Biofouling Solutions for Marine Renewables Knowledge Network Development

The UK government has set the objective of delivering at least 15% of electricity from renewable sources by 2020. Governmental projections of electricity generation from these sources have created significant interest in Orkney as a leading region for large scale deployment of wave and tidal energy converting devices.

Orkney has a well-developed infrastructure supporting the marine energy industry. This has recently been enhanced with the construction of additional piers and harbour structures designed to facilitate the growth of the marine energy sector.

A major concern to industries working in the marine environment is biofouling - the settlement and growth of organisms on submerged structures. The hydrodynamic and mechanical consequences of biofouling organisms on moving structures, e.g. marine turbines, include increases to surface weight and roughness thereby impacting drag, and survivability of devices; decreasing efficiency of energy generation; contributing to or accelerating corrosion of marine metals that could affect subsea connectors.

With support from the Energy Academy and working with the European Marine Energy Centre on Orkney, Dr Jo porter and Dr Andrew Want are looking at factors that influence the behavior of key fouling organisms with the aim of drawing up recommendations to inform maintenance schedules for marine devices. They also want to build a network of partners associated with marine energy test centres crossing the boundary between biofouling analysis and device maintenance. Such a network would provide an opportunity for scientists to work closely together with test site personnel and developers to gather data, to share knowledge and to formulate expertise on specific aspects of biofouling that are relevant to the marine renewables.

If successful it’s hoped that the work will suggest how best to undertake seasonal biofouling monitoring programmes at the EMEC test site and systematically document biofouling at harbour areas.

More information? Contact J.S.Porter@hw.ac.uk or telephone 0131 451 3148
Measuring and Collecting Wave and Tidal Data

Accurate data sets are regarded as invaluable to engineers & scientists involved in offshore / coastal research and design. Tidal predictions are affected by both local topography and environmental conditions. Models cannot predict ‘accurately’, extremes and return times, if not validated for complex topographic regions ‘remote’ from a primary tidal measurement site ‘port’.

At the International Centre for Island Technology (ICIT) on Orkney, with support from the Energy Academy, Dr. Robert Harris is working with Stromness-based Aquatera Ltd to develop a prototype buoy capable of measuring accurately, wave height and period and tide amplitude and phase that can be use in areas that are ‘remote’ or ‘uncertain’ with respect to their specific topographical variations and indeed which may also be susceptible to localised environmental (low / high pressure) differences.

The buoy which has been designed for coastal waters will be unique and able to measure accurately wave height and period and tide amplitude and phase simultaneously. The initial design will allow for one month remote operational capability with a design scope for 3-4 month operation prior to physical data download. Other key design features of the instrument include low cost of construction, ease of deployment and flexible compliant mooring.

The instrument will provide a low cost option to wave and tide data recording, the ease of installation, remote recording and design providing for greater opportunities for cross discipline research, i.e. engineering / environmental / biological. The unique data sets it is designed to collect will allow for greater insight into predictions of extreme wave / tide conditions towards associated research in: coastal structures, benthic / shoreline marine organisms, shore protection etc. Applications such as: coastal defence design, harbour design, breakwater design and compliant moored marine structures (particularly with mooring stiffness characteristics proportional to the water depth) are perceived.

Once built, it will be tested in the water in July / Aug 2015 with the aim, if proven, to seek further funding to develop the unit towards possible commercial production albeit on a small scale. More? contact R.Harris@hw.ac.uk or call 01856 850605.
Wind generation of electricity presents specific problems to the operation of electricity networks because of its intermittent nature and because its output cannot be guaranteed ahead of dispatch. Network operators rely on wind generation forecasts to estimate its future contribution to demand matching. However, these forecasts contain errors which increase in magnitude with prediction horizon, disrupting network balancing with attendant environmental and economic effects.

With support from the Energy Academy, Heriot-Watt’s Dr. Andrew Peacock, Dr. Edward Owens and Dr. Manju Dissanayake are developing new software that can be used to build a dataset from publically accessible on-line data sources that can then be interrogated by developers and researchers to explore the effects of forecast error on network balancing.

The analysis undertaken by the Group will bridge the gap between statistical treatment of forecast errors of wind generation and its impact on electricity network balancing to allow the creation of an applied forecast error that may be economic and/or environmental in nature.

Once collated, it is hoped that this information will be maintained and expanded and made available to registered users via a web service based interface.

The Heriot-Watt research group is gaining international traction in the field of community scale demand response and its relevance to future energy systems that contain substantial quantities of renewable generation. The Group seeks to engage across a broad stakeholder spectrum of stakeholders from policy makers to electricity network evolution to community participation in energy transitions.

More information? Contact A.D.Peacock@hw.ac.uk or telephone 0131 451 8310 or to learn more about the work of the Research Group, contact E.H.Owens@hw.ac.uk or telephone 0131 451 3743.
Microgrids – Workshop

Power Networks Demonstration Centre, University of Strathclyde, 62 Napier Road, Wardpark, Cumbernauld, G68 0EF
30th April 09:30 – 13:30

Who should attend: Companies with Smart Grid capabilities (ICT, sensors, monitoring, data analysis) or those with a general interest in microgrids.

Microgrids have global applicability and Scotland is one of the unique places where testing and implementation of new innovations is happening.

The workshop will examine the rise of microgrids as an innovative concept for secure and efficient electrical energy provision in campuses, business parks, cities, communities and islands.

The event will highlight how the Power Networks Demonstration Centre (PNDC) can act as a focal point for accelerating developments in this area, as well as collaborative working opportunities with Scottish companies. It will also explore the international context and landscape of microgrids and business growth opportunities.

Speakers include:

- Dr Andrew Roscoe, University of Strathclyde
- David Rutherford, PNDC
- Laura Campbell, Local Energy Scotland
- Rachael Taljaard and Stuart Duncan, Smarter Grid Solutions

This workshop is part of the Scottish Enterprise Smart Grid Supply Chain Events Programme. A buffet lunch will be provided on the day.


This week’s Contributors.

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