

Advantages

- ✦ Reduced transmission infrastructure
- ✦ Increased energy output from one array
- ✦ Shared operation and maintenance cost
- ✦ Common foundation - cost reduction
- ✦ Inclusion of predictable generation (Tidal currents)

Challenges

- ✦ Immature Technology (Tidal)
- ✦ Increased operation complexity
- ✦ Lifetime uncertainty
- ✦ Location restriction
- ✦ System Stability

Future potential

As tidal generation technology matures its cost will become more competitive with other forms of energy generation, opening up opportunities for it to be used in more innovative ways such as in this hybrid design. An investigation was carried out to calculate at what capital cost this system would become viable and with what agreed strike price.



Team



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Hybrid Offshore Wind & Tidal System



Introduction

Renewable energy, especially in the UK, is moving increasingly offshore in an attempt to harness this largely untapped and plentiful resource.

We have investigated a hybrid concept for future offshore energy generation which merges tidal and wind generation technologies.



This project will examine the feasibility of our concept, which has been designed to provide a simplistic, yet effective and reliable, approach into combining the two systems together. This design should enable for relatively efficient maintenance and installation.

Location

Choosing a location is no easy task, as it requires a place with good tidal and wind resources, and an appropriate depth.

After analysing the possibilities in the UK, we chose a location close to the Isle of Islay.

The characteristics of this location are:

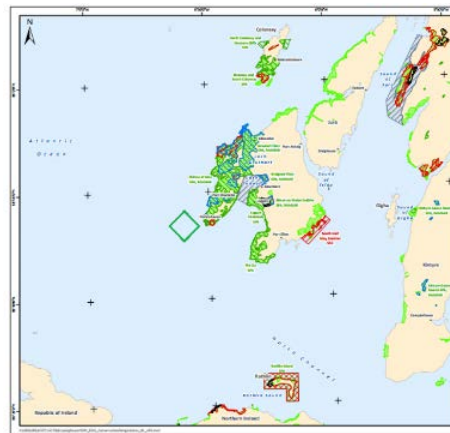
Depth	28 m
Peak tidal current speed	3.06 m/s
Annual mean wind speed	9.60 m/s



Environmental Impact Assessment Analysis

EIA impact study for the whole life cycle of development assessing:

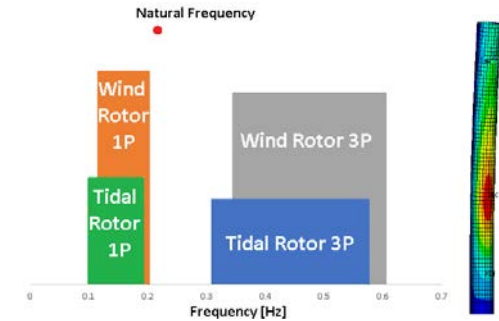
- ✦ Baseline Risk Assessment
- ✦ Potential Impacts
- ✦ Expected Outcomes



Map of environmentally protected areas around Islay

Structural Analysis

- ✦ Monopile foundation investigated
- ✦ Supporting structure stresses comparison of offshore wind turbine and hybrid device
- ✦ Structure's natural frequency and external forces loads' frequencies



Financial

A financial Analysis was carried out in order to determine the feasibility of our concept and to compare it with existing technologies. The main parts to our analysis were:

- ✦ Finding the maximum Levelised Cost of Energy we would require to make a profit
- ✦ A comparison of our hybrid system with existing systems
- ✦ A sensitivity analysis

