

The background of the image is a high-angle, aerial photograph of a vast, deep blue ocean. The surface is covered in intricate, white-capped wave patterns that create a textured, almost mountainous appearance. The lighting suggests a bright, possibly overcast day, with the sunlight reflecting off the water's surface.

wave-op

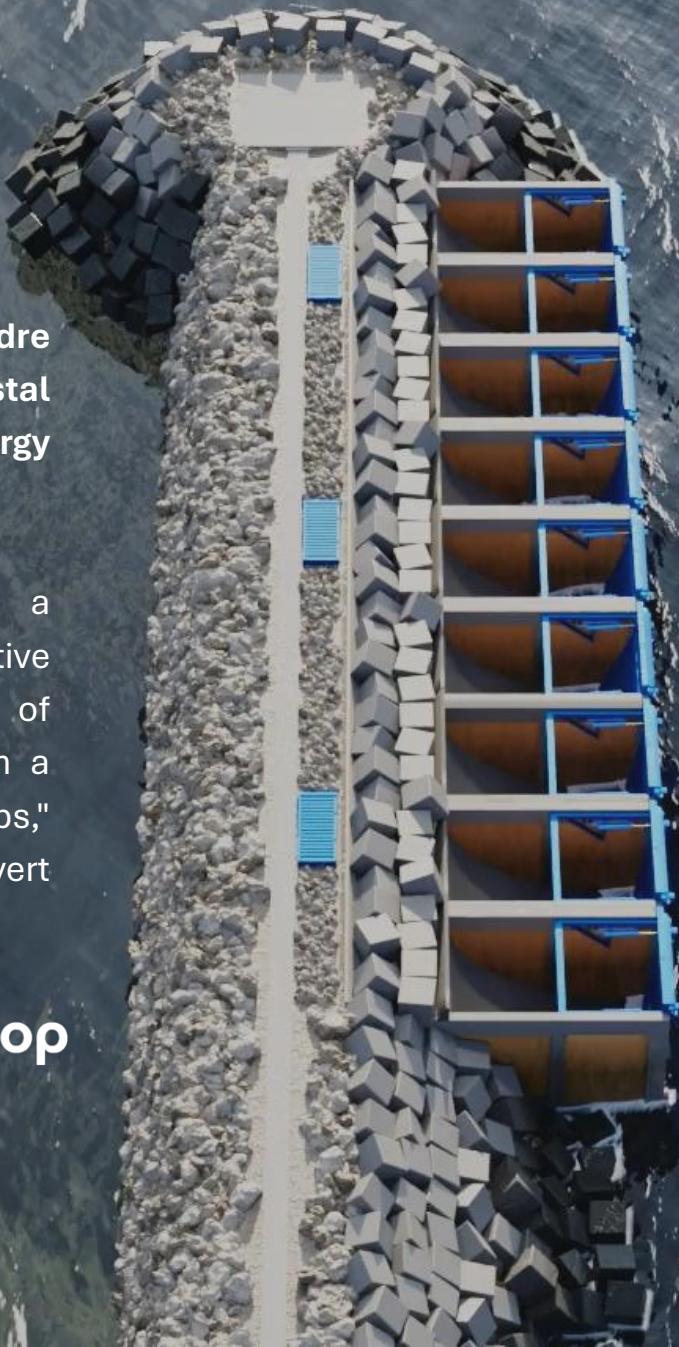
Swell. Energy. Innovation.

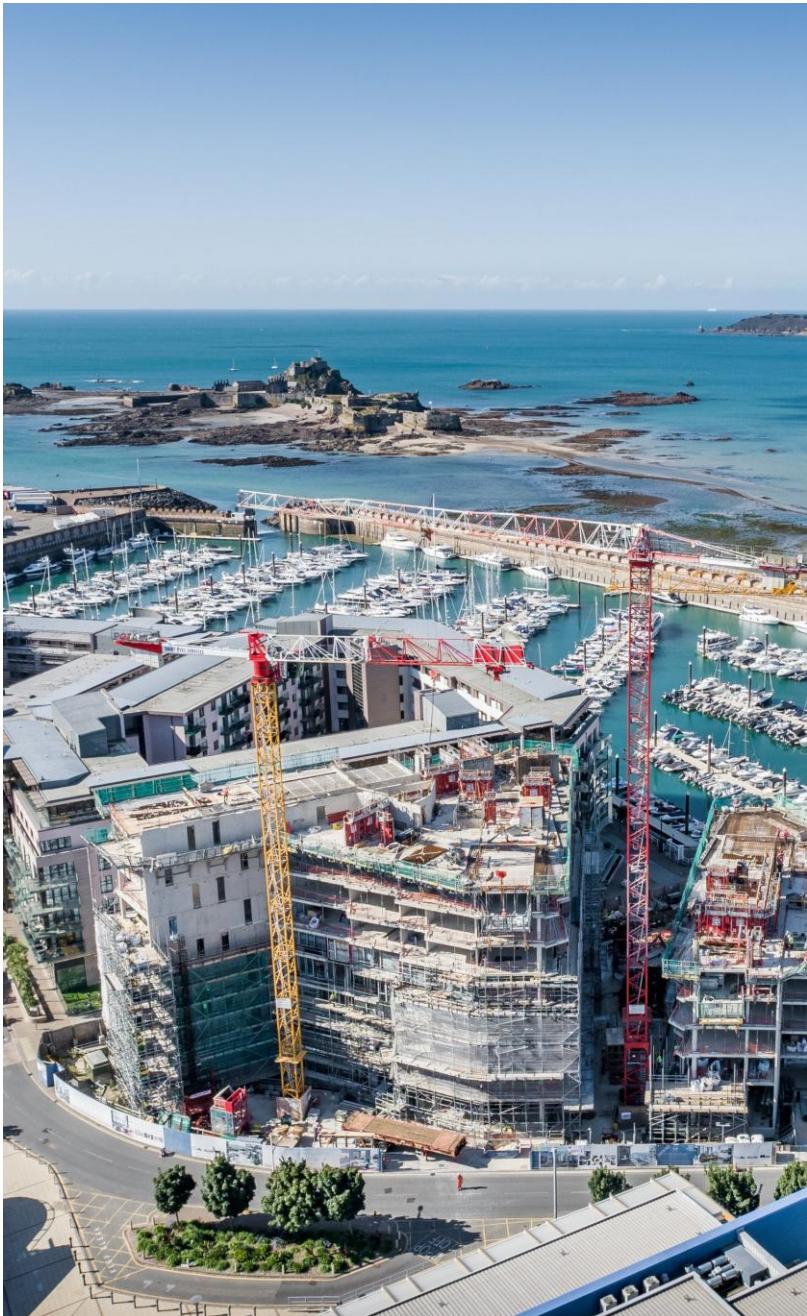
# Wave Energy

In partnership with **Geps Techno, Legendre Group** offers innovative solutions to **coastal regions** looking to accelerate their **energy transition**.

With the groundbreaking Dikwe project, a breakwater is no longer just a protective structure—it also becomes a source of renewable energy. The concept is based on a system of oscillating panels, known as "flaps," which are powered by wave motion and convert wave energy into sustainable electricity.

wave-op





Designing towns. Improving lifestyles.

Originally a family-owned SME, Groupe Legendre is now a major player in construction, real estate, and energy, both nationally and internationally.



**24**

Agencies across Europe



**1 Md €**

2024 annual turnover



**2 400**

Employees

Construction

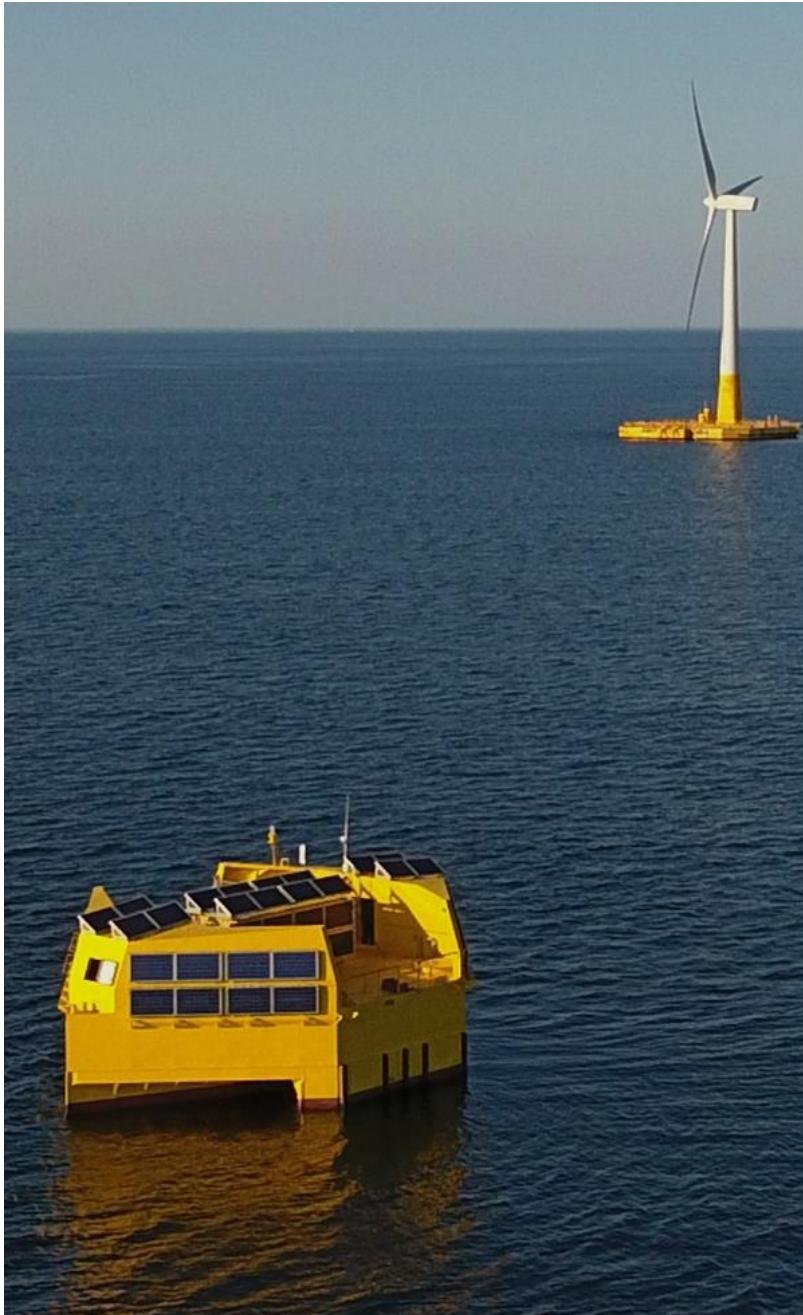


Real Estate



Energy & Service





**We bring energy offshore, where it's needed most.**

Our team of PhDs, engineers, and technicians builds on the expertise developed by GEPS Techno over the past 10 years—an ever-evolving knowledge base that includes CFD, mooring, wave energy, hybrid systems, stabilization, naval architecture, electrical design, communications, and more.



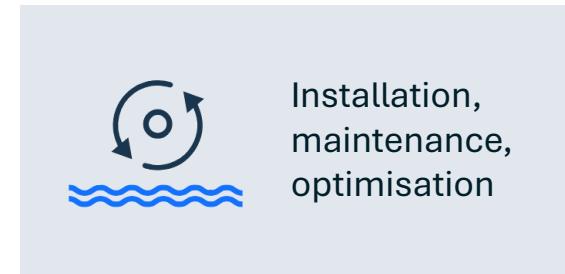
Design of buoys  
and platforms



Marine energy  
recovery &  
hybridization



Integration,  
configuration &  
commissioning



Installation,  
maintenance,  
optimisation

# History

## 2020 TANK TEST – TRL4

First major milestone: Wave tank testing campaign of a Dikwe scale model.



## 2019 DIKWE PROJECT

Creation of the Dikwe project, the first collaboration between Legendre Group and Geps Techno.



Winner 2020



Innovation Winner 2021

## 2023 PROTOTYPE – TRL6

Second milestone: Commissioning of the Dikwe prototype at the IFREMER test site in the Brest harbor.



# Prototype



12-month sea trial campaign.



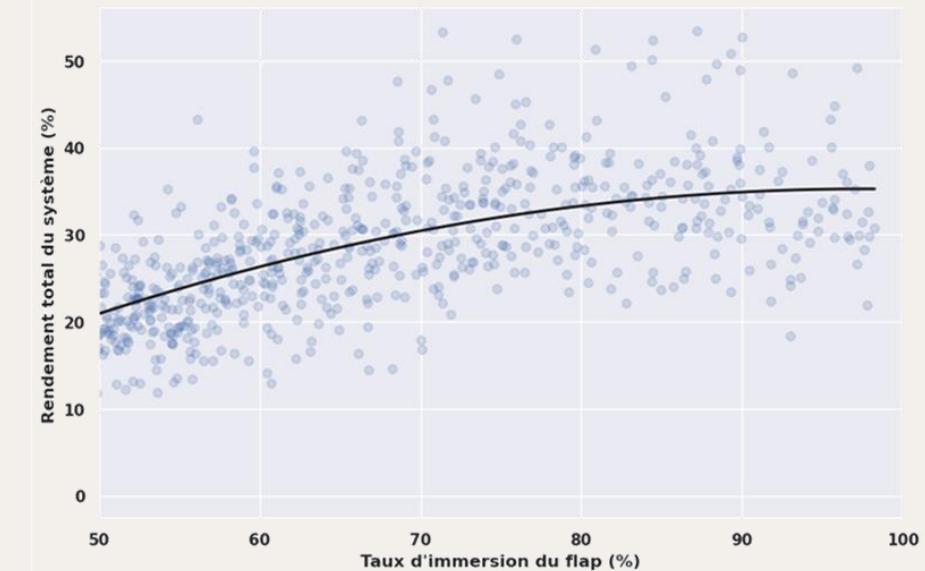
30%: Energy conversion rate



Testing site IFREMER Brest, Open C Foundation.



**Energy conversion curve**



The efficiency rate (x-axis) depends on :

- The immersion of the flap based on the tide level (y-axis)
- The module sized according to site-specific waves: Hs (significant wave height); Tp (wave period)

# Strategy

## 2024 WAVE-OP

Creation of a joint venture between Groupe Legendre and GEPS Techno to commercialize wave energy products.



Winner 2024



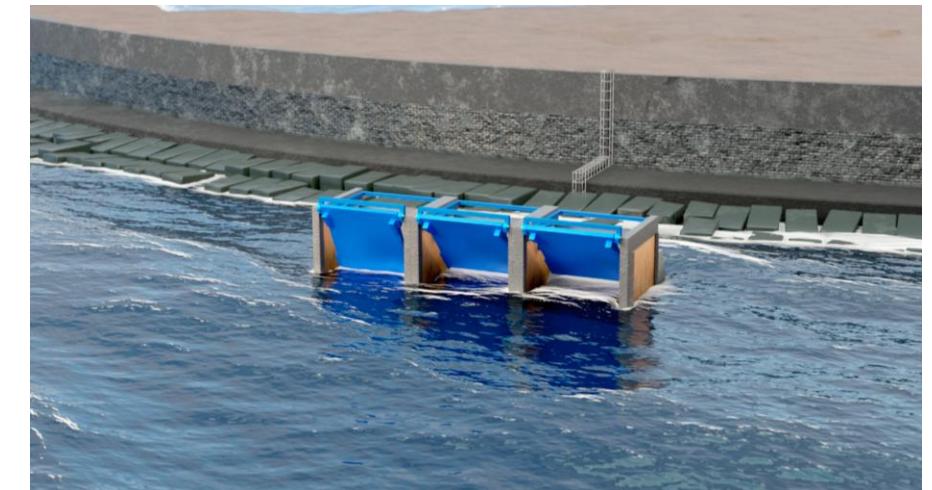
## 2027 PILOT PROJECTS

To complete the development process, pilot projects are being studied for the industrial deployment of WE products.



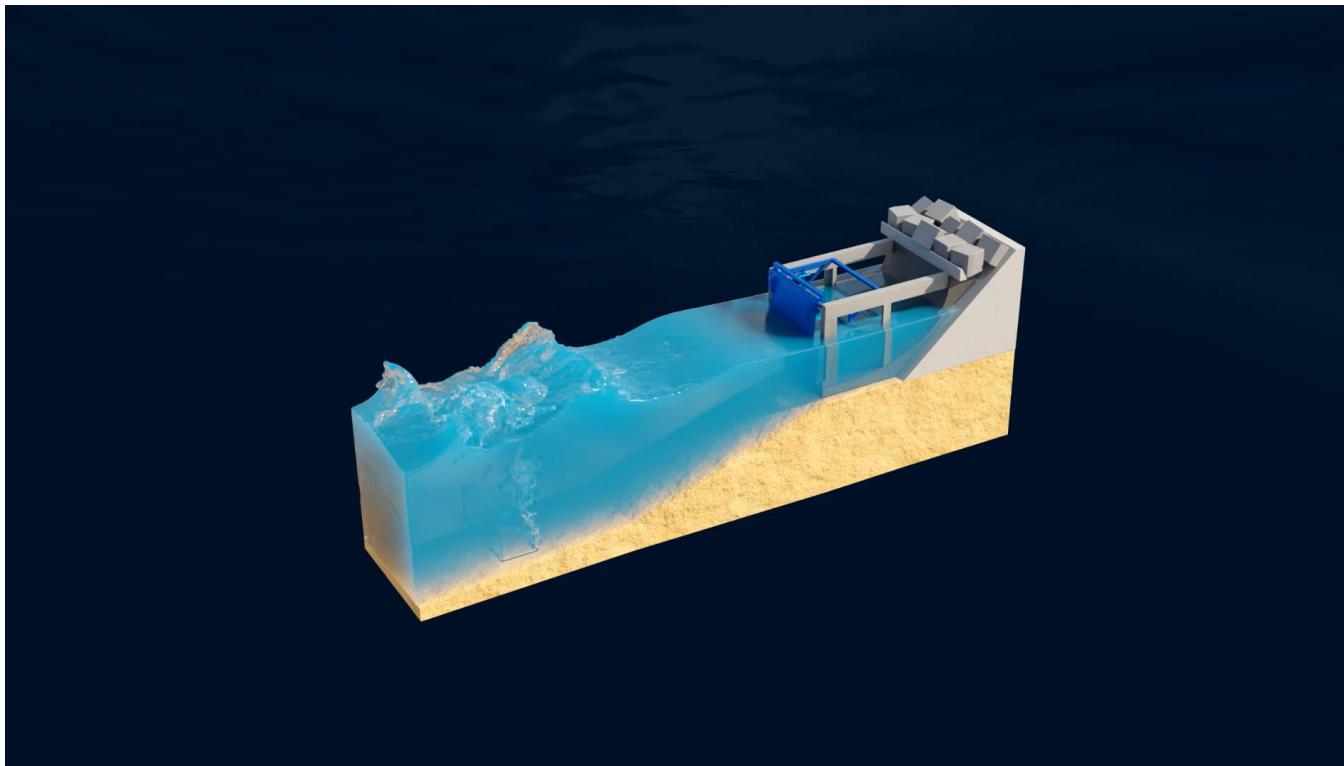
## 2025 DEMONSTRATOR

Final stage of the Dikwe program: the demonstrator. The project aims to renovate a section of the Carnot breakwater in Boulogne-Sur-Mer (FR).



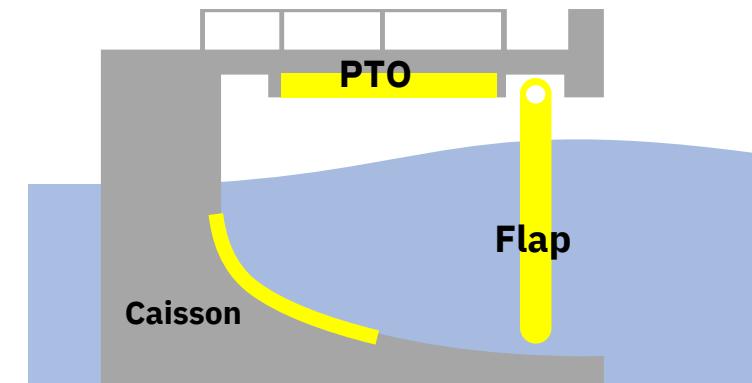
# Technology

The DIKWE technology consists of box modules built within a hybrid structure made of reinforced concrete, steel, and wood. The boxes are aligned in a linear configuration to form a complete protective structure.

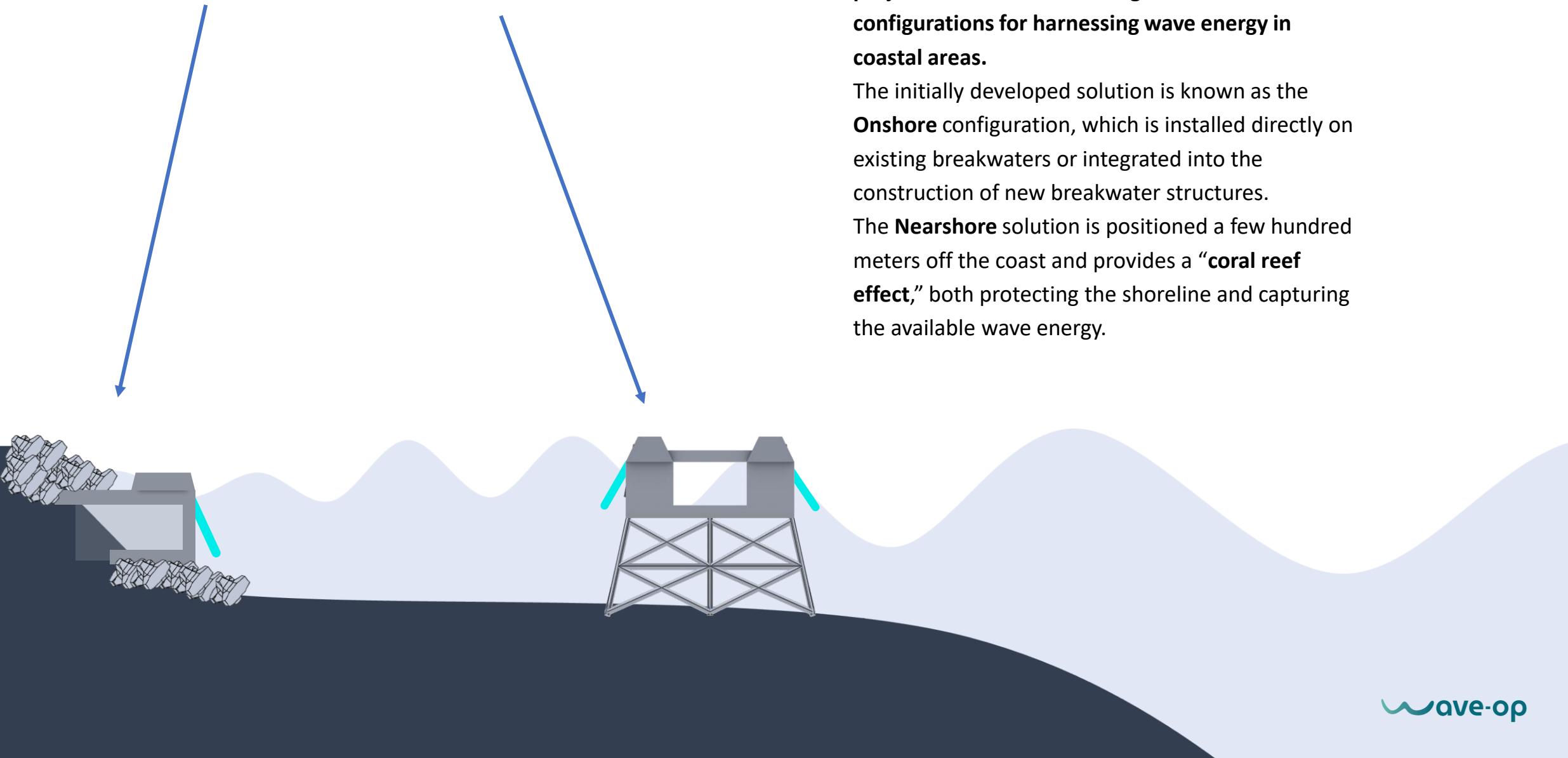


The technological elements integrated into the box modules capture wave energy:

- **FLAP:** A wave damping device in the form of a vertical rotating flap around a horizontal axis located at the top.
- **PTO:** A technological system with a hydraulic mechanism that converts the mechanical energy of the flap into electricity.
- **Caisson:** A secondary energy damping device, in the form of a damping beach, to absorb residual energy.



# Onshore or Nearshore



The technology developed through the DIKWE project has enabled the design of two innovative configurations for harnessing wave energy in coastal areas.

The initially developed solution is known as the **Onshore** configuration, which is installed directly on existing breakwaters or integrated into the construction of new breakwater structures.

The **Nearshore** solution is positioned a few hundred meters off the coast and provides a “**coral reef effect**,” both protecting the shoreline and capturing the available wave energy.

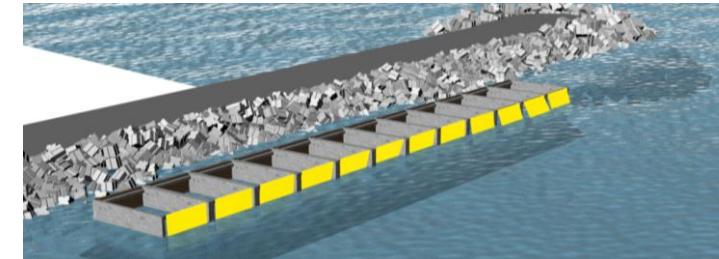
# Onshore → Breakwater

Breakwaters, the **first key application** of our technology.

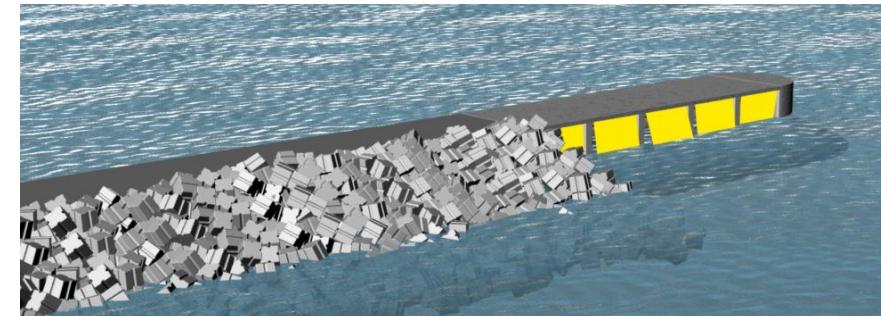


## Markets:

- Breakwater renovation/adaptation



- New breakwater

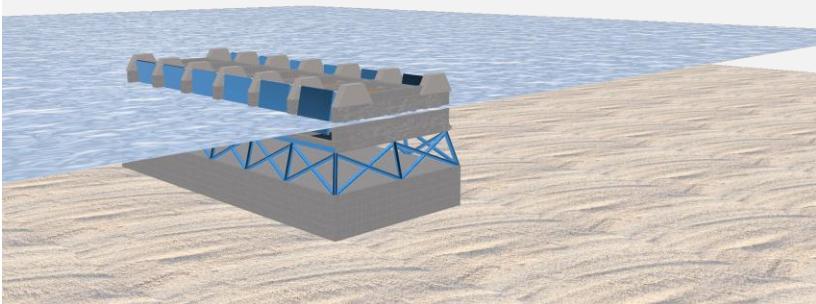


# Nearshore.

Nearshore areas, the second key application of our technology.



Single device Prototype DIKWE



Multi-device unit



In the face of climate change, coastal territories are increasingly exposed to **erosion** and **overtopping** waves, calling for tailored solutions to strengthen their resilience. Our technology, which combines coastal protection with renewable energy production, directly supports this approach.



Nearshore wave energy is **abundant** and holds significant potential with several gigawatts exploitable to complement national energy mixes.



Moreover, the installed modules **support biodiversity** by providing suitable habitats for marine species colonization and acting as ecological sanctuaries.