

Carnegie releases Product Validation Roadmap

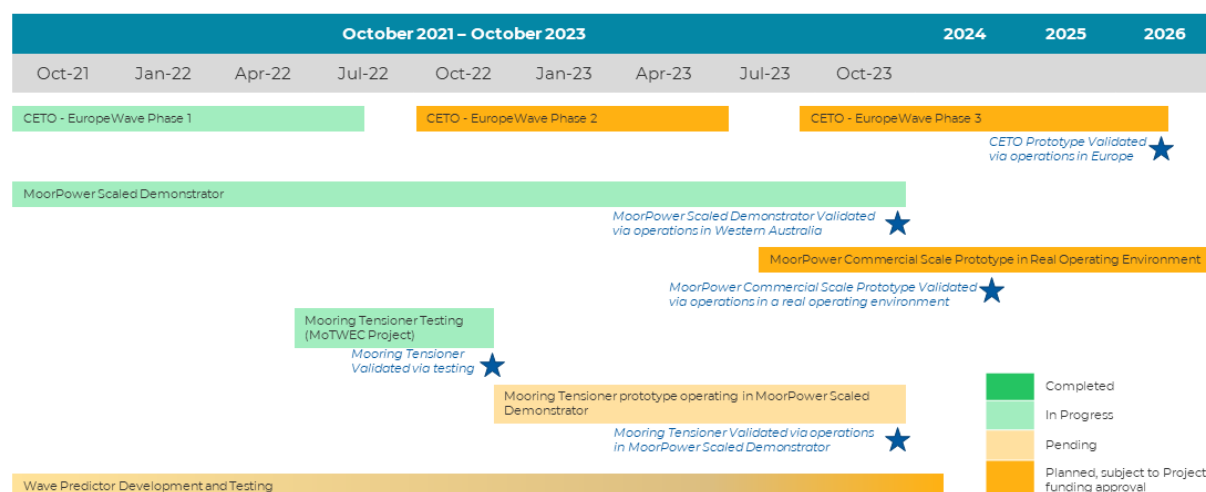
Clear and accelerated route to commercialisation

- New Product Validation Roadmap released for core CETO and MoorPower™ product development, alongside complementary product streams
- Roadmap outlines an important next stage in the commercialisation journey of Carnegie's products
- New Roadmap builds on the achievements of previous Digital Development Pathway
- Support of strategic partnerships, such as HPE, EuropeWave and Blue Economy CRC to accelerate roadmap advancements and underpin robust commercial pathway
- Carnegie holds sufficient funds to deliver projects underway
- Growing global support for wave energy as demand for renewables accelerates, and world faces significant pressure to rapidly reduce fossil gas reliance
- Wave energy forecast to become commercially competitive by following a similar cost and deployment trajectory to solar PV and offshore wind

Carnegie Clean Energy Limited (ASX Code: CCE) ("Carnegie" or the "Company") is pleased to announce the release of its new Product Validation Roadmap ("Roadmap") for Carnegie's primary CETO and MoorPower™ technologies, alongside additional products Wave Predictor and Mooring Tensioner.

The new Roadmap follows the completion of the Digital Development Pathway, which resulted in the Company reaching its internal target of incorporating innovations that enhanced CETO performance and reduced CETO's cost of energy, shortening the timeframe to commercialisation.

The latest Roadmap outlines activities to be progressed over the next 18+ months in order to validate Carnegie's products and is summarised below. This validation process is an important stage in the commercialisation pathways of our products.



Carnegie Products – Product Validation Roadmap Summary

Carnegie is in a strong position to validate its core CETO and MoorPower™ technologies through delivery of projects that have support from key partners and funding bodies. CETO Wave Energy Ireland's continued participation in the EuropeWave PCP Programme and Carnegie's MoorPower™ Projects are key mechanisms to validate the technologies in this Roadmap. These activities are supported by the Company's strong partner ecosystem, which includes Hewlett Packard Enterprise and Blue Economy Cooperative Research Centre (CRC).

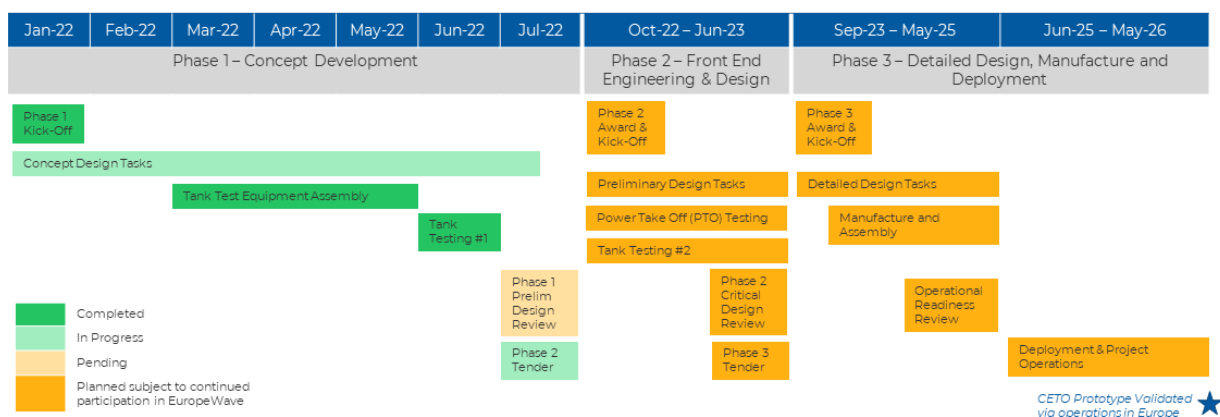
Carnegie currently holds approximately \$4m in cash with no debt. The Board believes these funds will be sufficient for the Company to complete the projects underway.

CETO Development and Milestones

To be validated via EuropeWave ACHIEVE Project

CETO is Carnegie's core technology, a submerged point absorber type wave energy converter which converts ocean waves into zero-emission electricity. Following the Digital Development Pathway's advancements, the technical and commercial promise of this technology was reaffirmed by the successful selection as 1 of 7 contractors into Phase 1 of the competitive €22.5m EuropeWave PCP Programme for the advancement of wave energy technologies. The EuropeWave Phase 1 Project, currently ongoing, is taking the innovation concepts of the Digital Development Pathway and progressing the design of a CETO prototype that, if awarded future phases, will lead to the full design, manufacture, deployment and operations of a CETO prototype. This provides a clear validation pathway for the CETO technology as illustrated below.

The team is currently completing Phase 1 EuropeWave activities and preparing its tender for Phase 2 of the Programme. With the recent completion of tank testing in Spain, the team, including a strong consortium of partners, are currently preparing the final deliverables under the EuropeWave Phase 1 contract. If awarded a contract for Phase 2 of EuropeWave, Front End Engineering and Design activities would commence at the end of September 2022.



CETO Development Activities (see Appendix for full size image)

Our CETO commercialisation objectives are well aligned with the EuropeWave PCP Programme's ambition. The ACHIEVE Project provides an attractive means to show future end users and project owners what CETO can do, and for these prospective future clients to see the technology in action - paving the way for the first early commercial projects and subsequent commercial roll out. Europe is a leader in wave energy funding and adoption, as countries steer away from relying on fossil fuels, and thus Europe is an ideal location to validate CETO's promise and unlock its potential.

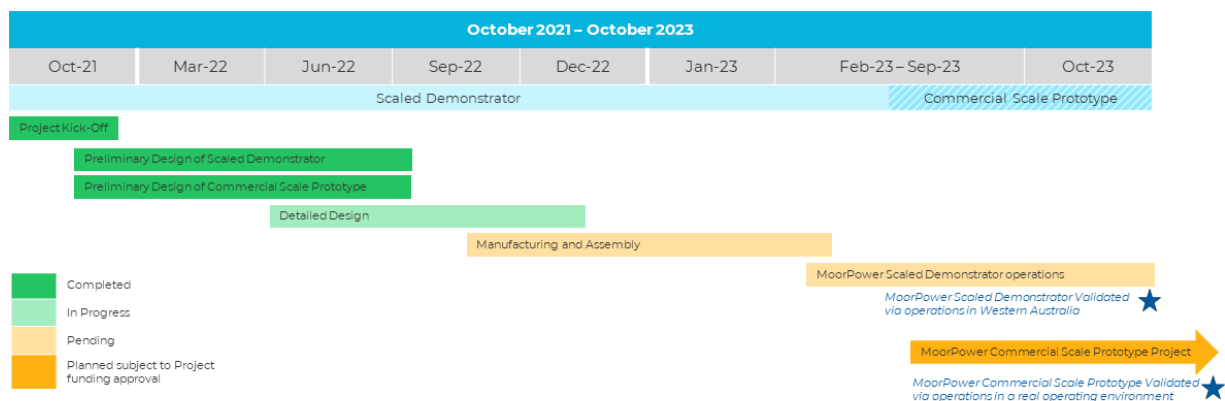
As the technology progresses along its commercialisation pathway and cost of energy decreases further, Carnegie envisages the addressable market for wave energy to expand, forming a growing adoption curve previously seen in the solar PV and offshore wind market expansions.

MoorPower™ Development and Milestones

To be validated via Scaled Demonstrator and Commercial Scale Prototype Projects

MoorPower™ has made great strides since the launch of the \$3.4m MoorPower™ Scaled Demonstrator Project in October 2021 with support from the Blue Economy CRC and in collaboration with a strong consortium of partners. MoorPower™ is a CETO derived wave energy product designed to deliver a sustainable energy supply for marine industries operating at a fixed moored location, reducing the reliance on diesel. Major aquaculture project industry partners are to be the first adopters of the technology.

As part of the MoorPower™ Scaled Demonstrator Project currently underway, Carnegie will design, develop, build and operate a scaled demonstrator of the MoorPower™ technology in collaboration with Blue Economy CRC and leading partners, including Huon Aquaculture and Tassal. The scaled demonstrator will be deployed and operated just offshore from Carnegie's office and research facility in North Fremantle, Western Australia.



* MoorPower is being validated via the Scaled Demonstrator project (with existing support from the Blue Economy CRC and a consortium of partners) and a subsequent commercial scale prototype to be deployed in a real operating environment with an Aquaculture partner (which is subject to funding).

MoorPower™ Development Activities (see Appendix for full size image)

As shown in the MoorPower development activities, a subsequent Commercial Scale Prototype Project is also planned to follow on from the Scaled Demonstrator, subject to continued partner participation and project funding. This Commercial Scale prototype will take the learnings from the Scaled Demonstrator Project and design, build and operate a MoorPower™ prototype in a real aquaculture operating environment – likely to be deployed on a feeding or lighting barge utilised by an aquaculture company at an offshore site. The timing will thus be aligned with the schedule of the selected aquaculture project site with development activities commencing in parallel with the operation of the Scaled Demonstrator Project.

Complementary Products – Wave Predictor

Development Activities

Carnegie’s Wave Predictor is an offering capable of predicting upcoming waves using artificial intelligence (AI) up to minutes into the future before they impact the shore, a structure or a wave energy converter. This increases the safety and performance of activities, including critical offshore operations, ocean based recreational sports and rock fishing. Therefore, while the Wave Predictor was developed as an input into Carnegie’s advanced controllers for CETO, there is a significant additional market that is being explored and tested.

The team has developed and validated the Wave Predictor via a previous tank testing campaign. This original Wave Predictor utilised wave buoys to provide the data input (knowledge) used by the Wave Predictor. To further improve the product, the next key development activity is expanding the possible input into the Wave Predictor to include image based data input such as stereoscopic imagery or radar. This will enable the product to be more adaptable to a wide range of applications and also reduce the cost associated with the data input required.

Over the coming months, Carnegie will work to deliver this expanded potential while also increasing data acquisition via direct and indirect methods. The Company is in discussions with multiple potential end users and intends to test and validate the expanded Wave Predictor as a demonstration project with a future client. Therefore, the timeframe and specifics of that testing campaign and the next key validation milestone is subject to project funding agreements.



Wave Predictor Development Activities (see Appendix for full size image)

Complementary Products – Mooring Tensioner

Development Activities

Carnegie’s Mooring Tensioner product provides passive tension required for rotary electric power take-off systems, such as is required for CETO and MoorPower™. In addition, there is potential for the Mooring Tensioner to be a standalone offering that provides other services such as improving station-keeping for vessels.

The Mooring Tensioner testing campaign received funding from the Blue Economy CRC and benefits from the support of a consortium of expert partners. Project partner Advanced Composite Structures Australia (ACS-A) and Carnegie have designed a Mooring Tensioner prototype that has now been manufactured by ACS-A. Carnegie has also designed and constructed a test rig that capable of undertaking functional and fatigue testing on the prototype. The Mooring Tensioner test rig is set to be commissioned shortly. Over the rest of 2022, the Carnegie team will undertake the planned testing at its private research facility in Western Australia. This will lead to dry test validation of the Mooring Tensioner.

The next key stage in the Mooring Tensioner Roadmap, is the design and integration of a Mooring Tensioner prototype into the power take-off of the MoorPower™ Scaled Demonstrator which will operate during 2023. These activities will deliver operational validation of the product in an operating MoorPower™ application. This would lead to delivery of a Mooring Tensioner for the Commercial Scale MoorPower™ product to be deployed in a real aquaculture operating environment offshore.



Mooring Tensioner Development Activities (see Appendix for full size image)

Carnegie’s CEO, Mr Jonathan Fiévez, commented: “I am extremely proud of the advancements made by our team culminating in the release of our new Product Validation Roadmap which shows the next stage in our commercialisation journey. Alongside our core CETO technology, we have a unique set of complementary products in MoorPower™, Wave Predictor, and the Mooring Tensioner to accelerate wave energy adoption. This is all underpinned by a solid commercialisation strategy and world-class partnerships.

“Our goal is to continue validating our technologies whilst reinforcing long term commercial partnerships and bringing forward revenue streams from our products. This is only the beginning for Carnegie as wave energy can play a huge role supporting efforts towards global decarbonisation.”

This announcement has been authorised by the Chairman and Company Secretary.

For more information

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ABOUT CARNEGIE

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.

<https://www.carnegiece.com/>

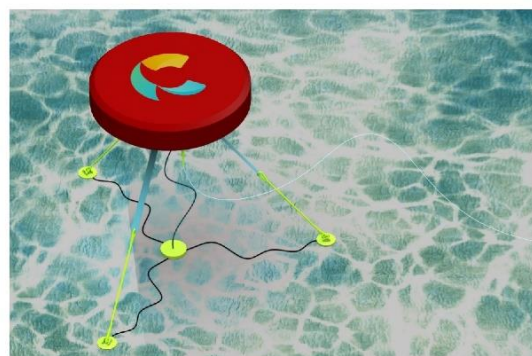
ABOUT EUROPEWAVE PCP

With almost €20 million in funding for the 3 phases of the programme, which runs from 2022 to 2026, 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).



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/>



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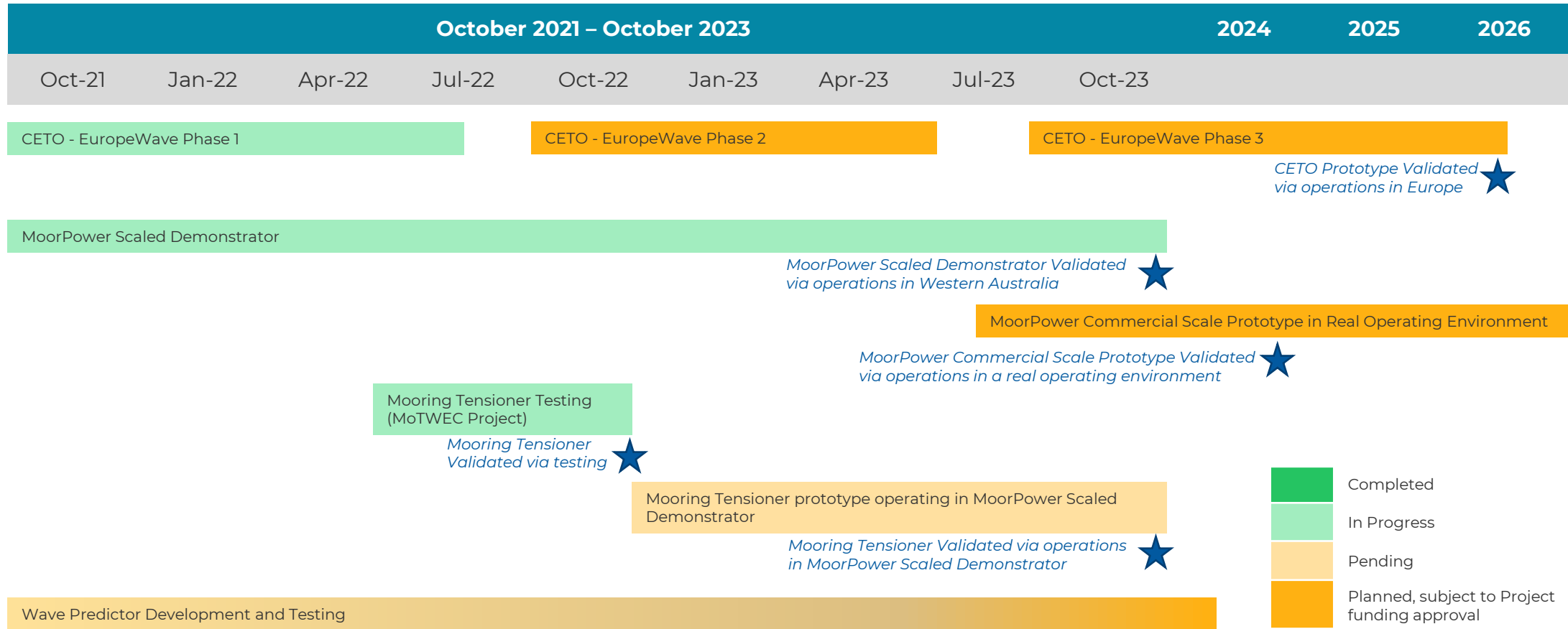


Appendix

Product Validation Roadmap



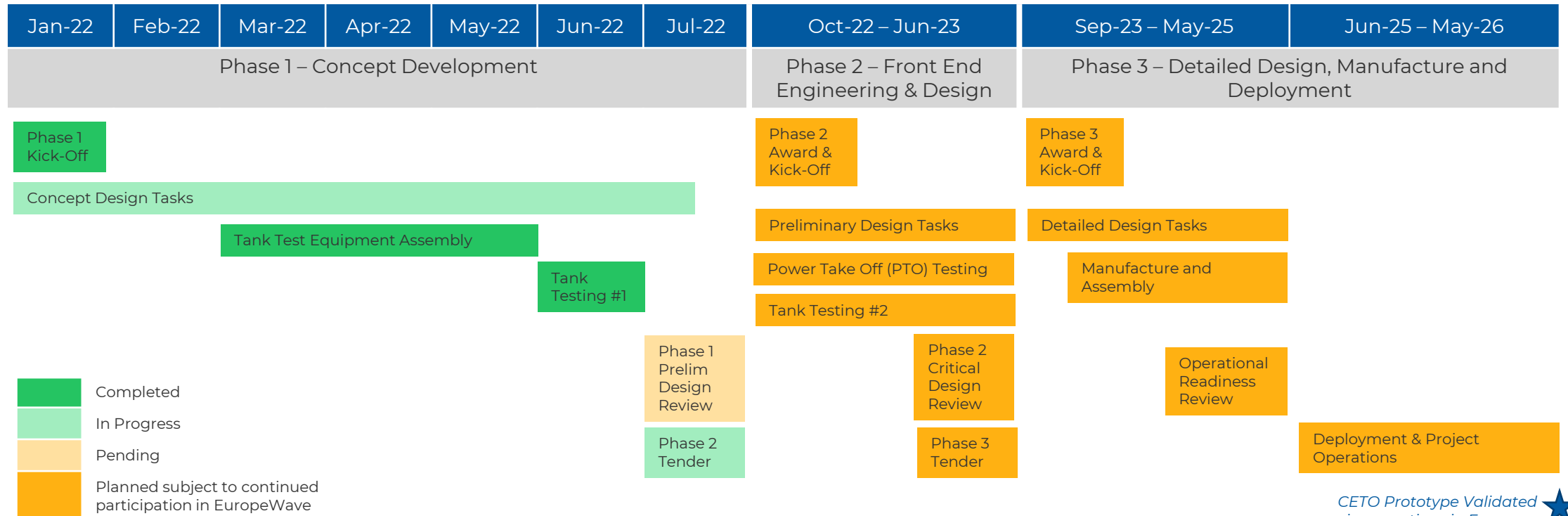
Carnegie Products Product Validation Roadmap Summary



Product Validation Roadmap



CETO Development Activities Validated via EuropeWave ACHIEVE Project



CETO Prototype Validated via operations in Europe ★

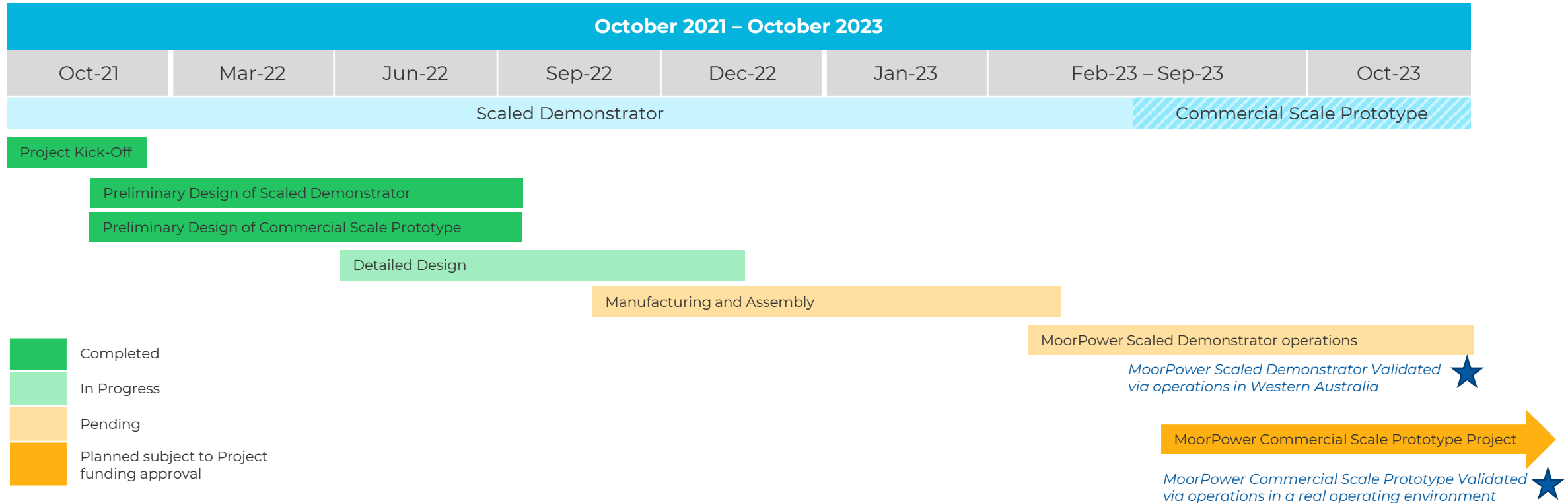
* CETO is being validated via CETO Wave Energy Ireland's participation in the EuropeWave ACHIEVE Project. Phase 1 is nearing completion. Phase 2 and 3 activities are subject to continued participation in the EuropeWave PCP Programme.

Product Validation Roadmap



MoorPower™ Development Activities

Validated via Scaled Demonstrator & Commercial Scale Prototype Projects



* MoorPower is being validated via the Scaled Demonstrator project (with existing support from the Blue Economy CRC and a consortium of partners) and a subsequent commercial scale prototype to be deployed in a real operating environment with an Aquaculture partner (which is subject to funding).

Product Validation Roadmap



Complimentary Products - Wave Predictor Development Activities



Product Validation Roadmap



Complimentary Products – Mooring Tensioner Development Activities

