



Newsletter

Edition 1 | 2022



Unexploded Ordnance (UXO)



UXO is a global issue; while the UK has been the most advanced in terms of wind farm development and therefore UXO identification and disposal has been well utilised in this country, the lessons learned, technologies and methodology employed and developed can be internationalised for use globally.



The challenge

It's no secret that the UK has big plans to significantly increase offshore wind capacity to 50GW by 2030. However, an estimated 500,000 legacy items/targets of undiscovered UXO exist in [UK waters](#)¹, highlighting the growing requirement for the safe removal or disposal of UXO in the pre-construction phase of a wind farm's life cycle.

On an international scale, the UXO threat for offshore wind is also prevalent among emerging offshore wind markets like Taiwan, France, Germany and the USA.

What's the issue?

Safety

Ensuring the safety of people and assets is at the top of every Developer's agenda. The stimulated pace of wind farm development necessitates an accelerated clearance of UXO before construction can commence, putting pressure on local supply chains and possible delays to project completion.

With an 80-90% success rate, the Low-Order technique can dispose of underwater UXOs without noisy explosions. **However**, if successful, the explosive filling and other components remain intact, leaving a large proportion of hazardous waste on the seafloor, which needs to be removed - further increasing environmental impact.

Impact on marine wildlife and the environment

Following a number of reports, it has been shown that marine wildlife has been impacted by the use of current UXO disposal practices, sparking debate across the sector about alternative methods.

Albeit a 100% UXO disposal success rate, the conventional High-Order UXO disposal method generates loud subsea explosions which can disrupt navigation, migration, feeding and communication of marine mammals, fish and other wildlife.

Choosing the best UXO detonation technique

Each site is different, meaning the correct UXO disposal technique needs to be carefully selected depending on the environment it's located. Choosing the best method for disposal may be seemingly daunting and highlights the importance of working with UXO specialists to guide through the process from planning all the way to project execution and completion.

Low-Yield; addressing the challenge

It is vital that the industry employs UXO identification and disposal techniques that are capable not only of paving the way for accelerated offshore wind development but also safeguarding our personnel and marine ecosystems.

As technology evolves, so do our practices. In 2015 a Low-Yield technique was developed by EORCA (UK), JF Renewables' exclusive partner.

What is Low-Yield?

Pioneering technique that generates a singular or multiple high-pressure water jets which are targeted at the explosive contents and vulnerable internal components of a UXO without burning or blowing up the UXO target.

The result is an innocuous explosion of only 300g as opposed to the 2.5kg to 10kg blast produced by High-Order explosive disposal techniques.

EORCA

EORCA (UK) has completed multiple Low-Yield operations in the offshore wind sector with a 100% success rate, five of which were conducted during 2021.

Why is Low-Yield beneficial?

- Quieter
- Produces a far smaller shock wave
- Causes less disruption to nearby marine mammals, fish, flora and fauna
- Depending on license, a bubble curtain is not required
- Leaves behind only tiny pieces of material, which are harmless in water and dissipate over time

In demonstrating that UXO can be successfully cleared without producing loud blasts and excessive waste, the Low-Yield technique offers a sustainable path to safe offshore wind development and is exclusively available to JF Renewables.





The importance of innovation

“In all that we do in the renewables space, particularly where UXO is concerned, we must be as environmentally responsible as possible. As technology continues to evolve we have an obligation to adapt and improve our practices to allow us to fulfil this commitment.”

The development and success of Low-Yield allows us to do just that while focusing on sustainability. Low-Order leaves a large proportion of hazardous waste on the seafloor which requires further clearance for the remaining waste to be gathered and placed in a disposal stillage and disposed of. By only leaving behind tiny pieces of material, which are harmless in water and dissipate over time, Low-Yield removes the need for a clearance operation therefore reducing time at sea and subsequently carbon footprint.”

**- Wayne Mulhall, Managing Director,
JF Renewables**



Why was Low-Yield developed?

“We identified a need to create a reliable and dependable system that could guarantee a low-consequence event in order to safely dispose items of UXO. Subsequently our goal is to be at the forefront of innovation and technology that can help reduce the effects of underwater blast and shock trauma to fish, mammals, flora and fauna.”

We continued to develop the Low-Yield system in 2021 for an offshore wind farm, where four identified UXO were large net explosive quantity. In successfully completing the disposal of the UXO using the Low-Yield technique, it was proven that the output of the aforementioned systems was negligible.”

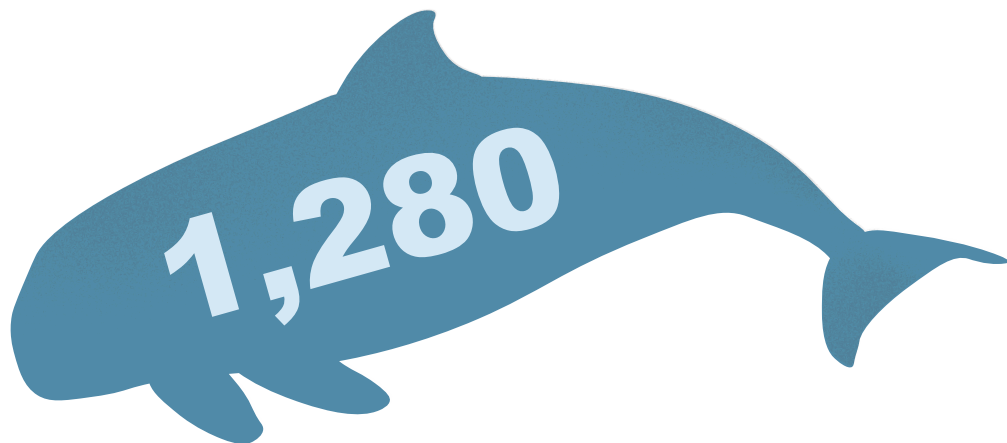
**- Adrian Dann LT CDR (SD) (X) (MCD) (AMW)
(AIEDD) RNR Rtd.
JF Renewables EOD Superintendent / EORCA**

UXO - the facts and figures



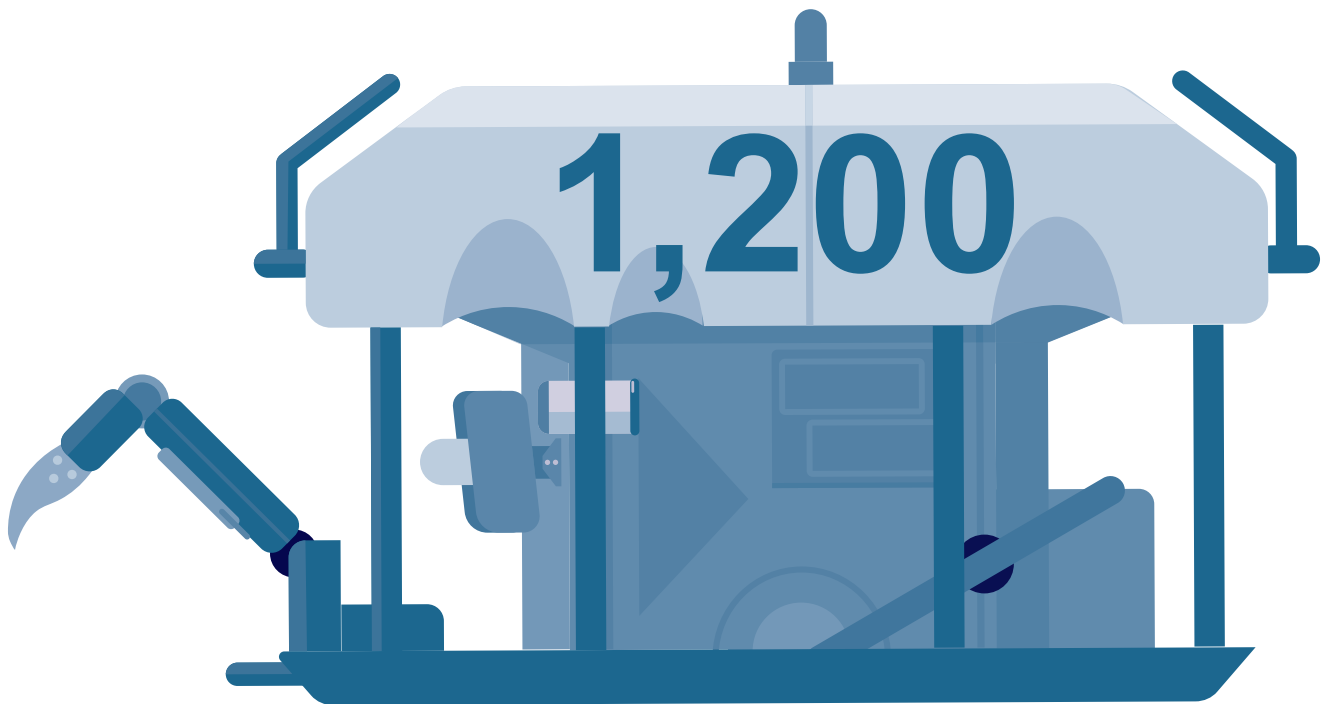
It is estimated up to **500,000 legacy items/targets** could still be present in [UK waters](#) ¹.

There's recently been [growing pressure](#)² from UK Parliament to adopt alternative solutions for the disposal of UXO.



[Research found](#)³ 88 ordnance explosions in the North Sea caused permanent hearing loss in **1,280 harbour porpoises**.

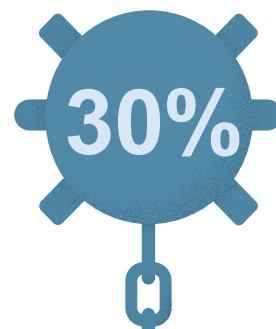
A single mine clearance operation in Germany in 2019 generated noise exceeding the maximum level allowed across almost an entire marine conservation area, causing [the deaths of 41 porpoises](#) ⁴.



Did you know that **over the past 12 years** we've conducted over **1,200 successful UXO disposals** from **36 vessels** and **remained incident free?**



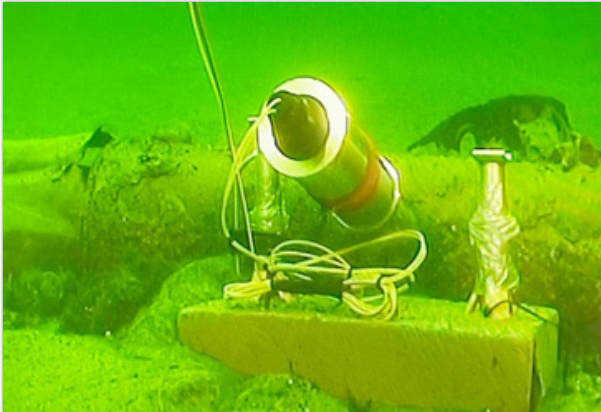
The UK plans to power every home from offshore wind by 2030. This will require the equivalent of one turbine to be installed every weekday for the [next ten years](#)⁵ – an unprecedented pace of offshore development.



30% of sea mines and 10% of torpedoes and bombs from World War II are estimated to lie, unexploded, around UK waters, posing a threat to new offshore energy infrastructure. There are already an estimated 50 marine mine and bomb clearances [each year](#)⁶ and this will only accelerate as offshore wind construction picks up pace.

UXO disposal methods

There are a variety of UXO methods that can be utilised depending on marine license, UXO type and other situational factors. We've provided you an overview of these here, all of which can be undertaken by JF Renewables.



LOW-YIELD

Barracuda 104mm Hyper-Water Jet, Disruption, Disintegration System

- Newest method to the market, has conducted 8 live firings, 5 of which were in 2021.
- Utilises high-pressure, hyper water jets to target the vulnerable areas of the identified UXO.
- Internal disruption of components, arming and actuation mechanisms and total disintegration of the explosive main filling.
- Blast / shock wave is much less than a High-Order technique but unlike a Low-Order technique, no explosive residue will remain on completion of the firing.
- Explosive Free certificate issued on completion, with debris recovered on completion.
- This method is recommended by James Fisher EOD Team.



LOW-ORDER

Barracuda 30mm Self-Filled Modular Charge

- A Low-Order technique uses a small shaped charge to initiate a deflagration (burn out) of the explosive main filling and burst open the UXO case. If successful, the blast / shock wave is much less than a High-Order technique. Very importantly, if successful, large amounts of explosive residue will remain and will require subsequent clear-up at the seafloor and will involve the use of a subsequent clearing-charge adding to time and cost of operations.
- Cannot always be guaranteed (80-90% success rate) and therefore the necessary precautions and mitigation measures for a High-Order detonation must be employed to ensure the safety of personnel, vessels, infrastructure / assets, fauna, flora, cetaceans, fish and mammals.



Want to know more?



Site preparation services



UXO disposal fact sheet



UXO track record



HIGH-ORDER

Barracuda 104mm Self-Filled Modular Charge

- Traditional method of disposal. Developed in 2008 and has conducted over 1,500 live firings since with no misfires / malfunctions accidents or incidents.
- Accurate placement of disposal system to generate either a plasma jet or a blast-fragmentation event to target the UXO at its most vulnerable point (as determined by EOD Superintendent offshore).
- Guaranteed disposal of cUXO target. Debris recovered on completion.
- Bubble curtain, can be supplied by James Fisher, and MMO mitigation requirement for containment.



LIFT & SHIFT

Remote Ordnance Lifting System (ROLS)

- Specifically designed to achieve lift raise and tow of UXO which have been deemed safe to move which were not able to be blown in-situ.
- Can remotely lift items of UXO up to 1,800 kg (weight in air) and can be towed at speed of up to 2 kts in up to Sea State 4 (2mHMax).
- The UXO is removed to an alternative location, carefully set down on the seafloor and left in an agreed wet-storage location or will be disposed of subsequently by positive EOD action at the new location.

James Fisher Renewables

James Fisher
Renewables



In addition to UXO services, JF Renewables provides **comprehensive and trusted offshore renewable solutions**, including:

Subsea IRM

James Fisher
Subtech



Offshore personnel

James Fisher
Rumic



Monitoring - structural health,
condition and mooring

James Fisher
Strainstall



Offshore cranes

 **SCANTECH**
A James Fisher Group Company

Bubble curtains

ScanTech
Offshore 

Blade repair and maintenance

**Rotos360**

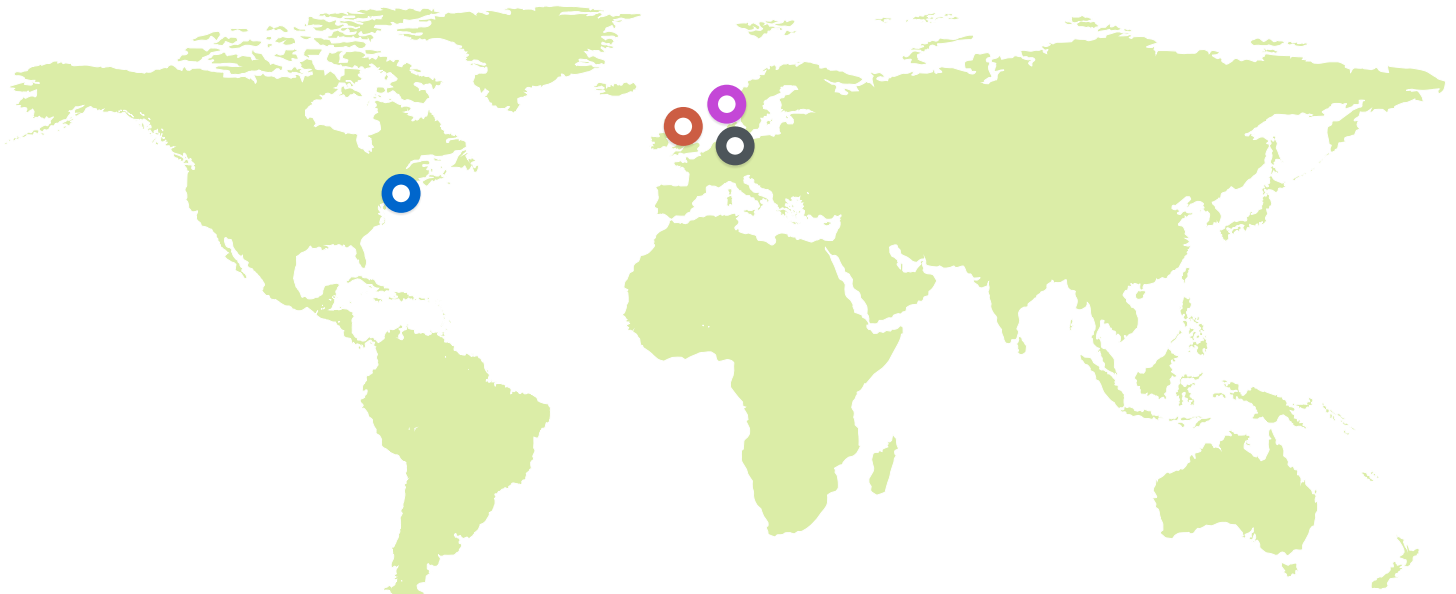
Asset management

 **eds**
HV GROUP
High Voltage Engineering



Where will we be?

Our team will be in attendance at the following events and exhibitions:



18 - 19 July - US Offshore, Wind, Boston

24 August - A welcome to offshore renewables for oil & gas professionals, Aberdeen

29 August - 1 September - ONS, Norway

27 - 30 September - Wind Energy Hamburg, Germany

Coming up...


In our next edition, we'll be exploring Balance of Plant (BoP).

BoP is the most important link for delivering power produced by a wind farm to the market. By undertaking appropriate BoP inspections, wind farm operators can ensure the safe and profitable operation of their wind farm by ensuring any issues are identified and addressed before any potential downtime of the asset.

[Send us your feedback!](#)



Get in touch

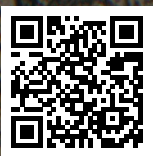
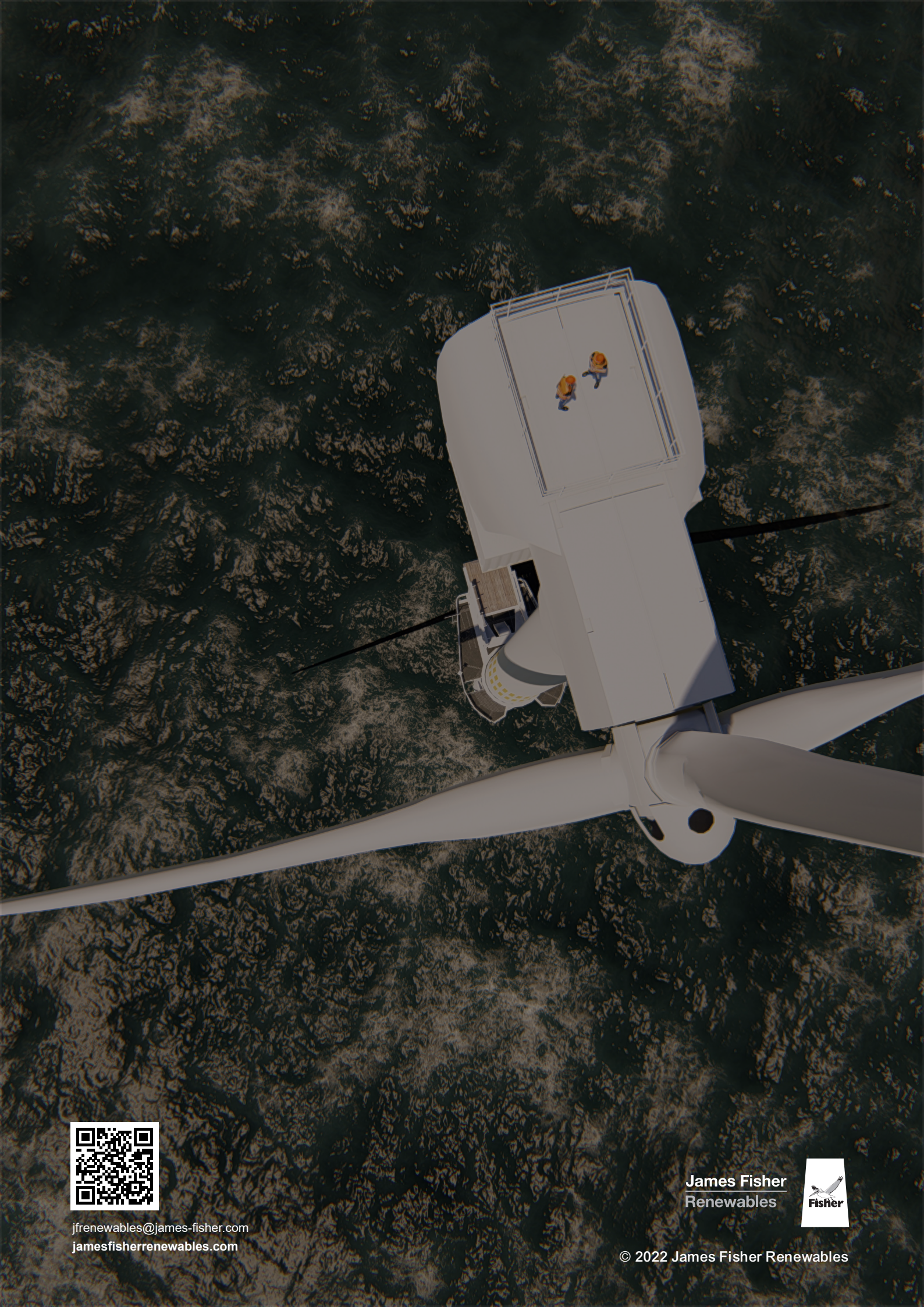
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3. [\(PDF\) Assessing the Impact of Underwater Clearance of Unexploded Ordnance on Harbour Porpoises \(Phocoena phocoena\) in the Southern North Sea \(researchgate.net\)](#)
4. [Germany: Clearing of WWII mines did cause porpoise deaths | News | DW | 22.10.2020](#)
5. <https://www.theguardian.com/environment/2020/oct/06/powering-all-uk-homes-via-offshore-wind-by-2030-would-cost-50bn>
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