

Foreign & Commonwealth Office
**Oil and Gas Decommissioning
From the UK's North Sea to the
Brazilian Atlantic**
Framework for Regulation

Final | 25 April 2017

This report takes into account the particular instructions and requirements of our client.

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Contents

	Page
1 Introduction	1
2 Principles of Effective Regulation	3
2.1 Introduction	3
2.2 Key requirements for effective regulation	4
3 Key aspects of regulatory regimes for O&G decommissioning	11
3.1 Introduction	11
3.2 Aspects of O&G decommissioning regulation	13
3.3 Regulatory interventions	18
4 Steps to Establish a Regulatory Regime	21
4.1 Introduction	21
4.2 The process of regulatory adjustment	21
4.3 Case Study: Regulatory adjustment in the UK	23
Abbreviations	24
Glossary of terms	26

1 Introduction

Arup has been commissioned by the Foreign & Commonwealth Office (FCO) to deliver the commission 'Oil and Gas Decommissioning - UK North Sea to Brazilian Atlantic' ('The Project'). The Project is commissioned to the benefit of Brazil's National Agency of Petroleum, Natural Gas and Biofuels (ANP).

In addition to a number of workshops and meetings the main written deliverables for the Project are three reports as follows:

1. **Description of the Regulatory Regime** – Provides a detailed understanding of the overarching framework of policy and legislation and informal approach which has been developed to influence the delivery of O&G decommissioning activities in the UK.
2. **Implementation of the Regulatory Regime** – Provides a detailed understanding of how the regime is implemented in the UKCS including full description of the informal mechanisms by which frameworks are implemented and delivered through regulation, by which organisations, and how projects are delivered as a result of this regulation. A comparison is provided between the differences in approaches taken by the other main North Sea countries including Norway, Denmark and the Netherlands.
3. **Decision Making Framework** – Develops a decision-making framework which ANP (or another O&G regulator) could use to develop their approach to developing their influencing and delivery of frameworks for O&G decommissioning. This final deliverable is not specific to Brazil, but rather a generic framework, which can be applied by any country looking to develop a decommissioning regime.

This report is the output of deliverable 3 and provides a framework for developing a regulatory regime for O&G decommissioning. In doing so, it draws on the two previous reports.

Structure of the report

Besides this introduction there are three main sections to this report.

Section 2 sets out some general principles to guide the design of elements in a regulatory regime. These principles are based on international experience across a range of industry sectors and are illustrated with examples of approaches to regulation of O&G decommissioning drawn from reports 1 and 2.

Section 3 relates more specifically to the regulatory issues specific to O&G decommissioning. This provides benchmarks for the design of a regulatory system based on the national approaches described in the previous reports. Due to specific sequencing and nature of the industry, the regulatory regime must address the varying issues that arise at each phase of work. This section refers to regulation in the UK and other countries involved in the North Sea basin, highlighting the similarities and differences between elements of their respective regulatory regimes.

Section 4 sets out an audit template to guide the process of developing a regulatory regime. This describes the sequence of steps often taken by governments and regulators to modify regulations or establish a fundamentally new regime. As in section 2, these steps are generic and not specific to O&G decommissioning. However, the key features are clearly recognisable in the approaches adopted in the UK and other countries.

A description of abbreviations and terms is provided at the end of the document.

2 Principles of Effective Regulation

A regulatory regime is established to promote government objectives for an industry. The elements of a regulatory regime are provided for in both primary and secondary legislation.

When adjustment is required to a regulatory regime, it is essential to fully understand the policy objectives that the regime is designed to promote and why provisions of the current regime are no longer the most appropriate for doing so.

Once policy objectives are defined, the task of designing new regulation, or establishing the changes required to elements of an existing regime, involves aligning the regulatory rules and processes with these desired outcomes.

There must also be appropriate mechanisms for enforcing any regulations, including provision for sanctions in cases where rules are not followed. Regulatory responsibilities should be clearly assigned to the bodies that will administer regulation, and these bodies must have the resources necessary to carry out their tasks effectively, including the right skills.

As both government policy objectives and industry conditions change over time, it is important that regulatory regimes include mechanisms for adjusting regulation when required.

2.1 Introduction

The term ‘regulation’ describes the methods adopted by Government to influence the behaviour of individuals or organisations in specific industries or across specific activities in order to promote Government policy objectives.

This section discusses the principles of effective regulation, namely the factors that should be considered when designing the different elements of a regulatory regime so that they are effective in their purpose.

Typically, regulations are either economic, technical or behavioural or a mixture of all three types.

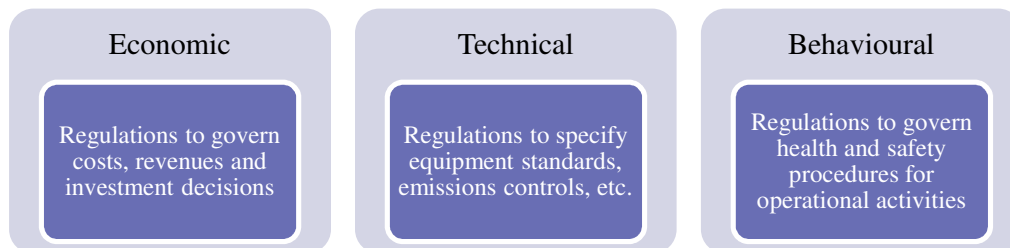


Figure 1: Types of regulation

In Parliamentary systems of government, the different rules in a regulatory regime are known as the regulatory ‘instruments’. These are provided for in primary and secondary legislation, and in other non-statutory documents. Primary and secondary legislation are two forms of law created respectively by the legislative and executive branches of government. How regulatory instruments

are matched to legislation or to non-statutory documents, depends primarily upon how flexible the different elements of a regulatory regime are intended to be and whether specific provisions are intended to be legally enforceable.

Primary legislation generally consists of statutes or 'acts' that set out broad outlines and principles. They delegate specific authority to an executive branch, such as a government department, to make more specific laws under the aegis of the principal act. The executive branch can then issue secondary legislation, mainly via its regulatory agencies. This process results in legally-enforceable regulations and the procedures for implementing them.

The government policy objectives for a regulatory regime are usually set out in primary legislation which requires an act of Parliament to alter it. More detailed regulatory instruments 'e.g. conditions in licences to operate', are generally set out in secondary legislation as they can be more easily changed if circumstances require.

Both may be complemented by other regulatory instruments, such as guidance notes or codes of behaviour which provide advice on procedures. From an administrative point of view these are usually the most flexible of all.

More information on regulatory instruments can be found in Section 2.2.3.

As described in the previous two reports, all of these elements are present in the regulatory regimes for O&G decommissioning in the UK. This is also the case for Norway, Denmark and the Netherlands which were described in the second report. However, these countries have different O&G licence ownership models and as a result tend to have more 'self regulation' when compared to the UK regime.

2.2 Key requirements for effective regulation

To be effective in achieving their aims, regulatory regimes require the following elements:

- Clearly stated policy objectives;
- Rules and processes to implement those rules (the 'instruments') that are designed to promote the policy objectives. This means they must create the right incentives for action by the regulated organisations or individuals and include appropriate criteria for decision making by regulators;
- Provision for the objectives, regulatory rules and processes, in primary or secondary legislation and other non-statutory documents. This includes enforcement and mechanisms for adjustment. These give legal force to the rules and processes where necessary or provide guidance for actions when an amount of discretion is desirable;
- Appropriate ways to enforce those rules and processes, such as sanctions which can be applied in the event rules or procedures are not complied with;

- Clear assignment of responsibilities between the bodies charged with implementing regulations. Those bodies also need to have the right resources, such as enough staff with the right skills and experience and, sufficient funding to carry out their tasks;
- Ways of adjusting regulation when industry conditions change or Government objectives change. Regulatory regimes must be able to change or they can become ineffective or, worse, result in outcomes that harm the interests or policies they are designed to promote.

The following sections discuss each of these elements in more detail.

2.2.1 Clear policy objectives

As regulation is intended to promote Government policy objectives, the first requirement is that these objectives are clearly set out.

Where there are several objectives, indications should be given to regulators on the relative priorities to those bodies responsible for implementing regulation. This can include Ministers and Government departments, independent or semi-independent regulatory bodies, or the courts.

For the UK O&G industry, the UK Government's primary objective is that the value of O&G extracted from reserves in the North Sea is maximised to the benefit of the UK economy. This is known as the objective of 'maximising economic recovery for the UK' (MER UK) (see Description of the Regulatory Regime Section 4.4). Hence the regulations governing the operators' applications for decommissioning installations must ensure that operators are not applying for Cessation of Production (CoP) prematurely when considering the economic opportunities of exploiting their licenced reserves, and those of third parties.

When decommissioning is permitted, the regulator must also ensure that the decommissioning is implemented in a manner which complies with other regulatory objectives e.g. environmental objectives and objectives related to health and safety of workers and the public.

2.2.2 Regulatory rules and processes

Regulatory rules can address both actions that should be carried out, and actions that should be avoided. In either case it is important that their requirements and the implications of non-compliance are clear to the regulated organisation and other stakeholders. These include other O&G operators, suppliers/supply chain and employees. The following topics should therefore be clearly set out:

- What operator action would trigger regulatory intervention e.g. an investigation to establish non-compliance;
- What information the regulator will require in order to decide whether a rule has been breached, as well as who should provide this information;
- What the regulator's criteria for a decision and subsequent action will be;

- What sanctions might apply in the event that an organisation has breached a rule. In addition the organisation or regulator might consider further steps to be taken to avoid it happening again. This is often referred to in the judicial system as the 'remedy'.

Transparency of regulatory rules and the processes that accompany them is essential. Where these are not transparent, regulatory interventions and subsequent regulatory actions can be questioned and the effectiveness undermined. Ultimately, the process of regulation can be questioned through the courts, a so called 'judicial review'. In such a situation an operator or other stakeholder challenges a decision on the grounds that the regulator has not followed the regulatory process properly.

Transparency and clarity is also necessary if government wishes to attract private sector investment into the sector.

How clearly and transparently this process is expressed in the regulatory instruments is therefore an important factor influencing the effectiveness of the regime. Ambiguities or confusions in process inevitably lead to ineffective regulation.

2.2.3 Appropriate regulatory instruments

The regulatory instruments and the policies they are intended to promote are specified in a mixture of documents. These perform different functions and convey varying degrees of rights and obligations for both regulators and regulated entities. They also vary in the ease with which they can be changed if it proves necessary to alter aspects of regulation.

Government policy objectives, as well as the roles, duties and obligations of regulators, are typically reflected in primary legislation. An example of such roles and duties include the power of a Minister to award licences for exploration or decommissioning of O&G.

The details of regulatory processes are often contained in secondary legislation and in non-statutory documents (such as codes of practice or guidance documents). These details could include detailed criteria for making individual regulatory decisions, such as guidance on structuring assessments or applications to the regulators. These have the merit of being quicker and less costly to change than primary legislation. The powers to enforce decisions made using secondary legislation are provided for in primary legislation.

It is also usually the case that the different elements of any regulatory regime, such as the regime governing O&G decommissioning, is provided for in a variety of legal documents. As regulations can encompass a range of economic, technical, environmental or behavioural issues, there may already be legislation in place. This can be seen in the UK regime where key provisions for the process of O&G decommissioning, such as the MER UK, are provided for in only a few legal acts namely the Energy Act 2016 and Petroleum Act 1998. At the same time other aspects of O&G decommissioning are provided for in other legislation such as the Offshore Petroleum Production and Pipelines (Assessment of Environmental

Effects) (Amendment) Regulations 2007 which determine management of environmental impacts, and in international legislation such as OSPAR 98/3 which set out the criteria for determining if infrastructure can be left in-situ.

To understand a regulatory regime it is therefore necessary to map the relationship between the provisions of these different forms of legislation and non-statutory documents.

2.2.4 Appropriate methods of enforcement

Enforcing regulation in the O&G industry means trying to ensure that operators, and their supply chain, comply with the regulations. Ultimately, the power to regulate effectively derives from having the power of the courts behind regulatory rules and decisions i.e. from the primary legislation.

However, non-statutory provisions are often part of the regulatory process and complement the more formal enforcement mechanisms. For example, compliance with a regulation might be achieved more effectively if detailed negotiations are left to the operator and the regulatory body. In such a scenario, the legislation would provide for the scope to do so without necessarily laying down in precise legal terms what the elements of the negotiation might be.

Negotiating compliance often involves a consultation process between the regulators, the operator and other affected parties. This process is used when the regulatory regime, or aspects of it, are under review. A review could be required due to industry conditions having changed and a new way forward needing to be established.

As described in the first two reports, parts of the UK regime for O&G decommissioning has recently entered such a phase. With the role for the recently established regulatory body, the OGA focused on promoting Government objectives through consultation with the industry. This approach complements the more formal processes governing decommissioning which are set out in primary legislation.

2.2.5 Assignment of regulatory responsibilities

A common assignment of responsibilities in regulation involves the Secretary of State (SoS) or Minister and their relevant Government department. Their responsibilities will include;

- Setting policy and ensuring key aims are incorporated in legislation when appropriate;
- Issuing relevant licences which confer rights and obligations on the licenced operator; and
- Making decisions regarding any cessation of licenced activity. For example, granting of permission to CoP rests with the OGA in the UK.

On the other hand, day-to-day implementation of regulation and provision of expert advice to the SoS and Government Departments is often assigned to a

separate regulatory body. Depending on how it is set up, such a body can provide a degree of independence from political decisions. This can also help develop the industry expertise necessary to act effectively which civil servants in Government departments with their many duties and differing career paths may not have the opportunity to develop.

Commonly, legislation permits the regulator with primary responsibility for an aspect of regulation to delegate authority to another body. For example, in Denmark the primary regulator is the Ministry of Energy Utilities and Climate (MEUC), but they have delegated most of the responsibilities and management of the O&G industry to the Danish Energy Agency (DEA).

2.2.6 Regulatory Capture

In addition to having the appropriate skills, the regulatory body needs to have a sufficient level of resources to carry out its tasks effectively. A classic challenge for regulators is so called 'regulatory capture', when regulatory decisions become biased in favour of the regulated organisations. This can arise for a number of reasons, not only because of the obvious reason of corrupt practices.

An inability to access the information required to make objective judgements can be a major cause of regulatory capture. A particular example would be when the regulator is dependent on the operator for its information and has no independent sources of information to check what it is being told. A regulator having enough staff with the right expertise can also cause delays in decision making. Moreover, regulatory capture can also affect the imposition of sanctions or corrective actions which can benefit an operator.

If this is to be avoided, legislation sometimes empowers the regulator to make an order, enforceable through the courts. This order can require cessation of activity until an investigation has been carried out and corrective actions established.

2.2.7 Adjustment to regulation

Regulatory regimes need to be able to change, both in the short term to make existing approaches work better e.g. on the basis of improved information, or to reflect long term changing industry conditions or changing Government policy objectives.

In any sector, substantial changes can occur over time which require radical revisions to the way a sector is regulated.

Figure 2 illustrates key phases of evolution for regulated industries. Irrespective of country and industry sector, it has become common in the last 30 years for industries to pass through three phases;

1. A phase of close government control followed by;
2. A commercialisation phase, and finally
3. A phase of liberalisation and privatisation.

Each phase involves changes in ownership and governance, market structure and the form of regulation. This process is particularly true for large utilities such as telecommunications, electricity as well as the O&G industry.

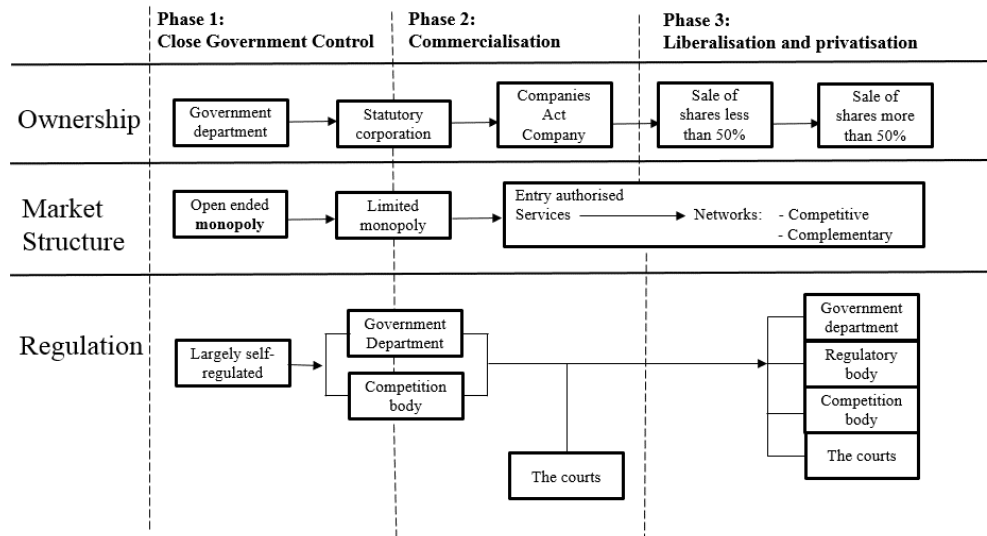


Figure 2: Phases of industry restructuring and regulatory change

Phase 1: Close Government control

Historically, the start of the evolutionary process for utility sectors has been a period of government ownership and control, known as ‘nationalisation’. This involves oversight by a government department and Minister, with financial matters closely overseen by the government finance ministry. Industries at this phase often enjoy a statutory monopoly so that competition from other firms is prohibited¹.

Regulation in this phase is largely administered by the government department, though the relationship between management, Ministers and departments is often very close so that regulation may not be transparent and explicit.

Common challenges with the performance of nationalised industries have prompted a re-appraisal of these industries. Challenges include:

- Difficulty of raising enough finance from government sources to support capital investments;
- Yearly budgeting cycles which inhibit long term planning;

¹ This is often the case when the organisation is expected to offer ‘universal service’ i.e. service on the same terms to customers in all parts of the country. Postal services and transport are sectors where this has been important worldwide, though other sectors such as energy have also adopted this approach. As costs of supply differ across geographical markets, cross subsidy between profitable and non-profitable parts of the business is implied. Unless explicit external subsidy is provided by Government, this cross subsidy needs restrictions on competition if the cross subsidy is to be maintained. Without such a restriction, firms would be attracted to enter the profitable markets, prices would be competed down and the profit margin used to provide the cross subsidy to unprofitable parts of the business eroded away.

- Cost inefficiency and lack of innovation leading to poor levels of service.

Phase 2: Commercialisation

The commercialisation phase involves changes designed to address the shortcomings in performance from nationalisation. This involves placing a greater reliance on market forces, in moving the governance of the industry to a more 'arms-length' relationship with government. This helps make the regulatory arrangements more explicit and transparent. A 'Companies Act' company is formed, initially 100% owned by government. This has been seen in both Norway and the Netherlands where Petoro and ENS are 100% owned by respective Governments. This automatically subjects the organisation to other regulatory influences in addition to the influence of the Minister and relevant departments.

Competition may be allowed, possibly on a limited basis at first. In many utility sectors competition has been permitted initially in the provision of services. Subsequently it is extended to the networks on which those services are provided e.g. energy networks. This has been seen in the supply of gas, electricity, telecommunications networks and other services to customers.

Often the commercialisation phase is a temporary state. Competition may be permitted to an increasing extent and the requirement for capital funding will increase. This means that sole reliance on government sources and revenues from customers is not enough to fund capital investment and recourse to capital markets is required. Governments may then sell shares in the company i.e. enter phase 3 involving 'privatisation'.

Phase 3: Further liberalisation and privatisation

In this phase governments sell an increasing proportion of shares, and competition is successively increased. Privatisation necessitates the greatest overhaul of the regulatory regime, because of changing economic drivers. In issuing shares for sale all of the terms that will influence prospective returns to shareholders have to be made transparent and explicit in the share sale documentation.

In the UK during the 1980s and 1990s this phase usually led to the creation of new regulatory bodies. More recently, new bodies have been created at the commercialisation phase as well.

3 Key aspects of regulatory regimes for O&G decommissioning

The decommissioning industry has a specific set of criteria and processes which must be considered when developing regulation to govern the activities. These criteria can be grouped into socio-economic, environmental and health & safety topics.

Socio-economic aspects include the considerations that impact on public finances and the overall economic benefit to the public from O&G activities. This topic should also consider the risks associated with decommissioning liabilities and wider policy drivers such as energy security and self-sufficiency.

Environmental and health & safety aspects are often part of established international regulations and practices, which influence national regulatory regimes. Both are also based on best practice and particularly for environmental aspects, the availability of information to assess a baseline scenario against which impacts can be measured and assessed.

The sequencing of how national regimes respond or require intervention on the issues raised by decommissioning varies between countries. Despite this the actions required are generally similar and include the estimation of the total decommissioning cost and who is liable for it, as well as their financial capability of meeting such obligations. Also a detailed programme for carrying out decommissioning and assessment of the impacts it will have, along with separate approval to cease production. Finally the assigning of responsibility for post-decommissioning liabilities is important to manage any financial risk to Governments.

3.1 Introduction

An effective regulatory regime must be adjusted for the context of the industry it is trying to regulate. This section draws on the previous two reports to provide context on the aspects of the O&G decommissioning regulatory regimes which are specific to this industry.

Notwithstanding the fact that decommissioning can be considered a subset of general O&G regulation, it does have specific and distinctive elements. Figure 3 illustrates the key drivers which will influence the development of legislation. Within each of these, a number of sub-topics have been highlighted to illustrate the spread of influences which a regulatory regime should consider.

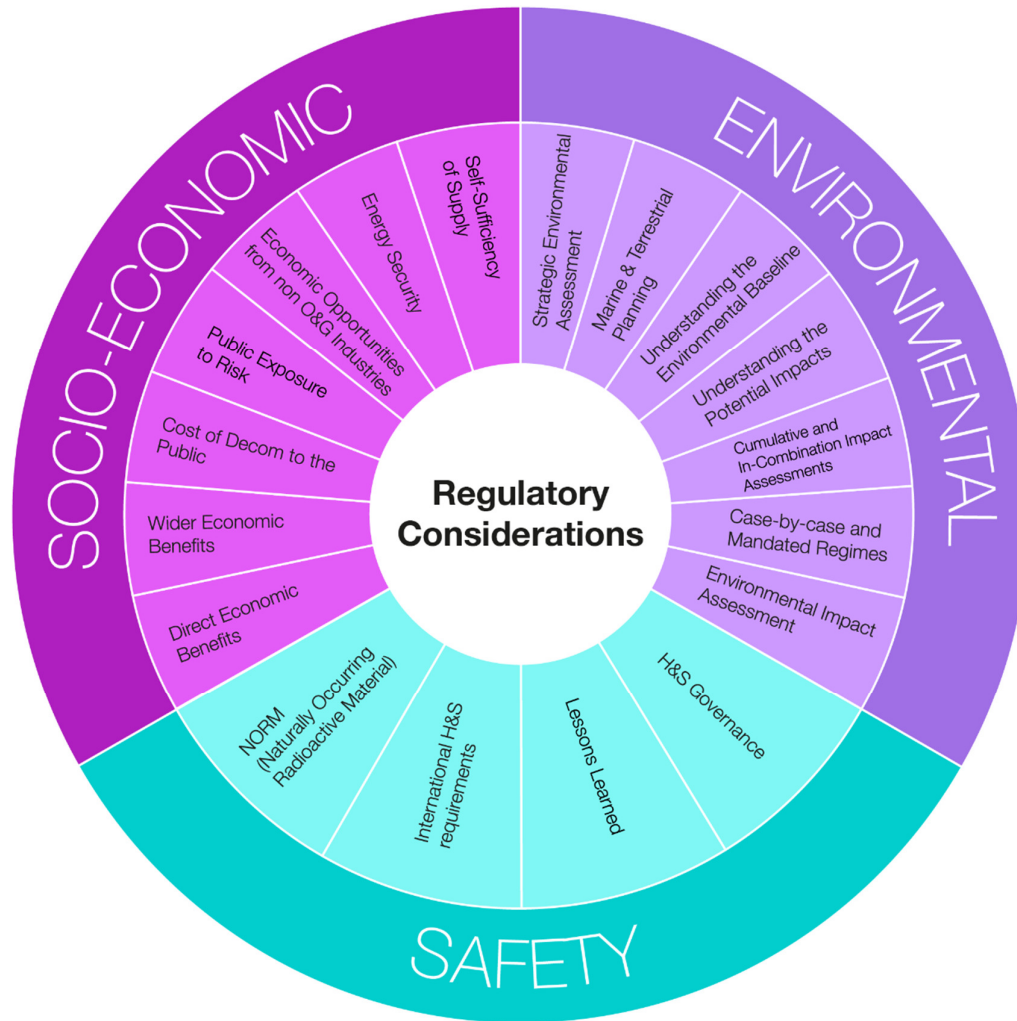


Figure 3: Key drivers and components of decommissioning

In sections 3.3, each of the topics from Figure 3 is discussed and examples provided to identify how policy objectives are reflected in appropriate regulatory instruments.

There are a number of regulatory intervention activities undertaken by North Sea regulators, which are common to all the regional decommissioning regimes. They respond to different regulatory issues that arise at different stages of decommissioning across the North Sea countries. These include key decision gates and associated provision of approvals to undertake activities, or ongoing review and monitoring. While the activities are common, the phasing of the regulators' interventions are not. These key intervention activities are summarised in section 3.4 alongside the timing of intervention.

3.2 Aspects of O&G decommissioning regulation

3.2.1 Socio-economic considerations

The O&G industry is a significant contributor to the wealth of many countries and has societal impacts which are broad in their nature. Around the North Sea, this value has been recognised and has generally fostered clear policy objectives in maximising socio-economic benefits which govern the industry.

Decommissioning has been recognised as a growing sector within the O&G industry, with its own specific socio-economic considerations.

The socio-economic outcomes are influenced through regulation which will determine the ultimate benefits generated by the O&G industry to the public sector and overall economy. These consideration may include;

- **Direct Economic Benefits.** Government's primary income from O&G exploitation activities is usually through taxation, or profit from government owned operator entities. It is estimated that the UK O&G industry has contributed over £300bn to the state in tax revenue [1]. Regulation is frequently structured to maximise these direct benefits to the public sector, such as is seen with the MER UK strategy. The economic benefits from tax income, or otherwise, are generally considered on an individual field or operator level. However, in the North Sea it has become apparent that the interconnectivity of infrastructure influences the ability to achieve the overall benefits of the industry.
- **Wider Economic Benefits.** Beyond the direct income from taxation or public sector operator income, a much wider economic benefit is realised from the O&G industry through creation of jobs and a wider supply chain. In Scotland alone the O&G industry was estimated to be worth £10bn to the economy and supported 124,500 jobs [2]. The decommissioning of assets will result in the loss of direct and indirect jobs related to the operation of assets. However, the decommissioning activity itself is a source of employment for both the O&G industry and other industries associated with the decommissioning processes. While UK regulation was historically focused on the direct economic benefits, there is now a focus on the more holistic economic benefits of the industry.
- **Cost of Decommissioning to the Public Sector.** Many O&G producing countries will have, or have had in the past, a level of state ownership in the industry. Decommissioning cost liabilities can therefore be of notable where Government is heavily involved in the industry. Even where Government is not directly involved, the cost to the public can be substantial depending on the taxation reliefs set up around decommissioning costs. Control of decommissioning costs is relevant to ensuring that MER UK objectives are not compromised.
- **The Public Exposure to Risk.** While the governments may have obligations to meet some of the decommissioning cost burden, either through direct ownership or through taxation reliefs, it is expected that significant proportions of the cost are met by the operators. Regulations should manage the risk of the public sector being exposed to further liabilities. This could

include risk of licence holders defaulting and not being able to meet their decommissioning costs or from environmental impacts resulting from residual infrastructure including plugged wells. In order to ensure these risks are minimised regulation should consider both the identification of liability, the financial robustness of the operator and the management of post decommissioning liability.

- **Economic Opportunities from Non O&G Industries.** Decisions to decommission assets undertaken by operators are primarily based on an economic analysis of the operator's field and infrastructure, and interaction with third party O&G activities. However, opportunities from non O&G industries can also offer socioeconomic benefits such as carbon capture and storage (CCS), offshore renewables, shipping, fishing, aggregates, power cables among others. The regulator system should consider these wider economic interests in determining the timing and approach to decommissioning.
- **Energy Security and Self-Sufficiency of Supply.** Energy security is often a feature in national energy policy, and decommissioning could be considered in this context, to ensure decisions are consistent with such objectives. Government objectives within this area might wish to drive decommissioning regulation to ensure decommissioning is not undertaken prematurely. Failure to do so may increase national reliability on imported fuels and open a country to geo-political issues.

Many of these issues are reflected in regulatory regimes in the North Sea regions. Examples are provided below to illustrate how the concerns and mitigating steps are reflected in policy and regulatory instruments.

3.2.2 Environmental considerations and implications

The requirement to understand and assess the acceptability of potential environmental impacts of proposed projects and plans is well established in national and international regulation frameworks. What level of impact, on both the marine and terrestrial environments, society is willing to accept for decommissioning O&G structures will vary according to other drivers often linked to how ecosystems are valued and managed.

In recent years, generally around the world, an increase in awareness has driven improvements in our understanding of the relationship between human activity and its impact on the wider environment. Pressures from international, national and local environmental stakeholders have highlighted concerns over the use of the marine environment as a 'dumping ground' with the United Nations Convention on Law of the Sea (UNCLOS) followed by the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention) aiming to prevent the disposal of waste material at sea.

When creating a regulatory regime to manage decommissioning impacts on the environment it is crucial that the regulator considers how potential impacts will be managed. In addition there is a need to build a knowledge base both on the status of the existing environment as well as evidence to support the assessment of

potential impacts. An example being, what is the impact of leaving a drill cutting pile in place?

Regulators should consider the following when designing the regulatory regimes:

- **Strategic Environmental Assessment (SEA) & Marine and Terrestrial Planning.** Some form of strategic planning is useful to assist regulators with decision making. In addition it makes it clear to industry what level of development and activities are acceptable and what mitigation may be required. The regulator may choose to develop a marine or terrestrial plan/programme that is subject to an SEA to fully understand the impacts of the plan/programme. The process should be driven by the regulator with advice from industry on the type and level of activity that may be proposed in an area.

Ideally planning should be undertaken considering all activities likely to occur in an area. For example, in the marine environment, shipping, fishing, tourism, O&G development, O&G decommissioning, designation of protected areas, and other environmental management regimes should be considered. The plan/programme should provide a framework for future development of an area, which the regulator can then assess individual plans against. The complete life cycle impacts of a proposed activity should be considered. For example, for O&G developments this should include all phases from initial surveys, through construction and operation to final decommissioning.

Managing the competing requirements of different industries and environmental protection is a challenging task. Deciding which industries or level of environmental protection takes precedent will depend upon society's needs and requirements.

When undertaking an SEA, the regulator should consider the potential cumulative impacts of developments on both the marine and terrestrial environments and also consider international impacts. Consultation should be undertaken with all stakeholders at the planning and SEA stage to minimise conflict at later stages, such as the assessment of individual applications. This is especially important where industries or stakeholders may hold opposing views.

- **Understanding the Environmental Baseline.** In order to undertake an SEA or produce marine and terrestrial plans it is vital that there is a thorough understanding of the existing environments. Without a thorough understanding, there is a risk that when individual plans are developed, environmental constraints will be identified at a stage when it is more difficult to manage activities. A good baseline across the wider environment allows individual developments to be placed in context with the wider environment and minimises spend in areas which may be deemed unsuitable for development. For decommissioning, understanding which areas of the marine environment have high ecosystem value could be crucial to informing the decommissioning options taken forward. Baseline information could be developed by the regulator, in collaboration with industry across a wide area.
- **Understanding the potential impacts.** Crucial to an effective SEA or planning process is developing an understanding of the potential impacts of

the activities which the plan is managing. The understanding of impacts should be evidenced based and peer reviewed. This enables stakeholders, both statutory and non-statutory, to sign up to the conclusions of the SEA/Plan. Developing this level of understanding requires investment from both regulators and industry and a willingness to share information and data and learn from previous experience. As with an inadequate environmental baseline, a poor understanding of potential impacts of decommissioning may lead to flawed decision making. This can have knock on effects in terms of impacts, risks and costs.

- **Cumulative and In-Combination Impact Assessment.** When implementing a regulatory regime, it is crucial that a system is put in place to assess and manage cumulative and in-combination impacts across industries. This will minimise impacts on industry and maximise environmental protection. This is often a difficult task, as different industries are be managed by different bodies. However, a fairness in approach and consistent management across the variety of sectors should be aimed for. Ideally, a standardised framework and guidance should be supplied by the regulator as to how cumulative impacts are to be assessed including agreement on what levels of impacts on certain features or species are seen as negligible through to significant.
- **Case by Case and Mandated Regimes.** Effective planning and SEA conclusions may result in conditions being applied to certain activities and these could be enshrined in legislation. For instance, a marine plan may state a requirement to remove or leave in place infrastructure related to decommissioned oil and gas or limiting fishing techniques in an area through no demersal trawling. Countries may choose to enshrine some basic requirements in regulation (such as the OSPAR 98/3 decision on removal of structures from European waters) where others may choose to manage aspects on a case by case basis. A mandated approach may lead to decommissioning activities occurring which do not present the Best Practicable Environmental Option (BPEO) overall. However, this approach does provide a clear instruction to industry as to what will be expected and may provide environmental stakeholders with a greater level of confidence that environmental protection will be achieved. The case by case basis allows for greater flexibility and innovative solutions to be developed and, if adequately managed and enforced by the regulator, may actually provide the BPEO across a range of activities. However, it requires an increased level of competence within the regulatory bodies to assess applications.
- **Environmental Impact Assessment.** Ideally, with all the above in place, a regulatory regime for the decommissioning of individual structures should be easily managed. Operators will have a clear statement from the regulator as to what activities are permitted in which locations as defined in plans, SEA and any mandated regimes. The assessment is underpinned by an informed baseline and an agreed and evidenced framework for individual and cumulative impact assessment. With all this context, the operator should be able to undertake surveys and assessment of their individual proposed activities to produce an Environmental Impact Assessment. This will allow the regulator to make an informed decision as to whether a proposed decommission activity should be permitted.

3.2.3 Safety considerations and implications

The O&G industry is typically subjected to rigorous and robust H&S governance, in order to manage the potential major accident hazards present on operating platforms and vessels. The profile of health and safety governance and waste management changes as an asset is shut down, decommissioned and removal begins. The regulator must understand the consequences and consider if existing regulations may require modification. Although the major accident hazards associated with operations (the presence of hydrocarbons) is much reduced, overall H&S governance is typically required to be maintained at the same level when executing decommissioning activities. Topics for consideration include:

- **H&S governance.** It is essential that the level of H&S oversight remains as robust during decommissioning as it is during operations. To facilitate this, the regulator must consider how existing legislation which governs the industry may need to be modified or if new legislation is required. Alternatively, an audit of current legislation might find that there is scope for existing governance to apply to decommissioning without modification. An example of this can be seen in the UK, where instead of a prescriptive approach, a goal-setting regime such as the Safety Case principle and the use of live Safety and Environmental Management Systems (including Emergency Response Plans) can accommodate a transition from operations to decommissioning without introducing a new regime. This approach requires the operator to modify existing governance and operational material to reflect the change of use, for review by the appropriate regulator.
- **Lessons Learnt.** As decommissioning and dismantling is executed by operators and the supply chain, a body of experience will be built up. This body of evidence can provide insight into work already completed and provide valuable learning points for future operations. Although this information will generally consider methodologies and project execution, it will highlight how the risk profile of decommissioning is different to that of operations. A regulator may wish to encourage the sharing of learning for the wider benefit of the industry. An example of how this is facilitated can be seen in the UK, where BEIS requires that close-out reports [3] are published on completion of decommissioning.
- **International H&S requirements.** The supply chain during decommissioning will involve the waste management industry to a much greater extent, aspects of which are governed by international obligations. Although this principle is no different to what is applied during typical O&G operations, the greater volumes of material being recovered to shore may place pressure on the waste management supply chain and result in a larger number of trans-boundary shipments. The regulator should ensure that the national governance is robust enough to cater for this and provide compliance with relevant international obligations such as the OECD Control System for Waste Recovery [4].
- **Naturally Occurring Radioactive Material (NORM) and Other Hazardous Waste.** The management of NORM is a well-documented challenge in the O&G industry but the profile of NORM is heightened during

decommissioning, with the potential for larger volumes than usual of contaminated material to be brought back to shore. Because of its prevalence in multiple industries (e.g. nuclear, medical), NORM is often the subject of overlapping regulation, regulatory bodies in decommissioning may wish to seek clarity. This complex landscape has been acknowledged in the UK and the regulator has recommended a review [5]. This exercise will review existing obligations with the objective of providing clear sector-by-sector decision-making guidance to industry, ultimately to substantially reduce radioactive discharges.

3.3 Regulatory interventions

There are a number of regulatory intervention activities undertaken by North Sea regulators which are common to all the regional decommissioning regimes. These include key decision gates and associated provision of approvals to undertake activities, or ongoing review and monitoring. While the activities are common, the phasing of the regulators interventions are not.

These key intervention activities are summarised below and the timing of their interventions are shown in figure 4.

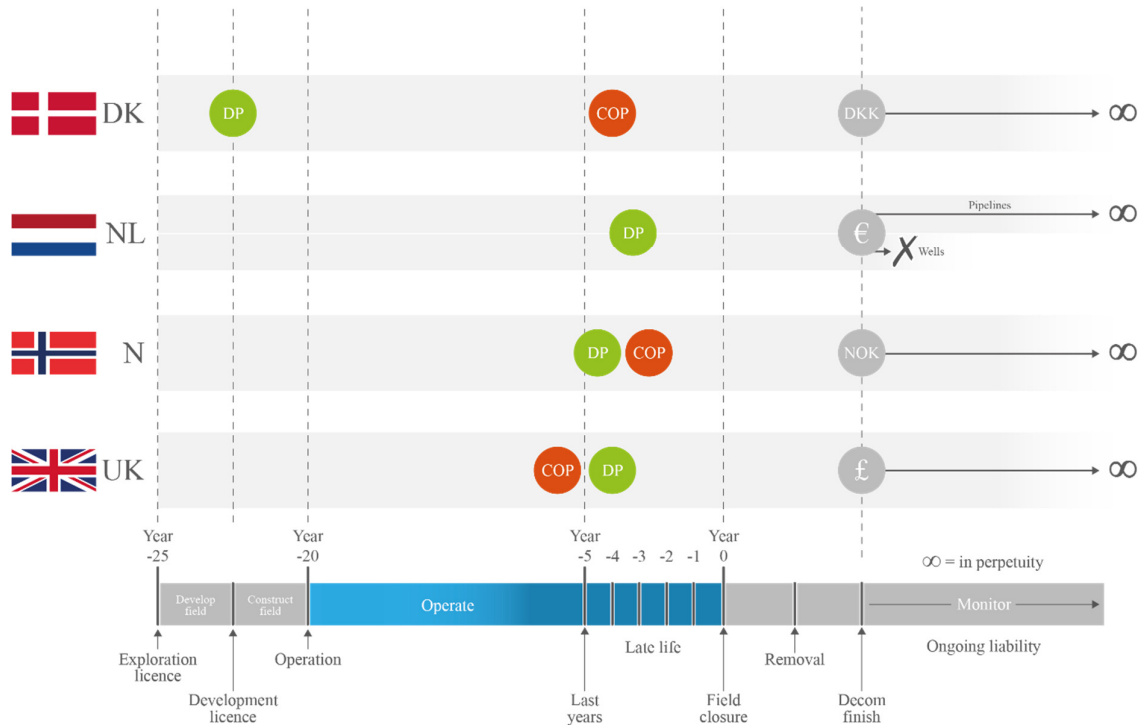


Figure 4: Sequencing of decommissioning - comparison of North Sea countries

Identifying liabilities for decommissioning

Identification of who is responsible for undertaking decommissioning planning and delivery, and meeting the costs of decommissioning is critical to ensuring that the public sector is not exposed to the costs of decommissioning.

All of the North Sea regulators have a process whereby they identify and formalise who is liable for decommissioning. In the UK BEIS is responsible for identifying liabilities through serving of a Section 29 on behalf of the SoS. BEIS endeavour to serve notices at the commencement of operations, or as assets are handed over as part of a sale.

Ensuring appropriate financial security

Once liabilities have been identified, provisions are in place across the North Sea countries to require a licensee to demonstrate its financial capability of executing the decommissioning liabilities.

If concern is raised by the regulator or its delegated authority, a notice can be served to demand security in the form of a security arrangement.

In the UK the timing of this activity is not specified in regulation. Ideally the activity is undertaken at the commencement of operation. It should be periodically reviewed during the operational life of the project as the financial stability of the operator and their total decommissioning obligations may vary over time. The recent period of sustained low oil prices has stimulated review by the regulator as the financial stability of the UKCS operators were significantly impacted by the market conditions.

Decommissioning programme

The main requirement prior to decommissioning is the production of a Decommissioning Programme (DP) which details the approach to decommissioning and its associated environmental, safety and commercial impacts. This must be prepared by the operator and approved by the national authority prior to decommissioning commencing. As shown in Figure 4 this takes place at different points in time across the North Sea countries.

Cessation of production

Cessation of Production would be applied for when a field is deemed no longer economically viable by the operator. The regulator has a role to play in approving CoP, confirming that all economic development opportunities have been pursued prior to granting approval to cease production. This process varies between the North Sea countries and the approval can be required both before submission of the DP, or in some cases it is not a requirement. In Norway, prior to ceasing production a DP must have been submitted and approved. In the UK CoP is applied for prior to submission of the DP. The CoP application will include wider considerations around whether the reserve has been economically exploited and if there will be impact on other fields as a result of decommissioning.

Post-decommissioning liabilities

Once the decommissioning has been completed there are residual liabilities associated with any infrastructure or materials left in situ, or as a result of pollution risk from plugged wells. The regulator has an ongoing interest in reducing the exposure to the public sector as a result of any enduring risks.

Liability can remain with the licence holder for any leaks or other environmental impacts for a finite or infinite period. Liability in perpetuity is common for all infrastructure in all North Sea regulatory regimes with the exception of plugged wells in the Netherlands where the operator's liability ends once a well is plugged and abandoned.

The Norwegian Petroleum Act 1996 allows for the licencees and the field owners to make alternative liability agreements with the State. This can allow for future maintenance, responsibility and liability to be taken over by the State, based on an agreed financial compensation.

4 Steps to Establish a Regulatory Regime

It is rare that an entirely new regulatory regime is to be put in place. Instead it is more common that the process of introducing new legislation and regulation is an iterative process, making adjustments to existing frameworks.

With this in mind it is useful to consider the establishment of new regulation as a review of policy objectives to ascertain whether or not an existing regime meets these objectives. If not then the review can inform specific actions to deliver the reform. Ongoing consultation and monitoring is also recommended to ensure that the regime is maintained in the future.

This form of regulatory adjustment has been witnessed in the UK, in the context of the O&G industry. This adjustment, which recommended the establishment of a new regulatory body is reviewed as a case study.

4.1 Introduction

In this section, a generic process for the introduction of new legislation and accompanying regulation is presented.

The requirement to modify regulations, or put in place a radically new regime, occurs when the prevailing approach to regulation is no longer considered effective in promoting government's policy objectives. In modifying existing regulations or designing a new regime it is therefore important to be clear what the objectives are and why the existing provisions need revision before setting out the plan for the new regime.

4.2 The process of regulatory adjustment

Governments often adopt successive steps to review objectives and the reasons for changes to the regulatory regime. This is essential to then determine the options for change and implementation of the new approach. This process is illustrated in the flowchart below.

Step 1: review of objectives and current approach

- Identify current and future policy objectives
- Assess the extent to which the current approach to regulation has met current objectives, for example evaluate their effectiveness against criteria such as:
 - *Are the objectives properly aligned against the policy objectives and will they create the right incentives for behaviour by the regulated firm?*
 - *What information will be required by the firm and the regulator and how will it be obtained?*
 - *Is the necessary expertise available to obtain the information and evaluate it?*
 - *How much will the regulations cost the regulated firm and the regulator to implement?*
- Assess the extent to which the current approach will be adequate to promote new policy objectives
- Identify reasons for current underperformance or reasons why the current regime may not be adequate to promote new objectives
- Identify which aspects of the regulatory regime need to change

Step 2: propose plan for regulatory reform

- Develop regulatory options and assess their advantages and disadvantages against policy objectives
- Decide on preferred way forward following industry and stakeholder consultation.

Step 3: implementation plan and delivery

- Review current legislation and legislative changes required to implement the new regulations (amendments to existing legislation and new legislation)
- Assign responsibilities (with new bodies created if appropriate) and make provision for changed or new duties of regulators, rights and obligations or regulated firms in legislation
- Enact new legislation
- Establish new regulatory bodies if appropriate
- Develop new regulatory rules as provided for by the legislation (may follow setting up of bodies and subsequent study of industry conditions etc.)

Step 4: monitor and report on effectiveness

- Make adjustments if required, for example through a 5 year review such as was seen in the UK through the Wood Review.

Step 5: further adjustments as required

- Use the provisions for change allowed for in the legislation

4.3 Case Study: Regulatory adjustment in the UK

The recent changes in the regulation of decommissioning in the UK, which in 2016 resulted in the formation of the OGA, followed a similar sequence. It is useful to examine this to observe how the requirements came about and how the process of regulatory adjustment was executed.

It had become clear to Government and the industry that evolving industry conditions associated with a maturing basin, would require changes in the way oil and gas regulation was being addressed. This was initiated by a number of factors such as an increasing reliance on shared use of infrastructure to exploit more marginal reserves combined with an increasingly fragmented industry structure in the North Sea.

The government was concerned that if decommissioning activities were to impact on shared infrastructure, then this could cause economic harm to other operators and to the wider economic output of the industry.

This review was undertaken prior to the most recent period of persistently low O&G prices. However these recent market conditions have increased then reduced the economic viability of a number of platforms and increased the likelihood of an early decommissioning applications from individual operators.

This increasingly complicated interdependence between parts of the industry together with changing market prospects prompted the Government to take action. This was initiated in 2013 when the Government commissioned a review of the decommissioning process, called the 'Wood Review' [6] (**Step 1**). The final report was published in 2014 following an interim report which was open to consultation.

The Wood Review recommended establishing the new OGA to work alongside BEIS and other regulatory bodies. The proposed new approach did not completely replace the existing regulatory framework. It added an additional complementary approach to regulation, focused on consultation and fostering co-operation. Some of the existing powers of the Secretary of State for BEIS were also suggested to be delegated to the new body.

The Government decision to follow the recommendations of the review followed a period of consultation with the industry and stakeholders (**Step 2**).

The details of the legislative changes and further changes to regulations were subsequently debated in parliament, as part of the process of enacting the new legislation (**Steps 2 and 3**).

As part of the requirements for the new regulatory body, the OGA, it was required to report to publish an annual plan. Moreover, an annual report to Government is also required to monitor progress in meeting its objectives (**Step 4**).

Further changes to the new regulations may be required because of new information, as well as consultations with industry and stakeholders who are part of the consultative groups that the OGA has set up (**Step 5**).

Abbreviations

Abbreviation	Description
AA	Appropriate Assessment
ANP	Agencia Nacional do Petroleo
BEIS	Department of Business, Energy and Industrial Strategy
CoP	Cessation of Production
DEA	Danish Energy Authority
DoC	Duty of Care
DP	Decommissioning Programme
EBN	Energie Beheer Nederland
EIA	Environmental Impact Assessment
EMS	Environmental Management Systems
EPA	(Danish) Environmental Protection Agency
ES	Environmental Statement
FCO	Foreign and Commonwealth Office
H&S	Health and Safety
HLV	Heavy Lift Vessel
HRA	Habitat Regulations Appraisal
HSE	Health & Safety Executives
MEA	Ministry of Economic Affairs
MER	Maximising Economic Recovery
MEUC	(Danish) Ministry of Energy, Utilities and Climate

Abbreviation	Description
MPE	(Norwegian) Ministry of Petroleum & Energy
NOK	Norwegian Kroner
NORM	Naturally Occurring Radioactive Materials
NPD	Norwegian Petroleum Directorate
O&G	Oil and Gas
OGA	Oil and Gas Authority
SEA	Strategic Environmental Assessment
SoS	Secretary of State

Glossary of terms

Cessation of Production

The termination of hydrocarbon production from a field or specific well. This can be due to technical, safety or economic reasons.

Decommissioning (or Abandonment) Programme

A legally required document that outlines the key decommissioning aspects for the installations of a field. Must be submitted to and approved by the Secretary of State.

OSPAR Commission

A commission established to protect the marine environment of the North East Atlantic. 15 governments participate in the commission. OSPAR decision 98/3 legislation is ratified by the OSPAR commission.

Department of Business, Energy, and Industrial Strategy (BEIS)

The O&G regulator in the UK. BEIS replaced DECC (Department for Energy and Climate Change) in July 2016.

Derogation cases

A proposal developed with the aim of seeking derogation approval, an exception to the OSPAR 98/3 removal criteria for offshore installations. These require approval on a domestic and international level.

Legislation

A directive placed by a government or governing body on either an industry or country. This must be complied with in order to remain within the legal requirements of that country or industry.

Act

A piece of primary legislation.

Bill

A proposed Act that has not yet been approved by the House of Commons and House of Lords, as well as then formally receiving Royal Assent.

Regulation

A regulation refers to a specific requirement that can take on various forms, such as industry specific regulation or broader in scope.

Abandonment retirement obligation

A legal obligation to retire an asset once it has reached the end of its life. The method and cost of retiring the asset will depend on the available options at the time of retirement.

Comparative assessment

A technique used to compare the similarities and differences between two or more decommissioning options. A comparative assessment is a legal requirement to support derogation cases and pipeline decommissioning approvals.

Consultation

The process of formally discussing activities with an expert in a particular field.

Decommissioning Security Agreement

An agreement to provide certainty over decommissioning liabilities of O&G field developments. The agreement identifies the liabilities of all parties associated with a field.

Derogation

An exemption from a rule. Derogation approval must be granted by a relevant authority.

Environmental Impact Assessment

An assessment of the complete environmental effects of a project that is currently being developed. These form part of a project's environmental statement.

Environmental Statement

A legally required report that provides publicly available environmental and planning information about a planned project. Environmental statements are submitted alongside planning applications.

Foreign & Commonwealth Office

A ministerial department of the government that promotes the United Kingdom's interests overseas. The Foreign & Commonwealth Office are responsible for the UK prosperity fund.

Framework

A tool developed from previous experience which comprises a set of rules and procedural steps.

Habitat Regulation Appraisal

An assessment of a project that will potentially affect the habitat of the area. This appraisal is carried out by a competent authority under domestic and EU habitat regulations.

Maximising Economic Recovery

A strategy developed by the UK government and implemented by the OGA. The strategy focuses on the overall economy of the petroleum industry in the UKCS and is a result of the 2013 Wood Review.

North Sea

A marginal sea of the Atlantic Ocean located between the United Kingdom, Scandinavia, Germany, The Netherlands, Belgium and France. The UKCS is located in the North Sea.

Oil and Gas Authority

A regulator for both onshore and offshore hydrocarbon operations in the United Kingdom. The OGA became a statutory corporation in 2016 as a result of the Wood Review with an aim of delivering the MER UK strategy.

Operator

The company responsible for the exploration, development and production of a field licence.

Post-Decommissioning Monitoring

An inspection of the installation site after all proposed decommissioning activity has been completed to ensure that all agreed work has been completed to the agreed standard.

Regulatory Regime

A system of regulations and the means to enforce them, usually established by a government to regulate a specific activity.

Secretary of State

The title given to a cabinet minister in charge of a government department. In this context, the department of Business, Energy and Industrial Strategy is the most relevant. Decommissioning programmes must be formally approved by the BEIS Secretary of State.

Section 29

A section of the UK petroleum act 1998 that grants the Secretary of State the ability to serve mandatory decommissioning notices to field licensees.

Securities

A deposit or pledge that serves as a financial guarantee of fulfilling a legal obligation.

Stakeholders

A group, organisation or company that has an interest or concern in an area or industry. Stakeholders can have commercial, environmental and social interests.

Transportation tariffs

A system of prices, or rates which are collected for allowing the movement of hydrocarbons through a pipeline network. Tariffs will likely be a burden on operators who wish to move resources from their field through a third party's pipeline to an onshore refinery for processing.

Well Plugging and Abandonment

The operation of permanently isolating and shutting in a well after production is concluded.

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