Harnessing Wave Energy: Geo-Development Challenges

Report on SUT Perth Branch Evening Technical Meeting
Tuesday 9th August 2016

By Damon Sunderland, OSIGp Committee Member

The event was jointly organised by the Western Australia Chapter of the Australian Geomechanics Society (AGS) and the Offshore Site Investigation & Geotechnical Group (OSIG) of the SUT (Perth Branch). The evening was opened and chaired by OSIGp Committee Member, Damon Sunderland (from Arup) who co-ordinated the event in conjunction with the AGS, of which Damon is also a Committee Member.

The evening talks were held at the Engineers Australia auditorium in West Perth, and were divided into two sessions focusing on two different wave energy convertor (WEC) projects:

- the CETO project developed and presented by Carnegie Wave Energy; and
- the mWave project developed and presented by Bombora Wave Power.

The event was kindly sponsored by Marine GeoSolutions (MGS) and the Norwegian Geotechnical Institute (NGI).

In order to link the two WEC projects to the OSIGp core themes of geology, geophysics, geomatics and geotechnics (the 4G's), each of the WEC presenters then had a second speaker to discuss the technical challenges associated with wave energy projects.

First off the rank to present for the evening was Angus Nichols from Carnegie Wave Energy who presented on the CETO 6 wave energy technology. This system essentially comprises a balloon suspended in the water column, which is tethered to the seabed and converts the oscillating motion of ocean waves into zero-emission renewable power with the added advantage of producing desalinated freshwater as a by-product.

To complement the Angus's opening talk, the second presentation was given by Dr Peter Ramsay, from MGS. Peter's presentation covered the 2015 geophysical site investigation survey for the CETO 6 power generation arrays and the cable routing offshore from Garden Island, WA. The survey highlighted the geological complexity of the area and provided a detailed assessment of the geohazards associated with the site and cable routing from the shore. Some very nice visualisation fly through videos were presented by Peter that helped illustrate the survey outputs, geology and geohazards.

The third speaker was Shawn Ryan from Bombora Wave Power who presented an overview of the mWave technology. The system offers a low cost renewable energy solution for broad commercial use in shallow nearshore locations with consistent large waves. Operating on the sea floor was shown to provide inherent protection during extreme storm events. Shawn explained that mWave technology harnesses the potential of wave energy in the form of pressure on the sea floor through a robust rubber membrane.

The fourth and final speaker was Dr Noel Boylan from NGI, who expanded on Shawn's talk from a geotechnical perspective. Noel pointed out that while nearshore high energy environmental conditions are attractive from an energy extraction perspective, the overall environment and operational requirements can be challenging from a foundation design perspective. His presentation provided an overview of these challenges and some of the solutions being explored to enable cost-effective developments using the mWave device.

We enjoyed four thought provoking and complementary presentations on an offshore renewables topic that has significant potential for our future energy needs. The crowd in attendance was exactly 100, which was the capacity of the Engineers Australia venue. Many questions from the floor and the fact that many from the audience stayed to engage in discussion well after the talks had finished proved that many of us in Perth have a great interest in the use of offshore renewable technologies and the geo-challenges that they bring.

After the presentations, the four presenters were accompanied by the evening chair and treated to a dinner at Black Toms in West Perth as a show of gratitude for giving up their time to present. The engaging renewable energy discussions over dinner (and a drink or two) reflected the same enthusiasm of the earlier Q&A session.

Many thanks go to the SUT members who attended in addition to the AGS and Australian Hydrographic Society (AHS) members who also attended. Also thanks to the four presenters that volunteered to speak at the event and again to our sponsor's, MGS and NGI. Finally many thanks go to Corelle, Fiona and Jen from the SUT Perth Branch for all their hard work, continued support and advice. Without them, these evenings would not be possible.