SEA Wave: Strategic Environmental Assessment of Wave energy technologies

Deliverable Report D6.3

Steering Group Minutes – 25th February 2019

This project has been co-funded by the European Maritime and Fisheries Fund EMFF) of the European Union. The contents of this document reflect only the (author's view. EASME is not responsible for any use that may be made of the information it contains.

Revision

Revision	Date	Description	Originated by	Reviewed by	Approved by
1.0	17/04/19	Originate	CL	Jennifer Fox (AQT)	
2.0	29/04/2019	Reviewed version	CL	Jennifer Fox (AQT)	

Project Information

Project title	Strategic Environmental Assessment of Wave energy technologies
Project acronym	SEA Wave
Grant agreement number	EASME/EMFF/2017/1.2.1.1/01/SI2.787660
Project start date	01/11/2018
Project duration	36 months
Project lead	The European Marine Energy Centre (EMEC) Ltd
Project website	www.seawave-emff.eu

Contents

List of Tables

1 Introduction

EMEC presented to the Offshore Renewables Joint Industry Project (ORJIP) for Ocean Energy Steering Group regarding the SEA Wave project and the opportunity for members to partake in the SEA Wave Steering Group. This presentation was conducted on the 25th February 2019. The following provides a summary of the discussion that took place at the Steering Group.

1.1 Attendees

Ian Hutchison - ORJIP Secretariat/Aquatera
Jennifer Fox - ORJIP Secretariat/Aquatera
Caitlin Long - ORJIP Secretariat/EMEC
Ed Salter - The Crown Estate (Dial in)
Hannah Hendron - Crown Estate Scotland
Janelle Braithwaite - Marine Scotland
Jared Wilson - Marine Scotland
Kat Route Stephens - Natural Resources Wales
George Lees - Scottish Natural Heritage
Andrea Copping - PNNL/ Annex IV
Charmaine Beer - DAERA Northern Ireland
Paul Ellsmore - Offshore Renewable Energy Catapult
Daniel Coles - Simec Atlantis Energy
Clodagh McGrath - DP Energy (Dial in)

2 Minutes

2.1 Update from ORJIP OE Secretariat

A brief overview of the activities of ORJIP OE since the last Steering Group meeting (January 2018) was given by the Secretariat including administrative, website, collaborative work with OES Annex IV and plans to continue this collaborative work in this phase of ORJIP OE

The Steering Group were asked which other projects or organisations they are already engaged with. The goal of this exercise is to ensure that ORJIP OE is represented across the spectrum of projects and organisations with goals that are aligned with those of ORJIP OE. While the Secretariat is involved or in contact with most of these projects and organisations, it is useful to share this engagement across the Sponsors also. A summary is provided in Table 1.

Organisation/ Project	Contact Name	Steering Group Member responsible
Wave Energy in Southern Europe WESE	Ana Brito e Melo (WavEC)	Caitlin Long
EnFait	Simon Forrest	Caitlin Long/ Vicky Coy
Marine Energy Wales	David Jones	Ed Salter
ORE Supergen	Beth Scott	Ed Salter
ORELG	TBD	Ed Salter
MASTS	Beth Scott	George Lees
NERC	Lizzie Hinchcliffe	George Lees

SpORRaN/ ScotMER	Janelle Braithwaite	Janelle Braithwaite
SEACAMS	Gemma Veneruso	Secretariat
Annex IV	Andrea Copping	Secretariat
SeaWAVE Project	Catrin Sutherland	Secretariat
Australian Marine Energy Taskforce	Stephanie Thornton	Secretariat
iMarDIS	David Mills	Secretariat
World Ocean Council Sustainable Ocean Summit	Paul Holthus	Secretariat
ORJIP Offshore Wind (The Carbon Trust)	Eloise Burnett	Secretariat
SEACORE	Michael Abundo	Secretariat
PRIMaRE	TBD	Secretariat

Table 1: Summary of Secretariat and Sponsor engagement with other projects and organisations

2.2 Round table – summary update on relevant activities from the Steering Group

A summary was given from each Steering Group organisation. See Appendix A for this update.

2.3 Update from on OES Annex IV Programme and priorities for 2019/2020

In introduction to and update on the OES Annex IV programme run by Andrea Copping at Pacific Northwest National Laboratory in Seattle, Washington.

2.4 Update on EASME/EMFF funded project SEA Wave

An introduction to the SEA Wave project was given by Caitlin Long (EMEC).

This project aims to address long term environmental concerns around the development of the marine renewable industry's emerging technology. It will work with four wave energy developers with planned deployments within the course of the project to develop environmental monitoring programmes for each. This project will build on the work done by ORJIP within the Forward Look and the Management Measures Tool.

It was proposed that the members of the ORJIP Ocean Energy Steering Group would be included in the SEA Wave Steering Group. This group would meet on a 6-monthly basis (likely to be remote meetings) during the course of the SEA Wave project to provide guidance, validation and feedback on the actions and priorities of the project. Members will be entitled to opt out of this should they wish. Additional representatives from Europe will be added to the SEA Wave Steering Group.

Generally, attendees were keen to participate of the Steering Group.

A summary of the presentation provided is illustrated in the Appendix B.

2.5 External research and monitoring updates

An update was provided from Steven Benjamins at SAMS on the MANTIS Project which was funded by the NERC Innovative Monitoring funding call. This project has been provided an extension from NERC for the delivery of the final report. It will investigate how the sounds

produced from commercially available systems might propagate through tidal flows. This will help to populate improved noise propagation models.

IH presented an update on the Development of Ocean Energy Integrated Monitoring Systems Project (DOEIMS). This project has developed a metadata catalogue of video data around deployed tidal turbines. This catalogue will be managed and maintained through ORJIP. The outputs of this project will be disseminated to the ORJIP Steering Group as soon as they are finalised.

2.6 Round table discussion

The priorities for ORJIP OE 2018/2019 were then presented. It was noted that there is a significant amount of active wave and tidal projects that are currently or will be operational in the near future. It is important that ORJIP OE is fully engaged with all monitoring activities around these operational projects to maximise the opportunities to meet the objectives set out in the Forward Look.

In addition to fully engaging with the existing operational tidal projects, ORJIP OE sees an opportunity to establish a funding mechanism to support environmental monitoring activities around marine renewable energy projects out with competitive grant schemes.

- Funding mechanisms is being discussed with international members of the Network such as Dept. of Energy, USA, Offshore Energy Research Association, Canada, Enterprise Singapore and the European Commission.
- The next steps are to gather support from industry and key stakeholders; establish funding requirements and reach out to possible contributors.

3 Actions

Action	Person or Group responsible
Circulate the Steering Group meeting slides	Secretariat
Update consultation database	Secretariat
Circulate updated consultation database to the team	Secretariat
Circulate list of projects/organisations and update list + contacts	Secretariat
Include list of meetings etc. for all projects/organisations	Secretariat
Ask Steering Group members responsible for liaising with other projects/ organisations (Table 1 above) to feed into the Monthly Progress Reports with relevant events, meetings and project updates	Secretariat
Send link to Evidence report on design envelopes on marine mammals	KRS
Issue further info on SEANSE Project through ORJIP to Steering Group	JW
Offer to disseminate SEACAMS info through ORJIP OE	Secretariat
Set up conversation with SEACAMS, NRW, Welsh Government and ORE Catapult on future plans for SEACAMS	Secretariat
Webinar idea- dissemination of SEACAMS results	Secretariat
Find out when Eye Sea will be available and update the Steering Group	AC
Get an update from all projects funded under the NERC Innovative Monitoring funding call	Secretariat

Action	Person or Group responsible
Disseminate results of DOEIMS Project	Secretariat
Issue detailed version of Global Environmental Research Fund to Steering Group	Secretariat

Table 2: Summary of Actions from the Steering Group Meeting

Appendix A: Steering Group Updates

The Crown Estate (Ed Salter)

Our main focus over the last few months has been on Offshore Wind. However, we remain in close and regular contact with our customers and developers in the Offshore Energy sector. In particular we are continuing to engage with and monitor progress on the Morlais project and look forward to seeing how the project progresses though the consenting process over the course of the year. We are continuing to progress work to support and build the evidence base for any plan-level HRA that may be required for Round 4. As such we are currently tendering for several small-scale research projects and are seeking to ensure alignment with other projects and work streams such as work being taken forwards under Scotmer.

We attended the MEW WG meeting on 30th Jan and are continuing to engage with Welsh Government on the Welsh National Marine Plan. Looking forwards over the course of the coming months, three members of the team will be in attendance at the MEW 2019 Conference at Celtic Manor.

Marine Scotland (Janelle Braithwaite)

ScotMER

The Scottish Marine Energy Research programme (ScotMER) is continuing to support research undertaken to improve our understanding of the environmental and socio-economic implications of offshore renewable energy developments. This collaborative and coordinated approach to research aims to reduce uncertainty in consenting decisions by addressing knowledge gaps that have been identified and prioritised by Marine Scotland and wider stakeholders.

Seven evidence maps have been produced to guide the ScotMER programme, covering knowledge gaps in ornithology, marine mammals, fish and fisheries, diadromous fish, benthic, physical processes, and socio-economics. Five of these evidence maps have been published online with diadromous fish and socio-economics evidence maps to follow.

The ScotMER programme was officially launched at the 1st ScotMER Symposium on 2 October 2018. This symposium focussed on seabirds and showcased research supported by Marine Scotland on the potential interactions of marine renewables and seabirds. The 2nd ScotMER symposium focussing on marine mammals will take place on 6-7 March 2019.

Current and recent research projects

Projects underway related to ocean energy with anticipated publication this and next financial year include:

- Individual consequences of tidal turbine impacts – part of the Marine Mammal Scientific Support Programme

- Fine scale marine mammal behaviour around tidal energy devices– part of the Marine Mammal Scientific Support Programme
- Apportioning of breeding seabirds at sea to breeding colonies
- Understanding salmon smolt migration routes off the Scottish east coast
- Improvements to modelling population consequences of disturbance for marine mammals (iPCoD)
- Improving estimates of seabird body-mass survival rates
- Improving our understanding of seabird behaviour at sea
- Defining 'local area' for assessing impact of offshore renewables and other marine developments
- Developing non-invasive tags to measure the energy expenditure of seabirds
- Bird sensitivity mapping tool
- Noise modelling at the MeyGen tidal site

Marine Scotland Science is also supporting a number of PhD studentships related to ocean energy, including:

- Use of tidal flow areas by seabirds and the potential interactions with tidal stream renewable energy (PhD – University of Highlands and Islands)
- Quantification of seabird use of tidal environments: Novel methods to address potential biases in vantage point survey data energy (PhD – University of Highlands and Islands)
- Top predator usage of tidal-stream sites in relation to fine-scale surface hydrodynamic features- using unmanned aerial vehicles (UAVs) as an ecological survey tool (PhD – University of Highlands and Islands)
- Use of high tidal flow areas by seals (PhD – University of St Andrews)
- Develop novel assessment and monitoring tool for fish communities around renewables developments (PhD – University of Highlands and Islands)
- Opportunities for small scale tidal energy generation (PhD – University of Highlands and Islands)
- Quantifying the impact of marine renewable energy devices on harbour seals: a multifaceted approach to plugging knowledge gaps on fine-scale habitat use in a tidally active environment (PhD – Queens Belfast)
- Wave current interactions in the Pentland Firth (PhD – University of Highlands and Islands)
- Determining the ecology and physics of tidal stream habitats (DEPTH) (PhD – University of Aberdeen)
- INDI-POP Individuals to Populations: The potential effects of large tidal arrays on mobile marine populations (PhD – University of Aberdeen)

Marine Mammal Research Programme

The marine mammal research programme, which is a five-year project to meet the ongoing and increasing need for marine mammal scientific support and to provide advice to Scottish Ministers across a range of key policy areas, is in its final year. The programme covers three major themes, including harbour seal decline and marine renewable energy. Specific research projects underway in relation to marine renewable energy with anticipated publication in the current and next financial year include:

Fine-scale underwater behaviour of marine mammals around tidal turbines (refer to following section on MeyGen)

Individual consequences of tidal turbine impacts on marine mammals

Progress on these work streams can be found in the annual reports at http://www.smru.st-andrews.ac.uk/research-policy/reports-to-scottish-government/. The next annual reporting cycle covering April 2018 to March 2019, is due in April 2019.

MeyGen

As part of a Scottish Government funded demonstration, the Sea Mammal Research Unit (SMRU) at the University of St Andrews is working with MeyGen Atlantis to understand the fine-scale underwater behaviour of marine mammals around an operational tidal array. Using a combination of passive acoustic monitoring techniques and seal telemetry, the project will provide information on marine mammal movements around an operational device. To date, twelve months of PAM data has been gathered at the site, along with four harbour seal tag deployments (the last in spring 2018), with current work focused on the analyses of all the data strands. The project will report in March 2020. Further information on the project, including annual progress reports can be found at http://www.smru.st-andrews.ac.uk/research-policy/reports-to-scottish-government/.

NERC platform

Marine Scotland, SNH, NRW and MeyGen Atlantis are partners in a NERC funded project being carried out by the Sea Mammal Research Unit (University of St Andrews), which aims to develop, test, and build a standardised monitoring system to track marine mammals around operating tidal turbines. The platform will consist of active and passive acoustic monitoring devices and work has already been undertaken to test components of the system on the west coast of Scotland with a successful outcome. Work is ongoing with the design and build of the platform due to be completed in summer 2019 ready for subsequent deployment and data collection thereafter although funding has yet to be secured for this element of the work. More information on the project can be obtained from Gordon Hastie at SMRU.

Scottish Natural Heritage (George Lees)

Our involvement in wave and tidal work, since the last PSG meeting in Jan 2018, has been relatively limited in comparison to previous years, reflecting primarily a slow down in new development proposals and research or guidance requirements. We have though received a steady stream of consultations from EMEC through the year in relation to deployments and associated work at their tidal and wave sites. Presently we are liaising with EMEC over the development of a site-wide Section 36 consent, analogous to that developed previously for the tidal site at Fall of Warness, and which should, if provided, streamline licensing and testing for developers at the Billia Croo site. Other than that we provided ad hoc advice, as required, to MeyGen, Orbital Marine Power (formerly Scotrenewables) and Nova innovation for their schemes in Inner Sound, Orkney and Shetland, respectively.

Our partnership project with Aquatera: *Development of an Ocean Energy Impact Monitoring System (DOEIMS)* continues and is nearing completion, and should be available in Q2 this year. This will include a technical review of underwater camera systems deployed on at least six tidal stream developments, recommendations for use of such monitoring equipment, protocols for analysis of footage and a summary of the, albeit limited, environmental information that has been gleaned thus far from these particular datasets.

A separate contract, *Guidance on Development Buffer Zones in Baseline Characterisation*, is undergoing QA and will be published later in Q1 or early Q2. Though focused on offshore

wind, this also offers guidance on buffer zone definition for wave and tidal developments. Other than that we continue to support the Scottish Government Demonstration Strategy at Inner Sound and, more broadly, their ScotMER (formerly SpORRAn) research framework and programme.

Natural Resources Wales (Kat Route Stephens)

Marine Energy Summit

NRW attended at the Welsh Government (WG) Marine Energy Summit in Swansea on the 31st January. The Welsh First Minister, Mark Drakeford, provided the opening speech and is supportive of marine renewable energy.

NRW presented at the Summit. The key messages are categorised into 5 themes that NRW consider key for marine renewable energy:

- The need for a framework of policy, strategic planning and assessment
- The importance of strategic evidence & research
- The implications of the consenting and assessment process
- The value of Communication and liaison
- Changes to NRW Governance and working arrangements that will help to facilitate development

WG will be a report summarising the outputs and next steps.

ORJIP OE Call for Evidence

NRW are engaging with an ORJIP study, commissioned by WG, identifying the key challenges associated with consenting marine energy (wave and tidal stream) in Wales and to propose solutions and recommendations to addressing these. This is through a formal call for evidence and 1-2-1 telecons with NRW staff.

Projects

NRW (regulatory & advisory) are involved in several marine renewable energy schemes. Notable projects:

Project name	Technology Type	Location	Summary
Marine Energy Test Area (META)	Component and scale device testing areas	Pembrokeshire	In pre-application discussions regarding draft environmental statement. Marine licence application expected end of March 2019
Morlais Tidal Demo Zone	Tidal stream	Anglesey	Scoping opinion issued under the Marine Works EIA Regs by NRW and under the Transport & Works Act by WG. Awaiting Marine Licence application which is anticipated summer 2019
Minesto (array)	Tidal stream - kite	Anglesey	Marine Licence Scoping Opinion Issued. Phased approach to array development under consideration.
Minesto (single device)	Tidal stream - kite	Anglesey	Developer wanting to deploy quarter size kite on current tether, exploring if within current licence

Nova	Tidal stream - horizontal axis	Llyn Peninsula	Revised scoping opinion issued in November 2018
DeltaStream (TEL)	Tidal stream	Pembrokeshire	Device no longer operational, in company in administration. Marine Licence extended to March 2019.
Tidal Lagoon Swansea Bay	Tidal range	Swansea	Marine Licence determination underway focusing on impacts to fish.

Guidance

Newly available NRW guidance and evidence reports:

GN030 Benthic Habitat Assessment Protocol – guidance on methods and approaches for surveying and monitoring of benthic habitats. Saltmarsh chapter available, further habitat chapters are in development.

Evidence Report 274: Defining project envelope for marine energy projects: Review and Tidal energy test facility and marine mammals case study – Technical report on how to develop a project design envelop.

Welsh National Marine Plan (WNMP)

NRW continue to support WG in the drafting of the first WNMP through the stakeholder reference group.

An internal workshop will be held in March to explore proportionality with regard to preparing to implement the WNMP, expected to be adopted later in 2019.

EMFF Project: Sustainable Management of Marine Natural Resources

NRW are managing a WG project on the *sustainable management of marine natural resources*, funded by the EMFF. This is a current, 3 year projects looking at 3 sectors of marine plan, including wave, tidal stream and aquaculture and identifying environmental opportunities and constraints around selecting suitable sites for development. Initial phase of project focused on gathering evidence together and collating this. Next phase is about filling the gaps and refining the presentation and interpretation of information it contains to maximise its use.

Stakeholder collaboration will be central to the project delivery to ensure fit for purpose end products.

EMEC (Caitlin Long)

The Interreg NWE FORESEA programme has successfully supported developers to test at several test centres across Europe including EMEC. To date, 19 technologies have successfully deployed, twelve of which have already completed their testing programme under FORESEA. Key highlights include: CorPower Ocean with the deployment of their C3 WEC at the Scapa Flow test site; Orbital Marine Power generated over 3 GWh of electricity within one year of testing; Tocardo's TFS successfully survived storm conditions at Fall of Warness; and, Naval Group deployed a Microsoft 450 kW underwater data centre at Billia Croo. Building on the skills, processes and expertise developed in the FORESEA programme, Blue-GIFT has been launched to drive forward the marine energy sector in the Atlantic Arc.

A new Interreg NWE project, Ocean DEMO, has been launched and will provide funding for developers of marine renewable technologies to test their products or services in real sea environments, specifically targeting multi-machine ocean energy installations. Ocean DEMO will support devices to be installed from 2020 to 2022.

Amphibious' EnergyPod is expected to be deployed at Scapa Flow this spring under the EU-funded MaRINET2 project. The project launched its third call with several further applicants planning to deploy at EMEC in the coming year.

Magallanes Renovables successfully installed their 2 MW floating tidal energy platform, ATIR, at the Fall of Warness this week. In advance of their arrival, EMEC conducted an acoustic baseline characterisation in preparation for a device characterisation in the coming months.

Wello's Penguin WEC has remained onsite for over 18 months proving the survivability of the technology. Funded through the H2020 CEFOW project, a further two WECs in the array are expected to arrive this year. Plymouth and Exeter Universities have continued to collect key data through 2018, this has involved the use of non-destructive towed underwater video systems (TUVS) and baited remote underwater video systems (BRUVS) to analyse habitat composition and species assemblages around the deployment location.

A European Maritime and Fisheries Fund (EMFF) SEA Wave project has been launched to address long-term environmental concerns around the development of emerging wave energy technologies. SEA Wave will build on the bespoke environmental research campaigns undertaken on Wello Oy's Penguin WEC and incorporate future environmental monitoring campaigns on WECs demonstrated by CorPower Ocean, Laminaria and Ocean Energy over the coming three years.

With the Heriot-Watt University ICIT, through the BioFREE project, EMEC has been researching practical strategies to minimise the impacts of biofouling for the marine renewable energy industry. Eight frames are deployed across EMEC's sites with data collection campaigns every three months. A webinar with key project findings will be aired shortly.

Finally, EMEC is currently preparing to submit a Section 36 consent application for the Billia Croo test site in the coming month. This will act as a site-wide envelope consent streamlining the consenting process for developers and bring the two full-scale test sites into the same consenting regime.

DP Energy (Clodagh McGrath)

Uisce Tapa, FORCE, Nova Scotia, Canada

Uisce Tapa is a 9MW in-stream tidal energy project located at the Fundy Ocean Research Centre for Energy (FORCE) in Nova Scotia, Canada. The Uisce Tapa incorporates 2 of the 5 berths at the FORCE Centre. DP Energy is working closely with FORCE and turbine manufacturer to incorporate the requirements for the EMP into the design of the project.

Fair Head Tidal, Co Antrim, Northern Ireland

The political landscape changed following submission of the consent application; with Government focus on Brexit and suspension of the Northern Ireland Assembly (NIA) since 26th January 2017. In November 2018, a Bill was passed to make provision about the exercise of governmental functions in, or in relation to, Northern Ireland in the absence of Northern Ireland ministers. This resulted in the Secretary of State issuing guidance for civil servants in

December 2018. This confidential guidance document details the complicated process for consent approval in absence of a minister.

DP Energy are working with the Department of Agriculture, Environment and Rural Affairs (DAERA) to progress our consent application.

Westray, Orkney, Scotland

DP Energy are working with National Grid in relation to our grid connection contract.

DAERA Marine Licensing (Charmaine Beer)

The marine licensing team within work closely with the statutory nature conservation advisors within Marine and Fisheries Division on DAERA on all applications. Ongoing projects we have in the renewable sector are:

Seagen, currently being decommissioned from Strangford Lough.

QED Naval have been issued with a 1 year extension until 29/02/2020 to their current Marine Licence to enable completion of sea trials of the gravity based foundation platform at QUB Tidal Test site within Strangford Lough.

Minesto ¼ scale Sea Kite. Following successful trails of a Marine Mammal detection system, Minesto propose to submit request to DAERA to vary conditions of current Marine Licence, which currently imposes strict shut down distances and operational windows for the device (daylight hours only).

Tidal Ventures Torr Head (Open Hydro). DAERA awaiting outcome of liquidation report to inform next steps in conjunction with The Crown Estate, potential license transfer following due diligence to new operator if any or void licence.

Fairhead Tidal. Licence currently a Draft Stage, following a successful Judicial Review in relation to Senior Civil Servants within the Devolved Administration in Northern Ireland taking Strategic National decisions in the absence of Government Ministers, this application is effectively on hold.

DAERA have a new marine map viewer available online https://appsd.daera-ni.gov.uk/marinemapviewer/ and issues marine licences are currently being digitised ready for uploading. Further information on DAERA marine licensing projects is available at https://www.daera-ni.gov.uk/articles/marine-licensing-public-register.

Appendix B: SEA Wave Presentation

This project has been funded by the European Commission under the European Maritime and Fisheries Fund (EMFF), Call for Proposals EASME/EMFF/2017/1.2.1.1 – "Environmental monitoring of wave and tidal devices". This communication reflects only the author's view. EASME is not responsible for any use that may be made of the information it contains.

SEA Wave
Strategic Environment Assessment of Wave energy technologies

aquatera environmental services and products · EMEC THE EUROPEAN MARINE ENERGY CENTRE LTD · HIDROMOD · UNIVERSITY OF PLYMOUTH · UNIVERSITY OF EXETER · CORPOWER OCEAN · LAMINARIA · Wello DIRECT CONVERSION · OCEANENERGY A WORLD OF POWER

At a Glance

EMEC THE EUROPEAN MARINE ENERGY CENTRE LTD

- Identify and address long term environmental concerns
- Develop and deliver environmental assessment programmes around four wave energy devices
- Data gathered and model developed suitable to inform consenting decisions across Europe
- Funded by EMFF
- 36 month project (currently M4)

Device Types

EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD

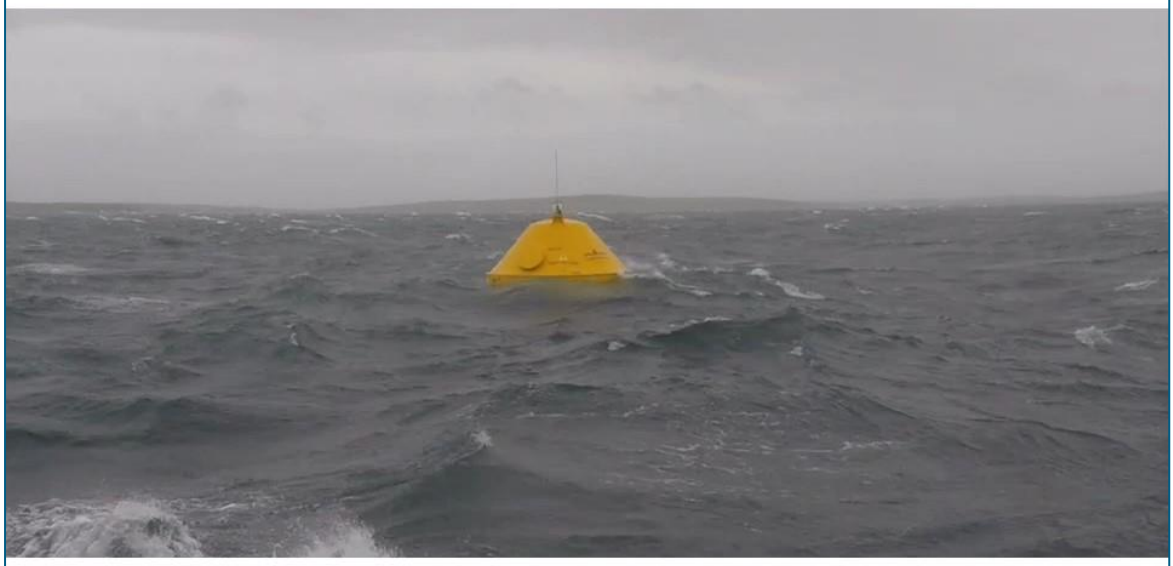
Gap Analysis & Monitoring Plan

EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD

- Identifying and addressing uncertainties
  - Where should research be prioritised?
  - Utilise OES Annex IV State of the Science & ORJIP Forward Look
  - Assess ongoing work
  - Prioritisation based on key consenting risks
- Critique of mitigation and monitoring strategies
  - Adequacy of standards – particularly at site selection/ pre-consent stage
  - Transfer lessons learnt from previous deployments
  - Reduce risk of duplication / use of unsuccessful techniques
- Parity with other industry consenting regimes
- Develop cost effective demonstration strategies

CorPower Ocean

EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD



CorPower Ocean testing at EMEC's Scapa Flow test site

Wello

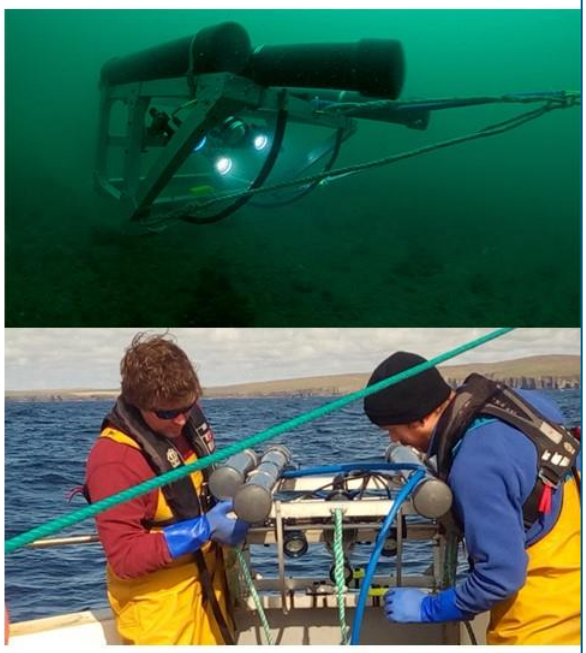
EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD

View from Wello's Penguin deck camera operating at the EMEC Billia Croo test site – first WEC of CEFOW array

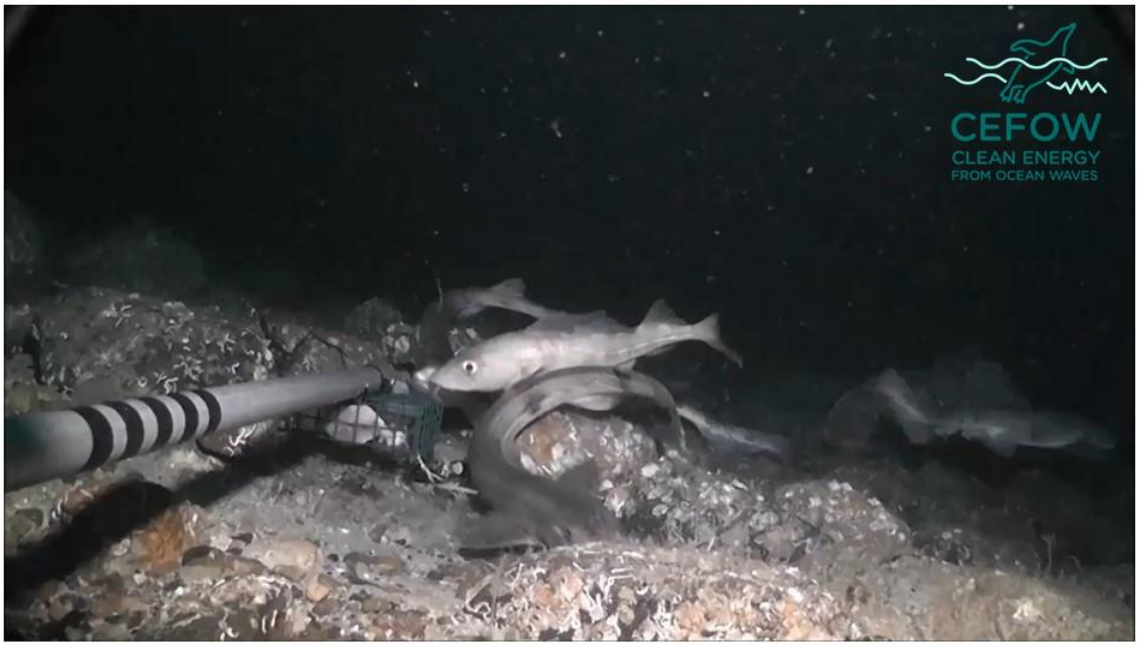
Data collection and analysis

EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD

- Ecosystem indicator-based monitoring focusing on seabed, seabirds, fish and marine mammals
- Contextualising device-specific responses rather than site-specific, focusing on consequence of upscaling from single to multiple converters
- Methodologies advised by gap analysis
  - Fisheries bioacoustics
  - Underwater noise characterisation
  - Device mounted equipment
  - Non-destructive towed underwater video system (TUVS)
  - Baited remote underwater video system (BRUVS)



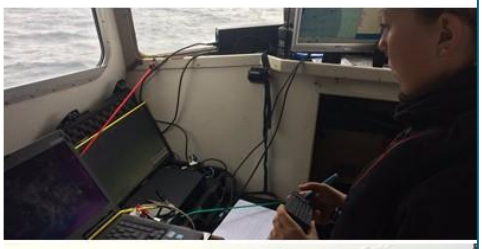
Data collection within H2020 CEFOW project

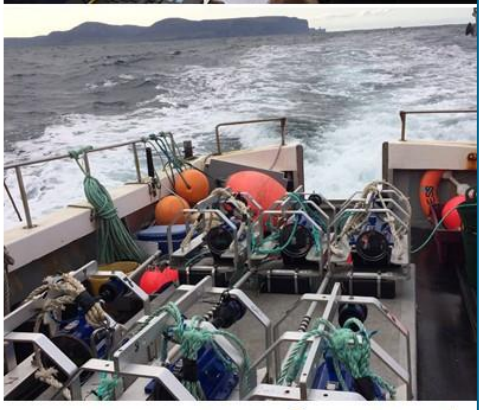


Modelling and validation

EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD

- Environmental response to single and multiple converters
- Power analysis to yield relationship between monitoring programme duration and minimum period required for detectable change
- Transferability of findings to other sites / jurisdictions
- Data compatibility with EU data platforms

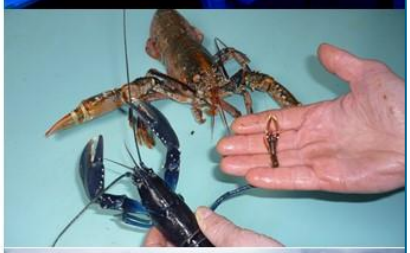




Strategic Recommendations

EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD

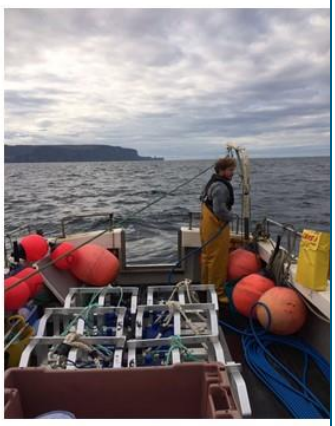
- Ease burdensome consenting process
  - Provide accessible guidance on EIA and HRA processes for developers
- Reassurance to support regulators in adopting risk-based consenting process
  - Guidance on realistic mitigation/ monitoring
- Guide CIAs & co-location with other sectors
  - Parameters for marine spatial planning
- Promote ecosystem enhancement
  - Design modifications to enhance positive ecological impacts
- Support four developers towards commercialisation



Project Outputs

EMEC THE EUROPEAN MARINE ENERGY CENTRE LTD

- Consensus on key environmental issues
- Comprehensive dataset on environmental interactions from multiple WECs
- Populated models developed using operational data from single device and arrays
- Reduce uncertainty for future deployments and risk during planning
- Transfer lessons learnt on effectiveness of monitoring to emerging technologies
- Promote transnational consistency in approach
- Translate good practice on mitigation and management methodologies and impact assessment techniques to inform policy
- Deliver integration techniques for sharing data to EU Data Platforms ensuring stakeholder and industry dissemination



WESE

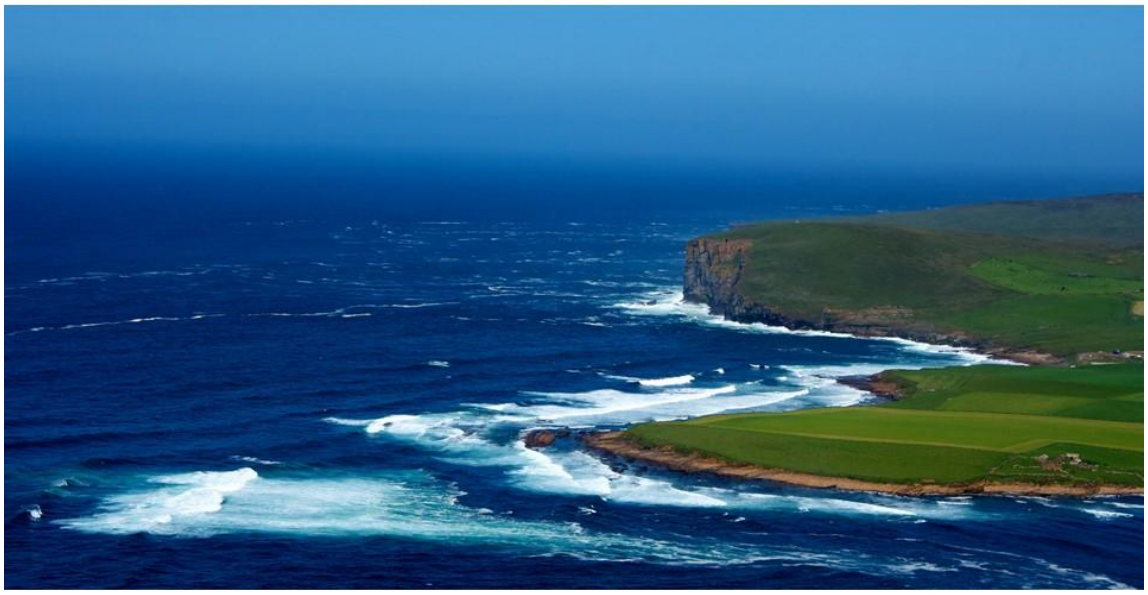
How you can support SEA Wave

EMEC THE EUROPEAN MARINE ENERGY CENTRE LTD

SEA Wave Steering Group

- Steer and validate the identification of knowledge gaps & priority work streams
- Engage developers, policy makers, regulators, academics & industry partners
- Participate in facilitated workshops
  - Screening and scoping exercises
  - Impact assessment techniques
  - Marine spatial planning
  - Translating good practice into policy
- Ultimately endorse guidance and recommendations
- Be an active member of a European network of stakeholders and end users

EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD



Follow us:

SEAWave

This project has been co-funded by the European Maritime and Fisheries Fund EMFF) of the European Union. The contents of this document reflect only the (author's view. EASME is not responsible for any use that may be made of the information it contains.

www.seawave-emff.eu