

# **THE GLOBAL OIL & GAS INDUSTRY**

Management, Strategy & Finance

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# Preface

The oil and gas industry is one of the world's largest and most important global industries. In this book, we describe and analyze the global oil and gas industry with a focus on the strategic, financial, and business aspects of the industry. Our goal is to provide a single source for anyone interested in how the world's largest industry actually works: business executives, students, government officials and regulators, people working in the industry, and the general public.

A basic premise underlying the book is that despite the size and importance of the oil and gas business, there is a basic lack of knowledge about the industry. This lack of knowledge is surprising given how important the industry is in the global economy and how the industry touches our daily lives in so many ways. Although there are thousands of books written about the industry, most are technical guides with very narrow audiences, or populist diatribes on the coming end of society as we know it. Among the books that deal with the business side of the industry, many are written by technical experts for nontechnical readers, such as a nontechnical guide to refining or a nontechnical guide to petroleum geology. Our approach in this book is the opposite: we have written a nontechnical business book that should help readers with technical backgrounds better understand the business of oil and gas. Some readers may recall that this was a major premise of the MBA degree many years ago—a curriculum focused on understanding business management for corporate employees who had reached management positions following careers in technical fields.

We address a wide range of topics, such as how resource nationalism and national security drive the competitive behavior of national oil companies (NOCs), how complex projects are planned and executed, how fiscal regimes are created, how crude oil is bought and sold, why cost management is so critical in the production of oil and gas, why some oil and gas firms are integrated across a diverse set of activities and others have a narrow focus on a single sector, why refining is not as profitable as the upstream, how fuels marketers compete with each other, and how the chemical industry supports a range of different business models. And this is just a small sample of our topic areas—this is in fact a big book!

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## Organization

The book is organized around the oil and gas industry value chain. The industry value chain starts with exploration and ends with products sold to consumers, such as gasoline, heating oil, natural gas for heating and power generation, and thousands of petrochemical products. We explain the different business segments in the value chain, such as exploration, development, production, crude oil marketing, refining, refined product marketing, the natural gas and liquefied natural gas businesses, and the petrochemicals sector. For each segment, we discuss the business and competitive aspects, with the goal of understanding competitive dynamics, key business and financial drivers, bases for competitive advantage, main competitors, and industry competitive challenges. We also discuss a number of NOCs and their evolving role in the industry and provide some predictions about the future of oil and gas.

We have tried to make the book as relevant, timely, and accessible as possible. Each chapter includes many real industry examples and case studies. The examples are drawn from all over the world because this industry is perhaps the most global of all industries. Each chapter also includes several “Industry Insights” to provide interesting and unique examples of different industry business practices, competitive actions, or managerial decisions.

## Audience

The book should be of interest to several different audiences. The first is the people working in the oil and gas industry and especially engineers and scientists who seek greater understanding of the oil and gas business. The book should prove very useful for those making the transition from technical roles to managerial positions, where knowledge of the business is essential for their career development. The oil and gas industry does an excellent job in turning engineers into businessmen, and this book was written with that objective in mind. The book should also be useful for new employees with strong technical training as petroleum or chemical engineers but limited knowledge of the business of oil and gas. A second audience is business students studying the oil and gas industry and looking for a comprehensive reference text. Some of these students will be taking specialized courses in undergraduate and graduate degree programs focused on the global oil and gas industry. The third audience is general readers interested in learning more about the business dynamics of arguably the world’s largest and most important industry.

**Table 1–1a. Major oil producing nations**

Country	Percent of World Production, 2009	Output Change Since 1999
Russia	12.9%	62.4%
Saudi Arabia	12.0%	9.7%
United States	8.5%	-6.9%
Iran	5.3%	17.0%
China	4.9%	18.0%
Canada	4.1%	23.4%
Mexico	3.9%	-10.9%
Venezuela	3.3%	-22.0%
United Arab Emirates	3.2%	3.5%
Kuwait	3.2%	19.0%
Iraq	3.2%	-4.9%
Norway	2.8%	-25.4%
Nigeria	2.6%	-0.3%
Brazil	2.6%	79.1%
Angola	2.3%	139.4%
Algeria	2.0%	19.5%
Libya	2.0%	15.9%
Kazakhstan	2.0%	166.3%
United Kingdom	1.8%	-50.2%
Qatar	1.5%	85.9%
<b>Total</b>	<b>84.1%</b>	

OPEC’s mission is “to coordinate and unify the petroleum policies of Member Countries and ensure the stabilization of oil prices in order to secure an efficient, economic and regular supply of petroleum to consumers, a steady income to producers and a fair return on capital to those investing in the petroleum industry.”<sup>5</sup> Despite being a cartel, OPEC’s ability to control prices is questionable. Surging oil prices in the 1980s resulted in energy conservation and increased exploration outside OPEC. Maintaining discipline among OPEC members has been a major problem (as is typical in all cartels). Massive cheating was blamed for the oil price crash of 1986, and in the 1990s Venezuela was considered one of the bigger OPEC cheats by regularly producing more than its quota.

Figure 1–2 shows OPEC production and crude oil prices. Although it is difficult to identify any clear continuing relationship between OPEC’s production over time and the movement of crude oil prices, the organization has clearly been instrumental in periodic “shocks to the system” as characterized by one analyst.

## China and India

In 1998, China became a net importer of oil for the first time. In 2006, China overtook Japan to become the world's second largest importer. By 2030, China will likely be importing about 80% of its oil. Clearly, China and Chinese companies are going to be major players in the oil and gas industry. Thousands of gas stations are being built, and Chinese companies are aggressively investing in upstream projects around the world.

Unlike the United States and Europe, China has no qualms about allowing its oil industry (the big three Chinese NOCs to start with) to invest in countries like Sudan and Iran. On the retail side in China, prices are regulated, resulting in unintended consequences. If the government increases prices, especially for diesel, there might be social unrest. Because refiners lose money on diesel, they cut back on diesel production, which can lead to diesel shortages and increases in diesel imports. State-owned refiners have little capital available for upgrades and modernization and often purchase low-quality crudes high in sulfur content. China has much less stringent environmental regulations than the developed world. More stringent regulations would mean higher fuel costs. As a comparison, the United States allowed maximum sulfur concentrations of 15 parts per million for most diesel fuels while China allowed up to 2,000 parts per million.<sup>28</sup> China's cities are among the most polluted in the world.

India is also a force to be reckoned with in the global oil and gas industry. India, the fifth largest oil consumer, needs energy to feed its rapidly growing and industrializing economy. Companies such as Reliance are moving aggressively into the upstream, and stodgy state-owned companies such as ONGC, Oil India Limited, and Gas Authority of India are slowly becoming more productive. Like China, India is far from self-sufficient in energy and must find new energy sources.

## Industry substitutes and alternative fuels

The role and future of non-hydrocarbon-based fuels and energy sources has become a critical issue for policy makers and energy companies. Various factors are contributing to a large investment flow into alternative fuel projects, including the rapid rise in oil and gas prices in recent years, concerns about global climate change, perceived competitive opportunities by energy companies (new entrants and entrenched players), and government subsidies.

IOCs. Thus, the more poorly managed NOCs will need the IOCs as much as they ever did. The IOCs' managerial and technical expertise and access to international capital markets will continue to make their role valuable. As one oil company executive noted:

*The continuing need of oil governments for the big international companies is the difference between economics and business. In economics, all firms are the same. In business—in the real world—all firms are not created equal.*

## The strategic interests of IOCs and NOCs

Using the NOC categories developed earlier, figure 2–8 presents a view of the strategic interests of IOCs and NOCs. Simply put, IOCs are in search of upstream opportunities and access, while most NOCs need technology, expertise, and access to technology and intellectual property. The stakeholders, interests, and objectives of IOCs are clearly narrower and more focused than those of NOCs.

In the highly complex and dynamic oil and gas industry, IOCs and NOCs have always coexisted. Increasingly, common ground is becoming difficult to find. The tension between NOCs and IOCs has historically been measured by crude oil prices and relative bargaining power. As illustrated in figure 2–9, during periods of low crude oil prices, when government margins from crude oil and gas production decline, NOCs often are in a relatively weaker negotiating position when it comes to attracting international capital and competency from IOCs. It is during these periods that IOCs have often been able to negotiate the access to reserves they need to grow and compete globally.

When crude oil prices rise, government revenues also rise. Increases in wealth move many NOCs, sometimes on their own initiative and sometimes on the urging of government and civil society, to pursue resource nationalism. This nationalism takes several forms, mostly in terms of the proportion of profits accruing to the state versus the IOC in existing developments, or in the more extreme, the elimination or denial of IOC access to state-controlled reserves. The changing roles and relative bargaining power of IOCs and NOCs are inevitably cyclical. In a nutshell, during up cycles resource nationalism increases and during down cycles it declines.

Ironically, this continuing relationship has put many of the world's IOCs in the forefront of the battle over “the curse of oil.” Whereas the governments of the producing states are not “reachable” in a political sense, the publicly traded IOCs



and Sinclair Oil, formed the American Independent Oil Company (Aminoil). The collective capital was just over \$30 million.

The US State Department supported the formation of Aminoil as a way for US oil companies to break the major's Middle East presence and more importantly, to break up the growing British dominance of Arab oil. Aminoil surprised the global majors by quickly concluding a concession with Kuwait in June 1948 to develop the Neutral Zone. The terms of the agreement included:

- A \$7.5 million signature bonus in cash.
- Exclusive development rights for 60 years.
- A royalty rate of \$0.35/barrel, if oil was discovered (the highest rate in history at the time).
- A minimum annual royalty of \$625,000, even if no oil was discovered. Though technically an advance upon royalties, the payment was due regardless of whether oil was ever discovered.
- 15% of all profits generated by Aminoil, *if* profits were ever produced.
- A yacht, approximately \$1 million in value, for the amir of Kuwait.

The size of the bonus was unheard of, the royalty rate the highest known, and the guarantee of income regardless of oil discovery or production, astounding. Only a few years previous, Kuwait signed major concessions for \$700,000, while Standard Oil of New Jersey paid only \$200,000 for its concession on more than 440,000 square miles of Saudi Arabia. Many believed that Aminoil was making a huge mistake.

At the same time, J. Paul Getty was interested in the other half of the Neutral Zone. Getty dispatched a geologist to Saudi Arabia to explore for oil. On an aerial tour of the Zone, the geologist spotted a desert dome resembling a similar feature in Kuwait that had yielded oil. Getty was informed that there was a 50% probability of oil. Getty immediately initiated secret negotiations with the Saudi Arabian government.

Getty successfully won the concession. (Getty, known for a variety of peculiarities, was an extremely intense businessman. He prepared for the final concession discussions with Saudi Arabian King Ibn Saud by listening to “Teach Yourself Arabic” records.) The concession for the Saudi Arabian Neutral Zone, signed December 31, 1948, included:

- A signature bonus of \$9.5 million.

Following the development of Prudhoe Bay on the North Slope of Alaska, a bidding frenzy for new exploration leases erupted in 1982 and 1983. In 1983, roughly \$1.5 billion in lease sales were made on the North Slope. Mukluk, one of the highest profile projects,<sup>20</sup> involved a consortium that included BP, Standard Oil Company of Ohio (Sohio), and Diamond Shamrock.<sup>21</sup> The consortium drilled an exploration well that was particularly difficult.<sup>22</sup> Located 60 miles west of Prudhoe Bay and 20 miles north of the Colville River delta, Mukluk Well No. 1 was in 48 feet of water. Lying within sandstone formations similar to that of Prudhoe Bay, estimates of recoverable reserves ranged between 1 and 5 billion barrels of oil, only about 10% of what Prudhoe Bay promised but an enormous prospect by industry standards. BP's geologists classified the exploration as one of the lowest risk developments the company had ever been part of. But as the old oil field saying goes, "Only Dr. Drill knows for sure."

The lease sale agreement of October 1982 required drilling to take place within one year. Development of the exploration well started in the coldest days of the winter of 1983 and extended into the spring and summer. The drilling rig was mounted on a man-made island 350 feet in diameter, with a work surface 12 feet above sea level. The island required 1.29 million cubic yards of gravel to construct and roughly \$100 million, with the drilling rig costing another \$50 million. Although the summer of 1983 was a record year for difficult ice floes, the island was completed, and drilling began in early October 1983. By November drilling had reached the Ivishak Formation at 7,000 feet in depth and yielded few positive results. At 8,000 feet the drill hit salt water. Drilling pushed on towards the terminal target depth of 9,860 feet in the Lisburne Formation. There the consortium found only traces—*oil stain*—indicating that although oil had indeed once occupied and flowed through the formation, the reservoir had been breached millions of years ago and drained of any commercial prospects.<sup>23</sup> On Friday, January 20, 1984, Sohio announced it was plugging its No. 1 Mukluk well in the Beaufort Sea.

Mukluk's message for years to come was interpreted in a variety of ways.<sup>24</sup> Mukluk became instantly known as "the most expensive dry hole in history."<sup>25</sup> That may or may not be so, given the numbers. But more importantly for the corporate strategies of the major oil and gas companies of the time was the reassessment of how to pursue the future. As Daniel Yergin argued in *The Prize*, Mukluk's message was clear: