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Offshore Renewable Energies

45 partners involved in 6 new R&D projects of France Energies Marines for a total budget of €9M



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The response to the technological and environmental challenges of the offshore renewable energy sector is the primary objective of France Energies Marines, which brings together public and private players around collaborative research. This Institute for the energy transition, which has 27 members and 70 employees, sets up and launches new projects each year as part of its multi-partner research activity, supported by the France 2030 Investment Plan. The end of 2022 sees the launch of 6 collaborative R&D projects with a total budget of €9M. These projects involve 45 private and public partners and are in addition to the 28 projects already underway. The topics addressed are directly related to the challenges that are emerging for the development of the sector: cyclone resistance of turbines, direct current electrical substations, impact and monitoring of biofouling, cumulative impacts of human activities, prioritisation of environmental issues, and supply of isolated grids.

Working for excellence multi-partner research at the service of the sector

As part of its collaborative R&D activity supported by the France 2030 Investment Plan, France Energies Marines has set up a selection process for new research projects that promotes excellence. Every year, projects are set up based on priority themes identified by all the members of the Institute. Each project is evaluated by a scientific and technological committee made up of 8 independent and international experts. At the end of the process, the Institute's Board of Directors selects and validates the new projects. **At the end of 2022, six collaborative R&D projects with a total budget of €8M will be launched with 45 private and public partners. The topics selected are fully consistent with the current and future orientations of the marine renewable energy sector.**

OROWSHI: Optimising wind turbines to withstand hurricanes

The offshore wind sector targets areas currently exposed to tropical cyclones, such as the Asia-Pacific region and the French overseas territories. Other areas, such as the East Coast of the United States and Hawaii, are moderately exposed to these events, but may become more so due to climate change. The assessments of extreme winds and waves are currently carried out by two different methods, which can lead to inconsistencies. However, it is this data that is considered for the final design of the offshore wind turbines. **With a duration of 3 years and a budget of €1.2M, the OROWSHI project will enable a better characterisation of the extreme conditions during tropical cyclones to optimise the design of offshore wind turbines installed on sites exposed to hurricane risks.**

AFOSS-DC: Designing a floating direct current power substation

The increasing distance to the coast of future offshore wind farms and the energy losses inherent in this configuration make high voltage direct current a competitive alternative. The design of floating substations operating with this technology raises several issues requiring research. Several crucial points have been identified: definition of electrical components, optimisation of compatible floats, design of the dynamic cable and its connection system, cyber security, qualification, and specification of the required test infrastructure. **With a duration of 3 years and a budget of €1.5M, the AFOSS-DC project aims to study the floating high voltage DC offshore substation as a system, analysing functional requirements, integration constraints, risks, and reliability.**

BIODHYL: Assessing the impact of biofouling on submerged structures

As the size and number of future floating wind turbines increases, the option of on-site maintenance seems to be favoured by wind farm developers. Regarding the biocolonisation of submerged structures, biofouling removal techniques and surface treatment approaches are being studied. A focus on mooring lines and dynamic cables seems essential as these key components are presumed to have a different hydromechanical behaviour and therefore a different wear once colonised. As biocolonisation can vary according to environmental conditions, it is also necessary to characterise biofouling on the sites of future farms. **With a duration of 3 years and a budget of €1.6M, the BIODHYL project will make it possible to quantify the impacts of the biofouling on floating systems, and to define a reference methodology for characterising and monitoring biocolonisation.**

NESTORE: Modelling the cumulative impacts of human activities on the marine environment

The rapid increase in the development of offshore wind energy in France will certainly lead the State to ask wind farm developers to include the cumulative impacts of offshore renewable energies and other human activities in their environmental impact studies. In this context, it is crucial to accelerate the development of adapted operational tools to meet this future legal obligation. A group of French experts has established an operational roadmap highlighting the need to adopt a modelling approach to this issue. **With a duration of 3 years and a budget of €3.3M, the NESTORE project will develop a nested modelling approach to assess the cumulative impact of different human activities, considering local and regional environmental and socio-economic aspects.**

COME3T: Prioritising the environmental challenges of offshore renewable energies

Since 2018, COME3T has brought together a group of national stakeholders in the sector to address environmental issues to a committee of neutral and independent experts. The questions addressed are based on the issues identified by the sector and on questions from the public. It is this strong connection between the concerns of the various stakeholders that makes the approach original. France Energies Marines is coordinating COME3T by acting as an interface between a steering committee and the group of experts. This steering committee, which includes farm developers, consultancy firms, environmental associations, universities, regions, and government departments, prioritises the issues to be addressed. The latter are transmitted to the expert committee, which classifies them according to the associated environmental issue. **The summaries of the expert committee's feedback serve as a basis for the preparation of informative and richly illustrated bulletins. 2023 will mark the beginning of the third phase of the project with six new issues being addressed.**

OPTILE: Proposing solutions for the supply of isolated grids

Isolated sites and microgrids are among the most relevant markets for marine renewables. The design of the power system and its integration must be carefully optimised to cover the needs at a realistic cost. The traditional optimisation approach focuses on matching generation to consumption, with optimised power from energy converters and storage. This approach can be improved by considering optimisation criteria from other disciplines: reliability, machine position, power grid, carbon dioxide balance, consumption control, cyber security, and electrical stability. **With a duration of 3 years and a budget of €1.5M, the OPTILE project aims to develop a multi-criteria optimisation for the production of electricity from marine renewable energies in order to supply isolated networks such as those of island or aquaculture infrastructures.**

Jean-Philippe PAGOT, Chairman of France Energies Marines



Identifying, proposing, organising, searching...finally finding, but searching again. Analysing, sharing, publishing, and searching again.... Every day, the France Energies Marines teams renew the initial promise to devote our human and financial resources to the responsible development of offshore renewable energy projects.

Jean-François FILIPOT, Scientific Director of France Energies Marines



With this new set of projects, France Energies Marines and its members will contribute to facilitating the implementation of France's offshore wind deployment ambitions. The projects aim to make the offshore wind sector more competitive by making deployments in high-risk (cyclonic) areas safer, by anticipating the structural needs of the floating sector (such as substations) and by optimising the integration of farms into the environment. They also complement the efforts made by the Institute's previous projects and those developed within other frameworks, such as SEMAFOR (co-funded by ADEME), which focuses on the characterisation of bird migratory flows, and HT-20MW (led by Eolink and co-funded by ADEME), which aims to define a new standard for 20 MW floating wind turbines.

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