ASX ANNOUNCEMENT
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Carnegie wins Phase 2 European Wave Energy Contract

- CETO Wave Energy Ireland Ltd selected as 1 of 5 successful contractors for Phase 2 of the EuropeWave PCP Programme, a competitive programme to advance wave energy
- Follows successful completion of Phase 1 which encompassed initial design, simulation and tank testing activities
- Awarded €600k (A$890k) Phase 2 contract to deliver CETO engineering and testing activities, subject to contract signing
- Phase 2 activities include power take-off (PTO) and tank testing and will further advance the CETO prototype design for European sites.
- Hewlett Packard Enterprise and Hutchinson join project team
- Winning Phase 2 provides expert validation of CETO's technical and commercial potential
- Clear alignment between EuropeWave Progamme's ambition and Carnegie's commercial and strategic objectives – unlocking the next step in CETO's Product Validation roadmap.
- Upon successful delivery of Phase 2, and subject to a final competitive selection, Phase 3 would fund the deployment and operation of a CETO prototype at a European test site.

Carnegie Clean Energy (ASX: CCE) ("Carnegie" or the "Company") is pleased to announce that its wholly owned subsidiary, CETO Wave Energy Ireland Limited (the "Contractor"), has been awarded a contract (subject to signing) for Phase 2 of the EuropeWave Pre-Commercial Procurement (PCP) programme. This follows the competitive selection and successful performance of CETO in Phase 1 of the programme, previously announced to the ASX on 8 December 2021 *Carnegie wins European Wave Energy Contract.*

EuropeWave PCP is an innovative and competitive stage-gate programme designed to advance promising wave energy converter systems to a point from which they can be developed for commercial exploitation through other national/regional programmes and/or private investment.

CETO Wave Energy Ireland Limited was selected alongside four other companies, out of the initial seven that delivered Phase 1, to deliver Phase 2 of the programme. Phase 2 includes Front End Engineering Design (FEED), wave tank testing, power take off component testing and related certification and commercialisation activities. Phase 2 will run from the end of September 2022 to June 2023.

Rigorous evaluations were carried out to progressively select the best of the competing solutions. This selection shows the potential for the CETO technology to be a frontrunner in the European wave energy space. Positive feedback was received in areas such as the techno-economic optimisation, approach to system performance, advanced control, levelised cost of energy (LCOE) modelling and forecasts, proposed activities, risk management and a strong and capable project team.

Phase 2 follows Concept Development in Phase 1, which delivered substantial progress in advancing the CETO prototype design and validation work through tank testing in Spain.

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Following the completion of Phase 2, three of the five companies will be selected on competitive basis to continue to the final Phase 3, which includes deployment in open sea conditions at the Biscay Marine Energy Platform (BiMEP) in the Basque Country or the European Marine Energy Centre (EMEC) in Scotland. The final phase is expected to start in September 2023 and conclude in May 2026.

With almost €20 million in funding for the 3 phases of the programme, the EuropeWave PCP is a collaboration between Wave Energy Scotland (WES), a subsidiary of the Scottish Government's Highlands and Islands Enterprise, and the Basque Energy Agency (EVE).

Carnegie's CEO, Mr Jonathan Fiévez, commented: *"EuropeWave is a driving force behind the global adoption of wave energy, aiming to identify, evaluate and fund the most promising wave energy technologies. Being selected to continue into Phase 2 of the programme is a huge endorsement of the applicability of the CETO technology and validates our commercialisation pathway.*

"This has been an incredible journey. Our fantastic team and consortium of partners have worked relentlessly to complete CETO's design and tank testing campaign and test the technology's performance in the European wave conditions. A number of significant improvements were made in optimising CETO's performance and cost of energy during Phase 1, which will help in the next stage.

"EuropeWave truly aligns with our objectives to pave the way for a CETO commercial roll-out and attract future project partners.

"Interest is building and it is only a matter of time for wave energy to become a key component in the renewable energy mix. We have the right technology and established partnerships to accelerate the adoption of the next big source of clean energy.

Key terms of the Phase 2 Contract

CETO Wave Energy Ireland will deliver Phase 2 of the EuropeWave PCP with the support of an impressive team including its consortium partner SAITEC Offshore Technologies and subcontractors Hewlett Packard Enterprise, Hutchinson, DNV (including support from Yavin Four Consultants), IHCantabria and Julia F. Chozas Consulting Engineer. All the Phase 1 partners will continue to be involved and are being joined by new project partners, Hewlett Packard Enterprise who will be involved in the reinforcement learning based control and Hutchinson, who will be involved in the design and testing of the belt component of the power take-off system.

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Under the Phase 2 contract, the team will complete various development and testing activities which progress CETO towards a potential European prototype deployment in Phase 3. This includes activities such as: Front End Engineering Design (FEED), Numerical Modelling, Power Take-Off Testing, Tank Testing, Operational Planning, Commercial Analysis and progressing the Certification Pathway with DNV.

A wave tank testing campaign will be undertaken at the Cantabria Coastal and Ocean Basin (CCOB) in Spain in early 2023. The tests will build on previous tank testing undertaken during Phase 1 and will validate the performance of CETO's advanced controllers and confirm a novel survival strategy, key advantages of the CETO technology.

A Power Take-Off (PTO) bench testing campaign will occur in early 2023 and will validate the fatigue life of the belt and characterise the efficiency and reliability of the PTO drive train, controller and electrical system. This work will be done in collaboration with the IMPACT project, which is developing test rigs that will be utilised by the team.

Carnegie will retain ownership of the intellectual property rights (IPRs) generated during the PCP Programme and will be able to use the IP to exploit the full market potential of the developed solutions.

Phase 1 Activities Already Completed

Phase 1 included undertaking tank testing and delivering a CETO concept design. During this stage Carnegie completed the following mandatory development tasks:

- Conceptual design development of the complete system to be tested during Phase 3.
- Physical testing of a small-scale model in the mandatory test conditions.
- Independent review of tank testing activities.
- Preliminary Design Review of the conceptual design for the Phase 3 prototype.

The phase commenced on 3rd January 2022 and ran for 7 months. The Company was paid €291k (A$463k) to deliver the required activities.

Completion of Phase 1 delivers progress along Carnegie's Product Validation roadmap and unlocks the next steps in CETO development which will be delivered during Phase 2.

Growing addressable market

Momentum is building for wave energy and renewables as a whole. Governments and businesses around the world are accelerating efforts to reduce the reliance on traditional fossil fuels and accelerate the rollout of renewables. This is also evidenced by Australia's recent landmark Climate Change Bill 2022 and the US's Inflation Reduction Act to reach net zero CO2 emissions by 2050. By 2050, almost 90% of global energy is predicted to come from renewables[1], with other renewable sources needed to complement the already well-established wind and solar sectors.

[1] IEA 'Net Zero by 2050. A Roadmap for the Global Energy Sector' Report, May 2021

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Last year alone global investments in wave energy increased by 50%[2]. Europe is leading the way in wave energy funding and adoption. Ocean energy has the potential to power 10% of Europe's current electricity needs by 2050 – enough to provide electricity to 94 million households every year[3].

As demand for wave energy rises, Carnegie envisages the addressable market for this renewable to expand, forming a growing adoption curve previously seen in the solar PV and offshore wind market expansions.

Carnegie will keep shareholders informed of its progress throughout Phase 2.

This announcement has been authorised by the Chairman and CEO.

For more information

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ABOUT EUROPEWAVE PRE-COMMERCIAL PROCUREMENT PROGRAMME

EUROPEWAVE

EuropeWave PCP is an innovative R&D programme for wave energy technology, which runs from 2022 to 2026. It will combine over €22.5m of national, regional and EU funding to drive a competitive Pre-Commercial Procurement (PCP) programme for wave energy.

Originally pioneered by the Wave Energy Scotland programme, the PCP model provides a structured approach, fostering greater openness, collaboration and sharing of risk between the public sector and technology developers. The programme will focus on the design, development, and demonstration of cost-effective wave energy converter (WEC) systems for electrical power production that can survive in the harsh ocean environment.

Match-funded by the EU's Horizon 2020 programme, it is a collaboration between Wave Energy Scotland (WES), the Basque Energy Agency (EVE) and Ocean Energy Europe (OEE). This collaboration is closely aligned with the decarbonisation, industrial and competitiveness objectives of the European Green Deal, and is part of a range of actions being taken to meet the European Commission's targets of 100MW of ocean energy by 2025 and at least 1GW by 2030.

[2] Energy Digital 'Investment in Ocean Energy Increases 50% in 2021', March 2022
[3] Innovation News Network, August 2022.

The main technical challenges to be addressed in EuropeWave PCP may be expressed in terms of:

- Performance – obtain quantitative evidence of appropriate power capture and conversion. capability and increase confidence in yield predictions from numerical model simulations.
- Survivability – demonstrate effective strategies for survival in survival events.
- Availability – demonstrate levels of availability through reliable prototype operation.
- Affordability – increase confidence in the estimation of the technology costs (capital and operational) and determine a route to cost reduction to achieve a competitive LCOE.

The 3 Phases of the Europe Wave PCP:

			Number of Contracts		Contract Maximum Value	
	Start date	End Date	Minimum	Anticipated	ex. VAT	inc. VAT
Phase 1 Concept Development	03 Jan 2022	29 July 2022	5	7	£ 291,667	£ 350,000
Phase 2 FEED and Modelling	26 Sept 2022	30 June 2023	4	5	£ 608,333	£ 730,000
Phase 3 Open- water deployment]	11 Sept 2023	29 May 2026	3	3	£ 3,750,000	£ 4,500,000
				Totals	£ 4,650,000	£ 5,580,000

This is part of the EuropeWave project that has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 883751.

https://www.europewave.eu/

ABOUT CARNEGIE & CETO WAVE ENERGY IRELAND

Carnegie Clean Energy (ASX: CCE) is a technology developer focused on delivering ocean energy technologies to make the world more sustainable. CETO Wave Energy Ireland is a wholly owned subsidiary of Carnegie Clean Energy. Carnegie is the owner and developer of the CETO® and MoorPower™ technologies, which capture energy from ocean waves and convert it into electricity. Using the latest advances in artificial intelligence and electric machines, Carnegie can optimally control our technologies and generate electricity in the most efficient way possible. The Wave Predictor technology developed by Carnegie uses a proprietary machine learning algorithm to improve the performance of our wave technologies and has additional applications beyond the wave energy industry. The company has a long history in ocean energy with a track record of world leading developments.

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