Workshop on Environmental Monitoring and Mitigation around Deployed Marine Energy Devices

October 2022

International Ocean Energy Conference – San Sebastian, Spain

Background

As tidal and wave project deployments are increasing around the world, there is a need to monitor for potential effects on the marine environment. Virtually all consenting (permitting) and licensing agreements require environmental monitoring, but few are explicit about how, when, and where monitoring must take place. This workshop, hosted by Ocean Energy Systems (OES)-Environmental and Offshore Renewables Joint Industry Programme (ORJIP) Ocean Energy, aimed to identify the key components of effective and efficient programs for environmental monitoring around tidal and wave devices, explore whether there are elements that could be standardized among projects worldwide, and discuss possible funding mechanisms to carry out needed research into techniques and outcomes to facilitate and reduce monitoring requirements and de-risk consenting and licensing processes as the industry scales up.

The workshop included presentations from OES-Environmental and ORJIP on examples of environmental monitoring and mitigation around tidal and wave projects around the world: Sustainable Marine Energy (Canada) Ltd.'s PLAT-I Grand Passage tidal deployment in Canada, CalWave's xWave scaled prototype deployment in the US, Voith Hydro's HyTide tidal deployment at European Marine Energy Center (EMEC) in Scotland, SIMEC Atlantis' MeyGen tidal deployment in Scotland, and Anglesey Marine Energy's Morlais tidal energy project in Wales. Following those examples, the participants engaged in a discussion around best practices for monitoring and data collection as well as information needs and sharing, and on research to support consenting and funding mechanisms.

Workshop attendees list and responses to online survey are provided as appendices.

Discussion

Throughout the workshop, questions were centered around several targeted questions. This section presents those questions and a summary of the discussion.

What drives specific monitoring data collection and analysis needs around a deployed device?

- Availability or absence (and therefor regulatory risk) of existing information where they plan to deploy
- Willingness of regulator to accept experience in other jurisdictions versus a focus only on a specific jurisdiction or potential risks specific to the location
- Regulators knowledge as well as legislation, and how it might be interpreted, which varies among jurisdictions
- What is considered in Environmental Impact Assessment (EIA) to be a moderate risk and/or require monitoring

- Environmental conditions (how complex environment/ecosystem is) and characteristics of the device are critical for setting monitoring requirements
- Deployment period for devices – short-term demonstrations are unlikely to cause significant long-term harm; when moving to commercial deployments of 15-20 years, this will change what is needed to test for approval and for the life of the project
- Government/regulators' responsibility to consult with indigenous groups and other stakeholders – outcome of these consultations can drive data/monitoring needs
- Information provided in monitoring plans should be credible and well referenced, as regulators often look to these for guidance
- Reevaluation of the precautionary principle should be the driver: need to use a more adaptive approach based on information, cost effective, and least trade restricted

Discussion focused on role of regulators

- Important regulators are knowledgeable about tidal/wave energy and the environment, gives them best perspective and can set risk tolerance, based on their understanding
    - At BiMEP, license for wave energy was streamlined because regulator understood project and valued small-scale clean energy; a much more complicated process was required when they added floating wind to test
- Regulators are not normally specialists, but many have experience being in the field
- With environmental impacts there is a political risk aspect to it
- There is a large turnover of regulators as consultants/industry often hire them. Having regulators/advisors better funded so they stay in their positions longer, become more experienced, and can decide on the actual risks would be beneficial
- Regulators are looking at best practices and trying to share these with their organizations, while working collaboratively with and talking to industry, but they have to work within constrains of legislative and regulatory regimes
- Regulators want specific description of project from the start – characteristics, how much power will be produced and what frequency of monitoring data will be collected
    - This workshop with regulators was considered a good opportunity to stay in contact with the industry
- Important for researchers and industry to share information and get it to those who need it; the scientific community can be the bridge between regulators and developers
- Example from petroleum sector and sound in the marine environment – Canadian regulators agreed to work with other governments and industry which led to determining risk and standard practice, helpful for regulators to have standards and for developers to know path for decision-making
- Regulators concerned that allowing a particular action or level of monitoring will open the flood gates, so they want to go slowly. Instead, regarding consenting arrays, should start at an appropriate scale (some debate about what that is, maybe 30 MW or so) to allow first steps toward understanding.
    - UK – MeyGen and Morlais arrays of many MW were consented through discussions with regulators on what to expect, which satisfied most of the regulators
    - At EMEC they are shifting to helping developers move towards arrays, thinking about supporting the sector (rather than consenting a single project)

- Morlais (240 MW) has consent for a wide range of devices subject to further studies about marine mammal risk (regulators satisfied most other things are not a concern), next stage of studies to understand how to set up monitoring scheme, what technologies work, what data can be gathered

Can we get to standards (e.g., TC 114) for environmental data?

- Collision is the major risk for tidal, currently use numerical models not fit for purpose; standards for this would make the biggest change with regulators
    - First, need devices in the water and monitoring + strategic research for better estimates from real world data on species behavior
- We know how devices work, but need a plan for how we will better understand the environment and animal behavior around devices – generate information everyone can use, leading to reaching the same conclusions about it, and leading to the same consenting decisions
- Starting point for collision risk: little to no interaction. One path forward is to put devices/small arrays in the water, monitor, and share data, so the next company (or next scale up) can use those data and processes
- Recommend taking a step back for collision; talk about encounters and use series of gradations working up to strike to see if modelling is accurate. In particular, are encounter rate and behavior models accurate? Need to understand animal behavior and examine the limited amount of time when they will be around the turbine. We need to look at models and see if those are accurate

What information can help focus these monitoring efforts?

- For Canada, regulators focused on interactions with animals found in Bay of Fundy; noise was of interest initially, but dropped off as a concern recently
- Easy to show noise is not an issue for individual devices, but arrays are harder
- Diving birds hitting a tidal device is another issue, at least in some jurisdictions
- Need to start working with regulators on challenges with large arrays/hundreds of devices
    - This scale may need research in new areas that have not thought were needed rather than collection of the same monitoring data as used for single devices – for example, for changes in oceanographic processes or displacement of migratory animals
- Need to look at climate change and shifting baselines, both for health of animals and habitats as well as energy resources

How can we deliver this information for the good of the sector?

- Developers should consider partnering with monitoring groups/experts to get results published, regulators may be more inclined to permit a project if can point to peer-reviewed literature, at least in some jurisdictions
    - Example – Gillespie et al. 2021 paper and collaboration between SMRU and regulator
- May not need to be published
    - Can have workshops with broad stakeholders including regulators and discussion that serves as peer review
    - Need to verify that evidence and data are representative of conditions
    - Up to regulators and advisors to say what they want the standards to be

- Thinking towards the future, we foresee a proper global market especially for countries where marine energy is to be deployed
    - Example – Latin America looks to international understanding for what to do as well as available research

Research to support consenting and successful projects and funding mechanisms

- Idea of Global Strategic Research Fund supported by public funds to work on internationally agreed-upon strategic questions, have different jurisdictions contribute for work by their nationals
- Public funded research is important
- The UK has models (Cowrie Research Fund, etc.) where the money comes from developers, steered by industry and regulators to answer need-to-know (not nice-to-know) questions
- In Portugal, probably won't have global research fund funded by government
- Worries expressed that relying on public funds to answer questions will be a struggle, may need developers to work together to help fund more collaborative research
- Getting regulators/governments to fund is difficult in many jurisdictions, and not true for others
- Bring together academic and research centers to identify long-range issues like cumulative effects and priority areas to get published research and international collaboration that regulators will pay attention to, but need to get the questions right
    - 2020 State of the Science report did that – lists of recommendations and research needs can be taken by research community to work on them and made their own
- If we want developers to pay, we will need to answer the question of when enough data is enough to ramp down research and monitoring and reach an end point – futureproofing on the idea of data collection
- Distinction between continuous monitoring to ensure predictions about project impacts are correct, and specific questions that are best addressed by specific research; proposed a risk assessment methodology for collision risk – remaining gaps that would be useful for everyone to be filled by specific tests

Other comments

- There are resource limitations, so it is important to understand actual costs for managing and carrying out monitoring programs
- Data collection to answer strategic questions needs to be funded by government agency in a way that it can be used by everyone
- Status quo is not acceptable as we need to move forward in the face of climate change; we have to examine all aspects of marine energy through this lens and mitigate the effects
- Concern raised that a study on a particular device might make it look bad, creating an intolerable risk for developers and risk for intellectual property. The developers in the room felt this was not a concern

Next Steps

- We have answers to many monitoring questions, so we need to consider what needs to be addressed next

- Recent reviews of monitoring research found that most aligned with recommendations for needed research from previous studies, and these authors provided future recommendations several of which are not being looked at yet (e.g., collision risk avoidance or evasion – what causes it and what is happening with prey to avoid area)
- Global Research Fund that is accessible to international regulators would be useful to support monitoring, allowing for checks and balances that do not involve additional costs to developers but rather add to global understanding
- We need to understand monitoring impacts and move from pressures to impacts, so we need good spatial understanding which takes time and is challenging for technology and test site developers
- We need to make better connections among international funds around the world – Europe ERA NETs focuses on ocean energy and member states have to co-fund to participate, strategy though not long term. US and Canada work within their nations
- Start writing Best Practice guidelines as there is a lot of information available

Appendix 1: Workshop Attendees

Name	Organization	Country
Laura Zubiate	BiMEP	Spain
Craig Chandler	Mersey Consulting	Canada
Paul Evans	Intertek	Wales
Conall O'Malley	Marine Institute / SmartBay	Ireland
Dan Hassleman	FORCE	Canada
Bruce Cameron	PAMEC	Canada
David Caures Naraujo	Itainnova	Spain
George Bonner	AMEC / Coastal Studies Inst.	US
Natalia Echeverri	Ocean Energy Europe	Belgium
Dominic Forbus	Sandia National Lab	US
Inês Machado	WavEc	Portugal
Ceri Seaton	NRW	Wales
Robert Meier-staude	UAS Munich	Germany
Jan Dillenburger-Keenan	Orbital Marine Power	UK
John Jenkins	Morlais	UK
Dafydd Lloyd Jones	Marine Space	UK
Iratxe Menchaca	AZTI	Spain
Ainhize Uriarte	AZTI	Spain
David Collier	Minesto	UK
Pedro Vinagre	WavEc	Portugal
Natalia Rojas	Aquatara Atlantico	Spain
Juan Bald	AZTI	Spain
Dernis Mediavilla	EMEC	UK
Organizers		
Andrea Copping	PNNL	US
Ian Hutchinson	Aquatera	UK
Shane Quill	Aquatera	UK
Lenaig Hemery	PNNL	US
Mikaela Freeman	PNNL	US

Appendix 2: Online Survey

Four workshop participants responded to the online survey that was offered at the end of the workshop. The questions and answers are presented below.

1. What was the most valuable aspect(s) of this workshop?
    - Wide variety of views and interactive discussion
    - Participation of people from different backgrounds and sectors
    - Start the 'best practices guide' to develop an understanding
    - Sharing of experience
2. What was the least valuable point(s) of this workshop?
    - No input
3. Are you interested in being involved in this kind of discussion in the future? Please provide your contact information at the end of the survey.
    - Yes (4)
4. What other topics would you like to see addressed in future workshops?
    - Marine spatial planning relating with consenting processes
5. Were you aware of OES-Environmental and/or ORJIP prior to the workshop?
    - Yes (4)
6. Would you like to join their mailing lists?
    - Yes (4)
7. Any other feedback for the team?
    - No input.