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# OFELIA, Offshore Foundations' Environmental Impact Assessment

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## Résumé :

*Un nombre de fermes éoliennes offshore sont en cours de planification dans la Manche, aussi bien du côté français qu'anglais, de façon à atteindre une production énergétique européenne à partir de sources renouvelables d'au moins 20% du total pour 2020. Cependant, l'impact environnemental de ces installations, particulièrement concernant l'impact sur le fond marin, reste mal estimé. OFELIA (Offshore Foundations' Environmental Impact Assessment) est un projet Interreg 4 A – Manche en cours de création. Il regroupe des équipes de recherche de trois universités : Université du Plymouth (United Kingdom), Université de Caen-Basse-Normandie et Université du Havre. L'objectif de ce projet est d'améliorer l'évaluation des impacts environnementaux de fondations éoliennes offshore d'un point de vue expérimental et numérique. En particulier, les questions suivantes seront traitées: (1) État de lieux des bathymétries, granulométries, états de mer (houles et courants) des sites de fermes éoliennes offshore existants, en construction et en projection dans la zone éligible ; (2) Étude de la précision des modèles régionaux en ce qui concerne les phénomènes à petite échelle (échelle d'une fondation) ; (3) Introduction de paramètres dans les modèles régionaux pour permettre la représentation des effets d'affouillement près du mât ; (4) Impact de plusieurs mâts sur le fond marin et les conditions hydrodynamiques à partir d'expériences physiques et numériques.*

## Abstract :

*A number of offshore wind farms are being planned in the Channel, both by British and French governments and developers, in order to reach a renewable energy production target of 20% of the total European energy production by 2020. However, the environmental impact of wind farms remains little understood, in particular in what concerns the impact on the seabed. OFELIA (Offshore Foundations' Environmental Impact Assessment) is a project considered currently by the EU Interreg IVA programme. The project involves three research teams from three universities: Plymouth University (United Kingdom), University of Caen-Basse Normandie and University of Le Havre. The aim of the project is to improve our understanding of the environmental impacts of offshore wind farm foundations, based on numerical and physical modelling. In particular, the following questions will be addressed: (1) Desk study and data gathering of bathymetries, sedimentary characteristics, waves and current conditions at existing, under construction, and planned wind farm sites within the Channel zone; (2) Study of the accuracy of regional models in their prediction of local hydrodynamics and sediment transport (at the scale of the monopile); (3) Introduction of parameters within regional models that capture scour characteristics around wind farm monopiles; (4) Assessment of impact of monopile arrays on the seabed and on hydrodynamic conditions based on numerical and physical modelling.*

**Mots clefs : éolienne offshore, impact environnemental, hydrodynamique, fondation, affouillement, expérimentation, simulation numérique**

## 1 Project Details

The European objective of 20% renewable energy in the total energy supply within 2020 lead to a strong need for research and development of low carbon technologies. France and United Kingdom (UK) are exceptionally suited to develop and deploy marine renewable technologies, in particular wind farms, due to their geography. Both countries

have direct access to the Channel Sea, where offshore wind turbines are being planned. Indeed, the French government has chosen 3 wind farm installation sites in the Channel area, where wind farms will be constructed in the next couple of years (Saint Briec, Fécamp, and Courseulles-sur-Mer sites, green marks in FIG. 1). In the UK a number of offshore wind farms have already been built in the Channel (red marks in FIG. 1). The Scroby Sands wind farm for instance (Round I), whose approximate location is shown as a blue mark on the Eastern side of the map, was built in 2004. Two further developments in the Channel are planned in the next offshore wind development phase (Round III) in the British Isles, the Isle of Wight farm and the Hastings farm (located between Eastbourne and Brighton). The approximate location of the Round III sites are shown as yellow marks in the map of the France-UK Channel region. All these sites, due to their geographical proximity, may have common characteristics such as, sediment characteristics or sea state conditions.

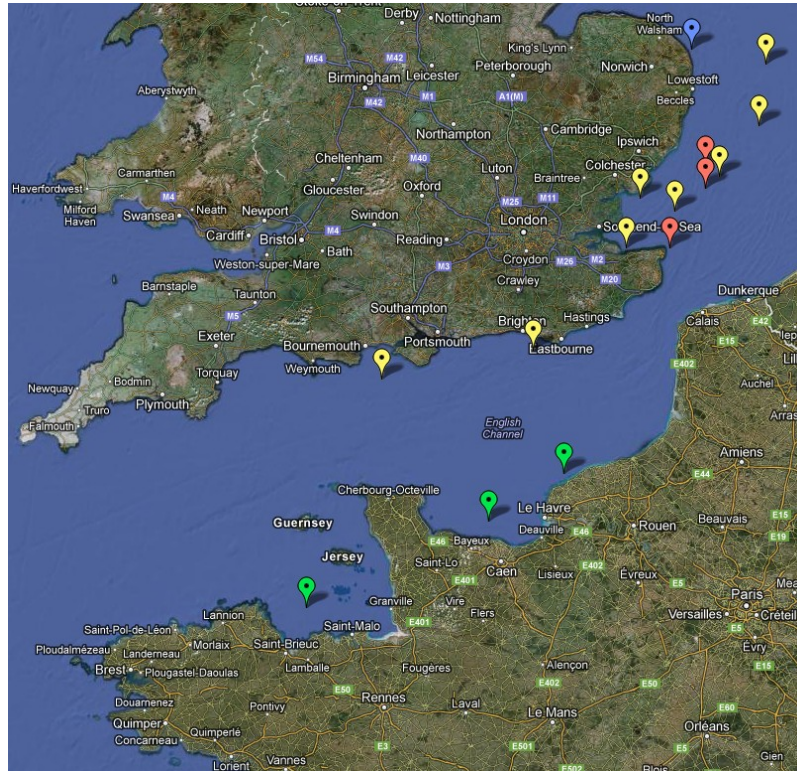


FIG. 1 – Existing and planned offshore wind farms in INTERREG IVA area

The aim of the current project is to improve our understanding of the environmental impacts of offshore wind farm foundations, based on numerical and physical modelling. In particular, the following questions will be addressed:

1. Desk study and data gathering of bathymetries, sedimentary characteristics, waves and current conditions at existing, under construction, and planned wind farm sites within the Channel zone.
2. Process and impact study.
  - Improve the understanding of hydrodynamics and sediment transport around a vertical mast submitted to waves and currents in order to identify the situations leading to critical scouring phenomena.
  - Identification and introduction of physical parameters within regional models that capture scour characteristics around wind farm monopiles.
  - Assessment of impact of a whole wind farm on the seabed and on hydrodynamic conditions based on regional modelling.