ASX ANNOUNCEMENT

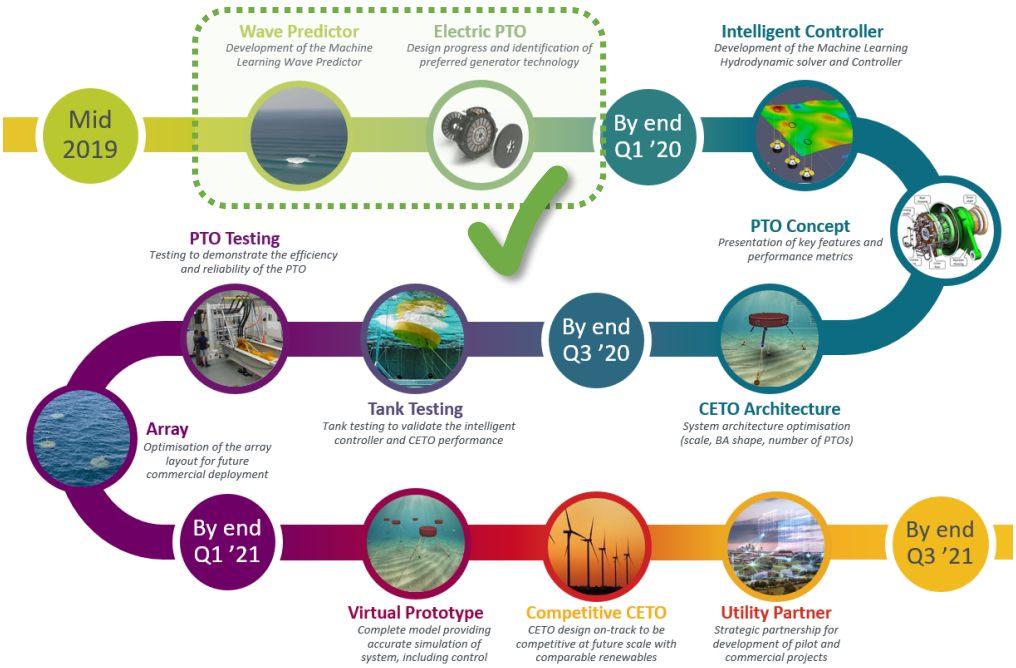
31 March 2020

CETO Digital Development Pathway Milestones Achieved

- Achieved first two CETO Digital Development Pathway milestones
- Wave Predictor developed and capable of accurately predicting waves 30 seconds in the future
- Potential standalone commercial applications for Wave Predictor
- Completed generator market study for new electric power take-off (PTO)

Carnegie is pleased to inform shareholders that the team has achieved the first milestones of the new CETO Digital Development Pathway:

- Developed the machine learning based Wave Predictor capable of predicting the characteristics of waves that will reach the CETO Unit up to 30 seconds in the future. This is the first product in Carnegie's suite of intelligent control products which will be capable of increasing the energy captured by a CETO Unit and also has potential as a standalone commercial product.
- Undertaken a comprehensive landscaping & market study on potential generator technologies and suppliers, progressing the development of a new fully electric PTO. The PTO converts the wave-driven motion of the CETO buoy into electricity.



Carnegie's Digital Development Pathway – First Milestones Completed

21 North Mole Drive, North Fremantle WA 6159
PO Box 39, North Fremantle WA 6159
+61 8 6168 8400
www.carnegiece.com

ABN 69 009 237 736

Carnegie's new CETO Digital Development Pathway, as outlined to shareholders in Carnegie's July 2019 Prospectus, aims to optimise the design of the CETO technology to significantly improve performance and reduce cost via the development and integration of several innovations.

Achieving Intelligent Wave Energy Control: Wave Predictor Development

One of the key innovations in the Digital Development Pathway targets the development of an intelligent wave energy controller that makes use of machine learning, a form of artificial intelligence, to increase the amount of energy captured from the waves and thereby increase the annual electric power yield of a CETO Unit. Future development will extend the controller to avoid damaging waves in storms, which will enable cost and risk reductions.

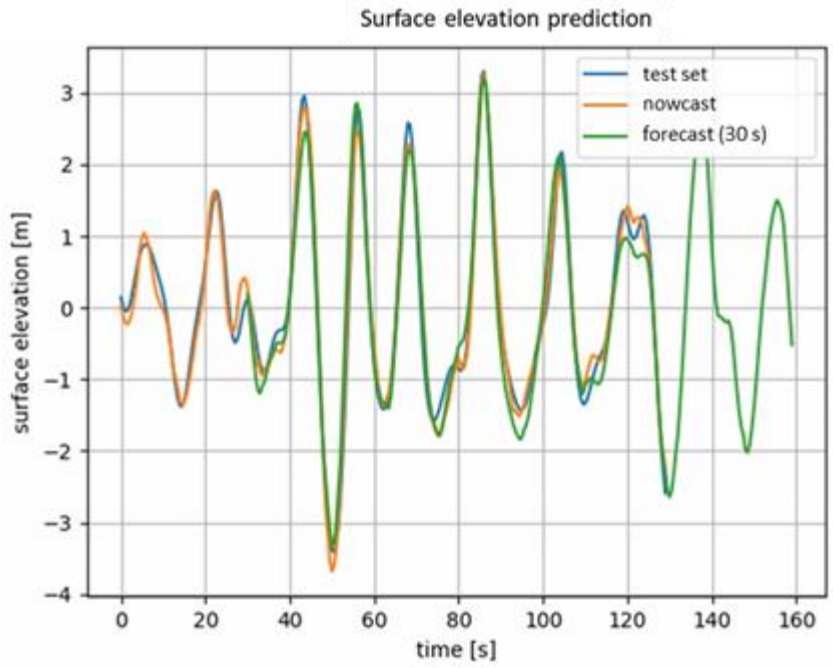
The Wave Predictor developed in this current milestone enhances the potential commercial viability of CETO and further enables the development of Carnegie's new intelligent controller, the Wave Controller.

Carnegie's suite of intelligent control products is comprised of the following sub-components, the first of which has now been developed:

1) **Wave Predictor** - A machine learning (ML) based wave predictor that can predict the key characteristics of waves 30 seconds into the future. This provides data that can be used to determine the forces that will be applied to the CETO Unit in the next step, the Wave Solver.
2) **Wave Solver** - An ML based hydrodynamic solver which utilises the output of the Wave Predictor to compute the hydrodynamic forces applied by the waves on the system in real time. This provides data that can be used by the next step, the Wave Controller, to decide how the CETO device should react to upcoming waves in order to maximise power production.
3) **Wave Controller** - An ML based intelligent controller, which utilises the outputs of the Wave Solver to optimally control the power take off (PTO) and maximise a CETO Unit's energy capture.

To develop the Wave Predictor in this milestone, Carnegie's data analysis team utilised the Pawsey Supercomputing Centre's state of the art supercomputing resources to run a non-linear wave propagation model and generate over 250 GB of virtual wave data. Using advanced data-science libraries, the wave data was used to train a neural network to predict waves in complex sea states, including directionally spread waves of varying heights and periods.

The data analysis team has now successfully delivered a Wave Predictor which achieves excellent accuracy, with wave height prediction errors averaging around 4% and no greater than 7% of the significant wave height, and orbital velocity prediction errors averaging around 3% and no greater than 6%. Carnegie's Wave Predictor has been validated and tested on numerical data, in sea states ranging up to 5 m in significant wave height.



Carnegie's wave predictor results showing close correlation of the surface height elevation prediction 30 seconds ahead ('forecast (30 s)') to the actual data ('test set')

This development of the Wave Predictor is significant for Carnegie as it is the first step in Carnegie's suite of intelligent control products which enable the CETO technology to respond to wave conditions in a manner that optimises power production, improving the commercial viability of the technology. In addition, Carnegie is also exploring the potential of the Wave Predictor to benefit other applications in the marine industry. Offshore operations such as crew transfer, refuelling and vessel manoeuvring could potentially be made safer and more efficient with an accurate short-term Wave Predictor.

The next step is to validate Carnegie's Wave Predictor using physical wave data. To this end, Carnegie applied for and was awarded funding through the European funded Marinet2 Project that provides 10 days of wave tank testing at the Cantabria Coastal and Ocean Basin in Spain. The award of this free access allows Carnegie to complete this next validation step at a significantly reduced cost. Carnegie had planned to undertake the tank testing validation in early May 2020. Unfortunately, this will now be delayed due to the COVID-19 pandemic. Carnegie is working to minimise the impact of this delay and continues progressing with other aspects of the intelligent control work.

Carnegie has commenced collaborating with various leading industry and academic partners on the development of the Wave Controller. These activities are stepping stones towards the completed development and validation of the full intelligent controller (the third and final sub-component outlined above).

Cantabria Coastal and Ocean Basin – Carnegie's free access provided through the European funded MaRINET2 Project

Innovating a fully electric Power Take Off (PTO): Electrical Generator Development

In the pursuit of electrification of the PTO to reduce cost and complexity, Carnegie has widely engaged with potential generator suppliers from a number of industries. This has included engagement with several leading suppliers for the Electric Vehicle (EV) market, leveraging on potential volume benefits that could be realised with increased EV uptake worldwide. Drawing on other industries, including wind energy, marine propulsion and machine tools, Carnegie has consolidated a comprehensive landscaping and market study on potential generator technologies and suppliers across different CETO scales.

The exact generator selected will depend on the outcome of the scale study currently ongoing as part of the CETO Architecture deliverable due by the end of Q3 2020. However, it is likely that direct-drive permanent magnet generator (DD-PMG) technology will be preferred. This technology is heavily utilised in the wind industry and has found particular application for in-wheel motors in the EV market. Furthermore, a strong and competitive supply base exists serving the marine propulsion, machine tool and industrial market, where volume benefit can be realised. DD-PMGs generally lend themselves to high torque, low speed application, aligned with operation of most wave energy converters. They can be built to be highly efficient across a broad operational range. Carnegie has developed strong parametric cost models for this technology, allowing exploration of the optimal CETO scale in relation to required generator size.

Nominal torque vs nominal speed for 59 different electrical machines investigated for use in the CETO device across a wide range of scales

More broadly, within the PTO innovation stream, development work continues on other sub-systems such as the translation and tensioning systems which convert the buoy motion from linear to rotary and maintain mooring tension respectively. Carnegie has engaged with a number of parties for development of the translation system and continues to explore possibilities for jointly funded developments in this area. Furthermore, tensioner work has continued utilising local engineering expertise. This work has advanced the design level of the tensioner, with an expected design program to continue throughout 2020 into testing in 2021.

Impact of COVID-19 Pandemic

During these challenging times, with COVID-19 impacting people and businesses globally, Carnegie's team continues to diligently progress the digital development pathway. The team remains committed to our shared vision for the successful commercialisation of the CETO technology and is adapting to the changing conditions and uncertainties expected over the coming months.

Fortunately, due the digital development approach, the majority of the activities being undertaken in the coming 6 months are generally unaffected by the need to self-isolate and work from home. For the development work that will be impacted by the COVID-19 pandemic, it is not yet possible to quantify the impact on the schedule and budget. Currently, delays to planned activities such as the wave tank testing (which was intended to occur in Spain in May)

and delays to planned recruitment. are expected to impact timing of some future milestones. Carnegie is working to minimise disruption and delay and will be adjusting planned activities as required.

Carnegie will continue to keep shareholders updated on progression along the milestones and will provide an update on COVID-19 impacts in due course.

For more information

Carnegie Clean Energy Limited

+61 8 6168 8400

enquiries@carnegiece.com

www.carnegiece.com