



EUROPEWAVE

**ACHIEVE**

**Jonathan Fiévez**

*CEO*

**CETO Wave Energy Ireland**



**CETO**

**WAVE ENERGY IRELAND**



This project has received funding from the European Union's Horizon 2020 research and Innovation programme under grant agreement 883751.



[www.europewave.eu](http://www.europewave.eu)



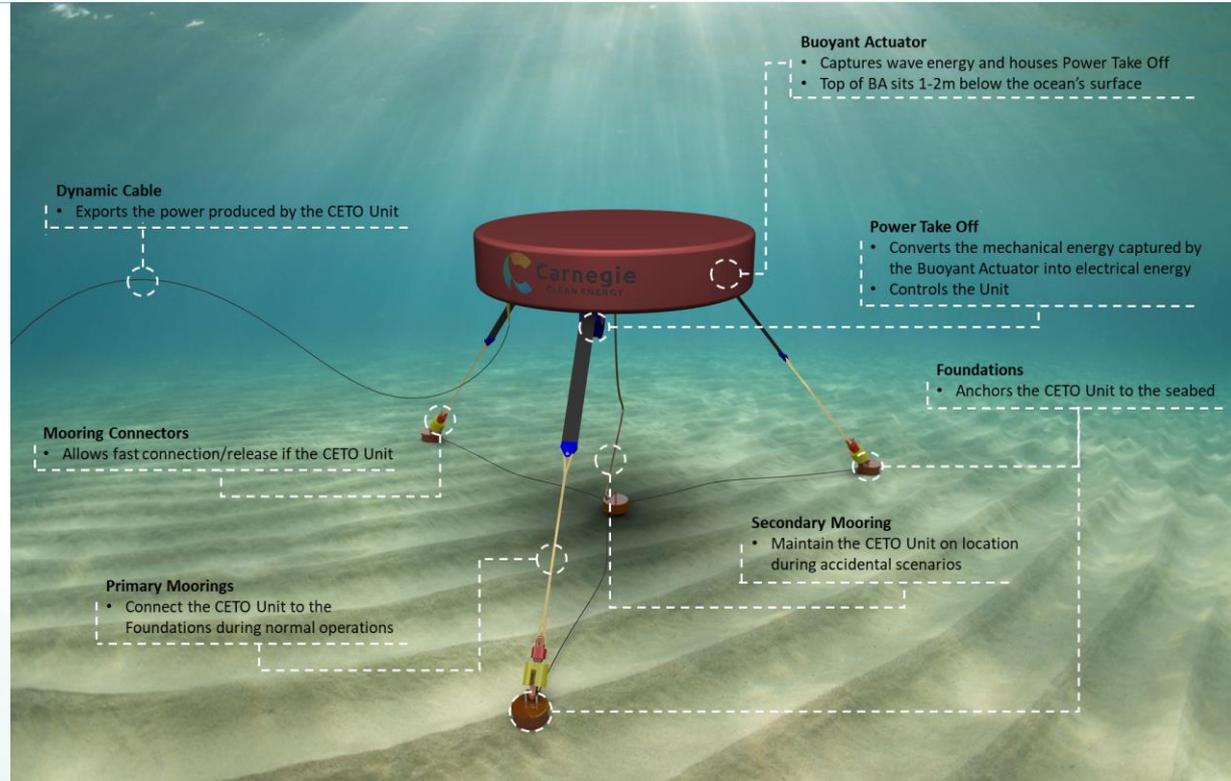
[@Europewave\\_EU](https://twitter.com/Europewave_EU)



[info@europewave.eu](mailto:info@europewave.eu)

# CETO Technology – Key Features

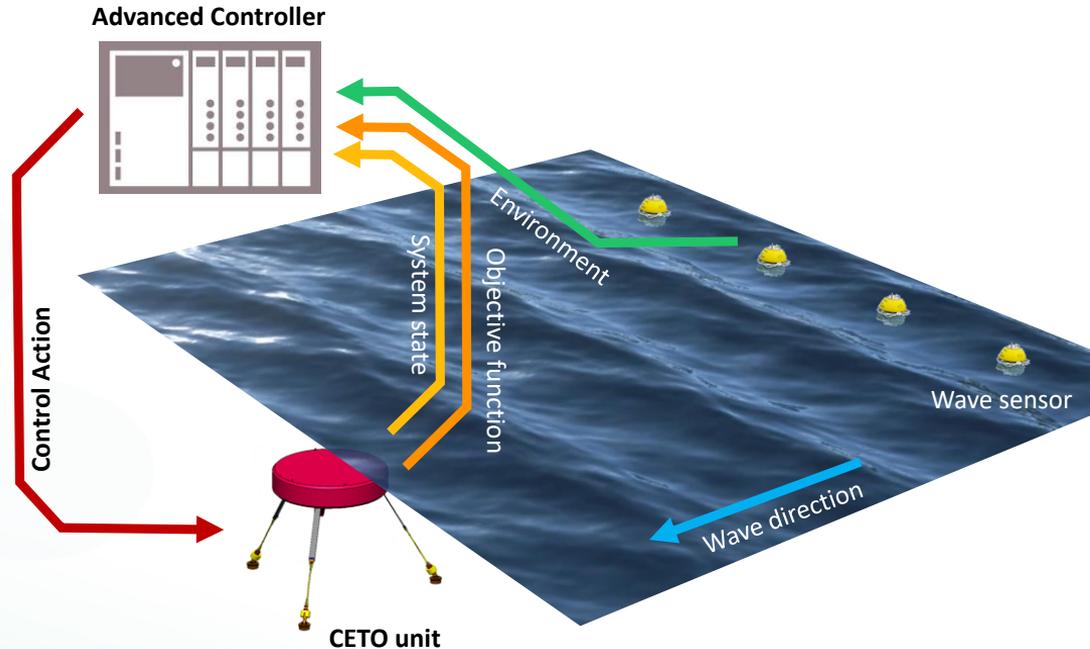
- Point Absorber
- Axisymmetric
- Submerged
- Multi-moored
- Scalable
- Adapts to various depths
- Optimised for lowest LCOE
- Survivability



# CETO Technology – Key Innovations

## Advanced Controller

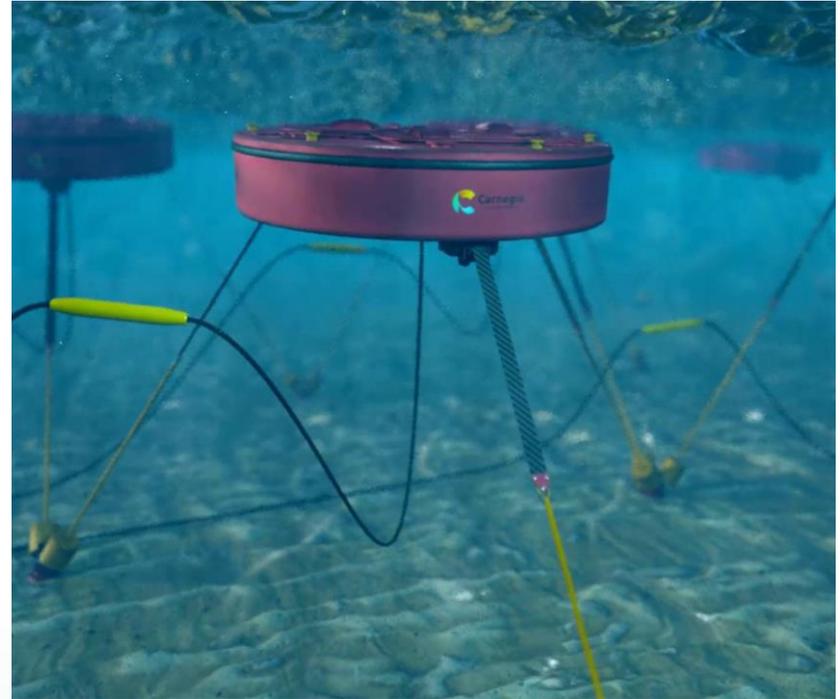
- Reinforcement Learning (RL) and Model Predictive Control (MPC) developed for CETO
- Includes wave predictor developed by Carnegie and tested at IHC
- Yield >20% compared to passive controller
- Controller to be physically tested during Phase 2 tank campaign



# CETO Technology – Key Innovations

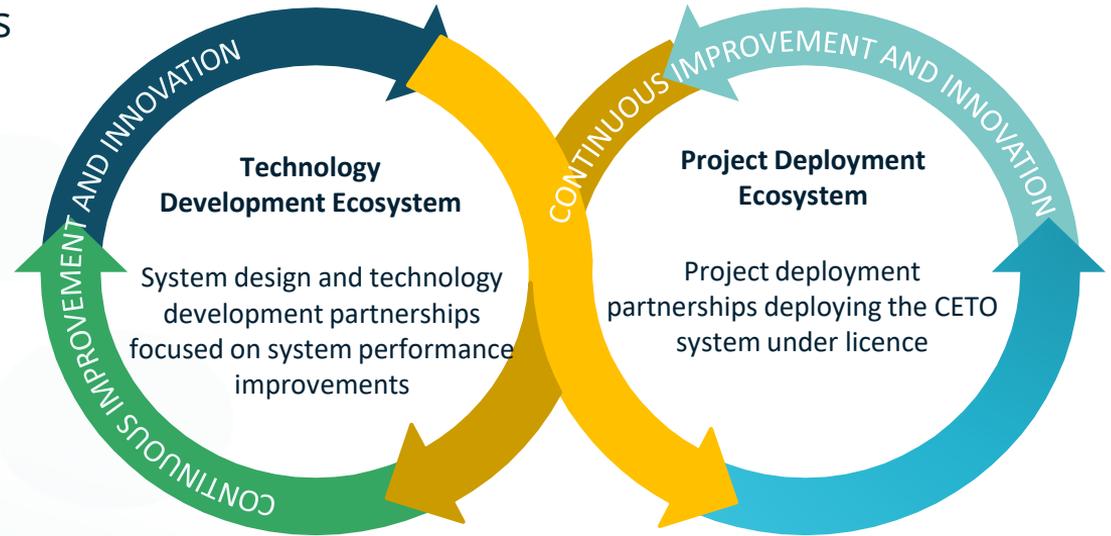
## Rotary Electric PTO

- Belt wraps on a drum driving mooring tensioner and electrical drive train
- Allows direct control of the force applied in each mooring enabling advanced controllers
- Offers direct energy conversion, leading to excellent efficiencies
- Simpler system with low part count for improved reliability
- Benefits from cost reductions achieved for electrical drive trains in other industries (offshore wind, EVs)
- Can easily accommodate large motions avoiding to design for end of stroke loads



# Long term vision

- CETO Prototype deployment unlocks roll out of CETO projects
- GWs of global CETO commercial deployments
- CETO deployed by partners under license/supply agreements
- Positioned as Technology Provider with strategic partners
- Wave energy is major contributor to clean energy



# CETO technology is scalable and deployable in multiple markets



## Remote & Islands

- High electricity tariff
- High carbon (diesel) intensity and hard to abate
- Potential value for additional benefits
- Limited space/land availability
- Hybrid systems



## Demand Applications

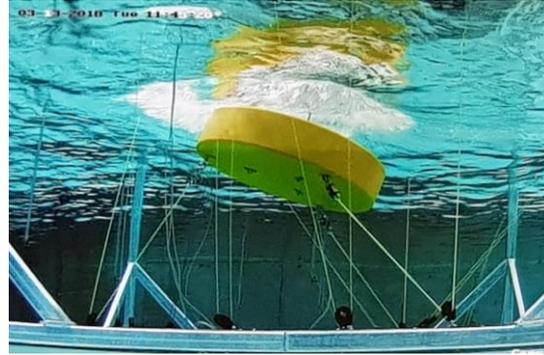


## Utility Scale

- Low electricity tariff
- High competition
- Enormous market size

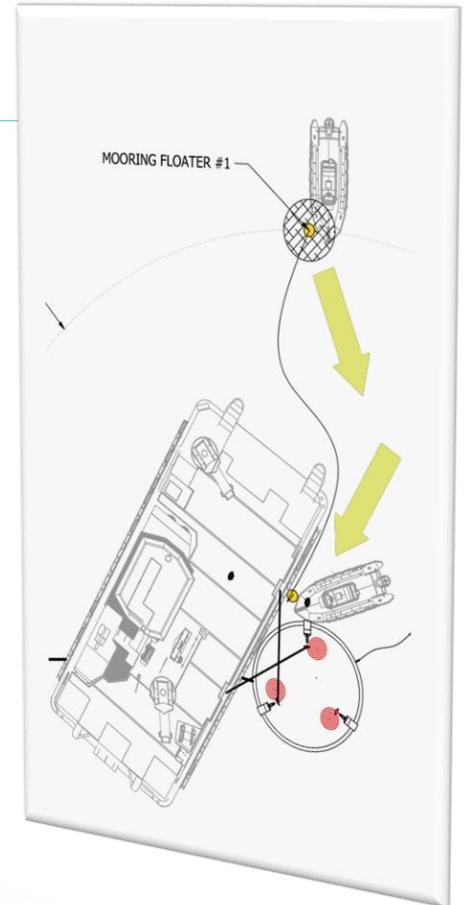
# Driving factors to participate in EW

- Programme and company objectives aligned
- Competitive format and management by industry recognised experts (buyers group) provides credibility
- Opportunity to deploy at world renowned site



# Phase 1 Achievements

- Solid project base established with a thorough **Basis of Design**
- **System Architecture** suitable for **BiMEP** and **EMEC**
- Unique **Survival Strategy**, solving fundamental WEC challenge – peak : average
- **Validated Numerical Models** used to confirm **Performance**
- Excellent progress on **Components Design**, supplier engagement ramping up in phase 2
- Clear **O&M plans** based on extensive operational expertise
- **System Engineering** and Project management best practices endorsed by **Classification Society**
- Financial modelling showing a clear path toward **Commercialisation**





# Ambition for Phase 3 deployment

- Deploy and operate CETO safely for 12 months
- Validate CETO performance and reliability
- Prove untapped improvement delivered by the advanced controller
- Verify survival strategies
- Demonstrate efficient recovery and maintenance procedures
- Attract future project partners
- Pave the way for commercial roll-out





EUROPEWAVE

 [www.europewave.eu](http://www.europewave.eu)

 [@Europewave\\_EU](https://twitter.com/Europewave_EU)

 [info@europewave.eu](mailto:info@europewave.eu)



This project has received funding from the European Union's Horizon 2020 research and Innovation programme under grant agreement 883751.

 [www.europewave.eu](http://www.europewave.eu)

 [@Europewave\\_EU](https://twitter.com/Europewave_EU)

 [info@europewave.eu](mailto:info@europewave.eu)