and, as we have seen throughout this report, these criteria establish early on the social priorities for project development. **Developers could be asked to provide evidence and plans that more comprehensively address social impacts and justice**, as is beginning to come through in the TCE Round 5 for offshore wind. In addition to responses on green growth, infrastructure, innovation, and skills in Contracts for Difference, a score for community participation could prioritise projects which show innovation in stakeholder identification and engagement, and early co-development with local communities. There is a strong incentive for developers to do this as it would help to identify and manage local conflict, reducing the risk of future project abandonment at a later stage. Literature reviewed in this study gives a good starting point as to what a good community participation might look like. It could be a requirement to commit funding to community participation throughout the life of the project.

A further key regulatory opportunity for truly transformative change is a more prescriptive and wider set of social impact assessments within EIA and planning (marine and terrestrial) and, crucially, within Strategic Environmental Assessment for the more significant projects. Delivery of social impact assessments would necessitate participation in order to gather context- and place-specific evidence. This would also trigger engagement much earlier in the planning process, consequently empowering communities to influence project design more than is currently the case and supporting delivery of just distribution. It should also be recognised that how different regulatory processes feed into one another is very important but is beyond what this review can inform.

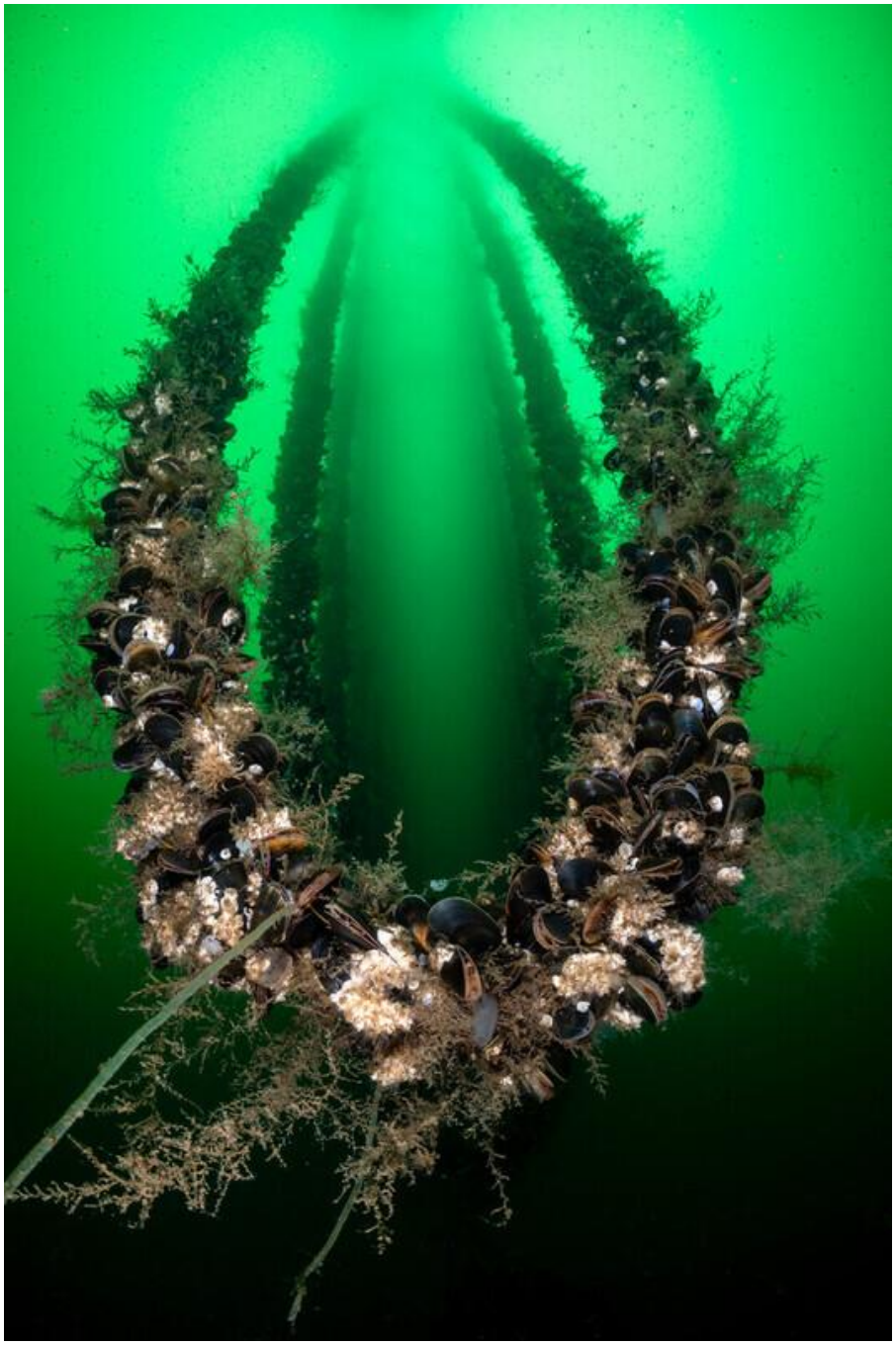

Image by Henley Spiers/UPY 2023

6. Recommendations

An aim of this evidence review was to draw up some recommendations to inform future research and practice. The cross-sector scope of the review has produced a range of recommendations for researchers, industry, and regulation, which are presented throughout the findings and below in **Table 9**.

There are also some core messages to recognise this opportunity for a change of mindset:

4) All people are a stakeholder in the management and exploitation of the marine environment, but coastal communities have a particular claim due to the geographical distribution of marine connected infrastructure and their direct cultural relationship with the sea. However, neither scale is currently well-served by centralised marine decision-making. Offshore development can and does impact coastal communities socially. More evidence is needed to interrogate the claims of community benefits and to identify or exclude potential social harms, and this must be place-based, recognising the important connection between the marine environment and coastal communities.
5) There is a need for a clearer terminology defining social factors and impacts to support communication and application of evidence. This will help develop standardisation that can be more readily taken up across sectors. This is particularly the case for defining stakeholders and what is meant by community, disaggregating between communities of geography, interest, and economics. It is easy to hide actual practices behind these terms and good governance requires transparent processes and definitions to enable scrutiny, challenge and improvement.
6) The review found that benefit / social value are defined in very limited terms, primarily concerning job creation and GVA. Financial and economic impact and benefit are not the only impact and benefit. It is difficult to quantify and measure other kinds of impact and benefit, but distributive justice demands a more wide-reaching evaluation which embraces the full scope of the social impact assessment principles.

Table 9 Specific recommendations developed through the cross-sector review of academic and industry evidence.

Research gaps	Location for more detail
Systematic review is undertaken on a sector-by-sector basis with defined social impact assessment criteria and examining the pillars of social justice.	4.2.5
More research is needed to deliver better baseline data on actual social impacts experienced from existing marine developments, offshore and onshore elements, across the life-cycle, and with a wide understanding of the term social impacts and recognition of place-based impacts.	4.2.5
Offshore wind: Research into interactions between offshore wind and tourism/fishing should extend its reach into communities where these are a significant part of the economy and community identity.	4.2.5
All sectors: The evidence base for other marine sectors should be grown by building on the groundwork laid by the offshore wind sector.	4.2.5

To address evidence gaps, more research is needed on the social impacts of CCS, cables, aggregates and, across marine sectors, onshore infrastructure.	4.2.5
Research diversification from acceptability and attitudes into actual social impacts and how these relate to predictions, where these exist (e.g., work by Glasson) across sectors.	4.2.5
More replication of frameworks proposed to test their efficacy in practice.	4.2.5
Clarification and transparency of who stakeholders are (place, interest, demographic, other?), why they are selected, and who is not being recognised as a stakeholder.	4.2.5
Action research to develop good participatory governance methodologies.	4.2.5
Need for social baseline indicators which extend beyond socio-economic framings for example, values, place relationships, community cohesion.	4.2.5
Deeper insight is needed into how planning (marine and terrestrial) and EIA, as the key formal routes to development, integrate with governance at the community level.	4.2.5
Sector	
Aggregates: There is a need for baseline evidence about social impacts, positive or negative, of marine aggregate activity upon coastal communities. This must extend to onshore infrastructure to give an holistic overview.	4.3.1
Cables: There is a significant gap in the evidence surrounding social impacts of subsea cables. Viewing cables as a sector may support evidence-gathering and enable assessment of compounded impacts through concentrated geographical spread of landing points.	4.3.1
CCS: Although a focus on technical feasibility is unsurprising for an emerging industry, the CCS industry has the opportunity to innovate in social impact assessment by embedding holistic thinking at this early stage, building on evidence from the offshore wind sector.	4.3.1
Ports: Engagement with the port sector is needed to support holistic social impact assessment of marine industries.	4.3.1
Offshore wind/renewables: The more established offshore wind and renewable energy sectors can continue to lead in the social domain by applying the SIA principles and social justice, putting research evidence into practice.	4.3.1
All sectors: Strengthening motivation for Social Impact Assessment with connection across the scales of company performance and project basis.	4.3.2
All sectors: Regulation at national and international scale needs to incorporate stronger requirements on social impact assessment and mitigation of negative social impact, drawing on the IAIA principles.	4.3.2
Company level	
Research into gaps in how human rights legislation is responded to by the marine sector, with particular attention to the new recognition of participatory environmental rights.	4.3.2
Regulatory guidance for participatory human rights within ESG and non-financial reporting context.	4.3.2

Development of standards (or encouragement to adopt existing standards) on social impact assessment, as distinct from the solely positive framing of social value.	4.3.2
Impact Assessment methodology revisions	
Need for more detailed guidance on scoping social impact to redress existing power imbalances between stakeholders.	4.3.2
More holistic approach to offshore marine sector conflicts and impacts. E.g., how dispersed are the impacts of a newly closed fishing are; will some communities be particularly affected due to the fishing ground used by fishermen in their community; what will the scale of the fishing industry impact be for that community more widely.	4.3.2
Broaden the scale of visual impacts out from designated landscapes/environments/buildings/routes, by including targeted evidence gathering of what/where is valued/used by the communities and why, in addition to formally designated sites and routes. And extend beyond visual to less tangible changes to character and sense of place.	4.3.2
More interrogation of social impacts at sea, such as changing access to archaeological sites.	4.3.2
The focus of cumulative impact assessment should centre communities at a range of scales to examine not only the cumulative impacts of like-developments, but other compounding factors influencing the community unit.	4.3.2
Further research, particularly action research which occurs in practice, is required to develop an holistic and integrated ESIA framework for marine developments.	4.3.2
Recommendation: IAIA SIA principles should be used to inform impact assessment in practice.	5.1.4

In commissioning this research, the Crown Estate is showing an interest in developing its own practice around the social impact assessment of marine industry and development. As a key marine decision-maker, TCE has influence upon marine governance in England, Wales and Northern Ireland, and has international recognition and standing. From this position, TCE can lead in developing fair and equitable marine governance by establishing a social impact assessment community of practice across marine sectors.

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8. Appendices

1. List of academic literature analysed

108 academic publications obtained through the literature searching methodology described in this report and used in the evidence review.

Authors	Article Title	Source Title	Date
Sitoe, AF; Hoguane, AM; Haddout, S	The ocean as a source of renewable energy in sub-Saharan Africa: sources, potential, sustainability and challenges	INTERNATIONAL JOURNAL OF SUSTAINABLE ENERGY	2023
Hateftabar, F; Hall, CM	Energizing tourism sustainably: A harmonious symphony of tourists' and locals' acceptance of renewable energy	JOURNAL OF ENVIRONMENTAL MANAGEMENT	2023
Moon, S; Kim, Y; Kim, M; Lee, J	Policy designs to increase public and local acceptance for energy transition in South Korea	ENERGY POLICY	2023
Caballero, MD; Gunda, T; McDonald, YJ	Energy justice & coastal communities: The case for Meaningful Marine Renewable Energy Development	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	2023
Liao, VTC	Marine spatial planning identifies solutions for offshore wind farms at fishery and environment in Taiwan territorial waters	ENERGY & ENVIRONMENT	2023
Gkeka-Serpetsidaki, P; Tsoutsos, T	Integration criteria of offshore wind farms in the landscape: Viewpoints of local inhabitants	JOURNAL OF CLEANER PRODUCTION	2023
Meehan, MC; Singh, GG; Ban, NC; Devillers, R; Claudet, J	Striking a balance between ecological, economic, governance, and social dimensions in marine protected area network evaluations	CONSERVATION SCIENCE AND PRACTICE	2023
Zimmerhackel, JS; Clifton, J; Ackermann, F; Burton, MP; Elrick-Barr, CE; Hill, G; Harvey, ES	A framework for the integrated assessment of social and economic values associated with man-made marine structures	MARINE POLICY	2023
Stelmach, G; Hazboun, S; Brandt, D; Boudet, H	Public perceptions of wave energy development on the west coast of North America: Risks, benefits, and coastal attachment	OCEAN & COASTAL MANAGEMENT	2023
Withouck, I; Tett, P; Doran, J; Mouat, B; Shucksmith, R	Diving into a just transition: How are fisheries considered during the emergence of renewable energy production in Scottish waters?	ENERGY RESEARCH & SOCIAL SCIENCE	2023
Wimhurst, JJ; Nsude, CC; Greene, JS	Standardizing the factors used in wind farm site suitability models: A review	HELIYON	2023
Shen, H	A critical assessment of the International Seabed Authority's implementation of the Common Heritage of Mankind principle from the perspective of benefit-sharing regime	INTERNATIONAL ENVIRONMENTAL AGREEMENTS-POLITICS LAW AND ECONOMICS	2023
Desvallées, L; de Sartre, XA	In the shadow of nuclear dependency: Competing pathways and the social acceptance of offshore wind energy in France	ENERGY RESEARCH & SOCIAL SCIENCE	2023
Fofack-Garcia, R; Mazé, C; Safi, G; Lejart, M; Chauvac, N; Thermes,	Socio-political acceptability of floating offshore wind farms in France: challenges	OCEAN & COASTAL MANAGEMENT	2023

M; Ragueneau, O; Le Loc'h, F; Niquil, N	and perspectives for marine governance towards sustainability		
Jacob, C; Diederichsen, SD; Fullbrook, L; Lombard, AT; Rees, SE; Rivers, N; Snow, B; Strand, M; Zuercher, R; Niner, HJ	A two way process-Social capacity as a driver and outcome of equitable marine spatial planning	MARINE POLICY	2023
Korsnes, M; Loewen, B; Dale, RF; Steen, M; Skjolsvold, TM	Paradoxes of Norway's energy transition: controversies and justice	CLIMATE POLICY	2023
El Kinani, K; Meunier, S; Vido, L; Le Ballois, S	Interdisciplinary analysis of wind energy-a focus on France	SUSTAINABLE ENERGY TECHNOLOGIES AND ASSESSMENTS	2023
Machado, JTM; de Andrés, M	Implications of offshore wind energy developments in coastal and maritime tourism and recreation areas: An analytical overview	ENVIRONMENTAL IMPACT ASSESSMENT REVIEW	2023
Frolova, M; Pérez-Pérez, B; Herrero-Luque, D	Diverse responses of coastal communities to offshore wind farming development in Southern Spain	MORAVIAN GEOGRAPHICAL REPORTS	2022
Getor, RY; Ramudhin, A; Keivanpour, S	Social acceptability of a wind turbine blade facility in Kingston upon hull	JOURNAL OF CLEANER PRODUCTION	2022
Salvador, S; Ribeiro, MC	Socio-economic, legal, and political context of offshore renewable energies	WILEY INTERDISCIPLINARY REVIEWS-ENERGY AND ENVIRONMENT	2023
Linnerud, K; Dugstad, A; Rygg, BJ	Do people prefer offshore to onshore wind energy? The role of ownership and intended use	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	2022
Bidwell, D; Firestone, J; Ferguson, MD	Love thy neighbor (or not): Regionalism and support for the use of offshore wind energy by others	ENERGY RESEARCH & SOCIAL SCIENCE	2022
Bingaman, S; Firestone, J; Bidwell, D	Winds of change: examining attitude shifts regarding an offshore wind project	JOURNAL OF ENVIRONMENTAL POLICY & PLANNING	2023
Dong, LR; Lang, CR	Do views of offshore wind energy detract? A hedonic price analysis of the Block Island wind farm in Rhode Island	ENERGY POLICY	2022
Glasson, J; Durning, B; Welch, K; Olorundami, T	The local socio-economic impacts of offshore wind farms	ENVIRONMENTAL IMPACT ASSESSMENT REVIEW	2022
Gkeka-Serpetsidaki, P; Papadopoulos, S; Tsoutsos, T	Assessment of the visual impact of offshore wind farms	RENEWABLE ENERGY	2022
Ram, B; Webler, T	Social amplification of risks and the clean energy transformation: Elaborating on the four attributes of information	RISK ANALYSIS	2022
Bacchiocchi, E; Sant, I; Bates, A	Energy justice and the co-opting of indigenous narratives in U.S. offshore wind development	RENEWABLE ENERGY FOCUS	2022
Marschke, M; Rousseau, JF	Sand ecologies, livelihoods and governance in Asia: A systematic scoping review	RESOURCES POLICY	2022
Elrick-Barr, CE; Zimmerhackel, JS; Hill, G; Clifton, J; Ackermann, F; Burton, M; Harvey, ES	Man-made structures in the marine environment: A review of stakeholders' social and economic values and perceptions	ENVIRONMENTAL SCIENCE & POLICY	2022
Buchmayr, A; Verhofstadt, E; Van	Exploring the global and local social sustainability of wind energy technologies:	APPLIED ENERGY	2022

Ootegem, L; Thomassen, G; Taelman, SE; Dewulf, J	An application of a social impact assessment framework		
Bjorkan, M; Billing, SL	Commercial Seaweed Cultivation in Scotland and the Social Pillar of Sustainability: A Q-Method Approach to Characterizing Key Stakeholder Perspectives	FRONTIERS IN SUSTAINABLE FOOD SYSTEMS	2022
Virtanen, EA; Lappalainen, J; Nurmi, M; Viitasalo, M; Tikanmäki, M; Heinonen, J; Atlaskin, E; Kallasvuo, M; Tikkanen, H; Moilanen, A	Balancing profitability of energy production, societal impacts and biodiversity in offshore wind farm design	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	2022
Billing, SL; Charalambides, G; Tett, P; Giordano, M; Ruzzo, C; Arena, F; Santoro, A; Lagasco, F; Brizzi, G; Collu, M	Combining wind power and farmed fish: Coastal community perceptions of multi-use offshore renewable energy installations in Europe	ENERGY RESEARCH & SOCIAL SCIENCE	2022
Fleming, CS; Gonyo, SB; Freitag, A; Goedeke, TL	Engaged minority or quiet majority? Social intentions and actions related to offshore wind energy development in the United States	ENERGY RESEARCH & SOCIAL SCIENCE	2022
Lee, CC; Huang, KC; Kuo, SY; Cheng, CK; Tung, CP; Liu, TM	Development of a Social Impact Assessment for the Water Environment: A Professional Perspective	WATER	2021
Fox, HK; Swearingen, TC	Using a difference-in-differences and synthetic control approach to investigate the socioeconomic impacts of Oregon's marine reserves	OCEAN & COASTAL MANAGEMENT	2021
Chapman, A; Shigetomi, Y; Ohno, H; McLellan, B; Shinozaki, A	Evaluating the global impact of low-carbon energy transitions on social equity	ENVIRONMENTAL INNOVATION AND SOCIETAL TRANSITIONS	2021
Tyler, G; Bidwell, D; Smythe, T; Trandafir, S	Preferences for community benefits for offshore wind development projects: A case study of the Outer Banks of North Carolina, US	JOURNAL OF ENVIRONMENTAL POLICY & PLANNING	2022
Laskowicz, T	The Perception of Polish Business Stakeholders of the Local Economic Impact of Maritime Spatial Planning Promoting the Development of Offshore Wind Energy	SUSTAINABILITY	2021
Motoori, R; McLellan, BC	Resource security strategies and preferences for deep ocean mining from a community survey in Japan	MARINE POLICY	2021
Hemmerling, SA; DeMyers, CA; Parfait, J	Tracing the Flow of Oil and Gas: A Spatial and Temporal Analysis of Environmental Justice in Coastal Louisiana from 1980 to 2010	ENVIRONMENTAL JUSTICE	2021
Campbell, LM; Fairbanks, L; Murray, G; Stoll, JS; D'Anna, L; Bingham, J	From Blue Economy to Blue Communities: reorienting aquaculture expansion for community wellbeing	MARINE POLICY	2021
Aponte, FR; Andersen, T; Norstebo, VS; Uggen, KT; Bjelle, EL; Wiebe, KS	Offshore Wind: Employment and value creation of EPCI exports in Norway	EERA DEEPWIND'2021	2021

Livzeniece, L; Pubule, J; Blumberga, D	Sustainability Assessment of Wind Energy in Latvia: Sustainability SWOT and Multi-Criteria Analysis	ENVIRONMENTAL AND CLIMATE TECHNOLOGIES	2021
Haggett, C; ten Brink, T; Russell, A; Roach, M; Firestone, J; Dalton, T; McCay, BJ	OFFSHORE WIND PROJECTS AND FISHERIES Conflict and Engagement in the United Kingdom and the United States	OCEANOGRAPHY	2020
Smythe, T; Bidwell, D; Moore, A; Smith, H; McCann, J	Beyond the beach: Tradeoffs in tourism and recreation at the first offshore wind farm in the United States	ENERGY RESEARCH & SOCIAL SCIENCE	2020
Boomsma, C; ter Mors, E; Jack, C; Broecks, K; Buzoianu, C; Cismaru, DM; Peuchen, R; Piek, P; Schumann, D; Shackley, S; Werker, J	Community compensation in the context of Carbon Capture and Storage: Current debates and practices	INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL	2020
Tercan, E; Tapkin, S; Latinopoulos, D; Dereli, MA; Tsiropoulos, A; Ak, MF	A GIS-based multi-criteria model for offshore wind energy power plants site selection in both sides of the Aegean Sea	ENVIRONMENTAL MONITORING AND ASSESSMENT	2020
Haraldsson, M; Raoux, A; Riera, F; Hay, J; Dambacher, JM; Niquil, N	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	2020
Hooper, T; Hattam, C; Edwards-Jones, A; Beaumont, N	Public perceptions of tidal energy: Can you predict social acceptability across coastal communities in England?	MARINE POLICY	2020
Slater, AM; Irvine, KN; Byg, AA; Davies, IM; Gubbins, M; Kafas, A; Kenter, J; MacDonald, A; Murray, RO; Potts, T; Tweddle, JF; Wright, K; Scott, BE	Integrating stakeholder knowledge through modular cooperative participatory processes for marine spatial planning outcomes (CORPORATES)	ECOSYSTEM SERVICES	2020
Upham, P; Johansen, K	A cognitive mess: Mixed feelings about wind farms on the Danish coast and the emotions of energy infrastructure opposition	ENERGY RESEARCH & SOCIAL SCIENCE	2020
Lamy, J; de Bruin, WB; Azevedo, IML; Morgan, MG	Keep wind projects close? A case study of distance, culture, and cost in offshore and onshore wind energy siting	ENERGY RESEARCH & SOCIAL SCIENCE	2020
Firestone, J; Hirt, C; Bidwell, D; Gardner, M; Dwyer, J	Faring well in offshore wind power siting? Trust, engagement and process fairness in the United States	ENERGY RESEARCH & SOCIAL SCIENCE	2020
Devine-Wright, P; Wiersma, B	Understanding community acceptance of a potential offshore wind energy project in different locations: An island-based analysis of 'place-technology fit'	ENERGY POLICY	2020
Lin, KJ; Hsu, CP; Liu, HY	PERCEPTIONS OF OFFSHORE WIND FARMS AND COMMUNITY DEVELOPMENT: CASE STUDY OF FANGYUAN TOWNSHIP, CHUNGHUA COUNTY, TAIWAN	JOURNAL OF MARINE SCIENCE AND TECHNOLOGY-TAIWAN	2019
Johansen, K; Upham, P	The post-normal politics and science of wind power planning: Evidence from a Danish near-shore wind farm tender	ENERGY RESEARCH & SOCIAL SCIENCE	2019
Kularathna, AHTS; Suda, S; Takagi, K; Tabeta, S	Evaluation of Co-Existence Options of Marine Renewable Energy Projects in Japan	SUSTAINABILITY	2019

Hevia-Koch, P; Jacobsen, HK	Comparing offshore and onshore wind development considering acceptance costs	ENERGY POLICY	2019
Dwyer, J; Bidwell, D	Chains of trust: Energy justice, public engagement, and the first offshore wind farm in the United States	ENERGY RESEARCH & SOCIAL SCIENCE	2019
Soma, K; van den Burg, SWK; Selnes, T; van der Heide, CM	Assessing social innovation across offshore sectors in the Dutch North Sea	OCEAN & COASTAL MANAGEMENT	2019
Firestone, J; Bates, AW; Prefer, A	Power transmission: Where the offshore wind energy comes home	ENVIRONMENTAL INNOVATION AND SOCIETAL TRANSITIONS	2018
Filer, C; Gabriel, J	How could Nautilus Minerals get a social licence to operate the world's first deep sea mine?	MARINE POLICY	2018
Firestone, J; Bidwell, D; Gardner, M; Knapp, L	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	2018
Rudolph, D; Haggett, C; Aitken, M	Community benefits from offshore renewables: The relationship between different understandings of impact, community, and benefit	ENVIRONMENT AND PLANNING C-POLITICS AND SPACE	2018
Pascoe, S; Beer, A; Thredgold, C; Young, M; Whetton, S	ESTABLISHING A SOCIAL AND ECONOMIC BASELINE PRIOR TO THE DEVELOPMENT OF AN OFFSHORE OIL INDUSTRY: AN EXAMPLE FROM THE GREAT AUSTRALIAN BIGHT	AUSTRALASIAN JOURNAL OF REGIONAL STUDIES	2018
Rydin, Y; Natarajan, L; Lee, M; Lock, S	Local voices on renewable energy projects: the performative role of the regulatory process for major offshore infrastructure in England and Wales	LOCAL ENVIRONMENT	2018
Scholtz, M; Saayman, M	Diving into the consequences of stakeholders unheard	EUROPEAN JOURNAL OF TOURISM RESEARCH	2018
Klain, SC; Satterfield, T; MacDonald, S; Battista, N; Chan, KMA	Will communities open-up to offshore wind? Lessons learned from New England islands in the United States	ENERGY RESEARCH & SOCIAL SCIENCE	2017
Sonnberger, M; Ruddat, M	Local and socio-political acceptance of wind farms in Germany	TECHNOLOGY IN SOCIETY	2017
Soukissian, TH; Denaxa, D; Karathanasi, F; Prospathopoulos, A; Sarantakos, K; Iona, A; Georgantas, K; Mavrakos, S	Marine Renewable Energy in the Mediterranean Sea: Status and Perspectives	ENERGIES	2017
Mabon, L; Kita, J; Xue, ZQ	Challenges for social impact assessment in coastal regions: A case study of the Tomakomai CCS Demonstration Project	MARINE POLICY	2017
Benham, CF	Aligning public participation with local environmental knowledge in complex marine social-ecological systems	MARINE POLICY	2017
Nichifor, MA	Public reactions towards wind energy instalments. Case study: Romania and the Netherlands	MANAGEMENT & MARKETING-CHALLENGES FOR THE KNOWLEDGE SOCIETY	2016
Kim, T; Park, JI; Maeng, J	Offshore wind farm site selection study around Jeju Island, South Korea	RENEWABLE ENERGY	2016
Bidwell, D	The Effects of Information on Public Attitudes Toward Renewable Energy	ENVIRONMENT AND BEHAVIOR	2016

Shiau, TA; Chuen-Yu, JK	Developing an Indicator System for Measuring the Social Sustainability of Offshore Wind Power Farms	SUSTAINABILITY	2016
de Groot, J; Bailey, I	What drives attitudes towards marine renewable energy development in island communities in the UK?	INTERNATIONAL JOURNAL OF MARINE ENERGY	2016
Petrova, MA	From NIMBY to acceptance: Toward a novel framework - VESPA - For organizing and interpreting community concerns	RENEWABLE ENERGY	2016
Börger, T; Hooper, TL; Austen, MC	Valuation of ecological and amenity impacts of an offshore windfarm as a factor in marine planning	ENVIRONMENTAL SCIENCE & POLICY	2015
Bates, A; Firestone, J	A comparative assessment of proposed offshore wind power demonstration projects in the United States	ENERGY RESEARCH & SOCIAL SCIENCE	2015
Chen, JL; Liu, HH; Chuang, CT	Strategic planning to reduce conflicts for offshore wind development in Taiwan: A social marketing perspective	MARINE POLLUTION BULLETIN	2015
Bonar, PAJ; Bryden, IG; Borthwick, AGL	Social and ecological impacts of marine energy development	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	2015
Hall, DM; Lazarus, ED	Deep waters: Lessons from community meetings about offshore wind resource development in the US	MARINE POLICY	2015
Chen, JL; Liu, HH; Chuang, CT; Lu, HJ	The factors affecting stakeholders' acceptance of offshore wind farms along the western coast of Taiwan: Evidence from stakeholders' perceptions	OCEAN & COASTAL MANAGEMENT	2015
Nordman, E; VanderMolen, J; Gajewski, B; Isely, P; Fan, Y; Koches, J; Damm, S; Ferguson, A; Schoolmaster, C	An Integrated Assessment for Wind Energy in Lake Michigan Coastal Counties	INTEGRATED ENVIRONMENTAL ASSESSMENT AND MANAGEMENT	2015
Vazquez, A; Iglesias, G	Public perceptions and externalities in tidal stream energy: A valuation for policy making	OCEAN & COASTAL MANAGEMENT	2015
Smyth, K; Christie, N; Burdon, D; Atkins, JP; Barnes, R; Elliott, M	Renewables-to-reefs? - Decommissioning options for the offshore wind power industry	MARINE POLLUTION BULLETIN	2015
Brownlee, MTJ; Hallo, JC; Jodice, LW; Moore, DD; Powell, RB; Wright, BA	Place Attachment and Marine Recreationists' Attitudes toward Offshore Wind Energy Development	JOURNAL OF LEISURE RESEARCH	2015
Krupa, J; Galbraith, L; Burch, S	Participatory and multi-level governance: applications to Aboriginal renewable energy projects	LOCAL ENVIRONMENT	2015
Kannen, A	Challenges for marine spatial planning in the context of multiple sea uses, policy arenas and actors based on experiences from the German North Sea	REGIONAL ENVIRONMENTAL CHANGE	2014
Fanning, T; Jones, C; Munday, M	The regional employment returns from wave and tidal energy: A Welsh analysis	ENERGY	2014
Ek, K; Persson, L	Wind farms - Where and how to place them? A choice experiment approach to measure consumer preferences for characteristics of wind farm establishments in Sweden	ECOLOGICAL ECONOMICS	2014

Rudolph, D	The Resurgent Conflict Between Offshore Wind Farms and Tourism: Underlying Storylines	SCOTTISH GEOGRAPHICAL JOURNAL	2014
Wiersma, B; Devine-Wright, P	Public engagement with offshore renewable energy: a critical review	WILEY INTERDISCIPLINARY REVIEWS-CLIMATE CHANGE	2014
Gurney, GG; Cinner, J; Ban, NC; Pressey, RL; Pollnac, R; Campbell, SJ; Tasidjawa, S; Setiawan, F	Poverty and protected areas: An evaluation of a marine integrated conservation and development project in Indonesia	GLOBAL ENVIRONMENTAL CHANGE-HUMAN AND POLICY DIMENSIONS	2014
Kerr, S; Watts, L; Colton, J; Conway, F; Hull, A; Johnson, K; Jude, S; Kannen, A; MacDougall, S; McLachlan, C; Potts, T; Vergunst, J	Establishing an agenda for social studies research in marine renewable energy	ENERGY POLICY	2014
Hooper, T; Austen, M	Tidal barrages in the UK: Ecological and social impacts, potential mitigation, and tools to support barrage planning	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	2013
Johnson, K; Kerr, S; Side, J	Marine renewables and coastal communities-Experiences from the offshore oil industry in the 1970s and their relevance to marine renewables in the 2010s	MARINE POLICY	2013
Haggett, C	Understanding public responses to offshore wind power	ENERGY POLICY	2011
Devine-Wright, P	Enhancing local distinctiveness fosters public acceptance of tidal energy: A UK case study	ENERGY POLICY	2011
Trivourea, MN; Karamanlidis, AA; Tounta, E; Dendrinos, P; Kotomatas, S	People and the Mediterranean Monk Seal (Monachus monachus): A Study of the Socioeconomic Impacts of the National Marine Park of Alonissos, Northern Sporades, Greece	AQUATIC MAMMALS	2011
Devine-Wright, P; Howes, Y	Disruption to place attachment and the protection of restorative environments: A wind energy case study	JOURNAL OF ENVIRONMENTAL PSYCHOLOGY	2010
Firestone, J; Kempton, W; Krueger, A	Public Acceptance of Offshore Wind Power Projects in the USA	WIND ENERGY	2009
Warren, CR; Birnie, RV	Re-powering Scotland: Wind Farms and the 'Energy or Environment?' Debate	SCOTTISH GEOGRAPHICAL JOURNAL	2009
Tsiourtis, NX	Criteria and procedure for selecting a site for a desalination plant	DESALINATION	2008

2. List of industry literature analysed

Organisation grouping	Snowballing through membership	Literature accessibility	Documents included in analysis
Marine industry and sectors			
The Crown Estate (TCE)	n/a	Publicly available	• An Economic and Social Evaluation of the UK Subsea Cables Industry, 2016 • Understanding the Impacts of Offshore Wind Farms on Well-Being, 2015

			• Aggregate Dredging and the Marine Environment: an overview of recent research and current industry practice, 2013
British Marine Aggregate Producers Association (BMAPA)		Key reports publicly available	Marine aggregate dredging and the coastline: a guidance note, 2013
	Brett Group Owned by Brett Group: Britannia Aggregates Volker Dredging		Environmental & Sustainability Report January to December, 2022
	CEMEX UK Marine		• Social impact Strategy • Community investment pillars
	DEME Building Materials		Annual report, 2022
	Hanson Aggregates Marine		• Social Value Policy • Heidelberg Materials UK sustainability policy
	Northwood (Fareham)	Dissolved	None
	Norwest Sand & Ballast Co	Dormant	None
	Sea Aggregates	Dormant	None
	Tarmac Marine		Act: Sustainability Strategy, 2021
Seabed User and Developer Group (SUDG)		Documents from news stream	Study of the Socio-economic Benefits of Marine Industries, 2019
	European Subsea Cables Association (ESCA)	Mostly available only to members, no document titles clearly relevant	None
	RenewableUK	Only open to members	None
	Carbon Capture & Storage Association (CCSA)	Minimal documentation publicly available.	CCUS Delivery Plan, 2035
	EnergyUK		Outside of scope; captured through other sources
	British Marine		Outside of scope; captured through other sources
	UK Major Ports Group (UKMPG)	Policy areas public, member login for other	Development policy (https://ukmajorports.org.uk/policies/development/)
	Offshore Energies UK	Mostly member only access	
	British Ports Association	Freely available reports	Ports & coastal communities: Community outreach case study report
	TCE	As above	
	MPA marine aggregates	As above (BMAPA)	
Suboptic Association		Nothing available to public	
International Energy Agency (IEA) Task 28	n/a	A range of publicly available industry and academic literature.	Implementing Agreement for Co-operation in the Research and Development of Wind Energy Systems (IEA Wind TCP) Phase IV Work Plan (2020-2024)

Misc		ClimateXChange	• Community Benefits from Offshore Renewables: Good Practice Review, 2014 • Net Zero Sense of Place Framework, 2023
Leading offshore wind developers in the UK			
Numerous public reports. Predominantly Annual Reports; Sustainability Strategies and Reports; Corporate Social Responsibility activities; various development specific information.			
Equinor	• Integrated Annual Report, 2022 • Energy transition plan, 2022 • Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report, 2019		
Iberdrola	• Policy on Respect for Human Rights, 2023 • General Sustainable Development Policy, 2023 • Sustainable Management Policy, 2022 • Sustainability scorecard, 2022 • Stakeholder Engagement Policy, 2022 • Statement of Non-Financial Information. Sustainability Report, 2022 • *Integrated annual report, 2022 – could not be downloaded*		
Ørsted	• Sustainability Report, 2022 • Economic Impact Study of Ørsted Investments in the Humber region. A Report for Ørsted UK, 2022 • Salamander Offshore Wind Farm: Environmental Impact Assessment Scoping Report 2023		
RWE	• Sustainability Strategy Report, 2022 • Sustainability Management Report, 2022 • Sustainability Performance Report, 2022 • Annual report, 2022		
SSE Plc SSE Renewables SSE Network	• Just transition: measuring progress. From action to accountability, 2023 • SSE plc Annual Report, 2023 • SSE plc Sustainability Report, 2023 • Just Transition: From Principles to Action Supporting workers transition from high to low-carbon careers, 2021 • Supporting A Just Transition, 2020 • Fifteen years of offshore wind, 2019 • BEATRICE Building for the Future: Socio-economic benefits and learnings, 2019 • Delivering Investment, Supporting Jobs: Understanding the socio-economic value from SSE Renewables' projects in Sutherland, 2021 • Community Investment Review, 2022-23 • Building Resilience: Resilient Communities Fund, 2017/18 • Resilient Communities Fund: Stakeholder consultation on criteria and scope of the fund, 2022		
Vattenfall	• European Offshore Wind Deployment Centre: Environmental Research & Monitoring Programme - Socio-Economic Study: Second Progress Report, 2019 • Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs), 2020 • The impacts of offshore wind farms on local tourism and recreation: a research study, 2021 • Responsibility towards indigenous peoples, 2021 • Summary of Vattenfall's Human Rights Assessment by BSR, 2021 • Materiality analysis, 2022 • Human rights action plan, 2022 • Annual and Sustainability Report, 2022 • Code of Conduct for Suppliers and Partners, 2023 • Human Rights Policy, 2023 • Norfolk Offshore Wind Zone Informed and Involved Communities: How we'll engage during the Construction of Norfolk Offshore Wind Zone, 2023 • Investing in Communities: Community Benefit Guide for Vattenfall UK's Onshore Wind projects • Norfolk Offshore Wind Zone Community Benefit Fund: The story so far - Phase 1 and Phase 2 workshops, 2023; and Climate Smarter Communities - Give My View survey results		
UK regulatory bodies (not included in evidence review but provided background context)			
England	Marine Management Organisation (MMO)		• Marine Plan Policy Assessment • Practical Framework for Outlining the Integration of the Ecosystem Approach into Marine Planning in England. MMO Project No: 1048

Wales	Natural Resources Wales / Welsh Government		• Welsh National Marine Plan • Vision, Objectives and Policies Welsh National Marine Plan • Statement of Public Participation for the Welsh National Marine Plan • Overview of Marine Sector Governance for Wales • Sustainability appraisal • Interim Marine Aggregates Dredging Policy South Wales • Social impacts and interactions between marine sectors
Northern Ireland	DAERA		• Draft Marine Plan for Northern Ireland • Marine Plan for Northern Ireland Statement of Public Participation
UK Government/ Agency other	Government BEIS JNCC		• UK Marine Policy Statement • Implementing geological disposal – Working with communities, 2018 • Supply Chain Plan Questionnaire. Contracts for Difference Allocation Round 6 • Exploring an integrated approach towards a sustainable blue economy, 2023
Relevant and emergent international frameworks and regulation/legislation			
United Nations	Global Compact		
OECD	Guidelines for multinational enterprises on responsible business conduct		
United Nations Human Rights Council	International Bill on Human Rights International Covenant on Economic, Social and Cultural Rights (ICESCR) Resolution 48/13 The human right to a clean, healthy and sustainable environment		

3. VosViewer analysis methodology

Vosviewer analysis was conducted using the following steps:

1. Co-occurrence analysis of all keywords was selected, using the counting method. This included both keywords chosen by the authors themselves and Keywords Plus, which is a unique Clarivate algorithm derived from words or phrases that are common in the titles of articles' cited references, but which are not in the article's title. These were therefore included to amplify the range of keyword themes and give an indication of the wider body of literature across disciplines, responding to the relative lack of coherence in terms yielding relevant articles in the literature search.
2. This produced a thesaurus of 620 keywords which were exported. 206 of the keywords were excluded (e.g., countries, research methodologies, words which have ambiguous meaning.) The remaining 414 terms were manually classified into 52 key themes[9] to create a new thesaurus which was imported into NVivo.
3. The analysis was then conducted to examine the relationships between the 52 keyword themes.

[9] See Appendix 4 for the detailed classification of the keywords.

4. Keyword classification for VosViewer analysis

620 keywords used in 108 academic publications were identified by the programme VOSviewer. These were manually grouped into 53 keyword themes to group together synonymous and closely related terms. The 53 themes fall into six overarching categories. The manual grouping is presented in the tables below, with a further table of keywords excluded from the analysis. For each theme, the number of occurrences is given in brackets, i.e. the number of articles with keywords for that theme.

Industry/energy	
Aggregates (1)	marine sand
Aquaculture & mariculture (7)	aquaculture marine aquaculture offshore mussel production offshore seaweed production
Cables (1)	submarine power cables
CCS (3)	carbon capture carbon capture and storage (ccs) carbon dioxide capture and storage ccs co2 storage dioxide capture tomakomai ccs demonstration project
Diving (1)	dive operators scuba diving
DSM (2)	deep sea mining seabed mining
Energy - salt gradient (2)	salinity gradient energy salt gradient power
Energy – tidal (10)	tidal barrage tidal current energy tidal current power tidal energy tidal power tidal stream energy
Energy – wave (6)	wave wave energy wave power
Energy theme (62)	canadian energy markets clean energy community energy planning electricity electromagnetic-fields energy energy development energy policy energy transition green electricity green energy green energy development power power development power projects power-generation power-station renewable energy renewable energy infrastructure renewable energy technologies renewable-energy rural electrification

Fisheries industry (11)	fisheries
Infrastructure – onshore (1)	onshore infrastructure
Life cycle (4)	decommissioning life cycle assessment life-cycle assessment
Marine energy theme (16)	marine energy marine renewable energies marine renewable energy marine renewables ocean energy offshore energy technology offshore renewables renewables-to-reefs roadmap for marine energy development
Marine industry and economy (4)	blue economy dam industry traditional industries
Marine structures (6)	artificial reefs offshore artificial structures platforms rigs rigs-to-reefs
Nuclear energy (1)	nuclear lock-in
Offshore – general (1)	offshore
Oil Gas Fossil fuels (6)	fossil-fuel offshore oil offshore oil and gas oil oil and gas
Ports and shipping (1)	port development
Solar energy (2)	solar
Tourism industry (8)	coastal tourism community-based tourism marine tourism tourism
Wind energy – general (42)	blade facility farm farms turbine turbines wind energy wind farms wind power
Wind energy – offshore (58)	block island wind farm floating offshore wind farm nearshore wind offshore wind offshore wind development coastal municipalities offshore wind energy offshore wind farm offshore wind farms offshore wind farms (owf) offshore wind power offshore wind production offshore windfarm
Wind energy – onshore (2)	onshore wind onshore wind energy

Social	
Acceptance, opposition and social licence (56)	acceptability acceptance community acceptance local acceptance opposition public acceptance public objection social acceptability social acceptance social acceptance analysis social acceptance of renewable energy social acceptance, willingness-to-accept social licence social licence to operate social license social license to operate socio-political acceptability
Attitudes theme (57)	attitude change attitude strength attitudes beliefs consumer preferences environmental beliefs environmental concern opinion opinions perceived risks and benefits perception perceptions perspectives preferences public attitudes public opinion public perception public perceptions public preferences public responses public-attitudes public-opinion residents attitudes responses risk perception risk perceptions shared values social marketing stakeholder perceptions stakeholder perspectives stakeholder values stated preferences values willingness to pay willingness-to-pay
Benefits (7)	community benefits community compensation ownership sharing mechanism

Social factors (31)	behavior community development health human dimensions hydropolitics identity identity processes local identity non-market valuation poverty recreation resilience social action social amplification of risk social and economic baseline social burden social capacity social capital social construction of technology social gap social identity social innovation social representations social sustainability social well-being society valuation vulnerability wellbeing

Place	
Place factors (28)	attachment island landscape landscapes local distinctiveness nimby nimbyism place place attachment place-identity seascape

Impact assessment	
Assessment unspecified (7)	evaluation impact assessment integrated assessment monitoring of case studies
Economic factors (6)	cost cost curve externalities monetary valuation property values socioeconomic impacts techno-economic aspects

Impacts – visual (6)	visibility visual disamenity visual impact visual impact assessment
Impacts and their assessment – economic (7)	economic criteria economic impacts economic-impacts employment employment creation illicit supply chains job creation livelihoods local socio-economic impacts
Impacts and their assessment – environmental (16)	air-pollution content in environmental statements ecological impact ecological impact avoidance eia environment impact assessment studies environmental assessment environmental criteria environmental impact environmental impact assessment environmental impact assessment (eia) environmental impact assessment (process) environmental impacts environmental-impact environmental-impact assessment marine environmental impact assessment underwater noise water quality water-quality
Impacts and their assessment – social (14)	local community impact social conflicts social criteria social framework for projects social impact social impact assessment social impact assessment (sia) social impact evaluation social life cycle assessment value impacts
Impacts unspecified (18)	Consequences environmental and social impacts impact impacts potential impacts
Sustainability – general (7)	sustainability sustainable development

Environment and ecology	
Environment general (3)	environment

Marine biodiversity, ecology, ecosystem and species (17)	biodiversity birds demersal fish ecological network analysis ecology ecosystem ecosystems fish marine ecological biological environment marine ecology marine ecosystems mediterranean monk seal monachus monachus monachus-monachus seagrasses seaweed water environment wildlife
Marine protection conservation (9)	conservation environmental conservation integrating conservation marine conservation marine protected area marine protected area (mpa) marine protected area networks marine protected areas mpa networks mpas no-take reserves protected areas reserves

Stakeholders	
community stakeholders (19)	aboriginal peoples blue communities coastal communities communities community local people local resources marine recreationists residents
Stakeholders, engagement and participation (30)	citizen-engaged community engagement community involvement community participation concerned partners coproduction engagement epistemic communities extended peer communities participation participatory governance public engagement public participation stakeholder stakeholder empowerment stakeholder engagement stakeholders

Management, procedure and governance	
Decision making processes (10)	decision decision support tool decision-analysis decision-making decision-support-system mcdm multi -criteria decision analysis multicriteria analysis multi-criteria analysis multi-criteria decision analysis multicriteria decision-making multi-use offshore installations
Governance theme (31)	environmental governance governance marine governance ocean governance policy policy-making politics risk governance sand governance
Information knowledge and communication (10)	cognitive polyphasia communication deliberative learning environmental communication information information sharing knowledge
Justice and trust (27)	bribes chain of trust common heritage of mankind common-pool resources distributive fairness energy justice environmental equity equality equity fair process fairness inequality just transition justice legitimacy procedural fairness procedural justice race rights silent majority social equity transparency trust

Management of marine resources (27)	coastal development coastal management coastal resource-management coastal zone management comanagement conflict controversies integrated catchment management integrated coastal management integrated water resources management (iwrm) license licensing processes management maritime multi-use regulation space-related conflict spatial conservation prioritization trade-offs trilemma
MSP and planning (15)	marine planning marine spatial planning marine spatial planning (msp) maritime spatial planning planning planning outcomes
Sector conflicts and colocation (6)	co-located wave co-location fisheries impact user conflicts
SES and Ecosystem services (4)	ecosystem services ecosystem services assessment social-ecological social-ecological systems
Siting (9)	renewable energy siting renewable energy siting factors selecting optimum locations site selection site selection procedure suitability analysis sustainable siting wind power siting

Excluded		
action situations	facilities	philippines
actor-network	feasibility	poland
aegean sea	focus groups	portofino
agenda	framework	post normal science
aggregation	france	poyang lake
analytic hierarchy process	fresh-water lake	programs
analytic network process	future	projects
asia	generation	q method
assessment	generators	qualitative modeling
attributes	geographic information science	queensland
australia	germany	rance
autonomy	gis	recommendations
baltic sea	great barrier reef world heritage area	recommendations for practice
barrier-reef region	greece	reflections
bayesian-estimation		regionalism

belgian part	green	regionalization
block island	guarani aquifer system	regions
breakwater	gulf of maine	relative importance
bristol channel	hazardousness of place	reserved areas
canada	hedonic model	resource
capacity	high-resolution	resource assessment
carolina coast	human interventions	resource security
census data	implementation	river-basin management
challenges	indicators	scale
china	infrastructure	science
choice	input-output-analysis	scotland
choice experiment	lake michigan	scottish
choice experiments	lcoe	sea
cities	lessons	sea use
city	lidar	security
climate change	lines	sediment load
coastal	logistic regression	sensitivity-analysis
coastal louisiana	magnetic-fields	services
coastal zone	marine	sets
co-existence	marine areas	severn estuary
comparative analysis	mediterranean sea	shore
comparison	metaphors	social representations theory
conceptual systems modelling	mixed logit	social science
construction	mixed logit model	social-psychology
context	multinomial logit model	software
contingent valuation	multiple dimensions	south
conversion	multiple objectives	spain
county	multiple uses	spanish method
decarbonization	mwtp	spatial analysis
delphi inquiry	national energy and climate plan	spatial-analysis
demonstration project	of latvia	special committee
dempster shafer analytic	national marine park of alonissos	spill
hierarchy process	needs	sswot
denmark	nepal	state
design	network	storage
developing-countries	network perspective	strength
development	networks	support
digital surface model	north	support-system
dimensions	north sea	survey
discourse	northern sporades	sustainability science
discrete choice	north-sea	swot analysis
discrete choice experiment	norwegian oil	system
distance decay	okinawa	systems
diversity	on-land	taiwan
dpsir framework	onshore and offshore	technical criteria
ds/ahp	operate	technologies
dutch north sea	opportunities	the enterprise
eastern english channel	optimization	thematic synthesis
efficiency	outcomes	transdisciplinary research
emergence	outer continental shelf oil	transitions
emissions	papua new guinea	uk
England	paradoxes	uk and eu experience
enhancement	parallel system	united-states
europe	pearl river delta	yangtze-river
expert elicitation	performance	

5. Relationship between keywords and occurrences

The table below is intended to give a crude indication of the consistency in terminology used in keywords in relation to overall frequency within the publications.

The number of original keywords per keyword theme is given alongside the occurrence of (number of articles containing) that theme in the VOSviewer analysis. A ratio is provided of keywords per occurrence and the keyword themes are presented in rank order from most number of keywords per occurrence to least. Colour coding is used to assist in interpretation for ratios up to 1.0: green for the third of themes showing most consistency in use of keywords across publications; yellow for the middle third; and orange for the top third showing highest variability in keywords. Ratios >1 are more difficult to interpret. The data suggests a saturation of keywords being used for the same theme within individual articles.

Although some insights and comparisons can be made, the data should be taken as only a general indication about maturity of the themes and the consistency of research area/terminology being adopted. Appendix 4 can be referred to for the full list of keywords per theme.

For ease, the cluster and general categories are also included. Only those keyword themes with at least 5 occurrences are included in this table.

Cluster	Theme	No. keywords included	Occurr-ences	Ratio: No. keyword / occurrences	Category
3: Ecosystem services	marine protection conservation	13	9	1.4444	Environment and Ecology
2: Environment impact	impacts and their assessment - economic	9	7	1.2857	Impact Assessment
6: Wind and planning	decision making processes	12	10	1.2000	Management, procedure and governance
2: Environment impact	impacts and their assessment - environmental	19	16	1.1875	Impact Assessment
1: Industry interactions	economic factors	7	6	1.1667	Impact Assessment
2: Environment impact	marine biodiversity, ecology, ecosystem and species	18	17	1.0588	Environment and Ecology
8: Social justice	social factors	29	31	0.9355	Social
6: Wind and planning	siting	8	9	0.8889	Management, procedure and governance
8: Social justice	justice and trust	23	27	0.8519	Management, procedure and governance
1: Industry interactions	marine structures	5	6	0.8333	Industries and Energy
1: Industry interactions	oil gas fossil fuels	5	6	0.8333	Industries and Energy
7: Governance, stakeholders and SIA	impacts and their assessment - social	10	14	0.7143	Impact Assessment
1: Industry interactions	management of marine resources	19	27	0.7037	Management, procedure and governance
4: Emerging energy	information knowledge and communication	7	10	0.7000	Management, procedure and governance

4: Emerging energy	impacts - visual	4	6	0.6667	Impact Assessment
1: Industry interactions	sector conflicts and colocation	4	6	0.6667	Management, procedure and governance
5: Energy acceptance and attitudes	attitudes theme	35	57	0.6140	Social
4: Emerging energy	energy - tidal	6	10	0.6000	Industries and Energy
3: Ecosystem services	aquaculture & mariculture	4	7	0.5714	Industries and Energy
4: Emerging energy	assessment unspecified	4	7	0.5714	Impact Assessment
9: Benefits	benefits	4	7	0.5714	Social
7: Governance, stakeholders and SIA	stakeholders, engagement and participation	17	30	0.5667	Stakeholders
1: Industry interactions	marine energy theme	9	16	0.5625	Industries and Energy
4: Emerging energy	energy - wave	3	6	0.5000	Industries and Energy
3: Ecosystem services	tourism industry	4	8	0.5000	Industries and Energy
3: Ecosystem services	community stakeholders	9	19	0.4737	Stakeholders
6: Wind and planning	msp and planning	6	15	0.4000	Management, procedure and governance
5: Energy acceptance and attitudes	place factors	11	28	0.3929	Place
5: Energy acceptance and attitudes	energy theme	22	62	0.3548	Industries and Energy
5: Energy acceptance and attitudes	acceptance, opposition and social licence	17	56	0.3036	Social
7: Governance, stakeholders and SIA	governance theme	9	31	0.2903	Management, procedure and governance
2: Environment impact	sustainability - general	2	7	0.2857	Impact Assessment
2: Environment impact	impacts unspecified	5	18	0.2778	Impact Assessment
5: Energy acceptance and attitudes	wind energy - offshore	12	58	0.2069	Industries and Energy
6: Wind and planning	wind energy - general	8	42	0.1905	Industries and Energy
3: Ecosystem services	fisheries industry	1	11	0.0909	Industries and Energy