

# OFFSHORE CHANNEL

WORLD TREND & TECHNOLOGY FOR OFFSHORE ENERGY SECTOR

Offshore  
Renewable  
Energy

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

May & Jun 2024



*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.

# RWE MARKS MAJOR MILESTONE WITH INSTALLATION OF HVDC OFFSHORE CONVERTER PLATFORM FOR SOFIA OFFSHORE WIND FARM

- RWE achieves key milestone with the installation of the Offshore Converter Platform at its Sofia Offshore Wind Farm – its first deployment of HVDC technology offshore.
- The installation represents the largest lift of its kind in the offshore wind industry, underscoring the successful collaboration between RWE, GE Vernova, and Seatrium.
- Sofia is RWE's largest offshore wind farm under construction in UK waters, and has a capacity of 1.4 gigawatts, enough to power approximately 1.2 million UK homes.





# THE OFFSHORE SUB-SEA DEBUT OF PULSE® INSTALLING PIN PILES

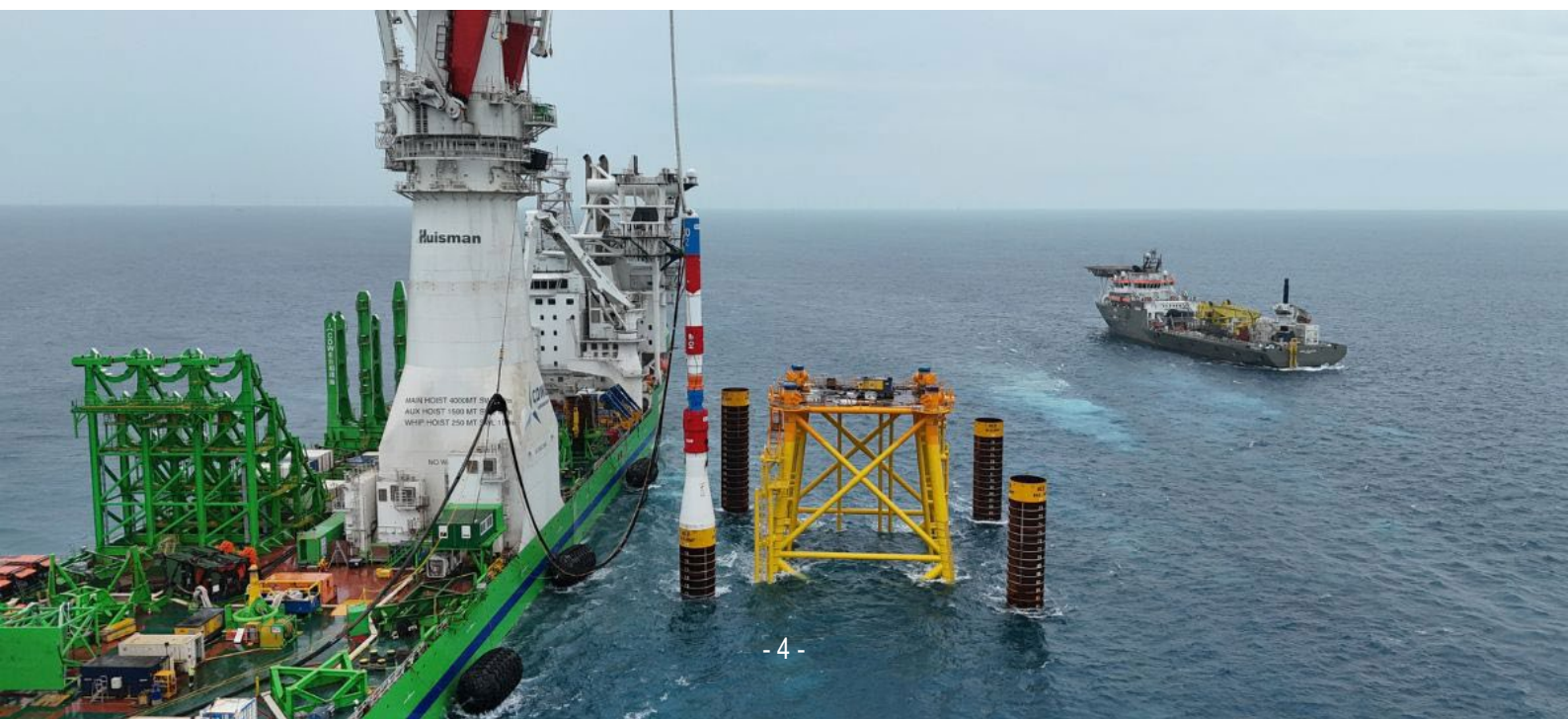
Recently, CSBC- DEME Offshore Engineerings' (CDWE) installation vessel 'Green Jade' successfully installed 84th pin pile of the Hai Long Offshore Wind project in the Taiwan Strait. Our IQ2 Hydrohammer®, in combination with PULSE, was used to drive those pin piles successfully to the target depth.

PULSE, designed to enhance noise reduction and – since 2020 – has already successfully installed around 150 monopiles and counting. It is also, for the first time, being utilized for the installation of sub-sea pin piles, proving being suitable for current pin pile diameters and showed consistent noise reduction results for sub-sea piling, as well as the ability to drive to final penetration.

Due to the successful installation of these piles at the Hai Long wind farm project, PULSE is also suitable for anchoring piles in the upcoming offshore floating wind market, keeping us at the forefront of technological development.

More about the PULSE®

PULSE is an innovative add-on to the Hydrohammer®, designed to enhance noise mitigation during offshore monopile installations. It consists of two pistons in a housing with a flexible column of fluid in between. This fluid-filled volume allows PULSE to control impact characteristics, reduce pile fatigue, reduce noise at the source, and protect marine life.





# Offshore Wind 4 Kids



We are beyond excited to launch our new **Floating Wind Model Set** Designed to inspire and educate the next generation about renewable energy and offshore wind technology!

Our model set features 5 unique floating wind turbine designs:

- Semi-Sub
- Suspended Counterweight
- Tension Leg Platform
- Barge
- Spar-Buoy



**Offshore Wind  
4 Kids**

#### Features:

**Expert Craftsmanship:** the models are crafted with the utmost care to ensure realistic and highly detailed models that replicate the complexities of a real floating wind turbines.

**Educational Value:** Perfect for aspiring engineers and renewable energy enthusiasts, these models provide an excellent opportunity to learn about the mechanics and design of floating wind turbines.

**Interactive Components:** With movable parts and a functional design, the models allow you to explore the intricacies of turbine operation, from the rotating blades to the stabilising bases.

**Materials:** Made from non-branded building blocks, the models ensure durability and a sleek, professional finish that stands out in any collection.

# GIANT DUAL-ROTOR WIND TURBINE TAKES TO THE SEAS



China's Mingyang Smart Energy has begun the deployment of a unique floating wind turbine structure. The company is calling the OceanX platform the world's largest floating wind power platform and the largest single-capacity floating wind platform.

Positioning of the platform began on Sunday, August 11, and is expected to take 72 hours to travel the 191 nautical miles to its offshore location in the Qinghou IV Offshore Wind Farm in Yangjiang, a city in southern China southwest of Hong Kong and Shenzhen. Officials highlight that it is a challenging navigation, maneuvering the platform below major bridges and past busy harbors while transiting the Pearl River Delta's waterways.

The platform is maneuvering along the Pearl River Delta toward its position in the ocean off Yangjian in Southwest China (Mingyang)

The platform was built at the CSSC Huangpu Wenchong Shipyard and launched in mid-July. The unique arrangement

incorporates two towers in a "V" shape, each holding an 8.3 MW MySE hybrid drive offshore wind turbine. The total output from the structure is expected to reach 16.6 MW.

Mingyang highlights that it is also the first use of ultra-high performance concrete that gives the structure a higher compressive strength. The company, which promotes itself as having the largest market share in offshore wind power, highlights as unique the structures airfoil double tower, its double main engine, double rotors, and application of the cable stay system as all being world firsts.

It is designed to be deployed in seas with a depth of 35 meters (115 feet) or greater with a draft of 5.5 meters (18 feet). It uses a single-point mooring system that can withstand extreme typhoons. At its highest point, OceanX is 219 meters (718 feet) and has a maximum width in the air of approximately 369 meters (1,200 feet). The total displacement is about 15,000 tons.



## NEXTFLOAT+ PROJECT SECURES €13M GRANT FROM INNOVATION FUND

The NextFloat+ Project has secured a 'cornerstone grant' of €13.4m from the European Commission's Innovation Fund supporting the industrialisation of floating wind.

The pan-European project aims to accelerate the roll out of the next generation of floating wind technology by boosting competitiveness and scalability.

Led by a consortium formed by X1 Wind, as project coordinator, alongside Technip Energies and NextFloat Plus S.A.S, it will involve the deployment of a 6MW floating wind platform at a test site in Mediterranean Sea.

The pre-commercial prototype, called 'X90', will demonstrate a cost-effective integrated system composed of a structurally efficient and lightweight floating platform with a SPM (Single Point Mooring) and a TLP (Tension Leg Platform), greatly reducing the seabed footprint impact.

The cash injection will further advance industrialization and scale-up of the integrated floating wind solution at 20MW+ scale.

X1 Wind CEO and co-founder Alex Raventos said the announcement comes after the X90 platform was granted a

Statement of Feasibility and a Statement of Compliance from world-leading independent expert DNV.

"We're thrilled to receive support from the Innovation Fund" said Mr Raventos. "The grant represents a cornerstone in the fundraising for the NextFloat+ Project, adding to finance already secured through the European Commission under the Horizon Europe program, finance secured through the French Government as part of the France 2030 plan operated by ADEME, plus private funding from partners and shareholders. Crucially, it will provide an opportunity to drive substantial improvements in the competitiveness of floating wind as we prepare for long-term mass deployment in locations around the world."

The NextFloat+ Project will build on the findings of the PivotBuoy Project, which proved X1 Wind's innovative technology by successfully deploying a part-scale prototype in the Canary Islands. In particular, it will introduce additional innovations to reduce the LCOE of floating wind and its environmental impact, namely the patented quick-connector system and the installation of a bio-boosting system applied on the floater.





# PRINCIPLE POWER SIGNS MOU WITH SHIPYARD HSG SUNGDONG TO ADVANCE SERIAL MANUFACTURING OF WINDFLOAT® FLOATING WIND FOUNDATIONS IN KOREA

Principle Power has signed a non-exclusive Memorandum of Understanding (MoU) with HSG Sungdong to cooperate on engineering developments for mass production and assembly of WindFloat® technologies. The agreement furthers the development of a sustainable domestic supply chain in Korea and supports the country's ambition to achieve 14.3 GW of offshore wind capacity by 2030.



# THE WINDCATCHER MODEL TEST

A physical model of the Windcatcher was recently tested at Stadt Towing Tank in Måløy, Norway. Measuring about 2 meters in all directions at 1:87.5 scale, the model was used to better understand how the concept behaves when exposed to hydrodynamic loads. The physical test campaign has provided valuable input to our technology development, confirming the favourable performance of the Windcatcher in a range of environmental conditions.



# WHEEL TECHNOLOGY WINNER FROM FLOWIN PRIZE PHASE TWO

Esteyco is pleased to announce that the WHEEL technology has been named a winner of the second phase of the U.S. Floating Offshore Wind Readiness (FLOWIN) prize by the U.S. Department of Energy (DOE)

Jose Serna, Chief Technology Officer in Esteyco, said:

“We are very pleased and committed to keep working hard so the Esteyco’s WHEEL floating wind platform can decisively contribute to making industrialized US-built floaters a closer reality.”

This Phase Two consisted of adapting the WHEEL technology for serial production, detail plan for mass production, assembly and deployment as well as preparing a cost estimate and production analysis for deployment in the U.S.

WHEEL is a concrete-made patented evolved spar solution, in which a stabilizing ballast tank is suspended from an upper buoyancy tank. The triangular configuration of the suspension

cables ensures both bodies move solidarily. The upper hull is submerged for convenient transparency, with a modular steel tripod emerging as transition piece.

This allows for fast concrete caisson construction on floating barges, qualitatively reducing the port infrastructure requirements.

With the WHEEL technology 98% of local US content can be achieved!

Congratulations to the WHEEL-US team, composed of Esteyco, as Coordinator, TotalEnergies, SSA Marine, IEA Infrastructure Construction, Sarens USA and Rover for the good work and to the other four Phase Two winners.

We are one step closer to US’s ambitious goals to achieve net zero emissions by establishing a pathway to cost-effective domestic manufacture and deployment of gigawatt-scale floating wind farms in U.S. waters.



# Principle Power

Globalizing floating wind

**Assembly of the Principle Power designed WindFloat® foundations is currently underway at Eiffage Metal's Fos-sur-Mer yard, working to connect the upper and lower main beams to the three column modules. Once the main structural connections are complete, the platforms will then be outfitted before the pre-commissioning and loadout phase.**

The lessons learned through the design and construction of LES EOLIENNES FLOTTANTES DU GOLFE DU LION (EFGL), along with our operational projects, WindFloat Atlantic and Kincardine, directly inform the features of our 4th Generation WindFloat® product portfolio.

These precommercial projects are stepping stones that enable us to move confidently to design commercial scale projects by allow us to test our products with different wind turbines, site conditions, supply chains, fabrications methods, contracting strategies, among others.

The project, owned by OW Ocean Winds and Banque des Territoires, will host three Vestas V164-10.0 MW wind turbines, and deliver a total capacity of 30 MW.

Once operational, the floating wind farm will provide clean energy to 50,000 homes, supporting France's goal of achieving 40 GW of offshore wind capacity by 2050.





## IN-LINE MOORING BUOYANCY SOLUTION FOR FLOATING WIND TURBINES AND STRUCTURES

Balmoral offers multiple mooring buoy solutions - standard systems which can be provided for traditional mooring systems and bespoke in-line mooring buoy systems that provide several unique characteristics and advantages for the floating wind market.

The Balmoral in-line mooring buoy is designed to secure floating wind turbines and structures to a seabed anchor whilst providing uplift to the mooring line and also act as a connection point between the bottom and top sections of the line.





**JBA**  
consulting

# JBA CONSULTING PARTNERS WITH QUOCEANT ON CUTTING- EDGE SUBSEA TECHNOLOGY DEVELOPMENT



**We're excited to announce that our ForeCoast® Marine software has been chosen by Quoceant to demonstrate the benefits of its innovative Q-Connect system.**

## **What is the Q-Connect System?**

The Q-Connect system is a versatile subsea technology, a quick connection system designed for the rapid and safe connection and disconnection of moorings and electrical cables to marine renewable devices. Its 'hands-free' remote operation eliminates the need for specialised vessels or complex cable handling. Offering a safer, more efficient alternative to conventional methods.

## **Why ForeCoast® Marine?**

ForeCoast® Marine has been chosen by Quoceant to demonstrate what makes the Q-Connect system a game-changer for the marine energy sector. Our software will be used

to simulate how Q-Connect performs in real-world offshore energy projects, comparing it to traditional connection methods. Evaluating everything from costs and project timelines to environmental impact. This modelling work is supported as part of Quoceant's wider development programme which has received funding from the Offshore Wind Growth Partnership (OWGP).

## **Benefits for floating offshore wind**

Leigh Baxter, an IDCORE Research Engineer working with Quoceant, will also use ForeCoast® Marine to explore the Q-Connect system's specific advantages for floating offshore wind farms. The project aims to address the unique challenges of floating platforms, such as maintaining stability and ensuring reliable electrical connections in changing conditions. This investigation will underline the transformative potential of the Q-Connect system for the floating wind sector.

# MOOREAST

## MOOREAST OUTLINES STRATEGIES TO ENHANCE MOORING SOLUTIONS FOR THE FLOATING RENEWABLE ENERGY SECTOR



Mooreast Holdings Ltd announced plans to expand its mooring and rigging solutions product portfolio and to enhance partnerships with international players in order to extend its value proposition to the global floating offshore renewable energy sector.

Mooreast released a Business Update outlining growth strategies outlined its growth strategies following its successful listing on Singapore Exchange (SGX) Catalyst in November 2021.



## COMING SOON: **NEW MONO-PILE INSTALLATION VESSEL**

New foundation Mono-pile installation tonnage is quickly needed, this part of the offshore wind market is “the most under-ordered segment in offshore wind.” “BALTICA STAR” solutions can accelerate your offshore wind projects worldwide.



**Jeroen Berkhout**  
Project Director at  
Offshoretronic



# SHANGHAI ELECTRICS PURPOSEBUILT SOVS DELIVERED



On August 16, 2024, Shanghai Electric proudly named and delivered two state-of-the-art Service Operation Vessels (SOVs) at ZPMC's Qidong base in China. These vessels, designed by Ulstein Design & Solutions AS, are the first purpose-built for China's offshore wind industry.

Featuring the innovative X-BOW and X-STERN designs, these SOVs ensure optimal seakeeping, reduced slamming, and enhanced safety. The Zhi Cheng 60 (ULSTEIN SX197) and Zhi Zhen 100 (ULSTEIN SX195) offer superior station keeping, wave response, and operability in high seas.

Liu Xiangnan, Vice President of Wind Power Company at Shanghai Electric, states that:

"The choice for Ulstein design has been based on their market leadership, proven track record and local presence. During the process of developing these concepts, Ulstein has been dedicated to their professionalism and expertise. Close collaborations among Ulstein, the yard ZPMC and Shanghai Electric have set a strong foundation for the projects. Shanghai Electric is the leading provider of offshore wind turbines in China. With these two world-class SOVs, we believe we can bring more value to our clients and provide a safer working environment to our colleagues at sea."



## **ØRSTED LAUNCHES WORLD'S FIRST HEAVY-LIFT CARGO DRONE OPERATIONS AT BORSSELE 1&2 OFFSHORE WIND FARM**

Ørsted, the global leader in offshore wind, is deploying heavy-lift cargo drones (HLCD) for the first time in an operational campaign at the Borssele 1&2 Offshore Wind Farm. This pioneering move marks a significant leap forward in operational efficiency and safety in the offshore wind industry. The heavy lift cargo drone will transport cargo from a vessel to all 94 wind turbines of the Borssele offshore wind farm.

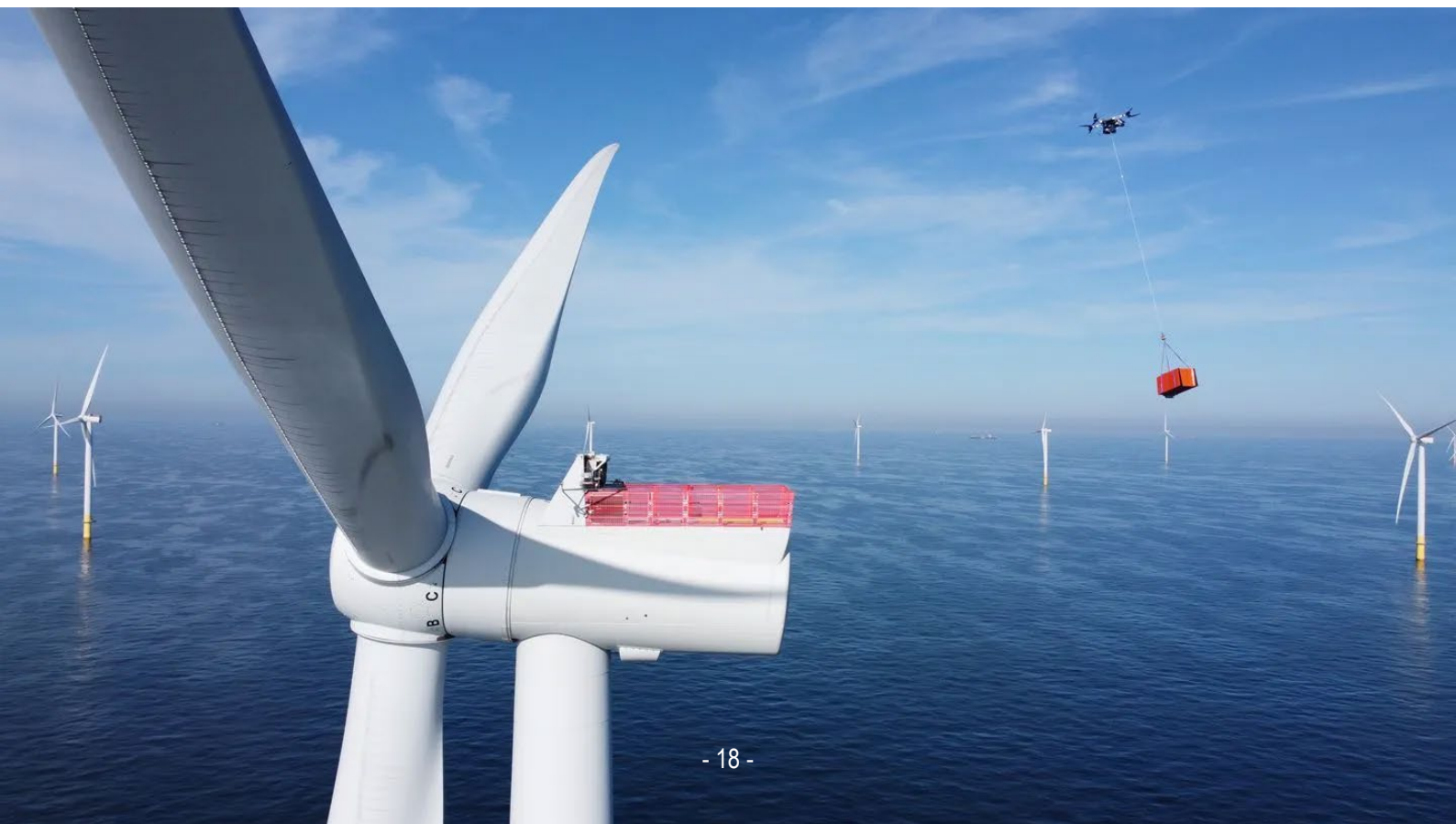
Building on previous trials and expertise using drones in other offshore wind farms, Ørsted is using the 70 kg drones - which have a wingspan of 2.6 metres - to transport cargo of up to 100kg, in an actual operations campaign, after the concept was tested last year at the Hornsea 1 Offshore Wind Farm in the UK.

For this specific campaign, Ørsted has decided to update some critical evacuation and safety equipment in each of the turbines. Normally, a vessel would sail from one wind turbine to the next, using a crane to lift each box containing the equipment onto the transition piece, after which the box would be lifted with the nacelle's crane to reach the nacelle and then be moved to the top of the turbine. Instead, the drone will simply fly back and forth from an offshore supply vessel directly to the top

of the nacelle. The drone flight from the vessel to the turbine takes about four minutes per turbine, while the conventional approach without using drones can take approx. six hours. Taking vessel transport between the turbines and from-and-to shore into account, Ørsted has been able to complete the tasks at Borssele 10-15 times faster than normally.

Rasmus Errboe, Chief Commercial Officer and Deputy-CEO at Ørsted, said:

"Ørsted has led offshore wind's journey from a niche technology to a cost-competitive and large-scale source of renewable power. We've done this through some big leaps by for example pioneering new turbine models, but also by continuously moving a lot of new and innovative ideas from the drawing board to real life application. The drones at Borssele 1&2 are a great example of this, as they will improve safety, bring down carbon emissions, and reduce the cost of operating offshore wind farms, which all further improve the commercial fundamentals of offshore wind for investors, governments, and corporations."





# PARKWIND INSTALLS MJR OFFSHORE CHARGING SYSTEM

Parkwind - JERA Nex takes a sustainable leap forward as it achieves world-first offshore green energy charging with MJR Power & Automation's pioneering system at Nobelwind wind farm

- Pioneering charging station enables vessels to access local renewable energy at sea, reducing CO2 and promoting sustainable operations
- Landmark achievement as system tested successfully over a 2-day period with power transferred safely to a CTV from a fully operational and producing offshore wind farm, a world first!

Parkwind has installed a pioneering boat charging station system at sea, designed to minimize greenhouse gas emissions from maintenance vessels and promote sustainable operations. Powered by local, renewable energy sources, this innovative infrastructure investment is a crucial step towards enabling low-carbon water transport. By utilizing locally-

sourced renewable electricity, we are further supporting our mission to generate clean energy while diligently minimizing our environmental footprint. This ground breaking initiative not only enhances sustainable maritime practices but also reinforces Parkwind's commitment to leading the transition to a greener future.

This innovative system, operational for the first time at the Nobelwind wind farm, enables vessels to use green, locally generated energy directly. The technology, developed by UK-based partner MJR, and integrated and deployed in collaboration with Parkwind, allows ships to connect to the charging cable and thus stay in place while charging, despite sea currents.

The automatic coupling and uncoupling process and charge management have been extensively tested and found to be successful. With this



# DESIGNED TO LIFT & UPEND PIN PILES FOR INSTALLING JACKETS

Shinfox Far East (SFE) commissioned TWD to design a pin pile lifting tool (PPLT) for the TPC Offshore Wind Farm off the coast of Taiwan. The tool's primary function is to lift pin piles for installing jackets, which serve as foundations for offshore wind turbine generators. In addition to the PPLT, TWD designed a dedicated seafastening frame for storing the tool during transit.

The PPLT is designed to lift and upend the pin pile by securing itself with hydraulic clamps. It includes a stabbing frame to ensure a smooth landing on the pin pile and has a working load limit (WLL) of 800 tons.

The main challenge was to deliver the PPLT within a strict timeline. TWD addressed this by adapting the design to match component procurement times, using off-the-shelf parts when possible, and providing procurement and fabrication assistance. The successful outcome was achieved through dynamic cooperation among suppliers, fabricators, SFE, and TWD.

#### Project highlights:

- Ensures smooth landing by using a stabbing frame
- Design adaptations to match procurement timeline
- Main clamps frame with rotational capacity
- Centralizing cylinders to ensure clamps alignment and pile disengagement
- Fully remote controlled



# More impact with less Jacking grease

## Proven results

- Reliable protection of equipment
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- Up to 30% volume reduction



More impact with less



## Properties

- Extreme load capacity
- Good pumpability in your systems
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Read more about our  
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high-performance lubricants



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# REMAZEL ENGINEERING SUCCESSFULLY COMPLETES TESTING PHASE FOR MONOPILE LIFTING TOOL

Remazel Engineering, an Italian provider of engineering solutions for the offshore market, announced the successful completion of the testing phase for their monopile (MP) Lifting Tool last week.

Designed according to the most challenging technical requirements of the offshore wind industry, this Lifting Tool features a groundbreaking lifting capacity of 3000 tonnes and an adaptable diameter ranging from 7 to 9 meters.

The test bench was engineered and constructed entirely in-house. The tests were performed at the exceptional load of 3600 ton, a number that marks a record in this sector, according to Remazel.



**PLARAD**<sup>®</sup>  
Torque & Tension Systems



## REVOLUTIONIZING BOLTING TECHNOLOGY: MEET THE XA1 POWER BATTERY HYDRAULIC PUMP BY PLARAD

For over 60 years, Maschinenfabrik Wagner, known under the brand PLARAD, has been at the forefront of bolting technology innovation. Specializing in a broad range of torque and tension systems—including electrical, pneumatic, hydraulic, manually, and battery-powered torque tools and pumps—PLARAD also offers comprehensive service and maintenance solutions for all common bolting systems.

Now, PLARAD is setting a new standard in the industry with the introduction of the XA1power Battery Hydraulic Pump. This groundbreaking tool is designed to transform the way you approach bolting operations, offering unmatched flexibility and ease of use.

### Why the XA1power Stands Out:

**170 bolting applications per charge:** Reliable performance you can count on.

**Lightweight and compact:** Weighing only 10 kg, the XA1 is easy to transport and reduces physical strain.

**Wireless remote control:** Enjoy full operational freedom with remote access.

**Engineered for excellence:** CE-approved and designed by

industry experts, ensuring top-tier performance.

**Fully automatic operation:** Simplifies tasks and boosts productivity.

**Test over 1000 bolts on a single charge:** Maximize efficiency with an impressive battery life.

Perfectly engineered to operate hydraulic wrenches up to 800 bar and deliver torque up to 150,000 Nm, the XA1 offers unparalleled versatility. Its compact design eliminates the tripping hazards associated with traditional power cables and heavy equipment, making it an ideal choice for both fieldwork and industrial environments.

With the XA1, PLARAD introduces a new era of bolting technology. Whether you're working in construction, wind energy, or oil and gas, this innovative tool delivers the power and precision you need—anywhere, anytime.

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IACS members and  
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all the optional  
depending on  
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# SPS SUPPLY AND DISTRIBUTE THE HIGH STRENGTH, LOW TEMPERATURE STEEL USED IN THE OFFSHORE ENERGY INDUSTRY

Offered as plate and sections to the exacting requirements both in terms of product and quality assurance, required by today's ever-demanding industry. All material is manufactured by globally reputable steel mills, rolled to industry standard or bespoke specifications as required.

Our stock range of offshore, marine and high strength structural grades in plates, sections and tubes, together with our relationships with mainstream European producers ensures that we are ideally placed to provide all steel requirements from project start-up to completion.

Our experienced and knowledgeable team are on hand to give further help and advice, please do not hesitate to contact us.





**Northern Ireland  
Maritime & Offshore**

## NORTHERN IRELAND'S MARITIME AND OFFSHORE SECTORS ARE SET TO REACH NEW HEIGHTS WITH THE LAUNCH OF THE NORTHERN IRELAND MARITIME & OFFSHORE NETWORK (NIMO).

NIMO, which is being funded by Invest Northern Ireland's Collaborative Growth Programme, will unite Northern Ireland's Maritime and Offshore sectors by supporting members to unlock commercial opportunities through innovation and collaboration.

Launching the new network are (from left) Stephen Kane (NIMO chair), Kerry Muldoon (NIMO member), Kieran Donoghue (Invest NI chief executive) and John Patterson (head of defence at Artemis Technologies)

Kieran Donoghue, CEO, Invest Northern Ireland said "Northern Ireland has a rich maritime heritage, and the sector plays an important role in the Northern Ireland economy, employing over 5,000 people and contributing almost £4bn to our economy each year. With NIMO poised to catalyse collaboration, innovation, and growth, Northern Ireland's maritime future looks brighter than ever.

"Invest NI is pleased to support NIMO which will advance our maritime and offshore sectors while addressing key strategic priorities, including job creation, regional balance, productivity enhancement, and carbon emission reduction. We are excited to see how the network will evolve over the coming years, as it expands its member base and reaps the benefits of Northern Ireland's rich maritime and shipbuilding heritage. With NIMO poised to catalyse collaboration, innovation, and growth, Northern Ireland's maritime future looks brighter than ever."

NIMO Chair, Stephen Kane, said: "This launch marks a significant milestone for long-term growth in Northern Ireland's maritime and offshore sectors. Through NIMO we aim to drive economic expansion locally, unlock sustainable opportunities through collaboration, and position ourselves as a leading maritime region in the UK and Europe.

"I am looking forward to working closely with our members,

partners, and stakeholders to achieve mutual success, and playing our part in ensuring Northern Ireland is a key destination to invest, work and live."

Through NIMO we aim to drive economic expansion locally, unlock sustainable opportunities through collaboration, and position ourselves as a leading maritime region in the UK and Europe.

Stephen Kane, NIMO Chair

The launch of NIMO builds on the work of the Belfast Maritime Consortium, which was led by Artemis Technologies, delivering an unprecedented investment of £33 million into Northern Ireland's new maritime ecosystem, through UK Research & Innovation's Strength in Places fund.

Dr. Iain Percy, CEO at Artemis Technologies, said: "As the founding member, Artemis Technologies is immensely proud to see NIMO officially launch.

"Working at the forefront of maritime innovation, we understand firsthand the importance of partnering and working together to achieve otherwise unattainable goals. We believe NIMO embodies this collaborative spirit, offering a unique platform to showcase Northern Ireland's exceptional talent, skills, and expertise to the world."

NIMO is made up of 46 members including Kinsetu, Belfast Harbour, Harland & Wolff, MJM Marine, Foyle Port, Doyle Shipping Group, CASC, Sea Source, Simply Blue Group and many more. The launch event is taking place at Belfast Harbour on 11th April and precedes the prestigious Maritime UK awards in Belfast on June 5th, 2024, which underscores Northern Ireland's growing prominence in the maritime and offshore wind sectors.



# ENSURING STABILITY: SCOUR PROTECTION FOR SUCTION PILES IN OFFSHORE WIND FARMS

As the offshore wind industry continues to grow, ensuring the stability and longevity of our structures is more crucial than ever. One key challenge we face is scour – the erosion of sediment around underwater foundations, particularly suction piles that support wind turbines.

## Why is Scour Protection Essential?

Scour can lead to significant structural issues if not addressed, risking the integrity of turbine foundations and ultimately impacting energy production. Effective scour protection is vital for:

- **Maintaining Structural Integrity:** Preventing sediment displacement around suction piles ensures they remain securely anchored and stable.
- **Enhancing Operational Efficiency:** A well-protected foundation contributes to optimal turbine performance and reduces maintenance needs.
- **Promoting Sustainability:** Protecting our offshore structures minimizes environmental impact and supports marine ecosystems.

## Innovative Solutions

At Ridgeway Rockbags®, we are dedicated to implementing cutting-edge solutions for scour protection. Our approach includes utilizing advanced materials and techniques tailored to withstand the harsh marine environment while ensuring minimal disruption to local ecosystems.

## Join Us in Leading the Way!

We believe that by prioritizing scour protection, we can enhance the resilience of offshore wind farms and contribute to a sustainable energy future. Let's work together to harness the power of wind while safeguarding our marine environments!


**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



**Jochem Tacx**  
**Cesare Meinardi**

An aerial photograph of a large offshore supply vessel, likely a jack-up vessel, positioned on the sea. The vessel is white with blue and orange accents. A prominent red lattice crane is mounted on the deck, extending upwards. The sea is a deep teal color. The vessel's deck is cluttered with various pieces of equipment, including pipes, containers, and structural elements. The overall scene is captured from a high angle, looking down at the vessel.

# **BUILDING AN OFFSHORE WIND FARM**

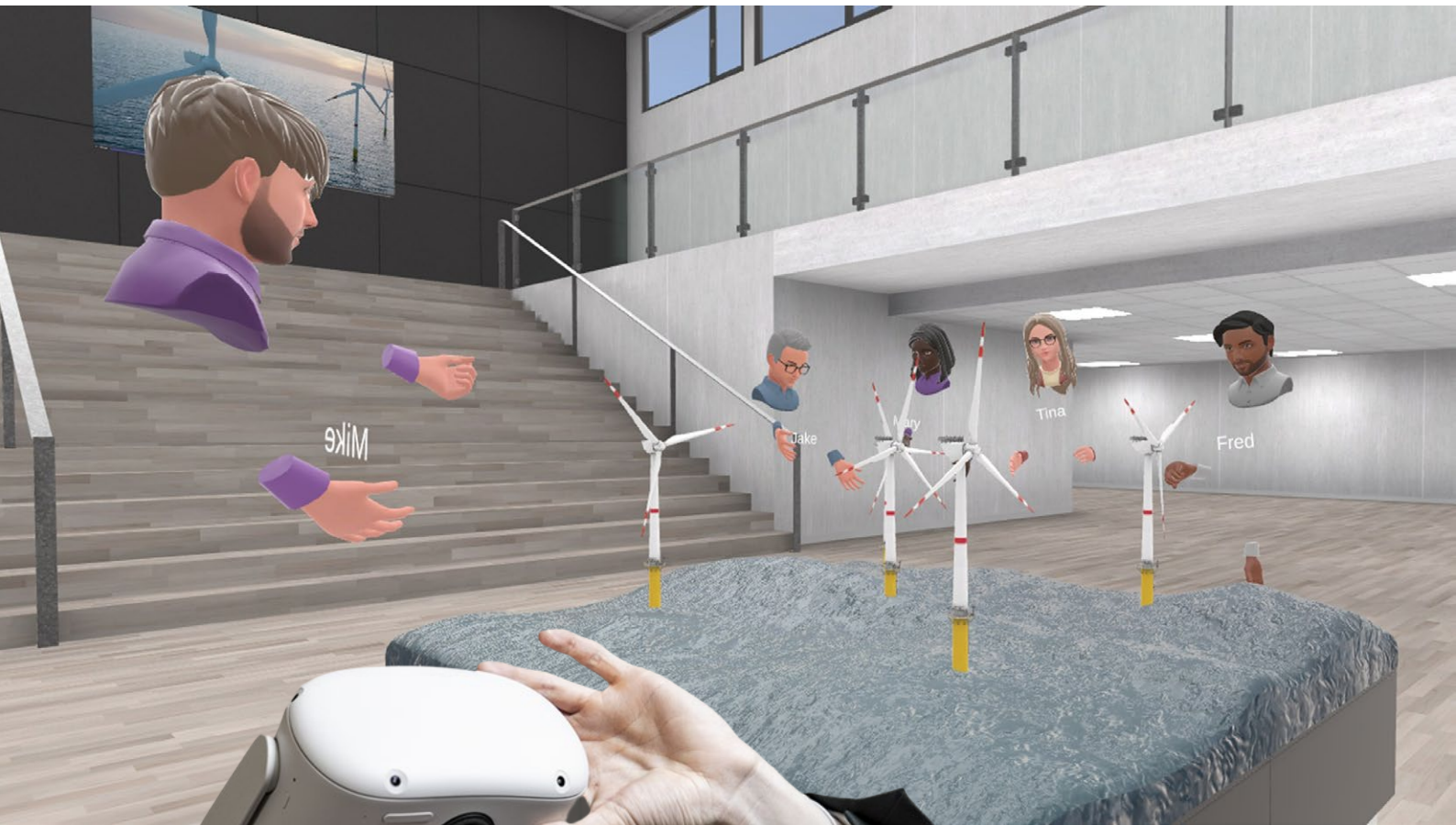
**OPERATIONAL GUIDE**

**Second edition**



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.





# OFFSHORE PHOTOGRAPHER

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

**Christophe Beyssier**

Photographer – France

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*Photo by: Gareth Rowland*

# APOLLO ANNOUNCES SUCCESSFUL TRIAL OF INNOVATIVE PALM QCS™ SYSTEM IN ORKNEY

Apollo, a leading engineering and energy advisory consultancy, is thrilled to report the successful trial of the PALM Quick Connection System (QCS) for floating offshore renewables. The trials, which took place from the end of March to the end of May this year in Orkney, demonstrated the robust capabilities of the system in real-sea conditions.

Developed through the Wave Energy Scotland (WES) Quick Connection Systems programme and with support from the Offshore Wind Growth Partnership, the PALM QCS is designed to streamline the efficient hook-up and disconnection of cables and/or moorings for floating offshore renewable devices. This system reduces operational costs significantly by enabling quick connections via the winching action of a conventional tow tug, thereby avoiding the need to tow devices to port for maintenance—a process that can be costly in terms of marine spread and lost generation time. The system allows connection and disconnection in higher sea states and removes the need for connections to be carried out on deck.

The PALM QCS is a mechanical system that can also incorporate electrical wet mate connectors bringing both together using the winching action alone. During the recent trials in Orkney, the system withstood severe weather conditions, including Storm Kathleen, and demonstrated its robustness through multiple connect and disconnect operations.

Apollo's Offshore Renewables Director Nigel Robinson stated, "The successful trial of the PALM QCS in Orkney is not just a milestone for Apollo, but a testament to the powerful collaborations that drive our industry forward. We are grateful to Wave Energy Scotland, through which the PALM QCS™ was conceived and developed. Their ongoing support is vital to our success. Equally, our thanks go to Lease Marine, who were essential as our marine contractor, and to the numerous local supply chain companies whose contributions were crucial. This trial showcases what we can achieve together to advance the future of offshore renewable energy, and we look forward to continuing these collaborative efforts in the future."





## SLOW MILL SUSTAINABLE POWER BV MOVES WEC FOR DRY TESTING AND OFFSHORE PREPARATION

In typical Dutch drizzling rain, we moved the Slow Mill-40 wave energy converter from the harbour location in Den Helder to the dry testing site.

At this site, the 40 kW wave energy generator will be subject to rigorous #drytesting before deployment at the Offshore Test Site (OTS) at Scheveningen.

In previous offshore tests, the structural design proved to be robust enough for the rough #NorthSea wave climate. We've improved the anchoring system, the blades and controllability of the device.

Aim of this series of testing is to get #validation of a full functional system (TRL 6), the energy production capacity and the survivability after one year of deployment.

Wave energy has a huge potential to contribute to a stable and reliable energy grid due to its complementarity with wind and solar.



# C-POWER & OPEN OCEAN ROBOTICS TO TEST INNOVATIVE USV ‘DATA MULING’ CONCEPT DURING DEMONSTRATION OF SEARAY OCEAN ENERGY SYSTEM

The upcoming field test of C-Power’s industry-leading SeaRAY autonomous offshore power system (AOPS) at the PacWave South wave energy test site off the Oregon coast will include co-demonstration of an uncrewed surface vessel (USV) from Open Ocean Robotics, the companies announced today.

The upcoming field test of C-Power’s industry-leading SeaRAY autonomous offshore power system (AOPS) at the PacWave South wave energy test site off the Oregon coast will include co-demonstration of an uncrewed surface vessel (USV) from Open Ocean Robotics, the companies announced today.

Open Ocean Robotics is a member of C-Power’s Partner Engagement and Co-development (PEC) Program. The companies seek to use the Oregon co-demonstration as a pilot project to advance a vision in which a C-Power AOPS serves as a central node of power and data for a swarm of Open Ocean Robotics USVs muling data from remote sensors to the AOPS to be uploaded to the cloud.

*“C-Power and Open Ocean Robotics share the belief that the future of the ocean economy is resident, digital, and autonomous,” said C-Power CEO Reenst Lesemann. “Working together, our USV and AOPS technologies have a pivotal role in enabling this digital and autonomous ocean economy. Our partnership demonstrates our shared commitment to delivering innovative power and data solutions wherever they’re needed offshore.”*

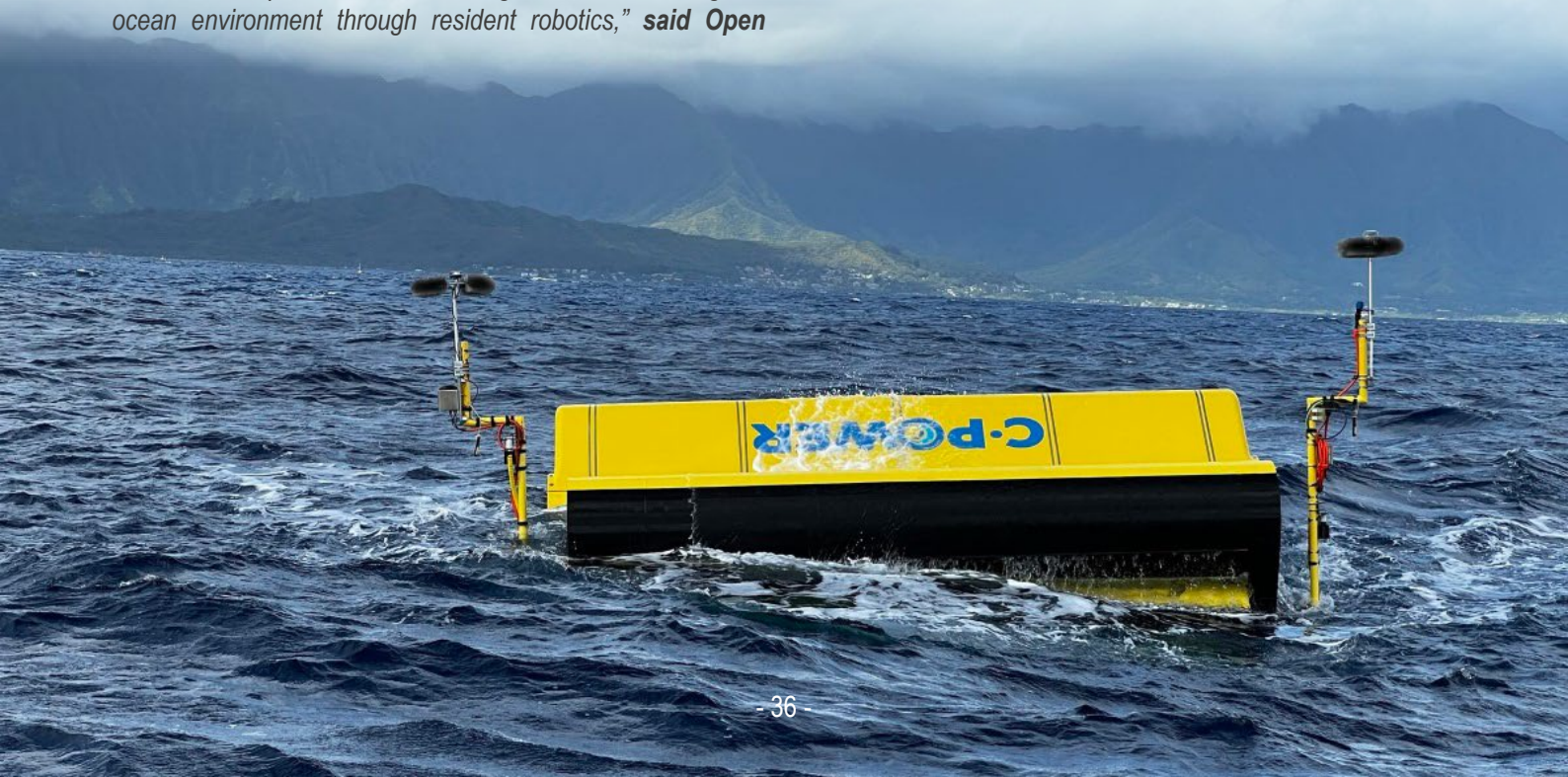
*“This collaboration showcases how our complementary technologies can extend persistent maritime operations and unlock new capabilities for observing and understanding the ocean environment through resident robotics,” said Open*

*Ocean Robotics Director of Sales Andy Ziegwied. “By combining SeaRAY’s reliable power and data connectivity with our energy-efficient data muling approach, we can dramatically increase the endurance and geographic scope of critical ocean monitoring missions.”*

*Ziegwied added, “Permitting and regulatory stakeholders are concerned with the potential environmental effects of introducing novel devices into marine ecosystems, requiring comprehensive monitoring data to inform decisions. Our partnership with C-Power will enable sustained data collection, providing vital insights to evaluate any impacts on the local marine environment.”*

The Oregon co-demonstration is being conducted in partnership with the U.S. Department of Energy (DOE) to advance the next generation of SeaRAY AOPS, expanding its use cases and proving long-duration survivability and reliability in one of the world’s harshest ocean environments. The next-gen system has been developed under a \$6 million program co-sponsored by the DOE, C-Power, and several PEC program participants.

A C-Power AOPS is a fully integrated system providing in-situ power, energy storage, and real-time data and communications support for offshore applications, including data-gathering equipment, robotic systems such as autonomous underwater vehicles, operating equipment, and uncrewed surface vessels. The SeaRAY AOPS at PacWave South will showcase significant advancements over prior generations, including deep-water mooring capabilities, satellite communications, higher generating capacity, increased transportability, improved maintenance and operations, and more efficient manufacturing.





# SMC MARINE:

## TRIAL ASSEMBLY OF THE UNIVERSITY OF WESTERN AUSTRALIA'S M4 WAVE ENERGY PROTOTYPE

The 'Moored MultiMode Multibody' (M4) Wave Energy Demonstration Project will design, construct, deploy, operate and decommission a wave energy converter in Albany's outer harbour, King George Sound. The M4 device is surface-riding, with two frame segments on floater buoys, generating electricity through the flexing motion in the hinge.

The M4 Project will demonstrate:

- the potential of the wave resources in the Great Southern to power the local economy and develop an export industry;
- the capabilities of the local supply chain in undertaking large scale ocean energy projects; and
- the efficiency of the M4 wave energy technology

The M4 is an attenuator type of wave energy converter, consisting of multiple floats connected by beams above the water. In the Albany demonstration device, three rows of floats are arranged in a 1-2-1 float array, with float diameter increasing from front to rear. The centre float hinge allows relative rotation between the front and rear beams, producing power from this

angular rotation under wave action. A single point mooring and the relative sizing of the floats allow the structure to naturally weathervane.

Electricity from wave action will be supplemented by two small wind turbines and a solar array and used for data collection and transmission. The demonstration model is scaled to 24 m length and will absorb 1-10kW in the target sea-states of King George Sound. Sensors will feed real-time, in situ data on device performance including energy production, motions, etc. to on-board systems.

The Great Southern coast boasts one of the world's best wave energy resources for power density and consistency. A grid connection point exists at the Albany Windfarm at Moodrenup/Sandpatch for a future full-size wave energy converter. The M4 Project established a potential nursery site for wave energy technology testing and uses a reduced-scale converter to model the potential for wave energy in decarbonising nearby end user operations such as the Albany Shellfish Hatchery and Albany's Historic Whaling Station on the Torndirrup Peninsula.

- **Project Partners:** Carnegie Clean Energy, Blue Economy CRC, Huon Aquaculture, Tassal Group, DNV GL Australia, Advanced Composite Structures Australia, University of Tasmania, Climate KIC/Australian Ocean Energy Group, AMC Search and University of Queensland
- **Location:** Carnegie's research centre and headquarters – North Fremantle, Western Australia

### About the Project

The MoorPower™ Scaled Demonstrator project, launched in conjunction with the Blue Economy Cooperative Research Centre, will develop and deploy a CETO derived wave energy product designed for moored vessels. It offers a solution to the challenge of securing clean and reliable energy for offshore operators, reducing the reliance on diesel generation. The initial target market for MoorPower™ is offshore vessels such as feeding barges for the aquaculture sector.

Starting in late 2021, Carnegie commenced a 2 year process to design, install and operate a scaled demonstrator of the MoorPower™ technology just offshore from its office and research facility in North Fremantle, Western Australia. This \$3.4m project is delivered with funding support from the Blue Economy CRC and in close collaboration with a consortium of partners including two of Australia's largest aquaculture companies, Huon Aquaculture and Tassal Group. Academic and industry partners include DNV GL Australia, Advanced Composite Structures Australia, University of Tasmania, Climate KIC/Australian Ocean Energy Group, AMC Search and University of Queensland.



# SEATURNS

## SEATURNS IS TESTING A CHAIN OF 5 FLOATS FOR THE FIRST TIME IN THE CENTRALE NANTES TEST TANKS

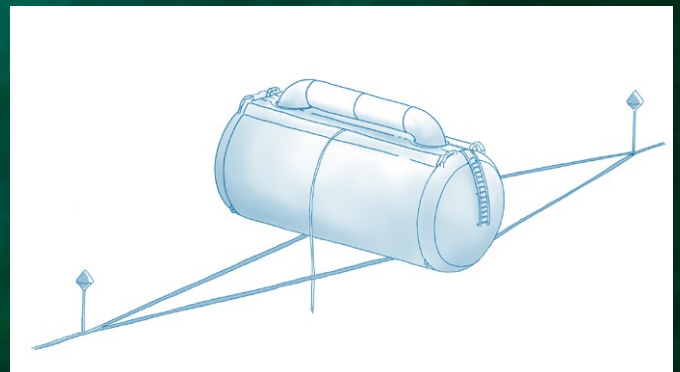
Centrale Nantes recently welcomed SEATURNS to its Centrale Nantes test basins for a series of crucial tests in the EMR sector. The team was able to benefit from the expertise and know-how of the test tanks to test for the first time a chain of 5 connected wave energy systems on a 1/15 scale under various wave conditions. The objective of these tests is to validate this configuration and its anchorings with a view to a future offshore farm.

These tests integrated trajectory measurements to better understand the movements of the floats and correlate them to the performance measurement. These measurements over a large area which covers the entire experimental system are possible with new cameras, financed by Nantes Métropole as part of the WEAMEC Call for Materials Project.

### What is SEATURNS?

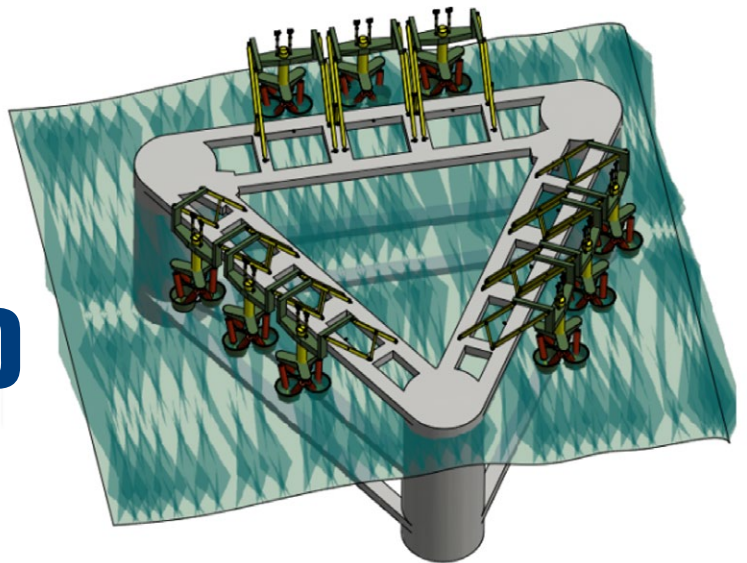
To capture wave energy and convert it into electricity, SEATURNS has developed a breakthrough wave solution based on an innovative system. This efficient and innovative technology consists of exploiting the technique of the internal water pendulum oscillating in a cylindrical float. It is a simple, compact, robust and small solution. This concept has been patented in France and internationally (South Africa, Australia, China, Europe and USA).

*Photo credit: Centrale Nantes*





# WAVEHEXAPOD TECHNOLOGY



## 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

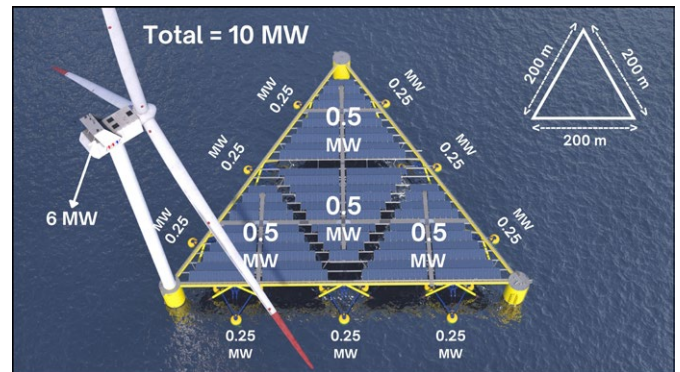
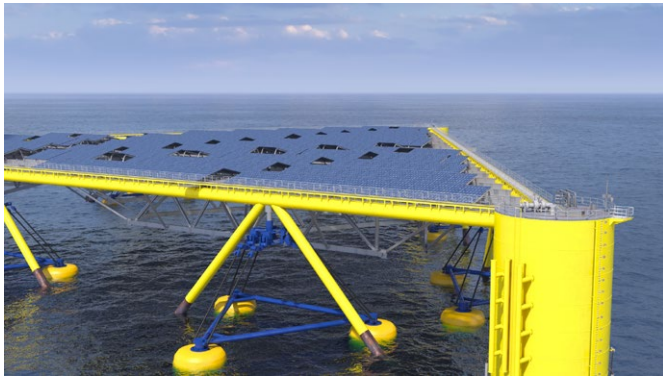
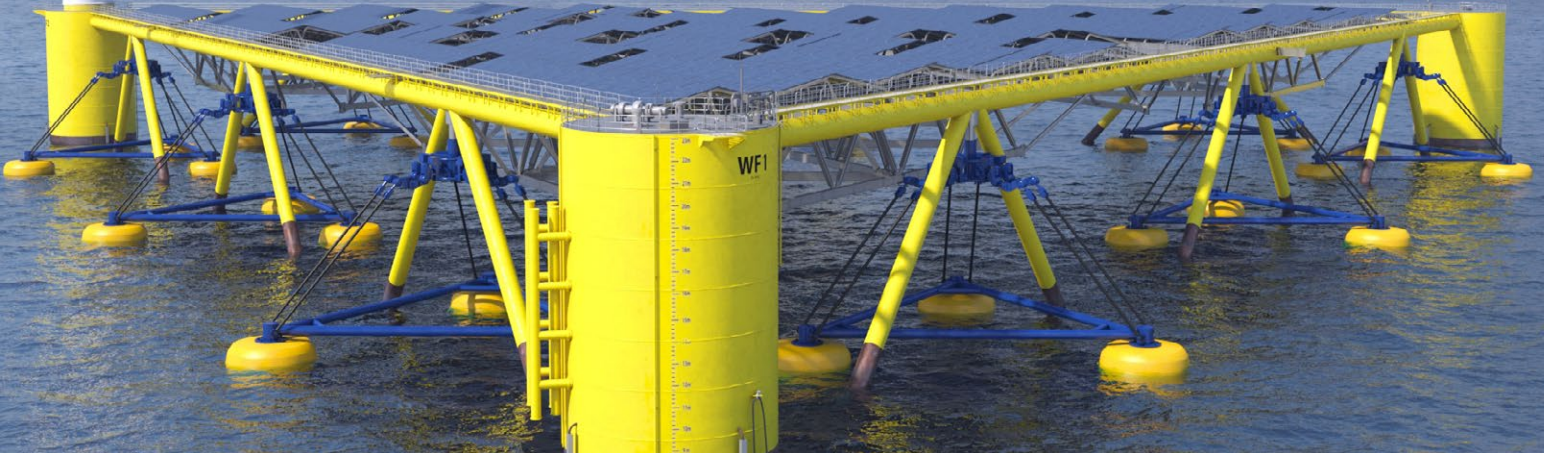
electricity through the 6 generators.

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.



# 10 MW OFFSHORE ENERGY ISLAND!



Using multiple sources of energy, such as wind, solar, and wave power, in offshore environments offers several advantages and helps diversify the energy generation portfolio.

Here are some reasons why these sources are commonly employed:

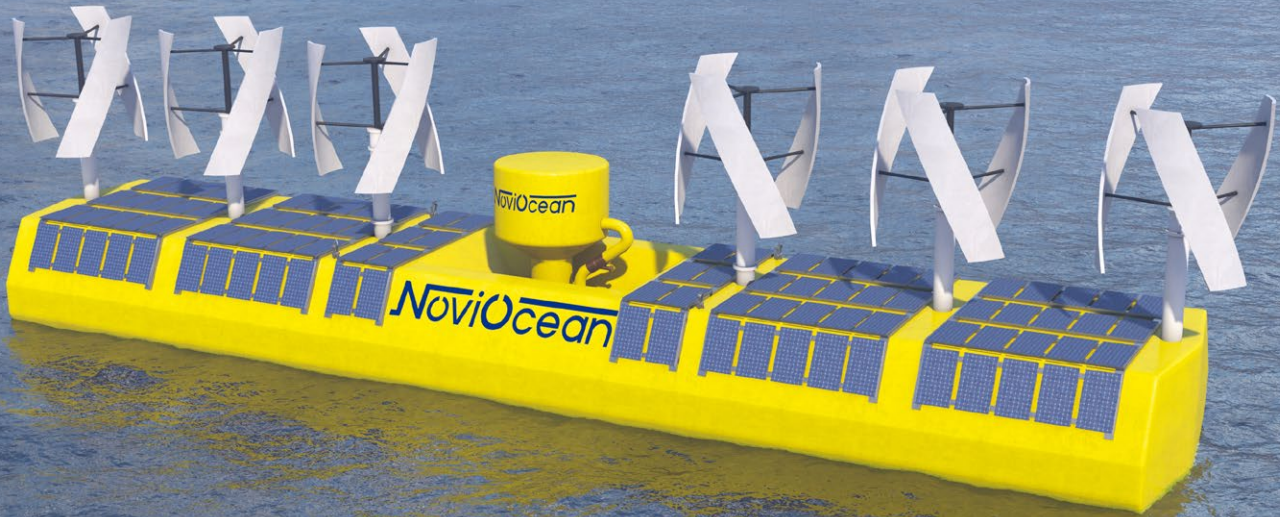
1. **Resource Availability:** Offshore locations offer abundant renewable energy resources like wind, solar, and wave power. By utilizing these diverse sources, we can unlock the full potential of renewable energy generation.
2. **Redundancy and Stability:** Combining multiple energy sources increases system reliability by compensating for fluctuations or downtime in one source. This redundancy ensures a continuous power supply, reducing the risk of outages and improving overall grid reliability.
3. **Complementary Nature:** Wind, solar, and wave power complement each other due to their different characteristics. Wind energy is stronger in the night and winter, solar energy is abundant during the day and summer, and wave power is more consistent year-round. Combining these sources balances out their intermittency and variability, resulting in a more consistent and reliable power output.
4. **Energy Production Optimization:** Integrating multiple energy

sources maximizes energy production by leveraging their different peak generation periods. This integration enables a stable and continuous power supply, optimizing the use of renewable resources and increasing overall energy output.

5. **Environmental Impact:** Offshore renewable energy sources emit minimal greenhouse gases, have low environmental impacts, and reduce dependence on finite fossil fuels. Wind, solar, and wave power offer clean energy alternatives, mitigating climate change and preserving ecosystems when properly designed and managed.
6. **Technological Advancements:** Advancements in offshore renewable energy technologies have made harnessing wind, solar, and wave power more feasible and cost-effective. Ongoing research and development efforts drive innovation, improving efficiency, reducing costs, and expanding the deployment of offshore renewable energy systems.

In the following, we mentioned the companies that activated in this industry, maybe better results can be achieved by the synergy of technologies by these companies. Principle Power, Wind Catching Systems, AE-WaveHexapod, Eco Wave Power, Slow Mill Sustainable Power BV, SolarDuck, Ocean Sun

*Renders created by: Fidar Offshore Animation*



# NOVIOCEAN HYBRID ENERGY CONVERTER

NoviOcean 1 MW Hybrid Wave, Wind & Solar Energy converter is set to change the renewable energy offshore landscape.

## Easy to Produce, Install and Maintain

- Simple Well Proven Parts
- Modular Design
- High Survivability

## Environment

- Low Visual and Audible Signature
- Low Environmental Footprint

## Cost Efficient

- Weight to Power : 1/2 vs Offshore Wind
- LCOE 1/3 vs start of Wind & Solar
- Power To Weight Ratio : 2-50 vs Wave
- Energy Competitors



SolarDuck floating offshore solar platform located nearby the Q13-A platform west of Scheveningen. An initiative of the Norwegian-Dutch company SolarDuck.

*Photo: Herman Jsseling (Flying Focus BV)*

Copyright Flying Focus



## TOWARDS JAPAN'S FIRST TECHNOLOGY DEMONSTRATION OF OFFSHORE FLOATING PHOTOVOLTAIC POWER GENERATION. COMPLETED INSTALLATION AND STARTED DEMONSTRATION

Tokyo Bay eSG Project" is now a reality, showcasing the potential of local renewable energy production at sea in Japan through the application of cutting-edge technology.

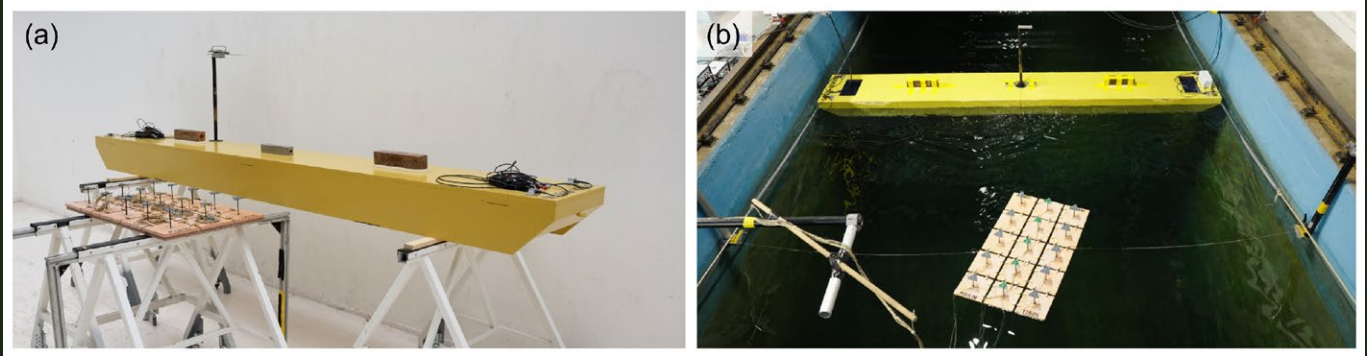
Tokyu Land Corporation (Head Office: Shibuya-ku, Tokyo; President: Hiroaki Hoshino) and SolarDuck B.V. ("SolarDuck", Head Office: Rotterdam, the Netherlands; CEO: Koen Burgers), in collaboration with Kyocera Communication Systems Corporation, have completed the installation of Japan's first offshore floating solar photovoltaic (FPV) power plant on the sea surface under

the Tokyo Bay eSG Project (the "Project"), an initiative of the Tokyo Metropolitan Government's Policy Planning Bureau.

This project is a demonstration project by the Tokyo Metropolitan Government that aims to realize the world's most advanced energy generation and transmission from the Tokyo Bay Area. SolarDuck, together with Everblue Technologies,

Inc. were selected in November 2022 in the field of "cutting-edge renewable energy" and have been working on the demonstration. Over the course of FY2024, the two companies will conduct demonstrations of power generation using FPV power generation facilities, storage of electricity in batteries on the ground, and transportation of the storage batteries.

The renewable energy generated will be used to power Open Street Corporation's state-of-the-art electric mobility vehicles and to power and navigate an electric boat. In addition, the company plans to consider the use of renewable energy for future events in the Takeshiba area of the Tokyo Bay area. In addition to aiming for the practical application of Japan's first FPV power plant, "the demonstration test of local production for local consumption of energy centered on the Tokyo Bay area will contribute to the study of urban models that can be deployed in other parts of Japan and abroad.



# WAVE BASIN TESTS OF MULTI-BODY FLOATING PHOTOVOLTAICS SYSTEM AND AN EXTERNAL FLOATING BREAKWATER. (SUREWAVE PROJECT)

The aim of the EU Horizon Europe project SUREWAVE (2022-2025) is to develop a floating PV solution for offshore environments. A concrete floating breakwater (FBW) configuration will be designed to provide shelter for the floating PV (FPV) against harsh environmental conditions. MARIN's scope is to support the hydrodynamic design of the system through numerical simulations and wave basin tests. Basin tests are scheduled at two stages of the project: (1) at early design stage (for a global understanding of the preliminary design); (2) at final design stage (for verification and demonstration). The present dataset contains the results of the early stage design stage wave basin testing.



# SOLAR PIONEERS ARE GLUED TO A CUTTING-EDGE INNOVATION THAT WILL REVOLUTIONISE RENEWABLE ENERGY CAPTURE IN THE MARINE SECTOR



Anglesey and Manchester-based Grafmarine is working in partnership with Henkel, the German multinational consumer and industrial goods manufacturer.

With international sites including the UK and Ireland, Henkel's technologies are used in many different applications and industries, and they are the name behind many well-known brands such as Loctite, Sellotape and Unibond.

The two businesses are collaborating on a hard-wearing, anti-corrosive adhesive that will bond Grafmarine's state-of-the-art NanoDeck tiles to any flat surface, namely ships and vessels.

Grafmarine's AI solar management system can capture, store, and remotely manage clean energy while at sea, and demand is accelerating quickly as leaders in global shipping markets are working towards net zero, driven by customer need and legislative changes.

Commercial Director Nigel Marc Roberts said: "To be working alongside Henkel and developing different ideas is a privilege, as they are a world leader in bonding technology.

"For us the focus is on ease of application, an adhesive that can effectively 'glue' the tile to the vessel, and that's something they are trialling.

"The process is incredible and a game-changer for us, as it makes the whole system less labour intensive, reduces thermal stress, and the tile can be attached to any type of material or surface."

Engineering Director Chris Russell added: "Henkel have been an amazing collaborative supply partner and together we have been working tirelessly on this new, sustainable and safe solution for our NanoDeck tiles.

"The Henkel product will enable us to mass install them onto any vessel quickly, seamlessly and with little cost – we are delighted to have them as our key long-term strategic partner."

Grafmarine has designed rugged square panels to be produced alongside its more aesthetic hexagonal model, with a focus on different sectors.

"The square is ideal for the hard-wearing, extreme conditions of the shipping industry while the hexagonal alternative is more aesthetically pleasing and attracting a lot of interest in the luxury super-yacht market," said founder Martin Leigh.

"Both are game changers and will have a major impact on how clean energy is stored and managed at sea."

A spokesperson for Henkel added: "We have a high focus on identifying and collaborating with sustainable opportunities, so being able to work with Grafmarine on this innovative solution for greener energy production in the shipping industry aligns perfectly with our core values."

Visit [www.grafmarine.com](http://www.grafmarine.com) and follow Grafmarine on social media @grafmarineltd for the latest on Grafmarine.

For more news and information from Henkel Ltd, visit the website: [www.henkel.co.uk](http://www.henkel.co.uk).

# A FLEXIBLE SUPPORT STRUCTURE FOR OFFSHORE FLOATING SOLAR

As the demand for renewable energy sources continues to grow, offshore floating solar has emerged as a promising solution for harnessing solar power. However, the unique challenges of offshore environments, such as waves, wind, and corrosion, require innovative support structures to ensure the stability and longevity of floating solar installations.

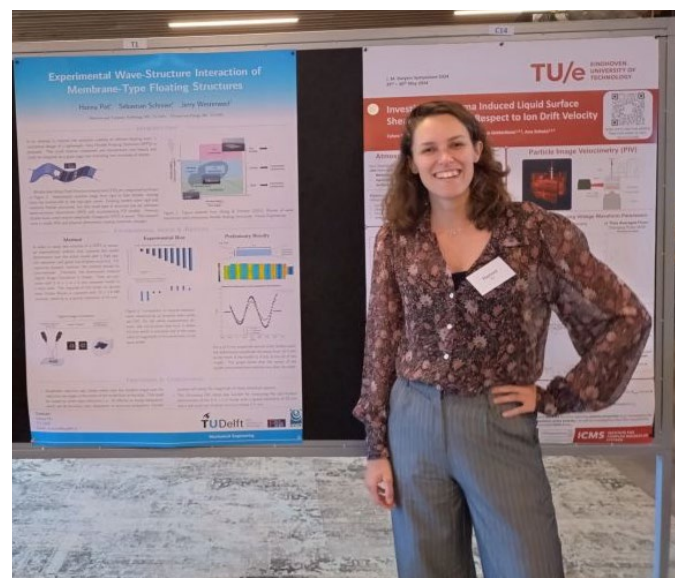
Dr. Hanna Pot and her colleague Esra Uksul, under the supervision of Sebastian Schreier, have conducted groundbreaking research on the development of a flexible support structure for offshore floating solar. Their Ph.D. thesis delves into the design and engineering of a novel support system that can adapt to the dynamic conditions of offshore locations, while also withstanding environmental stressors.

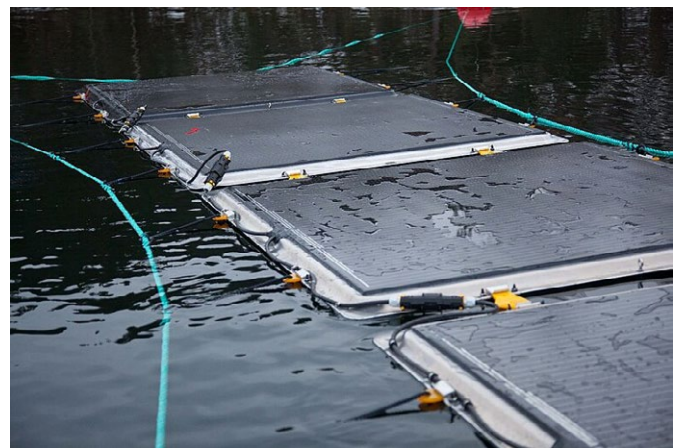
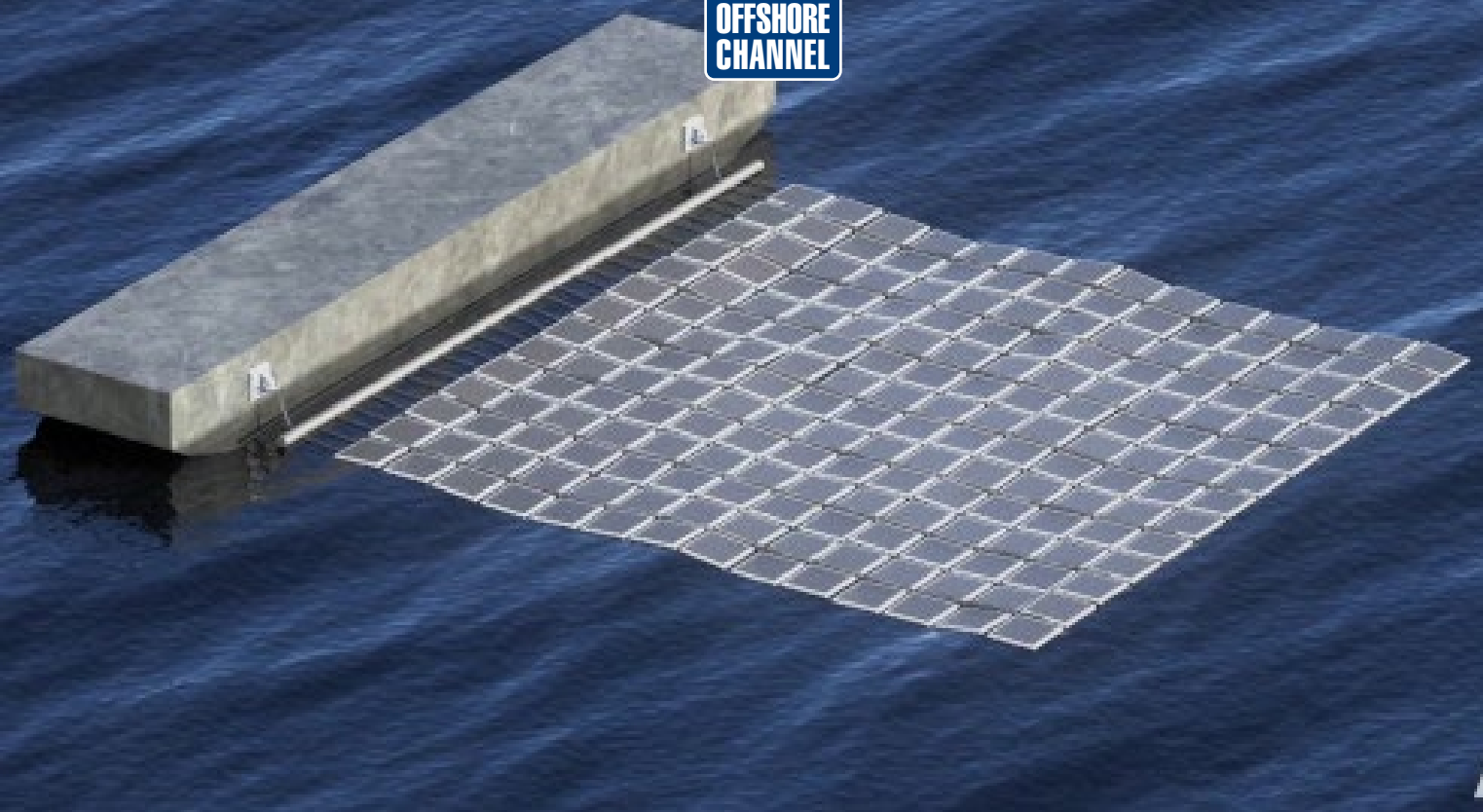
The key focus of their research is to address the technical and practical aspects of deploying floating solar arrays in offshore environments. By leveraging advanced materials and structural design principles, Dr. Pot and her team have successfully demonstrated the feasibility of a flexible support structure that can accommodate the movement of waves and mitigate the impact of harsh marine conditions.

Furthermore, their work contributes to the overall sustainability of offshore floating solar by optimizing the use of resources and minimizing the environmental footprint. The innovative approach presented in their research opens up new possibilities for expanding the deployment of floating solar technologies in offshore settings, ultimately advancing the global transition

towards clean and renewable energy.

In conclusion, Dr. Hanna Pot and Esra Uksul's Ph.D. research represents a significant advancement in the field of offshore floating solar, offering a promising solution to enhance the reliability and efficiency of solar energy generation in marine environments. Their pioneering work paves the way for the integration of renewable energy systems with offshore infrastructure, marking a pivotal step towards a more sustainable future.





## THE SUREWAVE PROJECT INTRODUCES CUTTING-EDGE FLOATING PHOTOVOLTAIC (PV) SYSTEMS TAILORED FOR MARINE SETTINGS, BROUGHT TO LIFE BY SINTEF WITH INDUSTRY FRONTRUNNERS.

The EU-funded project SUREWAVE aims to develop and test an innovative concept of Floating Photo-Voltaic (FPV) system for far-offshore marine settings and contribute to the replacement of emission-heavy and ecologically damaging energy sources. The FPV system offers to solve the main challenges of offshore FPV by developing a solution adapted to the most critical sea states. The system consists of an external floating breakwater structure acting as a protection against severe wave-wind-current loads on the FPV modules, allowing increased operational availability and energy output, thus unlocking the massive deployment of offshore FPV. To achieve this, the project will also take necessary steps, including developing circular concrete material that will be cost-effective and production-efficient, running excessive testing to validate

the system, and developing predictive computational modelling frameworks for managing structural health.

The SureWave project has recently completed the development of a global system design for floating solar systems, featuring integrated wavebreakers. This design is adaptable, intended to accommodate a wide array of project sizes and specifically tailored to meet the diverse local sea conditions and size requirements at different sites, including variations in wave heights, periods, and directions.



# INNOVATIVE WAVE TURBINE - GREEN ENERGY FROM SEA WAVES

## WAVE TURBINE

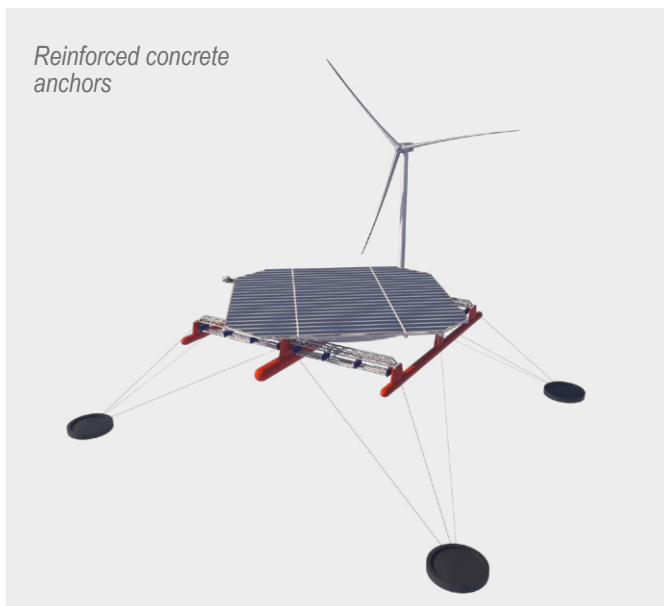
The wave turbine is a groundbreaking project of WUPROHYD design office, thanks to which one will be able to finally harness the huge energy resources from sea and ocean waves. This new RES can boast an estimated capacity of 2.5-3 TW, or 2,500,000-3,000,000 MW.

WUPROHYD design office, as the only one in Poland, has developed and patented this original prototype technology for the use of sea wave energy to produce electricity. Its main element comprises an ingenious wave turbine, i.e. a sea wave converter. At the current stage of the project, the technology development maturity level is RTL4 (according to the Technology Readiness Level), i.e. model tests were carried out for two different profiles of the turbine rotor. The tests confirmed the assumed rotational movement of the turbine rotor under the influence of the circular motion of water particles. The theoretical efficiency was determined at the level of approx. 7%. Therefore, the turbine can easily be used to directly drive power generators.

## WAVE TURBINE OPERATION AND CONSTRUCTION

In the current division of wave converters into terminators and attenuators, the wave turbine should be classified as a terminator, i.e. it is situated on the long side parallel to the wave crest (trough) and absorbs the wave energy in a short time. It is composed of a rotor that rotates in relation to a horizontal, stationary axis fixed in the supporting structure, which is oriented parallel to the wave crest (trough) of the wave. The rotor axis is below the water level, enabling it to work fully submerged at a depth at which the circulating movement of the water particles makes it rotate smoothly. The full rotation of the rotor takes place in time equal to the period  $T$  of the wave that moves it, in which it absorbs both the kinetic energy and the potential energy of the wave motion.



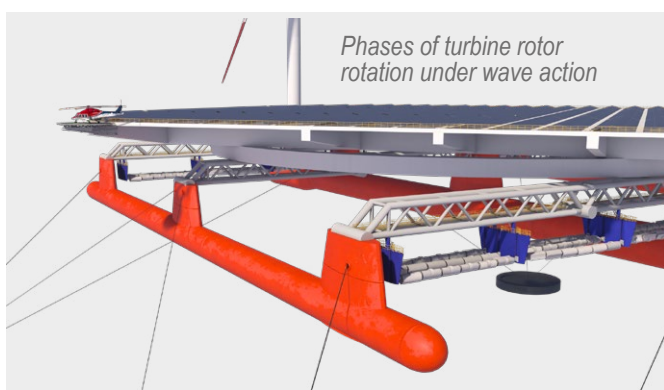


### HYBRID OFFSHORE POWER PLANT GUARANTEES LCOE REDUCTION

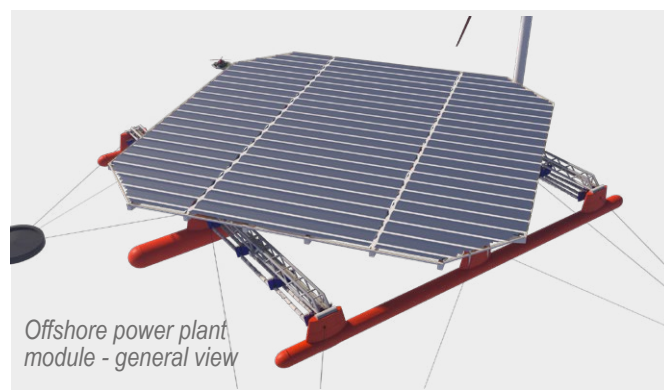
The use of sea wave energy is still a very underdeveloped field. In reality, there are no objects that could be called offshore power plants as far as installed power is concerned. Most of them are just very expensive prototypes, with low efficiency, recovering a small part of the wave energy. The main reason for such state of development of offshore energy is the occurrence of enormous loads due to wave forces in the marine environment, requiring powerful load-bearing structures for devices located on the seabed or floating as well as very complicated converters. Taking into account the very difficult sea conditions and having a simple device for converting the energy of waves, we have designed a floating offshore power plant - an energy island that enables one to harvest huge energy resources of seas and oceans on an industrial scale.

### MANUFACTURING TECHNOLOGY

The load-bearing structure of the energy island is designed to be self-erecting and attached to reinforced concrete anchors. The advantage of this solution is that it can be folded, built and equipped as much as possible in a dry dock, which is ingenious, as taking into account its dimensions in an open mode - it would be impossible for the opened structure,. In addition, such a solution reduces the costs of installing the energy island at sea, limiting the use of very expensive floating



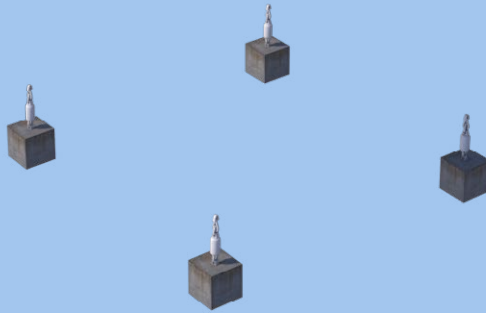
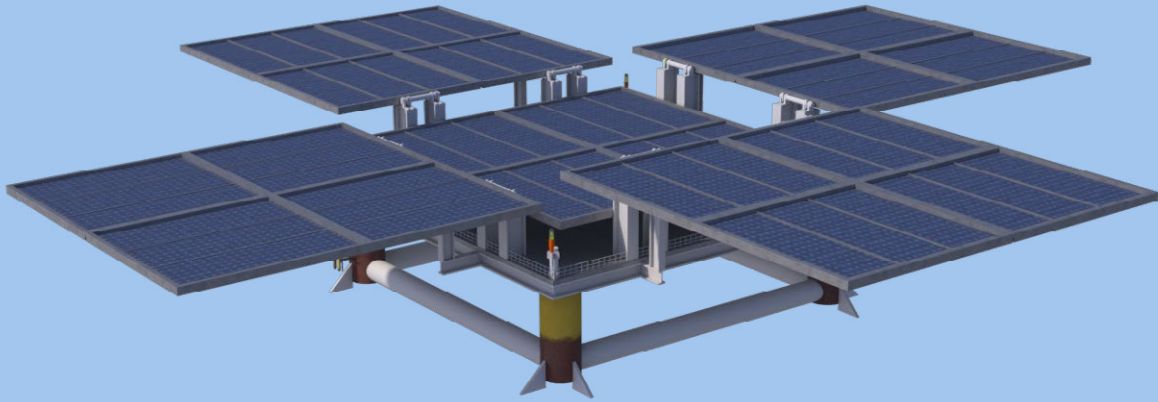
cranes and tugs to the necessary minimum. In order to install smaller pieces of equipment, the structure is equipped with a crane that can move along the track mounted on its trusses. Moreover, the very high stability of the three-hull structure will reduce downtime caused by bad weather conditions related to work at sea. In practice, the adopted production technology requires only a pontoon and a tug for transporting the elements of equipment, which have not been installed in a dock. Reinforced concrete anchors are also designed to be floating. After being towed to their destination, they will be flooded by loading their ballast tanks with water. Anchors, if necessary, will be lifted by blowing the water from the ballast tanks with compressed air.



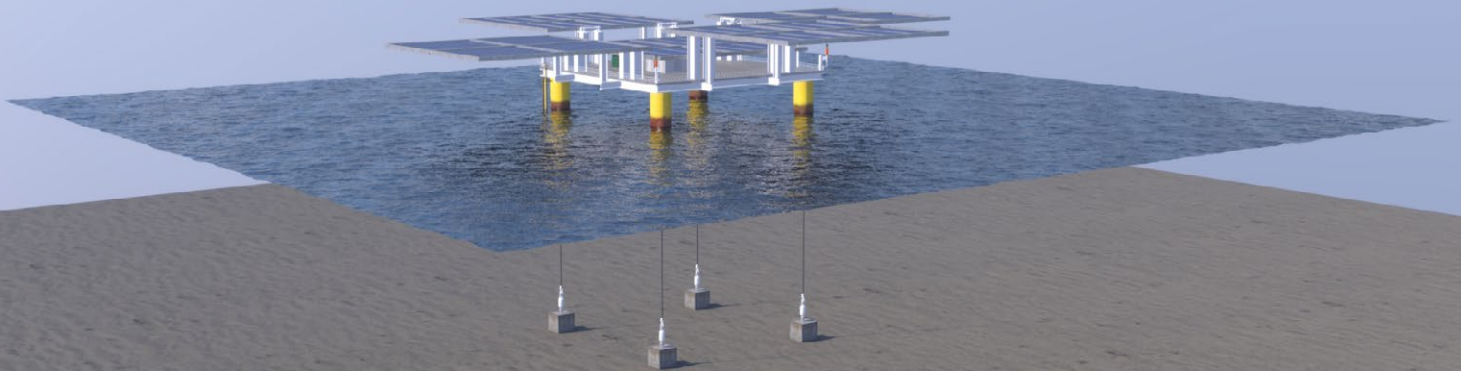
### ADVANTAGES OF THE PROPOSED SOLUTION

The energy island designed in the concept phase can be characterised by the following :

- reduction in LCOE compared to other floating objects using only wind and solar energy,
- will generate electricity in a predictable and stable manner from three independent renewable energy sources,
- it is made in the “floating” technology - floating platforms, unlike the previously used foundation solutions used for wind turbines placed on the seabed,
- its structure is independent of the depth of the water on which it is to work. Increasing the depth is related only to the lengthening of the mooring lines, so there is no necessity to make a more powerful foundation structure,
- it can be located at large distances from the shore at great depths so as to eliminate the negative impact of its view on the landscape, which is associated only with the cost of laying a longer cable, and not with a more powerful foundation structure,
- ensures the operation of photovoltaic panels at a low temperature, which increases its efficiency and allows to increase the amount of energy produced thanks to the work in a system “keeping up with the sun”, which is unprofitable on land,
- due to its high displacement, it can be used to produce green hydrogen,
- absorbing the energy of sea wind waves, it can be used to protect the sea shore.



- Salinex's Innovative-Offshore Floating Solar PV Plant.
- First of kind for deep offshore Solar PV with inbuilt Solar Panel protection from harsh weather.
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- Power generation during sunlight hours, complimenting Offshore Wind farms
- Built in novel Wave Energy Harvester and tidal turbine for extracting clean energy-site dependant.
- Efficient and economical with low LCOE



# 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.

Contact: [entwicklungsbuero-herberich@email.de](mailto:entwicklungsbuero-herberich@email.de)



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Fidar Offshore Animation Company is ready to advertise your company with the best quality and the lowest price. In fact, we are a young and creative team that specializes in producing industrial animation (Offshore Energy Sector), Architectural animation, motion graphics and web design. The Fidar Offshore Animation works in the business world with the message "Pay less, Get the best".

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Torslanda, Gothenburg, Sweden



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- 20 OFFSHORE ROCK BAGS** Ridgeway England 2022

Client Country Year

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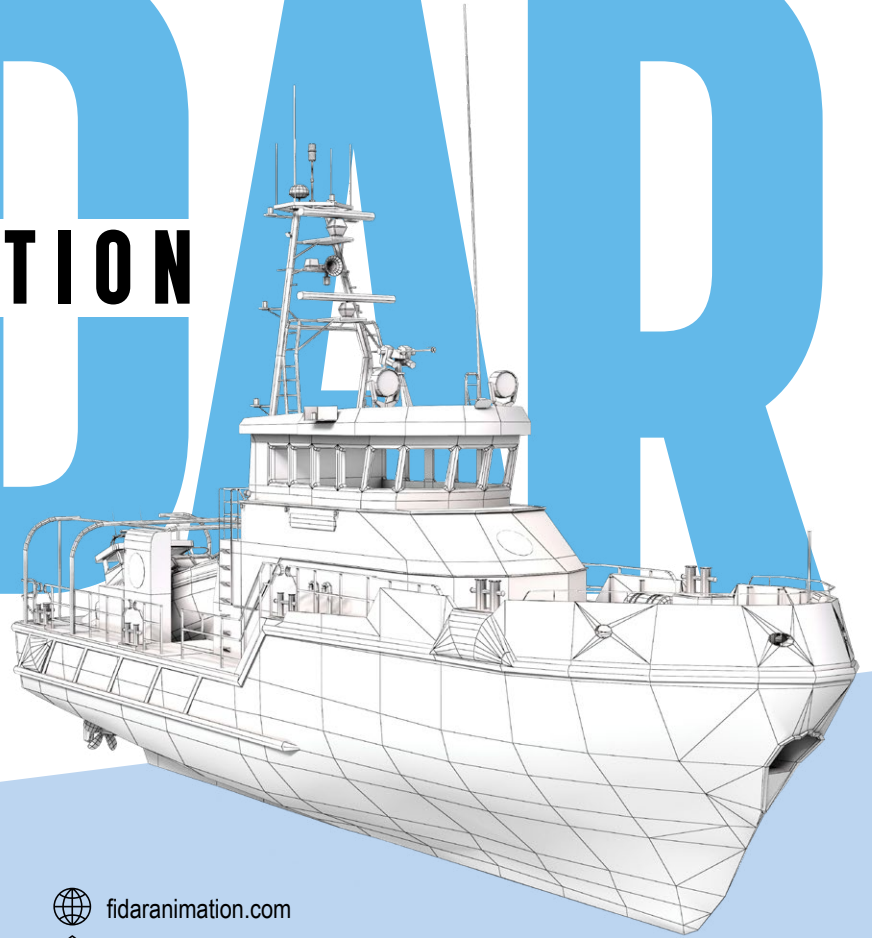


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