

Tidal stream power for Malaysia

Paul A. J. Bonar and Thomas A. A. Adcock

Department of Engineering Science, University of Oxford, Oxford, UK. Tel: 01865 273907
(paul.bonar@eng.ox.ac.uk) (thomas.adcock@eng.ox.ac.uk)

Introduction

In response to changing climates, developing countries such as Malaysia are looking increasingly to sustainable energy sources and particularly those that can be used in rural electrification. With its long coastlines and strong offshore industry, tidal stream power could be an attractive prospect for Malaysia. Preliminary studies have demonstrated the country's interest in the resource but as of yet there has been no robust assessment of the available power.

Methods

This project aims to assess the tidal stream resources of a number of candidate sites in Malaysia using the "upper bound" approach developed by Adcock *et al.* (2013), which provides an accurate estimate of the maximum amount of power that can be generated at a particular location without the need for exceptionally detailed study. A literature review has shown the Malacca Strait, which lies between the west coast of Peninsular Malaysia and the east coast of Sumatra, to have the most favourable geometry and infrastructure for tidal stream power development.

A depth-averaged hydrodynamic model of the Malacca Strait has been built using DG-ADCIRC and modified to include arrays of tidal turbines as momentum sinks using the methodology established by Draper *et al.* (2010). Following Adcock *et al.*, the model has been used to assess the maximum average power available from a number of candidate sites as well as the variation in power over the tidal cycle and the resulting changes to the natural hydrodynamics.

Discussion

Details of the numerical model and findings of the study will be presented at the conference. Preliminary results suggest that the Malaysian tidal stream resource is relatively small but that there may be opportunities for small-scale developments using low-speed tidal turbines.

To encourage discussion of these results and enable further resource assessments, details of the "upper bound" approach will be outlined clearly in a forthcoming paper and the Malacca Strait model and its results will be posted online, free for all to use. It is hoped that this work will be useful to the development of tidal stream power not only in Malaysia but worldwide.

Acknowledgements

The authors gratefully acknowledge the support of the Engineering and Physical Sciences Research Council (EPSRC) who sponsored this work under the Global Challenges Research Fund. The authors thank Ahmad Firdaus, Dr Dripta Sarkar, and Professor Alistair Borthwick for their contributions.

References

- Adcock, T.A.A., Draper, S., Houlby, G.T., Borthwick, A.G.L., and Serhadlioglu, S. 2013. The available power from tidal stream turbines in the Pentland Firth. *Proceedings of the Royal Society A*, 469, 20130072.
- Draper, S., Houlby, G.T., Oldfield, M.L.G., and Borthwick, A.G.L. 2010. Modelling tidal energy extraction in a depth-averaged coastal domain. *IET Renewable Power Generation*, 4(6), 545-554.