Geophysical Research Abstracts
Vol. 19, EGU2017-4850, 2017
EGU General Assembly 2017

Estimates of the global tidal range energy resource

Peter Robins (1) and Ian Walkington (2)

(1) Centre for Applied Marine Sciences, School of Ocean Sciences, Bangor University, UK. (p.robins@bangor.ac.uk), (2) CBS Consilium, Madeley, UK. (i.a.walkington@csbconsilium.com)

Renewable energy generation through tidal lagoons and barrages is an attractive energy source due to tidal predictability and the potential for energy storage. Yet so far, the annual tidal range resource has only been estimated at relatively coarse spatial resolutions and without detailed investigation of the temporal variation from individual or aggregated sites.

In this study, we estimate the theoretical tidal range resource of the northwest European shelf seas, using the 3D Regional Ocean Modelling System (ROMS) at roughly 1 km spatial resolution. Through tidal analysis of model output, we calculate the potential energy in both the rising and falling tides and, hence, show temporal variations in PE throughout the year. Based on a range of energy yield thresholds (rather than thresholds based on M2 range and water depth), we calculate the total annual theoretical resource from dual (flood and ebb) strategies.

Using the FES global tidal model, which resolves tidal elevations at 1/16° resolution, the global resource was also estimated with the regions with the highest energy yield isolated. We discuss our estimates in relation to the yield that can actually be obtained mechanically, and in relation to the total energy flux of a region and the potential impacts of different lagoon scenarios on the local and far-field energy fluxes.