

欧州における漁業協調の取組事例(イギリス)

Orsted社、Hornsea Four PJ で海草再生事業へ

(Hornsea Three プロジェクト ではミツユビカモメ(kittiwake)の人工営巣地の造成も:右図参照)



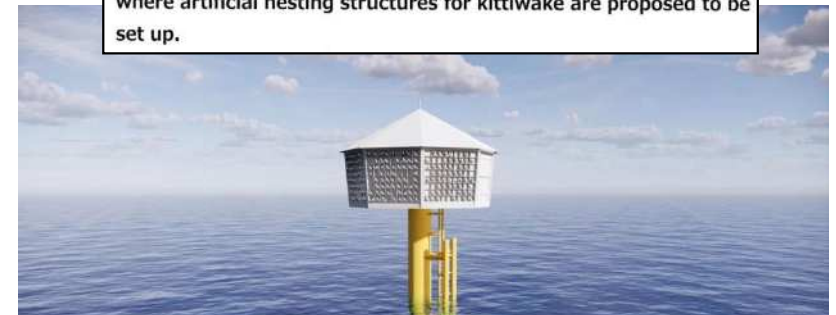
Ørsted and Yorkshire Wildlife Trust have teamed up to develop a seagrass restoration project as part of Ørsted's 2.6 GW Hornsea Project Four offshore wind farm in the UK. The initial phase of the project has already started as the Trust was commissioned to collect and plant seagrass seed across a 9.8 acres pilot area, which will be completed by early 2023.

世界有数の洋上風力発電会社のOrsted社が Yorkshire Wildlife Trust と共同で海草再生プロジェクトに取り組む

(出典: <https://www.offshorewind.biz/2022/11/15/orsted-plans-massive-seagrass-restoration-as-part-of-2-6-gw-hornsea-four-offshore-wind-farm/>)

Ørsted to begin surveys at Hornsea Three's kittiwake nesting sites

As part of its development of the 2.9 GW Hornsea Three offshore wind farm in the UK, Ørsted is also required to implement compensation measures for the protection of the Black-legged kittiwake. Now, the company is starting surveys at the locations where artificial nesting structures for kittiwake are proposed to be set up.



ミツユビカモメ向け営巣用構造物
(海岸沿いの断崖絶壁の穴に営巣する習性があることを利用して、多数の穴のあいた構造にしたもの。日本野鳥の会の専門家によれば有効ではないかとのこと。)

(出典: <https://hornseaproject3.co.uk/kittiwake-compensation>)

欧州における漁業協調の取組事例(イギリス)

FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group): 共存追求のための協議の場



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Our Members

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Marine Safety and Training

Offshore and Renewables

Scottish Fishermen's Trust



Wet Renewables Group (FLOWW)

The Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) was set up in 2002 to foster good relations between the fishing and offshore renewable energy sectors and to encourage co-existence between both industries. FLOWW's objectives are to enable and facilitate discussion on matters arising from the interaction of the fishing and offshore renewable energy industries, to promote and share best practice, and to encourage liaison with other sectors in the marine environment.

FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds

August 2015



marinescotland



(出典: <https://www.sff.co.uk/floww>)

イギリスFLOWWのメンバー構成

Membership of group

Membership of the group consists of representatives from the following sectors and organisations:

- The Crown Estate;
- Crown Estate Scotland (Interim Management)
- The Marine Management Organisation (MMO);
- Marine Scotland;
- National Federation of Fishermen's Organisations (NFFO);
- Scottish Fishermen's Federation (SFF);
- Northern Ireland Fish Producers' Organisation;
- Shellfish Association of Great Britain;
- Inshore Fisheries Groups (IFG);
- RenewableUK;
- Scottish Renewables;
- European Subsea Cables Association
- Kingfisher Division of Seafish;
- Maritime and Coastguard Agency;
- Offshore wind developers;
- Wave and tidal developers;
- Offshore transmission cables developers

行政関係

漁業者関係団体

UK、スコットランド再エネ・送電ケーブル関係機関

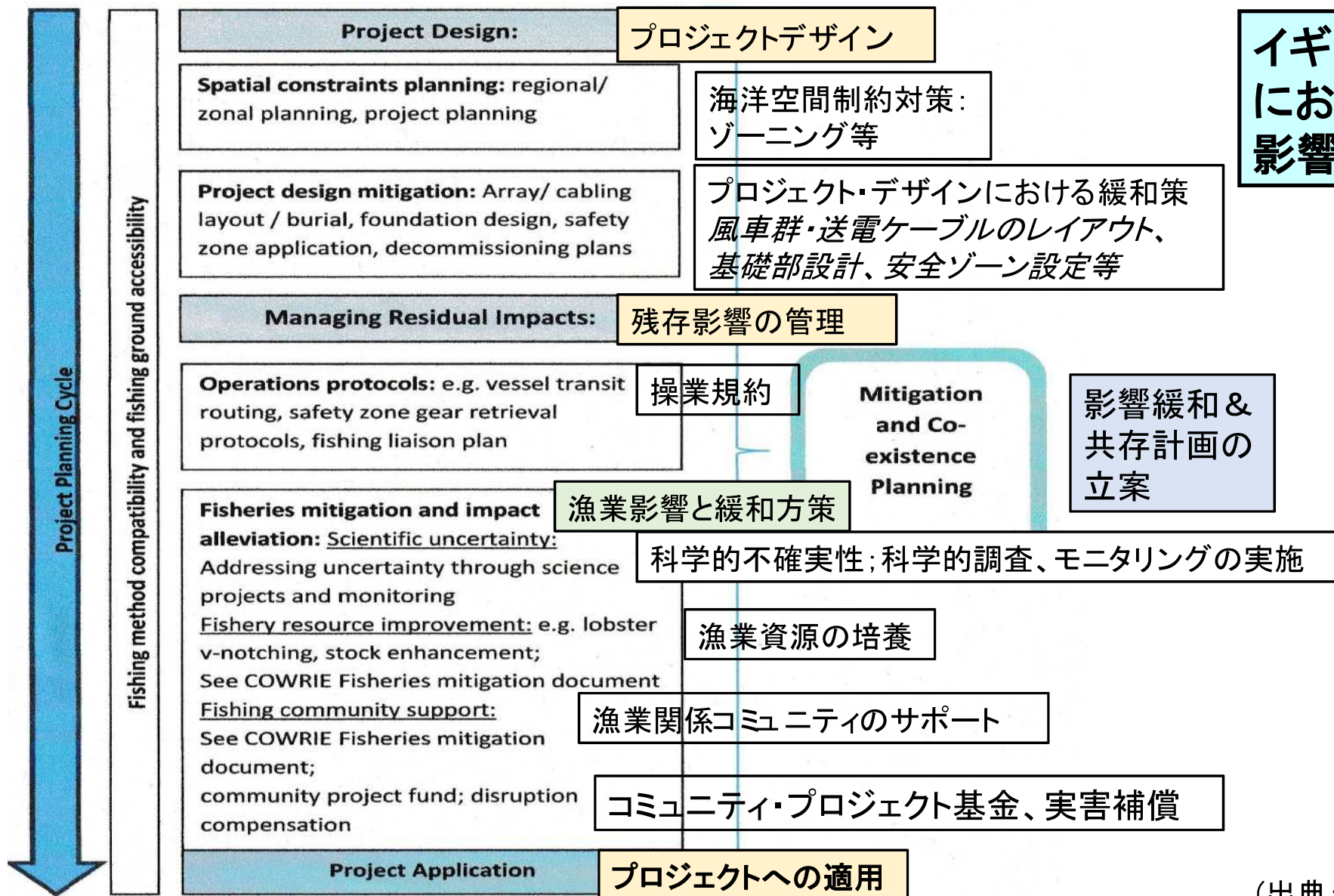
行政関係

風力・波力・潮力発電および送電ケーブル事業者

議長及び事務局は
The Crown Estate
(王室財産管理会社)
年3回各地で会合

Nominations for new members are welcome, and the group is committed to ensuring that membership is representative of the issues being explored by FLOWW.

(出典 : <https://www.sff.co.uk/wp-content/uploads/2016/01/FLOWW-Best-Practice-Guidance-for-Offshore-Renewables-Developments-Jan-2014.pdf>)



イギリスのFLOWW における漁業への 影響緩和・共存計画

(出典: 同前、p.31)

欧州における漁業協調の取組事例(スウェーデン)

スウェーデンOX2社、洋上ウィンドファーム+海藻牧場の取組

Swedish Offshore Wind Site Could House Large-scale Seaweed Farm

September 30, 2022, by Adrienne Bullen



Swedish renewable energy developer OX2 has signed letters of intent with companies Kobb and Nordic Seafarm to investigate opportunities for large-scale cultivation of seaweed at its Galatea-Galene offshore wind farm in Sweden.

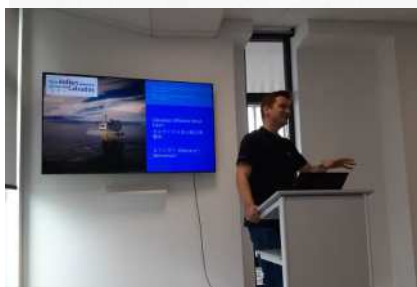
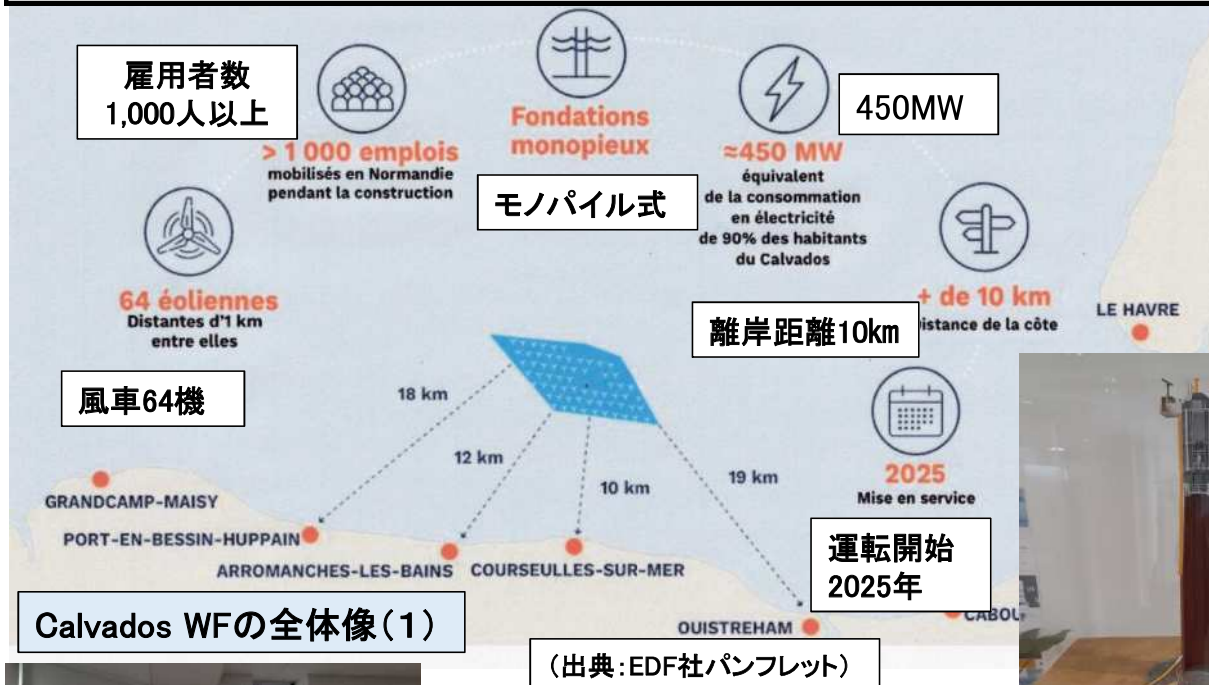
(出典：<https://www.offshorewind.biz/2022/09/30/swedish-offshore-wind-site-could-house-large-scale-seaweed-farm/>)



参考：Nordic Seafarm社、コンブの養殖業者
Website = <https://en.nordicseafarm.com/>

欧州における漁業協調の取組事例(フランス)

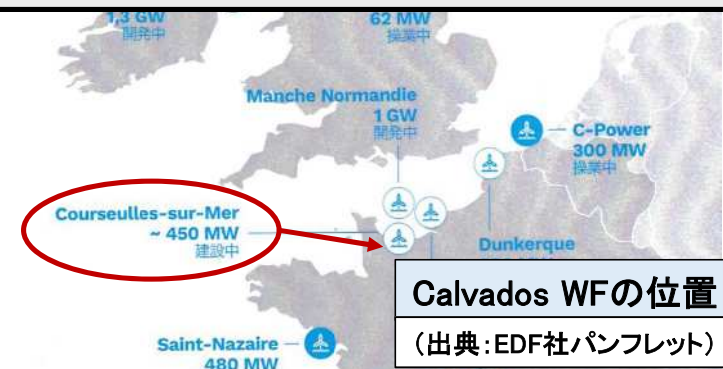
英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(1) 立地海域の概要 (EDF社コンソーシウム)



左: 建設事務所視察時のプレゼンの様子。中央下: モノパイル風車の模型
(2023.10.27の日仏海洋学会シンポジウム@フランス現地視察時に撮影)



Calvados WFのモノ
パイル式風車の模型



Focus on the layout of the wind turbines, the offshore
substation and the inter-array cables



欧州における漁業協調の取組事例(フランス)

英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(2) 立地海域の選定: 海域利用状況との関係

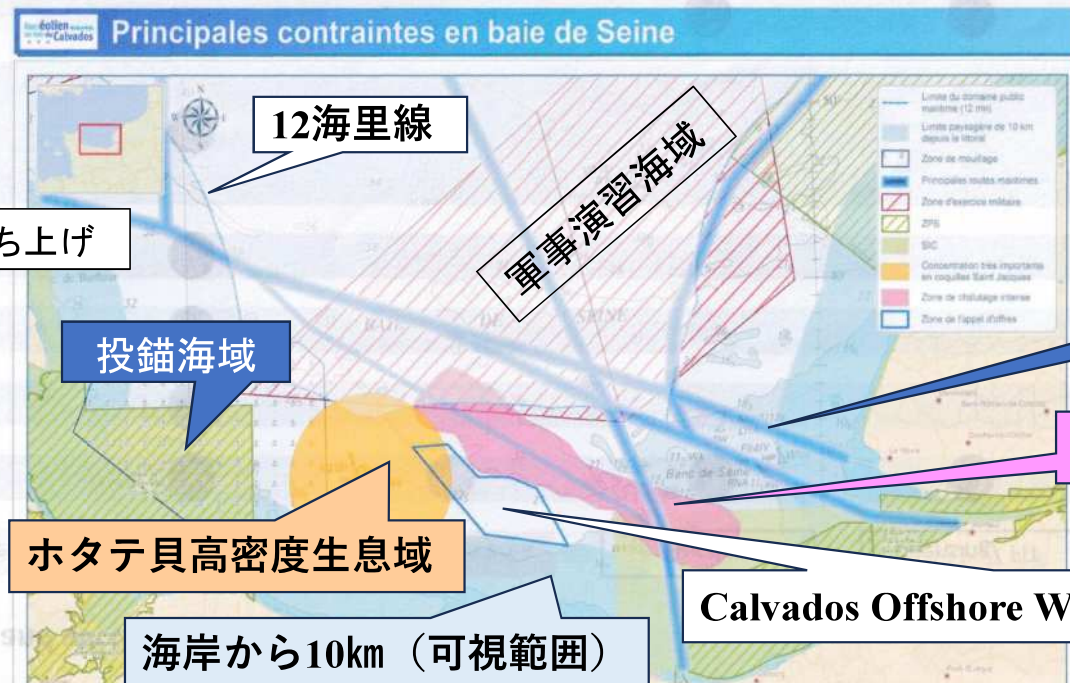
Why an offshore wind farm here?

- Planning exercise launched in March 2009: consultation and planning body set up on each coastline (bringing together government departments, local and regional authorities, wind farm developers, sea users, environmental associations,

2009年、各海岸ごとに関係者との協議会立ち上げ

- Identification of areas suitable for offshore wind power development, taking into account the issues at stake :

- **Technical** (bathymetry less than 40 metres, minimum distance of 10 km from the coast to limit visual impact)
- **Regulatory** (radar easements, military exercise zones, navigation routes, anchorage zones, etc.)
- **Environmental and socio-economic** (particular attention paid to respecting



技術的配慮＝水深 $\leq$ 40m、最短離岸距離10km。規制上配慮＝レーダー範囲、軍事演習海域、航路、泊地を除外。
環境的・社会経済的配慮＝漁業操業海域に特段の注意を払い、リスペクトする。

(出典：日仏海洋学会国際シンポジウムにおけるEDF社プレゼン資料、@フランスノルマンディー・カーン大学、2023.10.26)

欧州における漁業協調の取組事例(フランス)

英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(3)

Dialogue with fishermen

漁業者との対話

Numerous initiatives and a park designed from the outset with a view to cohabitation of uses

Wind turbines 5 nautical miles from the Cussy buoy (heart of the scallop beds in the Baie de Seine)

Spacing of 1000 metres between each wind turbine

Aligning wind turbines and power cables with the direction of the sea current 100°

Reduction in the size of the park to 45 km². (-40% compared with the area proposed in the call for tenders)

A "fisheries liaison unit" to regularly discuss the project, the next steps and our respective challenges.

Full-scale experiments: a "scallop experiment" in January 2018 and a "fishing study trip" to the United Kingdom.

An iterative process that led to the definition of proposed fishing rules within the park, which were shared by the "maritime safety" working group.

Presentation of the "Diverseaty" study (feedback on the impactx of offshore wind farms on fish stocks) in several fishing ports of Normandy during the winter of 2022-2023.

Environmental monitoring of the construction and operation of the offshore wind farm on the development of scallops

風車はホタテ貝生育海域中心部から5海里離す

風車と風車の間隔は1,000メートル離す

風車と送電ケーブルの接続角度は流向と100°にする

WFの面積を45km²削減する(応札時面積から-40%)

漁業者との連絡窓口(事業計画の今後につき常時意見交換)

ホタテ貝に関する本格的実験の実施。UKへ漁業実情視察

WF内漁業操業ルールの提案(海上保安当局と共有)

2022-23冬季ノルマンディー内漁港での水揚量への影響を提示

WFの建設および運用段階におけるホタテ貝資源開発に関する環境モニタリングの実施

(出典：日仏海洋学会国際シンポジウムにおけるEDF社プレゼン資料、@フランスノルマンディー・カーン大学、2023.10.26)

欧州における漁業協調の取組事例(フランス)

英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(4)

Environmental monitoring

環境モニタリング

Offshore

Calvados project

From 2011

2020-2021

2022-2025

Étude d'impact (impact assessment)
The result of several years' work prior to the submission of permit applications

État de référence
in progress over 1 to 2 years. First stage of the environmental monitoring program

Suivis environnementaux
throughout the construction period and for the duration of the operation (25 years)

Studies carried out by independent environmental experts: **consultancy firms, environmental associations or scientists.**

Logos: EDC, Universitat de València, CNRS, LPO, UNIAEN, UNIVERSITÉ CAEN NORMANDIE, Collège de Saint-Lô, Littoral Normand

Des suivis environnementaux sur chaque compartiment biologique

Marine mammals

Birds

Halieutic resources

Bio-sédimentaire and water quality

underwater acoustics

Focus on environmental monitoring : Large-scale aircraft monitoring of marine mammals and birds

Monitoring frequency :

- 1 year before construction, in addition to the 2012 and 2014 campaigns
- During the construction period: March and April 2022, February and April 2023
- 3 years of post-construction monitoring
- 1 year, 2 years before dismantling

Survey with airplanes

Sampling :

- Linear transects spaced 5 km apart in the "Seine Bay" study area. Presence of 1 pilot,
- 1 navigator and 2 observers. Observer/navigator relay every 3 hours
- Observation in a strip of 200 m on either side of the aircraft

Map of the Seine Bay study area

航空機による広域調査(海産哺乳類、鳥類)

Focus on environmental monitoring : Marine mammal and noise monitoring during drilling workshops in winter 2023-2024

Drilling system

Position of receivers during foundation drilling workshops

Example of a hydrophone used during recording campaign

Monitoring protocol :

- 3 acoustic recorders simultaneously placed at 750m and 1000m, for 15 days

掘削時の水中音による海産哺乳類への影響調査

Focus on an environmental support measure : Thesis on the impact of anthropogenic noise on the movements and behaviour of harbour seals at sea

Objectives of the thesis :

- Modelling of the sound levels perceived by seals during the reference state and the construction phase
- Analysis of the diving behaviour of seals and any changes in response to perceived sound

The modelling of sound levels perceived by seals during the reference state is based on environmental monitoring measure T1.

MSU11: Telemetric monitoring (GPS/GSM) of the Baie des Veys harbour seal colony

Seal fitted with a GPS/GSM beacon

Example of telemetric monitoring carried out on seals in the Bay of Veys

CIFRE thesis supervised by the University of La Rochelle/CEBC-CNRS and the SOMME design office.

The thesis will be carried out between 2023 and 2025, starting in September 2023.

Logos: CNRS, La Rochelle University, SOMME

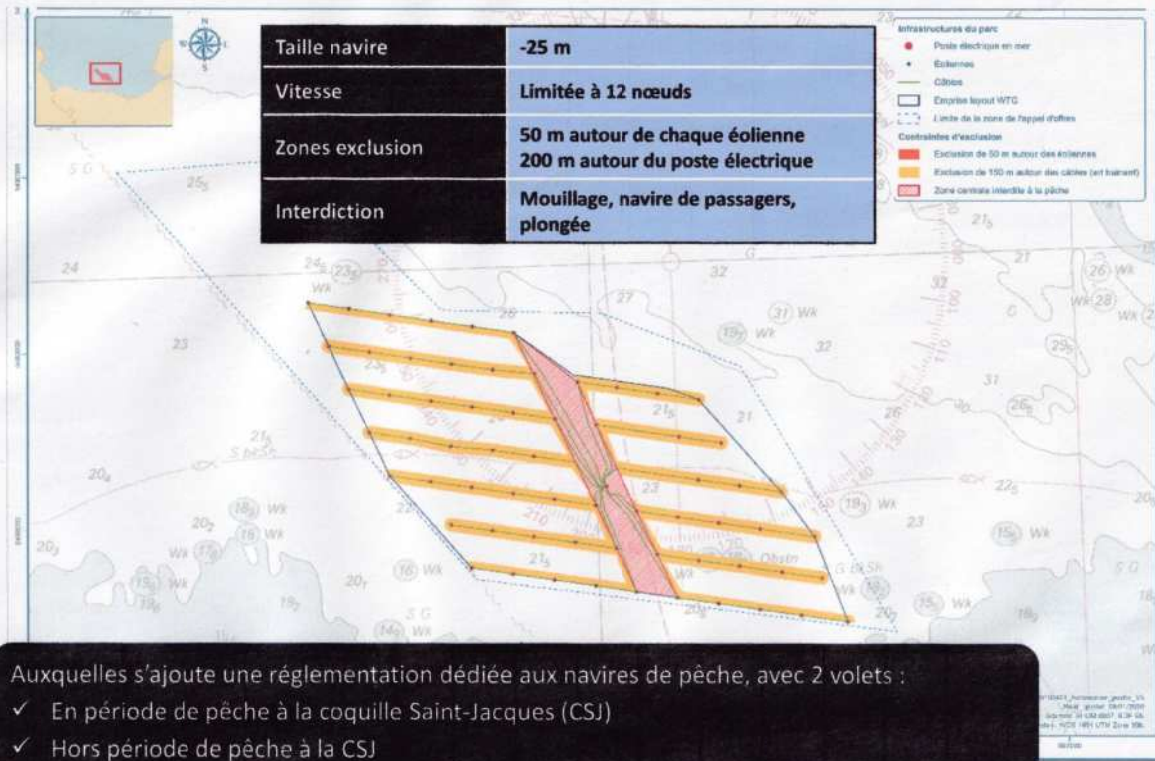
ゼニガタアザラシのバイオリギングによる水中音反応調査

(出典：日仏海洋学会国際シンポジウムにおけるEDF社プレゼン資料、@フランスノルマンディー・カーン大学、2023.10.26)

欧州における漁業協調の取組事例(フランス)

英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(5)

Propositions de règles de navigation et d'usages Règles générales



船舶航行の規制に関する提案 一般規則

船舶の長さ	25m以下
船速	12kt以下
船舶航行禁止区域	各風車の50m以内 変電所の200m以内
禁止行為	投錨、通過航行、 ダイビング

海底ケーブルから150m操業禁止

全操業行為の禁止

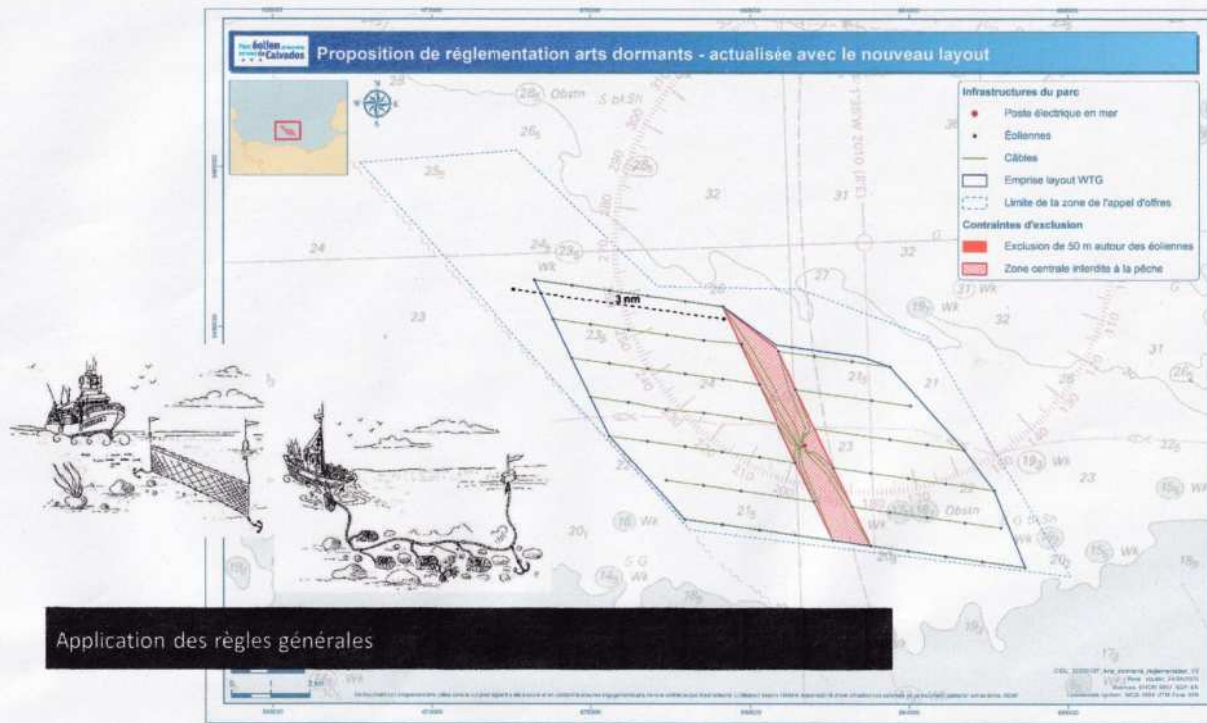
注：以降のフランス語の和訳は小池康之・日仏海洋学会顧問による。ここに特記して厚くお礼申し上げます。
(出典：日仏海洋学会国際シンポジウムにおけるEDF社プレゼン資料、@フランスノルマンディー・カーン大学、2023.10.26)

欧州における漁業協調の取組事例(フランス)

英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(6)

Propositions de règles d'usages pour la pêche professionnelle
Règles (hors période de pêche à la CSJ) pour les arts dormants

漁業操業に関する提案
延縄漁業(ホタテ貝漁期以外)



全操業行為の禁止

(出典：日仏海洋学会国際シンポジウムにおけるEDF社プレゼン資料、@フランスノルマンディー・カーン大学、2023.10.26)

欧州における漁業協調の取組事例(フランス)

英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(7)

Propositions de règles d'usages pour la pêche professionnelle Règles (hors période de pêche à la CSJ) pour les arts trainants



漁業操業に関する提案 底引き網漁業(ホタテ貝漁期以外)

海底ケーブルから150m操業禁止

全操業行為の禁止

操業可能

(出典：日仏海洋学会国際シンポジウムにおけるEDF社プレゼン資料、@フランスノルマンディー・カーン大学、2023.10.26)

欧州における漁業協調の取組事例(フランス)

英仏海峡ノルマンディー沖 Calvados Offshore Wind Farm の事例(8)

Propositions de règles d'usages pour la pêche professionnelle
période de pêche à la CSJ (horaires d'ouverture)



es règles générales
de toute activité de pêche à l'exception de la pêche à la CSJ
gation/pêche imposé dans chaque corridor Est - Ouest
ans un corridor interdit
e passer d'un corridor à un autre, dragues relevées
e franchir le couloir central Nord-Sud de convergence des câbles inter-éoliennes, en navigation,
ées

漁業操業に関する提案
ホタテ貝漁操業期間



海底ケーブルから150m操業禁止



操業可能

(出典：日仏海洋学会国際シンポジウムにおけるEDF社プレゼン資料、@フランスノルマンディー・カーン大学、2023.10.26)

Offshore wind and fisheries: a win-win relationship is essential for the energy transition



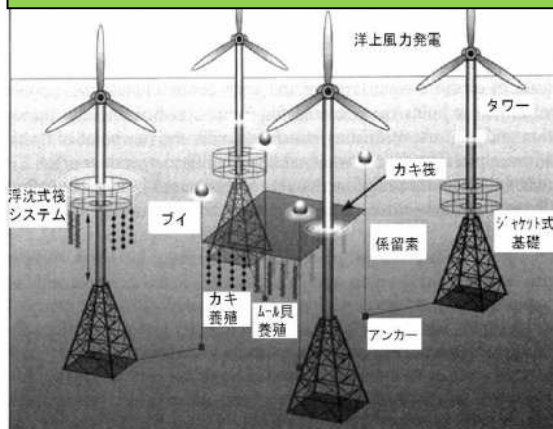
洋上ウィンドファームと漁業は共存できるか？
答えは、もちろん、イエスだ！

しかし、ハッピーな共存のためには様々な具体的条件が必要だ。

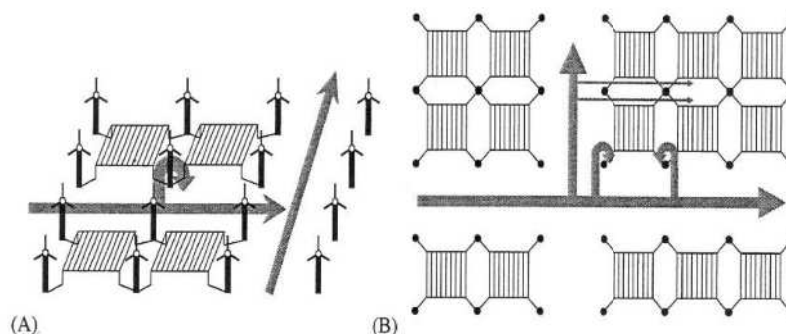
Can fisheries and offshore wind farms co-exist? This was the title of an event organised today by the European Parliament's Committee on Fisheries (PECH). The answer to this question, of course, is yes – but the happy coexistence of offshore wind and fisheries require specific conditions. European institutions now need to connect stakeholders and provide a dedicated place for sharing best practices and solutions.

(出典：<https://windeurope.org/newsroom/ews/> 2020年1月22日)

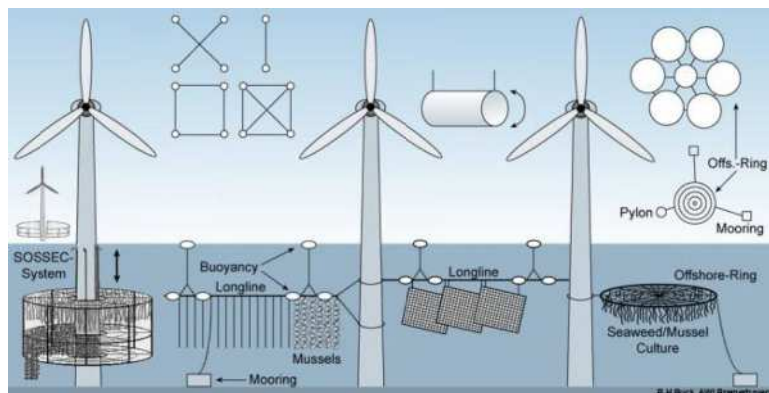
《参考》海外における漁業協調の構想例(1/2)



着底式風車基礎部を、魚礁構造にする。



洋上風車群のレイアウトを工夫して、船舶航行や漁業操業を含む海域多目的利用を可能にする。



風車間の海中空間に立体的に養殖いけすを設置する。(支柱に固着は大丈夫か?)



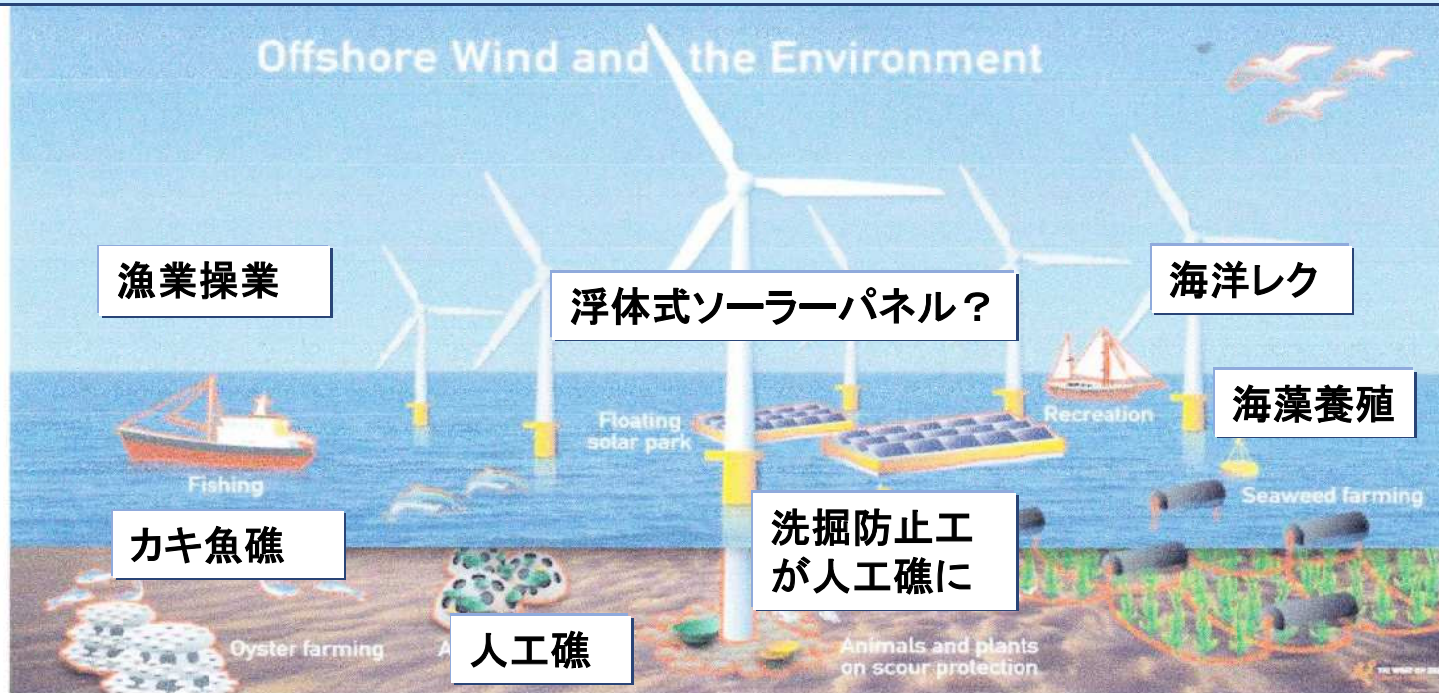
風車のトラス構造基礎部に養殖いけすを設置する。(この構造なら固着はOKかも)

(出典: Bela Hieronymus Buck, Gesche Krause, Harold Rosenthal, 2004)

(右下出典: Bela H.Buck, International Marine Spatial Planning Public Symposium, Providence, Rhode island, 2012)

《参考》海外における漁業協調の構想例(2/2)

洋上ウィンドファームと環境創造 (漁業協調; 海域多目的利用)



1. Multi-Functional Space Use in Offshore Wind Farms

(出典：TKI Wind op Zee Program 2019-2020、28 March 2019)

(<https://www.topsectorenergie.nl/en/program-line-offshore-wind-and-environment>)

ご清聴、有り難うございました。

(いつでもご連絡ください。)

神奈川大学海とみなと研究所上席研究員

神戸大学客員教授、横浜国立大学講師

(一社) 海洋産業研究・振興協会顧問

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