



Petroleum, Industry and Governments

A Study of the Involvement of Industry and
Governments in Exploring for and Producing Petroleum
Third Edition

By Bernard Taverne



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Sources

The following sources have been used:

- (a) Original legal documents belonging to the public sector, such as Conventions, Treaties, Protocols, Laws, Acts, Regulations, model contracts, model clauses for licenses and Petroleum Agreements, in the form as found in official publications of national governments or international organizations (State Gazette, Official Gazette, Official Journal, etc.); or as placed in original language or after translation into English, on websites of the internet by national government Ministries or Departments, the European Union, the United Nations, or by private sector entities;
- (b) In respect of statistical information presented in the Tables and throughout the text:
 - (i) BP Statistical Review of World Energy 2007 / 2009 / 2012
 - (ii) World Energy Outlook 2012, a publication of the International Energy Agency, Paris, France;
 - (iii) Statistical Pocketbooks, publications of the European Commission;
 - (iv) Middle East Economic Survey (MEES);
 - (v) US Department of Energy's Energy Information Administration (EIA);
 - (vi) OPEC Brief; and home page (internet) of the Organization of Petroleum Exporting Countries (OPEC).
- (c) In respect of information on scientific, technical, historical and government policy facts and matters:
 - (i) IPCC WG I Assessment Reports 1990-2007;
 - (ii) Energy Technology Perspectives 2010 / 2012, publications of the International Energy Agency, Paris, France;
 - (iii) Information placed by institutions, government organizations, interested parties, etc. on the website of Wikipedia, the free encyclopedia;

- (iv) Policy Papers and Annual Reports of the European Commission;
- (v) Robert Peele's Mining Engineers' Handbook, volume I;
- (vi) Petroleum Resources Assessment Reports of the US Geological Survey (USGS);
- (vii) Journals and Newspapers of internationally recognized reputation;
- (viii) Science publications, such as *Nature* and *Science*.

Preface to the First Edition

Petroleum, Industry and Governments describes and discusses the main aspects of the involvement of industry and governments with the production and use of petroleum. Within this setting this book gives an account of the technical and environmental aspects of the production of oil and natural gas, and the latter's position and function in the economy. It reviews government policies and attitudes towards petroleum and national and international regulation of onshore or offshore petroleum operations, including petroleum taxation. The book describes the development and working of the oil and natural gas markets, the cost of supply and the establishment of producer prices. Attention is paid to the internationalization of the extractive industry, the way this industry is organized and the old and new forms and manifestations of political risk, with which this industry has to cope. In addition this book contains a special chapter on production economics and the final chapter is devoted to the main forms of inter-company production agreements (joint ventures and unitization agreements). This book elaborates on the subjects described and discussed in the author's 'Introduction to the Regulation of the Petroleum Industry (Laws, Contracts and Conventions)' (first published 1994) and 'Cooperative Agreements in the Extractive Petroleum Industry' (first published 1996). However, this book is not merely an updated version of the earlier publications. Here, the occasion has been utilized to expand the scope of the discussion by paying attention to the value of petroleum for the economy and to its other economic aspects. As a result of this extension into the field of economy and economics, it is believed that this book is of special importance and interest to petroleum venture managers, as well as for independent consultants and other professionals with a commercial business background who are required to give advice with respect to the economic, regulatory and cooperative aspects of petroleum operations. In writing this book, the author has drawn on a total thirty-seven years' experience with the technical, economic and legal aspects of the international petroleum industry acquired during employment with the Royal Dutch/Shell Group, as well as his appointment as part-time professor at the Delft University of Technology.

The book is based and relies on original material consisting of the officially or otherwise published texts of laws, contracts, etc., official statements and policy documents and further on statistical data as made available to the public by international organizations and institutes, by international oil companies and trade journals.

Leidschendam, The Netherlands
April 1999

Preface to the Second Edition

In the year 2000, just one year after the publication of the first edition (1999), the global oil market reached a turning point. Against all expectations, predictions and growing concerns about climate change, the demand for oil started to rise quite steadily in response to an expanding world economy. From the years 2000 to 2006, world consumption increased from 76.3 million b/d to 84 million b/d. Over this period, China's oil consumption rose from 4.8 million b/d to 7.4 million b/d, even overtaking Japan thereby. International prices reacted more sharply, in particular after 2005 the price reached spectacular levels: in November 2007 Brent Dated was nearing the USD 100/b mark. To put the matter in its proper perspective, exactly the same crude had in 1998 been priced at USD 12.72. Even when correcting for the current weakness of the US dollar, this is an astonishing development. Nonetheless in the first quarter of 2008, these trends continued. In the last part of said quarter, the Brent price regularly exceeded USD 100/b in line with a further weakening of the US dollar. The world's annual consumption of natural gas also increased over the period: from 2,428 billion cubic metres in 2000 to 2,851 billion cubic metres in 2006. In light of these trends, the second edition undertook a new attempt, using the latest available information about future consumption, available reserves etc., to try to estimate the time that is left to the world economy before the oil and natural gas reserves are exhausted and practicable and acceptable alternatives must have been found to replace them. It is further investigated whether such alternatives exist.

Next to worrying about the prices of petroleum and the lifetime of the reserves, governments had to focus their attention on CO₂-emissions caused by the use of oil and natural gas and to make a start with taking measures and formulating policies which should help or which were thought to be necessary to reduce said emissions and so to fulfil the commitments accepted by them in this regard under the Kyoto Protocol (effective 16 February 2005). The often conflicting policy options open to governments and the consequences, if any, for both oil and natural gas and the petroleum industry are reviewed and discussed.

In the intervening years, governments have been active in further developing petroleum legislation although the changes introduced have not led to any significant difference with the systems and provisions described in the first edition. Nonetheless, legislation or contracts referred to and

presented in the first edition as examples of 'current' legislation or contracts have been kept still 'current' by including in the second edition any changes and additions that were found to have been made thereto over the last years.

Finally, the text of the second edition has been restructured, subjects have been rearranged in different chapters, the chapter 'on Government Policies' has completely been rewritten and the chapter 'on Production Economics' has been deleted and replaced by a new chapter 'on Charters and Interstate Agreements'. To the latter, a description and discussion of the 1959 Treaty on Antarctica and its Protocol of 1991 have been added.

Leidschendam, The Netherlands
April 2008

Preface to the Third Edition

In sharp contrast to the globally expressed concern about the emission of CO₂ stemming from the burning and combustion of the fossil fuels and the drive to establish by 2020 an universal Climate Agreement with binding commitments for all participants to reduce or even eliminate all such emissions, the demand for petroleum, next to coal an important constituent of the fossil fuels, is robust and is projected even to increase in the coming decades.

It is clearly expected by all parties concerned that future Government policies and measures taken within the framework of the intended Climate Agreement will not lead to a serious curbing of such demand. Apparently it is left to the markets to put a brake on excessive consumption.

For this surprising situation there are very good reasons. In the first place, there are no realistic, practical or cost-effective alternatives for petroleum in all those sectors of the economy which currently depend on petroleum as source of supply of either energy or feedstock. Trying to curb such supply (apart from taking measures to prevent wasteful behaviour or spillage) will have a very negative effect on all those sectors and on the economy at large as well.

In the second place, natural gas itself will serve as an alternative, namely as an alternative for coal in the power sector, not only on account of the fact that natural gas much better scores on the CO₂-emission table than coal but also because there are, in the absence of nuclear energy, not enough other reliable non-fossil alternatives available. Under these circumstances the consumption of natural gas may even be stimulated by Governments.

Given a continuing robust or even steadily increasing demand for oil as well as for natural gas, the question arises whether the petroleum industry is able to satisfy this demand and for how long.

As shown in this third edition, the projected total of remaining recoverable reserves (including proved reserves) amount for oil to 5,871 billion barrels. Whereas proved reserves at the end of 2011 are estimated to amount to 1,653 billion barrels, it follows that an impressive 4,218 billion barrels are waiting to materialise, as a result of making new discoveries and extending existing reserves.

The same applies to natural gas for which the reserves figures are respectively 790 tcm, 208 tcm and 582 tcm.

For both oil and natural gas these are staggering figures and it shows that in order to make these figures real, intensive exploration and application of sophisticated production techniques are called for, many times in extreme areas (deep water, Arctic) and/or under extreme conditions.

Given that current yearly rate of oil production amounts to about 31 billion barrels and the yearly rate of gas production to 3,3 tcm, it shows that there is enough scope for much bigger yearly rates of production and for an extended period of time. But then, all this oil and gas might not be needed in the end.

For the moment however any new discovery of oil or natural gas in any country, whether already producing oil or natural gas or not, may count on a warm welcome by the Government concerned and the general public.

This brings into focus the importance of modern petroleum legislation in which the interests of Government and petroleum industry are neatly balanced and the importance of workable agreements of co-operation which allow the industry to combine forces to undertake the aforesaid exploration and production efforts.

As before in the second edition, petroleum legislation is divided into western style, licence-based petroleum legislation on the one hand and non-western style, contract-based petroleum legislation on the other. But within this framework new legislation has been added. Since Governments of non-western countries tend to favour the production sharing contract almost all attention has been focused on this type of contract.

But petroleum legislation, Treaties, Conventions, Declaration, etc. that have slowly lost their relevance for petroleum (operations) and are now mainly of historic interest have been deleted. No longer are described: the 1959 Treaty on Antarctica and 1991 Protocol; the New International Economic Order, and the 1974 Charter of Economic Rights and Duties of States belonging thereto, although it should never be forgotten that the latter must be seen as the legal fundament of the contract-based petroleum legislation. Other changes in this context: the European Energy Charter and Charter Treaty are just referred to in passing, "International Regulation of Offshore Petroleum Operations" has been restricted to a description and discussion of the Convention on the Law of the Sea and of OSPARCON; Dumping Conventions have been deleted.

All statistics and projections regarding reserves, production and consumption of oil and natural gas have been updated.

Leidschendam, The Netherlands
September 2013

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