AFD Delivery Group

Delivering the Government-Mandated Acoustic Fish Deterrent (AFD) at Hinkley Point C

Installing and Maintaining the AFD at Hinkley Point C

A 2024 update on innovation and expertise

Delivering the Government-Mandated Acoustic Fish Deterrent (AFD) at Hinkley Point C

Executive Summary

- The Acoustic Fish Deterrent is currently mandated through a Development Consent Order
- The Acoustic Fish Deterrent is British Best Practice and is feasible to install at Hinkley Point C

This report shows that the installation of the Acoustic Fish Deterrent (AFD) is feasible on a technical level and presents the simplest solution for the installation of the AFD without the need for a disruptive saltmarsh or a second public inquiry.

In 2016, EDF unilaterally halted development on the AFD at Hinkley Point C. Despite a subsequent Welsh Government report, a public inquiry, and a final decision letter from the Secretary of State for Business Energy and Industrial Strategy all stating that the AFD must be installed, no further action has been taken to develop the AFD.

This report bridges the gap between 2016 and 2024, highlighting the innovations in technical ability, technology, logistics, and science. It shows that Remotely Operated Vehicles (ROVs), new AFD technologies such as Active Pressure Compensation Systems, and logistical innovations can reduce maintenance times from 72 days per year down to just 19, proving the AFD can be installed safely in the Severn Estuary.

Our conclusions are:

1. Innovations over the last eight years have led to improvements in ROV design, extending the operating capabilities and water velocities that ROVs can operate in.
2. Developments in AFD systems, including Active Pressure Compensation Units, have increased the service interval of AFD systems from 18 months to a minimum of 24 months.
3. These improvements mean divers will not be required to carry out the routine maintenance work on the AFD system, and won't be required for any of the installation work, although divers are already working on the AFD ready Intake Heads, so some diving activities will be acceptable, if required.
4. The AFD cannot be heard from shore, and does not affect marine mammals. This information is provided in the Appendix.
5. The new developments outlined here result in the original 72 days estimated by EDF that would be required each year to maintain the AFD system will now be reduced to less than 19 days per year.
6. The overall conclusion is that the AFD can be maintained without the need for divers to carry out the work. In relation to installation, no more diving time would be required than other Hinkley Point C installations.

The Group urges EDF to embrace the new technology and work with the industry experts to finalise the design of an AFD system, compliant with mandatory requirements as noted above, ensuring it is installed, tested and operational before the station starts to abstract cooling water. There is no evidence-based defence for failing to comply with this obligation.

The Acoustic Fish Deterrent Delivery Group.

An Evidence Based Approach

The approach the AFD Delivery Group used in this report is designed on updated and current innovations from the ROV, Acoustic Fish Deterrent, science, environment and sea technology industries. Facts and figures are based on EDFs original optioneering report, which can be found here. {1}

The optioneering report was put together by independent experts, however there is now an eight-year gap between 2024 and when the optioneering report was written. The statistics referred to in subsequent texts are linked in the Appendix of this report. The data is a robust assessment, but more detail will be provided during the detailed design stage for the AFD system.

The Group made a conscious decision to not include any innovations that have not yet been proven. The AFD has been installed in a wide range of locations across the globe, including installations in the United Kingdom, United States, Canada, China, Belgium and Ireland. The AFD has been proven as the best available technology and as UK Best Practice.

Where we are now

The AFD is still part of the Development Consent Order and has been scrutinised by the Secretary of State, a full UK Government Inquiry, and an independent Welsh Government Committee, all of which either recommended or mandated the Acoustic Fish Deterrent should be installed in 2021 and 2022.

Timeline of Events

2010: Hinkley Point C nuclear project gets initial government approval under the Labour government.
2012: Development Consent Order (DCO) is granted, including environmental mitigation measures like the Acoustic Fish Deterrent (AFD).
2013: European Commission approves financial support for Hinkley Point C.
2016: Final investment decision made by EDF and partners.
2018: Major construction work begins.
2019: EDF applies to remove the AFD requirement.
2021: Public inquiry held, reaffirming AFD as mandatory.
2022: UK government rejects EDF's appeal to remove the AFD.
2024: EDF reopens consultation on removing the AFD by proposing saltmarsh plan.
2024: Pawlett Hams saltmarsh plan scrapped.

{1} https://consult.environment-agency.gov.uk/psc/ta5-1ud-nnb-generation-company-hpc-limited-2/supporting_documents/Application%20Variation%20Supporting%20Information%20%20Engineering%20Optioneering%20Report.pdf

Plan to Deliver the Acoustic Fish Deterrent

The plan to deliver the Acoustic Fish Deterrent has been built on the foundation of existing technology and current working procedures on the Intake Heads that draw cooling water into Hinkley Point C.

EDF has stated that the AFD cannot be installed because of safety concerns and potential risks to divers. However, with the developments in ROV technology the Group concluded that the plan can be achieved using ROVs for all of the required work and won't require divers for routine maintenance.

While the installation can be achieved without divers, the Group agreed it will be possible to reduce time for the installation of the system by using levels of diving already used on similar tasks at Hinkley Point C and similar projects elsewhere.

Innovation and Developments over the last Eight Years

Vessel and ROV Improvements
Having spoken to experts at Beam - formerly Rovco/Vaarst, and other organisations such as Saab Seaeye, as well as attending conferences such as Oceanography International, the Group was encouraged to see innovations on LiDAR, RADAR, 3D mapping, ROV motors and capability design, and station positioning.

Example ROV vessels that could carry out the work are
ROV: Saab Seaeye Leopard. The Leopard is a powerful underwater robot with advanced control systems, able to operate in strong currents and help guide the attachment of frames to the seabed.
Vessel: 33m DP2 RSV (Voe Vanguard), Surface vessel with Dynamic Positioning, 24t & 34t cranes and 300m² deck space.

Active Pressure Compensation System (APCS)
AFD systems are now available with Active Pressure Compensation Systems (APCS), particularly suited to the site at Hinkley Point C, where there are large tidal ranges. The APCS extends the service interval of the Sound Projectors from 12 to a minimum of 24 months. Innovation for longer periods is possible, but is not included in the calculations below.

Power and Communication Hubs
The Underwater Power and Communication Hubs incorporate updated communication systems and the option for 100% redundancy, improving the reliability and long-term operation of the systems.

System Requirements

In 2024, the AFD Sound Projectors need to be refurbished once every two years. This requires the Sound Projectors to be removed from their position around the Intake Heads and replaced with like-for-like replacements, with the originals being refurbished and used as the next replacement. The Group worked on several options for removing and replacing the Sound Projectors, including using jack-up frames as well as lifting entire frames with just ROV.

It was agreed that the maintenance process should not touch the Intake Heads or the floor of the estuary, either with jack-ups or anchors, and so those options were excluded from further consideration.

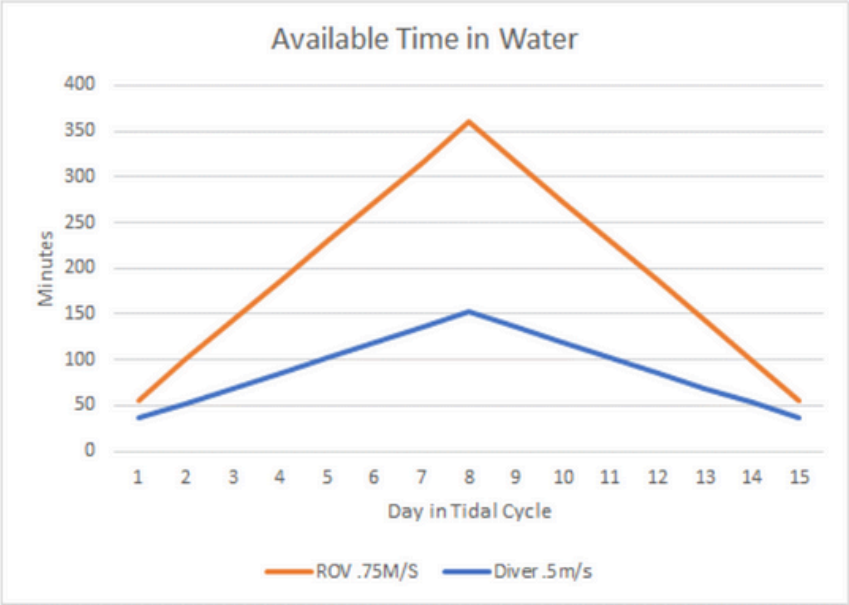
The maintenance at Hinkley Point C uses the same methodology proven at other operational AFD systems, where the Sound Projector Deployment Frames are raised to the surface and a replacement Deployment Frame, with refurbished Sound Projectors, will then be lowered down into the required location by the Intake Head.

The removed Deployment Frames are returned to shore, where they can be stripped down and fitted out with refurbished Sound Projectors, fully tested and then returned to the Intake Heads to swap out with the next removed Deployment Frames.

Maintenance Window - Reduction from 72 days to 19 days per year

A key factor relating to the Acoustic Fish Deterrent is the time it takes to complete the required maintenance. The Group looked at how long it would take to complete the maintenance of a single Deployment Frame. This was agreed at 130 minutes.

ROVs can work at higher water velocities than divers, up to 1.0m/s, but for this report the Group is using 0.75m/s and factoring in low/zero visibility. The Group concluded that the 130 minutes required to replace a frame is available on a minimum of 11 days out of 14. In addition, there are six days per tidal cycle where there is enough time for two Deployment Frames to be maintained in one day.



In the Optioneering Report, each Intake Head will have 12 Deployment Frames, so there are 48 Deployment Frames in total. Based on the requirement to replace each deployment frame every 2 years for maintenance the Group concludes that a rolling six month plan is recommended.

The Optioneering Report also concluded a 72 day per year schedule of maintenance was required, and using the same tide and depth data, created a new schedule using the innovations described in this report. The Group agreed to add extra days to ensure the programme is robust.

The Group concludes that the maintenance work can be completed in a maximum of 19 days per year; a reduction of 74% in on-site work.

The Future

The next stage is to develop a full delivery plan in collaboration with all parties to install the AFD onto the AFD-ready Intake Heads.

Through correspondence between the Group and the Department for Energy Security and Net Zero, the below is the standard procedure for a change to a Development Consent Order:

- **Pre-Application Stage:** EDF is expected to submit its material change application for Hinkley Point C to the Planning Inspectorate (PINS) by mid-2025. During this developer-led stage, public consultations are conducted. PINS ensures the developer has followed all pre-application procedures before moving forward.
- **PINS Review:** Once the application is submitted, PINS has 28 days to review the proposal and decide if it will be accepted for examination. They will assess if the consultation process and application meet the requirements of the Planning Act 2008. The panel of inspectors for the examination will be appointed independently by PINS.
- **Examination Process:** Should PINS accept the application, a detailed examination begins, during which interested parties, including the public, can register and submit their views. This is a key phase where stakeholders can influence the outcome by presenting evidence or concerns to the Examining Authority, including for example the robustness of alternative solutions as well compliance with obligations already established.
- **Secretary of State's Role:** After the examination, the Secretary of State will review the recommendations and relevant matters, including environmental impacts and legal considerations under the Planning Act 2008. The Secretary must ensure that the pre-application consultations were conducted adequately.
- **Final Decision:** The Secretary of State will make a quasi-judicial decision based on the examination's findings and other relevant factors. This decision will determine whether the AFD will be installed as part of the final plan for Hinkley Point C.

The Group has provided this report to deliver an alternative: one that saves money for the taxpayer, solidifies environmental protection, and protects endangered species.

Group Participants in Alphabetical Order

Marc Coull - Beam: formerly ROVCO/Vaarst
Professor Mark Everard - Associate Professor of Ecosystem Services at UWE
Lewis English - Underpin Consultants
James Douglas - Saab SeaEye
Dr David Lambert - Fish Guidance Systems
C.Wilson - Subsea Engineer
Claire Zambuni - Zambuni Communications

"There can in my scientific view be no justification for removal of AFD. It makes absolutely no sense to permit very substantial damage to marine biodiversity and hope then that modest mitigation entailing a degree of recruitment only of species reliant on the saltmarsh can offset it. Cost reduction is cited by EDF as one element of its plan to remove the mandated AFD and would appear to be its principal consideration, but one that obviously overlooks the vital purpose of deflecting fish from the intake. Ideally, saltmarsh restoration should be implemented ADDITIONALLY to the AFD to mitigate the still substantial likely entrainment of multiple life stages of fish and invertebrates, even with deflection from the intake."
Professor Mark Everard - University of West of England

"'Clean' can't just mean lower or no emissions, it also has to be good for the environment. Hinkley Point C cannot truly be clean unless it applies necessary requirements to protect the environment, that means installing the AFD. This report delivers that 'clean for environment' mantra. The AFD has been installed at power plants before, including in Europe, China, Ireland, Canada and the US. At Doel Nuclear Power Station in Belgium, AFD systems reduced fish entrainment by up to 98% for herring and 97% for sprat. This shows the AFD's significant environmental benefits. Doel also has other lessons to teach. The AFD was installed in 1997, and has been running nearly three decades."
Dr David Lambert - Managing Director FGS

"From a business process perspective, the alternative to any accepted and agreed-upon plan should be to deliver greater benefit than its predecessor. The initial decision should also be based on scientific evidence and use the best and most up-to-date information. The current drive for the removal of the AFD does not meet this relatively low water mark."
Lewis English - Underpin Consultants