New research to support the huge potential of tidal power

January 17 2013

(Phys.org)—New research from a global group of scientists and engineers, including from the University of Southampton, has been published in a special issue journal of the Royal Society. The work is in support of tidal power, which has the potential to provide more than 20 per cent of the UK's electricity demand.

While the predictable nature of tides makes them an ideal renewable energy source, more so than wind, the ability to effectively harness energy from the tides has proved elusive.

In order to develop effective tidal current technology, a special issue of the Philosophical Transactions of the Royal Society *A* describes the status of leading research and projects in the field to rapidly advance tidal energy technology.

AbuBakr Bahaj, Professor of Sustainable Energy at the University of Southampton and editor and contributor to the special issue, says: "The energy present in marine currents can be converted using technologies not too dissimilar to those used in wind energy. While technologies harnessing energy from the tides and currents have been discussed for many years, it is evident from recent deployment of single devices at megawatt scale that real progress has been achieved in a very short period of time.

"In essence, experience with single machines at such a power capacity, will make progress to deployment of multiple machines to convert the

marine energy resource much faster than that achieved at the start of the wind energy industry."

Although the potential for marine energy conversion clearly exists, the technology is presently still in a commercial prototype phase and only a handful of devices have so far been tested at full scale in the ocean. Unlike wind energy, there are currently various designs being promoted, with no single device design emerging as a winner so far.

Engineers try to tap tides in two ways: one involves building barrages across tidal estuaries that use tidal differences in sea surface elevation, so that the flowing waters turn turbines in a similar fashion as hydropower installations.

The other method involves placing turbines underwater in areas of the sea where fast flowing tidal streams, such as those found in coastal waters around the Channel Islands and Scotland. The technology could be similar to the three bladed turbines used in wind energy with the flowing waters replacing air. Developing power from offshore tidal streams is fraught with difficulty, but according to the authors of the latest research, 2013 could see a big breakthrough in tidal stream power. There are several companies planning to deploy arrays of tidal turbines in UK waters. For example MeyGen is planning to deploy tidal stream technology in Scotland's Pentland Firth that will initially generate up to 40MW of electricity, enough to power about 38,000 homes.

"This is a crucial milestone for technology development and deployment. Currently, it appears this will be the first deployment of an array of tidal stream turbines," says Professor Bahaj. "Such deployment will give a boost to the industry as it will also provide the needed data of operation in one of the most energetic areas of the sea. Overall, tidal power will also give us another component in the energy mix that's more energetic and reliable than wind."

In the journal, researchers say they are "extremely optimistic" that tidal stream technology can be realised relatively soon. However, while the articles paint a positive future for tidal power, a critical element is the availability of funds to undertake such deployment.

More information: rsta.royalsocietypublishing.or … site/2013/1985.xhtml

Provided by University of Southampton