

Evidence

Protection of biota from cooling water intakes at nuclear power stations: scoping study

Project summary SC160009

Background

New build nuclear power stations in the UK will require large-volume intakes of cooling waters from estuarine or coastal sites, and this report identifies information on techniques and systems to reduce the impact of such intakes on marine and estuarine biota (fish, crustacea, larval forms, plants and microscopic organisms). Available sources of information on the effectiveness and applicability of various biota protection methods are provided and summarised.

There are various engineering methods that may reduce the impact to biota, particularly fish, of large water intakes. Some engineering technologies and operational methods are well established, but others are new, with less information on their effectiveness in different situations.

This scoping study identifies the main sources of information available, and will form a resource for regulatory staff and other interested parties. It is intended as an initial phase of a full review into some or all of these techniques for biota protection in cooling water intakes. Information on biota protection measures from cooling water intakes at existing nuclear and conventional power stations and other large volume water intakes has been included where relevant. The information summarised in this report could have relevance to other large scale water intakes e.g. existing nuclear and conventional power stations, tidal hydropower.

A 2010 Environment Agency report (SC070015/SR3) considered options for large cooling water intakes and included some evidence for methods to reduce biota impact. Methods and techniques have developed since then and this scoping report highlights the available evidence applicable to UK situations.

Technologies considered

Sources of information are provided and briefly described in context for techniques that may aid protection of biota from entrainment (passing through) and impingement (being caught on screens at intakes).

The techniques considered are:

- optimising intake siting
- intake head design
- approach/escape velocity of biota at intake
- fish behavioural deterrents
- tunnel pressure change effects
- forebay and screenwell design
- onshore screening including fish recovery facilities
- fish return system (launders) and discharge head design
- fish lift pumps
- biofouling control and implications
- cooling water systems downstream of fine screens

Additionally information on monitoring and assessment protocols for fish recovery and return facilities, and for fish deterrent systems, and methods for fisheries impact assessment are discussed.

A list of available literature for each of these techniques is provided with a discussion of the state of the technology and known advantages or limitations in operation. Where there is little information on a technology's operational effectiveness this is noted.

The references discussed in this report provide a guide to the information and data on current available technologies for biota protection in cooling waters, and can be used to inform the decision-making process for permitting large-scale cooling water intakes.

Next steps

The information identified for these techniques will be reviewed in depth, assessing the applicability and most recent evidence available on biota protection methodologies in large-scale cooling waters with reference to UK conditions.

This summary relates to information from project SC160009, reported in detail in the following output(s):

Report: SC160009

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This project was undertaken by the Environment Agency's Research, Analysis and Evaluation group, which provides scientific knowledge, tools and techniques to enable us to protect and manage the environment as effectively as possible.

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