EERA Ocean Energy Joint Programme response to SET Plan Action 1 Ocean Energy Issue Paper

Introduction:
Regarding the potential contribution of OTEC and Salinity Gradient to the EU energy system: it is anticipated that these technologies could potentially provide an opportunity for component technology export within Europe, with countries such as the Netherlands already showing an interest in this area.

Question: Does the 100GW installed capacity of Ocean Energy in European Waters include OTEC and salinity gradient? And if so, what amount per technology? As a reference, the International Energy Agency estimates an installed capacity equal to 750 GW globally by 2050;

Correction: The replicability of OTEC is definitely not limited, amongst others, considering the fact that it's technical resource capacity is equal to 7 Terawatts globally with more than 10 EU Overseas Countries and Territories (OCTs) that have access to this resource.

Targets:
The targets outlined here are inline with those set out by other European Roadmaps, such as the Danish Roadmap. However, the Danish Roadmap has recommend that smaller artificial markets are created using higher feed-in tariffs or other means to stimulate building of first arrays.

The targets set out for wave and tidal seem arbitrary and difficult to understand without being referenced. Really these targets should be coming from an energy system model which uses cost, performance and reliability to generate market share and therefore installed capacity expectations – e.g. the ETI's ESME modelling activity presented on pages 14-15 of the Marine Roadmap http://www.eti.co.uk/wp-content/uploads/2014/04/Marine-Roadmap-FULL-SIZE-DIGITAL-SPREADS-.pdf

Such modelling activity could be carried out using a model such as MARKAL or TIMES so that targets are linked to the cost, performance and reliability of the generation technology. The inputs to the model could then be linked to some expectation/target levels of those inputs vs. time.
To reflect all this, the paragraph below the proposed targets box should be changed as follows:
"To realise this target it will be important to improve the reliability, performance and cost ~~and survivability~~ of the ocean energy converters."

Other important aspects that are not referred to within this section are:
1. The need to reduce the cost of development of the technology
2. The need to reduce the time to market.

There is the need to develop a strategy to reach these targets and take them as requirements. With less ambitious targets it may be feared that the ocean energy sector will lose relevance in comparison to solar PV and offshore wind.

Suggestion to change "demonstrate their market potential and they should be cost-competitive in comparison with other energy technologies." into: "demonstrate their market potential through

cost-competitiveness, predictability, availability and easiness of grid integration, complementing intermittent sustainable energy resources in the energy mix, like wind and solar energy";

The LCOE targets should be linked to deployed capacity rather than a fixed rate. OTEC can reach a LCOE of 7 ct€/kWh at 100MW scale;

The capacity factors of OTEC and salinity gradient are 90% or higher.

OTEC and salinity gradient targets are missing;

It is agreed that the target of 7 ct€/kWh is too ambitious, such an ambitious target should be matched with equally ambitious research and development funding.

Regarding the use of other indicators as targets such as availability rather than LCOE:
LCOE should not be the only assessment parameter, in particular in the short-term, as the accuracy in computing the LCOE can be limited. However it should be used to guide how costs may be reduced and also for policy purposes. Other important parameters should be easier to compute, like energy per unit mass (where possibly we need to convert mass of steel, mass of composite material and mass of concrete into the same unit). Also energy per unit force in the PTO or mooring line could be interesting parameters, but these need to be worked out as they are not recognized and standardized.

When using an indicator other than LCOE, such as availability, a TPL methodology could be used which in addition to LCOE, incorporates a scoring system which takes into account reliability and risk, ease of installation, manufacturability, etc.

Levelized cost of Energy seems most appropriate in the long run, which includes availability, capital and operational expenditure, grid integration cost, etcetera. The LCOE should be linked to deployed capacity as mentioned above; However, in the short term, it is good to have other indicators such as availability.

Regarding the device availability objectives of 80% by 2025 and 90% in 2030:
This can depend on the targets for the capacity factor as they together provide an assessment for the Annual Energy production. In the Danish Roadmap for example, there is a higher availability in order to reach the cost targets for the wave resource of 15 – 20 kW/m.

For OTEC this can be more ambitious, like 90% by 2025 and 95% in 2030.

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