

**C6534: SUPPORTING SERVICES TO
THE OCEAN ENERGY FORUM**

**MEETING REPORT:
MEETING OF THE STEERING COMMITTEES,
LONDON, SEPTEMBER 18 2015**

Prepared by: Cefas

Produced for: The European Commission - DG MARE and EASME

1. Event Overview and Context

The three Steering Committees of the Ocean Energy Forum met at St Ermin's Hotel in London on September 18 2015. A list of delegates is included at Appendix 1. In advance of the meeting, all Steering Committee members, including those unable to attend the meeting, were provided with the latest draft of the Ocean Energy Strategic Roadmap (version 2.2). The main purpose of the event was;

- to inform the Steering Committees of progress made since the Bilbao meeting in drafting the Strategic Roadmap;
- to provide a forum for the ratification of the draft Roadmap by the Steering Committees, together with an opportunity for discussion and further refinement;
- to communicate next steps.

The purpose of this report is to provide a summary of the meeting, including detailed notes from the discussion groups (see Appendix 3), and next steps. This report will be made available on the Forum website.

2. Event Structure

The Agenda (see Appendix 2) was developed and agreed with the Chairs of the Steering Committees (SC), and was designed to make the best use of the time available, with a mix of both plenary and group discussions. The Chairs would lead the breakout sessions, with technical and administrative support provided for each SC by the Secretariat. Key notes and actions from the plenary and breakout sessions would be produced (as per this report).

3. Session Information

The following is a note of the plenary sessions of the meeting. Notes from the breakout sessions are included at Appendix 3.

1. Welcome

Patsy Falconer of the Forum Secretariat welcomed SC attendees to the meeting on behalf of DG MARE and the SC Chairs. The objective of the meeting was to validate the Roadmap ahead of submission to DG MARE 02 October 2015 (see item 2 below). The following changes to the Agenda were outlined:

- Stijn Billiet, EU Commission DG MARE would provide an overview of meeting expectations following Lars Johanning's presentation - this instead of a closing address.
- There would be a presentation from Jacopo Moccia, Ocean Energy Europe, with an accompanying handout.

SC members were also asked to assist the Forum by providing comment on the draft Roadmap design, and by submitting quality images to the Secretariat suitable for use in the Roadmap.

2. Presentation by Lars Johanning, University of Exeter (UoE)

Roadmap principles

On behalf of the Secretariat, Lars thanked Forum members for contributions to the Roadmap process so far. The key objective is clear industrial targets. The Roadmap must be robust with real facts and figures; it also shouldn't over-predict. More importantly, it needs to make a change - it should outline issues and provide solutions, and the timeline needs to be realistic and achievable. The current draft needs to be validated today. It will become the blueprint for EU Commissioners to enable funding and decisions that will support development of the industry.

Work to date

Lars outlined the process since the OEF open session conference in Bilbao 01 July 2015¹. The SC 3 x 3-pagers² had been updated shortly after Bilbao with a period for comments via the Forum website from 20 July to 20 August 2015³. 50 pages of feedback⁴ had been generated as a result of the Bilbao conference where the 3 x 3-pagers were discussed in detail. A synthesis of **key messages**⁵ from the Bilbao event had then been produced (removing duplication and grouping feedback where appropriate).

Lars explained that the Roadmap being discussed at today's meeting was generated as follows:

- 1st draft V1.0 produced by University of Exeter 25 August 2015 (integrating Bilbao 3 x 3-pagers into a single document with consideration of Bilbao and website feedback);
- Cefas revised first draft; V2.0 submitted by University of Exeter 01 September 2015;
- V2.1 produced for 03 September 2015 Brussels meeting with SC Chairs;
- V2.2 developed by Chairs for SC 18 September 2015 meeting.

Next steps

The Roadmap (v2.2) is now becoming more fit for purpose. It is still missing evidence so further work needs to be done, both in the short term and in the period October 2015 to October 2016.

¹ Bilbao agenda can be found at <https://webgate.ec.europa.eu/maritimeforum/en/node/3763> .

² The 3 x three-pagers updated post-Bilbao can be found at <https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/OEF%20Collated%203%20pagers%2021072015.pdf>

³ Link to explanatory article on 3 x 3-pagers website feedback;
<https://webgate.ec.europa.eu/maritimeforum/en/node/3776>

⁴ Link to feedback received at Bilbao event;
<https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/C6534%20Ocean%20Energy%20workshop%20record%20final.pdf>

⁵ Link to Synthesis document produced post-Bilbao event;
https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/Ocean%20Energy%20Forum%20Bilbao%20Synthesis_30Sep2015_1.pdf

SC members are today asked to consider:

- Key messages in the Roadmap – are they correct; are they clear?
- Challenges for the industry – both macro and specifics need to be addressed.
- Recommendations – these will lead to funding structures etc. so they need to be fit for purpose.
- Funding structure – private / public funding and how much is needed?
- Timeline - is the industry happy with the timeline? Is it realistic?
- Credibility of information, including diagrams?
- Format and visual impression are also important so please provide comments.

3. Meeting overview from DG MARE

Stijn Billiet thanked those involved in the Roadmap development and remarked on the good progress to date. Today should be about focussing on the primary purpose of the document and to make sure the document is a true Roadmap in every sense of the word. Agreement on key outcomes rather than Roadmap detail is imperative today. The lobbying phase is over and Ocean Energy is on the political agenda - we have succeeded in the first part but we need to be specific now in order to continue to succeed. Specifically:

- Recommendations – **why** are they key and **how** will they be achieved? Who, what, why, when (actions) needs to be added to the document.
- Context - document still lacks context of why and also lacks acknowledgement of the current situation and why it isn't sufficient.
- Facts check - numbers need to be referenced is of secondary importance though needs to happen.

4. Presentation by Jacopo Moccia, Ocean Energy Europe

Jacopo outlined **four** key aspects of the Roadmap that need to be validated today:

- Phase definition - R&D, Prototype, Demonstration, Pre-commercial, Industrial roll-out
- Moving from phase to phase – what and when. Different technologies are at different stages of development (e.g. tidal stream and tidal range are further ahead). Roadmap timeline was originally based on Levelized Cost of Energy (LCoE) but concept is now volumes.
- Cost of technology of each phase and validation of figures
- Private/public funding and requirements – public funding needed at each stage of development in varying degrees to support private funding. Consider comparisons with other technologies and how much funding these have had.

Caveats

- Numbers are estimates
- Not one size fits all
- Difficult to cost R&D
- EUR/MW not ideal for R&D and prototype phases but is acceptable proxy

5. Breakout sessions by Working Group

At this point, each of the Steering Committees then moved to separate discussions on the Roadmap. The individual breakout sessions were led by the Steering Committee Chairs of the Finance, Technology and Environment & Consenting groups. Notes and actions from these sessions are provided at Appendix 3 below. The summary feedback was as follows;

Technology – Jacopo Moccia

The group spent most of the session discussing the four aspects from the morning presentation (see item 4 above) and has validated them. A few changes in terms of the volumes of wave that need to be deployed in the prototype phase plus the APEX costs for technology (especially for wave in its earlier phases). References need to be included. Group agreed text is on the right track.

Environment & Consenting (E&C)

The group felt the main issue was the consensus end and that despite best efforts, the Roadmap needed further work on this. Group needed to ensure consensus issues were included and that there was a balance on E&C views across the Roadmap. The Group first scoped and then discussed the key issues. The Secretariat technical leads (UoE) re-visited the E&C Bilbao “3-pager” document, together with the Roadmap, to look at gaps. The key points for feedback are:

- Planning – need to have a way of industry planning to minimise the potential for conflict.
- Guidance on consenting – make sure this is articulated but not necessarily “one” manual for Europe.
- Risk-based approach – Group believes a risk-based approach to how gaps are addressed is required.
- Best practice / knowledge exchange – harness the existing knowledge in Europe and where it works well (process and methods), e.g. Offshore Renewables Joint Industry Programme (ORJIP). Get consensus of what is good practice and establish a suitable suite of projects from which to compile knowledge and guidance.

Finance

The group worked through the Finance text at Section 3 of the Roadmap, and the key messages. There was good progress on Roadmap recommendations 4.1 to 4.4 though less on 4.5.

- Recommendation 4.1 - continuous innovation is needed throughout the phases.
- Recommendation 4.2 - enhance existing demonstration sites; grid connections not zones; priority is support for CAPEX for infrastructure.
- Recommendation 4.3 - propose funding model to finance 10 farms; funding would be for funding gap.
- Recommendation 4.4 - propose an EU insurance fund (e.g. bonds and level of funding needed).
- Recommendation 4.5 - combine with 4.4 above (reducing cost of capital will reduce insurance costs) ; link with the E&C Group by getting brokers involved at innovation and design stage.

4. Outputs, Next Steps

Outputs

The following outputs are being generated from the meeting:

- This **Meeting Report**
- Updated **Strategic Roadmap** for submission to DG MARE by 2nd October 2015 (to be published following DG MARE approval).

Next Steps

Following post-meeting discussions with DG MARE and Chairs, a process for the next steps in the Roadmap production was agreed. The details are as follows;

- Finance and Technology sections of Roadmap to be updated by Chairs, taking account of London discussions, by 25th September 2015
- UoE to update Environment and Consenting sections, taking account of London discussions, by 25th September 2015
- UoE to produce final draft of Roadmap by 29th September 2015
- Secretariat to provide QA (including technical content, Roadmap principles and requirements, written style, visuals and language etc.) and input into Roadmap design
- The Roadmap will then be submitted to DG MARE 02 October 2015 for Ministerial discussion in due course
- From October 2015 to 2016, the Secretariat will work to consolidate the evidence behind the Roadmap as well as support the progress of the Roadmap implementation. The Roadmap document will be refined accordingly.

Appendix 1; Delegates Attending

Name	Organisation	Steering Committee
Alex Alliston	Alstom Ocean Energy	T (Technology)
Andres Blanquet	Institute for Infrastructure, Environment and Innovation	E&C (Environment & Consulting) – not official member of SC, represented Frank Neumann
Andrew Smith	Scottish Investment Bank - Scottish Enterprise	F (Finance)
Anne Marie O'Hagan	University College Cork	E&C
Brendan Cahill	Sustainable Energy Authority of Ireland (SEAI)	T – not official member of SC, represented Declan Meally
Brian Carroll	Department of Communications, Energy and Natural Resources (DECNR)	F
Caroline Whybrow	Cefas	-
Charles Bodel	EDF	T
Dan Pearson	MeyGen	E&C
David Pratt	Scottish government	E&C
Eugene Nixon	Marine Institute Ireland	E&C
Fiona Buckley	ENGIE	T
Frank Fortune	Royal Haskoning DHV	E&C
Frank Neumann	Institute for Infrastructure, Environment, and Innovation	Did not attend, Andres Blanquet represented (E&C)
Helen Smith	University of Exeter	-
Henry Jeffrey	University of Edinburgh	T
Ian Hutchison	Aquaterra Ltd	E&C
Jacopo Moccia	Ocean Energy Europe	T
Janine Kellet	Scottish government	F
Jochen Weilepp	Sustainable Marine Energy Ltd. / University of Applied Sciences Biberach	T
Jon Rees	Cefas	-
Jose Joaquin Hernández Brito	PLOCAN	T
Jose Luis Villate	Tecnalia	E&C
Kelly Baker	Cefas	-
Kieran O'Brien	Carnegie Wave Energy (CWE)	F
Lars Johanning	University of Exeter	-
Lucy Greenhill	SAMS	E&C
Michael Bullock	Renewable Risk Advisers	F
Nicholas Walle	TPOcean	T
Nicki Hawkes	Cefas	-
Oliver Wragg	The European Marine Energy Centre (EMEC)	F
Pablo Ruiz-Minguela	Tecnalia	T
Paddy O'Kane	Aquamarine Power	T
Patsy Falconer	Cefas	-
Per Ebert	Wave Star	F
Peter Scheijgrond	Bluewater Energy Services	E&C
Phil Gilmour	Marine Scotland	E&C
Philipp Thies	University of Exeter	-

Pierre Ingmarsson	SP Technical Research Institute of Sweden	T
Rémi Gruet	Ocean Energy Europe	F
Ronnie Quinn	The Crown Estate	F
Sarah Carter	Cefas	-
Sian George	Contractor for several marine energy companies	F
Simon De Pietro	DP Energy	F
Stijn Billiet	European Commission – DG MARE	-
Tom Walsh	Atlantis Resources Ltd	F – not official member of SC, represented Tim Cornelius
Tony Lewis	Beaufort Research - HMRC, University College Cork	F – not official member of SC, supported the Secretariat

Appendix 2; Agenda

Meeting of the OEF Steering Committees 18 September 2015, St. Ermin's Hotel, London (1030-1600h) Agenda

Breakout Groups (G) – to be agreed by Steering Committee Chairs; Plenary (P) briefing, progress and next steps
From 09:45 Arrivals and Coffee

10:30	Welcomes & Objectives		
	On behalf of Steering Committee Chairs	Patsy Falconer, Forum Secretariat	P
	Housekeeping & Meeting Operations	Patsy Falconer, Forum Secretariat	P
	Meeting Objectives	Steering Committee Chairs	P
	Roadmap Progress since Bilbao July 2015		
10:45	Chairs' Overview	Steering Committee Chairs	P
10:50	Context on the Draft Roadmap	Presentation Lars Johanning, Forum Secretariat	P
11:25	Go to Breakout Sessions (2 x groups moved to breakout rooms; 1 x group stay in plenary room; coffee served in rooms from 11:30)		
11:30	Roadmap Validation	Steering Committee Chairs	G
	Objective: Give "green light" and agree updates to Roadmap		
	Chairs overview of requirements Roadmap Principles (paper: <i>Ocean_Energy_Forum_Roadmap_Principles_18Sep2015</i>) Discuss Contents (paper: <i>Ocean_Energy_Forum_Strategic_Roadmap_V2.2_18Sep2015</i>) Discuss Integration & Structure (paper: <i>OEF_Roadmap_TableofContents_18Sep2015</i>) Discuss Design (paper: <i>OceanEnergyForum_Roadmap_Design_V2.2_18Sep2015</i>)		
13:00-1340	Lunch (Balcony Area) then at 1340 re-group in breakout rooms to resume validation discussion		
13:45	Roadmap Validation discussion (cont.)	Steering Committee Chairs	G
	ACTION What key points from validation discussion do you want to feedback to the wider group? ACTION What is the Roadmap strap-line suggestion from this group		
	Coffee served in rooms 14:15		
14:30	Roadmap Implementation & Next Steps	Steering Committee Chairs	G
	Objective: Agree plans and actions to progress key Roadmap recommendations		
	Chairs overview of requirements Discuss implementation Discuss next steps (actions by WHO & WHEN) including look-ahead to Paris February 2016		
	ACTION What key points from implemenation discussion do you want to feedback to the wider group?		
15:00-1515	Break with coffee served in balcony at 15:00 then go to plenary room at 15:15		
15:15	Breakout feedback from each Group	Steering Committee Chairs	P
	Objective: Agree key updates for the Roadmap and main actions for progressing implementation		
15:55	Closing address	Stijn Billiet, EU Commission DG MARE	P
16:00	CLOSE-OUT	Patsy Falconer, Forum Secretariat	P

Appendix 3; Notes from the Discussion Groups

3.1; Notes from the Environment & Consulting SC breakout session

Feedback from the Group

1. The document is well integrated but there is too little focus on E&C issues –environmental practitioners reading the document may think it does not apply to them.
2. The structure of the document needs to include a re-emphasis on E&C; no time for a re-write.
3. Specific recommendation on E&C topic. We need those in charge of consenting processes to get a clear input from the Roadmap. Not suggesting a full section for E&C but need at least one key recommendation for E&C issues.
4. Need to integrate marine planning - focus from a cross-sector perspective e.g. offshore wind, aquaculture.
5. Implementation and guidance on EU directives is key – but this can't be a pan-EU licensing plan, as all Member States have own approaches.
6. Need examples of either projects that have failed due to consenting issues, or success stories.
7. A risk-based approach to E&C is key.
8. Roadmap must emphasise the benefits of ocean energy.
9. Maintain OEF to form working groups to produce relevant E&C guidance etc.
10. Clear grouping within each phase of development.
11. Agreed wording from 3-pagers developed in Bilbao.
12. List the challenges we are trying to address.
13. Action timeline – needs detail.
14. Clarity on marine planning process.
15. Review of licensing process - lessons learned.
16. Industrialisation is a negative term and must not be used; positive message is needed.
17. Marine spatial planning term to be re-introduced.
18. Highlight difficulties implementing EU directives.
19. Strategic monitoring needs including.
20. Need to mention current relevant EU directives, the role of DG MARE and include EIA (Environmental Impact Assessment) + SEA (Strategic Environmental Assessment).

21. Insurance fund to prevent risk of investment failure.
22. Establish links to International Electrochemical Commission (IEC) Technical Committee (TC) 114 standardisation (**specific action:** Peter Scheijgrond).
23. The main conclusion for those updating consenting is that ocean energy is in principle good for the environment (ocean energy technologies do not present major concerns for the environment). Let the technology make progress and not create artificial barriers. Key consenting aspects to be considered will require research to be better understood; this includes monitoring during demonstration projects.
24. Open-sea test sites can give a lot of experiences about environmental issues and then help to define consenting processes for bigger projects.
25. The demonstration phase can appear to be too dominant in comparison to the other phases of development. Need to demonstrate ocean energy technology that is well proven at a component level (demonstration of immature technology is a waste of money). Suggest changing recommendation 4.1 for defining a clear phase-gate process for components **and prototypes** before considering if they are prepared for demonstration (suggest wording in the Roadmap document can be improved). Related to this point: even when the industrial roll-out phase is achieved, R&D, prototypes and demonstration are needed to create new products that are more advanced. For example, wind energy industry with hundreds of GW installed worldwide is still researching in new materials and processes, while developing new prototypes of very-high powered wind turbines and demonstrating offshore wind turbines for deep waters.

ACTIONS SUMMARY	
1.	Include section on benefits of Marine Renewable Energy (MRE) in Intro (UoE)
2.	Summarise p1 of 8-pager into 3 rd cross-cutting theme in section 3.1 (UoE)
3.	Include relevant guidance on E&C issues in sections 3.2-3.4 for phased approach (UoE)
4.	Re-name section 3.5 'Governance' and include more detailed E&C issues and actions here, based on the four sections in the 8-pager (UoE)
5.	Add key recommendation to section 4 based on reducing the consenting barrier (UoE)
6.	Case study at a high level is needed. Just a text box. Peter Scheijgrond of Bluewater Energy Services will provide a case study of the Eastern Shelf Barrier (UoE)
7.	Establish links to International Electrochemical Commission (IEC) Technical Committee (TC) 114 standardisation (Peter Scheijgrond) (UoE)

3.2; Notes from the Finance SC breakout session

1. **Context for discussion.** Remi Gruet of Ocean Energy Europe and Finance Steering Committee Co-Chair outlined the Roadmap trying to explain where each technology was. Technology Group would validate this. Specifically wants Finance Group to look at the phases of the technologies, how they differ and what is needed in terms of finance. Roadmap Section 3 outlines overcoming the challenges and how the sector manages these (private and public funding; Section 4 outlines key recommendations that will move the industry forward. Stijn Billiet of DG MARE re-iterated it was important for the Roadmap recommendations to have IMPACT – who will do what by when and why the current situation is not enough.
2. Finance Group confirmed they had reviewed the Roadmap ahead of the meeting.
3. **Agreed** - different phases needed different funding requirements.
4. **Section 3.1 Specificities of ocean energy and cross-cutting challenges to deployment**
 - a. **Agreed** high-risk / high-CAPEX needs of sector means specific finance packages are needed.
 - b. Uncertainties and tariff system discussion. Private investors will always raise this point because they want certainty. Can we have an EU-wide tariff and can the EU support this as it does with banking – i.e. ask EU to encourage Member States with a coastline to the ocean, Channel or North Sea to implement a marine tariff in their Transmission System Operators (TSO) or other national tariff systems. Banking has a legal agreement for EU-wide approach; electricity does not and it would be difficult given the different markets.
5. **Section 3.2 Financing full-scale prototypes with grant solutions.**
 - a. **TRL 1-4 R&D.** Continuous innovation - there is an assumption in Roadmap that no more innovation needed in tidal/ stream. E.g. Half the tidal resource at a global level is of a lower velocity and there is risk of losing half the global market without innovation. Benefits of continuous innovation are improving certainty, collaboration, avoiding duplication of effort, data access and data sharing. **Agreed** – include R&D requirement in the development phases.
 - b. **TRL 3-6. Agreed** large-scale rather than full-scale (info will be passed on to TP Oceans). It's also not necessarily one device at a time. **Agreed** – this phase has to be in real sea conditions. Difficult to produce MWh when not connected to the grid. **Agreed** – connected to the shore. *This section info to be passed on to TP Oceans / Technology work stream for consideration.*
 - c. **3.2.2 The WES approach.** Can we propose an amount of funding over x years? Can we use demands for funds to predict amount needed (e.g. DG MARE, Ireland and WES)? **Agreed** - WES has specific fund criteria so is not a good benchmark. Reality is that current funding is not enough; companies are struggling and the sector is fragile. A combination of factors could seriously threaten the sector, namely (i) withdrawal of key companies (ii) change in markets (iii) Oil & Gas upturn and impact on supply chain cost. Thus long-term funding is needed. **Agreed** more funding needed at R&D stage compared to pre-commercial. For R&D and pre-commercial this will be public funding with pre-commercial public funding on commercial terms. **Agreed** - need an EU-wide fund with agreed priorities on how the money is used so Europe and individual Member States can see return from investment. Fund needs to be managed properly by people who know the industry. **NB.** Funding is for the gap – i.e. the money that companies don't have. For infrastructure this is 100% funding for zones at both R&D and pre-commercial stage. For components this is 100-70% for R&D and 70-50% for prototype. **Evidence** Meygen a

good example to look at the sunk costs (i.e. the costs needed to get to deployment.) Wave Energy Scotland (WES) is a good example of approach to validating components.

6. **Section 3.3 Demonstration & Pre-commercial – Getting the first farms in the water**

- a. **Agreed** – need context the beginning of the section with what is happening now and why it is not working. Need to be more grounded in the analysis. In the past some projects may have been presented more favourably than the reality. **Evidence** – include pipeline of funded / consented projects.
- b. **Section 3.3.2 Keeping public finance schemes flexible to account for changes inherent to innovation.** **Agreed** - funding was a factor in the failure of Skerries but not the only factor. Avoid “overselling” of technology status / deployment readiness.
- c. **Section 3.3.3 Applying State Aid rules to better enable ocean energy projects.** Issues re time and costs to check validity / compliance and avoiding potential infringement. **Evidence** can be provided by Scottish Enterprise and Sian George re examples of issues with State Aid. Guidance is available from the Commission but this is too generic and specific advice for Ocean Energy is often required urgently. **Agreed** - useful to have a State Aid compliant model that can be referred to quickly and avoid the work needed for every deal. This would help ensure resources are spent efficiently to get projects in the water. **Agreed** - the risk should sit with Europe. Ideal if could link with European Strategic Energy Technology Plan (SET-Plan). **Evidence** ADEM project France useful case study to consider as a combination of grant aid and loans.

7. **Key recommendations.** **Agreed** - Section 4.2 concerned with infrastructure; Section 4.3 projects; Sections 4.2. to 4.4 in the demonstration **and** pre-commercial phases.

8.

Section 4.2 Demonstration – Create publicly funded grid connected demonstration zones for farms

- a. Perceived focus of section is that new deployment areas should be created. **Agreed** - intended meaning is that existing demonstration sites should be supported and commercial-ready zones should be established to provide the conditions for envisaged large-scale projects. Ideally this should link back to device / deployment pipeline to show the need for additional zones / connections. Free at the point of use or rents appropriate to the project? Concerns on how to ensure best projects go forwards if free. CAPEX is a barrier to any project. Get the State to pay for infrastructure with an element of private ownership – the objective is to remove this cost from the developer’s balance sheet. Discussed charging rent for flexibility in the duration of lease depending on project. Charging for OPEX was also discussed and the understanding is that this can be charged. **Agreed** – need to support / enhance existing zones before creating new ones. Co-operation across Member States brings benefits such as sharing the costs of grid connection, infrastructure and data monitoring. **Agreed** – lose the zone phrasing.

9. **Section 4.3 Demonstration – Enable a packaged approach to finance for individual farms.**

- a. Further discussion on an EU-wide fund and how to stream the funding for Ocean Energy. It was noted that there funds but these tend to be for collective emerging industries rather than just Ocean Energy. E.g. New InnovFin scheme open to emerging industries including but not just for Ocean Energy (<http://www.eib.org/products/blending/innovfin/>). A solution could be to take a portion of funds specifically for Ocean Energy to pilot an EU-wide fund. Existing funding approach is random and complex. **Evidence** Maygen can provide info on funding models. **Agreed** – funding for up to 10 farms in the EU reasonable but need to include HOW it will actually happen – link to pipeline to make credible. **Evidence** – Isla, Minesto, Meygen 1b could be project examples plus Ronnie Quinn can provide details of UK pipeline projects.

- b. EU-wide fund approach – **Agreed** free up existing funding to be deployed into the Ocean Energy sector on a commercial basis (noting that not applicable to all of the phases) using experience of Member States on a debt and equity basis. The benefit is the strong ability to leverage in private money. **Evidence** - Revisit the Finance 3pagers to include some of the previous detail.
10. **Section 4.4 Demonstration – Create an EU insurance fund to underwrite demonstration project risks.** **Agreed** – focus on early stage shortfalls and decommissioning bonds. Amounts do not need to be huge. £15-20m per project for a worst-case scenario (fail) noting that such failures would not be allowed to happen across all projects. **Agreed** – ask European Investment Bank (EIB) to underwrite in part. Industry would put forward proposals noting that this was cross-sector also. **Evidence (post meeting)** – Best Practice Guide to Wave & Tidal Power on insurance guidelines (<http://www.renewableuk.com/en/publications/reports.cfm/wt-insurance>).
11. **Section 4.5 Industrial Roll-out – Collaboration to reduce costs and plan deployment.** **Discussed** – combine with section 4.4. Dialogue should be in conjunction with test sites. Get brokers involved at innovation and design stage so insurance advice drives innovation.

ACTIONS SUMMARY	
Para 5a	ACTION General - Draw out in Roadmap and diagrams innovation funding stream for the different phases and technologies noting that it is not a linear process. Include underlying R&D for all phases. <i>This is a key point and was raised in the Environment & Consenting and Technology Groups.</i>
	ACTION General – In recommendation sections, include benefits and risks.
Para 5b	ACTION TRL diagram terminology – use large-scale instead of full scale; include real sea conditions at prototype phase; consider deliver to the shore. <i>Info to be passed on to TP Oceans / Technology work stream.</i>
Para 5c	ACTION Recommendation 3.2 – “Maintain and increase significant EU and national grant funding programmes.....”. Refer to Maygen, WES and NER300 case studies, drawing out the mechanism of the WED model (not everyone knows what this is).
Para 5c	ACTION Section 3.2.2. Propose an EU-wide fund for innovation to improve certainty targeting component approach and tidal zone models.
Para 6a	ACTION Section 3.3. – include more context at start of section including pipeline of funded / consented projects.
Para 6b	ACTION Section 3.3.2 – qualify for Skerries project that funding not the only factor in failure – e.g. difficulty of overstating deployment readiness.
Para 6c	ACTION Section 3.3.3 – include evidence re cost / time re applying state aid rules and how a State Aid compliant model could help reduce burden. Refer to ADEM example.
Para 7	ACTION for Key recommendations 4.2, 4.3 and 4.4 to include Demonstration and pre-commercial.

Para 8a	ACTION Section 4.2 – Enhance existing demonstration sites; lose zones from the phrasing.
Para 9a	ACTION Section 4.3 – include evidence on existing (complex) funding models (e.g. Meygen); include examples of pipeline projects (Isla, Minesto, Meygen 1b) and HOW 10 farms could be funded (link to pipeline to make credible).
Para 9b	ACTION Section 4.3 Revisit Finance 3pagers to include more detail on the EU-wide fund approach.
Para 10	ACTION Section 4.4 – Industry to put forward proposals on how EU insurance fund underwritten in part from EIB would work with QA input from Michael Bullock. Refer to best practice document.
Para 11	ACTION Section 4.5 – Combine with section 4.4 and get brokers involved at innovation and design stage.

3.3; Notes from the Technology SC breakout session

1. **Context for discussion** - Discussion on slides that Jacopo Moccia presented during the a.m. plenary session. Four things need to be validated and agreed upon today;
 - Phase definition
 - Moving from phase to phase
 - Cost of technology
 - Private/public funding and requirements
2. **Phase definition** - If you don't tick all the boxes in one phase you can't move to the next phase.
 - 20MW (megawatts) by 2020 so we need to be asking for the appropriate levels of funding now if we're going to meet this deadline.
 - A definition list needs to be added

R&D - Testing happens throughout all the phases. **Agreed and action** we should leave R&D as is but put a testing statement in the box "ongoing process". We need to inform policy-makers that we are moving forward so need to make sure we indicate that we can move out of this phase. We could call R&D early development, as Wave is currently not accurately presented (as it is not at the R&D stage but not at prototype). Suggestion made to grade the arrows in the timeline graph so there is overlap between the phases.

Prototypes – Deployment in real sea conditions instead of deployed at sea. There will always be intermediary steps between everything. Define what you mean by prototype and define what you mean by demonstration. **Agreed and action** wording to be changed to appropriate sea conditions. Suggestion made as above.

Demonstration – **Agreed** No further changes required.

Pre commercial and Industrial role out phases discussed together – **Agreed** No changes required.

3. **Minimum volumes**, all projects included to move from phase to phase. Comments on figures? Figures seem right for demonstration and pre commercial. Should it be stated by MW in the water or devices in the water? Is MW the right measurement – already defined as a suitable proxy but not ideal in real terms so would it be better to state by technology. The message might be 'counter-productive' scary' to state how many types of technology need to be out there before the next phase can be moved to.
 - **Agreed and action** 20 MW is too high for wave so recommendation needs to be changed. 10MW?
 - Cutting back on Wave MWs – this will be assessed to see if this impacts on the demonstration phase.
4. **Moving from phase to phase - Timeline**

Does the diagram as it is currently presented look plausible?

 - Indicating that wave won't pass the prototype stage by 2020 is very risky
 - **Agreed** Shading of the R&D arrows as per item 2 above
 - What will happen when the government announces no more funding under tidal range? If Swansea bay doesn't go ahead the timeline will have to shift
 - Diagonal lines could be used to show transition between phases
 - Check Committee of the Regions (CoR) report to ensure consistency with Roadmap as necessary.

5. Cost of technology at each phase

- Ideally a range should be set for all technologies, but for wave and tidal as a minimum
- Cost in the wave prototype box is too small. 15-20? If Wave had sufficient R&D costs then prototype figure could remain 'as is'. Technology Innovation Needs Assessment (TINA) was taken into account when preparing costs for this meeting. **Action** A cost for Wave R&D will be added.
- Can we propose a figure to add into the R&D box?
- Are the calculations over-simplified as they stand? Currently they do not take into account any development costs - nor any support tariffs.
- Ocean Energy Systems (OES) Levelized Cost of Energy (LCoE) – Why aren't these figures cited? These numbers were taken into account as well as feedback that has been received. OES will be cited if used. **Action** Ensure sources are referred to within the Roadmap to support evidence.
- **Agreed and action.** Tidal stream will be reduced 7.5 – 10 for demonstration

6. Private/public funding and financing requirements

- **Agreed** that public funding will reduce as private funding increases during the industrial rollout phase
- The graph is a generic representation on purpose to avoid associating exact figures. Risk that this can be seen as a pure guess and throws out more questions. It's only meant to represent the proportion of funding required from private/public during through the phases
- A RenewableUK report from 2013 concludes that for every pound of public spend, there is 7 pound private spend to date
- Not felt that this image is the best way to present the information. **ACTION** to ensure this graph is presented in a clearer way
- Need to state that this is what needs to happen with regards to funding

7. Other points

- **Agreed and action** In the intro – 2020 and Energy Union message needs to be highlighted
- Set plan is mentioned but awareness needs to be raised so that we know what the EU are doing
- Prepared for EU but will be 'sold' to member states
- **Agreed and action** in 3.2.2 solution to rationaleWave Energy Scotland (WES) approach should be de-emphasised. Should just mention a phase/stage gate approach.
- **Agreed** Re-emphasise need to use existing infrastructure
- Page 20 – TP Oceans is mentioned but is this right place to put it? **Action** LJ/JM to review for the next draft
- Ocean Thermal Energy Conversion (OTEC) definition –Could a predictability of energy sentence be added? **Action** wording to be revised
- Not enough focus on the development (as opposed to the deployment) of the technology

ACTIONS SUMMARY	
Phase definition	ACTION Ensure all figures reiterate that innovation continues across all the stages. Update wording for real sea conditions.
Minimum volumes	ACTION 20 MW is too high for wave so recommendation needs to be changed. 10MW?

Cost of technology at each phase	Cost in the wave prototype box is too small. 15-20? If Wave had sufficient R&D costs then prototype figure could remain 'as is'. TINA was taken into account when preparing costs this meeting Action . A cost for Wave R&D will be added
Cost of technology at each phase	ACTION OES LCoE – Why aren't these figures cited? These numbers were taken into account as well as feedback that has been received. OES will be cited if used. Ensure sources are referred to within the report to support evidence.
Cost of technology at each phase	ACTION Tidal stream will be reduced to 7.5 – 10 €/m/MW in for demonstration
Private/public funding and financing requirements	ACTION Ensure private / public funding graph is presented in a more meaningful way
Section 3.3.2 of draft Roadmap	ACTION 3.2.2 solution to rationaleWES approach should be de-emphasised. Should just mention a phase/stage gate approach.
Page 20 of the draft Roadmap	ACTION Page 20 – TP Oceans is mentioned but is this right place to put it. LJ/JM to review for the next draft
Section 1.2 of Roadmap	OTEC definition –Could a predictability of energy sentence be added? Wording to be revised

THIS PAGE DELIBERATELY LEFT BLANK

