BAMBOO

Build scAled Modular Bamboo-inspired Offshore sOlar systems

Project overview

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Project Contractual Details

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Project Acronym	BAMBOO
Project Name	Build scAled Modular Bamboo-inspired Offshore sOlar systems
Project No.	101136142
Call	HORIZON-CL5-2023-D3-01
Topic	HORIZON-CL5-2023-D3-01-03
Type of Action	HORIZON Innovation Action
Project Coordinator	RINA Consulting S.p.A.
Project Start Date	January 1, 2024
Project End Date	December 31, 2026
Granting authority	European Climate, Infrastructure and Environment Executive Agency (CINEA)

Project Partners

Project Partners
1. RINA CONSULTING SPA (RINA-C) – Coordinator
2. OCEANS OF ENERGY BV (OOE) – Technology Owner and Technical Coordinator
3. PAUWELS TRANSFORMERS (PAU)
4. SOLARGE INTERNATIONAL (Solarge)
5. BV Twentsche Kabelfabriek (TKF)
6. SOLARCLEANO S. A R. L. (SCL)
7. AQUATERA ATLANTICO SL (ATA)
8. AMERICAN MPIRO OF SIPING HELLENIC MONOPROSOPI ETAIREIA PERIORISMENIS EVTHINIS, AMERICAN BUREAU OF SHIPPING (ABS)
9. FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (Fraunhofer) – Center for Silicon Photovoltaics (CSP)
10. STICHTING MARITIEM RESEARCH INSTITUUT NEDERLAND (MARIN)
11. SIRRIS HET COLLECTIEF CENTRUM VAN DE TECHNOLOGISCHE INDUSTRIE (SIRRIS)
12. WAVEC/OFFSHORE RENEWABLES - CENTRO DE ENERGIA OFFSHORE ASSOCIACAO (WavEC)
13. EUROPEAN MARINE BOARD IVZW (EMB)
14. VATTENFALL VINDKRAFT A/S (VAF)
15. AQUATERA LIMITED (AQT)

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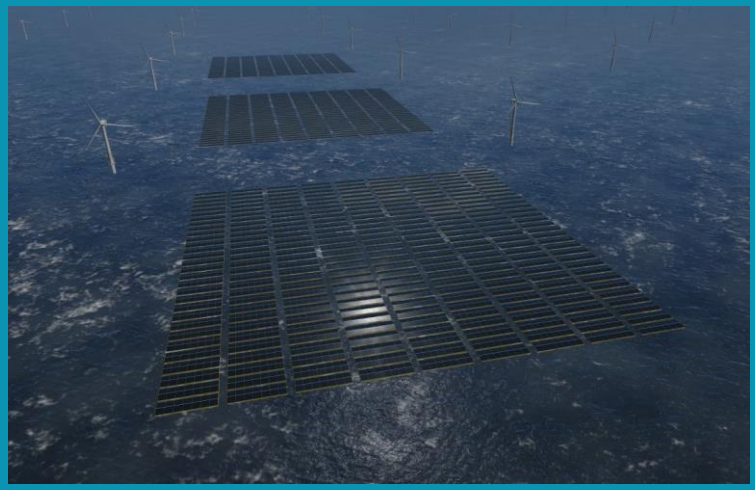
Vision

To **enable Europe's approach to offshore renewable energy** by developing a **groundbreaking offshore solar system spanning 1km²** with an installed capacity of 50-200 MW **that fits in-between 4 offshore wind turbines and has a complementary generation profile**

Initiative set to become the **industry standard for future offshore solar projects**, crucial for Europe's climate goals for 2030 and 2050, by **enabling 5x more energy generation per unit of sea space**



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Concept

Builds on pioneering **Oceans of Energy's Offshore Solar technology** engineered for offshore conditions and **proven in high waves of the North Sea**

Design philosophy to withstand offshore environment building on

4 fundamental characteristics

inspired from the bamboo-plant:

- ❑ **Lightweight**
- ❑ **Robust**
- ❑ **Flexible**
- ❑ **Sustainable**

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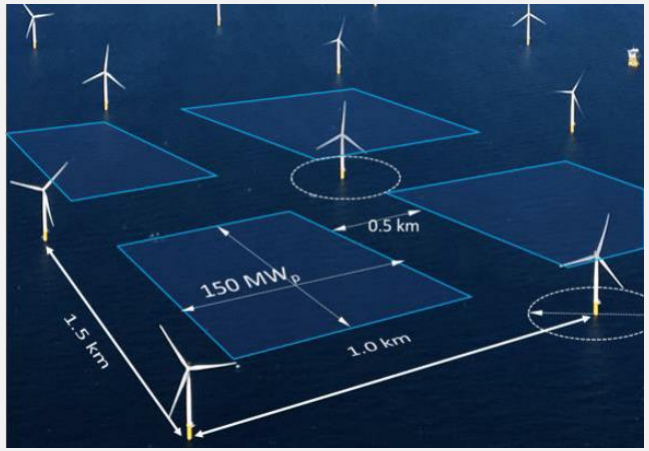
Mission

Collaboration of **15 leading European organisations** for the **scale up of Oceans of Energy's technology to Standard industry format of 1km² with installed capacity of 50-200 MW Solar-PV**

Building blocks set to become
a new Standard in offshore energy farms



where the specific size of **1km² equals the space available between four modern offshore wind turbines** (10+ MW)

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Approach

Placing solar farms within offshore wind farms

- ❑ makes **better use of the sea space**
- ❑ **increases energy output**
- ❑ **provides more continuous power**
- ❑ and will **drive down costs**

This innovative approach not only boosts energy production but also **uses maritime space efficiently and sustainably**, leaving more **sea space left untouched for nature, recreation, fishing or other blue economy activities**

In addition, the passive system bolsters **opportunities to act as a nature enhancing reef** and **marine protected environment**

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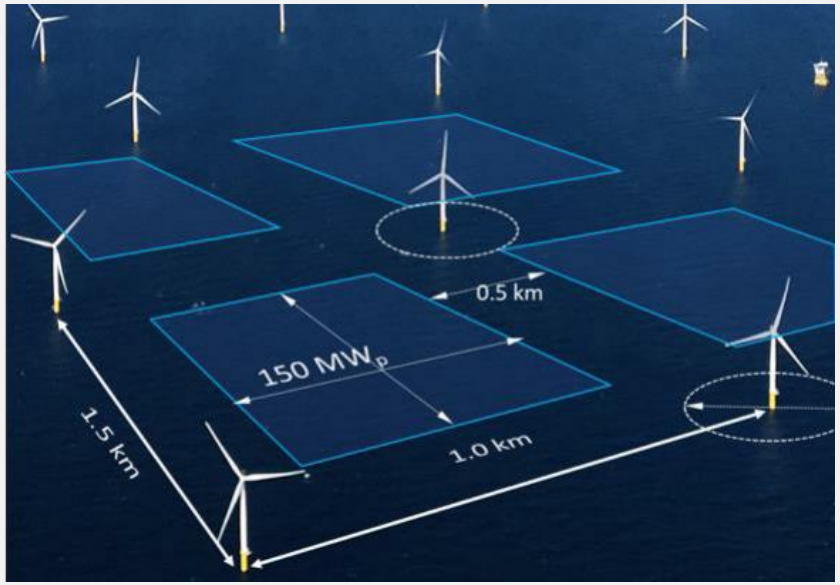
Project ambition

To **tackle the challenges and barriers** for the **implementation of a sustainable, large-scale offshore solar system of 1km² (50-200 MW)** that will act as an **Industry Standard for the rollout of offshore solar projects worldwide**



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Project main objective

Faced with the challenges of the **sea's harsh conditions**, BAMBOO will **advance the technology through cutting-edge sustainable innovations** and **bring it closer to commercial and financial / investment readiness** by tackling technical challenges for **scaling up the system** and for **lifetime performance and reliability**, whilst **exploring opportunities for nature enhancements** and **mitigating negative impacts on environment**

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Project specific objectives

- Realize **improvements in design and robustness** to extend and validate **lifetimes to 25 years**, in order to **decrease LCoE** by 50%, while addressing **reliability and performance**
- Expand the technology's application potential and de-risk investments through **enlarging the current demonstration prototype systems to 5 MW scale** and **extending the testing period from 18 to 54 months**
- **Increase understanding and address environmental impacts** and **opportunities** of large-scale offshore solar systems to **responsibly expand offshore solar applications** and **deliver environmental monitoring guidelines** and **end-of-life strategies** for large scale solar
- Enable a **fundable business case** for the **implementation of a first 1km^2 offshore solar system integrated in a wind farm before the end of the project**

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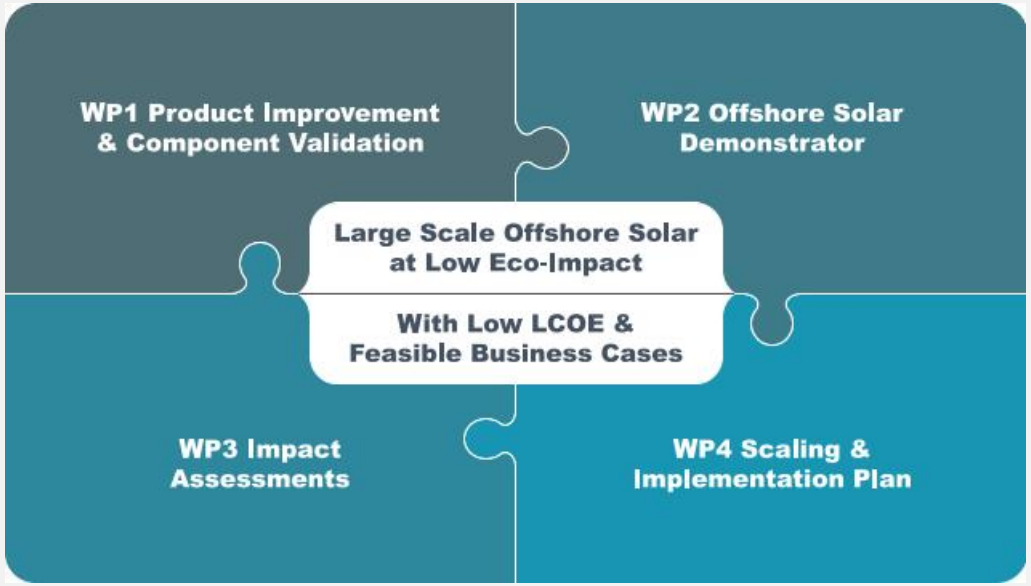
Project structure and methodology

To enable this **1km² Standard system**, the following **methodology** will be implemented:

- a comprehensive **Product improvement and component validation program** (WP1)
- a **5 MW-scale offshore solar farm demonstration at an offshore test site** (WP2)
- a **holistic Impact assessment** (WP3)
- and a **Scaling plan for the implementation of a 50-200 MW project** (WP4)



WPs 1-4 are pieces to one jigsaw that together form the **puzzle to unlock expansion of large scale offshore solar** at **minimized eco-impacts**, **low LCOEs** due to **cost reductions** (CAPEX & OPEX) and **improved yield performances**

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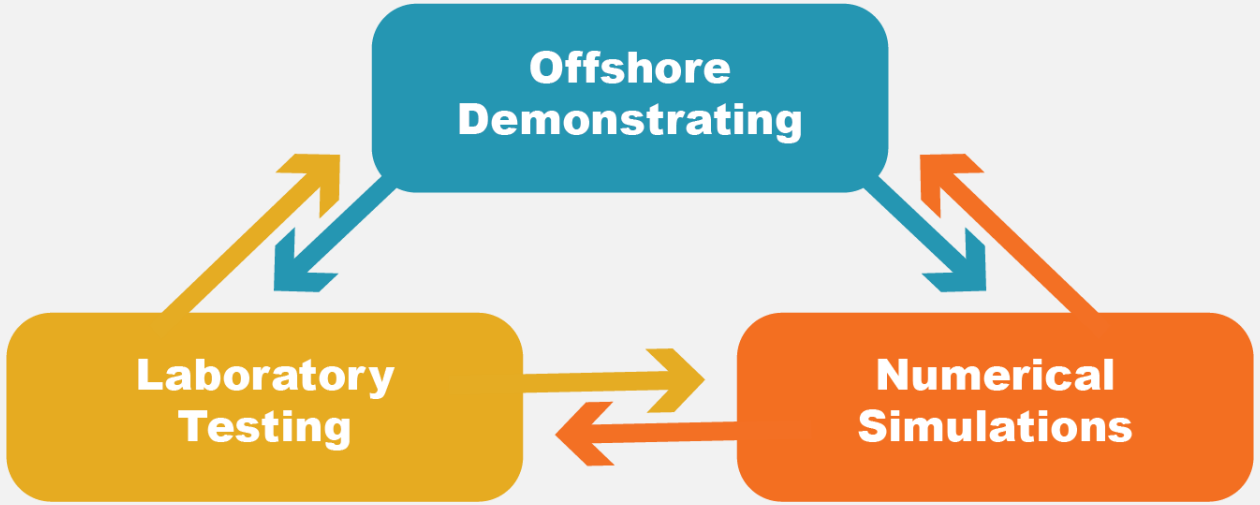
Project structure and methodology

The overall methodology is structured along the **Testing and Development Triangle** as a **de-risking tool** using different testing options to make iterative improvements



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WP1 |
Product improvement & Component Validation

Five **key components** will be **improved and validated** with **accelerated stress and lifetime testing**:

- **floating platform**
- **floating array**
- **PV-modules**
- **transformer**
- **dynamic power export cable**

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WP1 |
Product improvement & Component Validation

At three testing facilities **key components are tested and improved** to validate lifetime performance and reliability **in rough offshore environments**

The three testing campaigns contribute to the **development of industry guidelines and standards for offshore solar components**:

- At MARIN, an understanding of the **hydrodynamic behaviour of a 1km² offshore solar system** is developed with a **scale model in MARIN's Shallow Water Basin**
- At Fraunhofer, **mature PV module integration solutions for offshore solar installations are tested** with **accelerated lifetime testing in Fraunhofer-CSP's Climate Chamber**
- At SIRRIS, the **performance of the dynamic floating substation in offshore environment** is **assessed through SIRRIS' Large Climate Test Chamber**

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WP2 |
Offshore Solar Demonstrator

The **key improved components** are **tested and validated in an offshore solar system**

Furthermore, **experience** with **installation**, **operations**, **maintenance** and **monitoring practices** is obtained

In addition, a **feasibility study** is executed for **robotic cleaning of PV-modules** for possible **enhancements of power performance**

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WP3 | Impact Assessments

Several **impact assessment studies** are executed and/or **impact assessment tools** are developed

- A **predictive yield model for offshore solar** is developed considering the **typical effects of the offshore environment**
- **Environmental impact assessments** including large-scale offshore solar are executed
- **Life Cycle Assessment and end-of-life recycling strategies** are developed for all used materials and components considering **sustainable removal** and **repurposing** possibilities

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WP4 |
Scaling & Implementation Plan

The **development and implementation of a 1km² offshore solar system is streamlined** by:

- ❑ **Engineering studies** for a **km²-scaled offshore solar system**
- ❑ **Feasibility study** for **expanding offshore wind farm certification with offshore solar**
- ❑ The development of a **feasible business case**, **financing plan**, and **commercialization plan**

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www.bamboo-offshoresolar.eu

Thank you!

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