DTOcean

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The DTOcean overriding goal can be specified further into three major objectives:

1. Full suite of whole-system software design tools

2. Identification of enabling technologies (such as for the optimisation of resource analysis, installation methods or control procedures) to reduce deployment costs and increase the performance of ocean energy arrays.

3. Well validated guidelines for accelerating decisions by means of reducing risks and uncertainties.
Structure of the consortium

- Advisory Board
- Research Providers (Universities and Applied Research Centres)
- Utilities and Project Developers
- Supply Chain

- Test Centres
- Component Developers
- Government Agencies
- Industry Associations
- Device Developers
- Standards Development
- Third Party Verification

- Research Provider
- Supply Chain
- Utility Project Developer
Illustration of the overall workflow of the project

- Scenarios
- Array Layout
- Electrical System
- Moorings and foundations
- Lifecycle logistics
- System control

- Economics
- Environmental
- Reliability

- Design tools
Scenarios

DTOcean is guided by, dedicated to and makes reference to some first-generation array projects

**Sound of Islay:** Iberdrola has received consent for a 10MW Tidal Array in the Sound of Islay, between Islay and Jura on the west coast of Scotland.

**Aegir:** Vattenfall have a partnership with Pelamis Wave Power to develop the first wave power array off the Shetland Islands, Scotland.

**Rhinns of Islay:** DEME Blue Energy is involved in the development of a tidal energy array on the west of Islay, Scotland.
Array layout

- Identification of parameters for array descriptions for the identified scenarios and technologies
- Assessment of capabilities of available tools
- Hydrodynamic array evaluation and definition of relevant parameter ranges
Electrical System Architecture

- The tool will provide algorithms to identify:
  - Optimal inter array as well as the array grid connection and integration into the onshore grid.
  - Innovative features e.g. enabling the grid voltage and frequency control
  - The developed tool will be able to be continuously updated and extended in order to include new electrical infrastructure technologies.
Network topology – Components

- Umbilical
- Subsea connectors
- Offshore cable (offshore network)
- Collection point (hub/offshore substation with a transformer)
- Transmission Cable
- Cable protection
Each OEC connected to a single feeder
Cable rating is determined by the number of MECs in each string and the individual power rating of each device.

- Simple
- Cable can be tapered
- No redundancy
Network topology – Single-sided

- Each OEC connected to a single feeder
- Cable rating is determined by the number of MECs in each string and the individual power rating of each device.

- ✔ Redundancy
- ✗ Cable cannot be tapered
Moorings & foundations

- DTOcean will investigate suitable design tools and develop mooring and foundation assessment tools

- This project will enable an assessment and development of tools to inform about mooring networks and foundation requirements.

- Inform mooring and foundation designs for ocean energy arrays
Lifecycle Logistics

- Design tools to be developed will allow to analyse different installation methods and their impact on the project cost and risks.

- Specify accurately the infrastructure needs with regard to ports and vessel for entire lifetime of the project to be installed.

- This will inform investment into such infrastructure at regional as well as EU level.
System Control

- Maintenance strategies
- Modelling of impact of array options within the scenarios on O&M strategies
- Optimisation of array control
- Advanced Monitoring techniques and fault
Parallel analysis

- Economics
- Reliability
- Environment
Design Tools

• Requirements and design criteria

• Design of the software interface for the design

• Implementation of a multi-objective tool

• Validation against a predefined set of case studies
Overall deliverables:

- Suite of array design tools for wave and tidal energy arrays in conjunction with array developers and utilities already involved in development of European ocean energy array projects

- Test the design tools using the three real EU planned array projects.

- To build upon existing EU and Member State projects

- To ensure the design tools have legacy effect.
Thank you for your attention!

Questions?

- [http://www dtocean eu/](http://www.dtocean.eu/)