



FORESEA Success Stories



Introduction

FORESEA (Funding Ocean Renewable Energy through Strategic European Action) is an €11m Interreg North West Europe project. It helps bring offshore renewable energy technologies to the market by providing free access to North West Europe's world-leading network of test centres.

Offshore renewable energy will be instrumental in achieving a carbon-free energy system, and Europe is currently leading the world in developing those technologies. Transforming this technological lead into a new industrial sector will benefit Europe both locally by bringing growth to coastal regions, and globally with major export opportunities.

Since its launch in 2016, FORESEA has dramatically speeded up access to market for a significant number of innovative offshore renewable energy technologies. To this day, FORESEA has provided free access to real-sea test sites to 12 different developers, with 15 more to come before the project ends in December 2019.

This brochure will present 7 success stories from 7 technology developers that benefited from FORESEA's support. Thanks to FORESEA, they were able to prove their technologies, improve their Technology Readiness Level* (TRL) and leverage millions of euros of private investment.

*Technology Readiness Level is a method of estimating technology maturity on a scale from 1 to 9



CorPower Ocean

rWEC project



Project length

9 months

Completed



Technology Readiness Level

TRL 4 to TRL 6



Leveraged

€11.9m + €13m

expected short term

Main achievements

CorPower Ocean's C3 half-scale wave device was installed at EMEC in January 2018 and has demonstrated both its survivability and reliability. The device was connected to EMEC's floating microgrid, enabling it to behave as if it were grid connected. It weathered heavy storms with waves up to 4m and consistently exceeded expectations in terms of electricity production.

The testing campaign also provided key learnings for installation and disconnection operations, logistics, maintenance and control systems.

Next steps

CorPower Ocean's C4 full scale prototype is currently being designed. Learnings from the FORESEA testing campaign will help CorPower design, manufacture and operate a more reliable and cost-effective wave energy device in the future.

Following the completion of the testing period at EMEC, CorPower also received strong customer interest for wave energy. In addition to securing a contract with an oil and gas company, they were contacted by two major utilities developing offshore wind farms to explore the potential of combining wind and wave.

GEPS Techno

IHES project



Project length

18 months

Ongoing



Technology Readiness Level

TRL 5 to TRL 7



Leveraged

€4.7m

Main achievements

GEPS Techno's WAVEGEM is a mid-size marine platform that produces its own energy from the swell and the sun.

WAVEGEM, developed in a collaborative project called IHES, was installed at SEM-REV in August 2019. The installation operations and first months of activity already validated the mooring and hook-up process as well as the production of the power system.

Next steps

GEPS Techno, bolstered by the experience gained with the prototypes installed in Brest have decided to run trials in 2 successive phases. Phase 1 consists of sea preliminary trial of the platform, where all equipment and functions are tested and confirmed in real sea conditions.

Phase 2 is a crucial stage of the project, since it is through these results that the platform will be qualified to access to the commercial stage. Both the technical and financial development strategies will reflect the results from the testing campaign. For instance, testing will enable to validate the cost estimated for construction, transport, and installation phases.



Project length

24 months

Ongoing



Technology Readiness Level

TRL 5 to TRL 7



Leveraged

€25.5m

Main achievements

Ideol's Floatgen floating offshore wind turbine is the first offshore wind turbine installed off the French coast. It was safely towed and moored at the SEM-REV test site in April 2018 and started providing electricity to the grid in September 2018. The turbine was then tested during October and November, and the production was increased until it reached the power generation level planned for December/January.

The testing campaign is still ongoing, but the floater already survived strong waves during the Autumn. Power production, survivability and environmental impact are closely monitored at every step of the way. Additional environmental impact surveys will be carried out every 3 months.

Next steps

Ideol already signed a contract with Acacia Renewables (formerly RES Japan) to develop the first commercial floating wind farm in Japan. The construction is planned for 2023.

Nautricity

CoRMaT project



Project length

12 months
Completed



Technology Readiness Level

TRL 7 to TRL 8



Leveraged

€1m

Main achievements

Nautricity's Contra-Rotating Marine Turbine (CoRMaT) was successfully installed at EMEC's full scale tidal test site in April 2017. The CoRMaT tidal turbine was subjected to some of the harshest tidal conditions in the world which enabled important learning on the survivability and performance of the device's subsystems and components.

This testing campaign allowed Nautricity to analyse the robustness and reliability of the CoRMaT technology and its various innovative subcomponents. Those include systems to position the turbine automatically into the changing tidal flow, lower cost blades and a quick connection/disconnection system. The device was recovered at the end of March 2018.

Next steps

The data gathered on sub-components of the CoRMaT technology will guide the next phase of product development. The turbine will be improved based on the results of the testing campaign. It will then be reinstalled at EMEC for further operation over an extended period.

NEREIS

SEAc project



Project length

2 months

2nd testing campaign planned in 2019

Completed



Technology Readiness Level

TRL 7 to TRL 8



Leveraged

€85k

Main achievements

NEREIS develops unique and specific software to precisely classify sound sources. Combined with their expertise and databases, NEREIS can characterise potentially impacting noise sources and propose targeted mitigation measures.

Four acoustic devices have been deployed at the SEM-REV test site on 13th April 2018. One device was used to monitor the ambient noise, including noise from the FLOATGEN wind turbine mooring system. The 3 others were used to detect the occurrence of cetaceans.

Next steps

NEREIS will perform a 2nd testing campaign at SEM-REV in 2019. They will develop the ability of the recorder to send the data by radio transmission in real time and use artificial intelligence to improve data processing.

Microsoft

Natick project



**Project
length**

**12
months**
Completed



**Technology
Readiness
Level**

TRL 6

Main achievements

Microsoft's 'Project Natick' is investigating the numerous potential benefits that a standard undersea data centre can provide. To that end, Naval Group led the successful installation of Microsoft's 240kW subsea data centre at EMEC in June 2018.

The project is part of Microsoft's ongoing quest for cloud data centre solutions that are less resource intensive and offer rapid provisioning, lower costs, as well as high agility to meet the needs of users around the world.

FORESEA supports the project by facilitating continuous remote monitoring for the Microsoft team based in Washington, USA.

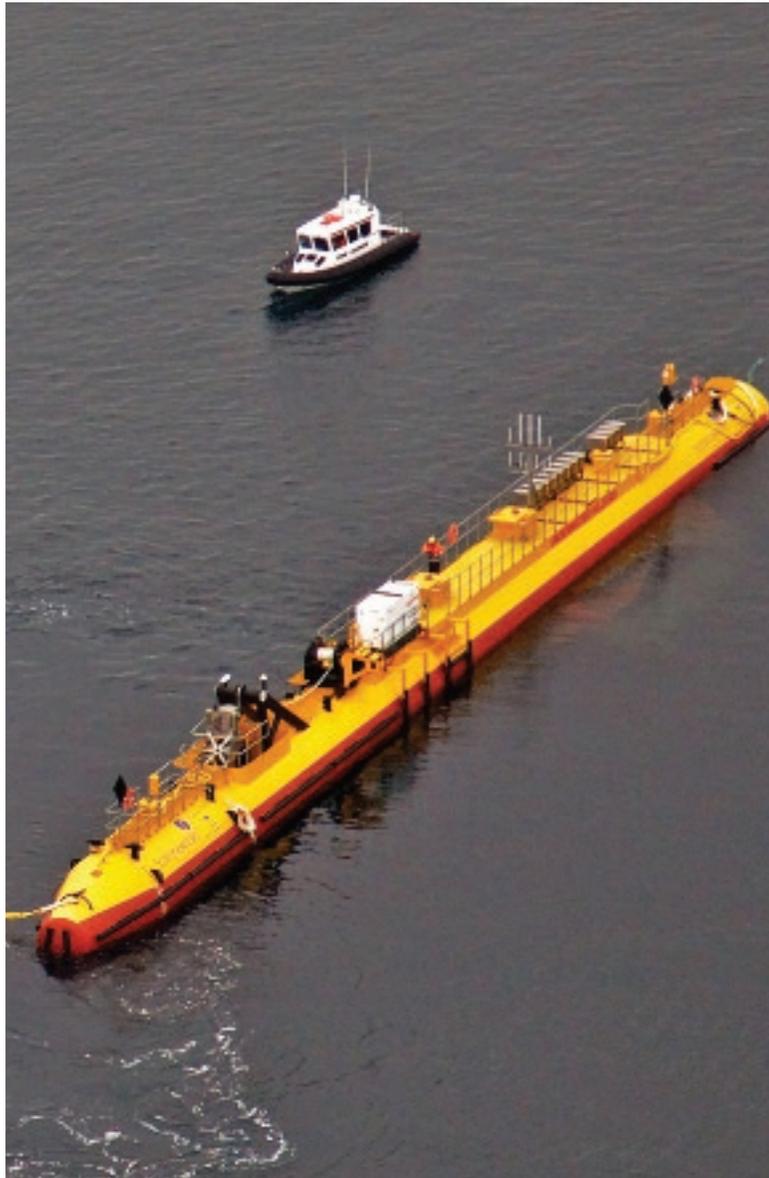
Deepwater deployment offers many benefits such as ready access to cooling and a controlled environment. It also offers the opportunity to be powered by co-located renewable energy sources, such as the pioneering wave and tidal energy technologies tested at EMEC's test sites.

Next steps

Project Natick has been extended until June 2020, and may remain at EMEC for up to five years.

Orbital Marine Power

SR2K project



Project length

12 months

Completed



Technology Readiness Level

TRL 5 to TRL 6



Leveraged

€8.8m

Main achievements

Orbital's SR2000 floating tidal turbine was first deployed at EMEC in October 2016 and was tested until September 2018, weathering harsh winter storms. During the 12 month FORESEA testing campaign, the SR2000 operated on site continuously. It generated over 3 GWh of electricity and supplied on average 7%, and at times up to 25%, of Orkney's total electricity demand. Orbital's device can boast that their generation enabled the world's first hydrogen produced from tidal energy (via EMEC's electrolyser).

Furthermore, installation, maintenance and recovery operations were carried out with small vessels, verifying the economic potential of floating tidal energy at full commercial scale.

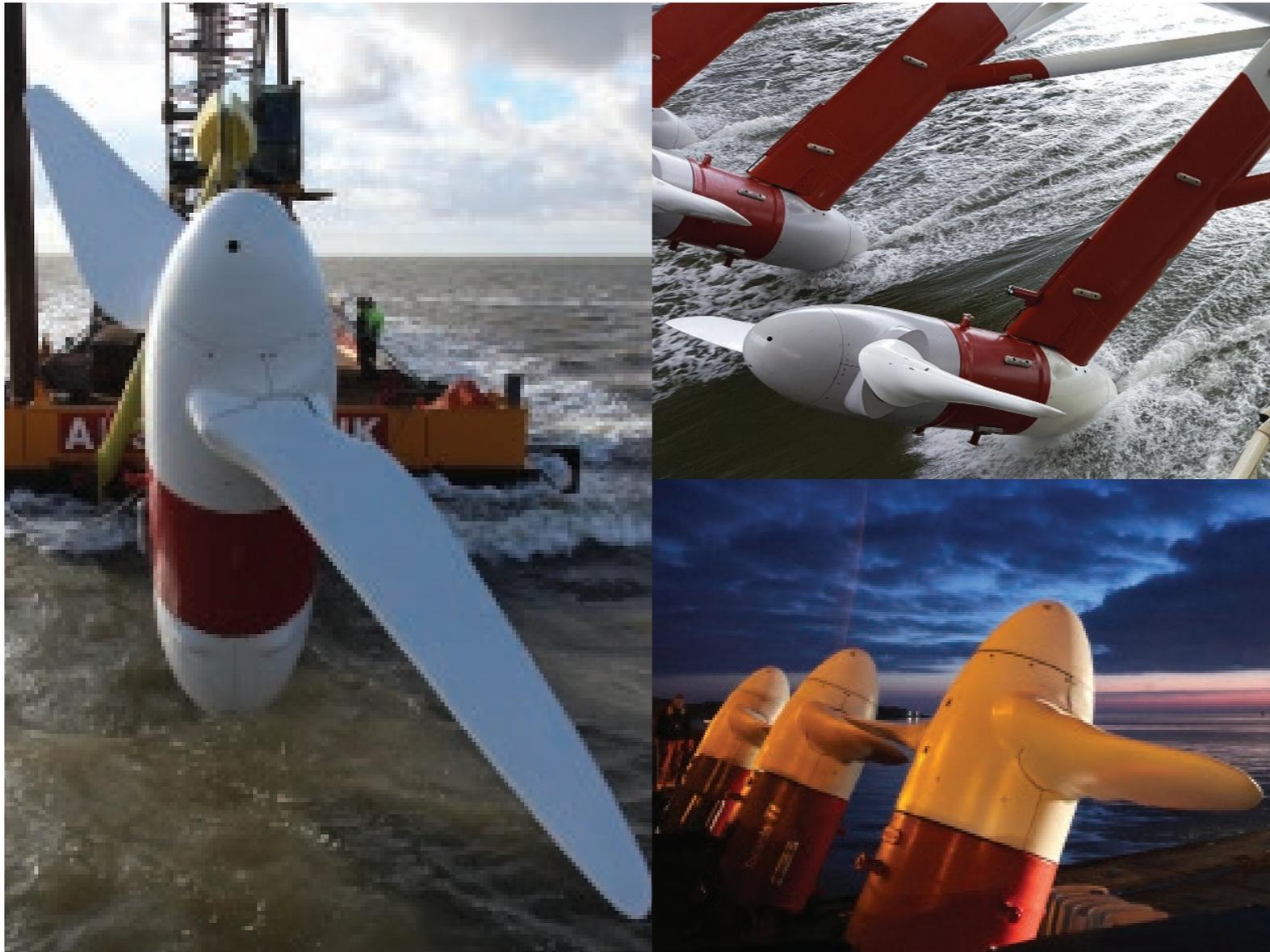
Next steps

Orbital Marine Power is currently building the new O2 turbine, which is due for deployment in 2020.

Orbital also agreed Heads of Terms for first commercial sales.

Tocado

ITC T2 EMEC & Fish test at DMEC projects



Project length

12 months

Completed



Technology Readiness Level

TRL 8 to TRL 9



Leveraged

€3.5m

Main achievements

Tocado installed its Temporary Foundation System (TFS) floating tidal platform equipped with two T2 tidal turbines at EMEC in March 2017. First power was generated on the same day the TFS was installed and connected to the grid, proving that the platform can be operational very quickly. The platform was monitored remotely from the Netherlands and the turbines' yield was improved by 10% through testing of an innovative control strategy.

Tocado also undertook a fish mortality test through FORESEA with the support of DMEC in May 2019. Fish were released 2 to 3 metres in front of turning tidal turbines, led through the turbines and caught back on the other side. They were kept there for several days in order to study potential long-term effects. The result was that none of the fish was injured or died due to interaction with the turbines. The test was carried out by independent specialist company ATKB with the support of a fishing vessel from Fishflow Innovations, and proved that Tocardo turbines are fish-friendly.

Next steps

Tocado turbines are now commercially available for all type of projects such as well barriers, offshore and river applications.

Tocado is also upgrading its TFS platform to a new UFS platform capable of carrying five T2 turbines.



Ocean DEMO - a new €13m Interreg North West Europe project - was launched in January 2019 and will follow in FORESEA's footsteps. It will provide funding to developers of marine renewable technologies to test their products or services in real-sea environments. However, it will go one step further towards industrial roll-out by focusing specifically on multi-machine ocean energy installations.

The transition from single machine to pilot farm scale is critical for the future of the ocean energy sector. Scaling up to multi-machine farms will improve the competitiveness of the technology by bringing down costs across the supply chain. This transition comes with higher capital requirements and investors require a proven business case before they get further involved. Ocean DEMO will ease the transition towards pilot farms and build upon FORESEA's successes to deliver a thriving ocean energy sector in Europe.

www.oceandemo.eu

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All the information presented in the Success Stories are based on test reports written and signed off by the technology developers.

Photo credits: Colin Keldie for CorPower Ocean, IDEOL, Mike Brookes – Roper for Nautricity, NEREIS, Scott Eklund - Red Box Pictures for Microsoft, Naval Group, Orbital Marine Power, Tocado.

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Since 2016, FORESEA has been supporting developers of offshore renewable energy technologies to test in real sea conditions around North West Europe.

The programme covers the following test centres:

- European Marine Energy Centre (EMEC): Orkney Islands, UK
- SmartBay Ireland: Galway, Ireland
- SEM-REV: Nantes, France
- Dutch Marine Energy Centre (DMEC): Alkmaar, Netherlands

The test centres are supported by the European industry body for ocean energy, Ocean Energy Europe, based in Brussels.

ForeseaProject.eu

PROJECT PARTNERS

