

1. Introduction

AIMS OF THIS BOOK

1.001 This book is part of a research project the aims of which include identifying common features, strengths and weaknesses of the policies and systems of government offshore petroleum resource management. This involves explaining host country involvement in resource management and assessing the relationship between host countries and oil companies in light of the changing maturity of fields and developments in stewardship, sustainability and social issues. The approach used is to compare Australia, Norway and the United Kingdom (UK) for reasons which will be explained shortly. This book also analyses the concepts used in petroleum resource management and how governments and the companies which are the licensees are responding to the changing challenges they face.

1.002 One of these challenges, which provided the initial motivation for this research, is that major offshore producing basins are reaching maturity.¹ These include Bass Strait, which is the offshore part of Australia's Gippsland basin, the Norwegian Continental Shelf (NCS) and the UK Continental Shelf (UKCS). Each of Australia, Norway and the UK has produced reports in recent years reflecting on the dilemmas of oil and gas development and production in current circumstances. They are the Norwegian Ministry of Petroleum and Energy, *An Industry for the future – Norway's petroleum activities* in 2011,² the Wood Review in the UK

¹ The term 'mature field' has no single definition. Often, engineers consider fields mature when they have declined in production by more than 50 per cent of their plateau rate. Different companies might apply their own specific definitions. See Mojdeh Delshad and others, 'Water Management in Mature Oil Fields using Preformed Particle Gels' (Society of Petroleum Engineers 2013) <<http://dx.doi.org/10.2118/165356-MS>> accessed 7 March 2017.

² (Meld. St. 28 (2010–2011) Report to the Storting (white paper)) (NMPE 2011 Industry Review) <https://www.regjeringen.no/globalassets/upload/oed/petroleumsmeldingen_2011/oversettelse/2011-06_white-paper-on-petro-activities.pdf> accessed 14 August 2017.

(Wood Review) in 2014,³ and the Australian Government Department of Industry, Innovation and Science, *Offshore Petroleum Resource Management Review Interim Report* in 2015 (AOPRMR Review).⁴

1.003 The Wood Review comments that instead of large fields with large operators, the UK now has to deal with many more fields, smaller discoveries, marginal fields and greater inter-dependence.⁵ The AOPRMR Review makes a similar comment, stating that:

Our major production provinces are now maturing, with a greater understanding of the economic and geological interconnectivity between fields and projects. A particular challenge in these areas lies in optimising overall resource recovery across multiple plays, and by utilising smaller finds and making full use of infrastructure.⁶

Maturity is only one of the challenges that states and companies have to address. Another that stands out is climate change which is causing what one report calls the ‘Grand Transition’ as the energy mix moves from fossil fuels.⁷

1.004 Maturity can have significant economic consequences. The Wood Review concluded that although 12 to 24 billion barrels of oil equivalent could still be produced from the UKCS (in comparison with 42 billion already produced) there was a major problem in that production had fallen by 38 per cent between 2010 and 2013.⁸ It therefore recommended evolving the licensing system to address certain key issues. Important

³ Sir Ian Wood, *UKCS Maximising Recovery Review: Final Report* (24 February 2014) (Wood Review) <https://www.ogauthority.co.uk/media/1014/ukcs_maximising_recovery_review.pdf> accessed 15 August 2017. See also Sir Ian Wood, *UKCS Maximising Recovery Review Interim Report* (11 November 2013) <<http://www.woodreview.co.uk/>> accessed 15 August 2017.

⁴ Department of Industry, Innovation and Science, *Offshore Petroleum Resource Management Review* (Interim Report, Australian Government November 2015) (AOPRMR Review) <<https://industry.gov.au/resource/UpstreamPetroleum/Documents/Offshore-Petroleum-Resources-Management-Review-Interim-Report.pdf>> accessed 16 August 2017. As of 16 June 2018 the final report was not yet available.

⁵ Wood Review, 1.

⁶ AOPRMR Review, 1.

⁷ World Energy Council, ‘World Energy Scenarios 2016 – The Grand Transition’ (2016) <<https://www.worldenergy.org/publications/2016/world-energy-scenarios-2016-the-grand-transition/>> accessed 11 October 2017.

⁸ Wood Review, 5.

considerations from the review are the issues that needed to be addressed, why they were not addressed earlier and the lessons for states embarking on their offshore petroleum journey or which have immature areas.

LICENCES, PSCs AND THE BARGAIN WITH THE STATE

1.005 Many countries exploiting petroleum on their continental shelves use a licensing system,⁹ including Australia, Norway and the UK, which issued their first licences in the 1960s. The first in production was the UK's West Sole field in 1967, followed by Australia's Baracouta field in 1969 and Norway's Ekofisk in 1971. The essence of licence systems is the grant to a licensee, usually an oil company or more commonly oil companies acting together in a joint venture, of the exclusive right to explore for petroleum in a defined licence area. If the licensee makes a commercial discovery, then it will have the right to develop the discovery and keep the petroleum produced.

1.006 A first step in the analysis of licence systems is to recognise that they have significant common elements. They generally require companies to conduct exploration, appraise any discovery that is potentially commercial, develop the necessary facilities and infrastructure for production, processing, storage and transport, produce the petroleum and finally decommission the facilities and infrastructure. This is done at the risk of the companies because the state does not reimburse them for their costs. They have to recover them from production, if they are able to make a discovery and produce from it in commercial quantities. In exchange the companies get, depending on the system, all, or a share, of the petroleum produced.

1.007 Only a few countries using licensing regimes seek a financial return through cash payments for the grant of the right to explore; for example the US in the Gulf of Mexico, and Australia in recent times. Most

⁹ According to a World Bank working paper produced in 2010, half the countries world-wide use a concession/licence/lease regime including USA, UK, France, Norway, Ireland, Spain, Chad, Australia, Russia, New Zealand, Colombia, and Argentina. Silvano Tordo, David Johnston and Daniel Johnston, *Petroleum Exploration and Production Rights Allocation Strategies and Design Issues* (World Bank Working Paper No. 179, 2010) 9 (World Bank Paper 179) <<http://documents.worldbank.org/curated/en/785881468336848695/Petroleum-exploration-and-production-rights-allocation-strategies-and-design-issues>> accessed 16 August 2017.

countries get their major return through taxes on the profits produced by the licensee, and through other fiscal measures, such as royalties and indirect taxes. The fiscal systems of Australia, Norway and the UK will also be compared to see what impact those systems have on the management of the resource. There are ways in which states can use the fiscal system to stimulate activity and improve some of the risks faced by the companies; for example by providing tax relief to a company for exploration expenditure that it is not able to set against profits.

1.008 A key factor in the relationship between the state and the companies is the competitive nature of the petroleum business; countries are competing to attract and retain companies to conduct these operations. Companies, unless they are nationally owned non-profit companies, are competing for opportunities to maximise their returns. A number of excellent books describe the commercial and legal relationship between the host country and the companies, and how a country can promote what it has to offer, but they do not deal in detail with resource management.¹⁰

1.009 Obtaining a financial return from production is a significant motivation for both host countries and companies, although expressed in different terms. On the company side this is demonstrated by an observation from one oil company executive, quoted as saying, 'we are all business people here. We are profitability driven at the end'.¹¹ Profit in a corporate sense is revenue less costs adjusted by relevant accounting principles to produce profit recorded in a company's accounts. Host countries tend to be preoccupied with sovereignty over their petroleum resources and then with their side of the profit distribution: that is pricing mechanisms which accurately value access to the resource and fiscal and other arrangements to capture for the country a share of the value realised by production.¹²

1.010 The petroleum legislation setting out the basis of this relationship can be divided into western style licence-based petroleum legislation

¹⁰ See for example Bernard Taverne, *Petroleum, Industry and Governments* (3rd edn, Wolters Kluwer 2013) (Taverne); Michael Bunter, *The Promotion and Licensing of Petroleum Prospective Acreage* (Kluwer Law International 2002) (Bunter); Ernest E Smith and others, *International Petroleum Transactions* (3rd edn, Rocky Mountain Mineral Law Foundation 2013) (Smith).

¹¹ The then chief executive of Shell, Mr Peter Voser, is quoted as saying this in relation to Shell's investment in Woodside. See *Australian Financial Review*, 29 May 2013, 40.

¹² See Thomas W. Walde's foreword to Bunter, vii.

and non-western style contract-based petroleum legislation.¹³ Although these different approaches have different underlying philosophies, which primarily has to do with non-western nations viewing the resource as being owned, and requiring development, by the nation,¹⁴ they have in common that the proceeds of production are split between the company and the country. In the non-western countries, this is generally done by the host country retaining ownership of the petroleum in the ground and the oil company being a contractor to it, getting a reward in the form of a share of oil produced. These are generally called ‘production sharing contracts’ (PSCs).

1.011 The way in which PSCs deal with petroleum resource management will be examined in Chapter 8, but the main focus of this book is licences. Licences confer ownership of the petroleum on the licensee with the state getting its return through taxes rather than a share of the petroleum. The time of passing ownership may vary between systems, but commonly it passes on production. What should be noticed here is that the conceptual difference becomes less significant when what happens to the production is considered. All parties are generally interested in turning the petroleum into money. In PSCs the contractor usually sells its share of production, but may be required to sell all the production under the terms of the PSC and pay the host country its share. With a licence the licensee also usually sells all of the production, but is then required to pay royalty and tax to the state.¹⁵ Hybrid arrangements exist that combine some of these elements; for example, a PSC regime could also have a royalty.

1.012 Licence-based systems and contract-based systems both involve a bargain between the state and the other party. The essence of a bargain comes out in one dictionary definition of a bargain as ‘an agreement on terms of give and take’.¹⁶ Why allocation systems of offshore petroleum represent a bargain is apparent from the ‘give and take’ elements. Traditionally the oil companies are given exclusive exploration and production rights over a defined area by the state on the basis that they bear the direct costs of exploration and production within that area. They also

¹³ Taverne, xxii and see further 2.018.

¹⁴ *Ibid.*, 238.

¹⁵ If licensees or their related entities sell a refined or other value-added product this is likely to involve valuation and transfer-pricing issues under the tax system of the producing state.

¹⁶ *The Concise Oxford Dictionary* (4th edn, Clarendon Press 1956); definition of ‘bargain’.

agree to bear certain incidental costs such as pollution and decommissioning and to be responsible for safety. The oil companies take those exclusive rights and also rights over the petroleum they produce, or a share of it. They give back to the state agreed exploration and other work and tax on their profits on the petroleum. Companies play a separate and vital role in managing the resource in their allocated area, generally with a view to the most profitable production.

1.013 This simple description makes the bargain seem uncomplicated. But this book will seek to clarify two factors that make for complexity. The first is the financial return from the bargain, or what might be termed the commercial interests of the parties. In the context of offshore petroleum negotiating satisfactory outcomes raises difficult issues, for example in relation to infrastructure use. These are contributed to by the second factor constituted by the special characteristics of petroleum. These characteristics are explained from 1.028. Importantly some of them create conflicts, or divergences, of interest between companies and between companies and the state which affect the financial returns. This means that regulation needs to play a special role. How that regulation is framed has important implications for the national interest and for the bargain. Making changes can affect the allocation of risk in the bargain.

REGULATION AND THE PURPOSE OF PETROLEUM RESOURCE MANAGEMENT

1.014 Regulation has become an increasingly important mechanism for managing the space within which society, the economy and the environment interact. This is recognised by the OECD in its 2014 publication *Best Practice Principles for Regulatory Policy: The Governance of Regulators* (OECD Regulation Governance).¹⁷ Regulation is significant in the offshore petroleum context with its origins in the concession and requirement for private capital to explore for and produce petroleum. Each of Australia, Norway and the UK has a regulator, and seeks to regulate petroleum activities through its petroleum legislation, regulations and licence terms.

¹⁷ *The Governance of Regulators* (Best Practice Principles or Regulatory Policy OECD Publishing 2014) 13.

1.015 The OECD Regulation Governance sets out a regulatory policy and governance framework. This suggests three elements required to produce good outcomes: (1) core policies; (2) actors, institutions and capacities; and (3) systems processes and tools.¹⁸ Each of these will be examined in this book. It is important that ‘the legislation establishing a regulatory scheme or framework should be written so that the purpose of the regulator and the objectives of the regulatory scheme are clear to the regulator’s staff, regulated entities and citizens’.¹⁹ The objectives of the resource management systems of Australia, Norway and the UK and their implementation and satisfaction are discussed throughout this book. This brings into consideration what can affect the outcomes sought, some of which are treated in this book as risks. There are a number of definitions of risk, but in this context what is relevant is what is affecting the outcome, that is the causative factor or factors, and then the magnitude of the effects.²⁰ The process of analysing these can be described as risk assessment, and of evaluating and implementing actions to reduce risk as risk management. Regulation is often relied on to address risks, for example risks of damage to the environment, which is also recognised by the OECD in its 2010 publication *Risk and Regulatory Policy Improving the Governance of Risk* (OECD Risk Governance).²¹ This is discussed in Chapter 3 from 3.051 in relation to regulation methodology.

1.016 To understand and evaluate resource management frameworks it is necessary to understand the concepts on which they are based, how the concepts affect the behaviour of licensees and the state and their role in the framework. Key concepts of petroleum resource management analysed in this book are inter-dependence, stewardship, good oilfield practice, efficient recovery and economic recovery. It is also necessary to set a base by explaining resource rent, how that is recovered through taxes, value versus recovery and some more general issues of regulation and accountability.

¹⁸ Ibid., 14.

¹⁹ Ibid., 30.

²⁰ Risk is defined in ISO 31000:2009 as ‘the effect of uncertainty on objectives’. International Organization for Standardization ISO 31000 < <https://www.iso.org/iso-31000-risk-management.html> > and by the Engineering Council in its *Guidance of Risk for the Engineering Profession* as ‘the possibility of an adverse outcome’ < www.engc.org.uk/engcdocuments/internet/Website/Guidance%20on%20Risk.pdf > both accessed 30 January 2018.

²¹ *Risk and Regulatory Policy Improving the Governance of Risk* (OECD Reviews of Regulatory Reform, OECD Publishing, 2010) 3.

1.017 The following quotation indicates some of the issues that need to be examined by a state designing the purpose of its petroleum resource management and the objectives to be achieved:

Mineral laws are man's device for administering his mineral inheritance, his once-only endowment. The ultimate test of the effectiveness of these laws is whether or not they bring about the maximum ultimate recovery of the resource, at the time when it is needed, and at costs which the contemporary economy can afford – in other words, maximum economic recovery, the maximum addition to the resource base of the host nation's economy.²²

1.018 A key issue which this book examines is how the effectiveness of the resource management system is to be judged. Effectiveness in this statement is judged by maximum recovery. Costs are looked at in terms of what the contemporary economy can afford, rather than lowest costs, or costs which mean that recovery is profitable for the oil company. There is no mention of socio-economic factors. The interests of future generations are not mentioned. All these are relevant considerations which will be discussed. This perhaps indicates that Ely's test is too narrow, but it also demonstrates that substantial change has occurred since 1970 when Ely was writing. For example the interests of future generations can be looked at now in the light of the 1989 definition of intergenerational equity that humans 'hold the natural and cultural environment of the Earth in common both with other members of the present generation and with other generations, past and future'.²³

COUNTRIES STUDIED

1.019 The approach of the book is to bring resource management to life by focusing on Australia, Norway and the UK. Some other countries will also be mentioned in relation to specific ideas; for example Angola, Brazil and Indonesia.²⁴ What makes Australia, Norway and the UK a good group to study is that they have a number of common elements apart from the use of a licensing system. They all have a significant off-shore petroleum resource and commenced production about 1970. Their

²² Northcutt Ely, 'Policy Considerations in the Development of Mineral Laws' (1970) 3 *Natural Resources Lawyer* 281, 282.

²³ Edith Brown Weiss, *In Fairness to Future Generations: International Law, Common Patrimony and Intergenerational Equity* (Transitional Publishers 1989) 8.

²⁴ See Chapter 8.

- Australia Commonwealth: Minister for Resources and Northern Australia,²⁸ his responsibilities being served by the Department of Industry Science and Tourism (the department is referred to as ACDOJ);
- Norway: Minister for Petroleum and Energy (the ministry is referred to as NMPE);²⁹ and
- UK: Minister for Business, Energy and Industrial Strategy (the ministry is referred to as MBEIS).³⁰

1.023 In Australia and Norway the minister has responsibility for the administration of the licensing act. The minister referred to in relation to Australia is the federal minister: Australia is the only one of the three countries to be a federation, and this produces complexities. One of these is that the states and territories play a role in management of the resource offshore through the involvement of the relevant state or territory minister in a body called the Joint Authority. They also have control of the resources on their land area and the first three nautical miles of the sea. The position in the UK changed in 2016 when the minister's powers were largely delegated to the Oil and Gas Authority (OGA), although the minister retains responsibility for environmental matters and decommissioning.

1.024 In each country there is also a body, or in the case of the UK a government-owned company, which has administrative responsibilities in connection with licences or licensing, although it may also have decision-making power in certain areas. These are:

- Australia: National Offshore Petroleum Titles Administrator (NOPTA or Titles Administrator);
- Norway: Norwegian Petroleum Directorate (NPD); and
- United Kingdom: OGA.

²⁸ As at 22 June 2018 this was Senator Matt Canavan. The Minister is the Minister for Resources and Northern Australia, but as his portfolio responsibilities are served by the Department of Industry Science and Tourism that department is referred to.

²⁹ As at 22 June 2018 this was Terje Soviknes.

³⁰ As at 22 June 2018 this was the Right Honourable Greg Clark MP. His title is actually Secretary of State, which position he holds as a member of the Cabinet responsible for a department. Generally the expression 'minister' will be used in this book rather than 'Secretary'.

1.025 The other main actors in petroleum resource management are the companies which are licensees. Commonly there will be several companies in an unincorporated joint venture who are the licensees. The composition of the licensees has changed over the last 50 years. There has also been a significant increase in the number and power of nationally owned oil companies and greater diversity in the others. Chapter 4 examines these changes.

1.026 Each of Australia, Norway and the UK has a single statute applying a licensing system to offshore petroleum. Petroleum is typically defined in this to include all hydrocarbons in their natural state.³¹ In some cases, coal and similar minerals are excluded.³² The statutes are:

- Australia: Offshore Petroleum Greenhouse Gas and Storage Act 2006 (Commonwealth)(AOPGGSA);³³
- Norway: Petroleum Act 1996 (NPA);³⁴ and
- UK: Petroleum Act 1998 (UKPA).

1.027 In addition each of Australia and Norway has a set of regulations which deal with important aspects of licensing and the regulation of petroleum activities, for example field development plans and reporting of activities. These are for Australia the Offshore Petroleum Greenhouse Gas and Storage (Resource Management and Administration) Regulations 2012 (ARMAR) and for Norway the Petroleum Regulations 1997 (NPR). The UK took a different approach, which was to include model clauses in licences to deal with matters covered by ARMAR and NPR. The current model clauses are set out in the Petroleum Licensing (Production) (Seaward Areas) Regulations 2008, SI 225/ 2008 (UK) and are referred to here as Model Clauses or MC.

³¹ The Petroleum Act 1996 (Norway) ss 1–6 defines it as ‘all liquid and gaseous hydrocarbons existing in their natural state in the subsoil, as well as other substances produced in association with such hydrocarbons’. See also Offshore Petroleum Greenhouse Gas and Storage Act 2006 (Commonwealth) s 7 and Petroleum Act 1998 (UK) s 1.

³² Petroleum Act 1998 (UK) s 1.

³³ This started life as the Offshore Petroleum Act 2006, but was then extended to cover greenhouse gas storage, for which licences are also used and that can use depleted petroleum reservoirs. This amendment explains the current long title, but also why the petroleum licences are qualified by the word petroleum; for example petroleum production licence.

³⁴ Some writers describe it as the ‘Petroleum Activities Act’, as it is Act 29 November 1996 No. 72 relating to petroleum activities.

DIVERGENCE OF OBJECTIVES AND THE PROBLEM OF INTER-DEPENDENCE

1.028 The Wood Review uses the expression inter-dependence to describe the fact that in a mature basin fields depend on each other. The idea of inter-dependence lies at the heart of much of the discussion in this book. In the writer's view it is central to many of the problems in petroleum resource management and complexity in the bargain between licensee and state. So its meaning should be elaborated at the start. The essence of inter-dependence in this context is that performance depends on something outside the control of a licensee. Petroleum development and production involve multiple inter-dependencies. This may be expected in any complex endeavour, but offshore petroleum production has some special features that magnify these. Two particular features are fundamental because they relate to the special geology of petroleum and the means of production.

1.029 The first of these fundamental inter-dependencies arises when different licensees share a reservoir. There are three causes. The first is that rights to explore for petroleum, and produce any that is discovered, are divided up by mapped areas on the earth's surface. In Australia, Norway and the UK these areas are called licence areas and the holders are generally called licensees. The second is that petroleum systems under the seabed, called reservoirs, can extend into licence areas allocated to different owners. The third cause is that a particular feature of conventional petroleum is that reservoirs transmit fluids and are pressurised.³⁵ It means that petroleum will move through a reservoir to a well puncturing it because the well bore creates an area of lower pressure. This is an important point of difference from the hard rock minerals such as iron ore, which do not move. Reservoir pressure is itself an important resource as it enables easier and lower-cost production of the petroleum.

1.030 Petroleum reservoirs frequently occur in sedimentary basins at continental margins as a result of plate tectonics, which is explained in

³⁵ The Schlumberger oilfield glossary defines reservoir as 'a subsurface body of rock having sufficient porosity and permeability to store and transmit fluids. Sedimentary rocks are the most common reservoir rocks because they have more porosity . . .', and reservoir pressure as 'the pressure of fluids within the pores of a reservoir, usually hydrostatic pressure, or the pressure exerted by a column of water from the formation's depth to sea level'; see Schlumberger, 'Oilfield Glossary' (2017) <<http://www.glossary.oilfield.slb.com/>> accessed 14 August 2017.

detail in books on petroleum geology.³⁶ In summary, hydrocarbons were created from plants and animals washed down into these basins and buried under sedimentary deposits. As a result of pressure, temperature and bacterial action they were converted into oil and gas molecules compacted into strata of shale, sandstone and limestone. In the evolutionary process the earth's crust buckled and fractured creating reservoir traps made up of porous and permeable rocks like sandstone.³⁷ Compaction and cementation of subsequent layers on top sealed these traps over time. If hydrocarbons migrated from their original source rocks into these traps as a result of these pressures, then commercial deposits of petroleum were created.

1.031 Conventional petroleum reservoirs consist of rocks like sandstone with reasonable porosity and permeability. This means that the pore spaces in the rock can contain hydrocarbons, and that those pore spaces allow fluids or gas to flow through them. If these reservoirs are pressurised, and assuming the hydrocarbons are of a low viscosity so that they can flow, then a well penetrating the reservoir creates a point of low pressure, and hydrocarbons move into that space, followed by others moving into the voided pore space. Typically with an oil reservoir the causes of this pressure are called drives, and can also be referred to as reservoir energy. There are three main drives: dissolved gas drive, gas-cap drive and water drive. The first two rely on gas dissolved in the oil or between the oil and the ceiling of the reservoir. With water drive the pressure usually arises with the encroachment of water from below. Where a reservoir contains gas, the basic drive is the gas itself, as gas will expand as pressure is released by a well.

1.032 To locate a possible reservoir a licensee will have to do seismic and other work. When the licensee drills a well that penetrates a reservoir that well must first go through other strata to get to the reservoir, the number depending on geology and the depth of the reservoir below the seabed. Until the well is completed by metal casing cemented into the reservoir to prevent leakage and has the necessary control valves in place, the licensee will have to use the counter-pressure of drilling fluids in the well bore to prevent the escape of hydrocarbons to the surface.

³⁶ For example Richard C Selley, *Elements of Petroleum Geology* (2nd edn, Academic Press 1998). See also Stephen L McDonald, *Petroleum Conservation in the United States: An Economic Analysis* (The Johns Hopkins Press 1971) 9 (McDonald).

³⁷ The most common are anticlinal, fault-sealed and stratigraphic.

1.033 Where a reservoir crosses more than one licence area a geological inter-connectivity exists between them. This is because hydrocarbons can move from one licence area to a well in the licence area next to it, which is particularly likely if the well is close to the boundary. Hence inter-dependence arises. What a licensee is able to produce, that is how it performs in production, will depend on the behaviour of the other licensee sharing the reservoir. For example the other licensee can drain the first licensee's part of the reservoir by being first in production with a well close to its boundary with the first licensee. What should also be noticed here is that most licence systems encourage competition between licensees sharing a reservoir by providing that a licensee gets title to the petroleum it produces in its licence area, irrespective of where it comes from. This is called the rule of capture, which was developed in the US.³⁸

1.034 The rule of capture creates an incentive for the second licensee to act to the disadvantage of the first licensee and vice versa. Also production declines over time and reservoir pressure is likely to be strongest for early production. Licensees have an incentive to compete to extract the greatest amount of petroleum at the earliest time. This creates a conflict of interests. A second source of conflict is the use of reservoir energy. Not only can poor use of reservoir energy disadvantage one of the licensees, it can damage overall recovery. For each reservoir there is a maximum rate of production at each stage of depletion consistent with the fullest use of reservoir energy. A higher rate will result in some avoidable reduction in overall recovery from the reservoir.³⁹

1.035 What this illustrates is inter-dependence at the reservoir level when reservoirs are shared between licence areas or a reservoir in one licence area is connected with a reservoir in another. There is a divergence of interests, and therefore of objectives, between the licensees sharing the reservoir. Another way to describe it, more commonly used by lawyers, is as a conflict of interests. It also creates a divergence, or conflict, of objectives between the licensees and the state. Each licensee will focus

³⁸ See cases like *Eliff v Texon Drilling* (1948) 146 Tex 575 and *Barnard v Monongahela Natural Gas Co* (1907) 216 Pa 362.

³⁹ McDonald, 19. This is discussed further in Chapter 6 in relation to 'efficient recovery'. The view is expressed by Daniel Johnston and David Johnston that with conventional black oil reservoirs there is not a strong correlation between rate of extraction and ultimate recovery; see Daniel Johnston and David Johnston, 'Maximum Efficient Production Rate' (CEPMLP Paper CP3/02, Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee 2002) 4.

on production from its licence area, as that is the area over which it has rights. The state, on the other hand, will want to optimise recovery from all the areas it has allocated to licensees. The reasons include increased production overall, but also economic benefits, such as employment, through increased activity. To optimise overall recovery the state can seek to make the best use of reservoir pressure. This can be done in various ways, including unitisation.⁴⁰

1.036 A second fundamental inter-dependence arises because a large and expensive part of the production of offshore petroleum is the provision of the required wells, subsea pipelines, platforms, treatment and storage facilities, worker accommodation and other infrastructure and facilities. The word ‘infrastructure’ will generally be used in this book to encompass both infrastructure and facilities. Inter-dependence in this context arises most obviously because projects sharing infrastructure are dependent on that infrastructure. But the inter-dependence also has an economic significance because effective use of infrastructure, for example through joint development, reduces the cost of production and should increase financial return. Joint development or access to existing infrastructure can allow smaller fields, where the expense of new infrastructure would not be justified, to go into production.

1.037 Neither companies nor states want production to destroy value by making losses – say if the costs of production exceed petroleum sale proceeds. This leads to a focus by some states on ‘economic’ recovery. The meaning of economic recovery is explored in Chapter 6. For companies it is important for its relationship with profitability. For states it is relevant to maintaining the level of petroleum activity and also their financial return. Loss-making production does not generate tax revenue and losses can also reduce it if they can be offset against profits from profitable fields, other businesses or tax paid. Ongoing economic production is also relevant to attract companies to conduct petroleum operations, which sustain employment and other benefits for the state.

1.038 The state’s attempts to make more effective use of infrastructure can give rise to conflicts. For example, if the state wants a licensee to spend money to maintain existing infrastructure to enable others to use it, that will involve the first licensee in additional expense which can reduce its profitability. Those wanting access to the infrastructure can

⁴⁰ This is discussed at 6.045 in relation to ‘efficient recovery’.

recompense the first licensee, but they will often have different views as to the amount.

1.039 The main conclusion to be taken from this section is that when private capital is used to produce petroleum under a bargain with the state, which gives companies exclusive rights over defined areas, this gives rise to conflicts of interest (or divergences) between companies with rights in different areas and also with the state. Importantly also, if the objectives of the state include deriving financial returns from the production of the petroleum these conflicts represent risks which can affect that return. We can note in passing that these risks also affect the licensee's return. The research for this book was based on a working hypothesis that divergence between the objectives of the state and licensees has become more apparent as offshore fields have matured. One important reason is that inter-dependence between developments in different licence areas has become clearer with increasing geological understanding of reservoirs. Other reasons are that over time more infrastructure has been built and discoveries in mature fields tend to be smaller, which means they need access to that infrastructure. The correctness of this hypothesis has been confirmed by the reviews mentioned at 1.002 and the interviews conducted. This simply means that it is increasingly important for states to address the issues presented by these conflicts.

CHAPTER OVERVIEW AND GUIDE TO COUNTRIES

1.040 The approach of this book is to:

- explain the basic principles of licensing (Chapter 2);
- describe the regulatory structure and regulators of the three countries and applicable regulation methodology (Chapter 3) and then the companies who are the other main actors in petroleum resource management (Chapter 4);
- explain resource rent, recovery versus value and stewardship (including the way in which MERUKS (see 1.052) deals with stewardship) (Chapter 5). Chapter 6 looks at the role of economic tests in petroleum resource management and analyses economic recovery, efficient recovery, good oilfield practice and prudent production (prudent production is used in the Norwegian system);
- examine the role of resource management policy and how it varies between the selected countries (Chapter 7);
- examine any critical differences in approach to petroleum resource management in production sharing contracts (Chapter 8);

- explore in more detail the approach to resource management used by regulators in the selected countries in the phases of the upstream petroleum cycle. Chapter 9 goes through the initial phases from the release of acreage for exploration through to the selection of licenses and the conduct of exploration and appraisal. Chapter 10 deals with development and Chapter 11 deals with the production phase;
- compare controls over infrastructure, focusing on the preservation of required infrastructure, joint development of infrastructure and third-party access to existing infrastructure (Chapter 12); and
- set out the book's conclusions on the future of offshore petroleum resource management (Chapter 13).

1.041 The licensing and resource management systems of Australia, Norway and the UK have common features. But since their creation in the 1960s differences have developed in both the approaches and concepts applied. A sense of the differences is given by the brief outline from 1.042 to 1.044. This is also a guide to where particular features are dealt with, which may be of interest to readers looking at a particular country or idea.

1.042 Australia is the only one of the three countries which is a federation, and this has had a significant impact on its licensing system. Its impact on the regulatory structure is explored from 3.016. The Australian system places significant reliance on optimum long-term recovery (6.011) and good oilfield practice (6.054). The policy of the Australian Government towards petroleum exploration and production has been expressed with very broad objectives like that in the 1990 policy framework: 'to maintain and enhance the contribution of the offshore petroleum industry to rising national prosperity' (modern policy is dealt with from 7.030).⁴¹ A major focus of the Australian system is to create a regime for oil companies to explore and produce so development occurs.⁴² It does not incorporate social values or specific economic objectives.

1.043 Norwegian petroleum policy incorporates social values, which are then translated into the legislation. The legislation states that petroleum

⁴¹ Department of Primary Industries and Energy, *Offshore Strategy: Promoting Petroleum Exploration Offshore Australia* (1990) 1.

⁴² These ideas are brought together at AOPRMR Review, 1 where it states 'While the regime is based on optimising resource recovery through timely commercial development, it also provides for effective long-term management of Australia's petroleum resources through the application of good oilfield practice and the principles of safe and sustainable development'.

resource management will be carried out 'in a long-term perspective for the benefit of the Norwegian society as a whole'.⁴³ This book describes this as the Society Benefit Principle. It is accompanied by two other high-level principles which this book calls the State Control Principle and the Prudent Production Principle, which are then elaborated in more detailed rules. These principles indicate that the Norwegian system has clear objectives. The State Control Principle reflects a high degree of state intervention in resource management, which contrasts with the position in Australia and, until recently, the UK. How those principles developed is explored in terms of regulatory structure from 3.029 and in policy terms at 7.013 and 7.070. The Prudent Production Principle is dealt with from 6.071. The degree of state intervention comes through in areas like assessment of applications for licences (from 9.049) and development approval (10.027).

1.044 The UK system does not incorporate social values. As explained in the next section its licensing system now has a central focus on maximising economic recovery of UK petroleum. This change has brought significant developments in stewardship (from 5.069), the meaning of economic recovery and what might be expected by a licensee as a satisfactory commercial return (from 6.023), benchmarking operator performance (from 11.025) and powers of enforcement (3.084 and 11.045).

MAXIMISING ECONOMIC RECOVERY OF UK PETROLEUM

1.045 This section introduces some of the thinking behind the recent overhaul of the system in the UK. There are several reasons for introducing it here. First, it represents a possible blueprint on how to manage a mature oil and gas province.⁴⁴ Secondly, it represents a very significant shift in thinking on petroleum resource management in systems based on concessions. It is radical because it seeks to get licensees to focus on the UK's economic interests as well as their own. It represents a striking

⁴³ Norwegian Petroleum Act 1996 ss 1–2 is set out in full at 7.044. It requires that 'resource management shall provide revenues to the country and shall contribute to ensuring welfare, employment, as well as the strengthening of Norwegian trade and industry and industrial development'.

⁴⁴ Oil and Gas UK, *Economic Report 2016* (The UK Oil and Gas Industry Association 2016) 76 <<https://cld.bz/bookdata/6GmHgP/basic-html/page-1.html>> accessed 16 August 2017.

contrast to the previous approach which was generally focused on the individual licence area rather than regional or national issues.⁴⁵ Thirdly, it illustrates one way to try to resolve the problems of inter-dependence and conflicts of interest mentioned from 1.028. The first step is for a state to see that there are divergences which require the national interest to be protected. The next step is to introduce a mechanism to do that.

1.046 The first step was the Wood Review in 2014. It identified six key issues:

- i. the need for operators to focus on maximising economic recovery for the UK as well as pursuing their individual commercial objectives;
- ii. the need for fiscal stability consistent with the challenges of maturity;
- iii. the need for a greater resourced and more proactive regulator;
- iv. the need for significantly improved asset stewardship;
- v. the need for far greater constructive collaboration between operators; and
- vi. the need for better implementation of industry strategies.⁴⁶

1.047 The Wood Review recognised divergence of interests, and that there is a national interest to protect, in stressing that operators had pursued individual commercial objectives in isolation, with limited obligation to maximise recovery across fields or make the most efficient use of infrastructure by sharing it. The mechanism proposed in the Review to protect the national interest lay in its primary recommendation for a new tripartite approach requiring industry, treasury and a new regulator to develop and commit to a new strategy for maximising economic recovery from the UKCS. The review also commented that ‘the problem the Review has identified will be largely resolved by evolving the model to introduce a stronger regulator with broader skills and capabilities able to significantly enhance the level of coordination and collaboration’.⁴⁷

1.048 The government response seized on the fact that the Wood Review identified that full and rapid implementation of its recommendations ‘could deliver 3–4 billion barrels of oil equivalent more than would otherwise be

⁴⁵ This is made as a statement of the general position. There are exceptions provided through the model clauses applicable to licences, which will be discussed in later chapters; for example, the criteria for approval of field development programmes and plans.

⁴⁶ Wood Review, 5.

⁴⁷ Ibid.

recovered over the next 20 years, worth over 200 billion pounds' which meant that the minister was prepared to commit to rapid implementation.⁴⁸ This was followed by an impact assessment of implementation of the Wood Review proposals estimating extra revenues of £32.8 billion from oil and gas production and £8 billion of additional revenue from a reduction in production costs. Costs of implementation were estimated at £160 million on a net present value basis, which costs related to better resourcing a regulator and industry engagement with that regulator.⁴⁹

1.049 The next step of introducing a mechanism to deal with divergence had several elements. Section 41 of the *Infrastructure Act 2015* (UK) (UKIA) inserted a new section 9A into the UKPA. This required the Secretary of State to produce one or more strategies to enable the principal objective to be met. The 'principal objective' is defined as 'the objective of maximising the economic recovery of UK petroleum'.⁵⁰ UK petroleum is defined as 'petroleum which for the time being exists in its natural condition in strata beneath relevant UK waters'.⁵¹ The UKIA also provided for the financing of the relevant regulatory costs by a levy on the industry.

1.050 UKPA section 9C requires the parties listed in section 9A(1)(b), known as the MER Parties to act in accordance with the current strategy

⁴⁸ The Hon Ed Davey Secretary of State for Energy and Climate Change, *Government Response to Sir Ian Wood's UKCS: Maximising Economic Recovery Review* (Department of Energy & Climate Change July 2014) 4 <https://www.ogauthority.co.uk/media/1018/wood_review_government_response.pdf> accessed 24 November 2017.

⁴⁹ DECC, *Implementation of the Wood Review proposals for UK Offshore oil and gas regulation* (Impact Assessment (IA), 5 September 2014) 3 (Wood Review IA) <<https://www.gov.uk/government/publications/implementation-of-the-wood-review-proposals-for-uk-offshore-oil-and-gas-regulation>> accessed 20 November 2017.

⁵⁰ UKPA s 9A(1) which goes on to say:

in particular through: (a) development, construction, deployment and use of equipment used in the petroleum industry (including upstream petroleum infrastructure), and (b) collaboration among the following persons (i) holders or petroleum licences; (ii) operators under petroleum licences; (iii) owners of upstream petroleum infrastructure; and (iv) persons planning and carrying out the commissioning of upstream petroleum infrastructure.

By virtue of UKPA s 9(A)(3) these do not limit what a strategy may cover.

⁵¹ Relevant UK waters are defined in UKPA s 9I as: '(a) the territorial sea adjacent to the United Kingdom; and (b) the sea in any area designated under section 1(7) of the Continental shelf Act 1964. . . .'

when planning and carrying out activities in their stated capacity. The MER Parties, and their capacity, include the holder of a petroleum licence, the operator under a petroleum licence, the owner of upstream petroleum infrastructure and those planning and carrying out commissioning of upstream petroleum infrastructure.⁵²

1.051 The Energy Act 2016 (UK) (UKEA) established the OGA as a government-owned company, specified its general objectives and provided for the transfer to it of the new powers under the UKIA and the minister's powers to grant and administer licences.⁵³ It also made the OGA responsible for developing and applying the strategy.⁵⁴

1.052 A strategy (which this book calls MERUKS)⁵⁵ was introduced containing a central obligation that 'relevant persons must, in the exercise of their relevant functions, take the steps necessary to secure that the maximum value of economically recoverable petroleum is recovered from the strata beneath relevant UK waters'.⁵⁶ Relevant persons are the OGA and the MER Parties. MERUKS came into force in March 2016. The strategy sets out that it is drafted 'in accordance with section 9A(2) of the Petroleum Act 1998, to enable the principal objective established in that section to be met. To that end it sets out a Central Obligation binding on relevant persons (including the OGA)'.⁵⁷

1.053 Importantly MERUKS contains obligations other than the central obligation. UKPA section 9C requires the MER Parties to comply with the strategy which means these other obligations are binding as

⁵² Upstream petroleum infrastructure is defined in UKPA s 9H as meaning a gas processing facility, oil processing facility and upstream petroleum pipeline as further defined in s 90 of the Energy Act 2011 (UK).

⁵³ This received the Royal Assent on 12 May 2016. The OGA did not become an independent government company until 1 October 2016.

⁵⁴ By amending UKPA s 9A. See UKEA Sch 1.

⁵⁵ MERUKS refers to *Maximising economic recovery of UK petroleum: the MER UK strategy* (18 March 2016 OGA Publication) <<https://www.ogauthority.co.uk/news-publications/publications/2016/maximising-economic-recovery-of-uk-petroleum-the-mer-uk-strategy/>> accessed 29 January 2018.

⁵⁶ The draft strategy was laid before Parliament for scrutiny on 28 January 2016, and since neither House passed a negative resolution against the draft, it was produced (came into force) on 18 March 2016; see Oil and Gas Authority, 'MER UK Strategy' (Last updated 1 October 2016) <<https://www.ogauthority.co.uk/regulatory-framework/mer-uk-strategy/>> accessed 29 January 2018.

⁵⁷ MERUKS, 6.

well. MERUKS puts it on the basis that ‘in order to secure the effective delivery of the Central Obligation, this Strategy also sets out Supporting Obligations and Required Actions and Behaviours, which are as binding as the Central Obligation’.⁵⁸ The supporting obligations cover exploration, development, asset stewardship, technology and decommissioning. Required actions and behaviours refer to obligations being complied with in a timely fashion, collaboration, cost reduction and the consequences of not ensuring maximum economic recovery. The latter incorporates a ‘use it or lose it’ approach, meaning that relevant persons are expected to divest themselves of licences or assets where they decide not to ensure maximum economic recovery from their licences or infrastructure.⁵⁹ There are safeguards in MERUKS which are important protections against this use it or lose it approach.⁶⁰

1.054 There are a number of important themes in MERUKS which will be discussed in subsequent chapters. These include the development of stewardship, the development of economic and other tests and safeguards and the role of the regulator in resolving disputes. An important element is the role of the central obligation as a means of protecting the national interest by dealing with the divergence of interests mentioned earlier. It can be described as a national interest protection device, or mechanism. It works by requiring relevant persons, such as licensees, to focus on ‘maximising economic recovery for the UK as well as pursuing their individual commercial objectives’.⁶¹ They must focus on the region rather than just an individual licence area.⁶²

CONVENTIONAL AND UNCONVENTIONAL PETROLEUM

1.055 This book will generally use the word ‘petroleum’ to mean both oil and gas. To describe one or the other specifically, ‘oil’ or ‘gas’ will be used. Petroleum consists of, and is often defined in petroleum legislation

⁵⁸ Ibid.

⁵⁹ Ibid., 13.

⁶⁰ Ibid., 7.

⁶¹ Wood Review, 5.

⁶² Oil and Gas Authority, *The Maximising Economic Recovery Strategy for the UK: Impact Assessment* (28 January 2016) para 14 (MERUKS IA) <https://www.ogauthority.co.uk/media/1043/20160308_-_mer_uk__strategy_-_impact_assessment_-_signed_by_minister.pdf> accessed 20 November 2017.

as, hydrocarbons. Hydrocarbons are in compounds. The simplest form is methane (consisting of four hydrocarbon atoms bound to one carbon atom), which at atmospheric conditions is what natural gas normally consists of. More complex compounds consist of heavier gases, such as ethane, propane and butane. Then there are liquids, such as hexane and octane, and finally solids, such as bitumen.

1.056 The focus of this book is offshore conventional petroleum. The reason is twofold. First, that it is the most economically important production of the selected countries. Secondly, there are many differences in the geological, engineering, commercial, financial and legal issues between onshore and offshore conventional petroleum and unconventional petroleum. Widening the book out to cover onshore petroleum and unconventional petroleum would make it too long. For the same reason there will be little focus in this book on decommissioning because it is a vast topic on its own, not only because of what decommissioning involves, but also because of liability issues.