

How to better assess potential environmental and socio-economic impacts of renewable marine energies?

France Energies Marines, a Technology Platform offering scientific and technological facilities for an industrial development of marine renewable energy (MRE)

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1. Context

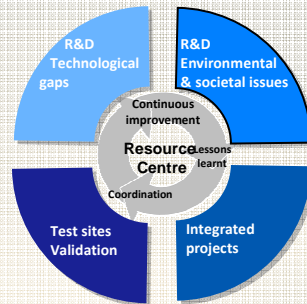
- Commitments to reduce CO₂ emissions in Europe (20/20/20), and in France (“Grenelle de l’environnement”; 23% renewable energy, 3% marine renewable energy).
- 2011: “France Energies Marine” answers to a call for tenders for “Institutes in decarbonated energies” (IEED).
- July 2011: French Government Call for tenders for 3 GW of offshore wind turbines (5 parcs in Manche and Atlantique)
- Other marine renewable energy (MRE) technologies are currently tested (tidal and wave; floating wind turbines).
- **How will MRE interact with coastal ecosystems and existing human activities (fisheries, tourism,...)?**

2. What is France Energies Marines ?

- FEM is a Public-Private Partnership
 - more than 30 companies and 20 public entities
 - representing all the key players of the MRE sector across the different coastal regions mainland and in France’s overseas territories.
- 70 researchers, engineers, technicians
- 142 M€ over 10 years

FEM considers all technologies:

- Offshore Wind
- Tidal Energy
- Wave Energy
- OTEC



Main objectives:

- environmental impact
- acceptance with other marine activities
- law & regulation
- cost-benefits analysis
- MRE business models in various paradigms

- Consolidate a scientific excellence
 - Multidisciplinary teams (as opposed to today’s specialised teams) public-private synergies (various level of technology development and maturity)
- Validate the technologies and reduce their costs
 - prototypes/pre-commercial units and arrays (a range of services) shared infrastructure (numerical modelling, test benches, test sites)
- Support the industry by education and training
 - define the appropriate training programs required disseminate learning tools



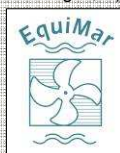
3. Environmental impacts

- **Issues:** Like many human activities in the coastal areas, MRE development modify important environmental parameters (substrate, hydrodynamism, turbidity, noise, electromagnetic fields,...) that may lead to ecological impacts (positive or negative) on the compartments of “receptor” ecosystems. **The nature and significance of these impacts need to be better assessed. Large uncertainties remain especially regarding cumulative impacts.**



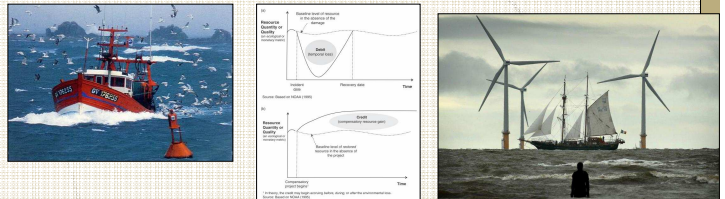
- FEM will adress generic issues** on environmental impacts. Research will be undertaken at the scale of both pilot devices deployed at test sites (for tested technologies such as tidal turbines) and industrial parcs (for fixed offshore wind farm)
- The main objectives are:
- Provide standardised protocols of environmental impact assessment (EIA), on the basis of the deliverables of the European “EquiMar project”.
 - Research activities that deal with impacts on
 - Physical habitat and sediment dynamics
 - Pelagic and benthic ecosystems (benthos, fish, marine mammals and birds)
 - Ecological processes (“reef” and “reserve” effects; food web changes,...)

- FEM will take part to collaborative work:**
- The European Energy Research Alliance (EERA)



4. Socio-economic impacts

- **Issues:** MRE deployments target marine provisioning ecosystem services (ES) (energy production) at the expense of other ecosystem services such as regulation ES (changes of current, habitat, benthic flora and fauna...), cultural ES (changes of landscape, new constraints for boating...) and also traditional provisioning ES (professional fishing). **What type of compensation for these ecosystem services losses?**



- Basic useful concepts:** Ecosystem services as defined within the Millennium Ecosystem Assessment framework and modelling equivalencies between impacts and compensations.
- Objectives:**
- Support tools for decision making in the context of societal impact assessments and compensation measures.
 - Investigate interactions between various uses on different sites and impacts associated with new MRE development.
 - Evaluate methods to compensate in the most effective and the least expensive way both stakeholders and the environment in case of impact.
 - Extensive fieldwork is required in leader countries (Denemark, UK, Germany) which have already deployed such programs.
 - Carry out a pilot study in a French site (Bay of Saint-Brieuc). It will be important to develop an integrative model in order to test different scenarios regarding impact assessment and potential compensatory measures.
 - Mapping and modeling systems represent important tools for this purpose.

FEM partners:

