Commercial fisheries and offshore wind

A perspective on coexistence, from Europe and beyond

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Agenda

1. **Overview of Ørsted and offshore wind**
2. **Ørsted's experience of fisheries coexistence**

Hywel Roberts

Position
Senior Lead Strategic Specialist

Role
Facilitating coexistence with other sea-users

Location
London

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Ørsted develops energy systems that are green, independent and economically viable

Installed Under construction

Offshore wind

- Global leader in offshore wind
- Develop, construct, operate and own offshore wind farms
- Ambition to reach ~30 GW installed capacity by 2030

Onshore renewables

- Strong presence in the United States and Europe
- Develop, operate and own onshore wind, solar PV and storage projects
- Ambition to reach ~17.5 GW installed capacity by 2030

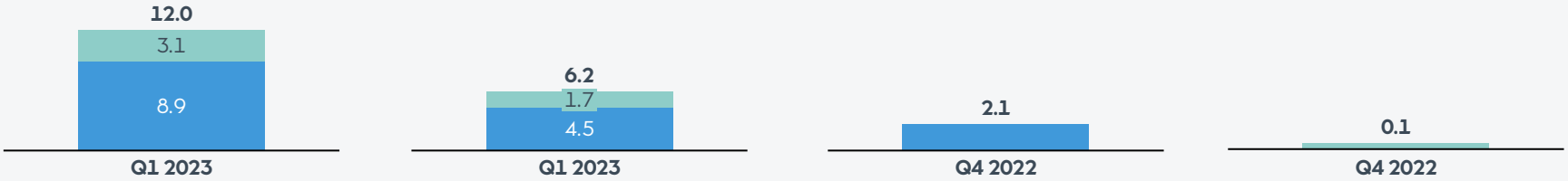
Bioenergy & other

- Presence in Europe, including bioenergy plants, legacy gas activities and patented waste-to-energy technology
- Own and operate bioenergy and waste-to-energy plants, and optimise gas portfolio

Renewable hydrogen and green fuels

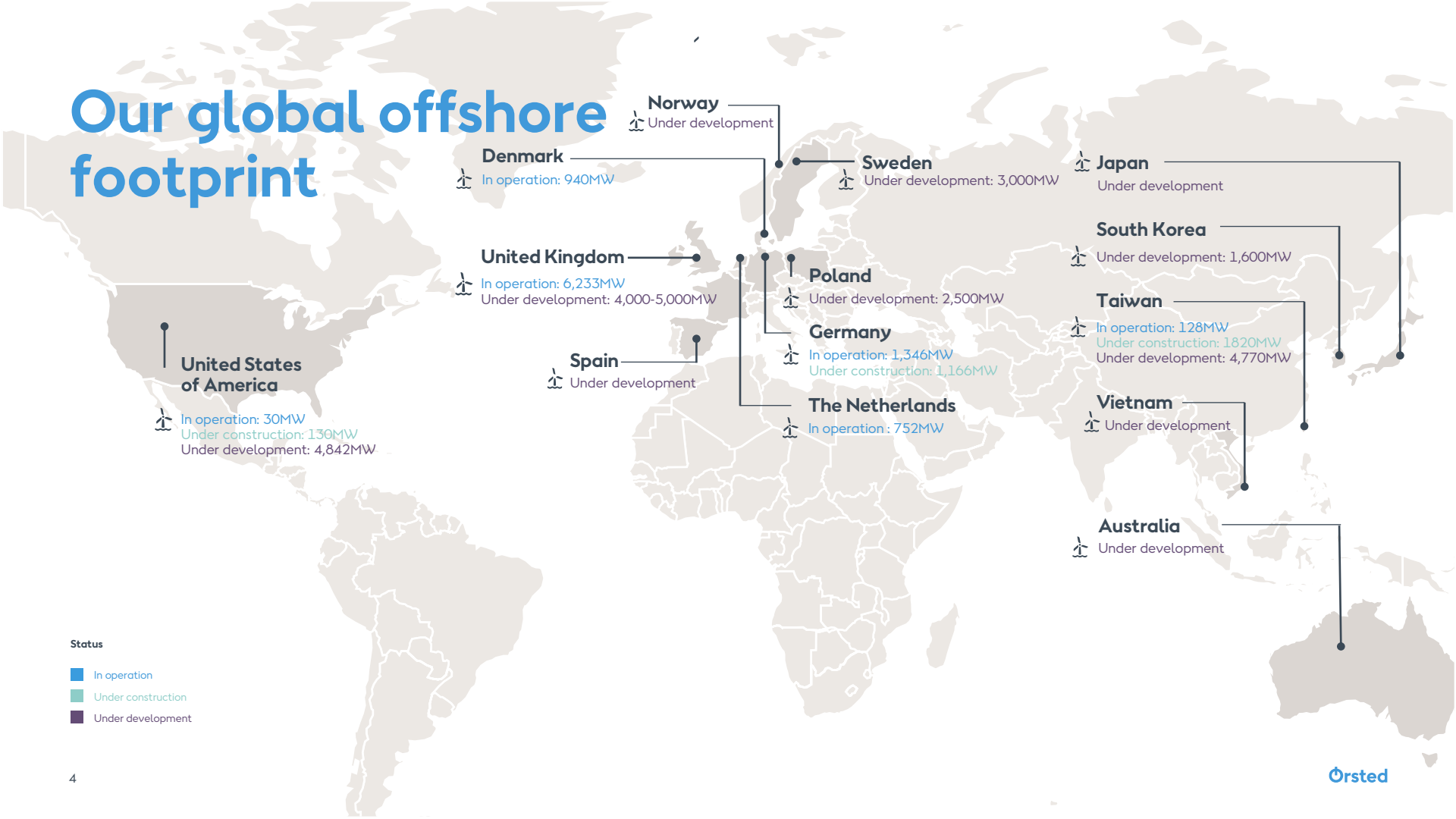
- Emerging platform with 10 pipeline projects (+3 GW) mainly in Europe
- Develop, construct, own and operate hydrogen facilities
- Ambition to become a global leader in renewable hydrogen and green fuels by 2030

Capacity, GW



Source: Ørsted Interim report Q1 2023

Our global offshore footprint



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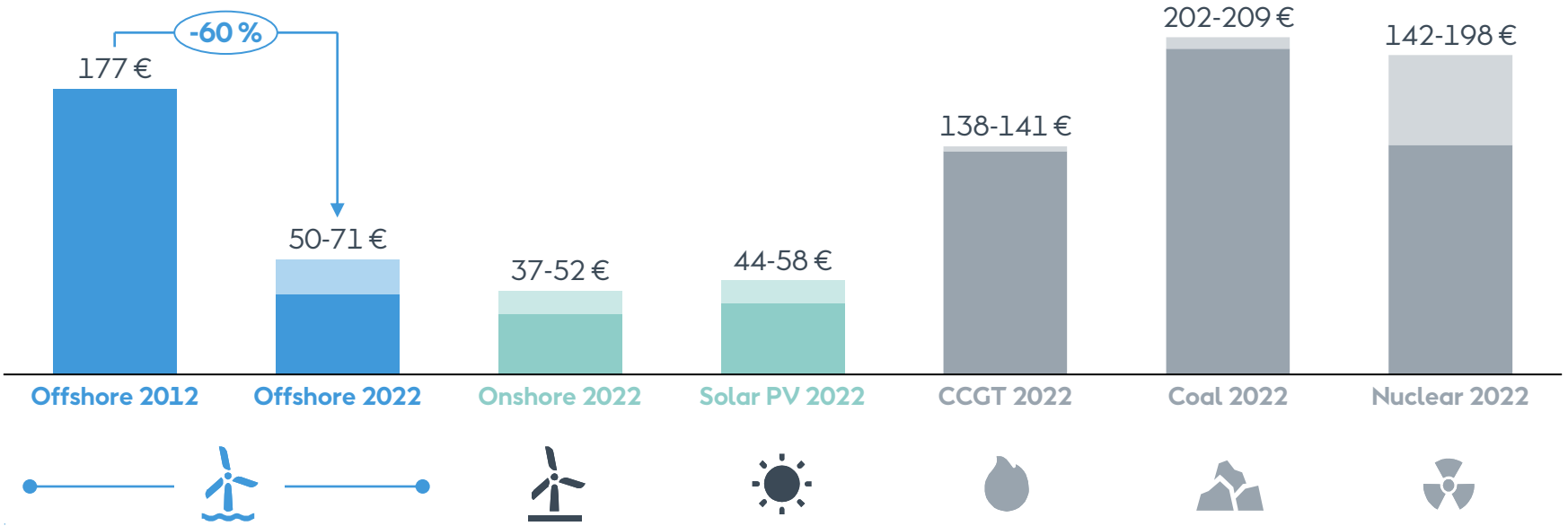
Today, offshore wind is fully cost-competitive with fossil fuels

Levelised Cost of Electricity (LCoE)[1,2]
EUR/MWh, 2012 and 2022, Northwest Europe



1. The chart illustrates the total span of low and mid scenarios (i.e., lowest national LCOE found in low scenario, highest national LCOE found in mid-scenario) for projects with FID today and construction beginning tomorrow. Same hurdle IRR used in low and mid scenarios. Nuclear: UK. Coal: DE. Natural gas: UK. Solar PV: DE, UK. ON wind: DE, UK. OF wind: DK, NL, UK. DE OF wind mid scenario omitted as cost of 104 EUR per MWh deemed unrepresentative. OF wind 2012: generic offshore wind, Northwest Europe, FID 2012; 2. CCGT and Coal LCOEs in the low and mid scenarios are calculated with BNEF's benchmark fossil fuel and carbon prices. The LCOE span could be much wider if different price scenarios were applied. Nuclear new builds in Europe has been very limited the past decades and there is a high uncertainty in construction costs that is not reflected in the nuclear LCOE span
Source: Bloomberg New Energy Finance – 2H 2022 LCOE Update.

Over the past decade, scale and continuous innovation have driven down the cost of offshore wind

Key cost reduction levers

- Larger sites
- Larger turbines
- Cost reduction across all components
- Shorter installation cycles
- Lower operations and maintenance costs
- More competitive supply chain

Boeing 747-8
Length: 76m

1991	2000	2003	2005	2007	2013	2017	2024
0.5MW	2.0MW	2.3MW	3.0MW	3.6MW	6.0MW	8.0MW	12.0MW

We aim to maintain a leading sustainability ambition

2025 Carbon neutral business

2040 Carbon neutral footprint

SCIENCE BASED TARGETS

2030 No later than 2030, all projects commissioned must have net positive biodiversity impact

Today Ban on landfilling of wind turbine blades

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Promoting collaboration, avoiding conflict

- Variable weather conditions, volatile market prices, and a hazardous working environment mean that **fishing is a tough business**.
- Seabed habitats and catch species are vulnerable.
- Fishers must apply continuous effort to maintain a delicate balance and concerns are understandable:
  - *"Will I be able to access the wind farm?"*
  - *"Will there be anything left to catch when I do?"*

Ørsted understands that fishing is more than just a job. It's a traditional way of life and an integral component of coastal communities.

Concerns expressed by fishers

"Will I be able to access the wind farm?

(impediments to fishing)

- Reduced access to established fishing grounds
- Displaced fishing effort increasing fishing pressure / gear conflict
- Rerouted shipping increases traffic within fishing grounds
- Additional steaming time
- Gear snagging

"Will there be anything left to catch?"

(potential stock/habitat impacts)

- Temporary / long-term habitat loss/disturbance
- Suspended solids and sediment deposition
- Underwater noise (piling and operational)
- Creation of reef habitats
- Electromagnetic field (EMF)

Ørsted's engagement with fishers includes

1. Diversification opportunities
2. Academic research
3. Fishing community initiatives

https://youtu.be/LxdLQ7lN4P4
Ørsted video on fisheries coexistence

Supporting fishers - through diversification

Case Study 1: Sea Source Offshore

- A fishers cooperative based in Northern Ireland.
- Ørsted have collaborated with and supported Sea Source Offshore for a number of years.
- Fishing vessels (both working and purpose-rigged) support offshore wind farm construction and operation:
  - Guard vessels;
  - Survey vessels;
  - Offshore communication platforms;
  - Fishing liaison services.
- Profits are fed back into the co-operative and make their way directly into the fishing communities.
- Ownership of some support vessels is shared, meaning that benefits are spread across members.

sea source Offshore

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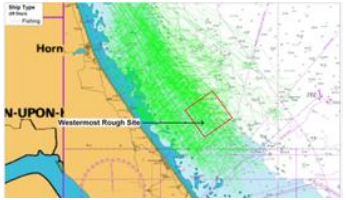
Supporting fishers - through academic research

Case study 2: Westermost Rough shellfish study

- Wind farm sited within UK's largest crab/lobster fishery (see fishing vessel tracks), valued at £10M p/a, ¼ of all UK lobsters.
- Long-term impact study funded by Ørsted and carried out by local fisherman's' association (HFIG) and Hull University.
- Survey emulates local fishing techniques, and was undertaken using HFIG's research vessel (pictured).
- 6-year fieldwork campaign (first of its kind in the world) completed in Oct. 2019 - no deleterious effects identified.
- Papers published in ICES Journals of Marine Science[1].

"Crab and lobster fishing has continued to thrive. Good communication, a willingness to work together, and mutual respect underpin the positive working relations." Jamie Robertson, CEO HFIG

"Fishermen can sometimes be sceptical of surveys, but not this one, as it was conducted under commercially realistic conditions." Mike Cohen, CEO National Federation of Fishermen's Organisations



[1]*Co-existence in practice: a collaborative study of the effects of the Westermost Rough offshore wind development on the size distribution and catch rates of a commercially important lobster (Homarus gammarus) population.* Michael Roach, Andy Revill and Magnus J. Johnson. ICES Journal of Marine Science, 2022, 0, 1–12

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Supporting fishers - through fishing community initiatives

Case study 3: West of Morecambe Fisheries

- Ørsted has donated £0.9M to West of Morecambe Fisheries to support fishing community initiatives.
- The initiatives promote the long-term prosperity of the fishing industry.
- Collaboration and joint-research projects help to foster good-will.
- West of Morecambe Fisheries provides facilities, equipment and training to fishers.
- For example, Ørsted have recently part-funded a research facility and lobster hatchery in Bridlington.

"Thanks to this funding, we have been able to begin an ambitious programme of research and stock enhancement that will make a positive difference to the future sustainability of the Holderness fishery." Dr John Terschak, Lab. Manager, HFIG

What works well?

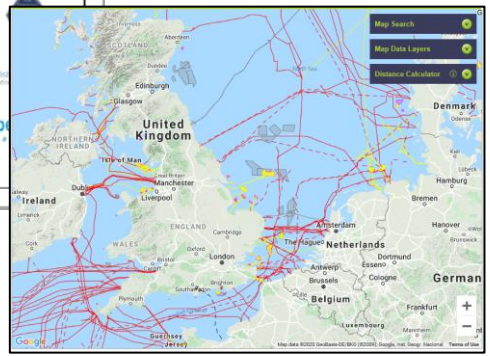
- **Engagement, early and often**: consultation, leasing, SEA, EIA, Coexistence and Liaison Plans, Notices to Fishers, and hiring of On- and Offshore Fishing Industry Representatives.

- **Promotion of cooperation not conflict**: engagement in collaborative research initiatives, funding of fishing community initiatives, diversification opportunities.

- FLOWW UK forum at which offshore wind farm developers, fisheries representatives, and regulators resolve issues and generate cross-industry best-practice guidance.

- KIS-ORCA
  - Physical infrastructure (cables, turbines and platforms) are mapped and made freely available to fishers.
  - Files are uploaded into the fish-plotter systems that fishers utilise offshore in real-time while fishing.
  - Funded, and managed on a voluntary basis by cable owners and OWF developers.

Tom Watson, ex-fishing skipper and ex-UK West coast Onshore Fishing Industry Representative



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Offshore wind and commercial fisheries co-location

What's the status in Europe today?

Open to fishing

- Offshore wind farm (OWF) array areas in the UK are largely open to fishing (at the fishers risk) during development, construction, operation, decommissioning.
- Fishing activity is spatially incompatible with simultaneous OWF construction works. High-profile disputes over which sector has the right to occupy the marine space during construction can, and have, ended in the High Court.
- The 'hands-off' approach adopted by UK regulators presents many challenges, however, the UK experience has demonstrated that pre-wind farm levels of passive fishing methods can resume within operational array areas.

Partially open

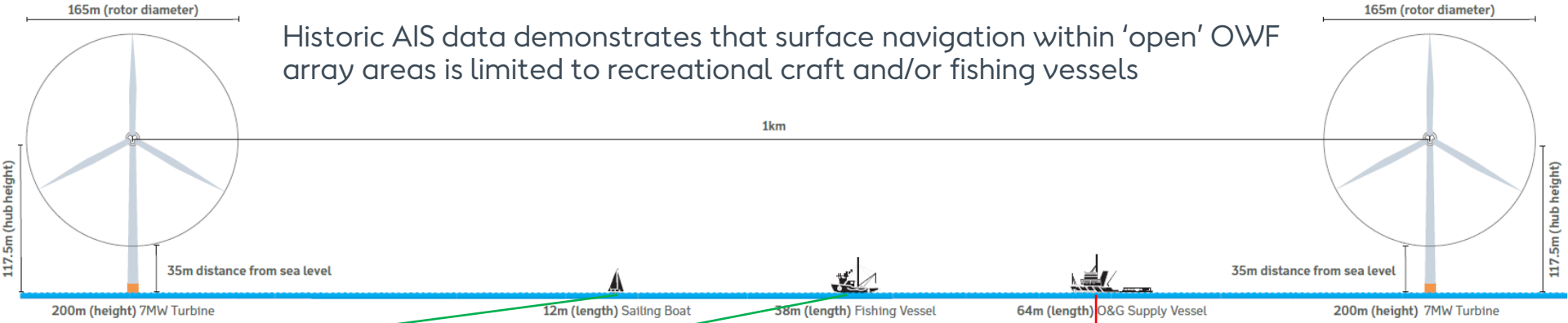
- OWF array areas are increasingly closed in the following order: FR, DK, BE, and NL
- This applies in terms of fishing vessel transits, and the type of fishing methods permitted (passive/active).

Closed to fishing

- OWF array areas in DE have been closed to fishing and are only partially open for transiting fishing vessels.
- Policymakers in DE have recently begun the process of loosening restrictions (some passive fishing likely to be allowed).

Vessels that do, and don't, navigate within wind farms

Historic AIS data demonstrates that surface navigation within 'open' OWF array areas is limited to recreational craft and/or fishing vessels



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Construction

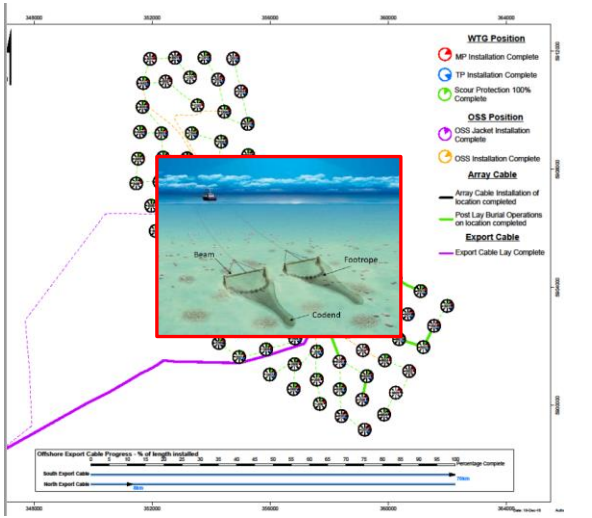
Fishing is spatially incompatible with ongoing offshore wind farm construction activity.

30+ vessels on-site: installation jack-ups, heavy lift vessels, inter array cable lay vessels, export cable lay vessels, trenching vessels, accommodation vessels, crew transfer vessels, guard vessels, survey vessels.

- Multiple subsea snagging hazards
- Exposed / partially buried cables
- Varying construction sequences
- High-cost (multi-billion €) and highly complex installation programme











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Systematic review of available science

Centre for Environment Fisheries & Aquaculture Science

Cefas

Effects of offshore wind farm construction and operation on commercial finfish and commercial shellfish stocks and fisheries

Systematic Evaluation of the literature

Author(s): Andrew Gill[1], Julie Bremner[1], Sylvia Blake, Lisève Fierens, Frances Mynott, Karen Vanstaen

August 2021

1 – Joint lead authors

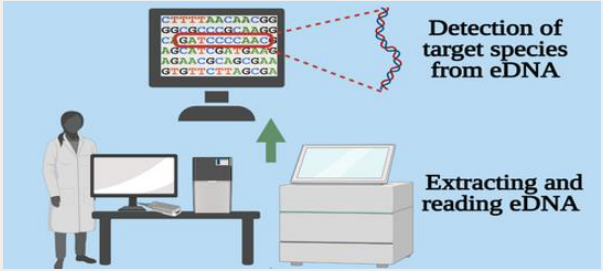
	Fishes				Shellfish	
	Pelagic fish	Demersal roundfish	Demersal flatfish	Elasmobranchs	Crustaceans	Molluscs
Construction (construction noise)						
Behaviour, health						
Operation (presence of the structure itself)						
Landings						
Catches						
Weight/biomass						
Quantity						
Size						
Behaviour, health						
Operation (operational noise)						
Behaviour, health						
Overall						

How do wind farms interact with fisheries resources?

Systematic Evaluation of Evidence on Offshore Wind farm and Fisheries Interactions

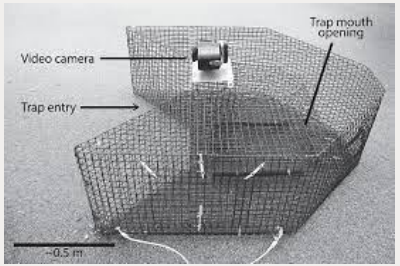
Fisheries monitoring

- eDNA surveys
- Trawl surveys
- Slocum glider (pelagic fish survey)
- Acoustic telemetry
- Baited Remote Underwater Video (BRUV)









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Let's create a world that runs entirely on green energy

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Love your home