TEN YEARS OF MARINE ENERGY EXPERIENCE

GLOBAL OCEAN ENERGY

16-17th October 2013

European Marine Energy Centre (EMEC) Ltd

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Executive Summary

Established in 2003, The European Marine Energy Centre (EMEC) Ltd is the first and only centre of its kind in the world to provide developers of both wave and tidal energy converters with purpose-built, accredited open-sea testing facilities. As part of its 10th anniversary celebrations, EMEC extended an invitation to existing (and planned) wave and tidal test facilities worldwide, to attend a symposium in Orkney.

The event took place over 4 days in October 2013, with a programme including site visits, presentations, breakout discussions and various networking opportunities. Extremely positive feedback was received with 93% of delegates who responded rating the overall experience of the event as 5 out of 5.

A dedicated section of the EMEC website was constructed as a repository for information before and after the event. Further details including the programme, speaker presentations and photographs from the event are available at: http://www.emec.org.uk/global-ocean-energy/.

The breakout discussions which were part of the main symposium proceedings enabled delegates to discuss collaborative opportunities worldwide. A summary of the conclusions reached by the symposium delegates can be seen below:

A. Follow through from the event should be ensured by circulating a report, actions and next steps to delegates.
B. EMEC should act as global lead in establishing an informal 'test site operator's forum'.
C. An international forum to develop a research framework for wave and tidal energy should be established.
D. Planning for a future event should include a series of workshops covering specific topics.
E. Input to development of international standards should be continued.
F. EMEC should develop its international accreditation / performance validation capability.

While some of this work can be undertaken within existing resources, any meaningful development of a network will require to be resourced (as a minimum administrative and event management).

EMEC is seeking support to progress actions in relation to points A to F via its' Board in 2014

1. Background

Based in Orkney, Scotland and established in 2003, The European Marine Energy Centre (EMEC) Ltd is the first and only centre of its kind in the world to provide developers of both wave and tidal energy converters – technologies that generate electricity by harnessing the power of waves and tidal streams – with purpose-built, accredited open-sea testing facilities.

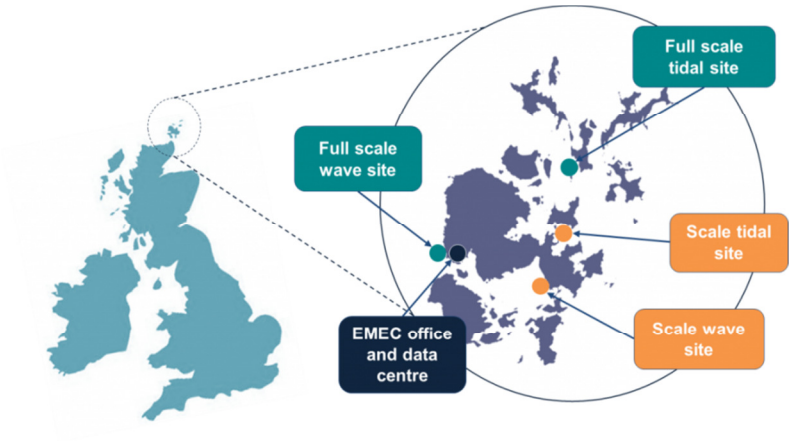

Figure 1 – EMEC location and facilities map

It was proposed that 2013 would be a year of events and activities to highlight and celebrate 10 years of EMEC. The aim of one of these events was to extend an invitation to existing (and planned) wave and tidal test facilities worldwide, to attend a symposium in Orkney hosted by EMEC.

Numbers were limited, allowing for just one or two representatives from each country/organisation. A dedicated section in the EMEC website was constructed to keep delegates informed as plans develop and details were confirmed: http://www.emec.org.uk/global-ocean-energy/

1.1 Event programme

Tuesday 15 October

- Delegates gather in Aberdeen, and fly to Kirkwall late afternoon.
- Orkney welcome - civic reception hosted by Orkney Islands Council (Kirkwall Town Hall)

Wednesday 16 October – *History: infrastructure investment and local benefit*

- EMEC welcome
- Boat trip (split into 2 groups - choice of Fall of Warness or Lyness)
- Lunch with local supply chain (coordinated by Orkney Renewable Energy Forum)
- Billia Croo tour, Hatston tour, meet Highlands and Islands Enterprise/Orkney Islands Council
- Orkney themed gala dinner and entertainment (Lynnfield Hotel, Kirkwall)

Thursday 17 October – *Future: meeting industry needs*

- Symposium – workshop on developing a global industry including sessions on:
  - government policy/investment (with Scottish Government, Highlands and Islands Enterprise)
  - licensing and consenting (with Marine Scotland, Northern Lighthouse Board)
  - research, site management and safety (with EMEC projects and case studies, Crown Estate)
  - marine operations and safety (with OpenHydro, Scotrenewables, Alstom (TGL), Aquamarine and Seatricity)
  - standards development (with EMEC)

Friday 18 October

- Depart early, first flight back to Aberdeen in the morning.

1.2 Promotion

To promote the event EMEC provided copy for various targeted media. Press releases can be found in the media centre in the EMEC website:

http://www.emec.org.uk/press-release-orkney-to-host-major-global-ocean-energy-event/

http://www.emec.org.uk/press-release-international-marine-energy-experts-head-for-orkney/

http://www.emec.org.uk/press-release-global-collaboration-vital-for-growth-of-marine-energy/

2. Event feedback




All delegates were provided a delegate feedback form (see Annex 1). 15 of the 19 visiting delegates responded, representing a 79% response rate.[1]

2.1 What were your expectations prior to the event?

Delegate Comments:

- *Networking/EMEC familiarisation*
- *Knowledge transfer, networking, state of the nation re ocean energy testing*
- *Learn more about EMEC (development, history, experiences) and meet peers in the field*
- *I expected that it would be an opportunity to learn about EMEC's accumulated experience over 20 years of wave and tidal testing*
- *Connect/build relationships with other test centres; get a better understanding of progress/activities at all centres*
- *To find out what EMEC provide to developers and what EMEC do to international collaboration to standardise the test in marine energy field*
- *Sharing the experience of test site construction and carrying on the collaboration based on MoU*
- *Network opportunity and a chance to understand the state of marine renewable industry/technology development*
- *High, as it's EMEC, but my expectations were exceeded*
- *Meet international colleagues (initiating establishing network), share knowledge/problems/info*
- *Meet other test sites operators, give message ocean energy R&D in Ireland is open for business, see EMEC facilities and meet team*
- *To know the structure of EMEC and other test sites, to explore collaboration between test centres*
- *Global view of relevance of test centres and need for standards and collaboration*
- *Meet and learn from other test centres*

[1] It is noted that 1 respondent did not fill out the back of the form, and several missed out particular questions.

2.2 Did the event live up to your expectations?

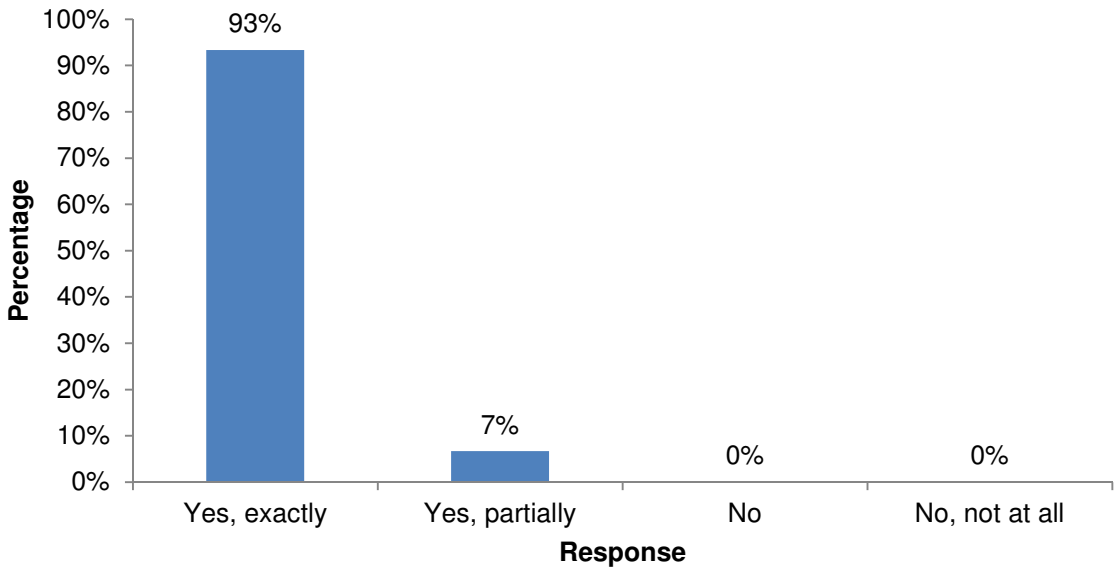

Figure 2 – How the symposium lived up to delegate expectations

2.3 How satisfied were you with the hospitality?[2]

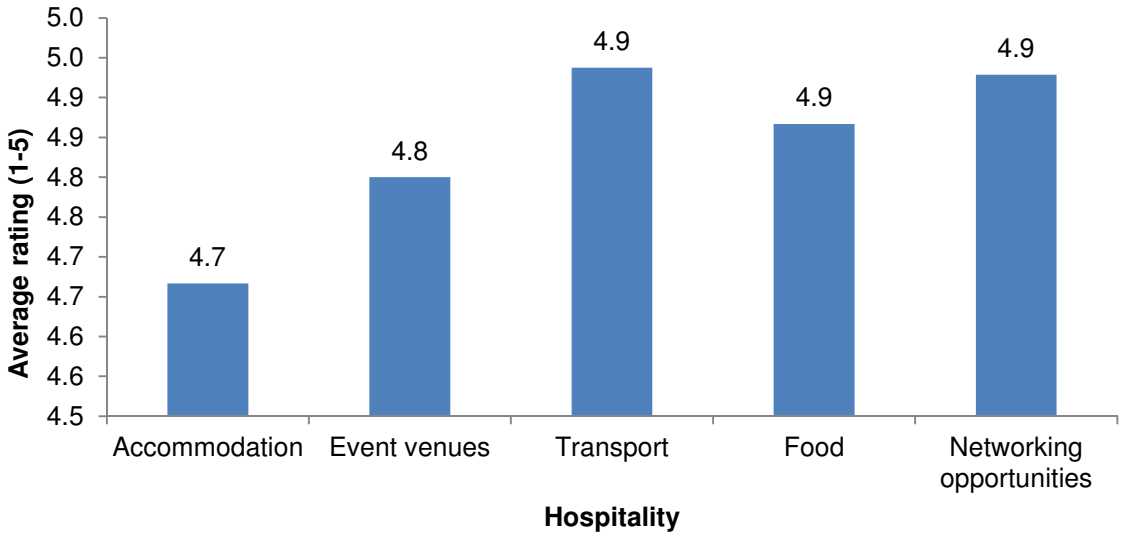

Figure 3 – Delegate feedback on symposium hospitality

[2] Ratings from 1 to 5 were invited throughout the survey, with 5 being the best/highest score.

2.4 How useful/informative were the following visits?

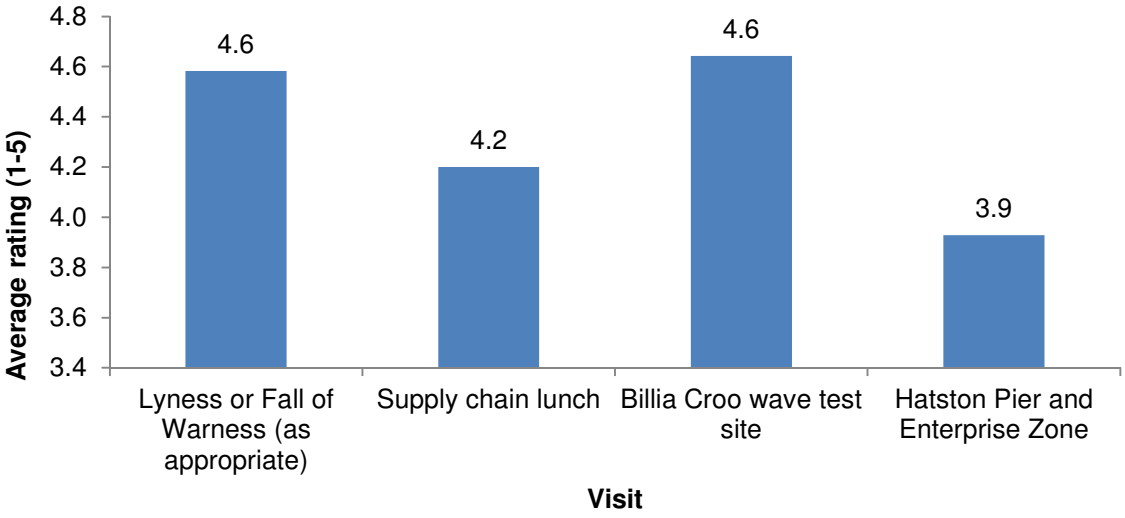

Figure 4 – Delegate feedback on site visits

2.5 How useful/informative were the following symposium sessions?[3]

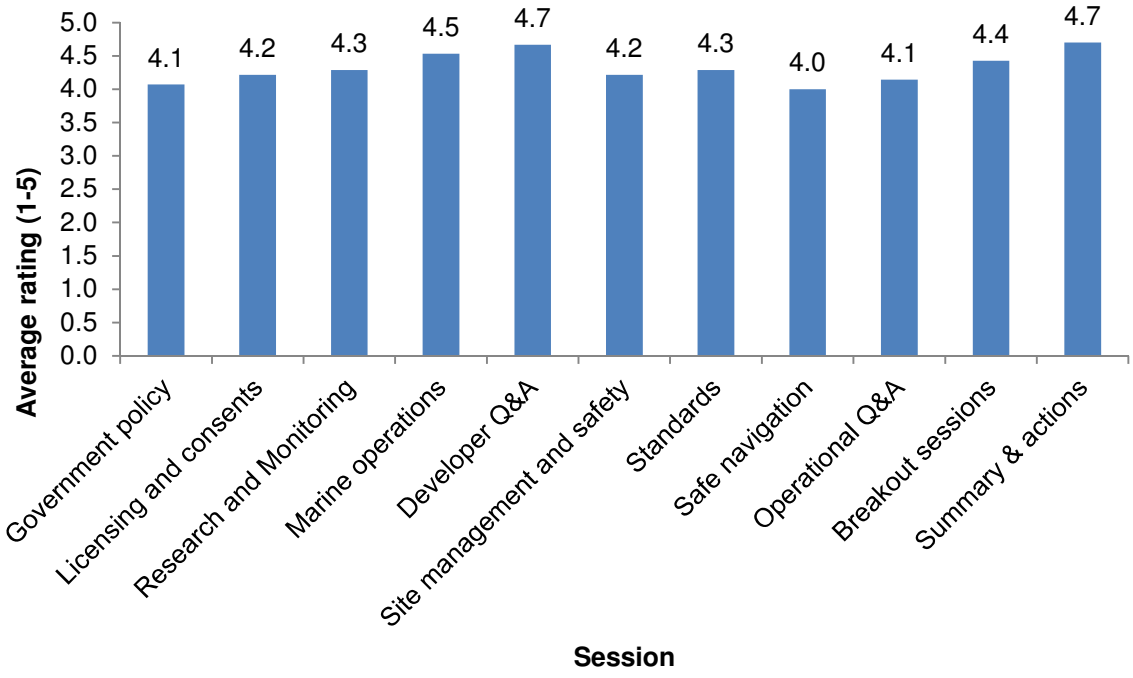

Figure 5 – Delegate feedback on symposium presentation sessions

Delegate Comments:

- *Overall too long, saturation started after lunch.*
- *Breakouts too rushed.*

[3] 2 delegates gave several extra votes to the Developer Q&A session as being particularly interesting.

2.6 How would you rate the event logistics and organisation?[4]

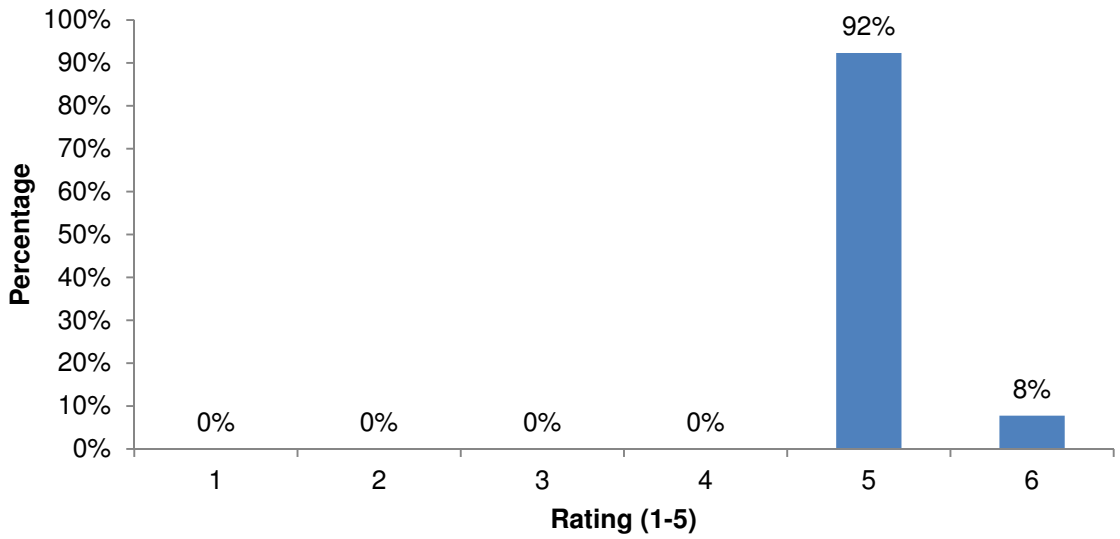

Figure 6 – Delegate feedback on event logistics

2.7 What were the two best things about the event:

Delegate Comments:

- *Networking opportunities, technology status update*
- *Chance to meet/discuss, meeting developers*
- *The opportunity to talk with participants- both delegates and others, tie for tours and symposium*
- *New relationships/contacts, provided perspective on industry status/progress*
- *Visiting in the field, breakout session*
- *Organisation, knowing the delegates and communicating deeply*
- *Networking, detail understand of test site (wave/tidal) and views from device developer*
- *Network/global reach, consent/objectives/tours*
- *Getting new contacts/networking, visits including answers*
- *Networking, site visits*
- *Not too many people. Only people from test centres, logistics and organisation*
- *Networking, learning of progress*
- *The wide variety and quality of people, the small set-up – VIP treatment*
- *Networking; field visits*

[4] Rating from 1 to 5, with 5 being the best/highest score

2.8 Which two things about the event you would change:

Delegate Comments:

- *The Orkney accommodation offer*
- *More time for breakout sessions*
- *Breakouts needed to be longer*
- *Can't think of anything!*
- *No*
- *More time for Q&A, more focus session on specific issues*
- *More interaction/discussion about future actions*
- *Presentations by more international delegates*
- *Not enough lessons learnt. It is needed to share some failures to let the rest learn. A session on contracts with users, responsibilities…*
- *Divide sessions and site visits equally over 2 days; more time for breakout sessions*
- *More time for breakout sessions*

2.9 How would you rate the experience overall?

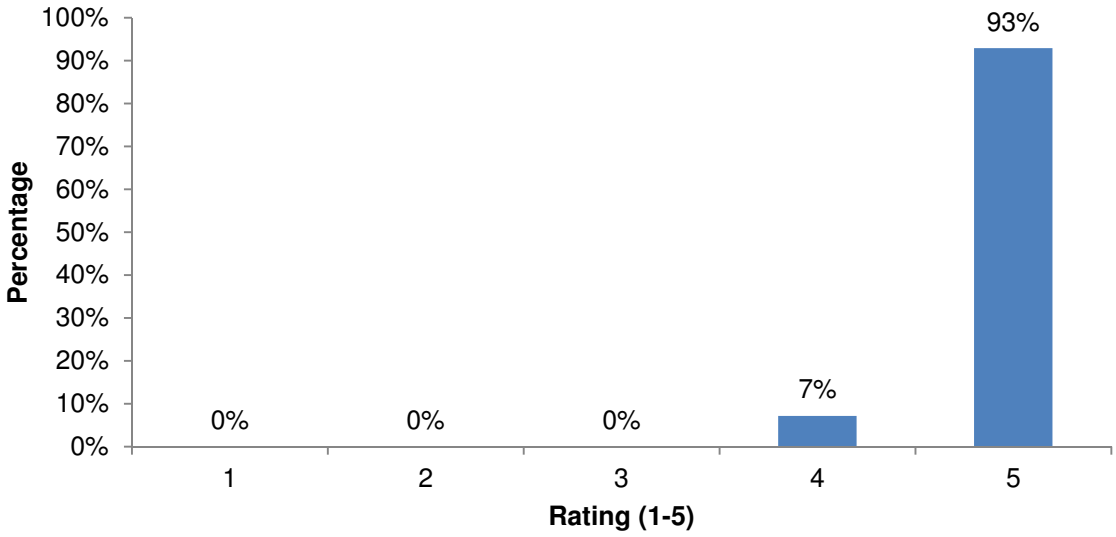

Figure 7 – Delegate overall experience feedback

2.10 Do you have any other feedback you wish to add?

Delegate Comments:

- *EMEC reinforced global leadership status as a result of this event – where next for the global network? Could this become the global industry annual/biannual gathering?*

- *It would be great to have further meetings of test facilities to share best practices and lessons learned*
- *It is better to hold an symposium every 2 years to share knowledge each other in global field*
- *Excellent! Very well organised and very relevant; something that is needed to do*
- *Very well done – SUPER INITIATIVE!*
- *Thank you for organising event – much appreciated*
- *Thanks!*
- *Happy birthday EMEC*
- *Thank you very much!*

3. Discussions

To gain greater insight from the symposium delegates a number of breakout sessions were held to discuss specific issues. These discussions were chaired by EMEC staff and key findings were fed back to delegates via closing session presentation slides shown in Figure 8 below. The raw feedback from these sessions is presented below in Annex 1

Figure 8 - Closing session presentation slides

4. Actions, next steps





4.1 Actions

Conclusion	Action
A. *Ensure follow through on event*	Circulate report, actions and next steps to delegates
B. *EMEC to act as global lead in establishing informal 'test site operator's forum'* [5]	Develop Terms of Reference
	Agree Membership Criteria
C. *Establish an international forum to develop a research framework for wave and tide*	Develop network subgroup and interaction with EMEC Research team
	Share list of research topics
D. *Plan future event but include a series of workshops covering specific topics.*	Seek resource for supporting network and planning biennial event in Orkney
	Arrange interim meeting in association with international conference (e.g. ICOE 2014) to discuss/identify workshop topics
	Schedule next event
E. *Continue input to development of standards*	Nominate regional representatives for IEC mirror committees

[5] *Suggestions for name include:*
- *Global Wave and Tidal Test Sites: Global-WATTS, or,*
- *International WaTERS (Wave and Tidal Energy Research Sites)*

Conclusion	Action
F. EMEC develop international accreditation / performance validation capability	Review remote accreditation requirements with UKAS
	Initiate remote/international accreditation feasibility project

4.2 Next steps

While some of this work can be undertaken within existing resources, any meaningful development of a network will require to be resourced (as a minimum administrative and event management).

EMEC will be seeking support to advance actions A to F via its' Board in 2014.

4.3 Feedback

In developing a truly global marine energy industry EMEC values the relationships that have been built with a robust network of wave and tidal testing centres.

To provide any further feedback on this report please email EMEC at info@emec.org.uk.

Annex 1: Symposium breakout session feedback

Symposium breakout session 1

What do you think are the priority issues for collaborative research?

- Design optimisation:
  - Testing of equipment and sensors; component testing.
  - Define standards, e.g. China currently does not employ any standards.
  - Sharing of power analysis.
- Cost reduction:
  - Join funding for European/global projects.
  - Focus on areas to reduce uncertainty and increase investor confidence.
- Risk assessment:
  - Data from other countries can be used to bring down insurance costs in all areas.
- Governance, development of legislation and procedures:
  - Use results of R&D to inform legislation.
  - Permits / government process before research/work can begin on site.
  - Analyse effect of government involvement on industry.
- Site environmental monitoring:
  - How to structure monitoring / environmental monitoring package.
  - Using results/findings of environmental monitoring to convince regulators of what the issues really are.
  - To study device interactions within arrays (e.g. looking at wake effects).
  - Tool development (resource assessment).
- Resource characterisation and environmental impacts in *low energy* inshore environments.
- Look at other uses for energy produced (e.g. storage, desalination).
- Operational development:
  - learn from how ops are carried out.

How is research initiated or coordinated at your test site?

- Need to build a case for research and then apply to funders (usually national government, EU, etc).
- Some centres use EERA (European Educational Research Association) but this is only for accredited research institutions.
- Cooperation with the UK is seen as essential for industry development.
- Research should be strategic as opposed to reactive to current funding.
- Universities could play larger role, perhaps picking up certain tasks in research projects.

- Feedback on the success of a research project is required, perhaps including developers

- Non-sensitive research could be good basis for collaboration, for example research on environmental impacts, anchoring, corrosion/fouling, education opportunities
- Mechanisms for funding, such as Horizon 2020 or Eureka could allow for joint Canada/EU funding of research

How can we foster international research collaborations across the test sites?

- **Establish an international forum to develop a research framework for wave and tide**. The forum would need to have the authority/access to funding to actually commission research instead of just discussing it. Everyone in the group said that they would be keen for EMEC to be heavily involved in such a forum.
- **Have future events like this (symposium), but include a series of workshops covering specific topics.**
- **Continual development of standards**
- Data sharing
- Collaboration, collaboration, collaboration

Symposium breakout session 2

Could a network support development of national test centres?

- Yes. Delegates commented that it would be good to hear the issues people are having, and discuss solutions.
- **A network would be useful to share knowledge – i.e. not having to 'reinvent the wheel'.**
    - **Increases value and decreases risk** = investor confidence increased
    - **Funding** might be an issue.
    - **Efficiency and progress** seen to be the major benefits of networking from the supply side (i.e. the test centres).
    - Would be good to see these benefits translate to the demand side (how can the meetings **benefit the customer**)?

What form could a network take?

- It would be good to establish some kind of **informal 'test site operator's forum'**.
    - This requires a **framework at multiregional level**
    - **Initially requires a focal point** e.g. Spokesperson/company to get ball rolling
    - MUST have more than just good intentions

    - Strict, formal membership not seen as the best option, **the informal nature of the symposium has been positive**.
    - Perhaps there isn't room for all stakeholders at the global network event, it was suggested to perhaps **stick to open-sea test centres**. Even then will it be full scale only? Should towing tanks etc. be invited to join?
- Would need to **develop an Agenda well in advance**.
- Possibly **organise an event to coincide with a major conference** – e.g. a 'sub-conference' (lots of key people, developers, etc. will already be there).
- **Include a newsletter**.
- Consider **use of web-based networking tools** – e.g. linkedin or VCs.
    - Costs of involvement should be low, potential to use existing software
- Overall it was agreed that there was **no substitute for face to face contact**.
- Regarding funding, each participant could pay their own travel costs etc., with the 'host' facility covering the event/organisation costs.
- Suggested name for the network: "**Wave and Tidal Test Site (WATTS) consortium**".

What functions could a network provide?

- Test centres to **share best practise/business model.**
- Dissemination of info **will lead to increased opportunities.**
- Members could get **'expert' advice as required.**
- Possibly **remove the need to tender for some types of work** – e.g. could use any member of the network who could provide the service.
- **Platform for development of standards.**
    - **Could EMEC provide proxy accreditation**? Developers would be an EMEC client but if berths were full or unsuitable the could test at a test centre somewhere else in the world but still achieve that **EMEC stamp** that is sought after by developers.
- A **single point for dissemination of news, updates,** etc.
- There is perhaps scope to create a greater voice for the purpose of government lobbying, **creating a voice for the industry**
    - Each country requires a focal point/voice to speak for the industry in that region.
- Possibility of **using IEA-OES as a mechanism for funding**[6] should be explored.

[6] Having explored this as a possibility with the UK Government, it would appear that the previous Annex V workshop was a one-off event - a Workshop on Open Sea Testing Facilities that was organised by the OES, as part of the research project "The Exchange and Assessment of Ocean Energy Device Project Information and Experience". This project (called Annex V of the OES) is led by the United States Department of Energy and Roger Bagbey from Cardinal Engineering coordinated the activity. They are conducting a further workshop under Annex V in Edinburgh on Nov 25-26 on Computational Modeling and Analysis, possibly working towards validation and verification from there, and so the role that testing plays with confirming performance predictions will be a central theme. Another workshop is anticipated in 2014.

- many delegates attended the previous session in Dublin which appear to have had similar aims as the symposium, so far the only outcome is a modelling workshop and there doesn't seem to be any other actions.
- The formation of an Ocean Energy network seems to be covered by IEA-OES Annex V, although to date no real outcomes have come from this.