



# Annual General Meeting

November 2021

Carnegie Clean Energy Limited  
ASX: CCE

# Achieving a net zero future

Increasing global opportunities for renewable energy technologies

## Opportunity driven by global demand for renewable energy

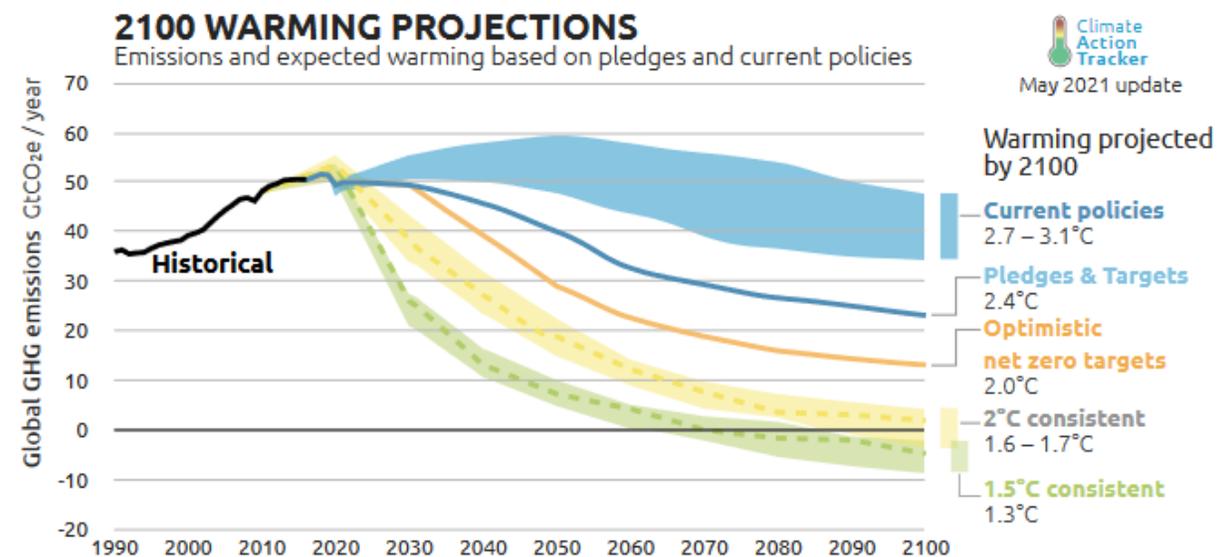
- Global transition to clean power to secure global net zero CO<sub>2</sub> emissions by mid-century and limit global warming to 1.5°C
- International Energy Agency (IEA) estimates that annual clean energy investment needs to more than triple by 2030 to over \$4 trillion, representing well over \$100 trillion in clean energy investment over the next three decades<sup>1</sup>
- Ocean Energy Europe (OEE) forecasts a €653b market potential for ocean energy by 2050<sup>2</sup>

<sup>1</sup> IEA Report: 'World Energy Investment 2021', Executive Summary <https://www.iea.org/reports/world-energy-investment-2021/executive-summary>

<sup>2</sup> Carbon Trust (2011) Marine Renewables Green Growth Paper

## Growing 'Blue Economy'

- Opportunities to replace diesel generation by shifting to low or zero emissions and reduce risk for the environment



[https://climateactiontracker.org/documents/853/CAT\\_2021-05-04\\_Briefing\\_Global-Update\\_Climate-Summit-Momentum.pdf](https://climateactiontracker.org/documents/853/CAT_2021-05-04_Briefing_Global-Update_Climate-Summit-Momentum.pdf)

# Potential for wave energy

Wave energy's role in our net zero future and future commercialisation

## Wave Energy is an untapped opportunity

- Enormous untapped clean, renewable resource
- Consistent – present day and night – predictable and abundant
- Complements existing renewable energy technologies and reduces energy storage needs

## The potential scope for growth

*Offshore wind sector growth serves as a blueprint for wave energy sector*

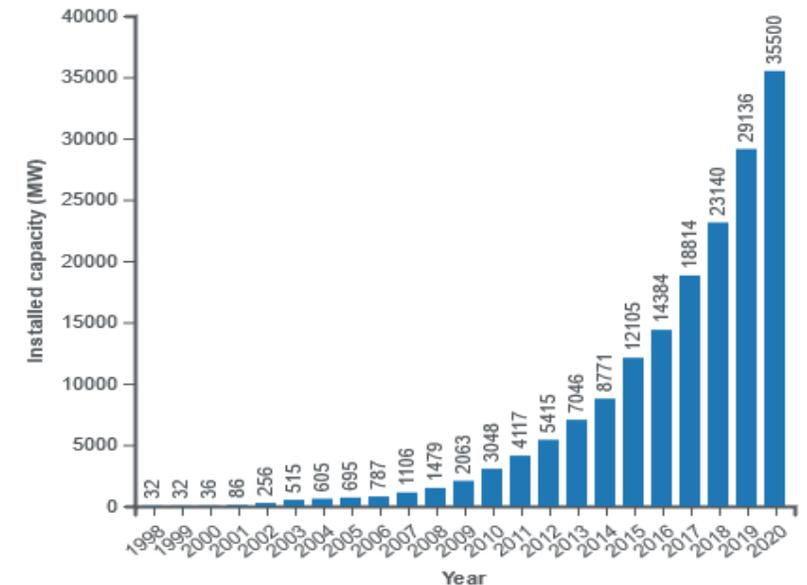
- 1991 – 5MW installed in world's first offshore wind farm, Vindeby
- End of 2020 – 35 GW Installed globally<sup>1</sup>
- The wave energy industry is expected to achieve growth rates in line with previously developed energy technologies such as offshore wind and solar PV

Source:

1. Global Offshore Wind Report 2021 <https://gwec.net/wp-content/uploads/2021/09/GWEC-Global-Offshore-Wind-Report-2021.pdf>

## Global cumulative offshore wind capacity (MW).

Sources: [GWEC](#) (2011–2020) and [EWEA](#) (1998–2010)



# Who we are



## Carnegie is an ocean energy technology company

- Experts in wave energy and related technology
- Technology developer creating unique wave energy products and IP
- 10+ years of partnerships in industry and academia



## Why Carnegie?

Game-changer technologies converting ocean waves into zero-emission electricity



## Our Products

CETO

MoorPower™

Wave Predictor

## Our Purpose

*We harness ocean energy to make the world more sustainable.*

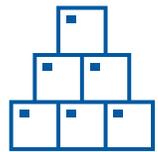
## Our Vision

*To be the most successful ocean energy company on Earth.*

# Corporate strategy – last 12 months



Focused on Delivering Carnegie's Strategic Business Plan - Launched in 2020



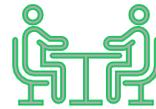
**1**

Create unique competitive products



**2**

Build a market for wave energy



**3**

Foster the partner ecosystem



**4**

Secure financial sustainability



**5**

Cultivate high performing team

# Execution – last 12+ months



**1**

Create unique competitive products

Advanced core CETO product

Achieved significant CETO cost and performance improvements

Developed and launched MoorPower™ product

Validated Wave Predictor product



**2**

Build a market for wave energy

Building market intelligence for CETO and other products

Educating markets and stakeholders

Active industry engagement and outreach - Ocean Energy Europe, Australian Ocean Energy Group and more.



**3**

Foster the partner ecosystem

Blue Economy CRC

Hewlett Packard Enterprise (HPE)

Microsoft AI for Earth

5+ active academic partners



**4**

Secure financial sustainability

Achieved debt-free status

Sold legacy gold royalty for \$1m

Cash position of \$4.4m at 30 September, 2021

Working to maximise Garden Island revenue



**5**

Cultivate high performing team

Team of world class engineers and scientists with a passion for technology, renewable energy and sustainability

Recruitment of new specialist positions aligned with Strategic Business Plan

# Plan evolution – 2019 to 2021

To capture emerging technical and commercial opportunities

## Achievements

- Optimised CETO technology – reduced cost and increased performance.
- Achieved CETO design target - on track to be competitive with other sources
- Vast array of internal simulations delivered new levels of accuracy and insight
- Introduced new spin-off products
- Attracted funding support for many activities



# Plan evolution – what has changed

## What has changed



### Second tank testing campaign shifted into 2022



### PTO testing shifted into 2022

- Mooring Tensioner awarded funding, manufacturing underway, testing starting in January 2022
- Integrating with MoorPower project – testing mid 2022



### Utility Partner

- Focus moving to 'project' partner for next CETO deployment

## What was added



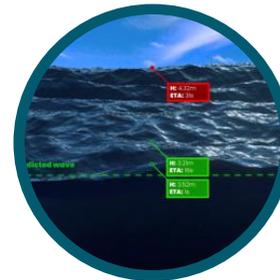
### New MoorPower Spin-off Product

- \$3.4m MoorPower™ Scaled Demonstrator Project Launched



### New partners and opportunities emerged

- Blue Economy CRC
- Hewlett Packard Enterprise
- Microsoft
- Others in discussions



### Wave Predictor Spin-off Product

# Strategy – next 12+ months



## CETO®

Advanced proprietary submerged wave energy technology

- Tank testing
- PTO testing
- Strategic partnership for deployment project
- Commence design for deployment project



## MoorPower™

Integrated wave energy technology for offshore demand applications

- Customer requirements / engagement
- Scaled Demonstrator design and manufacture
- Onshore testing



## Wave Predictor

Product capable of predicting upcoming waves using ML algorithm

- Expand market potential by enabling use of alternative input data options
- Customer engagement Identifying new applications



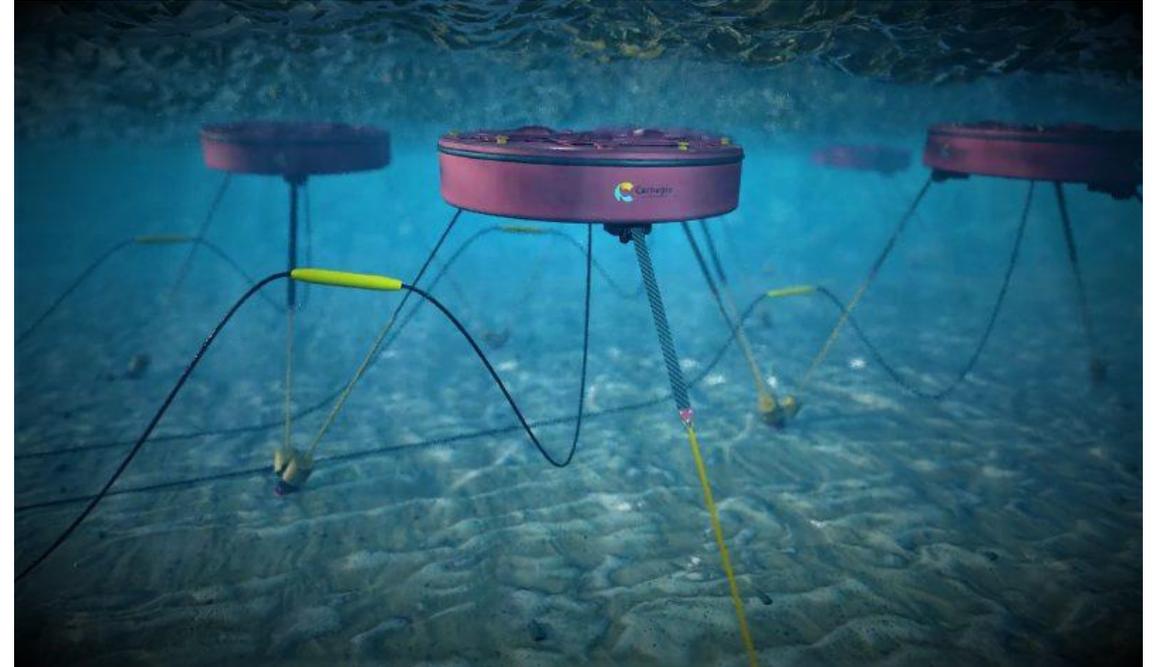
## Additional Products

- Mooring Tensioner testing
- Exploring other component and enabling technology spin-off opportunities

# Products - CETO

## Early mover in emerging market

- CETO is a wave energy converter which captures energy in ocean waves and converts it into zero-emission electricity
- The CETO system is a fully submerged buoy that sits a few metres below the surface of the ocean and moves with the ocean's waves. This orbital motion drives a Power Take-Off (PTO) system that converts the wave motion into grid-ready electricity
- Largest target market comprises the global utility scale electricity markets and early target markets include remote coastal and island markets.



# Products - MoorPower™



- MoorPower™ is a CETO derived wave energy product designed for floating offshore structures such as feeding barges in the aquaculture sector
- Offers a solution to the challenge of securing clean and reliable energy for offshore activities, reducing reliance on diesel generation, and reduced risk for people and environment
- Over the next 2 years, Carnegie will design, develop, build and operate a scaled demonstrator of the MoorPower™ technology in collaboration with leading partners in the \$3.4m MoorPower™ Scaled Demonstrator project
- Batteries or hydrogen system for buffering/storage
- Future hydrogen integration opportunities



## Scaled Demonstrator Partners



# Wave Predictor & additional products



## Wave Predictor

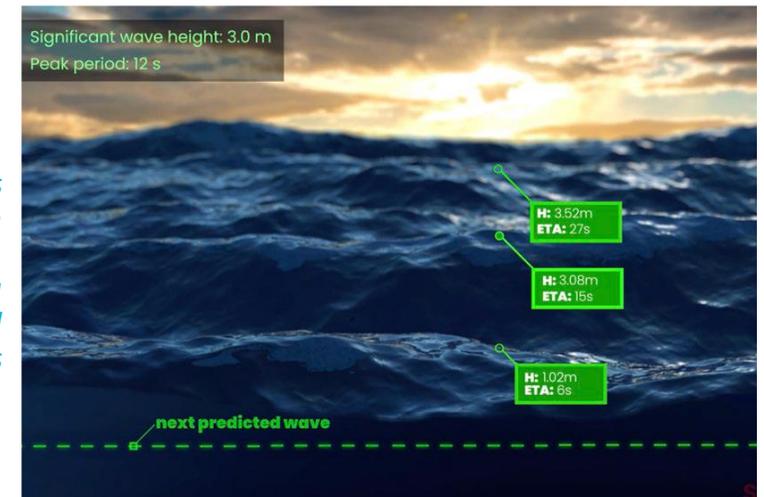
- Leveraging the power of Artificial Intelligence to predict ocean waves up to minutes into the future, before they impact the shore, a structure, or a wave energy converter
- Utilises data captured from nearby wave buoys or sensors to feed into the algorithm and predict waves to a high level of accuracy
- Wave Predictor increases the safety and performance of many activities including wave energy converters, critical offshore operations and rock fishing



## Mooring Tensioner

- Provides passive tension for CETO and MoorPower products
- Could be a standalone product that improves station-keeping for vessels

*The Wave Predictor has potential applications in wave energy and beyond, including improving safety of personnel transfers*



# Investment highlights



**1**

Technological advantage

Advanced IP and early mover in one of the world's largest untapped sources of clean energy



**2**

Solid strategy for growth

Clear strategy delivering CETO technology and spin-off products



**3**

Strong partnerships

World class industry and academic alliances to support the development and pathways to commercialisation



**4**

Global renewables market boom

Governments are committed to zero carbon by 2050, and wave energy can play a huge role as an untapped renewable resource



**5**

Only the beginning

CETO products to revolutionise power generation, producing clean energy and support global efforts towards decarbonisation



# Thank You

Carnegie Clean Energy Limited

ABN: 69 009 237 736

ASX: CCE

Telephone: +61 (0)8 6168 8400

Website: [www.carnegiece.com](http://www.carnegiece.com)

Registered Office:

21 North Mole Drive, North Fremantle WA 6159

Postal Address:

PO Box 39, North Fremantle WA 6159