Tidal Energy
History, Challenges and Opportunities

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Business Development Lead for Energy
8th November 2024

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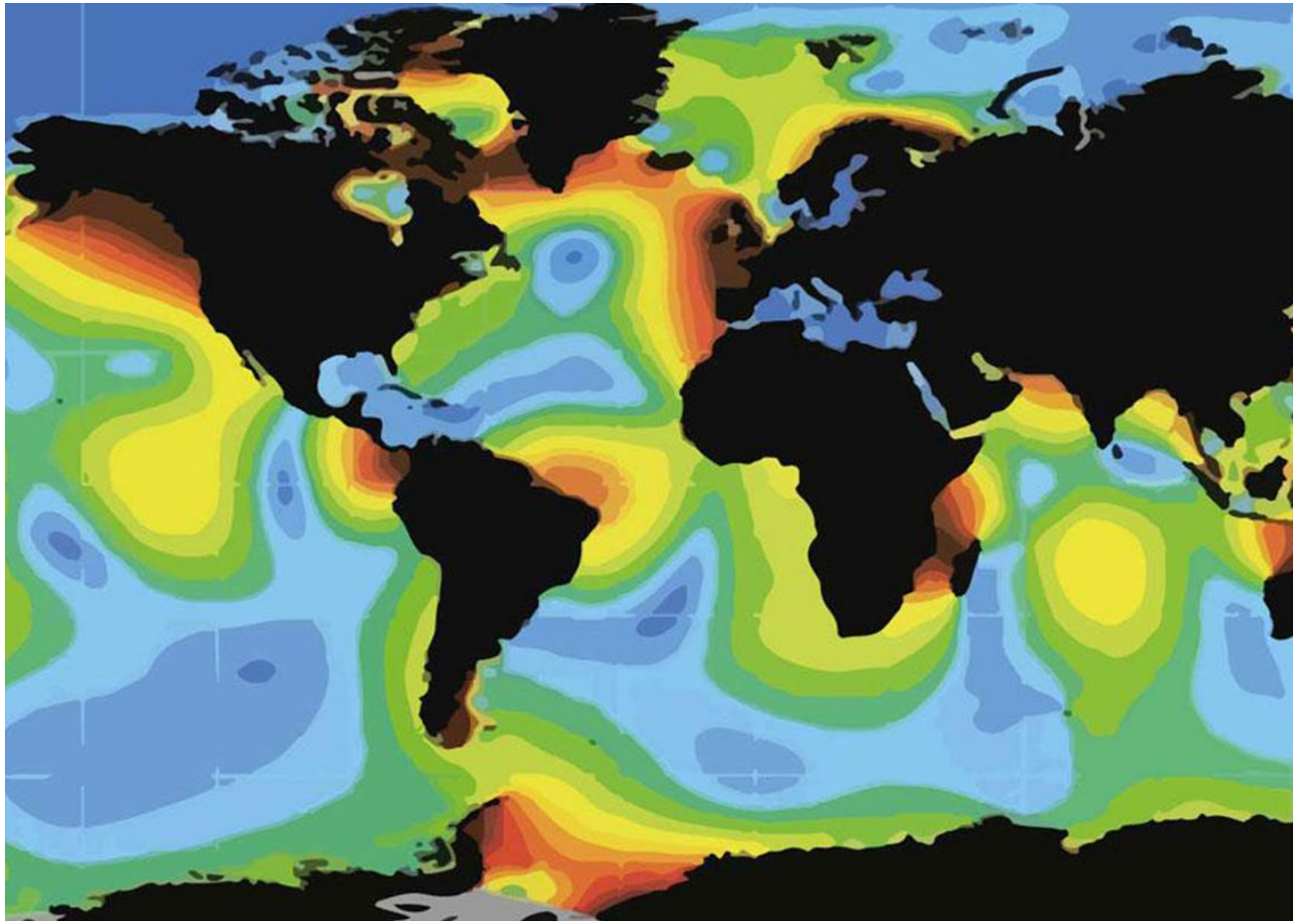
Agenda

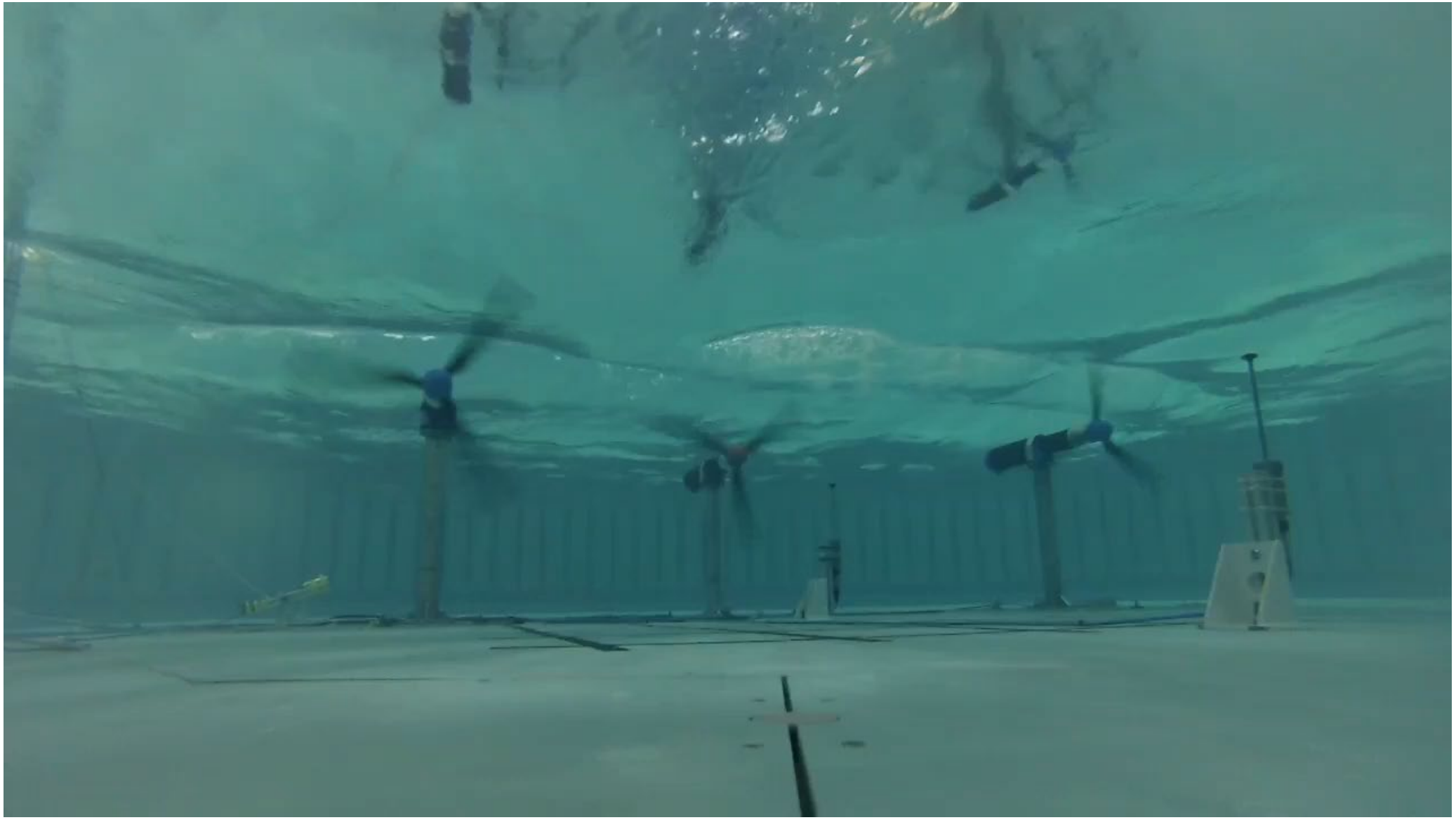
- Tidal Energy Resource
- Tidal Energy Technology
- Future challenges and opportunities
- Tidal Energy Research at The University of Edinburgh

World Ocean Energy Resource

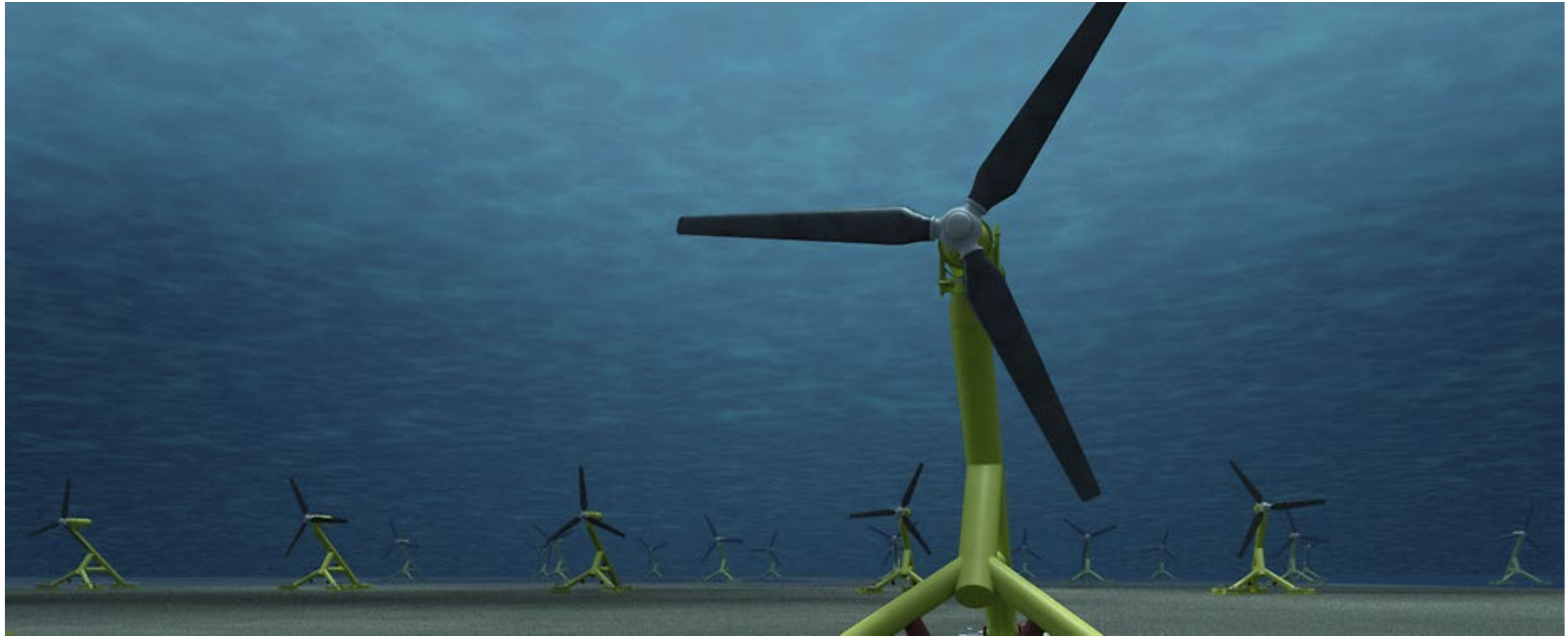
- Resource of 100TWh
- Potential 300GW of ocean energy projects by 2050
- Small number of High Capacity Utility scales sites i.e. Bay of Fundy & Pentland Firth
- Numerous smaller community scale sites



Tidal Energy



Tidal Energy



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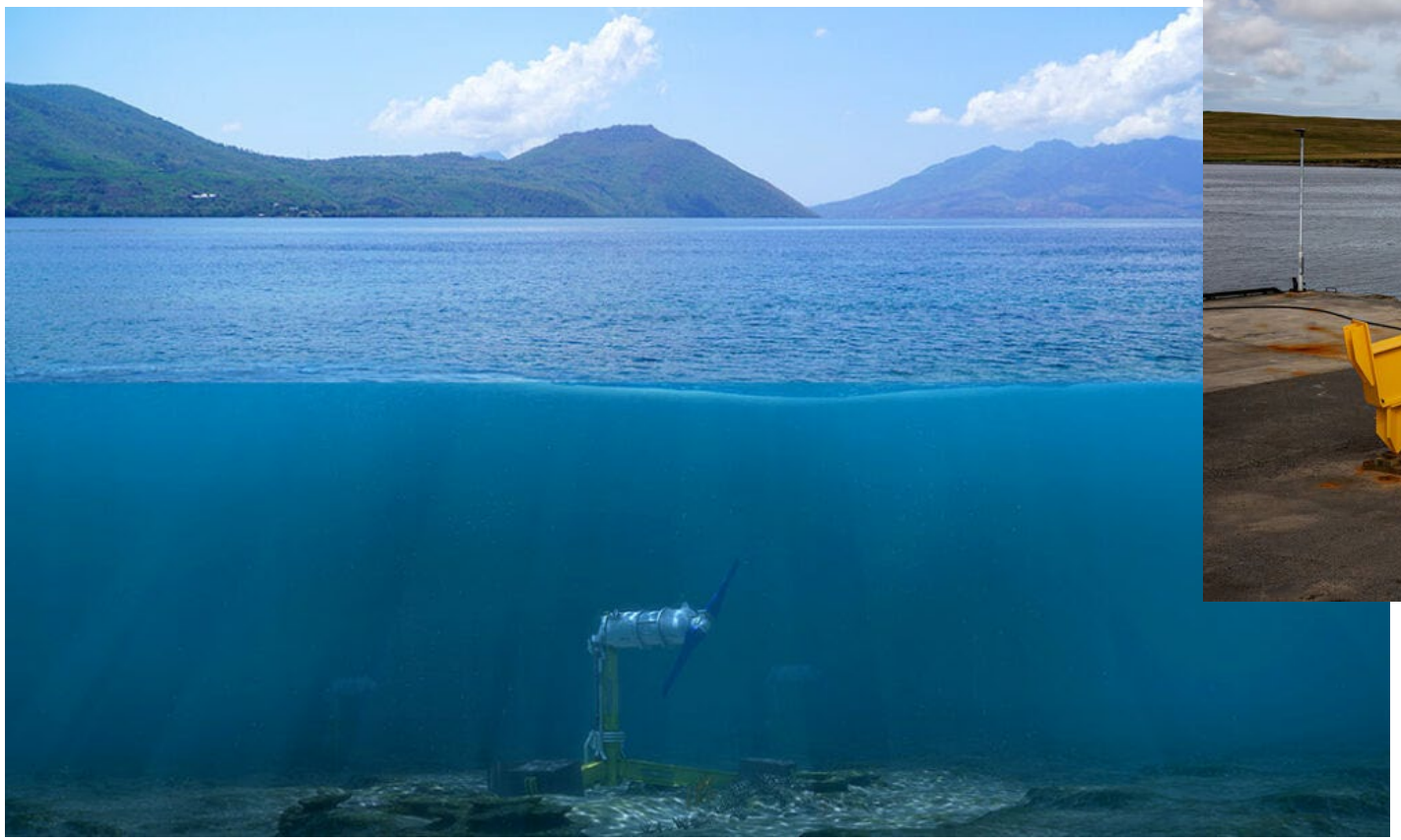
Tidal Turbines – Seabed mounted



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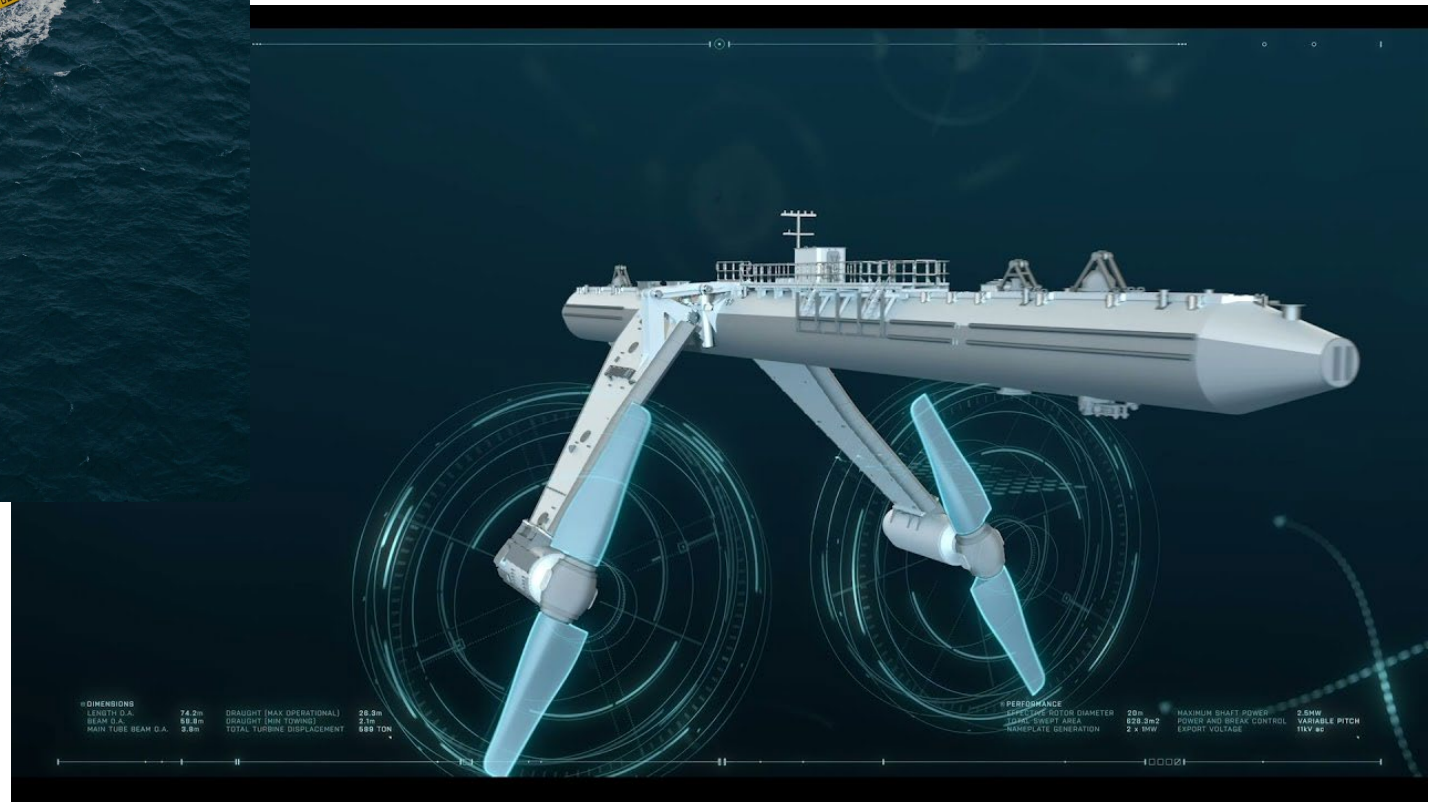
Tidal Turbines - Floating



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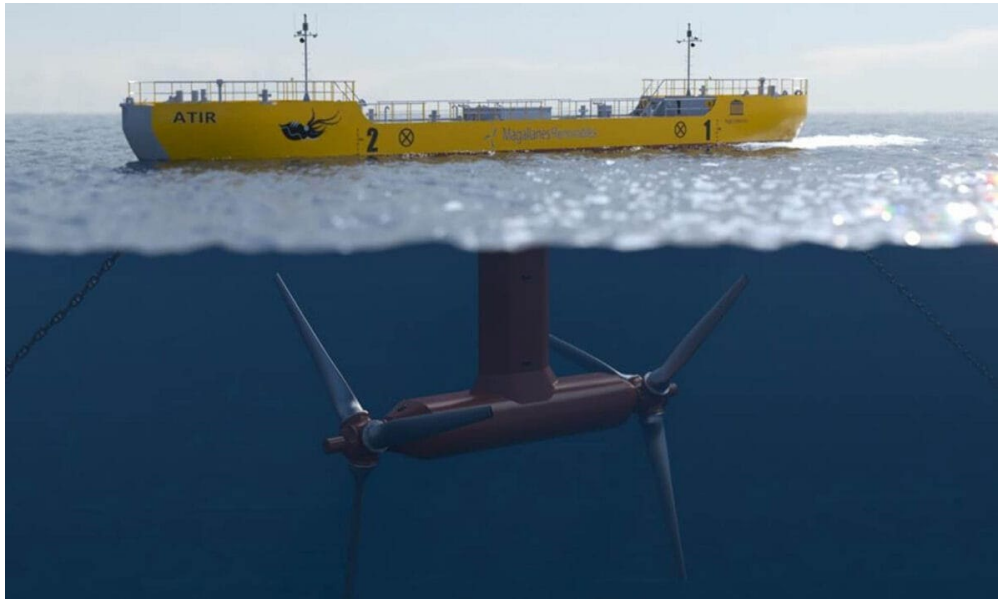
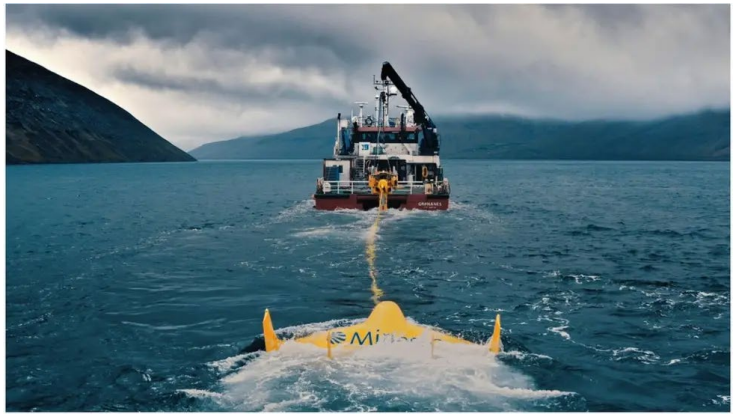
Tidal Devices





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Nova Innovation – World's First Tidal Array 2016

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Orbital Marine Power – World' most powerful tidal turbine

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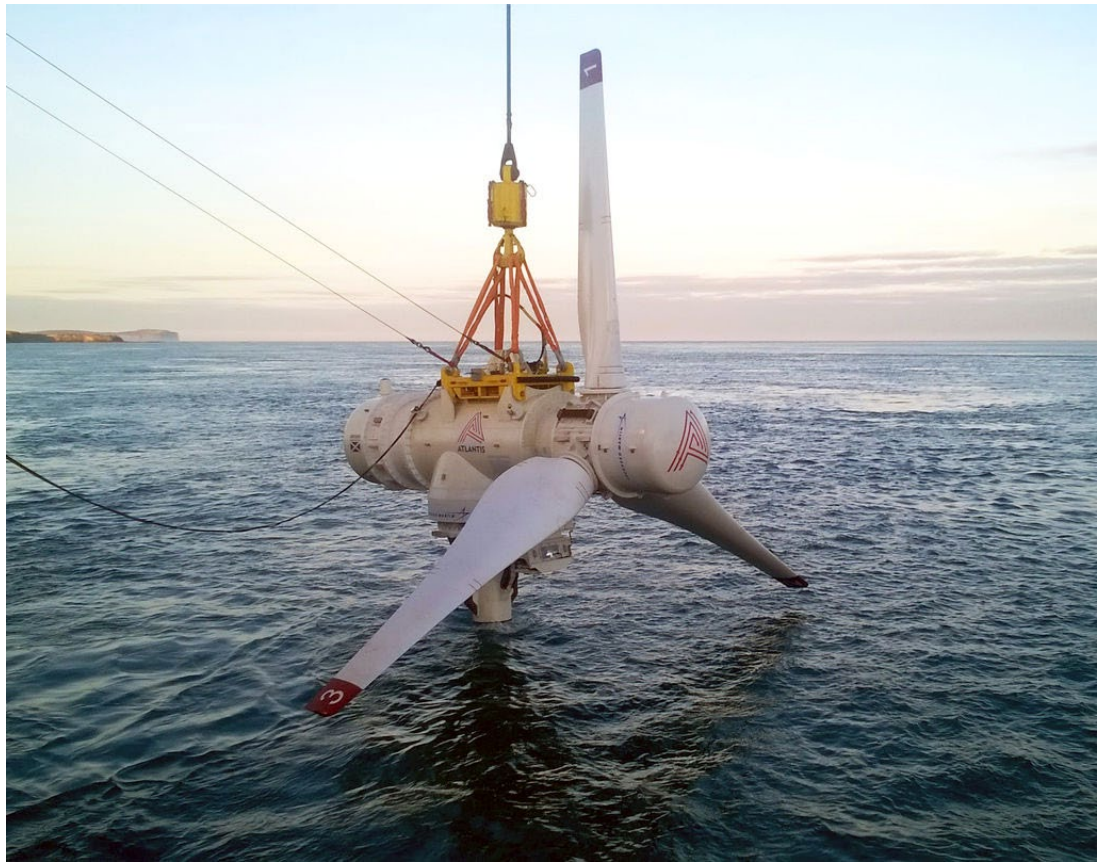
Meygen – World's Largest Tidal Array



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Benefits

Installed Capacity (GW)

Direct Jobs

Investment in 2050 year/Gross Value Added (GVA US$)

Carbon Savings (Tonnes of CO2)

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Tidal Energy Future Growth

Tidal Energy Installed Capacity (2024)

12 MW

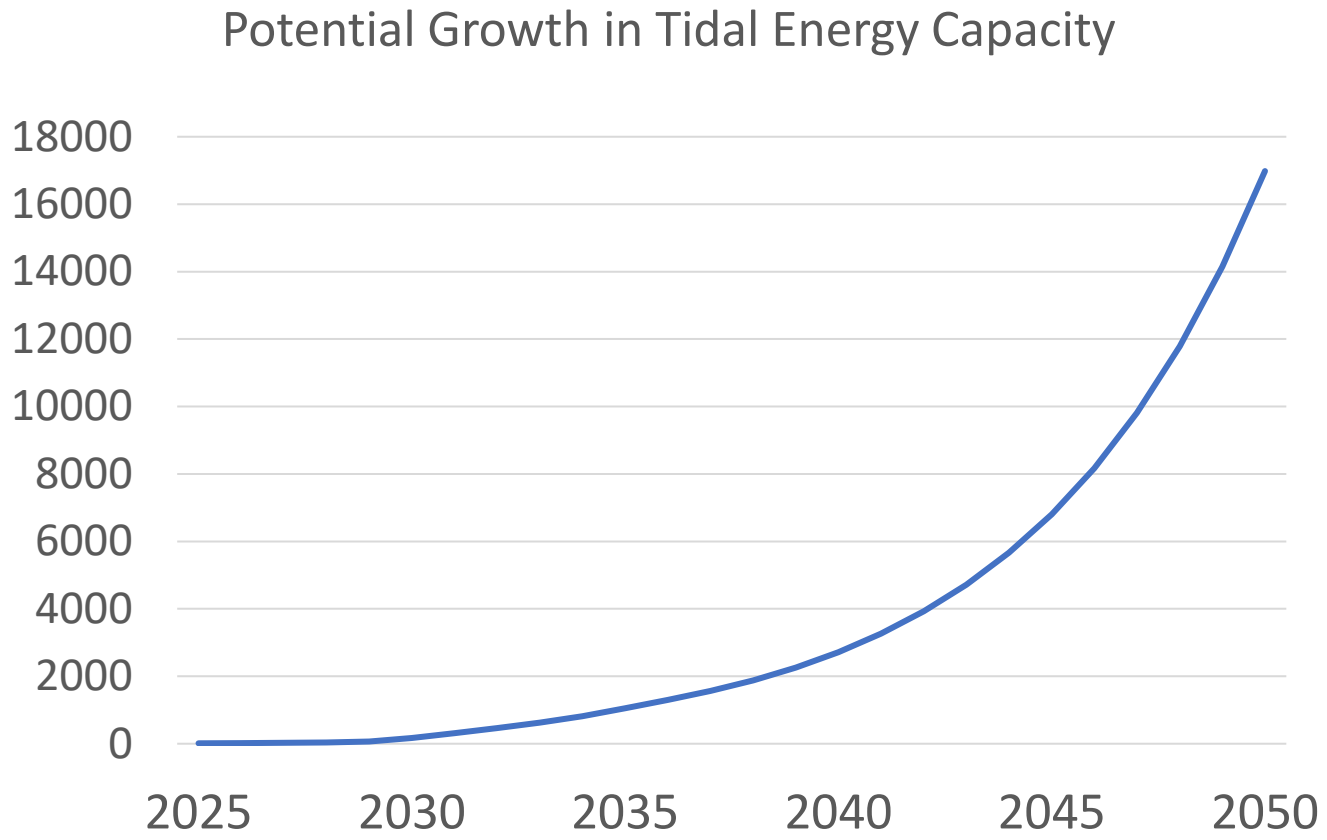
12 Devices

Tidal Energy received UK Government CFD due for installation 2027 – 2030

(£182 per MW average price)

122 MW

94 Devices



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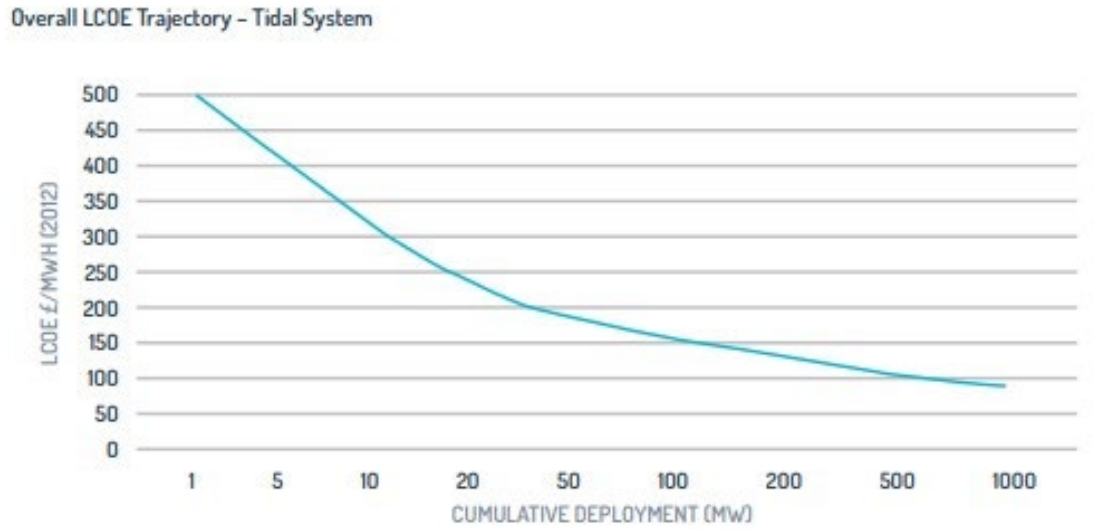
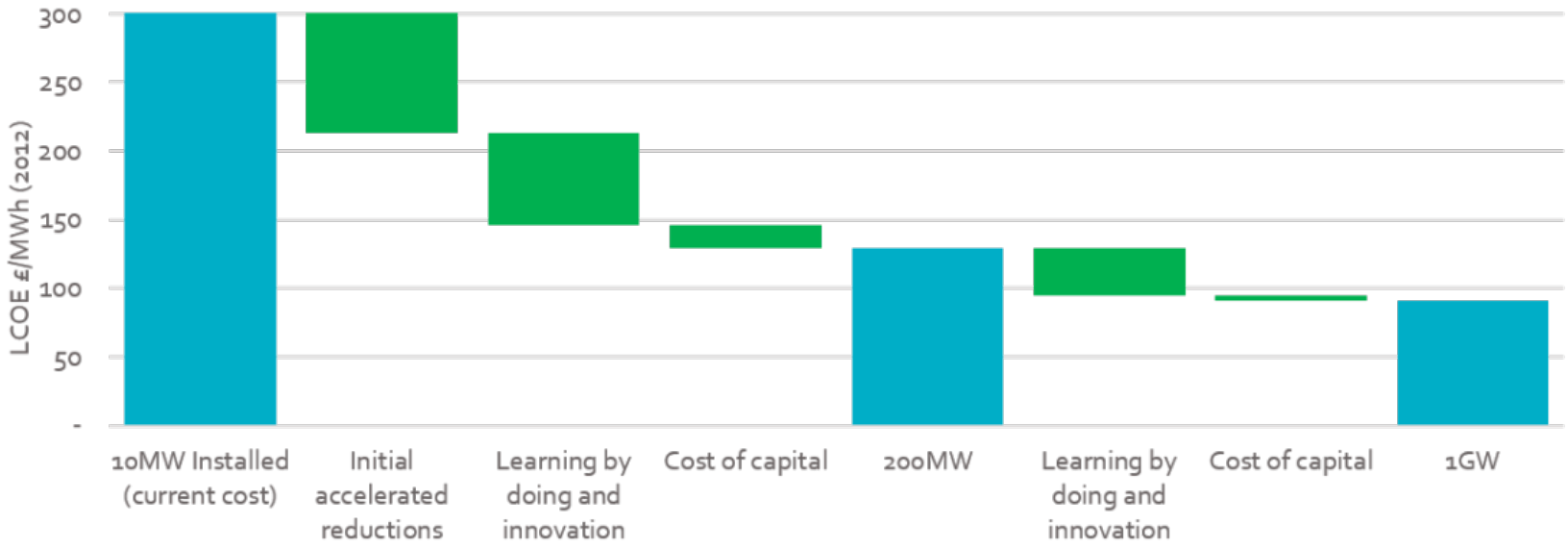
Tidal Energy Cost Reduction Pathway





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Challenges and Opportunities – Ocean Energy

Challenges :

- Manufacturability
- Operationability
- Reliability
- Affordability
- Next generation innovation

Opportunity to develop a manufacturing base for tidal devices, exporting devices globally. Manufacturing technology including; blades, nacelles, generator, power electronics, etc.

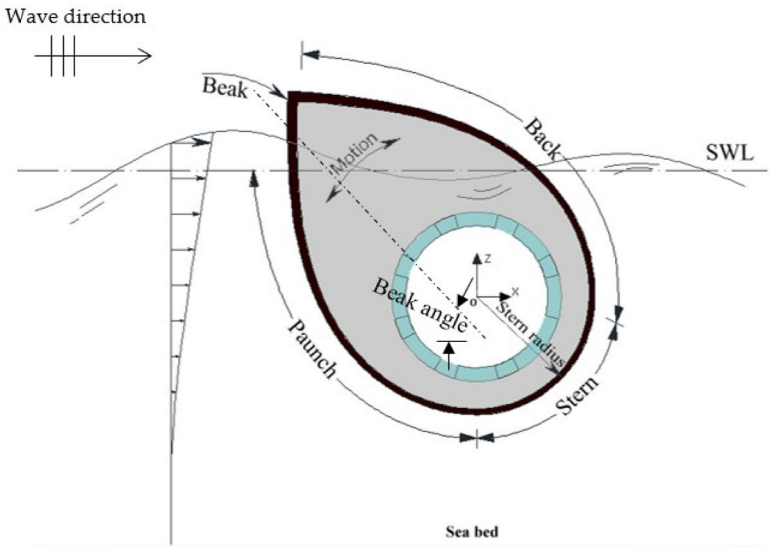
Development of world class O&M sector

Use of Tidal Power for local communities including system integration, batteries for base load and EV points

Scotland – the home of Ocean Energy

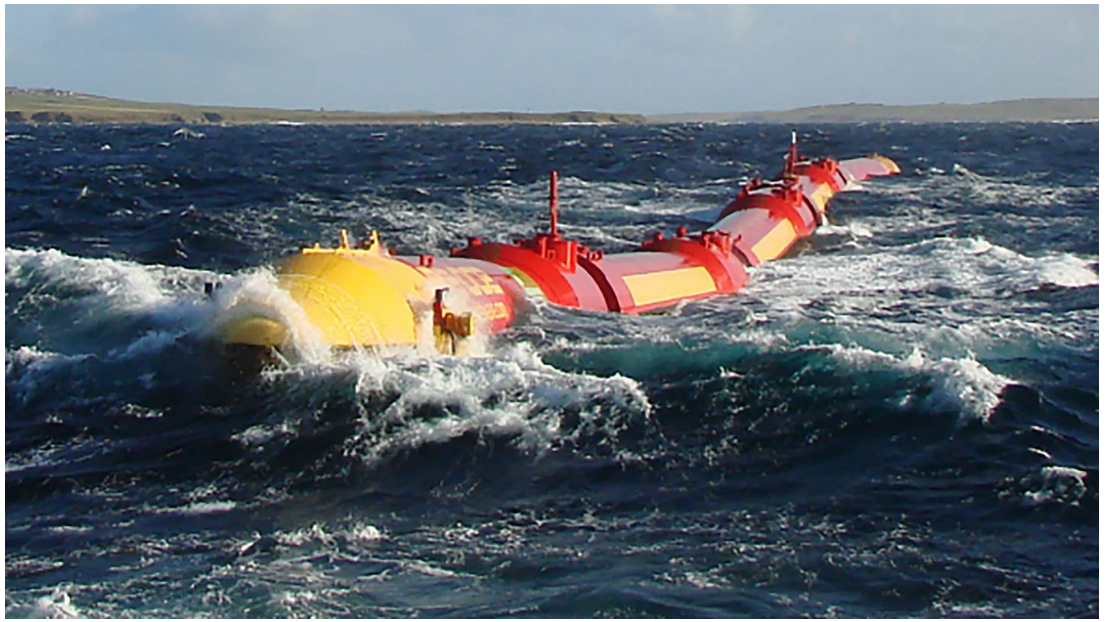
- Building on the pioneers of the industry, Scotland is home to world leading wave and tidal developers, in the process of commercialisation
- Scotland has world class research and commercialisation infrastructure including;
  - Various academic institutes
  - Offshore Renewable Energy Catapult
  - EMEC (European Marine Energy Centre)
- Scotland has a growing world class skills base and teaching capacity
- Scotland is exporting technology and skills worldwide

Scotland and The University of Edinburgh
Pioneers in Ocean Energy



Salter's Duck (1970s)

Wave power device, developed by Stephen Salter at The University of Edinburgh that converts wave power into electricity, with a potential efficiency of up to 90%.



Pelamis (1990s)

Work developing the first commercial scale, offshore, wave power machine to successfully generate electricity into the national grid

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Future research

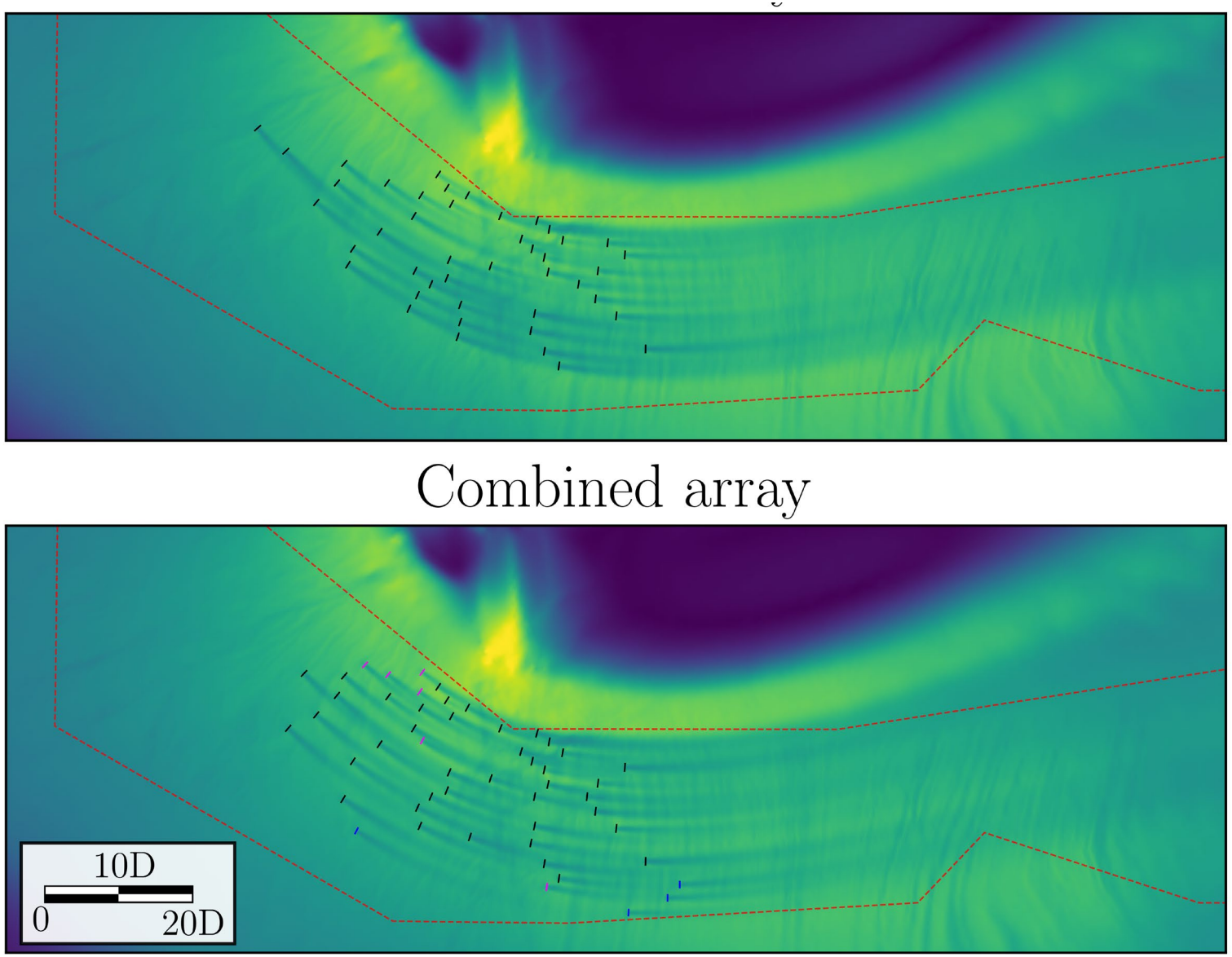
- Technical Innovation

- Array Design

- Ocean Digital Twin

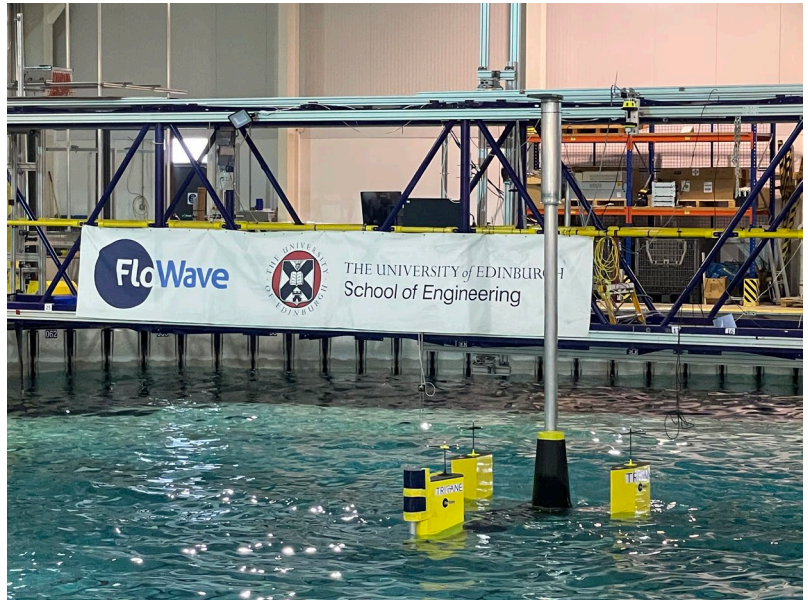
- Commercial Advice

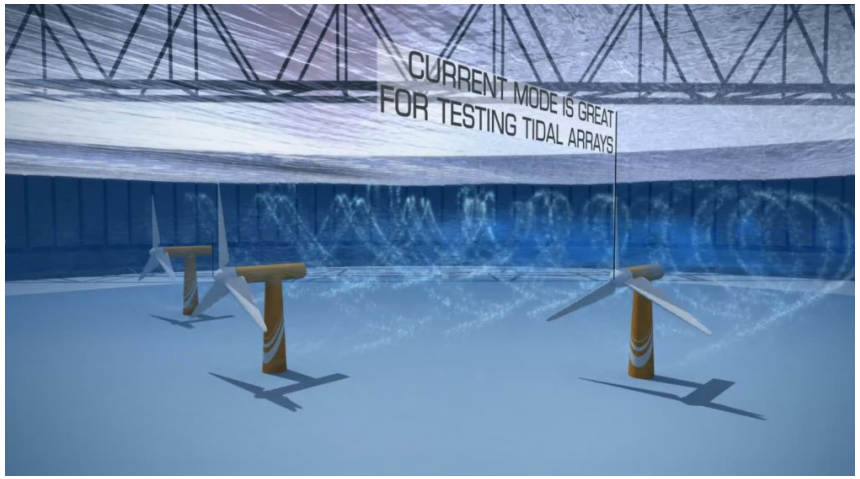
- Policy Advice



FloWave

Conceived for cutting edge academic research into wave and tidal current interactions, the FloWave Facility is also an amazing tool for developers to ensure their technologies and projects perform 'right first time' and are de-risked as much as practical before cutting steel or going offshore.





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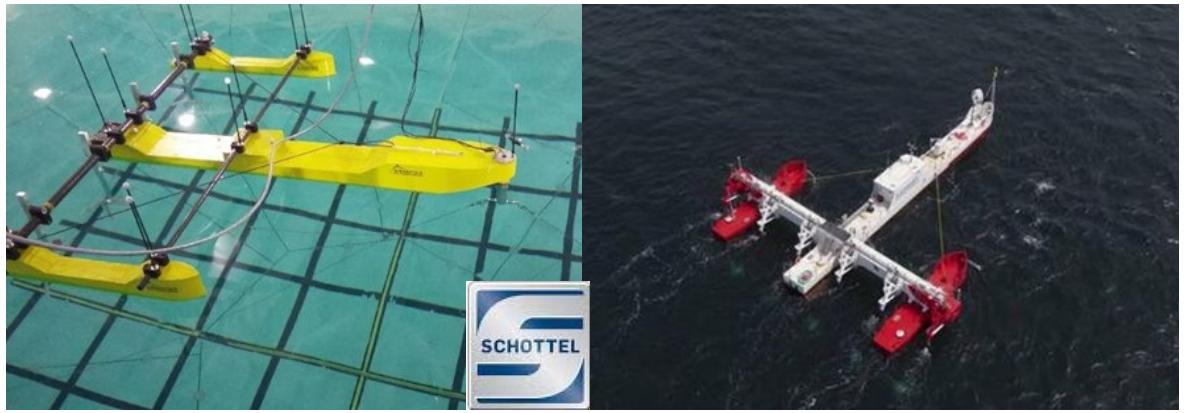

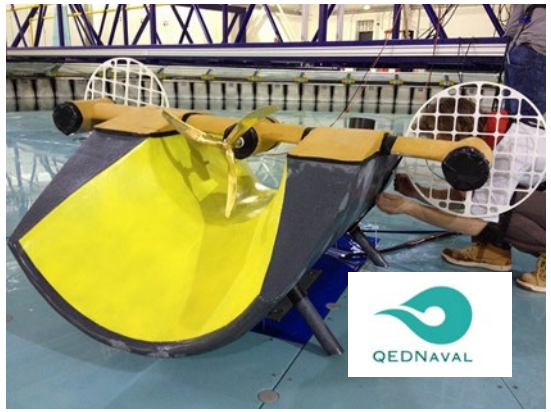

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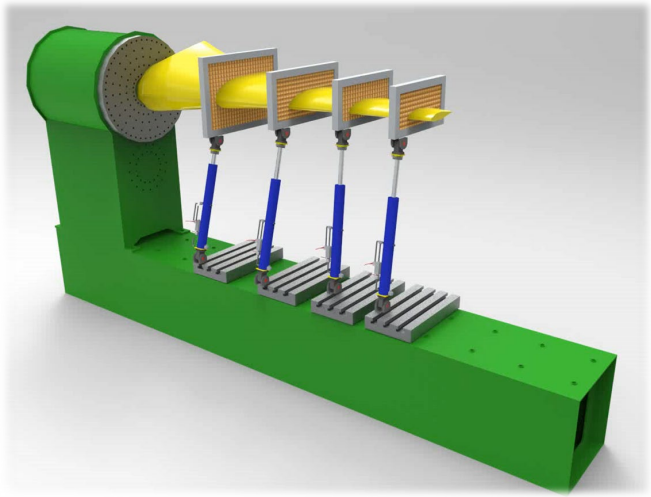
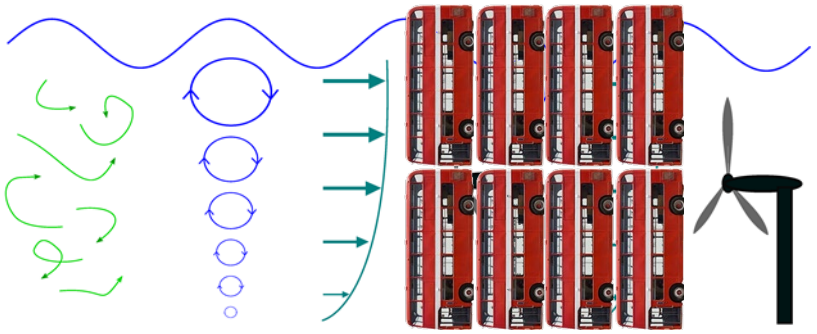
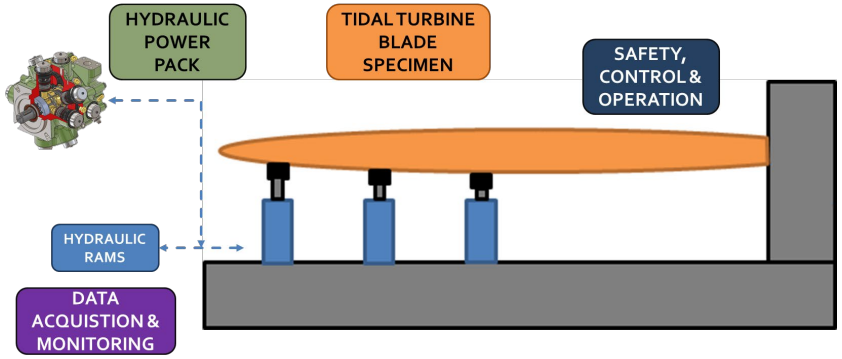
FASTBLADE Structural Composites Research Facility

An innovative structural composites test facility
funded by the EPSRC for FULL scale fatigue testing of:

- TIDAL BLADES
- Marine & Defence Structures
- Aircraft wing boxes
- Stiff and slender structures







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Our Wind Energy Experience & Expertise: computation

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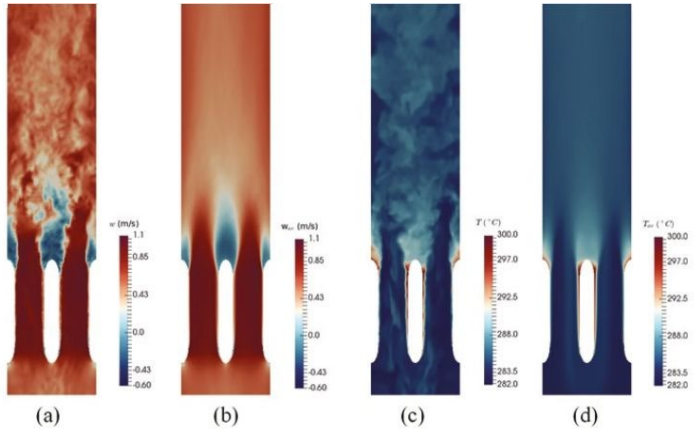

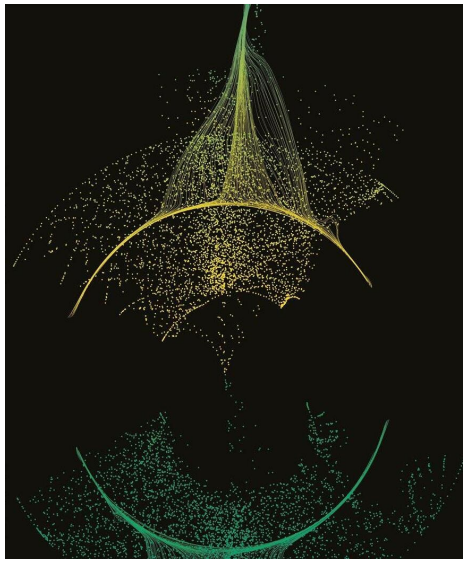

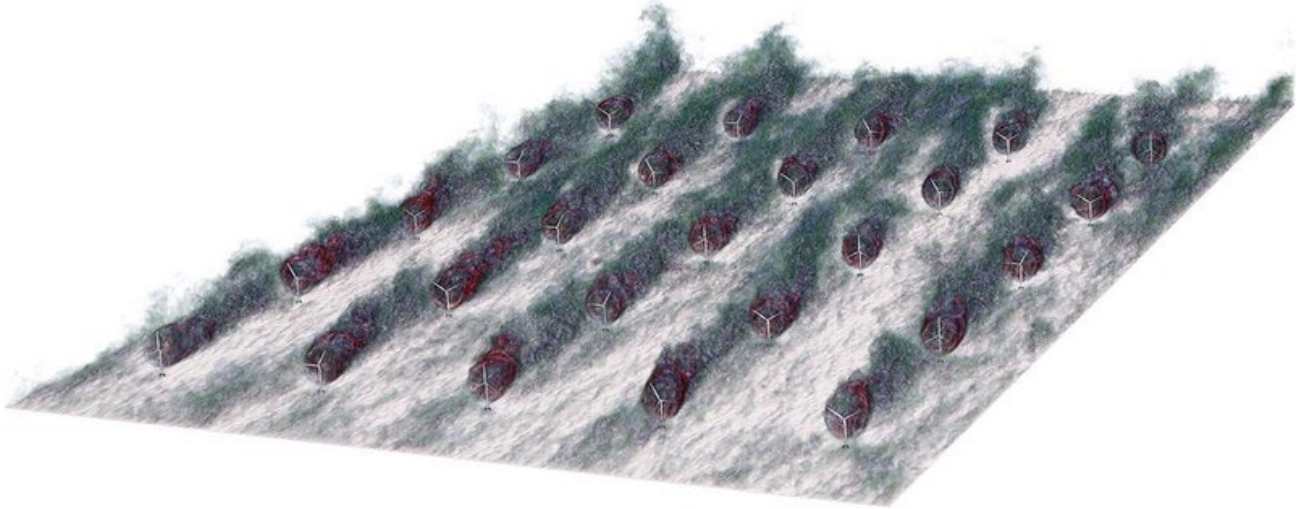

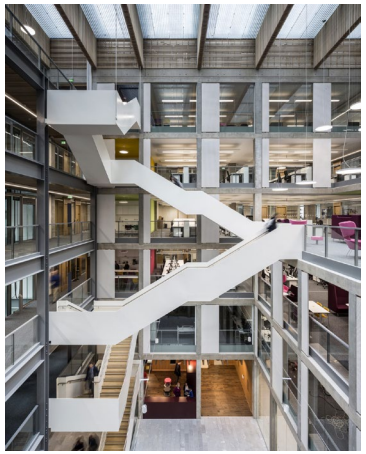

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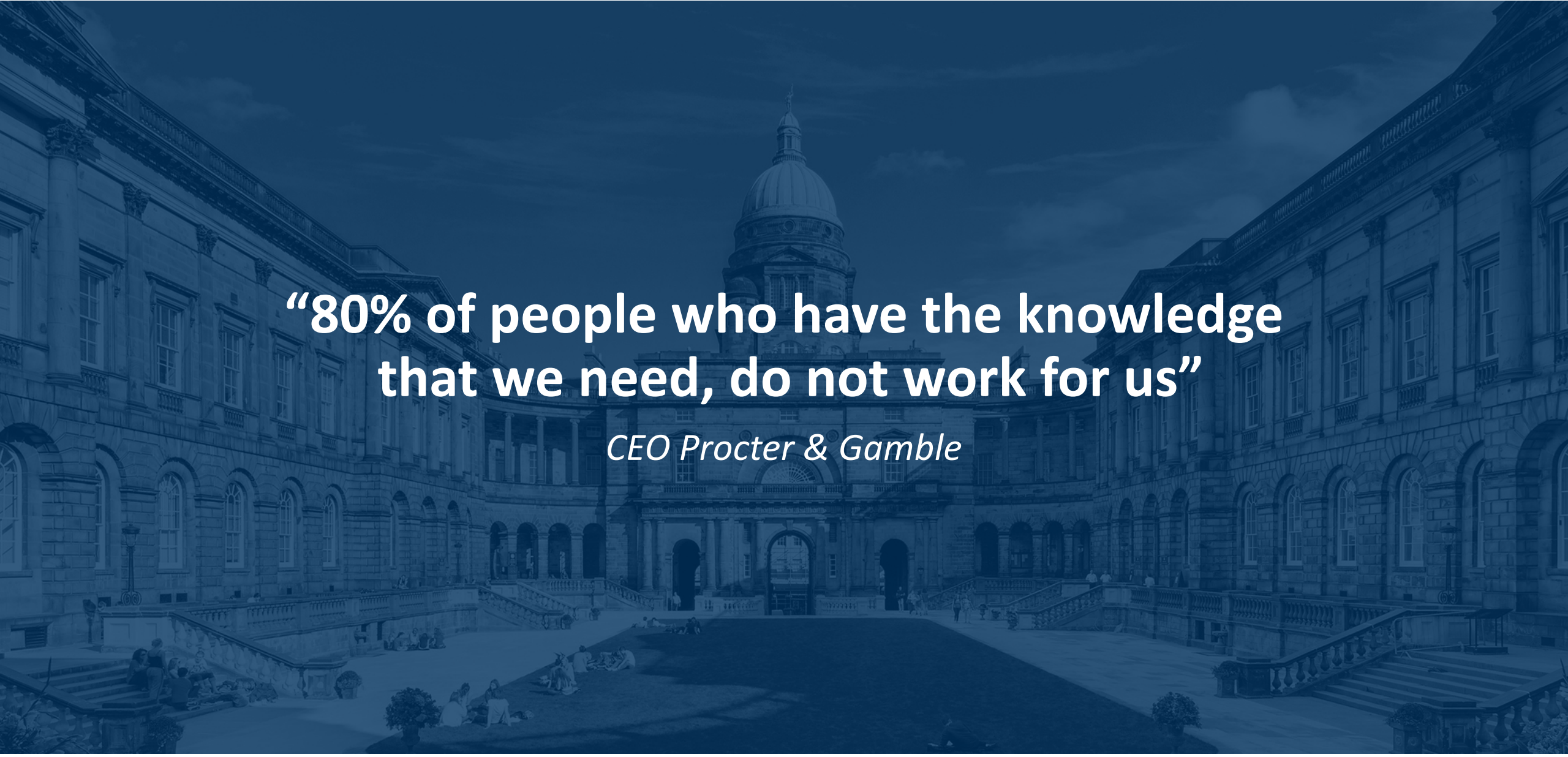

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Ways to engage with the University

- Help set a industry focused MSc project
- Fund / co-fund PhD or EngD projects
- Fund Industry Research
- Collaborative Project

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Business Development Lead for Energy

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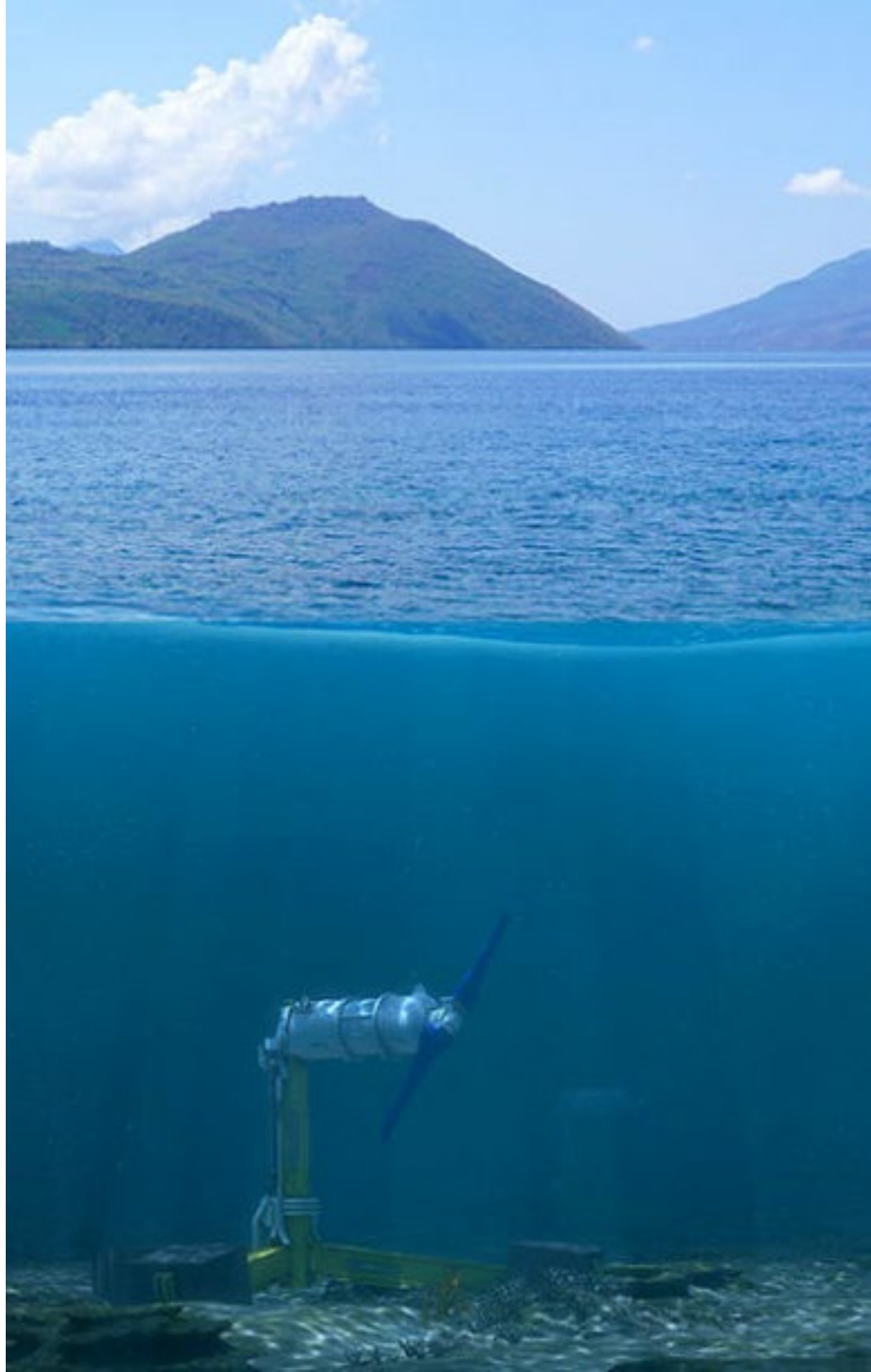

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