EUROPEAN COMMISSION
RTD - Energy
ENER - Renewables, R&I, Energy Efficiency
JRC – Institute for Energy and Transport
SET Plan Secretariat

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15th June 2016

FloWave 'Input Paper' response to European Commission SET Plan Actions 1&2 - Issues Paper on Ocean Energy

Dear Sir/Madam,

The FloWave Ocean Energy Research Facility at the University of Edinburgh is a UK Research Council funded Research Infrastructure active primarily in wave & tidal energy, and offshore wind. With a 25m diameter circular test tank able to replicate complex wave conditions and fast tidal currents at model scale, FloWave is the most sophisticated test tank facility in Europe and the perfect place for technology and project developers to prove concepts, refine performance and de-risk their technologies. We are funded as a "national facility of international importance" and participate in many FP7 and Horizon 2020 programmes, as well as national and regional programmes. Since becoming operational in April 2014 we have hosted more than twenty different technologies and are in the process of becoming the definitive last 'staging post' prior to full scale deployment at sea, as well as a key facility for established developers to bring subsequent or scaled-up versions of their technology to for development testing.

With this experience, and our position as an independent stakeholder and observer in the ocean energy sector, please find attached our 'Input Paper' response to the SET plan issues paper on ocean energy.

Yours faithfully

Stuart Brown
CEO

FloWave TT Ltd is the wholly-owned subsidiary company of the University of Edinburgh, responsible for the design, build and operation of the Ocean Energy Research Facility at the University of Edinburgh's King's Buildings campus in Edinburgh, Scotland. For more information please visit our website: www.flowavett.co.uk

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Response to “SET Plan Actions No. 1&2 - Issues Paper on Ocean Energy”.

This document is intended to provide comments/feedback on the Issues Paper on Ocean Energy according to the instructions stated in the document “Set Plan Actions: Implementation process and expected outcomes”, and is principally aligned to the Key Actions 1 and 2 ‘Performant Renewable Technologies’ and ‘Cost Efficient Technologies’, but with relevance also to Key Action 4 ‘Resilient & Secure Energy System’.

For the Main Expected Outcome Stage 1, the following questions have been considered and answered:

a) Do you agree with the targets set in the issue paper?

The high-level targets of bringing the ocean energy sector to commercial deployment is valid, and the focus on availability, reliability, survivability, and LCoE will certainly align with the key measures and concerns of developers and investors necessary to achieve that objective. Expecting ocean technologies and projects to be directly cost competitive with other forms of generation in the near term is unrealistic however and should be a longer-term aim. In strict technical and commercial terms, ‘proven and reliable’ must be the priority over LCoE, because only through proven technologies and ‘bankable’ projects will volume and economies of scale be achieved, and through this, reduced LCoE will be achieved.

b) Do you think that the level of ambition is correct?

First of all, it is worth to noting that in the document, there is ambiguity between the availability target stated in the main body in the paper, and that stated in Annex 1. Specifically, on page 3 in the body it states a target of “at least 80% in 2025, 90% in 2030, etc”, whereas at the top of page 8 in the annex it bullets “availability >85%”. For the latter no timescale is given, but since an earlier bullet (bottom of page 7) states 2020, the inference is that the >85% target is to the same timescale and so is misaligned with the page 3 target.

In considering the targets themselves, the availability targets seem realistic and achievable. However, reducing LCoE from 20ct€/kWh in 2020 to 12ct€/kWh over 5 years, and to 7ct€/kWh five years after that, does seem to be over-optimistically aggressive, particularly so for sectors that by 2020 & 2025 may only have successfully deployed and operated a handful of 2-6 unit demonstrator arrays. Perhaps more importantly there is no comparable offshore sector, whether it be oil & gas, shipping or offshore wind, that has ever achieved such a significant cost reduction in such a short timescale; and these are sectors where there is already significant volume and where financing is relatively straightforward.

Whilst it setting ambitious targets is recognised as a great way to stimulate innovation and competition, there is a significant danger in setting unrealistic targets that may actually have the opposite effect. For example:

1. *In order to meet the unrealistic targets, developers make equally unrealistic promises in order to secure the funding. These targets cannot be met and the “over-promise and under-achieve” cycle already noted in the sector continues, with a similar number of failures and departures from the marketplace.*
2. *Developers consider the targets to be fundamentally unachievable and decide to pursue other avenues instead. Especially so if performance against these otherwise unachievable targets is directly linked to levels of funding or reimbursement.*

In summary, FloWave accepts the availability targets as realistic and achievable, but does not agree with the LCoE targets, believing them to be too aggressive for the wave and tidal sectors given their early stage of development, the historic difficulty of raising finance to develop technologies and build out projects, and the lack of volume to achieve the economies of scale necessary to underpin such dramatic cost reduction.

c) Are there any standing issue(s) in the way to reaching the proposed targets/priorities?

Standing issues in the way of achieving the targets include the consenting regime in the different jurisdictions with wave and tidal energy resources, the grid connection near to places where the resource is at its best, and the speed of roll-out and scale-up of projects to achieve both volume and economies of scale. Proven reliability for MWh out and survivability for insurance premiums are also both key to attracting investment in the first place, and achieving low operational costs thereafter. Proven projects and technologies, and getting investors 'comfortable', are therefore key issues for achieving volume and therefore the targets and priorities.

At the stage prior to that there are issues surrounding security of IP, access to funding, and the peculiar challenges and hurdles of having to 'dance around' the European State Aid rules. The latter makes its appearance known particularly where FloWave is concerned because although we see a lot of good ideas with good levels of public support, these companies continually struggle to raise "the other 50%". Where this comes from equity, quick exits and IP preservation demands usually de-focus the company from achieving the main technical objective. Patient capital, opex funding, an exemption or similar from State Aid rules as far as clean ocean energy for Europe

d) What are your specific recommendations on prioritising R&I activities on these issues?

In the short to medium term it is necessary to demonstrate some pilot projects, share the lessons learned, and ensure that the projects that follow are better. Whilst accepting that prioritising deployment projects and 'getting steel wet' is a real priority, this should not be at the expense of the second, third and fourth 'waves' of new ideas, new concepts, and new challengers. Equally R&I priorities should also allow and encourage those companies with deployed projects to continue their activity developing new solutions to existing and encountered problems. They are the 'champions' of the sector and they should be recognised and supported as such, both at sea ***and*** *in the lab.*

Since clean, secure and self-delivering energy from the oceans is clearly in line with EU priorities, and exemption from restricting State Aid regulations would be beneficial. Patient and risk sharing capital, public loan guarantee schemes, as well as opex support in addition to capex support, would all help energise the sector towards faster growth.

e) What are the best placed actors to implement the targets/priorities (industry, EU, Member States, regions, groups of countries/organizations/etc.)

Generally speaking, industry supported by research organisations in respect of the advances on technology, analysis and modelling; but then member states, finance institutions and public bodies on the financial support necessary to both support technology development and leverage funding for projects. A good example being the impact of KfW-IPEX on the offshore wind industry in the German EEZ.

f) Identify possible barriers related to regulation, cooperation issues, standardisation/ industrialization/ manufacturing, socio-economics, etc.

The lack of a stable regulatory regime in the UK over the last few years, and 'meddling' by politicians over the last 15 months, has decimated many onshore and well as ocean energy sectors, resulting in the UK crashing from 5th to 13th in the Ernst & Young country attractiveness index for renewables. This is proof positive that a stable policy and regulatory framework that extends well beyond the lifetime of current and even subsequent parliaments is essential to provide certainty for developers and investors.

On cooperation barriers a key element undermining good collaboration at the moment is the requirement in funding bids to have many partners from across multiple national jurisdictions. When the ocean-facing countries of Europe number less than ten, this leads to less than perfect results. In the case of tidal energy, where the UK and France between them have 80% of the total resource of Europe, having to invite two or more other partners into proposals 'just to fil them out' means these proposals are inevitably weaker as a result, particularly where the small number of players in the sectors are conflicted due to other commercial arrangements or 'mutually exclusive' funding arrangements. Removing or reducing the three nations constraints, and allowing key organisations to be in multiple competing bids at the same time, would alleviate this constraint considerably.

On standards this has yet to be developed properly, but a three-dimensional characterisation of site conditions covering wave climate, tidal current, and turbulence characteristics, as well as a focus on 'what exactly is a survivability test pass or fail', would benefit the entire sector. (i.e. like an extension of the IEC wind turbine classification system, supplemented by a 100/500/1000 year return period survivability standard).

On socio-economics, public understanding and acceptance of distributed tidal power as baseload, and wave-power anywhere as predictable >48 hours ahead by satellite – in contradiction of the 'intermittency' message currently holding sway – should be encouraged and would result in greater public acceptance and fewer consenting delays.

g) Identify possible gaps or duplication of efforts in the R&I priorities.

On possible gaps in R&I priorities: The focus on LCoE as a measure fails to identify the wide range of other uses of ocean energy where the value added by the project is not intended to be electricity connected into the grid. This includes desalination, passive cooling, substitution or mitigation of diesel gen-set power for aquaculture, fish-farms, remote sensing/pumping relay stations, islanded communities, and so on. Furthermore, there is a gap in terms of R&I into hybrid and integrated systems, for example co-located wind and wave, or wave-powered pressurisation of subsea airbags for storage and balancing.

On duplication of effort: At the moment competition for funding and to attract commercial clients into research infrastructures such as FloWave, ECN, etc is probably leading to duplication of effort and some withholding of knowledge and expertise. Similarly, the question should be asked as to why every ocean facing nation needs to establish its own offshore test facility when a) there are more than enough already in Europe, and b) there are not yet enough technology developers at sufficient stage to fill all the berths available.

h) Identify priorities where there is scope for and benefit in more coordination and/or cooperation across EU, Member States, regions, Research Institutions and/or Industry;

Coordination priorities we'd identify include the integration of wave and tidal energy onto the grid and with storage, especially in a scenario where there is a large amount of solar on the network and overnight generation, storage and distribution are required to 'take up the load' when the solar-based generation is offline. This requires a coordinated and Europe-wide approach involving representation of all actors and stakeholders.

i) Identify best practices of past or present coordination and/or cooperation that can be used as an example or as a starting point.

As previously mentioned the KfW-IPEX led leveraging and growth of the German offshore wind industry is good example. On RD&I the FP7 MaRINET trans-national access programme – where developer time in research infrastructures such as FloWave was funded centrally from Europe by direct reimbursement – was a particular success in getting SMEs access to performance raising and risk reducing scale model testing prior to real ocean deployment. This helped validate performance claims – reassuring for investors – as well as allowing the developers to learn lessons and make mistakes behind closed doors. The direct benefit of this for FloWave clients included leveraging further investment, and increasing the probability of a 'right first time' deployment of their first prototype at sea.

j) Outcome to identify groups of stakeholders and areas of cooperation.

In the UK the Crown Estate owns the rights to the seabed, but they are passive when it comes to understanding the detailed nature of the resource at potential ocean energy sites. A small investment in gathering resource data that can be shared with potential developers would save a later measurement campaign and ease financing though reduction of uncertainty in energy yield predictions. Adopting such a measurement campaign 'across Europe', and coordinated amongst all the equivalents of the Crown Estate would generate a comprehensive and Europe-wide information base. If the regulations and processes for developing these areas could be harmonised (but led by the ocean facing few rather than the whole 28) then this would be a worthwhile collaboration opportunity.

In the research community then there are obvious groups of Research Organisations that would benefit from closer ties and closer cooperation and collaboration. For example, in ocean modelling, physical modelling (test tanks like ourselves, ECN, Plymouth, etc), and in test and demonstration centres (like EMEC, PLOCAN, etc).