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ETIP Ocean Webinar

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2025

We are unlocking the vast power of the ocean

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Carnegie is a global leader in wave energy technology. We are committed to harnessing the power of the ocean.

Our **MoorPower** and **CETO** technologies is ready to change the world.

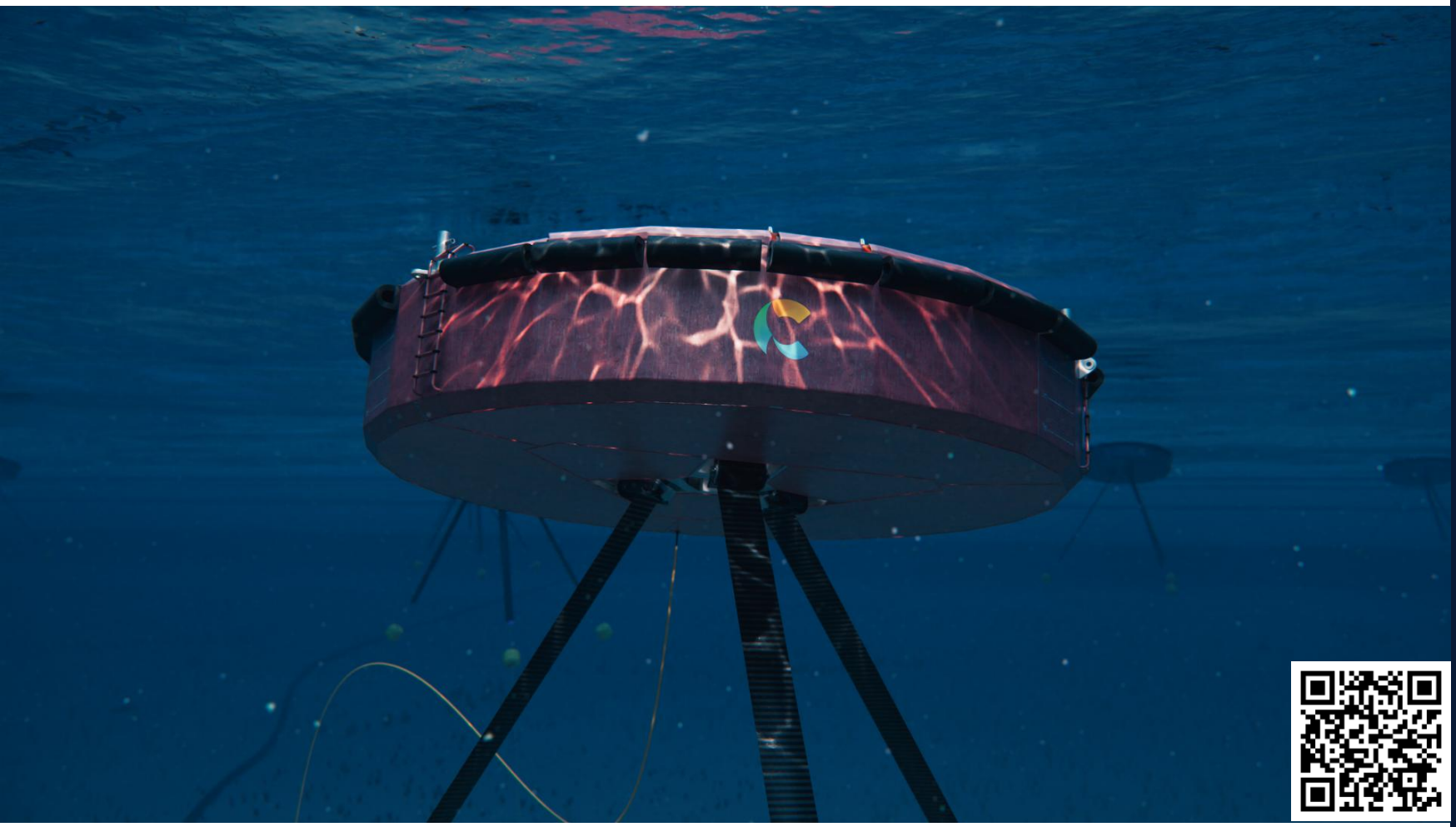
Our global challenge is to deliver a transition to clean energy with the ability meet future demand for sustainable, reliable and affordable energy.

Wave energy is unique. Unlocking its potential will change the world.

It is a source of renewable energy that is consistent and predictable.

Wave energy produces zero emissions and can provide 24/7 power at scale. It’s the world largest battery

CETO – Harnessing Ocean Waves



Our core technology is unique and avoids known issues

- Water in waves move in an orbit. The buoy is forced to move in the same motion

- This kinetic energy is transformed by the three Power Take-Offs within the buoy

- CETO operates fully submerged, avoiding issues of visual amenity and damaging forces from breaking storm waves

- Artificial intelligence helps us capture more by adapting to every individual wave that passes

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MoorPower

- Aquaculture
- Defence surveillance
- Environmental monitoring
- Oil and gas operations

Foundations

Unique set of requirements

- Tight mooring arrangement
- Inclined loading but close to vertical
- Highly cyclic loading:
  - About 4 millions per year
  - Stress ratio R close to 0

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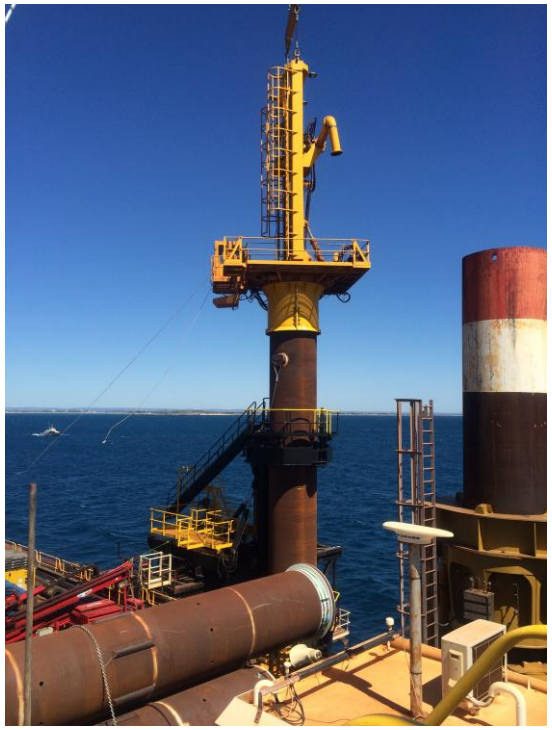
Foundations

Previous experience

- Installation of 3 foundations for PWEP
- Soil: ~5 m sand over calcarenite
- Mono-piles
- Drilled and grouted
- Installed with Jack-up rig

▶ Expensive, Water depth limitation, Environmental impact, Geotechnical risk.



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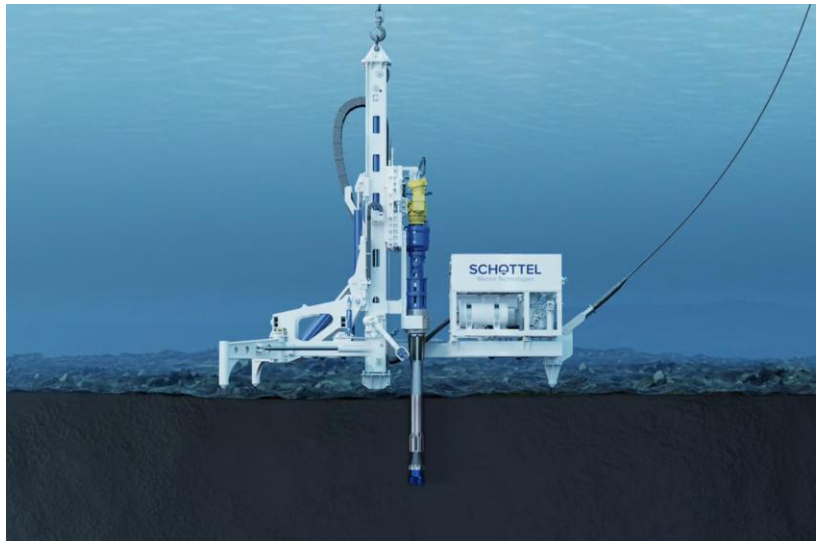
Foundations

Recent Alternatives

- Helical piles for sand, silt and clay
- Rock anchors
- Benefits:
  - Recoverable
  - Smaller installation vessel
  - Minimal seabed disturbance
  - Reduced cost of anchor & installation

Hybrid caisson/helical pile from Triton Anchor

Rock anchor (top) and subsea installation rig (bottom) from Schottel Marine Technologies



Moorings

- Return to base O&M strategy
- PTO module hot swap

▶ Need a quick and efficient mooring connector

- Requirements:
  - Cyclic loading
  - Remotely triggered active release under load
  - Overload release
  - Combine electrical connection

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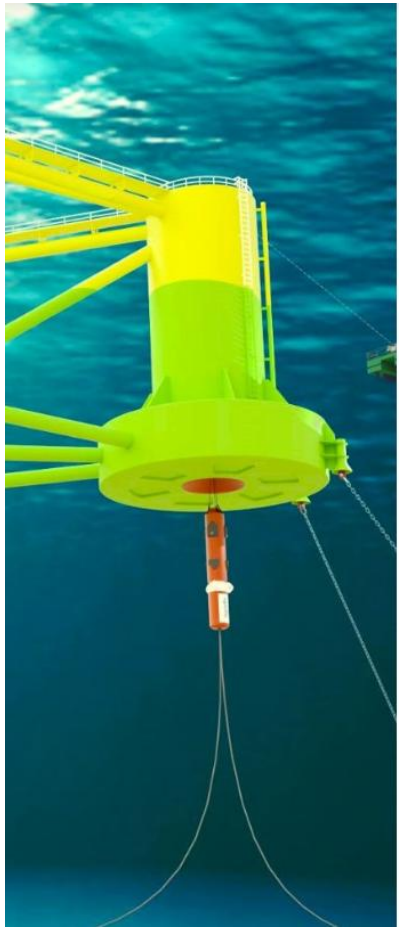
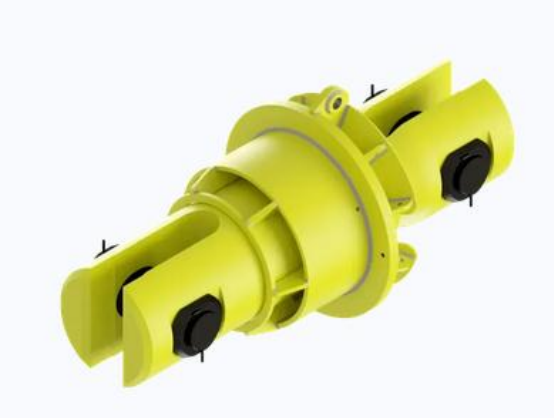
Mooring Connectors

- Development to date driven by O&G, Offshore Wind and EU funding calls (WES quick connection systems)
- Few companies have developed MC, some have been used offshore.
- Combining all requirements is challenging and requires bespoke development.
- Applied to Horizon Europe Critical Technologies call to progress development of MCs.



PALM connector from Apollo Engineering

Q-connect from Quoceant



MoorLOCK from Balltec

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EUROPEWAVE

RENOVABLES MARINAS DEMOSTRADORES

Funded by the European Union NextGenerationEU

MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO

IDAE

Plan de Recuperación, Transformación y Resiliencia

Thank you!

EUSKO JAURLARITZA
GOBIERNO VASCO

ENERGIAREN EUSKAL ERAKUNDEA
ENTE VASCO DE LA ENERGÍA

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