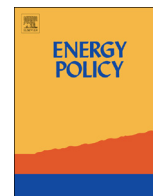




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## Structural crisis in the oil and gas industry

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## H I G H L I G H T S

- Dominance of the state companies in world oil supply.
- Differences between developed and developing countries oil demand.
- Likely changes in structure of oil and gas industry.
- Increasing oil interdependence between Middle East and Asia.
- Uncertainties about size and coherence of international gas trade.

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## A B S T R A C T

The structure of the oil and gas industry is being disrupted by technical developments which increase supply and reduce demand, the reversal of growth in demand in transport in OECD countries and less dependence of the US and Europe on Middle East oil supplies. Upstream, expectations of scarcity are changing to expectations that, at current prices, national oil companies face increasing competition from public listed companies which use diverse advanced technologies to develop reserves in areas outside NOC control. The public listed companies also have the opportunity to bring specialized technology to match NOC needs. Downstream oil markets are dividing into the OECD markets where growth has been reversed and a non-OECD markets where it continues. This is a challenge for the major public listed companies whose downstream operations are concentrated in the OECD. They may respond by focusing on local advantages or by separating the downstream from their upstream businesses. The natural gas industry is being transformed by new discoveries, particularly in the US, but regional markets remain separated by transport costs and pricing systems. The challenge will be to find prices which will grow both the supply and demand in each region.

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## 1. Introduction

The 20th century oil industry trajectory encapsulated periods of expansion and disruptions which were followed by rough new equilibria, an epic described by several authors (Adelman, 1972; Jacoby, 1974; Parra, 2004; Penrose, 1968; Yergin, 1991). There was no reversion to a “normal” structure: each new equilibrium accommodated the causes of its predecessor's destruction. The industry again faces disruption, followed by contraction for oil, but expansion for gas.

The main causes:

- Technical developments increasing global oil and gas supply from new sources (mainly shale, also deep water and pre-salt reservoirs), mostly outside OPEC and national oil companies.
- Reversal of growth in demand for oil transport in developed countries, resulting from a combination of oil prices, technical

development in vehicles, and government policies to restrict greenhouse gas emissions.

- Reducing dependence of the US and Europe on Middle East oil supplies. These and their associated risks become more of an Asian than a global problem.

National oil companies (NOCs) dominate known reserves and global production. Publicly listed international oil companies (including the IOCs) struggle to “replace reserves” and grow production, and public policies are confounded by conflicts between economic, security, and climate change objectives.

This article argues that these changes will increase disorder; the industry is entering an age of entropy. Previous values will be destroyed and new, more widely dispersed value will be created.

## 2. The industry's convulsive history

The early modern oil industry – from the 1870s – saw turbulent expansion as oil replaced coal. New Markets were created, depending on clean and easily transportable oil from North

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America, Russia (Azerbaijan), Indonesia and Persia, fuelling automobiles, trucks, trains, aircraft, ships and all the vehicles that brought new mobility to the 20th century. New sources were continually added, in the Middle East, the Soviet Union, and Africa, many of which were under some form of colonial or foreign control. Expansion of supply was driven by competition between US and European IOCs, under concessions granted by local governments that owned or controlled the underground resources. New supplies drove oil further into markets, e.g. power generation, previously dependent on coal.

The Achnacarry agreement (1928) somewhat stabilised the cutthroat territorial competition outside the US between the great IOCs until the 1960s. Supplies emerged outside the agreement countries; new energy markets were developed on the basis of stable and falling prices. Falling prices meant falling tax and royalties for oil exporting countries' governments, dependent on them. Many were becoming independent from metropolitan powers; this informed their attitudes to the IOCs. OPEC was formed (1960) to defend its member governments' revenues against falling prices, and regain control of concessions from the IOCs. European and US governments were not in a position to frustrate the governments of the oil exporting countries; by 1970–1973 the system was in collapse.

A decade of disruption followed. OPEC governments took over the price setting mechanisms and also, in most cases, expropriated the foreign companies' concessions. The oil shocks of 1973 and 1978–1979 (triggered by political events) caused a dramatic fall in demand, leaving large spare production capacity in OPEC. Competition between governments replaced competition between companies. Prices collapsed through the early 1980s, until OPEC developed a production quota mechanism. IOCs switched their exploration and production programs to new areas outside OPEC influence: North Sea, Alaska and Gulf of Mexico. Until 2003–2005 this system created a rough equilibrium between state competitors and managed rough stability of prices around \$20–\$30 (\$2012) per barrel.

### 3. The crisis upstream now

This stability has been disrupted. Demand, led by Asian countries, grew faster than supply; the structural surplus disappeared in 2008. Crude oil prices tripled in 2003–2008 and remain high, despite the drop in demand after the financial crisis 2008–2009. It seems likely (in early 2013) that prices around \$100 per barrel can be sustained, despite increasing supply capacity, while demand has slowed and probably peaked in developed countries.

These prices, through new production technologies, promote the expansion of oil production outside OPEC. Many such areas, e.g. the US, are open to the private sector, either through private ownership of the resources, or private (usually foreign) companies working under contract to NOCs. The growth of oil service companies during the past 20 years has broadened competition and enabled expansion with worldwide scale that often exceeds (e.g. in drilling) that of any major operating company. They are also a source of technical innovation and transfer of technology from one experience to another. They support the growth of independent private sector operating companies (i.e. not the major IOC's) and the NOCs themselves (Gould, 2012).

The governments of OPEC have no control over this expansion. In most mainstream projections, the OPEC share of world oil supply is expected to remain around 39–40% through 2020 (EIA, 2012, 2013; OPEC, 2012). A surplus of 6 mbd is possible by 2016 (OPEC, 2012), about 15% of projected OPEC capacity; OPEC's ability to stabilise prices will again be tested.

### 3.1. The role of governments in the oil industry

The structure of the oil and gas industry is special – even dysfunctional. High rents available from production – especially from oil – are targets for governments as well as investors, accessed with different instruments and for different purposes.

First in line are the owners of the resources. In the US, Canada, and a few other countries underground resources belong to the surface owners, who either collect royalties from leasing land to operating companies or operate the development of the resource themselves. Where government is an owner – for example in offshore resources – it gets rent through the same mechanism, supplemented by sales of new leases. In some important countries the government is the owner of the resource but grants licences and levies special taxes and royalties on the resulting production (Russia, UK, Norway). In most of the rest of the world, the state is the owner of the resource, and oil production is so important that it has not been left to the private sector, particularly if foreign oil companies would dominate. There, a government agency – the “National Oil Company” (NOC) has been created with a monopoly to develop the resource and manage the investment, operations and sales.

In most oil producing countries there has been broad stability in the degree and nature of government intervention in the oil industry during the past two decades (though tax and royalty rates have increased as oil prices rose). Some countries have seen structural changes. In Russia, there is a mixed picture of private sector companies and companies with state majority holdings. Rosneft has evolved into a *de facto* NOC by a process of acquisition, but since 2013 it has a private sector listed company (BP) as a 19.5% shareholder with two seats on the board. In Algeria a reforming hydrocarbon law for 2005, modified by decree in 2006, preserved the right of Sonatrach, the NOC, to majority participation in all future projects. A 2013 law allows foreign minority participation in shale oil and gas projects. The Chavez government essentially dismembered the Venezuelan NOC. Only Argentina, which went further than most oil producing countries in privatising the NOC YPF in the 1990s, reversed it by expropriation in 2010.

### 3.2. The status quo

The distribution by size of the output of individual companies was highly concentrated. The top 10 companies (only one publicly listed) delivered 43% of the world's oil supply in 2011. OPEC NOCs produced 39% of global oil. After meeting the domestic consumption of their owner-countries state companies supplied about 18 million barrels a day or 35% of the world's regional oil trade (Fig. 1).

## 4. Cracks in the strategies

### 4.1. The national oil companies (NOCs)

National oil companies have exclusive access to almost three-quarters of the world's currently proved reserves (Table 1).

How NOCs are run, and what objectives government sets for them, shape the international oil industry. Private sector companies' strategies cannot be independent of those of the NOCs, neither is the whole story.

Until recently, the strategies of NOCs and their government owners could proceed in confidence that demand for oil was growing, resources were limited in the long term (especially for the private sector), NOCs' share of world production would

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