



SEA Wave: Strategic Environmental Assessment of Wave energy technologies

Deliverable Report D5.2

**Recommended techniques for impact assessment:
Recommendations for the use and development of tools and resources for marine energy consenting**



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1 Introduction

This deliverable supports impact assessment and site selection by making clear the role that consenting tools and resources can play in ‘levelling up’ the knowledge and evidence bases in relation to environmental consenting across the sector.

Online consenting tools, data portals and knowledge repositories can be a useful resource for developers, regulators and their consultants across all stages of the consenting process, from site selection and scoping through to the design of post-consent monitoring plans. When used effectively, such online resources can:

- help to streamline the consenting process for wave and tidal energy developments;
- support developers (and other applicants) and their consultants in preparing up to date, proportionate and fit for purpose reports, information, and data to support licence and consent applications for wave and tidal developments; and,
- support decision makers in managing risk and uncertainty regarding key potential environmental effects relevant to wave and tidal developments.

1.1 Previous studies

Issues around data, metadata, and knowledge availability and accessibility are frequently highlighted as important themes emerging from risk-oriented workshops on ocean energy such as the series of ‘risk retirement’ workshops hosted by OES Environment¹. A recent study commissioned by the Welsh Government (2020)² highlighted that there continues to be a lack of awareness of the resources and tools available to support marine energy consenting. A more recent workshop hosted by ORJIP Ocean Energy in 2021³ highlighted that there is a lack of awareness of these resources and tools. Where developers, regulators, and advisers are aware of these resources and tools, they may be hesitant to apply them during the consenting process. This may stem from a lack of confidence in information provided by such tools, or in the case of impact assessment tools, outputs may not be considered ‘acceptable’ by all parties.

These previous studies highlighted that guidance on existing tools and resources may help potential users to determine which sources of information and data are best for their particular applications and could also provide a common understanding of the limitations of each resource across developers, regulators, and other stakeholders. Such guidance may also help to highlight where new or redeveloped tools would be relevant to the sector, and where resources are best spent on strategic monitoring to fill key evidence gaps.

By identifying the most relevant and effective online resources and developing pathways to improve them with independent input from all parts of the sector, we aim to develop a common knowledge base and progress towards a more streamlined and proportionate approach to consenting for wave and tidal energy projects.

¹ OES Environmental workshop reports available here: <https://tethys.pnnl.gov/conferences-and-workshops?content=All&search=oes>

² Welsh Government, 2020. Marine Evidence Framework: Feasibility study to review existing online EIA tools. Atkins Ltd. 53 pp.

³ De-risking consenting of tidal energy arrays – are we nearly there yet? Marine Energy Wales online side event 29th January, 2021. Workshop report available here: http://www.orjip.org.uk/sites/default/files/MEW_TidalWorkshop_Report.pdf



1.2 Available tools and resources for consenting

Online tools and resources for wave and tidal energy consenting can generally be divided into knowledge repositories, GIS data portals, and impact assessment tools. While the purpose of all of these resources is generally to establish a common knowledge base for decision-making, each will be used in different ways, at different stages of the consenting process. Likewise, some resources will be more effective at aligning the expectations of regulators, advisers, developers, and their consultants, while others may not be considered acceptable decision-making tools from all perspectives.

A general summary of online resources and tools can be found below, while individual tools and resources are listed in 8.1.

1.2.1 Knowledge databases

Knowledge databases act as centralised repositories for research outputs and publications, guidance notes, workshop reports, briefing papers, and a host of other industry-specific resources, making them available to a wide audience. They can provide useful information on best practice for survey requirements, management, and monitoring measures, and can also provide species- or habitat-specific information to support impact assessments. Commonly used knowledge databases include the Tethys Knowledge Base⁴ and MarLIN⁵.

1.2.2 GIS data portals

A number of publicly accessible GIS data portals exist, curating spatial datasets that include the environment's physical characteristics, marine species distributions, industrial developments, marine infrastructure, and resource use. Usually presented in the format of a map, multiple data layers can be simultaneously accessed, filtered, and downloaded for specific locations. Regulatory bodies may also curate their own data portals which are available to internal staff, while publicly available data portals may either be 'open' – free to use by all – or have associated costs for private sector use.

Commonly used GIS data portals include MEDIN, EMODnet, and Marine Scotland's National Marine Plan Interactive.

1.2.3 Impact assessment tools

Several tools for impact assessment have been developed, requiring extensive input and critical review from regulators and important stakeholders. These tools generally bring together available evidence, expert judgement, and key criteria to determine which impact pathways will be relevant for particular developments. In order to remain an accepted consenting tool, particularly for regulators, these resources must be maintained, and so require ongoing input to remain relevant.

Impact assessment tools that have been developed include IMPACT, FeAST, MarESA and the Tethys Data Discoverability Matrix.

1.2.4 Regulator licensing and consenting portals

Regulator licensing and consenting portals can provide access to information and documents associated with previously licensed wave and tidal energy projects, including

⁴ <https://tethys.pnnl.gov/>

⁵ <https://www.marlin.ac.uk/>



environmental statements and environmental monitoring plans. It has previously been noted that these resources, often in online formats, provide a useful source of information for both regulators and developers, especially when they include a search function². The Marine Scotland Information webpage is a good example of this type of resource⁶.

2 Aims and objectives

The overarching aim of this deliverable is to help ensure that the best available scientific evidence and tools are used during the consenting process for wave and tidal energy developments, thereby streamlining the process and de-risking consent. With that in mind, the objectives of this deliverable are:

- To provide a means for stakeholders to become more aware of, and feel able to utilise, existing online consenting resources and tools.
- To identify where existing resources can be improved and/or further developed.
- To develop recommendations for the use and development of online resources and tools that accurately reflect the expectations and needs of all parts of the sector.

The outcomes of this deliverable will also feed into the ongoing work programmes of ORJIP Ocean Energy⁷ and OES Environmental⁸ on streamlining of consenting through reducing the uncertainty around environmental impacts of wave and tidal energy developments.

Access to and use of the best available evidence during the consenting process ensures that assessments are focused, proportionate and in line with the current state of knowledge. Non-significant impacts are more easily agreed between regulators, advisors, developers, and their consultants, so that baseline data collection, licensing conditions and monitoring requirements are targeted on receptors of high risk or uncertainty, with the remainder 'scoped out' of assessments. Likewise, access to an agreed knowledge base or impact assessment tools can promote better understanding of licensing decisions.

3 Approach

In this study it was important to build on previous outcomes of reports^{9,10} on consenting tools and resources for offshore energy developments, noting that those studies assessed the level of awareness and initial stakeholder perceptions on the potential use of tools and resources for marine energy consenting.

To build on the recommendations of previous reports, a stakeholder consultation approach was set out in two phases. First, stakeholders were consulted in sector-specific focus groups, to enable individuals representing particular parts of the sector to discuss amongst

⁶ All application and project documentation | Marine Scotland Information; <http://marine.gov.scot/mslot-all-application-and-project-documentation>

⁷ <http://www.orjip.org.uk/oceanenergy/about>

⁸ <https://tethys.pnnl.gov/about-oes-environmental>

⁹ OES Environmental workshop reports available here: <https://tethys.pnnl.gov/conferences-and-workshops?content=All&search=oes>

¹⁰ Welsh Government, 2020. Marine Evidence Framework: Feasibility study to review existing online EIA tools. Atkins Ltd. 53 pp.



peers. The outcomes of the sector-specific focus groups were then compiled and presented to all participants at a summary workshop, where further reflections were gathered.

3.1 Sector-specific focus groups

Sector-specific focus groups (e.g. regulator-only, developer-only, etc) were designed to enable greater focus on the perspectives, challenges, and ideas of each group. Focus groups were held as follows:

- Regulators and government bodies – 30th March, 2021, 15:30-17:00 BST
- Developers – 1st April, 2021, 11:30 – 13:00 BST
- Advisory bodies – 1st April, 2021, 15:30 – 17:00 BST
- Technical experts – 6th April, 2021, 15:30 – 17:00 BST

Focus groups each lasted 90 minutes, and were comprised of 4-8 participants and three members of the SEAWave project team. A list of organisations attending each focus group can be found in Section 8.2.

Table 3.1 | Generic agenda for sector-specific focus groups.

Timing	Activity
15 minutes	Welcome and introductions
10 minutes	Ground rules
15 minutes	Introduction to SEAWave Background information on Consenting tools
45 minutes	<u>Facilitated discussion:</u> 1. Use of tools and resources When have you used particular tools? • At what stage of the development process? • What attributes led you to use these tools? 2. Experience of using different types of tools • Where have you had positive experiences? • What are the limitations of these tools? 3. Gaps and improvements • What are the most important attributes of these tools and resources? • How could they be improved? Are there any gaps that could be addressed?
5 minutes	Summary and next steps

3.2 Summary workshop

A summary workshop was held on 27 April 2021. All participants of the focus groups were brought together to review the outcomes of the focus groups and to jointly discuss recommendations for industry-wide use and further development of consenting tools and



resources. Areas of consensus amongst different parts of the sector were noted as were areas of differing perspectives.

The summary workshop was held in an online format. During the discussion session, participants were split into three breakout groups, where ideas and suggestions were recorded on Google Jamboards. The agenda for this 90-minute summary workshop is below.

Table 3.2 | Summary workshop agenda. April 27th 2021.

Timing	Activity
5 minutes	Welcome and introduction
15 minutes	- Recap previous focus groups - High-level summary of content - Highlight overarching common themes and recommendations for breakout discussion
10 minutes	Interactive plenary: Use polling software to generate information on who is attending, and on introductory questions from themes
40 minutes	Breakout groups, focus on key themes: - Authoritative data - Standardisation of data/metadata - Accessibility of tools - Guidance and/or training on tools - The role of regulators and knowledge providers
10 minutes	Feedback from breakout groups
10 minutes	Next steps / conclusion

4 Outcomes

4.1 Sector-specific focus groups

Each sector-specific focus group discussed the same series of questions and ideas, although the nature of the discussions in each group was different. Many themes emerged that were consistent across these groups. These themes are discussed in Section 4.1.2. A brief summary of each focus group discussion is provided in Table 4.1.

Table 4.1 | Discussion highlights from each focus group held in April 2021.

Focus Group	Discussion highlights
Developers	At project planning phase, available tools & resource can help plan how much more data needs to be collected, over what timescale, and to what cost



Focus Group	Discussion highlights
	- Once a site has been selected, most data are collected and stored in-house – this is valuable IP & not made publicly available - Environmental data that is not technology-specific may be less valuable than technology-specific data or data contributing to bespoke models - However, when knowledge and data are available at a site, consenting is much easier (e.g. at test centres). - Developers look to regulators for guidance on scope of work, and need to understand what the expectations of the regulator are
Regulators/ Government bodies	- Tools and resources are used in pre-application and scoping stages, to cross-check sources used by developers, and for cumulative impact assessment - There is a perception that developers and consultants are somewhat overwhelmed by tools and resources – guidance on how to use the portals could help - Having all information in one place is desirable, particularly when using a common set of data sources. - However, this is a long-term and resource-intensive project will require consistent management and curation. - Different levels of planning and permitting (e.g. regional vs. national) can make streamlining tools complex
Statutory advisors / NGOs	- Advisors and Statutory Nature Conservation Bodies (SNCBs) work within legislative framework to put advice forward – they can recommend information sources and certain methodologies for impact assessment, however it remains the regulator who makes decisions - Advisors and SNCBs encourage early engagement with them - There is a gap in terms of data provision for projects that are already consented, for example in post-consent monitoring. - Public provision of post-consent monitoring data help cumulative effects assessment and help to provide information about the effects the development actually caused. - The quality of assessments received by advisors and SNCBs is not always good enough. Advisors are looking for ways to improve this, including guidance, but there needs to be a place or repository to put this guidance that is accessible on the part of the developers and their consultants.
Consultants and technical experts	- For new sites, any tools/resources would be used straight from the get-go, particularly GIS tools. - This group suggested that there is no established or consistent way to access information on environmental impacts, which leads to a precautionary approach that may not be proportional for single devices or arrays - Digital EIA is a new development that could lead to increased consistency in impact assessment



Focus Group	Discussion highlights
	- Mechanisms for sharing valuable monitoring data would be helpful for future projects, but this is currently limited by IP. - It is also important to address what 'data' is required – raw data, processed, analysed, metadata or knowledge outcomes can have different uses. - Some tools are dated now and may only be fit for scoping phase. Furthermore, if there is no existing data at a site, tools become less effective. Site-specific data are most important for this group. - Need to look forwards and consider how tools are/could be used for decommissioning

4.1.1 Use of tools and resources throughout the development process

Different parts of the sector use tools and resources for different purposes across the consenting or permitting process. These are outlined in 4.1.1.1 to 4.1.1.6.

4.1.1.1 Site Selection

This is the stage where project developers accessed consenting tools and resources. Once a site has been selected, they tend to collect their own data and create their own models to improve resolution. For developers, publicly available information is useful for screening for sites and identifying constraints, and can give some indication of what additional data needs to be collected.

4.1.1.2 Pre-Application/Scoping

Consultants & technical experts brought in to a project would begin to use any tools/resources as soon as they begin working on a project – GIS tools are particularly important.

Advisors encourage developers and consultants to maintain communication with them at this stage and are available to offer advice on data sources/portals for use.

Impact assessment tools are also useful at this stage, particularly for consultants and technical experts. However, many are dated and/or are not fit for purpose, so their usefulness is limited.

4.1.1.3 Application

Tools and resources are not broadly used at this stage. Developers, consultants, and technical experts will already have identified areas where further data collection is needed. At this stage data and information must be bespoke to the development site and are rarely found in sufficient detail within publicly available consenting tools and resources.

4.1.1.4 Determination

Regulators and advisors use tools at this stage to verify data used by developers.

4.1.1.5 Post-determination

Although existing tools and resources are not generally used at this stage of development, it was suggested that data from pre-installation surveys and post-installation monitoring should be made available at this stage in order to support cumulative impact assessments for further projects.



In the UK, environmental monitoring reports are shared with the regulator in association with licensing conditions. Some participants noted the perception that data cannot be shared more widely, as they are perceived to be valuable and commercially sensitive to the organisation that collected it. Additionally, there is currently little incentive for data sharing to take place, and pathways and/or infrastructure for such sharing are lacking. However, mechanisms for sharing environmental monitoring data would be welcomed by many groups, who cited that it would be helpful for future projects. At present the only direct route for knowledge from required environmental reporting to be transferred and taken up more widely, is OES-Environmental's searchable database of metadata forms¹¹.

In order to encourage future data sharing of this type, developer sensitivities must be acknowledged. The current perception is that sharing environmental data could make available information about resource assessments, potentially affecting competitiveness and investment. Likewise, any environmental impacts could lead to an overall negative perception of the project.

In enabling data sharing post-determination, it will be important to identify precisely what could or should be shared, whether it be raw or analysed data, metadata, or simply the interpreted outcomes.

The provision of post-consent monitoring data was identified as important by both advisors and consultants, as it would provide information to validate the original EIA. It was suggested that it would be helpful for projects to work together in this respect, as is already happening for offshore wind in some areas.

4.1.1.6 Decommissioning

There is an emerging need to look forward and understand how consenting tools and resources are, or could be, used for decommissioning, and whether they provide adequate information to support that process.

4.1.2 Key themes emerging

4.1.2.1 Authoritative data

The concept of 'authoritative data' was first identified in the regulator and government body focus group, and was defined as data provided by trustworthy sources, and/or backed by the government or regulators for consenting. Traceability, quality control, and timeliness (data that are 'up to date' and/or timestamped) were all qualities that described authoritative data. Data with high levels of authority was important for assessments, while it was acceptable that data be less authoritative in the early stages of a project (e.g., scoping). It was also perceived that if a dataset was more than 4 or 5 years old, it would no longer be acceptable to regulators for use in consenting.

Authoritative data was important for all groups of stakeholders. Although there was a perceived onus on regulators to validate data provided, regulators acknowledged that it was difficult for them to validate or 'approve' tools and resources. Several groups noted that the long-term management of portals was vital, both for marine energy consenting and for good marine spatial planning. Authoritative data supports good marine spatial planning, and good marine spatial planning supports data accessibility.

¹¹ <https://tethys.pnnl.gov/oes-environmental-metadata>



4.1.2.2 Standardisation of data/metadata

Standardisation of data formats and/or metadata could help to support the provision of authoritative data and to encourage data transferability between development sites. However, standardisation has so far proven challenging.

Metadata standardisation was suggested to be relatively more straightforward than standardisation of data collection methodologies and formats. Important elements to be provided within a standard metadata format included:

- Method of data collection, including procedures followed
- Deployment platforms
- Technology used
- Calibrations
- Deployment conditions
- Data processing and analysis methods or procedures (for processed data sets)
- Modelling tools used and assumptions

It was highlighted that standardisation of data formats and/or metadata could help regulators to validate approaches used to make comparisons of environmental effects across development sites, which was particularly attractive in the context of assessing cumulative effects.

In one focus group, participants stressed that standardisation of data collection or analysis techniques should not prevent innovation. Instead, new tools, methods, or procedures should be presented alongside old ones for comparison.

4.1.2.3 Accessibility of tools

A key barrier to the use of consenting tools and resources is awareness and accessibility. Across all focus groups, stakeholders stated that it was important for all parties to be aware of the various tools and resources available and how they could best be used. All groups also suggested that awareness was lacking, and that many people did not have a sufficient grasp of what tools and resources were available. Stakeholders suggested that regulators and advisors needed to access consenting tools and resources so that their knowledge base remained current. This would enable them to incorporate new findings and perspectives into their work. Developers, on the other hand, need to understand where to look in order to obtain the best available data to inform their projects and the consenting process. This could enable developers to anticipate future data needs for their developments.

Although regulators are not currently able to provide guidance on what tools or resources should be used, it was noted that training or guidance in this area would be helpful.

4.1.2.4 Guidance and/or training on tools

At present, there is not an established or consistent way to access information on environmental impacts. There is a perception that the lack of guidance leads to a precautionary approach on the part of all stakeholders, which may not be proportional for single devices or arrays.



A possible area where guidance could be useful is at the scoping stage. A scoping opinion provides information about what should be assessed but does not describe how it should be assessed. For example, there is uncertainty around the acceptability of impact assessment or modelling tools, and whether these approaches will be acceptable to the regulators. It was suggested that consistent approaches to assessment go hand in hand with a mature industry – offshore wind energy is heading this way. While there is still development in methodologies etc, required, some flexibility is important in order to enable development of appropriate approaches, but this could be supported alongside guidance on existing or commonly used approaches.

Guidance could help to improve the quality of assessments, which would make processing environmental documentation easier/faster for advisors. Guidance should be accessible to developers and their consultants, so needs to be made accessible in a place that is accessed by all.

Topics for guidance suggested by participants of this study can be found in Section 4.2.4.

4.1.2.5 The role of regulators and knowledge providers

The role of regulators and decision-makers was a recurring theme throughout the focus groups, and one which links to many of the key themes highlighted in previous sections. For example, regulator approval or quality control of data within a portal or resource was important for the generation of authoritative data. Similarly, regulators or decision-makers also had a role to play in supporting updates to impact assessment tools or resources, because ultimately proponents would be using the information they contained in applications for consent. It was suggested that one way government bodies could support this work was through provision of funding. Guidance was another avenue for support, as developers and consultants suggested that they would look to regulators and decision-makers to clearly communicate their expectations. This could substantially simplify and/or streamline the consenting process.

4.2 Summary workshop

The high-level themes that emerged from the sector-specific focus-groups were taken forward for discussion in the summary workshop. Participants were split into three breakout groups and led through a series of questions under each of the key themes.

4.2.1 Authoritative data

The most common definition for authoritative data within our participant group was “data that can be trusted” for use in the consenting or permitting process. This might be data or information that has been ‘backed’ by regulatory bodies, that is peer reviewed, or that has been standardised and made suitable for comparisons.

Participants were asked what different stakeholder group could do to support or improve confidence in the data and/or information used in consenting. Actions and recommendations for each stakeholder group can be found in Table 4.2.

The most common theme echoed across all focus groups was that regulators have a central role to play in the collection and use of authoritative data. Many participants noted that the regulator has responsibility for orchestrating data collection, analysis methodologies, storage, and sharing, because of the authority or decision-making power they hold. Consenting requirements that supported the collection and sharing of authoritative data were



widely encouraged, but many participants felt that transparency and true accessibility to authoritative data could not happen without the support of the regulator.

Participants were also keen to highlight the difference between data and information, and questioned what was truly needed to streamline consenting. Data was defined as recorded or quantified observations that have not yet been interpreted. (e.g., raw data) Raw data may not be useful in many cases, whereas analysed data sets were perceived by some to be more valuable. However, other groups noted that access to raw data was important, provided that methods for analysis were documented so that studies became more repeatable. Information was defined as the end product, or what is learned from the data following analysis.

Table 4.2 | Recommended actions to be taken by different organisation types to improve trust in data and information used in consenting

Organisation type	Recommended action to increase trust in data and information
Regulators	- Take steps towards a more strategic view of data, joining up available data and information across industries - Require consistent and well-documented approaches to data collection at development sites in applications for consent. This includes transparent communication and reporting of data and any associated metadata. - Encourage standardisation of data collection, analysis, and storage (e.g. metadata) - Improve availability and accessibility of data from previous projects process by engaging with stakeholders to manage expectations for data provision and access, and to ensure that existing portals are searchable and user-friendly. - Engage with data-sharing platforms
Funding bodies	- Enforce more stringent rules on data access and sharing - Support data-sharing and standardisation initiatives
Portal/ tool owners	- Data must be robustly quality checked to provide users trust - Support platforms for data sharing across all sectors within the wave and tidal energy industries
Developers and consultants	- Engage in a consistent approach to data collection across development sites in application for consent - Engage in transparent dialogues with regulators around data and methodological requirements. - Support initiatives for standardisation of data collection, analysis, and storage (e.g. metadata) - Provide data to data-sharing platforms.
Researchers	- Collaborate with developers to conduct research in the context of regulator requirements. This includes the collection of data in consistent ways. - Provide data to data-sharing platforms



4.2.2 Standardisation of data/metadata

Participants discussed the difference between raw data and ‘information’ (i.e., processed or analysed data sets and outcomes), highlighting that these two words were often used to mean the same thing. Raw data may not be useful in many cases, whereas analysed data sets were perceived by some to be more valuable. However, other groups noted that access to raw data was important, provided that any methods of analysis were well documented so that studies became more repeatable.

Standardisation of data and metadata would improve access to data by making it more searchable. Although standardisation of data collection methodologies was thought to be a challenging task, standardisation of metadata provided with datasets would improve transparency and trust in the data itself. This would also enable improved data transferability¹² between sites.

While the units of measurement, data collection methodologies, procedures for data handling, and analysis methods could all be standardised, it is important to understand first and foremost what the data will be used for, and what benefits would emerge from efforts to standardise at each stage. For modelling approaches, supporting information provided alongside model analysis could be standardised, including any assumptions made, descriptions of model parameterisation and validation procedures, and model limitations. This could be included in model metadata.

Standardisation of data and metadata would improve access to data by making it more searchable. A key benefit of standardisation is the transferability of data or knowledge between sites, in turn enabling comparisons of relative impacts across sites, and improved decision-making. Participants noted that this could help to streamline consenting for individual sites, but would also help to inform cumulative impact assessments.

Other indirect benefits of standardisation include a ‘common currency’ for ocean energy data collection and analysis that could reduce misunderstandings, thereby increasing the confidence of the regulator in decision-making. This is particularly relevant where an experienced developer proposes a new project in a new jurisdiction, and wishes to apply data and learning obtained from other locations to the new development. Overall, standardisation could accelerate progress towards de-risking the sector by providing a larger knowledge base that is comparable across development locations, regions, and countries.

A key challenge is that different countries and data repositories have different standards for provision of data and metadata. In the UK, MEDIN is often used as a data standard, but many other portals choose to develop their own. Standardisation also has the effect in reducing flexibility in data collection, and it may be difficult for some development sites to collect data in the prescribed way, given the developing nature of the ocean energy sector. Although differing regulatory requirements and legal standards adopted by different countries makes international standardisation difficult, participants suggested that standardisation of metadata documentation requirements would be a much easier task than standardisation of data collection methodologies. It should be acknowledged that the development and adoption of any standards will require resource on the part of those developing standards and those adopting the standards.

¹² For more information on data transferability, see OES-Environmental's Short Science Summary on Risk Retirement and Data Transferability: <https://tethys.pnnl.gov/summaries/short-science-summary-risk-retirement-data-transferability>



4.2.3 Accessibility of tools

Improving the accessibility and user experience associated with consenting tools and resources was highlighted in the preliminary focus groups as a good opportunity to improve project consenting from all perspectives (regulator, developer, consultant, advisor). Participants noted that data portals, knowledge bases, and impact assessment tools were equally important, serving different, but complementary purposes. Many individuals suggested that awareness of the different tools and portals was low, and that better signposting and development of guidance could improve access to the data and information they contain. This, in turn, would improve the quality of environmental assessments and transparency of decision-making.

Many data portals are associated with multi-year international projects, storing data associated with those projects for only short time periods, until the project ends. Planning for longevity of these data portals beyond the project end or for data transfer to another well-established data portal is recommended.

The challenges experienced by participants in using tools and resources, and suggested means of improvement are set out in Table 4.3.

Table 4.3: Identified challenges in using or accessing tools and resources, and recommendations for addressing challenges.

Challenges		Recommendations
Data Portals	- Difficult to find site-specific data - Search algorithms are not effective - Data is not 'interoperable' or sufficient for use internationally - Project-specific data portals close when project or funding ends	- Enable data searches within areas defined on a map - Enable simultaneous searches for datasets and reports - Improve search algorithms using modern techniques - Improve standardisation of metadata, at minimum - Funders to require long-term plan for data portals - Relevant organisations to consider how data in closed portals could be captured and made available
Knowledge bases	- Can be difficult to navigate - Search algorithms could be improved	- Enable data searches within areas defined on a map - Enable simultaneous searches for datasets and reports - Improve search algorithms using modern techniques - Push for standardisation of metadata, at minimum
Impact assessment tools	- Often out of date - Users need to understand ownership of the tools	- Impact assessment tools must be adequately resourced to ensure they can be kept up to date and reflect the state of the art



Challenges		Recommendations
	- Information contained within the tools should be well referenced and documented, to improve trust in outcomes	- Funding sources and ownership of tools should be well documented and easily accessible - Information, algorithms, assumptions, and overall functionality of the tool should be well documented - Consider academic peer review of impact assessment tools

Although participants perceived that regulators and government bodies had the greatest role to play in curating, resourcing, or providing guidance on the use of consenting tools and resources, all parts of the sector were noted as having a role to play:

- **Government organisations and regulatory bodies** already curate marine planning portals that provide accurate and detailed information about all types of developments (in addition to ocean energy). These organisations can also provide a mandate for data sharing and provision for data archiving post project-end, in the case of limited project durations. Regulatory bodies can also provide guidance on the use of tools and resources, as discussed in Section 4.2.4.
- **NGOs and research institutions** have a substantial and trusted knowledge base associated with marine energy developments. These organisations should work towards providing authoritative data and/or developing provisions for data handover as funded projects end.
- Many useful data portals already exist for the marine energy sector. The **users and developers of portals** could to communicate more effectively to ensure that tools and resources are developed with users in mind. It is important to note that no developers of data portals or tools were present at the workshop.
- **Funding organisations** should encourage funding recipients to share data transparently and with adequate metadata, and consider mechanisms for continuity or transfer of any data- or information-serving portals when funding ends to ensure that knowledge is not lost.
- As mentioned above, **researchers** are trusted curators of data and information about marine energy developments. They too must contribute data to portals in transparent ways with adequate metadata. Academic peer review was suggested as a mechanism to improve confidence in impact assessment tools.
- **Developers and their consultants** are at the forefront of data collection and interpretation around marine energy sites. They should work towards developing data-sharing protocols that can be agreed and enacted across the industry, on an international basis.

4.2.4 Guidance and/or training on tools

All parts of the sector would benefit from additional guidance or training on tools, but it was suggested that new hires within regulators, developers, and consultants could benefit most. Researchers were also a possible beneficiary, in that training and/or guidance would provide insight into industry needs for information. Participants suggested that any training or guidance be produced by either the appropriate regulator, or by a neutral party such as an academic or research organisation, in order to enhance the credibility of the guidance.



Five specific topics were suggested for training and guidance. These were:

- **Signposting** by the developers or curators of resources and tools in ways that showcase the different applications of their products.
- **Making clear the limitations** of various tools and resources and establishing what they can and cannot do for the user.
- The **application of expert judgement** to the use of tools and resources. This should be delivered by established experts.
- Translating or **applying the research base** to regulatory processes and requirements.
- **Guidance for modelling tools** that discuss parameterisation of and assumptions made by models

The most popular format for training was online, in the form of interactive webinars that could also be viewed retrospectively. The interactive components were important, in order to give individuals practical experience in using portals and tools, and the opportunity to ask questions of experts. In the case that guidance documents or reports were to be produced, participants suggested that they be complemented with a strong outreach programme in order to ensure good levels of uptake.

4.2.5 The role of regulators and knowledge providers

Regulatory and government bodies were intrinsically associated with ‘authoritative data’, both in focus group sessions and in the following workshop. Participants in the final workshop highlighted that regulators play an important role in enabling data sharing and transparency throughout the consenting process. Regulators are able to set the requirements for license applications, and have agency to ensure that metadata for various studies within each assessment are made available and that datasets are archived appropriately. Regulators and government agencies are also able to shape not only the type of data collected, but also how those data are collected and interpreted, and have some responsibility to ensure that these processes are carried out in a way that ensures transparency of decision-making. With this in mind, regulators will need to play a central role in ensuring that consenting tools and resources are appropriate for use throughout the licensing process, in curating or supporting the maintenance of tools and resources such that they are up to date, and in providing feedback on the development of future developments in this space.

5 Over-arching themes

Knowledge of the capabilities of tools and resources is lacking – this was also highlighted in a report to the Welsh Government in 2020¹³. Improving awareness of available tools and resources, as well as their limitations, should be a focus for a number of stakeholder groups. Developers of tools must do more than simply develop a tool or resource; the development must be widely shared across the sector in order to ensure uptake. Regulatory bodies and their advisors also have a role to play in signposting development proponents to appropriate tools for use in environmental assessments, including knowledge databases, GIS portals, and modelling tools. Participants felt that when regulators, advisors, developers, and consultants were able to access the same data and resources, assessments became more transparent and streamlined.

¹³ Welsh Government, 2020. Marine Evidence Framework: Feasibility study to review existing online EIA tools. Atkins Ltd. 53 pp.



Improving access to, use of, and development of tools and resources for marine energy consenting will **increase transparency** in decision-making throughout the consenting process. A goal for most, if not all, participants on the focus groups and workshop was increasing mutual understanding across the sector of how decisions are made. Increased transparency, in turn, will enable the sector as a whole to more easily learn from previous experience, thereby saving future resources and cost. Improving the availability of authoritative data and standardisation of data/metadata collection, analysis and reporting is a first step towards increasing sector-wide understanding of how environmental impacts are determined or de-risked, reducing uncertainty across the sector. For regulators, this would enable decision-makers to validate the approaches used by developers and their consultants, and to make comparisons across sites. This becomes increasingly important when assessing cumulative effects. Activities to increase transparency will become more essential as the industry matures.

Regulators must also be at the heart of any initiatives to support improved access to data and information. This is because of the central role played by regulators and government agencies in determination of consent for developments. As one participant put it, “the buck stops with them”. Regulatory bodies and government agencies set requirements for environmental assessments, for example, and as such could support a push for standardisation in data collection techniques, analysis methods, reporting, and data storage. However, given the international nature of the marine energy industry, regulators and government agencies must work together across national boundaries to ensure that requirements are sufficiently equivalent worldwide. Finally, by signposting appropriate tools, resources, and guidance, regulators ensure that development proponents use the most recent available data and techniques in their assessments. This signposting could occur even before the scoping stage, but could be reinforced through good communication at the scoping stage. Consultants, developers, advisory bodies, regulators, and government bodies all suggested that such activity had significant potential to improve submitted environmental assessments, reducing the time and resource needed for a decision to be made.

6 Recommendations

6.1 Regulators

- Regulators must actively support the development of marine energy consenting tools and resources that meet their requirements, and that are highly accessible to the sector. Individuals must be supported to engage with these tools.
- Regulators should work together internationally to support alignment of requirements, and must also play a role in standardisation of data or metadata to enable data transferability.
- Developers look to regulators for guidance on the scope of work for environmental assessments. By signposting available data, tools, and resources, regulators can help developers to plan future data collection needs, giving greater certainty in how resources must be allocated.
- Provision of guidance or training on how to use data portals effectively for marine energy consents would help to alleviate overwhelm on the part of developers. This could take the form of short webinars, made available online after a ‘live’ session.
- Regulators must work together across jurisdictional boundaries (regional, national, international) to understand how requirements for environmental assessments could be streamlined at each stage. Advisory bodies, conservation organisations and NGOs must also support this process.



- Work with advisory bodies, developers, and consultants to make data from already consented projects more available. Data and/or information from post-consent monitoring would be particularly useful for decision-making for future projects.
- Consider taking steps towards a strategic view of data, linking data and information across industries
- Explore the implementation of digital EIA, as has been taken up by other offshore sectors including offshore wind.
- Identify the best available suite of impact assessment tools, and support their maintenance in order to keep them up to date.

6.2 Advisory bodies, SNCBs, NGOs

- Work together across jurisdictional boundaries to support streamlining of requirements for environmental assessments (as in Section 6.1)
- Support developers and consultants to access data that is available to advisory bodies, SNCBs and NGOs via appropriate tools and resources, to ensure that the best available information is used in assessments.

6.3 Developers and industry

- Developers and organisations that support industry development should work together to support greater access to data and data or metadata sharing. Barriers to data sharing must be openly discussed in order that they can be addressed. Initially, this will involve identifying what types of data are most useful (e.g. raw, processed, analysed, or study outcomes), and what is most easily shared¹⁴.
- Engage as early as possible with regulatory bodies, their advisors, SNCBs, and NGOs to understand data and information requirements and where to source them.
- Engage with regulators, consultants, and advisory bodies to work towards provision of post-consent monitoring data.

6.4 Consultants and technical experts

- Work towards traceability and transparency in data production and storage. This creates trust in data and information used in consenting.

6.5 Academics and researchers

- Acknowledge the challenges faced by developers around sharing of data, in order that these can begin to be addressed.
- Take part in ongoing efforts to standardise metadata provision, and data collection and analysis methodologies

6.6 Funding organisations

- Enforce more stringent rules on data access and sharing for publicly funded projects
- Engage fully with data platforms and knowledge bases

¹⁴ ORJIP Ocean Energy report on Sharing Environmental Monitoring Data:
<http://www.ordip.org.uk/sites/default/files/ORJIP%20Ocean%20Energy%20%20Sharing%20Environmental%20Monitoring%20Data%20V2.pdf>



6.7 Developers of tools and resources

- Make provision for consistent metadata that meets the industry's needs. This might include information on how and when the data was collected, who collected it, any post processing, and methods for quality assurance.
- Define and communicate methods for quality assurance for information contained within portals in order to increase trust
- Engage in cross-sectoral and cross-portal data sharing initiatives
- Engage in long-term planning for portals and seek adequate resource to do so.
- Work with other data and information repositories to move towards metadata standardisation

6.8 International knowledge exchange programmes (e.g. ORJIP Ocean Energy, OES-Environmental)

- Provide a platform for stakeholders to actively participate in data/metadata standardisation and data transferability initiatives
- Make use of existing networks to signpost consenting tools and resources
- Work with developers of tools and resources to develop guidance appropriate for the marine energy sector
- Continue to host internationally-inclusive workshops and events that provide opportunities for discussion, learning, and knowledge exchange

7 Conclusion

A series of sector-specific focus groups and a follow-on workshop brought together marine energy industry stakeholders to establish development needs and recommendations for the implementation of data portals, knowledge bases, impact assessment tools, and other resources throughout the consenting process. The present perception within this group is that there is no established or consistent way to access information on environmental impacts, which leads to a precautionary approach in decision-making. Generating trust in information through the provision of authoritative data and standardisation of data collection methods, analysis methodologies, and metadata provision would help to improve confidence in decision-making across the sector. These activities could also ease the regulatory burden of verifying all information contained within assessments by ensuring that all parts of the sector are accessing the same information sources. They could also assist developers and consultants by supporting knowledge transfer across development sites, enabling particular topics to be increasingly 'scoped out' of assessments.

To support these activities, guidance will be essential, and there is a particular expectation that regulators and government bodies would look to support this work.

Finally, participants highlighted that internationally-inclusive workshops such as these continue to be important as they enable the global industry to learn at the same pace worldwide, accelerating development of the industry overall.



8 Appendices

8.1 Strategic resources and tools

Knowledge databases

Tethys Knowledge Base - <https://tethys.pnnl.gov/knowledge-base>

OES Environmental Resources - <https://tethys.pnnl.gov/about-oes-environmental#products>

ORJIP OE & OES Environmental's workshops and webinars -
<https://tethys.pnnl.gov/environmental-webinars?content=All&search=oes>

Marine Scotland Current Projects webpage - <https://marine.gov.scot/marine-projects>

Wave and Tidal Knowledge Network - <https://www.waveandtidalknowledgenetwork.com/>

Reports & key documents

ORJIP Forward Look - <http://www.orjip.org.uk/documents>

ORJIP Critical Evidence Gaps - <http://www.orjip.org.uk/documents>

OES Environmental State of the Science - <https://tethys.pnnl.gov/publications/state-of-the-science-2020>

British Standards Institution Public Document: Environmental impact assessment for offshore renewable energy - Guide -
<http://shop.bsigroup.com/upload/271276/PD%206900.pdf>

GIS and Data Portals

MARENDATA - <http://marendata.eu/>

MEDIN – www.medin.org.uk

NBN Atlas - <https://nbnatlas.org/>

MarLIN and the MarESA database - <https://www.marlin.ac.uk/>

EMODnet - <https://emodnet.eu/en>

The Crown Estate Open Data portal - <https://opendata-thecrownestate.opendata.arcgis.com/>

Marine Scotland National Marine Plan Interactive -
<https://marinescotland.atkinsgeospatial.com/nmpi/>

iMarDIS - <https://www.imardis.org/>

JNCC Marine Mapper - <https://mapper.mpa.jncc.gov.uk/>

MAGIC - <https://magic.defra.gov.uk/MagicMap.aspx>



Marine Information System -

<https://www.arcgis.com/apps/webappviewer/index.html?id=3dc94e81a22e41a6ace0bd327af4f346>

Consenting tools

Tethys Management Measures Tool for Marine Renewable Energy -

<https://tethys.pnnl.gov/management-measures>

Tethys Data Discoverability Matrix - <https://tethys.pnnl.gov/monitoring-datasets-discoverability-matrix>

FeAST (Feature Activity Sensitivity Tool) - <https://www.marine.scotland.gov.uk/FEAST/>

MarESA Approach - <https://www.marlin.ac.uk/evidence>

Guidance Documents

Marine Scotland Guidance - <https://www.gov.scot/publications/marine-scotland-consenting-licensing-manual-offshore-wind-wave-tidal-energy-applications/>

NatureScot Guidance - <https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development>

Natural Resources Wales Guidance - <https://naturalresources.wales/guidance-and-advice/business-sectors/marine/marine-renewable-energy-developments/?lang=en>

8.2 Focus groups – organisations in attendance

Advisory Bodies, Statutory Advisors and NGOs

- Nature Scot, UK
- NOAA Fisheries, Office of Habitat Coordination, USA
- NOAA, Office of Policy, USA
- RSPB, UK
- The Wildlife Trust, UK
- Natural Resources Wales, UK

Regulators and Government Agencies

- National Directorate for Natural Resources, Maritime Safety and Security, Portugal
- Portuguese Environment Agency, Portugal
- Welsh Government, UK
- Natural Resources Wales, UK
- US Department of Energy Water Power Technology Office, USA
- US Bureau of Ocean Energy Management, USA
- Marine Scotland, UK



Industry

- Sabella, France
- Minesto, UK/Sweden
- EMEC, UK
- AWS Ocean Energy, UK
- OceanEnergy, Ireland

Consultants and Technical Experts

- WavEC, Portugal
- EMEC, UK
- Xodus Group, UK
- Wave Energy Scotland, UK
- Aquatera Ltd., UK

8.3 Summary workshop – invited organisations

- Aquatera Ltd., UK
- Bangor University, UK
- Bureau of Ocean Energy Management, USA
- US Department of Energy, USA
- European Marine Energy Centre (EMEC), UK
- Harvey Ecology, USA
- Integral Corp, USA
- Kearns West, USA
- Marine Energy Wales, UK
- Marine Scotland, UK
- MarineSpace, UK
- MEDIN / British Oceanographic Data Centre (BODC), UK
- Minesto, UK/Sweden
- National Directorate of Energy and Geology (DGEG), Portugal
- Natural Resources Wales, UK
- NOAA, USA
- Nova Innovation, UK
- Orbital Marine, UK
- ORE Catapult, UK
- Pacific Northwest National Labs, USA
- Portuguese Environment Agency (APA), Portugal
- Sabella, France



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