

Sizewell C Acoustic Fish Deterrent (AFD) ISH7 Additional Information

FGS Reference – 1688R0303

Summary

This additional information has been provided following the Issue Specific Hearing 7 (ISH7) on Biodiversity and Ecology (Part 2 – Marine Ecology), and specifically the Cooling Water System and the requirement for an Acoustic Fish Deterrent (AFD) system.

Environment Agency Best Practice for the development of cooling water systems using **once-through-cooling, as proposed at Sizewell C, is based upon the assumption that all mitigation measures available will be used**, these being an AFD, Low Velocity Side-Entry (LVSE) Intake Heads and a Fish Recovery and Return (FRR) system.

Any deviation from this specification that omits one or more of the three mitigation techniques should be considered non-BAT-compliant and other methods of plant cooling should be sought. As a result, **if an AFD is not installed then serious consideration should be given to Sizewell C using cooling towers, rather than once-through cooling**. We assume this will not be acceptable to any of the stakeholders in the project, so the project should continue and be based upon the inclusion of an AFD, or it should be abandoned completely.

The environmental conditions, as well as the much higher potential for the impingement of significant numbers of clupeids at Sizewell C means that any decision at Hinkley Point C regarding the removal of the AFD is not relevant at Sizewell C, as under Best Practice, each site must be assessed individually.

EDF has made a 'business decision' to exclude the AFD from Sizewell C. The safety concerns raised by EDF to justify the exclusion of an AFD system from the mitigation measures can be overcome, if EDF is truly committed to the installation of an AFD system.

EDF can reduce or totally eliminate the risk to divers working on the installation, operation and maintenance of the AFD by working with suitably qualified and experienced suppliers.

- The use of an ROV to replace the work carried out by divers will significantly reduce, if not totally eliminate, the risk of a fatality occurring during the maintenance of the AFD.
- The risk to divers, along with the long-term maintenance requirements, can be reduced by changes to the Sound Projector 'clusters', combined with extending out the service interval of the Sound Projectors, which can potentially reduce the risk to any divers by between 66%-75%.

Any issues can still be overcome with potentially 8 or more years before an AFD system is required.

**Sizewell C Acoustic Fish Deterrent (AFD)
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1. EDF's Claim that Rejection of the AFD at Hinkley Point C Inquiry Sets a Precedent for Removal at Sizewell C

In the Fish Guidance Systems Ltd (FGS) document submitted to the Planning Inspectorate (FGS Reference 1688R0103) in response to the Stage 3 DCO Consultation we drew attention to the omission of the proposal to install AFD equipment at the SZC cooling water intakes.

In this note we would like to draw attention to evidence relevant to this matter presented in the Environment Agency (2010) review of the BAT (Best Available Technology) status of once-through, direct cooling at coastal sites. This advice was aimed in particular towards NNB developments such as the SZC project. Any decision on this matter relating to the Hinkley Point C NNB site should not be taken to influence the regulatory position regarding the Sizewell C Project, as the sites are significantly different. Sizewell has different environmental conditions, including significantly lower tidal velocities, lending itself more to the use of existing ROVs, as well as significantly larger quantities of clupeids, namely sprat and herring, which as previously noted are very sensitive to acoustic signals, and will all die if an AFD is not installed.

Rather than paraphrase the information, the following is taken verbatim from Section 7.3 of the EA document:

The European Commission Reference Document on Application of Best Available Techniques to Industrial Cooling Systems (BREF Cooling, December 2001) identifies direct cooling as BAT for large power plant cooling systems, stated as follows:

"In an integrated approach to cooling an industrial process, both the direct and indirect use of energy are taken into account. In terms of the overall energy efficiency of an installation, the use of a once-through system is BAT, in particular for processes requiring large cooling capacities (e.g. > 10 MWth_r). In the case of rivers and/or estuaries once-through can be acceptable if also:

- *extension of heat plume in the surface water leaves passage for fish migration;*
- *cooling water intake is designed aiming at reduced fish entrainment;*
- *heat load does not interfere with other users of receiving surface water.*

For power stations, if once-through is not possible, natural draught wet cooling towers are more energy-efficient than other cooling configurations, but application can be restricted because of the visual impact of their overall height."

It may be concluded from the BREF that direct cooling would not be BAT for large power stations if any of the three conditions were not met.

That is to say, the advice leads to the conclusion that the use of direct seawater cooling at SZC would not meet BAT criteria in the absence of AFD, which is identified in the 2010 report as a key element of protection systems against fish kills associated with the cooling system.

**Sizewell C Acoustic Fish Deterrent (AFD)
ISH7 Additional Information**

FGS Reference – 1688R0303

The Best Practice Guide concludes “*direct cooling may be the best environmental option for large power stations sited on the coast or estuaries, subject to current best planning, design and operational practice and mitigation methods being put in place, and meeting conservation objectives of the site in question.*”

We submit that it would be improper to permit a DCO for direct seawater cooling which does not incorporate all of the critical elements identified in Environment Agency guidance as best practice, that is to say incorporating all of the indicated mitigation techniques, viz.:

1. LVSE low velocity intake
2. An effective Acoustic Fish Deterrent system
3. A fully specified Fish Recovery and Return (FRR) system.

Any deviation from this BAT specification that omitted one or more of the three mitigation techniques should be considered non-BAT-compliant and other methods of plant cooling would need to be sought, irrespective of any ruling on the requirement of an AFD at the Hinkley Point C site.

Reference

Environment Agency (2010). Cooling water options for the new generation of nuclear power stations in the UK. Science Report SC070015/SR3 for the Environment Agency, Bristol, UK. [Authors: Turnpenney, A.W.H., Coughlan, J., Ng, B., Crews, P., Bamber, R.N., Rowles, P.]

2. EDF’s Business Decision not to install an AFD at Hinkley Point C and Sizewell C Nuclear Power Stations

During the public enquiry relating to the removal of the AFD from the requirements of the Hinkley Point C DCO, Dr O’Donnell of NNB Generation Company Ltd made a number of comments during his evidence to the inquiry, including

“...if at all possible, we would have preferred to deliver an AFD system....”, and this has been reiterated by EDF’s representatives at this Sizewell inquiry.

However, Dr O’Donnell also provided evidence during the Hinkley inquiry that stated NNB made a business decision in November 2017 not to proceed with the installation of the AFD due to safety concerns about the risk to divers carrying out the installation, operation and maintenance of the AFD, as well as due to Cefas advising EDF *“that not fitting the AFD system at HPC would result in ecologically negligible increases in impingement loss for those species”*.

Dr O’Donnell also stated during his testimony

“EDF could have chosen to develop a Remotely Operated Vehicle, in relation to the AFD, but as I outlined in my proof, in Quarter four of 2017 there was a clear decision taken internally in the business to seek a variation in the Design Consent Order and the associated permitting, with that, and that followed on to stop all new AFD related development work, for which ROV work would fall into. So there was a clear decision in the business not to move forward on the developments. Further to that then, ROV developments work represents new research and developments it would not be, it would not be right and proper to follow it up if the business

Sizewell C Acoustic Fish Deterrent (AFD) ISH7 Additional Information

FGS Reference – 1688R0303

had decided not to carry on new works. In terms of ROV personally, in terms of ROV developments, I don't see EDF becoming a lead on the development of ROV technology, relative to others who are much better placed to do so, and to take those developments forward. We could of course work with them, and I answer like this, because it is also pointed out that EDF does invest in R&D. Typically the R&D invested in is in relation to risks or opportunities for EDF."

If EDF/NNB was really committed to installing an AFD it could have looked to reduce the risk to the divers by –

- Reaching out to AFD suppliers, such as FGS, to see what could be done to reduce the perceived safety risk to the divers, but it chose not to.
- as noted above, EDF/NNB could have chosen to develop an ROV with a suitable supplier to reduce the risk to the divers, but it chose not to.
- EDF could have used its own R&D resources, typically invested "*in relation to risk*", to reduce the risk to the divers, but it chose not to.

Instead EDF made the 'business' decision' to challenge the need for an AFD at Hinkley.

Time Line

This 'business decision' has also impacted the Sizewell project, as shown by the Sizewell consultation process –

23 rd November 2016	EDF releases Sizewell C Consultation 2, which included an AFD as part of the mitigation measures on the cooling water system.
November 2017	EDF makes the decision to contest the requirement for an AFD at Hinkley Point C.
4 th January 2019	Sizewell C Consultation 3 released. AFD removed from proposed mitigation measures.

There has already been over two years since Consultation 3 for EDF to review these same concerns, and there is potentially another 8-10 years until an AFD is required at Sizewell. However, it prefers to use safety concerns as a reason why an AFD cannot be installed.

As a result, when reviewing the requirements for an AFD at Sizewell we all need to be aware that NNB submissions are based upon a 'business decision' not to install the system.

3. Minimising Safety Issues to Divers Raised by EDF

The safety review provided by EDF/NNB for the Hinkley Point C inquiry was part of the 'Optioneering Report', which formed part of EDF/NNB's Submissions. It was this report that identified a risk of 0.39 fatal injuries associated with the AFD installation, maintenance and operation over the assumed 70-year life of the plant.

Reducing Risk

The risk can be reduced by the following actions –

- Reduce the need for divers to carry out the work
- Reduce the number of clusters of Sound Projectors
- Extend the interval between service work

**Sizewell C Acoustic Fish Deterrent (AFD)
ISH7 Additional Information**

FGS Reference – 1688R0303

Reduce the need for divers to carry out the work

Throughout the Optioneering Report the document continually refers to 'diver or ROV' activities, indicating that the vast majority of the work associated with the maintenance of the AFD can potentially be carried out by an ROV. The use of an ROV will significantly reduce the risk of a fatality, as the divers will not be required and so will not be exposed to a risk.

FGS has previously advised of the lower flow rates encountered at Sizewell, in comparison to Hinkley, and potential ROVs that could be used to minimise the risk to the divers. While EDF/NNB has chosen not to develop an ROV, or to work with a suitably qualified supplier to develop an ROV to reduce the risk to the divers at Hinkley, as part of Dr O'Donnell's evidence to the Hinkley Point C Inquiry Dr O'Donnell identified a number of ROVs that are coming onto the market, which may be suitable, including the Isurus, from Oceaneering. Further testing may be required, but these can be used a basis for the development of a suitable ROV if other units don't meet the final specification required at the site.

The overall risk to the divers will also be significantly reduced if EDF carries out other developments to minimise the time the divers are exposed to any risk.

Reduce the number of clusters of Sound Projectors

The Optioneering Report concluded that clusters comprising of 6 Sound Projectors should be installed, however the safety report concludes "*The process for selecting the preferred AFD design.....did not factor in the safety impacts of ongoing AFD maintenance explicitly. This omission at optioneering stage is not explained in the documentation, and could therefore be used to call into question the final result on safety grounds*".

EDF has subsequently used safety concerns as one of the main reasons not to install an AFD.

While this inquiry is not revisiting the optioneering process, it is relevant to note that the risk assessment was carried out on the basis of clusters comprising 6 Sound Projectors. By altering the clusters to comprise 9 Sound Projectors, rather than 6, the number of Deployment Frames on each Intake Head would be reduced from 12 to 8 (Optioneering proposed 36 Sound Projectors on either side of each Intake Head). This would reduce the number of Deployment Frames by a third and so one can expect the time taken by divers to recover and deploy the Sound Projectors will also reduce by approximately a third. This will reduce the overall risk to any divers working on the system by 33%.

Likewise, changing the Deployment Frames so that each cluster comprises 12 Sound Projectors, rather than 6, would reduce the time taken and risk, by 50%.

Extend the interval between service work

FGS has already submitted a number of documents to the Inspectorate. Document Reference 1688R0103 outlined the Active Pressure Compensation System (ACPS).

The APCS has been developed by FGS over the last four years and enables existing service intervals to be extended. As a result, the current 18-month service interval could be extended out to three years.

This would half the time required to carry out the maintenance of the system, thereby reducing the risk by a further 50%.

Sizewell C Acoustic Fish Deterrent (AFD) ISH7 Additional Information

FGS Reference – 1688R0303

As a result, while ROV's could completely eliminate the potential risk to divers, relatively simple changes in the design and operation and maintenance of the system could reduce the overall risk to any divers working on the AFD system by between 66% and 75%.

4. Offshore Location of the Intake Heads

EDF has stated it is hazardous to run power and communication cables out to the intakes located 3km offshore, and yet it has multiple off shore wind farms in the UK and elsewhere that are significantly further offshore. Saint Nazaire in France is more than 12 km from the shore.

It is possible to run cables out to these facilities, which cover a far greater area than the proposed Intake Heads, and so we fail to see why the requirements for Sizewell pose a greater risk than these other sites, which EDF is able to develop.

5. Glossary & List of Abbreviations

The following are taken from Environment Agency guidance, along with other additions as required to provide a complete list of acronyms in this document.

AFD: Acoustic fish deterrent: propagation of underwater sounds to deflect fish from water intakes.

DCO: Development Consent Order.

EA: Environment Agency

EDF: EDF Energy

FGS: Fish Guidance Systems Ltd.

FRR: Fish Recovery and Return

LSVE: Low Velocity Side-Entry Intake Heads

HPC: Hinkley Point C.

NNB: Nuclear New Build Generation Company; NNB is a subsidiary created by EDF Energy to build and then operate Sizewell C

ROV: Remote Operated Vehicle

Dated: 23rd July, 2021