I.A Resource Assessment

Purpose of Resource Assessment

The resource assessment should provide

(1) an estimate of the available energy resource, and

(2) an assessment of the operating and survival characteristics of a specific site.

Resource assessment is aimed at achieving an understanding of wave and tidal climates from which estimates of energy production can be made. A second requirement is to provide information for engineering design. It is expected that the end user may be interested in seasonal, annual and longer-term characteristics

Objectives of Resource Assessment

1.Resource characterisation

- is normally carried out to establish suitable geographic locations for deployment, and has the following objectives:

A. To ascertain the potential resource for energy production with an explicitly stated degree of uncertainty, including seasonal and inter-annual variation;
B. To identify constraints on resource harvesting.

2.Site assessment

- is normally carried out prior to deployment, to establish the detailed physical environment for a particular marine energy project, with the following objectives:

C. To assess the energy production throughout the life of the project;
D. To characterise the bathymetry of the site to an explicitly specified and appropriate accuracy;
E. To ascertain the spatial and temporal variation of the resource with an explicitly stated degree of uncertainty;
F. To describe metocean conditions to support installation, operation and maintenance;
G. To establish extreme / survivability conditions with a defined return period;
H. To identify potential interference between multiple devices located at the site.

Reporting from Activity

Both Resource characterisation and Site assessment should result in:

1. Analysis of the level of resource
2. Description of the limits of the assessment;
3. Description of the particulars of the site where the development is to be placed;

4. Description of the instrumentation used to collect site data;
5. Explanation of the analysis methods used in determining the potential resource and how they meet the criterion for accuracy and consistency;
6. Explanation of the use of numerical models in providing the resource assessment;
7. Model results and observation data, archived in a consistent, documented and accessible manner for possible future re-analysis.

Contents of Protocol

1.Resource characterisation

This section of the protocol will:

(i) Describe specific, tested methods for wave and tidal analysis, including methods for the quantification of uncertainty;

(ii) Describe key parameters that should be used in discussing wave and tidal climates and their role in energy assessment;

(iii) Provide a context for the use of numerical models in transforming the sea climate from one location to another;

(iv) Describe a systematic approach for identifying factors that place constraints on exploitation.

2.Site assessment

This section of the protocol will:

(i) Provide a rationale for the type, number and duration of measurements;

(ii) Provide a context for the use of numerical and statistical models in the quantification of spatial and temporal variation of the sea climate;

(iii) Describe methods for the assessment of operating conditions through the quantification of key parameters along with their associated variability and uncertainty;

(iv) Describe key parameters for assessing device survivability and guidance for quantifying their extreme values and return periods.

3.Exclusions

This protocol will not give guidance on Objective H. Guidance on array performance will be given in "II.C Deployment and Performance Assessment of Multi-Megawatt Device Arrays".

Principles

1.Resource characterisation

- Assessment of the wave/tidal resource should be based on robust, validated methods.
- Existing field measurement data from quality controlled instruments recorded over a significant duration should be used

wherever possible.

- Distant environmental conditions should be transformed to local conditions using established, recognised, transformation techniques.
- Error analysis should be performed to quantify the degree of uncertainty associated with any predictions.
- Constraints on the extraction of the resource must be identified.

2.Site assessment

- Appropriate bathymetric surveys should be available for the whole of the deployment site.
- The local metocean conditions for the site must be established including wave, wind and currents.
- The operating and survival conditions at the site should be quantified with specified accuracy and return periods.

Key Aspects

1. Measurement
   - The principles, operation and limitations of the measuring system should be explained and uncertainties stated.
   - The operational aspects of the measurement regime shall be described and shown to meet the accepted degree of uncertainty.
   - The results should be reported in a way that the key parameters are highlighted along with an estimate of the associated uncertainty.
2. Numerical Modelling
   - The principles, operation, limitations and assumptions of the model should be explained and uncertainties stated.
   - The sensitivity of the model to input conditions should be established.
   - The methods for validation of the model should be explained.
3. Analysis
   - Analysis techniques should be consistent and robust over a variety of wave and tidal climates.
   - They should be shown to meet the required accuracy.
   - They should be repeatable by an independent external auditor.