EMB POLICY BRIEF

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Decommissioning of offshore man-made installations

Taking an ecosystem approach

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RB

INSTITUT ZA OCEANOGRAFIJU I RIBARSTVO SPLIT

DTU Aqua National Institute of Aquatic Resources DTU

ACADEMIA SCIENTIARUM ESTONIAE

cnrs

Ifremer

UNIVERSITÉS MARINES

KDM Konsortium Deutsche Meeresforschung

hcmr ΕΛΚΕΘΕ

Irish Marine Universities Consortium

Marine Institute Foras na Mara

CoNISMa Consorzio Nazionale Interuniversitario per le Scienze del Mare

National Research Council of Italy

OGS

KLAIPĖDA UNIVERSITY

NWO Netherlands Organisation for Scientific Research

NIOZ Royal Netherlands Institute for Sea Research

INSTITUTE OF MARINE RESEARCH HAVFORSKNINGSINSTITUTTET

The Research Council of Norway

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INCDM

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This policy brief was prepared in close collaboration with the INSITE programme (see page 6)

Offshore installations in the OSPAR region

Since the late 1960's major developments in energy industries have led to a multitude of man-made structures being installed offshore. In 2015 there were an estimated 1,357 oil and gas installations in the OSPAR maritime area (OSPAR Commission, 2015). Approximately 1,800 grid-connected offshore wind turbines are also installed in the North Sea while the total number of wind structures in EU waters as a whole is predicted to reach more than 9,000 by 2030 (European Wind Energy Association, 2015).

Ultimately the fate of these structures needs to be managed as they come to the end of their intended life. OSPAR Decision 98/3[1] requires that all offshore installations are fully removed at the end of their useful life. Exemptions may be granted for a small number of structures that were installed before the regulation was adopted.

The process of decommissioning these structures is in its infancy and the discussions have largely focused on the potential economic cost of this process. A recent study suggested that the total cost of full decommissioning of the oil and gas installations in the North Sea alone for the period 2015 to 2040 will be between US$70 and US$82 billion (Wilby, 2016).

In Norway, the Netherlands and the UK, the cost of decommissioning is shared between the owners of the fields and the national governments. The public will carry between 50% and 80% of the cost of decommissioning by virtue of tax relief on expenditure. The potential financial burden on society is, therefore, significant.

OSPAR Decision 98/3 means that decommissioning must now be incorporated into the contractual and design considerations for new offshore installations. Although there are significant differences in the types of equipment used, the much younger offshore renewable energy sector, for example, already makes provisions for eventual decommissioning of the structures it installs. For this reason, it is expected that the cost of decommissioning oil and gas installations to society will decrease over time. But there is more to the decommissioning challenge than the financial cost.

As with any hard substrate introduced to the marine environment, offshore structures naturally become part of the ecosystem. Oil and gas operators include marine growth removal in their ongoing maintenance regime to reduce the loads on their structures during their operational phase. In recent years the industry has been seeking ways to manage marine growth which remains on structures at decommissioning (Oil & Gas UK, 2013).

The need for scientific input

The OSPAR regulation was designed to address the technical aspects of the removal of offshore installations. It does not take account of the potential impacts of such removal on marine life and ecosystems. Moreover, the influence and role of such installations in the ecosystem has not been studied in any detail. Scientific research offers a significant opportunity to provide a greater evidence base in assessing potential impacts and determining good practice for the decommissioning of offshore installations.

Credit: Cor Kuyvenhove

Divers taking samples from an artificial structure in the North Sea

[1] http://www.ospar.org/site/assets/files/1290/ospar_convention_e_updated_text_in_2007_no_revs.pdf (see article 5)

OSPAR: Oslo and Paris Convention for the Protection of the Marine Environment of the North Atlantic

The OSPAR Commission is the mechanism by which 15 Governments and the EU cooperate to protect the marine environment of the North-East Atlantic Ocean and its resources. The fifteen Governments are Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

OSPAR started in 1972 with the Oslo Convention against dumping and was broadened to cover land-based sources and the offshore industry by the Paris Convention of 1974. These two conventions were unified, updated and extended by the 1992 OSPAR Convention. The new annex on biodiversity and ecosystems was adopted in 1998 to cover non-polluting human activities that can adversely affect the sea.

OSPAR Decision 98/3 requires the removal of most offshore installations from the marine environment at the end of their useful life.

Decommissioning practices worldwide

Decommissioning of oil and gas infrastructure is a relatively new challenge for industry and governments worldwide. The region where most decommissioning has taken place to date is the Gulf of Mexico, much of this being required as a result of hurricane damage in the region. All five US states bordering the Gulf of Mexico and California have rigs-to-reefs programmes, offering an alternative to fully removing redundant structures and bringing them back to shore. Under these programmes, subject to agreement with the regulator, a structure can be toppled *in situ*, or lifted from the seabed and placed in a designated reef area with other decommissioned structures. Typically, these sites are in shallow water areas on the continental shelf. The cost savings are split between the platform's owner and the state, with the state assuming ongoing liability for the artificial reef that is created. Since 1986, the US Department of the Interior has approved around 2600 decommissioning applications of which around 400 have been applications under a rigs-to-reef programme.

There are also examples of the rigs-to-reef approach being adopted in Malaysia, Brunei and Japan, where topsides have been removed and brought back to shore and the remaining steel substructures have been deposited on the seabed as reefs. In the North Sea and wider North Atlantic region, however there are no large-scale artificial reef programmes comparable to those in the US and Asia. Operating under the governing OSPAR regulation, redundant North Sea structures are being removed and returned to shore for disposal, with typically more than 95% of the recovered materials re-used or recycled. To date, around 10% of the oil and gas structures installed in the North Sea have been decommissioned in this way.

The development of offshore wind and ocean energy installations is currently dominated by Europe and focused within the OSPAR region. Experience in relation to their decommissioning and subsequent impact is still in its infancy.

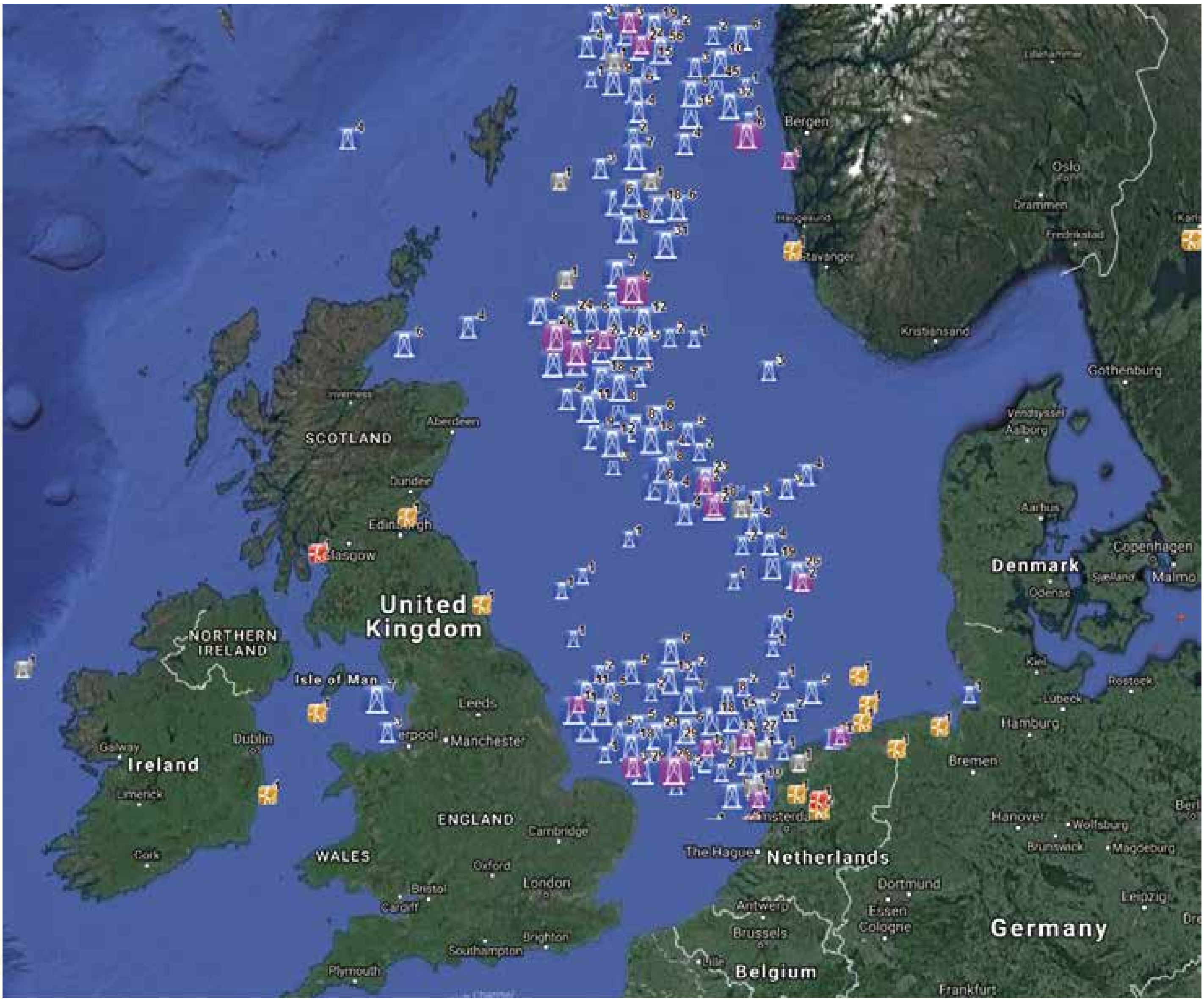
Credit: J. Fontes - ImagDOP

A rigs-to-reefs programme off California

The ecological questions

Fundamental ecological questions exist when considering the most appropriate management strategy for offshore structures, that have reached the end of their useful life. The current regulatory regime defined by OSPAR has been in place for nearly 20 years, but a scientific rationale or evidence base to support it does not exist. Some of the ecological questions arising include:

- What are the consequences of different approaches to the management of hard substrates that have been in the marine environment for a number of years (in some instances for forty years or more)?
- Has human intervention added a new layer of diversity by introducing these structures to the marine ecosystem?
- What is the magnitude of the effects of artificial structures compared to the spatial and temporal variability of the North Sea ecosystem, considered in different scales of time and space?
- Will different installation types, locations, durations and build materials effect their relative impact on the ecosystem?
- Are current contractual and design considerations regarding decommissioning and recycling or re-use suitable and sufficient?
- To what extent, if any, do the man-made installation in the North Sea represent a large inter-connected hard substrate system in their own right?
- What will be the impact of partial or complete removal of a single structure, and multiple structures, on biodiversity?
- How can this impact best be monitored and quantified?
- What are the key indicators to consider with regards to ecosystem impact?



Current structures in the North Sea region. Source: EMODnet Human Activities Portal - Hydrocarbon Extraction, Ocean Energy Facilities and Wind Farms

INSITE

The INSITE Programme

In order to support a debate and ultimately to ensure robust decision-making around the fate of redundant man-made structures, a more comprehensive scientific evidence-base is required. To move this forward, in 2012 Oil & Gas UK facilitated the creation of a scientifically led, long-term environmental Joint Industry Project (JIP) aimed at improving scientific knowledge across all aspects of the ecosystem. In April 2014, eight energy companies signed an Agreement, marking the start of the INSITE Programme.

The 'INSITE Programme' ('INfluence of Structures In The Ecosystem') is a major initiative, which seeks to provide all stakeholders with the independent scientific information needed to better understand the effect of man-made structures on the North Sea and its ecosystem and hence better inform any future decision making process, including any decisions regarding decommissioning.

The overall objective of the Programme is stated as: "To provide stakeholders with the independent scientific evidence-base needed to better understand the influence of man-made structures on the ecosystem of the North Sea".

To ensure independence and transparency, INSITE is committed to proactively engaging with the broader stakeholder community of the North Sea and making the findings of the Programme available in the public domain.

The INSITE 'Collaborative Model'

It was recognized early in its development that the INSITE Programme needed to be science-based and science-led. A governance model was therefore developed which fully supported that philosophy by appointing an Independent Scientific Advisory Board (ISAB) responsible for developing the scope of work and creating the scientific programme to deliver on the INSITE objectives.

The role of the INSITE Sponsors is to commit the funds, agree the high-level objectives with the ISAB and then agree on the affordability of the recommended programme of research.

To demonstrate the independence of the ISAB, the process of agreeing objectives and concluding the research programme was audited by DNV-GL[2], with the results of the audit also being made public.

In 2015, following an extensive 'Request for Proposals' process, the ISAB recommended that a programme of eight research projects and one data project should be funded by INSITE. The INSITE Sponsors approved a £1.8M programme of research supported by 17 universities and research institutions across Europe. Researchers from the UK, Norway, The Netherlands, Belgium and Germany are all engaged in the work. The INSITE Data Initiative addresses the availability of environmental data relevant to North Sea decommissioning both in the public domain and held by oil and gas operators. The Data Initiative, conducted by researchers at the University of Edinburgh, is collaborating with EMODnet to promote data sharing and address barriers to accessing environmental data in a decommissioning context.

Details of the scope of work and institutions delivering the scientific programme can be obtained from **www.insitenorthsea.org**.

[2] DNV GL (www.dnvgl.com) is an international certification body and classification society with main expertise in technical assessment, advisory, and risk management

Future opportunities

An opportunity exists for industry and academia across Europe to build on novel and collaborative approaches such as INSITE to develop, and importantly co-fund, further phases of scientific research. The common aims of this research would be to support a debate on the best management strategy for legacy structures in the marine environment of the North Sea, the wider north Atlantic region and, indeed, internationally.

For the oil and gas industry, this is the start of a new phase with much greater scientific collaboration, which could mutually benefit industry, governments, research and most importantly global marine ecosystems. For offshore wind power, this is a critical period in its expansion and having scientifically justified strategies to ensure not only a green present but also a green future will be a big factor in its evolution. For the fledgling industry of ocean renewable energy, with few commercial installations deployed to date, this is an ideal time for such discussions to start along the path to economic, social and ecological sustainability.

Ultimately, appropriate decisions need to be made in the very near future regarding the decommissioning of oil and gas and renewable energy structures. At present, there remains a need for more scientific research to better inform the decision-making process regarding their fate.

Credit: Alain Norro

References and suggested further reading

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Decommissioning, oil and gas, platform, renewable energy, offshore wind farm, marine ecosystem, biodiversity, North-East Atlantic, rigs to reefs, ocean, offshore installations, OSPAR.

Artificial hard substrates often become overgrown by a highly diverse ecosystem, in addition to the soft-bottom community.

EMB policy briefs provide a high-level summary of the key research needs and priorities on topics of strategic and emerging importance in seas and ocean science from a European perspective. Policy briefs are normally (but not always) summary versions of full EMB position papers, produced by EMB expert working groups.

Cover image: Odfjell deep-sea drilling rig in the Atlantic

Credit: Siemens AG, Munich/Berlin (www.siemens.com/press/en/index.php)

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