

# OFFSHORE CHANNEL

WORLD TREND & TECHNOLOGY  
FOR OFFSHORE ENERGY SECTOR

## Offshore Renewable Energy

- Wind Energy
- Wave Energy
- Tidal Energy
- Solar Energy





*Farshid Ebrahimi*  
*Responsible Director*

Offshore renewable energy consists of many different sources that are abundant, natural and clean, like Wind, Wave, Tidal and Solar. Unlike traditional fossil fuels, this energy will never run out. Renewable energy is essential for reducing the potentially devastating effects of climate change, and protecting the natural environment for future generations. Offshore renewable energy includes offshore wind, wave, tide and solar, where the strength of the wind, the pull and rise and fall of the tides, and the movement of waves, produces a vast amount of power that can be harnessed by modern technology.

The energy of the oceans can be harnessed by modern technologies without emitting any greenhouse gases, making offshore renewable energy a potential cornerstone

of the clean energy transition all around the world.

Offshore Channel Magazine reports on innovative engineering projects around the world, profiling the key players making a difference to the engineering profession. It's our flagship publication and our main channel for keeping our members up to date on what's happening at the offshore industry.

Offshore Channel Magazine is the flagship publication of the international Society of Professional Engineers. Published six times per year, Offshore Channel Magazine covers news and commentary on professional issues: licensing, engineering ethics, employment, legislative and regulatory issues, education, and many others that have a direct impact on professional engineers.

# BOSKALIS' MIGHTY SERVANT 1 FITTED WITH 'WINGS' FOR TENNET'S 73M WIDE DOLWIN EPSILON PLATFORM

For many years Boskalis has made a significant contribution to the energy transition with their versatile fleet.

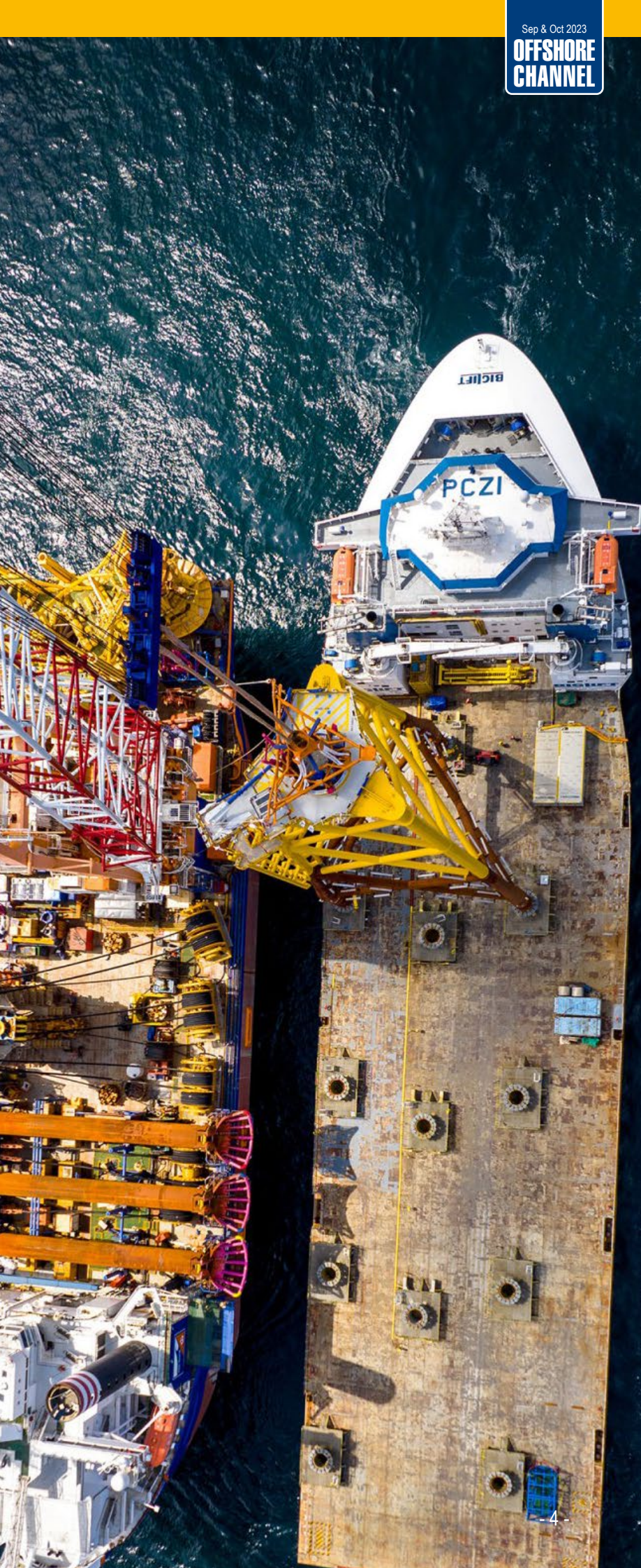
From the preparation of the seabed with their subsea rock installation vessels and the installation of power cables with their cable-laying vessels to the installation of turbine foundations with their impressive crane vessels. But also in an earlier phase by transporting subsea power cables, monopiles, jacket foundations and offshore converter platforms across the globe with their semi-submersible heavy transport vessels.

The latter is what their Mighty Servant 1 is currently transporting – the impressive DolWin Epsilon platform, weighing more than 23,000t. This HVDC converter platform will export the wind-generated electricity from several offshore windfarms to the onshore power grid.

Unique about this transport is that the Mighty Servant 1 deck is 50m wide and the cargo is 73m wide, almost one and a half times as wide!

Therefore, the deck has been extended with four outriggers. Simply put; four 'wings' – two on each side of the vessel – which made the Mighty Servant 1 wider at crucial points to carry TenneT's 82m long and 84m high DolWin Epsilon platform.





## MV BIGLIFT BAFFIN DELIVERS 38 JACKET FOUNDATIONS AT SAINT-BRIEUC OFFSHORE WIND FARM

BigLift Shipping transported 38 jacket foundations from El Ferrol, Spain to Van Oord's offshore installation vessel Aeolus in the Bay of Saint-Brieuc for the Saint-Brieuc offshore windfarm, 16.3 kilometres off the coast of Brittany.

Equipped with a state-of-the-art dynamic positioning system and her 125\*42 metre flush deck, BigLift's heavy transport vessel BigLift Baffin was the right vessel for the job.

Between June 4 and October 5, the vessel executed ten shipments, carrying the jacket foundations on deck; eight trips with four and two with three pieces. The three-legged jackets are 70 metres high and each weighs approximately 1,100 mt. The jackets were lifted and seafastened on to purpose-built quick-release systems to minimize time during the lifting operation in the field.

Out at sea, the jackets were discharged by Van Oord's Aeolus while BigLift Baffin stayed in position using her DP2 system. This was the first project where BigLift Baffin deployed her DP2 configuration. The area near the Channel Islands is renowned for its large tidal range, which means that high current speeds must be counteracted by the DP system. Furthermore, due to the height of the jackets, the vessel experienced large windage on top of the high current. Despite the extremely challenging conditions, the DP system performed excellently.

This project was an example of an extremely fast-track project with limited time for preparation. BigLift Shipping is happy and proud that both its MC-Class vessel BigLift Baffin and the organisation have proved to be ready for this new step, and looks forward to being challenged even further in the future.

### Saint-Brieuc wind farm

The Saint-Brieuc wind farm is being developed by Ailes Marines, a company wholly owned by the energy company Iberdrola, and is the first wind farm in France equipped with jacket foundations. It contains 62 wind turbines that will generate 496 megawatts clean energy for 835,000 people.

# VAN OORD INSTALLS FIRST TURBINE AT SOUTH FORK OFFSHORE WIND FARM

Van Oord's offshore installation vessel Aeolus successfully installed the first of 12 turbines at the South Fork offshore wind farm. South Fork is the first offshore wind project in the State of New York, a contribution to meeting the state's ambitious clean energy and climate goals.

Van Oord was chosen by the 50/50 joint venture partnership between Ørsted and Eversource for the transport and installation of wind turbine generators (WTG's) for the South Fork offshore wind farm. The 132 MW wind farm is located 35 miles east of Montauk Point, off the eastern tip of Long Island, New York. It will generate enough clean energy to power 70,000 homes.

Offshore installation vessel Aeolus has recently undergone a major crane upgrade, which includes a new, longer boom on its existing crane. With this new 133m long boom the Aeolus is capable of installing the newest generation of turbines for offshore wind projects. The installation work at South Fork Wind will be supported by a fleet of American vessels including barges, tugs and other support vessels.





**WINDAR**  
renewables

**ANOTHER MAJOR  
MILESTONE ACHIEVED:  
WINDAR RENEWABLES  
AND NAVANTIA  
SEANERGIES SHIP FIRST  
TWO MONOPILES FOR  
MORAY WEST**

The business alliance between Navantia Seanergies and Windar Renewables is loading out the FIRST MONOPILES manufactured at the new plant in Fene, which brings us one step closer to supplying clean and renewable energy worldwide.

They will be transported to Scotland, where the OW Ocean Winds Moray West offshore wind farm, which will have an installed capacity of 882MW, is located.

This is the FIRST MONOPILES project executed by Navantia Seanergies-Windar Renewables in Fene. 14 GIANTS of 2,000tn for an offshore wind farm that will supply 1.33 million homes with clean energy.

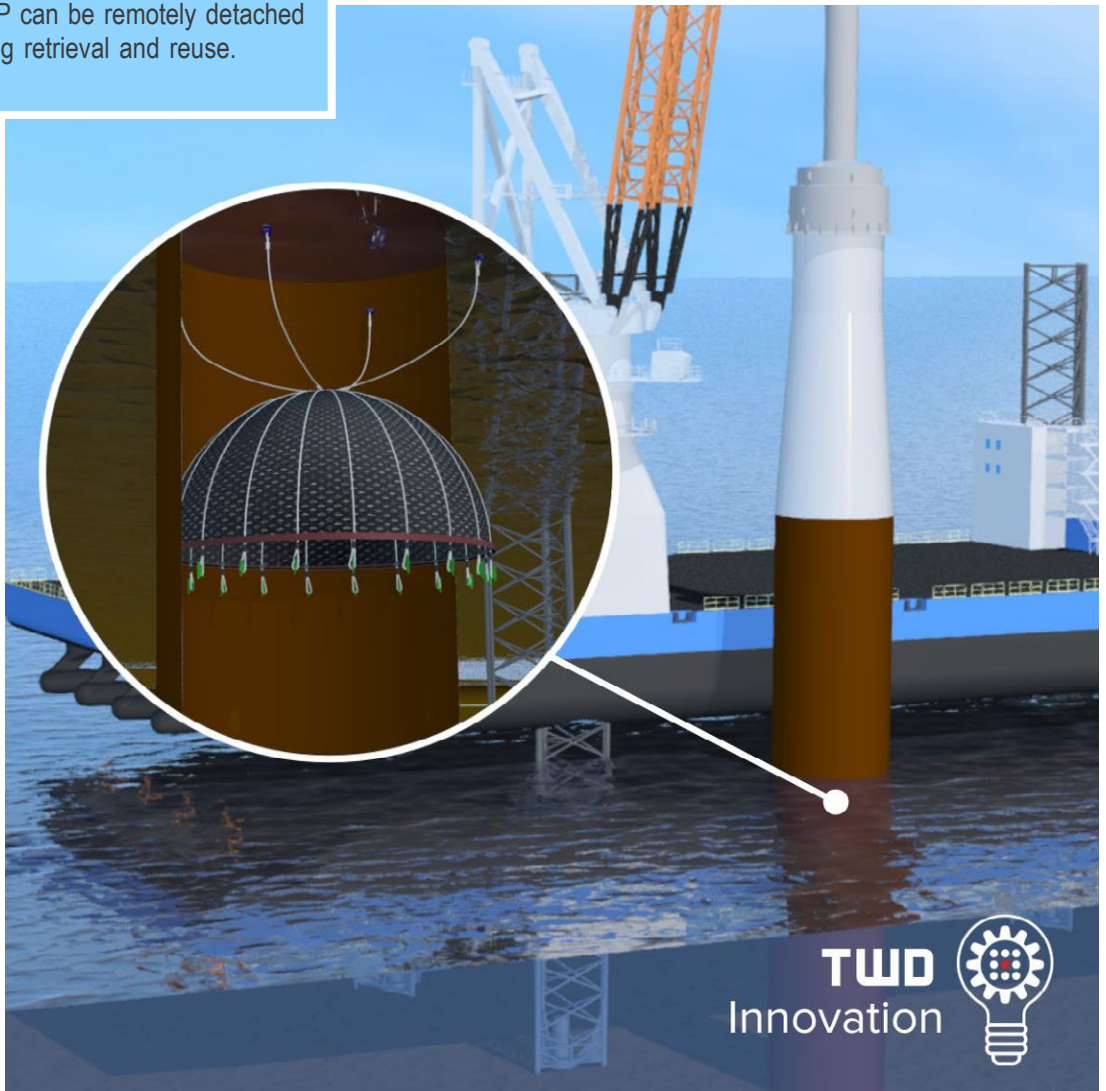




Meet one of TWD's innovative designs, the Pile Run Parachute (PRP). It combines materials already commonly used in offshore applications, such as steel wires and geosynthetic materials, to create an inner damper. This reduces the maximum velocity as well as the depth at which the pile run terminates. The PRP boasts three unique characteristics:

- Damping: By limiting the flow of seawater passing through the PRP, the monopile is slowed down to a controlled speed, ensuring safety, and reducing the risk of damage.
- Flexibility: The PRP is flexible, allowing it to cope with hammer blows without any energy loss during hammering.
- Re-usable: The PRP can be remotely detached from the pile, enabling retrieval and reuse.

## HOW CAN THE MONOPILE ITSELF BE UPGRADED TO DE-RISK THE POTENTIAL OF PILE RUN DURING INSTALLATION?



# PIVOTBUOY PROJECT: X1 WIND REPORTS SUCCESSFUL RESULTS



The PivotBuoy Project, developed by X1 Wind in collaboration with 9 industry and R&D leaders, finalized its offshore demonstration with excellent results that promise to revolutionize the floating wind industry.

The Spanish firm's X30 platform was tested in full operational conditions at PLOCAN from October 2022 to May 2023. During the 7-month demonstration, the device became the world's first fully functional floating wind TLP (Tension Leg Platform). The unit fed its electricity to PLOCAN's Platform via a 1.4km 20kV subsea cable.

X1 Wind CEO Alex Raventos said that the recently published results illustrate excellent performance across a broad range of parameters including platform stability, passive alignment, structural behaviour and power production:

"The PivotBuoy Project marked an important phase in the development of our innovative technology," he said. "It allowed us to retrieve large amounts of data for a sustained period of time in full operational conditions. This data was collected from multiple sensors installed across the platform through a dedicated and proprietary SCADA called Floating Management

System. These findings have provided crucial insights which are now being incorporated into X1 Wind's ongoing commercial-scale projects, including the NextFloat Project."

The most striking result is that data showed very good alignment with the wind using its passive orientation system. The platform showed better alignment than publicly available data for traditional active yaw systems for strong winds (>7.5m/s) and similar alignment for lower wind speeds (<7.5m/s).

In terms of power production, energy generated by the modified Vestas V29 – which operates in a downwind configuration – was well aligned with theoretical models, with no sign of power loss or increased 3P vibration due to the tripod shadow. The results confirm that X1 Wind's streamlined tripod arrangement eliminates the known drawbacks typically associated with downwind operation.

In addition, the platform overcame several harsh storms, with maximum wave heights reaching 6.7 meters, equivalent to more than 20 meters in full-scale. During these extreme events, the unit behaved well with motions and accelerations matching the predictions in simulation models.

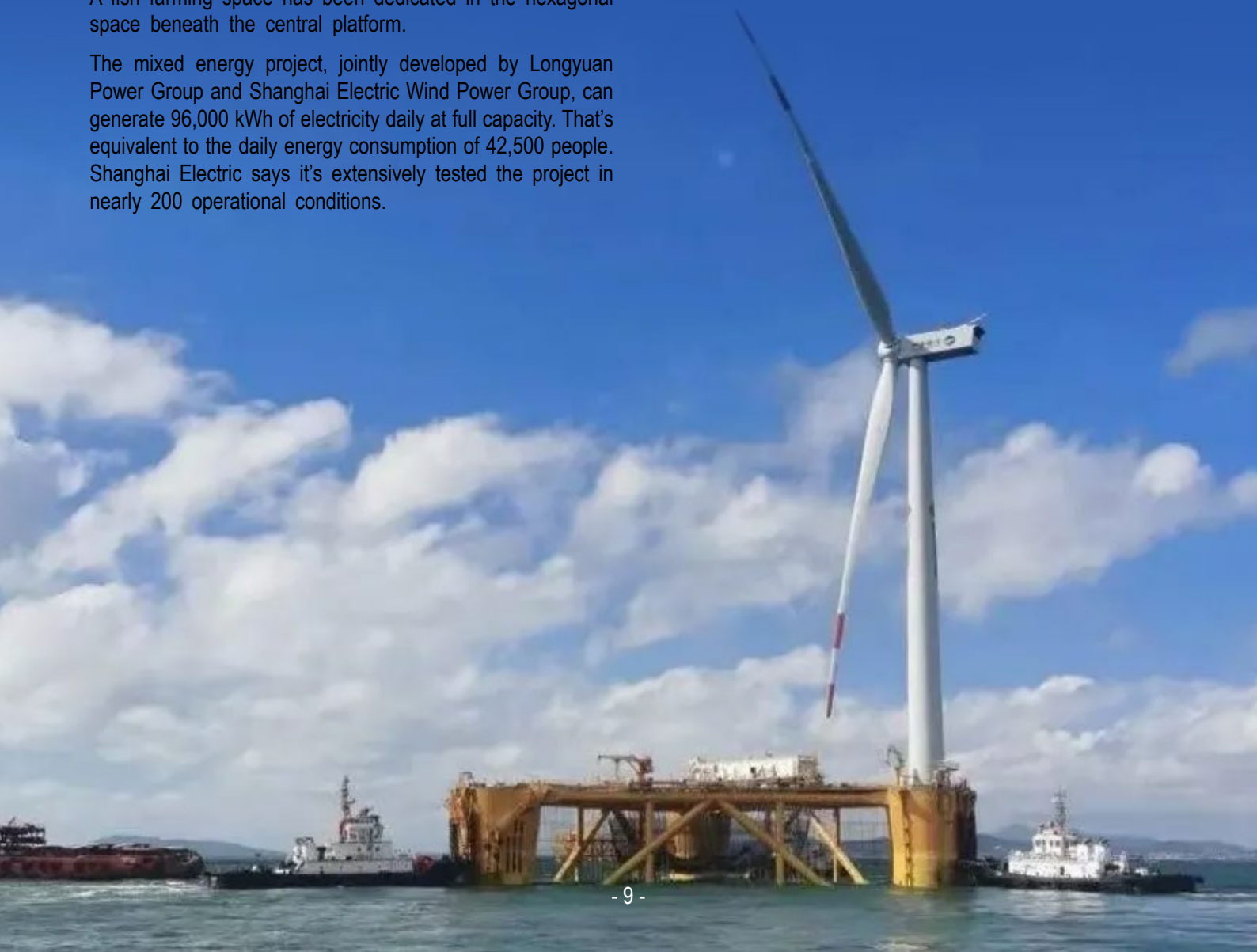


# THE WORLD'S FIRST FLOATING WIND-FISHING INTEGRATION PROJECT HAS BEEN INSTALLED AND CAN GENERATE 16 MILLION KILOWATT-HOURS OF ELECTRICITY ANNUALLY

The hybrid floating wind, solar, and fish farm – or aquaculture – project is in the National Marine Ranching Demonstration Zone near Nanri Island, a fishing island in Fujian Province, China.

It features a three-columned, semi-submersible floating platform that supports a 3.6-megawatt (MW) offshore wind turbine and 0.4 MW of lightweight, flexible solar panels. It's installed in an area with a depth of around 115 feet (35 meters). A fish farming space has been dedicated in the hexagonal space beneath the central platform.

The mixed energy project, jointly developed by Longyuan Power Group and Shanghai Electric Wind Power Group, can generate 96,000 kWh of electricity daily at full capacity. That's equivalent to the daily energy consumption of 42,500 people. Shanghai Electric says it's extensively tested the project in nearly 200 operational conditions.



# NOVEL DESIGN FOR FLOATING OFFSHORE WIND APPROVED BY ABS

ABS issued an approval in principle (AIP) to ECO TLP™ and MOCEAN-Offshore BV for its floating offshore wind turbine support structure.

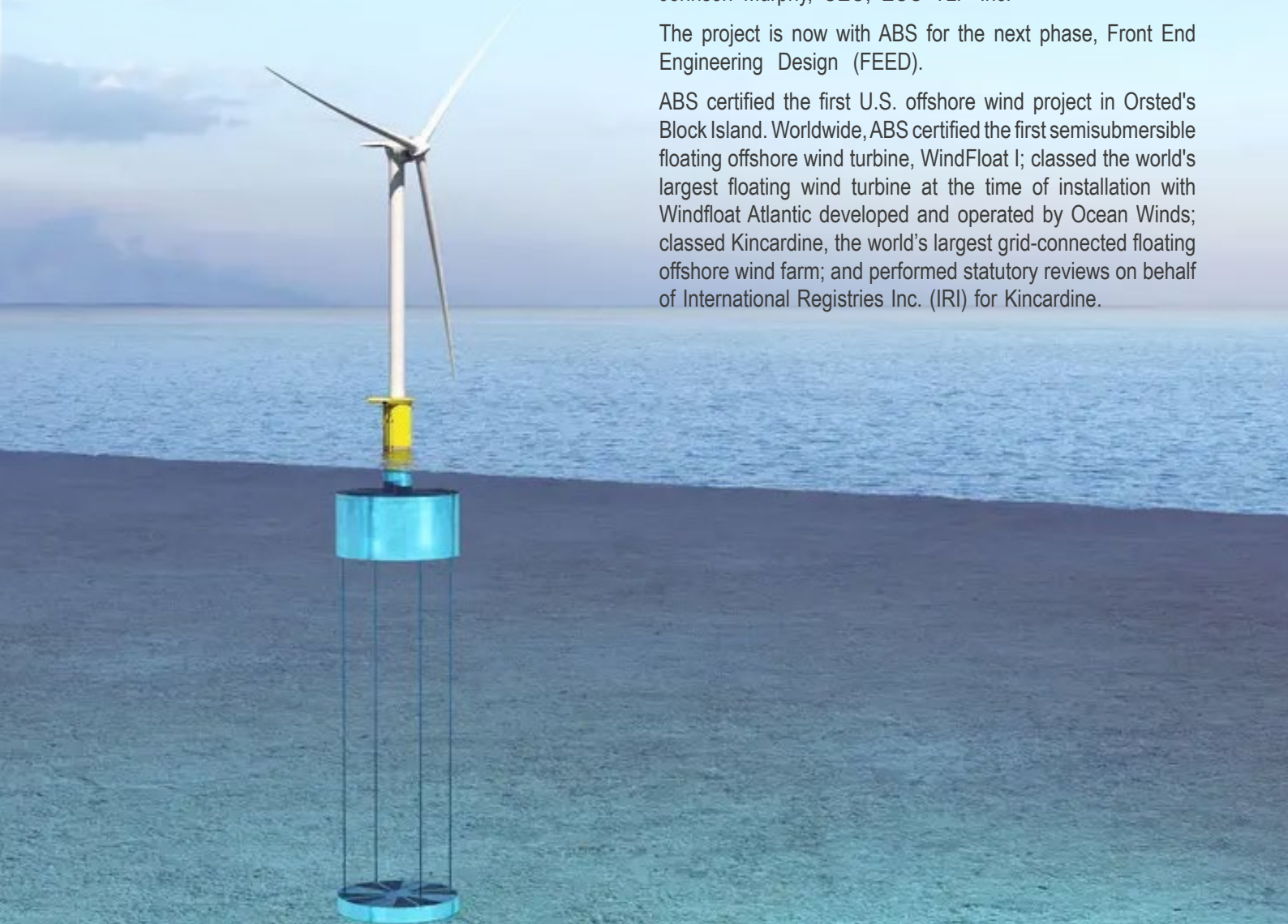
The unique design from ECO TLP™ utilizes slip-formed cylindrical concrete hulls and gravity anchors, which, when combined with a tension-leg mooring system, has a smaller footprint than traditional structures using steel column-stabilized hulls.

“Offshore floating wind will play a key role in the global energy transition by expanding the reach of renewable generating capacity to waters that are too deep for fixed-bottom wind projects. ABS is proud to support innovative companies like ECO TLP Inc. who are designing structures that address and solve challenges related to offshore wind’s manufacture, installation and cost,” said Miguel Hernandez, ABS Senior Vice President, Global Offshore.

“ECO TLP™ simplifies the 250-meter to 2,000-meter floating wind installation process. Looking at both capital and operational expenses, we are an extremely low-cost solution, incorporating available, non-proprietary components and standard local labor support across the globe,” said Nicole Johnson Murphy, CEO, ECO TLP Inc.

The project is now with ABS for the next phase, Front End Engineering Design (FEED).

ABS certified the first U.S. offshore wind project in Orsted’s Block Island. Worldwide, ABS certified the first semisubmersible floating offshore wind turbine, WindFloat I; classed the world’s largest floating wind turbine at the time of installation with Windfloat Atlantic developed and operated by Ocean Winds; classed Kincardine, the world’s largest grid-connected floating offshore wind farm; and performed statutory reviews on behalf of International Registries Inc. (IRI) for Kincardine.



# AIKIDO'S TECHNOLOGY SOLUTIONS ADDRESS THE CHALLENGES AND BOTTLENECKS THE TEAM FACED IN DEVELOPING SOME OF THE WORLD'S FIRST FLOATING WIND FARMS

- Industrialization of platform fabrication
- Unlocking port infrastructure
- Minimizing fabrication time
- Reducing final assembly footprint by 75%
- Removing need for tall cranes
- Tapping into local supply chains
- Reducing floating wind costs
- Increasing generation output
- Enabling local jobs and growing local economies

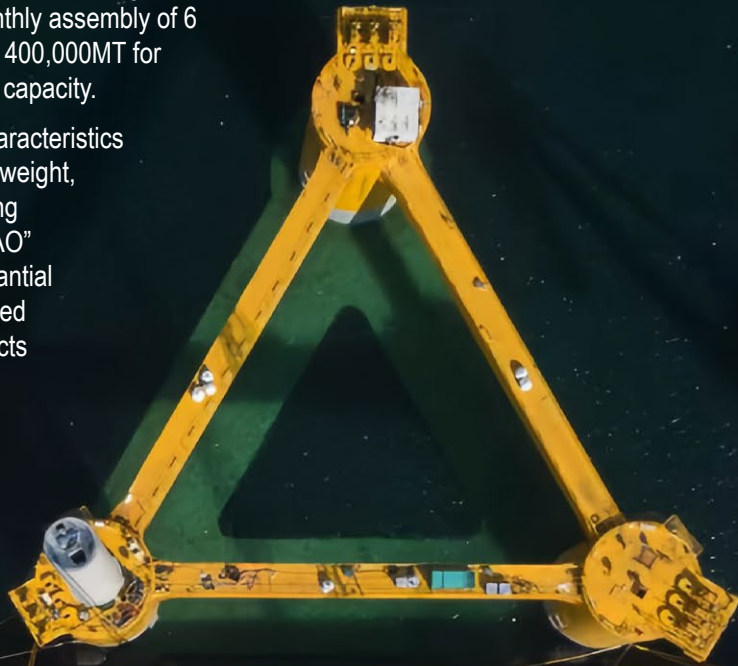




# FIRST FLOATING WIND PROJECT, FUYAO, DEMONSTRATES CAPABILITIES

CNOOD-Wenchong Heavy Industries (CWHI) specialises in the large scale manufacturing of fixed and floating wind foundations produced via its seven strategically located fabrication yards spanning a total area of 3,294,000 sqm. We are well positioned to meet the growing global demand for floating wind foundations from our Dongguan and Longxue manufacturing facilities with a current monthly assembly of 6 sets and an annual fabrication capacity of 400,000MT for subsections with plans to further increase capacity.

Floating wind foundations have similar characteristics to fixed foundations: large volume, heavy weight, complex structures with high manufacturing difficulty. During construction of the “FUYAO” floating platform, we harnessed our substantial shipbuilding heritage and experience gained in the manufacturing of wind power products combined with advanced manufacturing technologies.



*Aerial view of “FUYAO”*



Commemoration Ceremony



"FUYAO" departs Dongguan Yard prior to installation

Installed at an average water depth of 60 meters, "FUYAO" was China's first deep water floating wind power project and is equipped with a CSSC 6.2MW Anti-Typhoon Type I Wind Turbine. The unit's tower height reaches 78 meters, the central height of the hub is 96 meters and, with a 152 meter diameter of the wind whistle, was the largest floating wind turbine in China. The floating unit has a total length of 71.96 meters, 33 meter depth, 80 meter width and weighs 3,351 tons.

CNOOD-Wenchong Heavy Industries Co., Ltd (CWHI), headquartered in Guangzhou, Guangdong Province, China, is a world leading solution provider specialising in large scale manufacturing for offshore structures, renewable energy, oil

and gas applications, infrastructure and mining. CWHI is a subsidiary company of Guangzhou Wenchong Shipyard Heavy Industry (GWSHI), itself part of China State Shipbuilding Corporation (CSSC).

With over 40 years of experience, CWHI has an extensive track record supplying complex projects globally for the energy sector. CWHI's core business sectors include: Large scale structural fabrication, engineering, resources integration, supply chain management, project management, global logistics and financing. We are Ahead for Energy, proudly contributing to the world's transition towards sustainable energy.



Integration of the Tower

# JET CONNECTIVITY LAUNCHES FLOATING 5G FOR OFFSHORE WIND FARM



JET Connectivity has today announced the launch of its largest, permanently deployable, 5G ocean data platform, built to provide 5G to an offshore wind farm in a way previously not possible.

The 17m tall, bespoke platform enables long range 5G connectivity for a multitude of uses, in this case as an offshore wind farm-based testbed which will be used to push the boundaries of digital operations through robotics and autonomy.

Offshore wind farms go through years of surveying, decision making, construction and commissioning before becoming operational. For a large proportion of this time, mobile phone signal and internet are not available due to the requirement of a stable platform and fibre cables traditionally needed to run a network.

JET Connectivity has developed a unique solution which utilises its own, in-house designed and built 5G Radio Access Network software and systems, and floating buoy hosting platforms, to provide pop-up, solar powered, fibre-less 5G networks to offshore sites.

This allows for connectivity to be available to those working offshore from the start of a project through to operation – enabling safety critical communications to staff working offshore through to high bandwidth autonomy and robotics for safer and smarter operations.

JET has followed a strong focus since it was founded in 2020: to enable a safe and secure, sustainable, smarter global blue economy. This is now being achieved through secure, resilient connectivity, real time environmental data streaming from the buoy platforms, and digitisation of operations utilising the network.

In this particular deployment, JET is working with a consortium including Microsoft and the Offshore Renewable Energy (ORE) Catapult, funded by industry, the Greater Lincolnshire LEP and Innovate UK, to deliver a 5G testbed – at an operational windfarm – which can be utilised by companies developing and trialling offshore technology that will require resilient, high bandwidth connectivity, such as drones and autonomous vessels.

James Thomas, CEO and Founder of JET Connectivity, said: “This launch of our first offshore network is testament to what hard work from an exceptional team can deliver, and I am so grateful of the effort and hours the team has put in, particularly in the final build the last few weeks.

“I hope we can continue to make the maritime sector safer and more environmentally sustainable as we grow our deployments in the coming years. Features such as the reef cubes built into our mooring systems are small ways we can make a positive impact on our oceans above the core services we are offering and enabling with our ocean data hubs.”

# SEAQUALIZE SUCCESSFULLY EXECUTES FIRST EVER OFFSHORE TRANSFER LIFTS ON VINEYARD WIND 1

First turbine components successfully fast-lifted in the open Atlantic Ocean. Dutch heave compensation specialist Seaqualize executed the world's first offshore transfer lifts of wind turbine components from a heaving supply vessel. Their newly developed offshore lifting device, the Heave Chief 1100 is deployed by DEMA Offshore US. Together with the feeder barge solution developed by DEMA Offshore US with partners Barge Master, Foss Maritime and Seaqualize, and the operators and equipment from GE Renewables, this technology will ensure that the Halliade X 13 MW turbines can be installed year round, to form the first commercial scale wind farm installation project in the USA, Vineyard Wind.





# AN IMPORTANT SITE ACCEPTANCE TEST (SAT) TOOK PLACE AT THE PREMISES OF SK OCEANPLANT IN SOUTH KOREA

The Eager.one team was awarded the design and supply of a remotely operated Jacket Lifting Tool for South Korean offshore wind specialist SK Oceanplant.

This remotely operated Jacket Lifting Tool will be used for upcoming offshore wind projects in Asia. It will be able to handle up to 2500t jackets from the yard onto transport vessels. The HMPE (High Modulus Polyethylene) rigging design is engineered for two types of lifts; Floating inshore lifts with a sheerleg containing 4 hooks and for lifting with a land based Gantry Crane with 3 hooks, which is required for fabrication purposes (to lift the top section on the lower section).







**HEAVY  
LIFT  
AWARDS  
2023**

**FINALIST**

**Innovation Award**



FASTRO is the smart modular lifting system that empowers contractors to efficiently perform any heavy lift operations with optimal efficiency, without wasting time, money, manpower, or materials.

# HEAVY LIFTING WITH COMBILIFT



The launch of the Combi-LC Blade marks Combilift's official move into the offshore wind sector and is the culmination of a close collaboration with Siemens Gamesa. But the offshore wind sector is more than just blades : steel towers, hubs, nacelles, rotors, floating structures... Combilift's array of "heavy lifters" includes high-capacity C-Series multidirectional trucks, Mobile Gantries (Combi-MG) and Straddle Carriers (Combi-SC), with a chassis lifting capability of up to 150t. Moving extremely overloaded, long and heavy loads is not a problem for these "big boys" – not to forget Combilift's core principles are uppermost on the agenda: handling loads efficiently and safely both indoors and outdoors.

It all started in 1998 with a concept that has revolutionised the materials handling sector: a multidirectional 3-wheel, 4-tonne capacity forklift truck for handling long loads safely; and for the last 25 years, Irish-based Combilift has continued to lead the field in "lifting innovation". Combilift's ever-growing range has broadened greatly since the first-ever C-Series was built, culminating in Combilift's latest addition, the Combi-LC Blade mover, which allows for the movement of wind turbine blades – some as long as 115m and weighing 70t.

Danish manufacturer Andresen Towers was an early convert to the Combi-SC when it was looking for a method of handling its next much larger generation of shell towers for wind turbines. Crates of these 14m long, 3.3m diameter elements can now be easily moved in and around the production facilities and

loaded onto HGVs in the yard without the need for a crane. This enabled the company to achieve a competitive price point for its customers as a result of better logistics, transportation and storage.

Combilift's range of heavy lifting equipment is not limited to the wind industry. They are being utilised in other sectors such as structural steel, modular construction and concrete, to name a few. An example of the latter is German concrete specialist Tenwinkel GmbH & Co. KG. They can manufacture and handle ever heavier finished products that its customers such as Liebherr are demanding thanks to a 30t capacity Combi MG. Replacing a combination of counterbalance truck and crane, its Combi-MG is a very flexible and mobile solution for lifting high-density moulded parts, technical components and counterweights around the premises and loading them for dispatch. All Combi-SCs and Combi-MGs can be built to dimensions to suit specific applications, and fitted with a wide range of lifting accessories and this was the case with Tenwinkel's machine. Its width and height were tailored to ensure easy access to the production area through doorways while the telescopic facility enables it to be used for positioning manufacturing tools.

So, if you think you have a problem handling awkward or extra-large products, share it with Combilift – it will not only be a load off your mind but could open up new possibilities for your business.

# WIND ORCA AND WIND OSPREY REUNITED IN ROTTERDAM FOR PARALLEL CRANE UPDATES!

PTC 210-DS installs the first part of the new on-board crane on the offshore wind installation jack-up ship "Wind Orca" last week in Schiedam (NL).

*copyright by Jelco Stouthandel Photography*





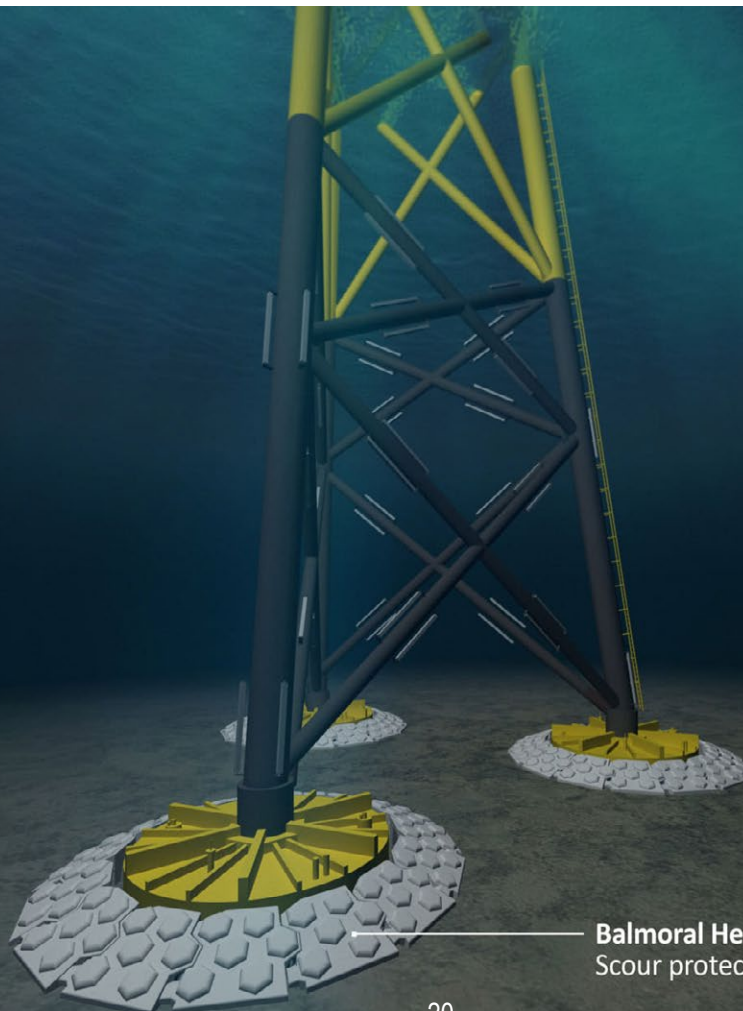
# BALMORAL LAUNCHES INNOVATIVE HEXDEFENCE FOR JACKET FOUNDATIONS TO REVOLUTIONISE SCOUR PROTECTION FOR OFFSHORE WIND TURBINES

Balmoral, a leading offshore energy supply chain company, proudly announces the launch of its groundbreaking HexDefence product designed for jacket foundations, a globally patented product designed to significantly mitigate jacket foundation scouring around fixed wind turbines. This revolutionary solution not only marks a leap forward in offshore wind technology but also promises substantial cost savings and environmental benefits.

Building upon the success of the HexDefence development work used for monopile structures, which integrated seabed protection and flow reduction to minimise operational costs and prevent cable failure, Balmoral's latest innovation specifically targets jacket turbine foundations. The HexDefence jacket system aims to eliminate or dramatically reduce the need for

traditional and resource-intensive scour protection methods, such as rock dumping with additional benefits of being installed at quayside, eliminating the requirement for additional installation vessels and ensuring the scour protection is active from point of foundation installation.

Dr. Aneel Gill, Product R&D Manager at Balmoral, said: "The jacket version of HexDefence represents a significant step forward for scour protection, offering highly cost-effective performance enhancement across installation, management, and maintenance. This proprietary system eliminates the requirement to dump rock, providing a non-invasive approach to protecting the jacket foundation and the immediate surrounding area."



**Balmoral HexDefence®**  
Scour protection solution

**RIDGEWAY**

**ROCK BAGS**  
100% RECYCLED

# INNOVATIVE SUBSEA ASSET PROTECTION

Introduced into the U.K. and Europe by Ridgeway and Sumitomo in 2009, We have been busy listening, learning and promoting the offshore applications and benefits of the Kwoya Filter Units or more commonly referred to by the offshore and marine markets as “Rockbags”.

Designed originally as an effective means of “filter layer” scour protection for subsea structures in dynamic seabeds and challenging velocities, the Kwoya Filter Unit Rockbag has evolved to become a significant technical product and proven a safe, 100% recycled clean engineering solution with various innovative options on size and product specifications.

The knowledge base and expertise learned from severe Japanese weather conditions has expanded the use of the Rockbags over many decades within civil engineering applications also marine infrastructure protection of cables, pipelines, and seabed correction. Patent protected for various applications (Patent Nos EP2341592, EP2348215 and EP2354535, the Rockbags, used in combination with other traditional methods of cable and scour protection, are adding value to the solutions toolkit of the marine contractors.

Ridgeway have been working in collaboration with clients to add value on providing tools for stability calculations, CFD, excessive performance testing and modelling also trusted environmental subsea performance during their lifetime and importantly safe decommissioning.



Once installed the filter unit Rockbags create their own mini ecosystem encouraging the regeneration of aquaculture environments, this aspect has become an important aspect for developers adding real value environmental engineering and sustainability in their subsea solutions.

In addition to this, Ridgeway have established a comprehensive geographical stock network of fast response capability for filled Rockbags under hook at ports throughout Europe utilising local labour and logistics.

Ridgeway have now a significant project track record for example flagship projects such as Teesside Offshore Wind Farm by EDF Energy Renewables. A world first in 2013 using Filter Unit Rockbags for scour protection on monopiles. It has also won contracts for works in Ireland at Arklow Bank, in Scotland at Beatrice, in England on Robin Rigg constructed by German provider E.ON, Gwynt y Môr wind farm in Wales (RWE Renewables UK) and other E.ON's schemes such as Humber Gateway and Rampion. For more information please visit: [www.rockbags.com](http://www.rockbags.com)

# RIDGEWAY

Offshore Wind Farm Project	Country	Owner	Protection	Year
Sherringham Shoal	UK	Equinor	Cable Underpinning	2010
Nordsee Ost	Germany	RWE	Jacket scour protection	2012
Arklow Bank	Ireland	GE Energy	J-tube cable support	2012
Teesside	UK	EDF	Monopile scour protection	2013
Westermost Rough	UK	Orsted	Cable protection	2014
Karehamn	Sweden	E.on	Cable protection	2014
Gwynt y Mor	UK	RWE	CPS Stabilisation	2014
Humber Gateway	UK	E.on	Cable protection	2014
Luchterduinen	Netherlands	ENCO	Freespan correction	2015
Dolwin 2	Germany	Tennet	Cable protection at OSS	2015
Dudgeon	UK	Equinor	Cable protection	2016
Wavehub	UK	Wavehub	Cable protection	2016
Egmond aan Zee	Netherlands	Shell	Freespan Correction	2016
Rampion	UK	E.on	Cable protection	2016
Robin Rigg	UK	E.on	Monopile scour protection	2016
North Wind	Belgium	Parkwind	Belmouth Stabilisation	2016
Race Bank	UK	Orsted	CPS Stabilisation	2017
Beatrice	UK	SSE	Bellmouth cable support	2018
East Anglia 1	UK	Scottish Power	Cable protection	2018
Kincardine Floating	UK	Pilot Offshore	Export cable support	2018
Formosa Phase 1	Taiwan	Orsted	Monopile scour protection	2019
Wind Float Atlantic	Portugal	Repsol/EDP/ENGIE	Cable route preparation	2019
Barrow	UK	Orsted	Cable stabilisation at OSS	2019
Yunlin	Taiwan	WPD	Monopile scour protection	2020
Hornsea 1	UK	Orsted	Cable protection/support	2021
Galloper	UK	RWE	CPS Stabilisation	2021
Saint Nazaire	France	EDF	Cable protection	2021
Hollandsee Kust Zuid	Netherlands	Vattenfall	Cable crossing protection	2022
St Brieuc	France	Iberdrola	Export cable protection	2022
Arcadis Ost 1	Germany	Parkwind	Cable protection	2022





**A UK FIRST! The Hybrid CTV, HST MILLIE is IMO Tier 3 compliant with SCR's (Selective Catalytic Reduction) to reduce NOX & SOX.**

She was designed by Chartwell Marine Ltd for High Speed Transfers Ltd and is now completing final sea trials ahead of her handover.



## **JAN DE NUL ORDERS XL CABLE-LAYING VESSEL FLEEMING JENKIN**



**Jan De Nul Group orders Fleeming Jenkin, an extra-large cable-laying vessel, at the CMHI Haimen shipyard. With an unrivalled cable-carrying capacity of 28,000 tonnes, the vessel will serve the renewable energy and subsea cable industry in installing cables over longer distances and in deeper waters. The vessel will be delivered in 2026.**

Installation assets and human resources for the offshore energy industry are a top priority at Jan De Nul.

Offshore wind farms go deeper and further offshore, and the interconnectivity between countries and regions become essential for the economy and energy security. Both markets today require longer, stronger and heavier cables for deeper waters. For that reason, Jan De Nul continues to invest in installation assets and human resources to serve the offshore energy industry.

Philippe Hutse, Director Offshore Energy Division at Jan De Nul Group: "We stand firm in our belief in the energy transition. Following our previous investments in the jack-up vessel

Voltaire and crane vessel Les Alizés for the installation of the next-gen wind turbines and their foundations, we now proceed with this magnificent cable-laying vessel. Thanks to her unprecedented capabilities, Fleeming Jenkin will be a perfect fit for the interconnector and export cable markets."

Jan De Nul's offshore installation fleet will count four powerful and diverse cable-laying vessels, next to two offshore jack-up installation vessels, three floating crane installation vessels, five rock installation vessels and two multipurpose vessels.

This diverse fleet can not operate without a strong team. Jan De Nul already started recruiting extra crew and staff members to operate Fleeming Jenkin. Supported by an extensive in-house training programme, a multidisciplinary team of dynamic positioning officers, engineering technicians, tensioner carousel operators, cable-laying superintendents, various specialised offshore technicians and engineers in civil and mechanical engineering will be put together and become part of Jan De Nul's leading workforce specialised in offshore energy.



# ZTT IS PROUD TO ANNOUNCE THE SUCCESSFUL LAUNCH OF THEIR CUTTING-EDGE SELF-PROPELLED FULL ROTATION CRANE VESSEL, 'ZHONGTIAN 39', ON OCTOBER 29, 2023

The 'Zhongtian 39' is a wind power construction vessel that measures an impressive 215 meters in length and 51.8 meters in breadth.

It combines exceptional transportation and construction capabilities, setting new industry standards. Notable features of the 'Zhongtian 39' include: The vessel has two main hooks: a full rotation 3500-ton hook and a fixed stern crane with a lifting capacity of 5,000 tons.

This enables it to lift 3200-ton wind turbine foundations and 4500-ton topside modules of substations. Equipped with a MENCK 3500kJ hydro pile hammer, it is well-prepared for piling operations. Utilizing a DP-1 dynamic position system, the vessel ensures precise manoeuvrability within offshore wind farms. The deck can accommodate one complete jacket structure or two monopiles, each with a diameter of 10 meters and a length of 120 meters.

The 'Zhongtian 39' is a highly versatile vessel that can be used for various purposes. It is capable of constructing offshore oil platforms, erecting large cross-sea bridges, hoisting heavy structures, and salvaging large sunken ships and objects. In addition, the vessel can efficiently carry out essential tasks such as port loading, marine transportation, and foundation pile installation for all units of 10MW and above.

The 'Zhongtian 39' by ZTT will undoubtedly play a pivotal role in driving the progress of wind power and offshore construction projects, making a significant contribution to the sustainable development of the industry.





**HUGHES  
SUBSEA**  
an O&G Group company

**DIVING SERVICES ARE AT THE VERY CORE OF OUR BUSINESS, AND WE PRIDE OURSELVES ON PROVIDING EXPERIENCED, TIME-SERVED AND COMPETENT DIVERS TO PERFORM ALL OUR SUBSEA ACTIVITIES IN A PRODUCTIVE AND SAFE MANNER**

The core management team at Hughes Subsea have a background within the diving industry, and as such have a solid understanding of the challenges posed by the marine environment. Hughes Subsea Services Ltd is a registered diving contractor under the UK Health and Safety Executive (HSE). We are also fully accredited members of the Association of Diving Contractors (ADC) and comply with all issued International Marine Contractors Association (IMCA) guidelines.

#### **Unrivalled subsea knowledge and expertise**

We combine our extensive experience in the Oil and Gas, Civil Engineering, Marine Renewable Energy and Power Generation Industries with the latest in subsea technology. This allows us to provide teams with unrivalled knowledge and know-how, for as long as the project requires.

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- Subsea Cathodic Protection Design and Installation
- Subsea Mattress Installation and Relocation
- Asset and Scour Protection
- Salvage Operations
- Subsea IRM services
- Civil Engineering
- Demolition
- Asset Inspection and NDT
- Subsea Coded Welding to ASME 9 standards





# SUBSEA ROBOTICS SERVICES

## PETRODIVE GROUP PLANS TO DEVELOP ITS ROV CAPABILITIES

Dubai-based subsea services provider PETRODIVE has recently acquired 5 ROVs.

The acquisition of these ROVs adds to PETRODIVE's capacity to undertake the broadest range of ROV requirements from O&G and Maritime Contractors. This includes high-quality survey work, inspection, repair, and maintenance (IRM), and heavy intervention tooling down to 1,000 meters.

PETRODIVE Teams are experts in providing the most effective solutions that can prolong the life of subsea assets.

PETRODIVE invested \$5 million in its ROV fleet. The Company established its ROV Division in 2021, initially focusing on providing experienced personnel at all levels in observation and work class vehicles. It operates both in Africa and internationally.

It currently owns 3 ROVs with observation classes and 2 ROVs with work classes and is planning to acquire more ROVs in the future.

### OBSERVATION CLASSES AND WORK CLASSES

ROVs are controlled by a ROV operator typically on a surface vessel, using a joystick like you would play a video game. A group of cables, or tethers, connects the ROV to the ship, sending electrical signals back and forth between the operator and the vehicle. They use external sensors that are mounted on the vehicle to measure things like conductivity, temperature, and depth.

### Observation Class

PETRODIVE uses observation class ROVs to inspect infrastructure and the underwater area to help plan future projects for Oil and Gas Contractors. These ROVs are equipped with high-end cameras and lightweight sonar systems to avoid missing any small details like cracks. A manipulator (arms and hands) on one of these vehicles tends to be small with limited functionality (1-3 functions typically), and their thrusters can be either vectored or standard.

### Work Class

PETRODIVE also uses Work class ROVs. They are used for ocean floor exploration, deep depths that divers cannot reach, and heavier construction tasks that take more time on the bottom than divers can spare. Due to their FO-equipped umbilicals, they can carry additional sensors and have multiple capabilities that allow for additional tools. Their sensor and sonar arrays can image large areas or provide minute details to specific structures. Most are equipped with a pair of manipulators—one for heavy lifting and grasping and the other with up to 7 individual functions that can be nearly as nimble as the human hand! The thrusters on these ROVs are vectored and very powerful, producing from 50 to over 200hp.

The Panther is a great alternative to heavier hydraulic vehicles, particularly where deck space is at a premium. These ROVs set the standard for electric light work class vehicles operating across a broad spectrum of subsea energy projects.



**Fraunhofer**  
IFAM

## **POTENTIAL OF DRONES OFFSHORE DRONES**

Wind turbines offshore have plenty of advantages, but maintaining them is challenging. So-called offshore drones can relieve the burden of impassable work such as maintenance, inspection, repair or surveying. They have been specially developed for these difficult conditions. With the "Offshore Drone Campus Cuxhaven" (ODCC for short), Fraunhofer IFAM is creating a test and development infrastructure for unmanned aerial systems for offshore use. The aim is to provide industry and the economy with a long-term planning perspective and procedural security for the regular operation of offshore UAS.



Signing a cooperation agreement between SynergyXR and Fidar Offshore Animation for the development of VR&AR technology in the offshore renewable energy industry.

SynergyXR is a powerful cloud platform that lets companies train employees, deliver maintenance and offer remote support across all XR devices without having to write a single line of code.



Jochem Tacx  
Cesare Meinardi

An aerial photograph of a large offshore supply vessel, likely a jack-up vessel, positioned in the ocean. The vessel is white with blue and orange accents. A large red and white lattice crane is mounted on the deck, extending upwards. The vessel's hull is visible at the bottom, showing various equipment and structures. The water is a deep blue-green color.

# **BUILDING AN OFFSHORE WIND FARM**

**OPERATIONAL GUIDE**

Second edition

# OFFSHORE PHOTOGRAPHER

**AN IMAGE CREATION SPECIALIST WITH THE NECESSARY CERTIFICATIONS TO ACCESS MARINE SITES, TO DOCUMENT THE ACTIVITIES OF THE OIL AND GAS AND MARINE RENEWABLE ENERGY INDUSTRIES**



*A technician accesses a foundation / Saint Brieuc Windfarm -France – C.Beyssier*

Christophe decided in 2022 to stop sailing. After 25 years commanding vessels such as harbour and coastal tugs, and having spent several years on the coast of Africa on anchor-handlers and supply vessels, he has decided to combine his 2 passions, associating the sea, the maritime industry & image.

As well as documenting your large-scale operations or the work of your teams, Christophe can help you with your communication projects. He has cameras in his bag, of course, drones, but also a fullformat camera with 4k quality.

He'll be with you for the long haul, providing you with photos,

aerial images and videos:

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**Fully offshore certified:**

FOET with EBS-Offshore Medical, VCA, MIST,  
GWO, Working at Height, Chester Step





# CORPOWER C4 EXPORTING POWER TO THE PORTUGUESE GRID

CorPower Ocean's first commercial scale Wave Energy Converter, the CorPower C4, continues to make rapid progress after its first seven weeks of operation off the coast of Aguçadoura in northern Portugal, accelerating through commissioning and exporting power to the grid.

The main steps of the commissioning program have now been completed, verifying that the machine functions are operating as specified. All operational modes, including Storm Survivability, Derated and Tuned Production modes as well as Maintenance modes have been successfully tested.

In addition, the C4 device has shown its capacity to make autonomous decisions transitioning between different machine states according to ocean conditions, which are monitored by onboard sensors and control systems.

In the coming period, CorPower Ocean's team will focus on ramping up the machine's motion and power capture as focus shifts towards power performance tuning, while monitoring safe operation in storm conditions.

CorPower Ocean Chief Engineer Jonny Meason said: "We have been making steady progress after the installation in August, with initial focus on machine safety and survivability, to ensure robust operation in any kind of weather. Safety critical control and sensing functions have been successfully verified with the C4 enduring waves up to six meters. Power export to the Portuguese grid began on the same day as the required permit was received from authorities. After verifying power generation in tuned operation with limited motion envelopes, work to gradually allow the device to make increasingly larger motions and thereby capture more energy has been initiated. We look forward to providing further progress reports in due course."

A key innovation which CorPower Ocean has brought to wave energy is its 'WaveSpring' phase control technology. When activated on the C4 device, the novel feature has been verified to significantly amplify the device motion, allowing it to make larger movements than the incoming wave height, which increases the power capture.





## **OCEAN POWER TECHNOLOGIES SECURES \$1.6 MILLION ORDER FOR MULTIPLE WAM-V 16S FROM SULMARA**



Ocean Power Technologies Strengthens Collaboration with Sulmara Demonstrating Commitment to Sustainable Offshore Solutions

MONROE TOWNSHIP, N.J., Oct. 24, 2023 (GLOBE NEWSWIRE) -- Ocean Power Technologies, Inc. ("OPT" or "the Company") (NYSE American: OPTT), a leader in innovative and cost-effective low-carbon marine power, data, and service solutions, today announced it has received an additional volume order from Sulmara, a prominent player in offshore services, of WAM-V 16 uncrewed surface vehicles (USVs) making this the largest single order of WAM-Vs to date. The order, valued at \$1.6 million, underscores OPT's commitment to providing innovative and sustainable solutions for the offshore industry. Due to demand, production is already underway to support and will allow for revenue recognition this fiscal year.

The WAM-V 16, known for its unparalleled versatility and exceptional performance, will enable Sulmara to continue to redefine the way that marine data is collected. Designed to adapt to various marine environments and applications, the WAM-V 16 offers unmatched reliability, maneuverability, and modularity that empowers remote marine operations like never before.

Commenting on this significant achievement, OPT's CEO, Philipp Stratmann, expressed his enthusiasm for the collaboration with Sulmara: "We are delighted to expand our partnership with Sulmara and provide them with our state-of-the-art WAM-V 16 uncrewed surface vehicles. This order reflects our commitment to enhancing the efficiency and sustainability of offshore operations. We are proud to collaborate with a

company like Sulmara, which shares our vision for the future of ocean technology. This contract, and others we are finalizing, is testament to the quality of our product lines and operators."

Sulmara, recognized for its commitment to the environment while delivering world-class offshore survey services, envisions OPT's WAM-V 16 as a valuable addition to their fleet. The WAM-V 16 will bolster capabilities in various subsea applications, including hydrographic survey, remote inspections, UXO detections, and environmental monitoring, across many markets, including global offshore wind development.

"Our investment in a fleet of bespoke WAM-V USVs is marking another pivotal step in our ongoing mission to decarbonize the offshore industry," commented Sulmara's COO, Carlo Pinto. "This strategic move not only demonstrates our dedication to environmental sustainability but also consolidates our role as an industry pioneer in adopting innovative solutions.

"The collaboration with OPT is proof of their unwavering support and alignment with our environmental and forward-thinking goals. Together, we aim to pave a greener path forward for the offshore sector."

Ocean Power Technologies is proud to be a leader in providing sustainable solutions for the maritime industry and aims to continue pushing the boundaries of what is possible in the world of ocean technology. This order from Sulmara exemplifies the growing interest in innovative, environmentally responsible solutions to the challenges facing the offshore industry today.

For more information on Ocean Power Technologies please visit our website at: [www.OceanPowerTechnologies.com](http://www.OceanPowerTechnologies.com)

# WAVE BUOYS AND ABB ROBOTICS IN THE SKY!!!

**WaveHexapod is building a robotics powered and energy generating wave energy converting test setup next to the A16 in Wattstraat 5, Dordrecht... Part V, system is now ready for electrical installation!**

Green Energy from waves at the AE-WaveHexapod testing facilities at Van Bodegraven Elektromotoren B.V. in Dordrecht!

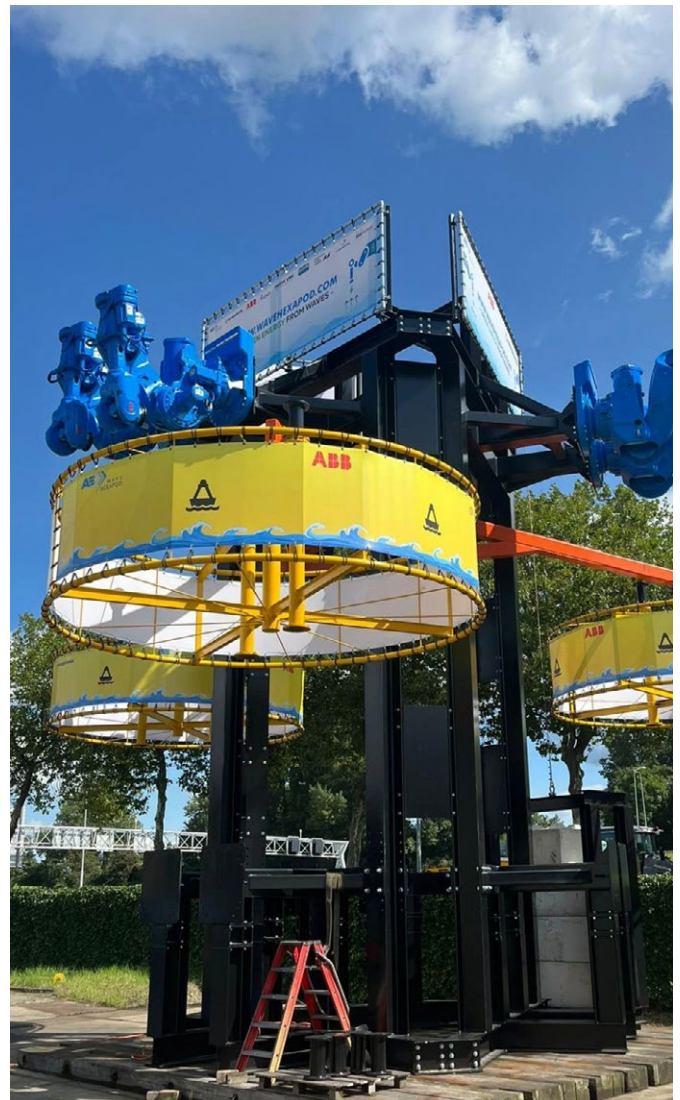
## How the WaveHexapod works

The wavehexapod is a hexapod consisting of 6 generators on 3 buoys. The hexapod hangs from a fixed connection with the outside world at the top. We have now designed submersibles that contain 9 Hexapods and are connected to the bottom only with anchor cables.

The wavehexapod can make optimal use of the movement of the waves with its 3 buoys. Waves go up and down, but also move in the horizontal plane. With its hexapod structure, the wavehexapod can make optimal use of this 3D movement. Every movement can be converted into energy in this way, in the case of wavehexapod this energy is converted into electricity through the 6 generators.

The wave hexapod has a unique proposition. Because the hexapod can be safely placed between windmills with a submersible, we use the existing infrastructure to increase the energy output in the wind farm. Up to 4 times more energy per year. In addition, the wavehexapod with its submersibles can also be located in old depreciated wind farms to generate energy, in order to make optimal use of the existing cabling.

Both with brownfield (old park engineering) or greenfield (new park engineering) the wave hexapod does not use the windmill poles, but only uses the electricity connection of the poles.



# CALWAVE

## CALIFORNIA ENACTS LANDMARK WAVE ENERGY LEGISLATION

CalWave applauds California Governor Gavin Newsom for signing into law California Senate Bill 605, which aims to pave the way for ocean renewable energy to play a significant role in California's 100 percent clean energy future. The bill passed both the California State Senate and Assembly unanimously before it was signed by Governor Newsom.

Introduced by Senator Steve Padilla (D-San Diego), the new law will require the California Energy Commission to "evaluate the feasibility, costs, and benefits of using wave energy and tidal energy" and to "identify suitable sea space for offshore wave energy and tidal energy projects in state and federal waters."

Wave energy may provide numerous benefits to the electricity grid not exhibited by currently commercialized renewables like wind and solar. According to a 2021 report by the Pacific Northwest National Laboratory, increasing marine renewable energy resources from zero to 50-60 percent of our renewable energy generation capacity would cut required battery storage capacity by two-thirds. This can be attributed to the resource's consistency and proximity to demand relative to other renewables.

"Signing SB 605 into law is a crucial step in diversifying California's energy mix," said Marcus Lehmann, co-founder and CEO of CalWave. "Deploying wave energy farms in California can reduce costs for California ratepayers and support grid resilience and energy security while creating local jobs."

Multiple studies (Castle Wind and University of Edinburgh) show that a more diverse generation mix leads to lower total system costs, particularly for wind-wave co-location, and therefore lower electricity costs for ratepayers. CalWave is on track to deploy its first utility grid-connected system at the DOE-funded PacWave site offshore Oregon in 2025. A successful deployment there can lay the groundwork for the widespread scale-up of the company's technology along California's 840-mile coastline.

### About CalWave

Founded in 2014, CalWave is a California-based wave energy developer on a mission to provide reliable and cost-effective ocean wave technologies for sustainable energy access. CalWave's vision is to unlock the power of ocean waves to secure a clean energy future.

The company is a member of the International Electrotechnical Commission's U.S. Shadow Committee for international standards on marine energy, and a member of NHA's Marine Energy Council, which is calling for domestic marine energy deployment targets of 500 MW by 2030 and 1 GW by 2035.





# MODEL TESTS OF THE OCEAN OASIS BUOY

For the past month, model testing of Ocean Oasis' wave energy converter concept for desalination has been ongoing at Océanide in Southern France. A range of hull shapes have been tested covering the full range of potential future installations.

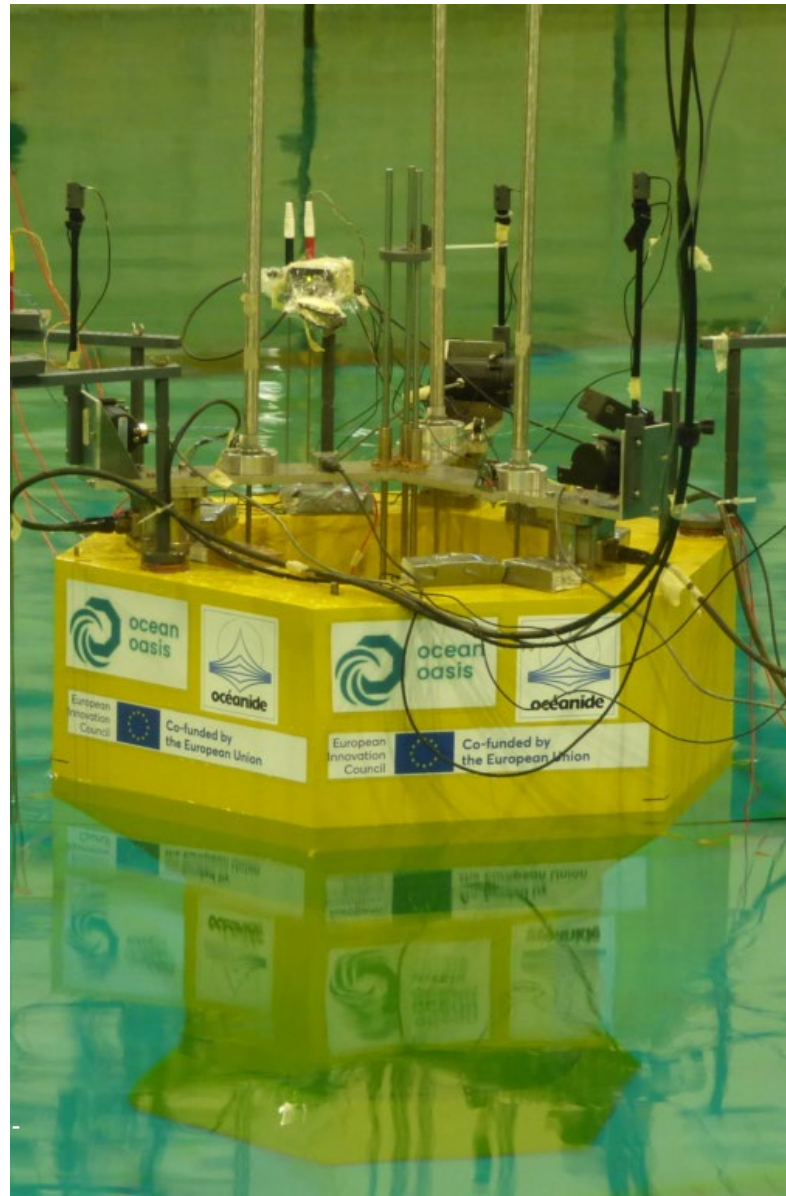
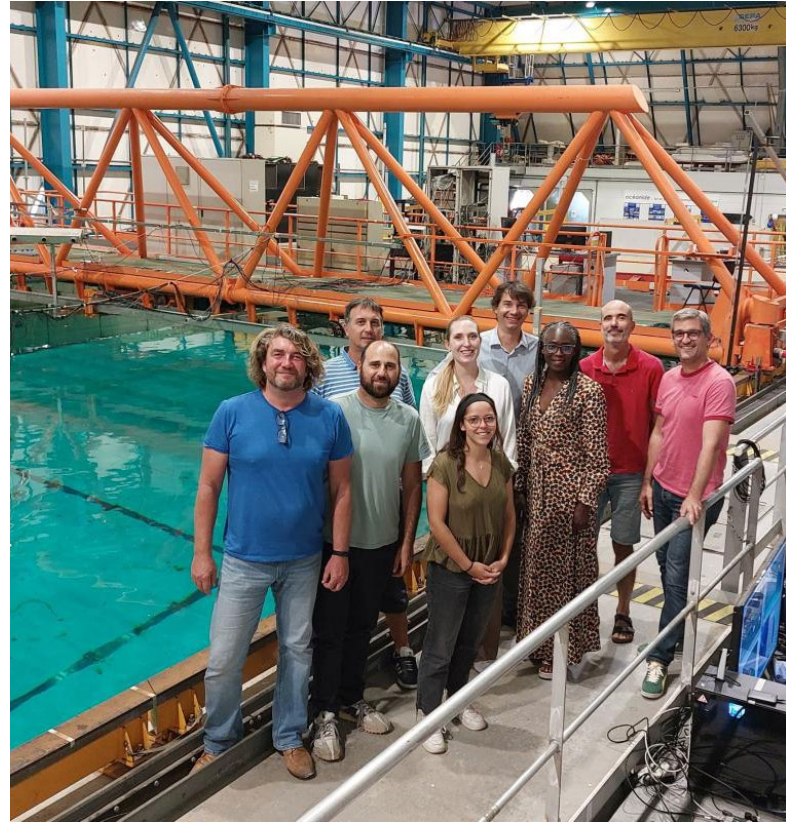
During the model test campaign, an extensive range of buoy shapes and configurations have been tested in operation and survival conditions with the objective of validating our numerical tools and studying the hydrodynamics in more detail.

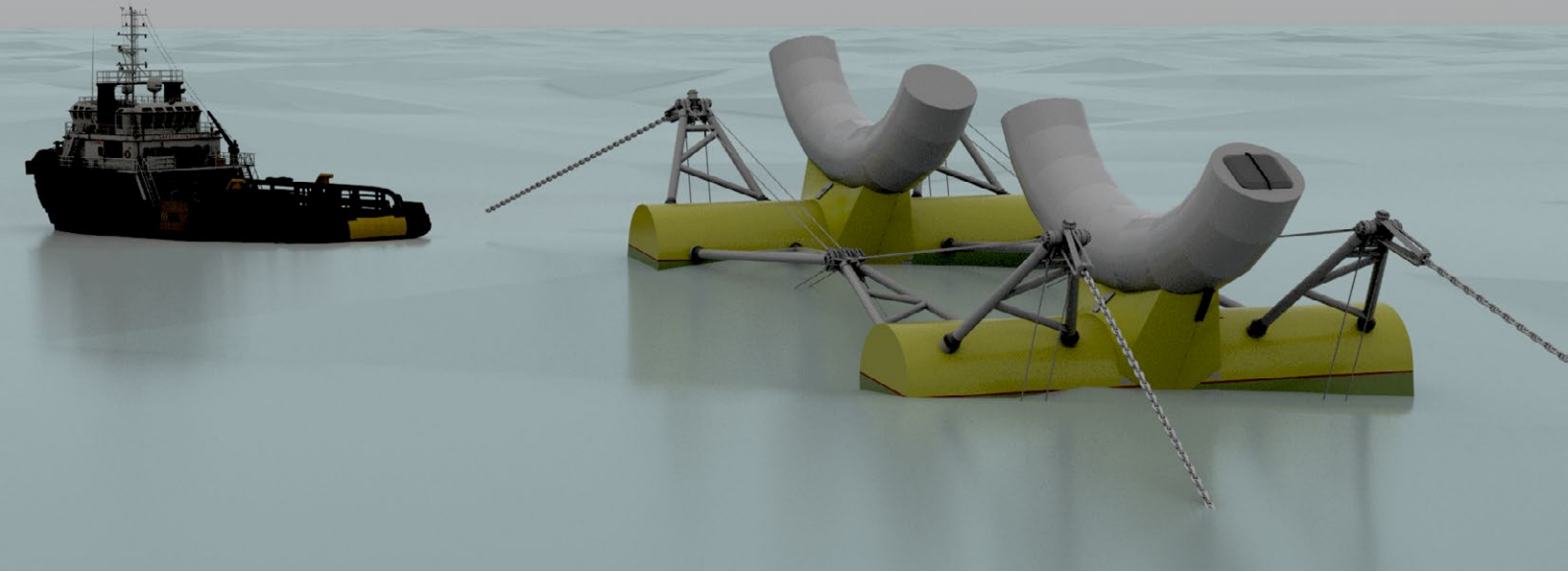
The test basin at Océanide has the capability of modeling waves, current and wind on fixed and floating structures in deep and shallow water. Together with a workshop providing high-quality models and an extensive range of instrumentation available, the facilities are highly suited for testing complex renewable concepts.

"The Océanide team has delivered excellent services throughout this challenging project and has provided a high-quality data set which will be very useful for many years", says Thomas B. Johannessen who is following up the testing for Ocean Oasis.

The model test campaign is being conducted in La Seyne-sur-Mer, Southern France. Océanide provides model testing and engineering services for coastal and offshore applications, serving both public and private customers, as well as collaborative research projects. Océanide has a strong focus on offshore renewable technologies.

The model testing at Océanide is part of Ocean Oasis' EIC Accelerator project named ReWater, co-funded by the European Union.





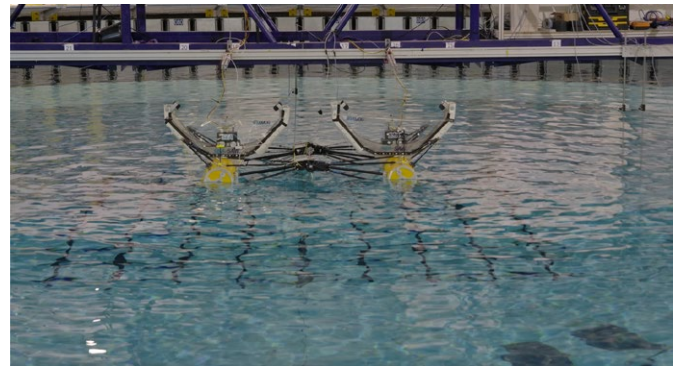
## SUCCESSFUL COMPLETION OF AMOG'S SEA-SAW WAVE ENERGY CONVERTER DESIGN REVIEW IN PHASE 2

AMOG successfully completed Phase 2 of the EuropeWave Pre-Commercial Procurement (PCP) Programme, for its Sea-Saw Wave Energy Converter (WEC) technology.

During Phase 2, AMOG undertook a two-stage FEED (Front End Engineering & Design) process, whereby an 8-week Pre-FEED was undertaken from October - December 2022, and a more comprehensive FEED undertaken from January - June 2023.

Pre-FEED included working with AMOG's design partners, Mainstay Marine Solutions and Supply Design, to define key electrical components and sizings, conduct hull and PTO (Power Take Off) enclosure design optimisation through developing more detailed numerical models, forming design cases and running assessments against ULS (Ultimate Limit State), ALS (Accidental Limit State) and FLS (Fatigue Limit State) conditions for the potential Phase 3 deployment locations. A major outcome from Pre-FEED was the identification of key risks that would be carried through into FEED, along with structure design changes from the design developed in Phase 1.

FEED involved further development of the subsystems of the WEC technology, along with engagement with potential Phase 3 suppliers to optimise the manufacturing plan. Design risks for all subsystems were managed through comprehensive



risk assessment. A detailed structural analysis was conducted to ensure health and safety during deployment. Economic modelling was updated and project cost estimates for Phase 3 and LCOE (Levelised Cost of Electricity) predictions were refined based on Phase 1 outcomes and market engagement.

FEED also included the completion of model testing using advanced control methods at the FloWave Ocean Energy Research Facility within the University of Edinburgh, Scotland.

Phase 2 involved several design reviews - independent third-party verification of the WEC design, O&M and installation strategies developed at both the Pre-FEED and FEED stage, as well as a critical design review involving AMOG, their design partners, and the EuropeWave buyers group.

Once again, Phase 2 highlighted that the nature of R&D activities can be challenging for both technical and commercial aspects of a project. While technical challenges were largely overcome, due to commercial considerations, AMOG elected not to progress the design under the EuropeWave PCP programme, choosing to progress discussions with other parties more suited to the larger scale of AMOG's entry-size device.



# WAVE ENERGY

**IS A DYNAMIC AND SIMPLE SOURCE OF CLEAN, RENEWABLE ENERGY THAT HAS THE POTENTIAL TO PROVIDE SIGNIFICANT BENEFITS TO COMBAT THE HUMAN ACCELERATION OF CLIMATE CHANGE.**

**Wave energy is generated by the motion of ocean waves, which is driven by wind and other meteorological conditions. The energy in ocean waves is tremendous, with the potential to generate large amounts of electricity if harnessed correctly. Unlike other forms of renewable energy, such as solar or wind, wave energy is constant and predictable, making it a reliable source of energy for communities and countries that depend on it.**

There are many and varying types of wave energy and one of the key benefits is that it can be generated close to the coast, reducing the need for expensive and environmentally damaging transmission lines. This means that wave energy projects can provide clean, renewable energy to coastal communities, making it a valuable source of energy for rural and remote areas. Additionally, wave energy devices can be designed to have a low environmental impact and can even be used to enhance the biodiversity of coastal ecosystems. Where wave energy cannot be directly harnessed such as for land locked countries or those sheltered from significant ocean power the power can still be transmitted via grid systems to alleviate stress.

The EU has committed to a renewable energy target of 32% by 2030 and by 2050 10% of all renewables can be provided by wave energy. Norwegian company Havkraft provides a unique modular system where the generators can be adjusted to fit the average wave energy at a specific site. They are providing direct power to fish farms in support of government policy in a manner which can dramatically improve the industry. This offers the dual benefit of providing an eco-friendly power source while providing a boost to the economy.

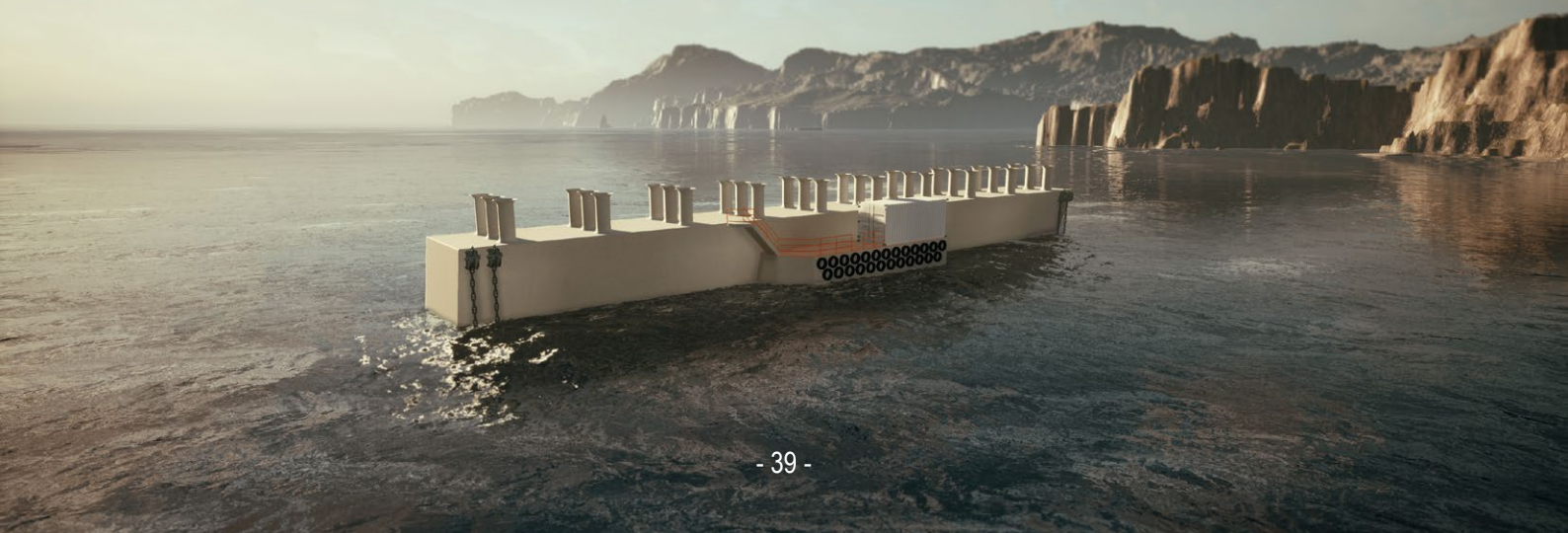
Central to Havkraft's uniqueness is its modular design

philosophy. Imagine the technology as a Lego-system for energy production, where the Havkraft Wave Energy Converter (H-WEC) serves as the fundamental building block. This modularity empowers Havkraft to offer a versatile range of products that can be tailored to fit any site and cater to varying energy demands. Havkraft is developing various types of OWC wave power plants. The HAVKRAFT N-CLASS which is fitted for nearshore locations and the HAVKRAFT O-CLASS which is fitted for offshore-operations. The most developed solution is the HAVKRAFT A-CLASS which is an add-on solution to existing or new infrastructure, already used to power test-projects with power-production both off-grid and to the national grid in Norway.

Havkraft's OWC technology is highly efficient and flexible and the various products in advance development can be fitted to any site in the ocean. All the products are equipped with Bosch off-the-shelf electro components and generators. After over a decade of systematic and thorough testing and increased technology readiness (TRL) of the H-WEC, Havkraft is now ready to replicate the results in various projects world-wide. Havkraft is working with DNV to certify their solutions to the highest standards.

Havkraft offers a strategic capability which differentiates from most others, and it has the most developed and advanced capability globally for such provision. Interest in the products is growing rapidly and Havkraft is in close discussion with government, industry and energy providers on all continents.

Strategic wave energy conversion represents a quantum boost to global renewable energy provision and Havkraft technology represents the cutting edge of capability and technology readiness.



# MEET THE WINNERS OF STARTUP4CLIMATE 2023!

Swedish startups Cemvision & Novige were rewarded for their groundbreaking solutions - fossilfree cement & innovative wave power.

## Novige

**Harnessing renewable wave power around the globe**

NoviOcean focuses on ocean-based energy through its 1 MW hybrid units for wave, wind and solar power. Through their innovative solution, they aim to generate 52,000 MWh annually per square kilometer, while reducing carbon dioxide emissions by an impressive 13,000 tons. A ground-breaking solution to meet today's major challenges.

## Cemvision

**Efficient, fossil free process for cement production**

Cemvision aims to take on the energy and emission intensive cement industry. By replacing virgin limestone use with industrial residue materials containing sufficient levels of calcium oxide, they offer a process in need of lower temperatures enabling an efficient electrification of the procedure.





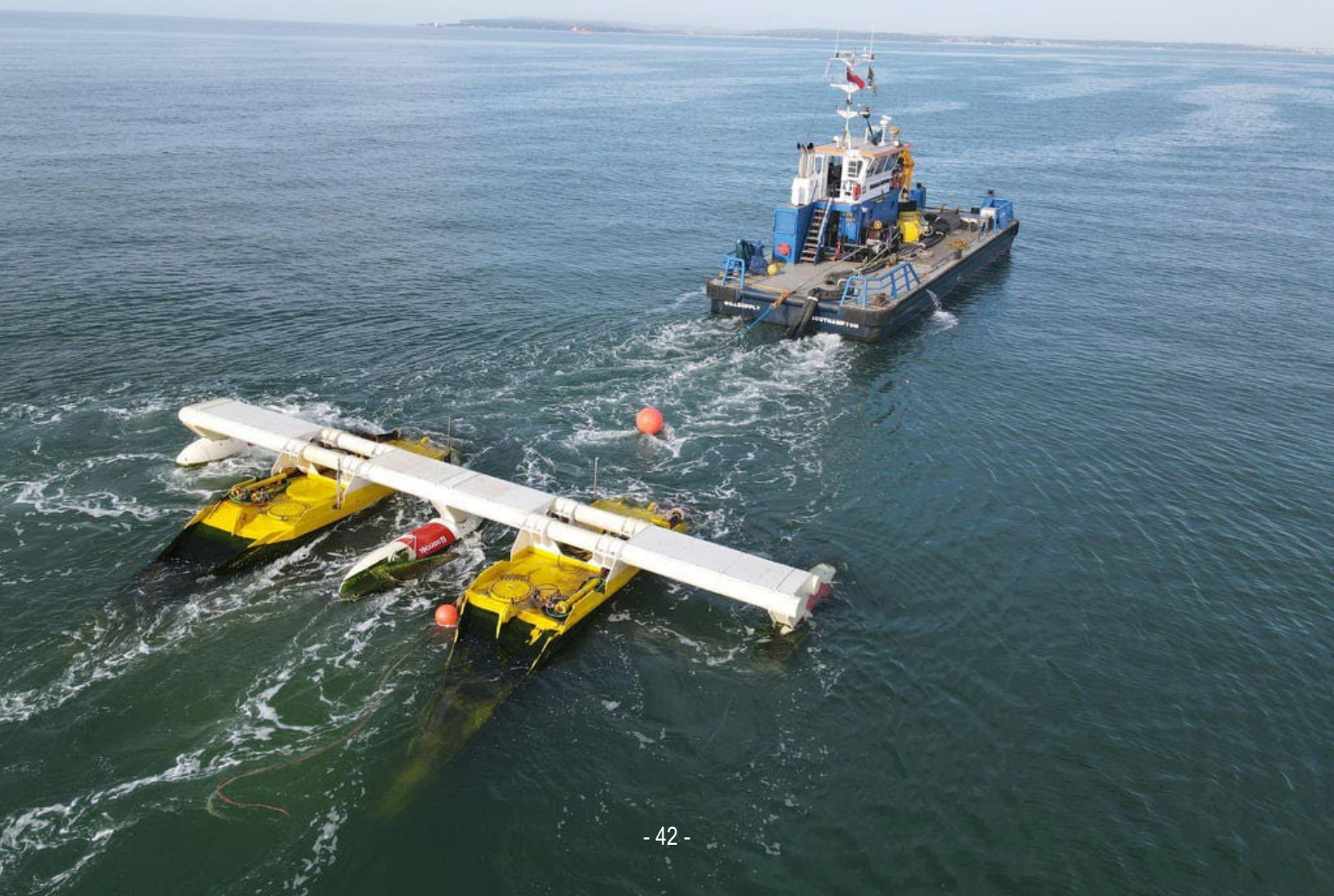
**TIDAL ENERGY:**  
A RENEWABLE ENERGY SOURCE  
ENTIRELY PREDICTABLE

# MOR ENERGY & MAGALLANES RENOVABLES APPLAUD UK'S TIDAL ENERGY BOOST

"It's official, the tidal stream energy market has taken off with 11 companies awarded the contracts for difference," said MOR Energy, a QED Naval subsidiary company, which has been supported in the latest UK renewables auction round along with Spanish-based Magallanes Renovables which also welcomed this significant milestone for the entire tidal energy sector.

Jeremy Smith, CEO of QED Naval, said: "We are delighted with this news and I would like to thank all our shareholders who have backed our ambitious vision and disruptive tidal technology. This is a huge vote of confidence in the tidal stream energy sector and will allow us to move forward with our plans to develop the infrastructure and create skilled jobs in the supply chain.

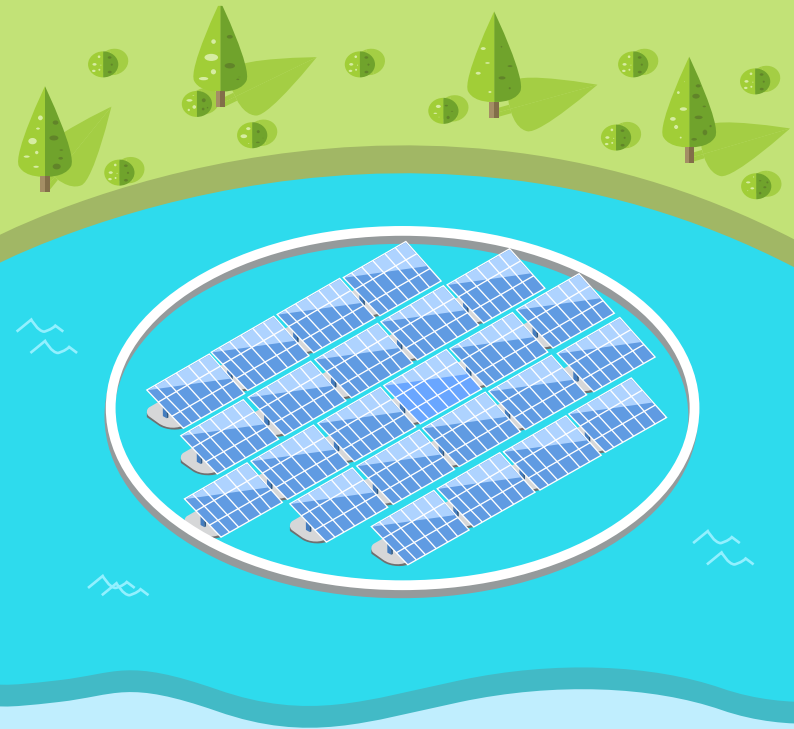
"With a global tidal energy market of £76 billion, and a predicted GVA of £1.4bn by 2030, supporting some 4,000 jobs, the UK has the chance to truly become the frontrunner of the ocean energy market globally."



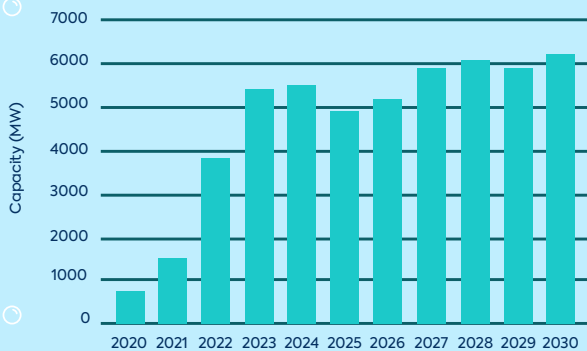


## MARKET OVERVIEW

# FLOATING SOLAR 2023



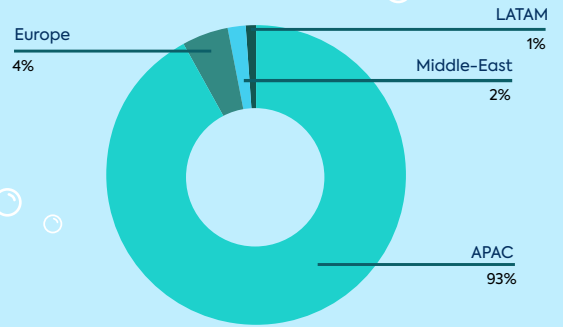
## Historical and expected annual global floating solar installations



Source: Wood Mackenzie

- According to Wood Mackenzie, the global floating solar installations amounted to about **3.8 GW** in **2022**.<sup>1</sup>
- **In the next ten years**, cumulative global floating capacity is expected to surpass **58 GW**.

## Market share



Source: Wood Mackenzie

The **Asia-Pacific (APAC)** region remains the **most dominant player** in the floating solar market, boasting over **93% of installations** in 2022 with a total capacity of **3 GW**.<sup>1</sup>

## Financial landscape



The global floating solar market is expected to increase from **\$2.5 bn** in 2021 to **\$24.5 bn** by 2031.<sup>2,3</sup>

## Market drivers



Land scarcity



Increased land costs



New market entrants



Growing market maturity

## Potential

A recent study published in the journal Nature found that covering **30%** of the **world's reservoirs** (between 0.01 km<sup>2</sup> and 30 km<sup>2</sup>) with floating solar panels could yield **9,434 TWh** of electricity annually, a figure that is close to the electricity output of all the world's coal-fueled power plants.<sup>4,5</sup>

### Top 3 countries for floating solar potential:



1,911 TWh per year



1,107 TWh per year



865 TWh per year

If implemented, the floating solar projects could preserve an estimated **106 km<sup>3</sup> of water** annually, a quantity that is almost equivalent to the amount of water utilized by **300 million people** each year.



# SOLARDUCK WINNER OF GREEN AWARDS AT GREENTECH FESTIVAL 2023

At the heart of GREENTECH FESTIVAL, the GREEN AWARDS celebrate the most innovative projects and minds. For the second time in the USA we will roll out the green carpet to celebrate those who are making a significant difference to our future: our green leaders. Together we will highlight their innovative projects, sustainable companies and long-lasting ideas, with a focus on mobility, energy, and a special prize for an outstanding contribution to a greener world.



## **SOLARDUCK**

Category: Energy

SolarDuck will build a 5MW offshore floating solar demonstrator plant with innovative, integrated energy storage solutions, due to become operational in 2026. The plant, the largest hybrid offshore floating solar plant in the world announced to date, will be integrated into the offshore wind park Hollandse Kust West VII in the Netherlands, 53 km from shore. The novel application of hybrid offshore floating solar in combination with offshore wind has very positive environmental and economic impacts. Doing so at megawatt scale will prove the scaling potential for both, offshore floating solar as well as hybrid parks; thus accelerating future developments. And finally, proving the technology at scale and in one of the most demanding marine environments in the world such as the North Sea is the ultimate proof of robustness.



# OCEAN SUN AND INSEANERGY ENTER A PARTNERSHIP TO SUPPLY THE AQUACULTURE INDUSTRY WITH GREEN ENERGY

Following the settlement of a patent dispute earlier this year, Ocean Sun and Inseanergy have entered into a cooperation agreement to supply green energy systems based on Ocean Sun's floating PV technology to the aquaculture industry worldwide.

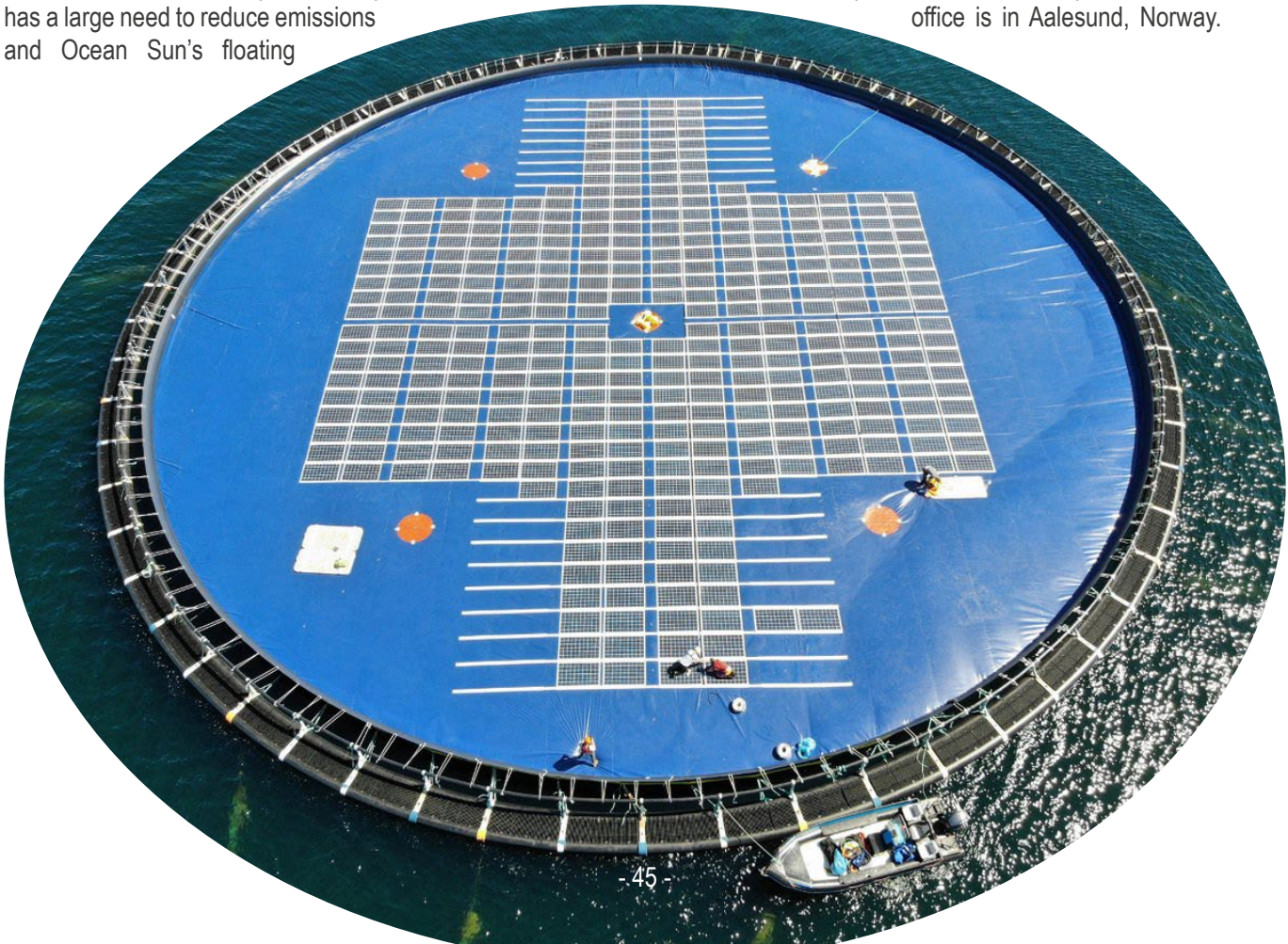
"Through extensive testing, validations, and full-scale demonstrators, Ocean Sun has shown that their technology is very well suited to our main market, namely operations in the aquaculture industry. By forging strong partnerships with world-class technology providers, in combination with our competence as a system integrator and our vast network within aquaculture, we can together increase the opportunity to take global green leadership" – says Kari-Elin Hildre, CEO of Inseanergy.

"The aquaculture industry in Norway and abroad has a large need to reduce emissions and Ocean Sun's floating

solar technology is perfectly suited for reducing fossil fuel consumption. Inseanergy is an ideal partner, as a system integrator, and in reaching the large and widespread market internationally. Strategically located in Ålesund, they have a significant client base in the aquaculture industry, and with the outward-looking and business-oriented view that a "Sunnmøring" is known for, they also have a global perspective on everything they do." – says Børge Bjørneklett, CEO of Ocean Sun

### About Inseanergy

Inseanergy is a cleantech energy company that develops and supplies green energy systems for aquaculture. Choosing an energy system from Inseanergy gives you access to self-produced, short-distance, and emission-free energy. The company was founded in May 2020 and its head office is in Aalesund, Norway.





Agnes "solar floating in the sea".  
Demo installation into the city dock of  
Ravenna (Italy)



# Swimsol

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Swimsol provides affordable and durable marine floating & rooftop solar PV systems for the tropics, where land space is limited. We make solar energy a hassle-free experience by handling all the tech & maintenance.



# ARE SOLAR PVT EVACUATED TUBES THE FUTURE OF THE OFFSHORE FLOATING SOLAR PANELS?



Matthias Herberich



Farshid Ebrahimi

Looking to the future, we need to be open to new ways to we can make our contribution to climate protection effectively.

In the currently available PV floating systems, they use framed standard photovoltaic modules and these are today more than 2 sqm and flat. But the size of the modules increases more and more with increasing performance. In the countryside this may be an advantage, but on the water, this is a big disadvantage. The static load caused by snow and above all wind and high waves are a major risk factor. The load on the material is therefore very high.

“Our innovative TUBE MODULE has addressed this problem”, explains the developer of this tube Matthias Herberich.

The round shape reduces the possible snow load. Wind and

waves have less attack surface. Thus, many photovoltaic projects can from a static point of view with classic modules on land and on water realized only at high cost.

Not to forget the design, because the power generation by Photovoltaics can also look good.

The prototype in the field of floating PV has already been successfully tested in practice. The next steps are optimization of size and performance and after this the test in wind and wave tunnel for the preparation of pilot plants at sea and on land.

Founding of a start-up. Investors are welcome.

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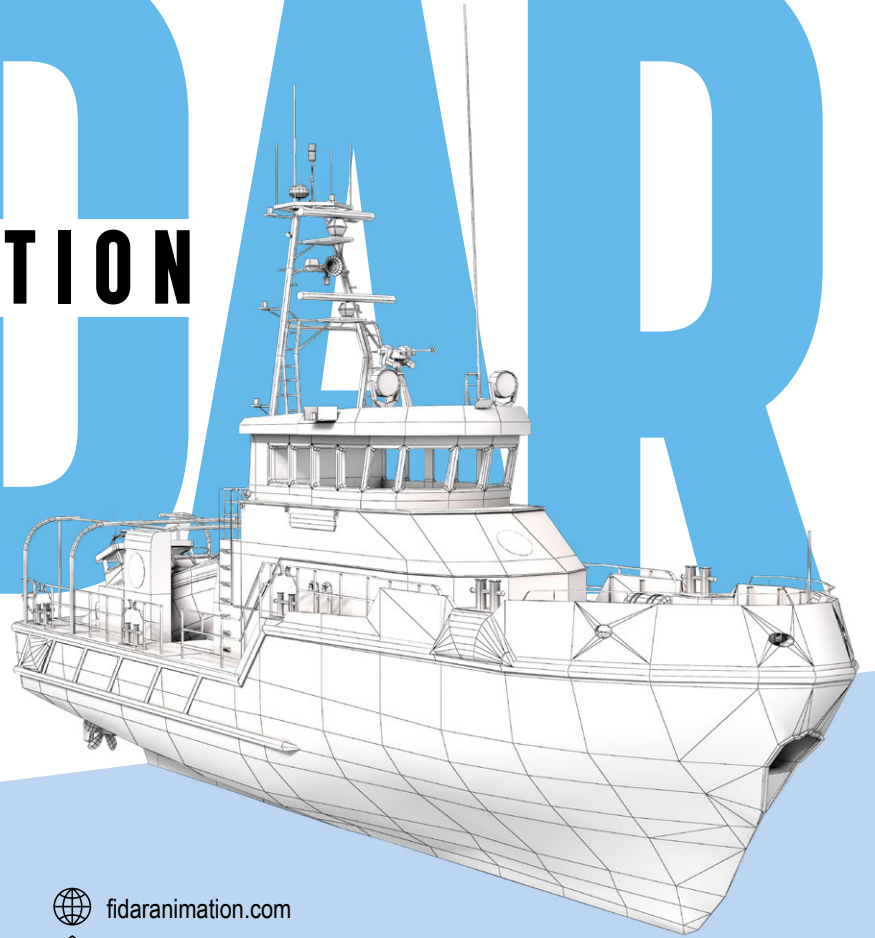


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