



More for Asia: Rebalancing World Oil and Gas

John Mitchell

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Contents

Acknowledgments	iv
About the Author	v
Executive Summary	vi
1 Introduction	1
Security	1
The regions	2
Why consider oil and gas together?	3
Scenarios for oil and gas	4
2 Oil Balances	5
North America	5
Europe	6
Atlantic Basin	6
Asia-Pacific region	7
Global oil balances	8
Sensitivities	9
Conclusions on oil	10
3 Global and Regional Gas Balances	11
The 2020 gas scenario	11
LNG	13
Regional or global gas prices	14
Gas-balance sensitivities	14
Conclusions on gas	15
4 Securing Access to Resources: Investment Strategy	16
OPEC	16
Gas Exporters' Forum	17
State companies	17
Conditions of access	18
Private-sector companies	20
5 Access to Supply and Markets: Trade Strategy	21
Governance	21
Market structures	22
6 Energy Security	25
7 Conclusion	27
Outlook	27
Implications	27
Strategic challenges	28

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John Mitchell is an Associate Fellow of the Energy, Environment and Resource Governance Programme at Chatham House and Research Adviser at the Oxford Institute of Energy Studies. During his earlier career with BP, his posts included head of the company's Policy Review Unit. He has published widely on energy issues, particularly oil. In 2007 he received a lifetime achievement award from King Abdullah at the 3rd OPEC Summit in Riyadh.

Executive Summary and Policy Recommendations

The oil and gas industry is set to undergo a decisive transition over the next 10 years as global balances of demand and investment shift towards Asia and away from Europe and North America. These are sectors where geography matters and such a transition will have major geopolitical implications and a profound effect on industrial strategy. Oil and gas companies and their governments also face unprecedented uncertainties over a growing range of issues, including the development of low-carbon policies, shale gas, questions about Iraqi oil production, and surging demand in China.

Asia will account for 60% of global oil deficits by around 2030. Its oil demand is already beginning to exceed and outstrip the net surpluses available from the Middle East. *Europe will no longer be able to rely on Middle East surpluses to meet its oil deficits. It will instead have to look to Russia as its default supplier of oil, while competing with Asian importers for supplies from areas such as West Africa, Northern Iraq, Central Asia and Eastern Siberia which are pivotal between Asian and Atlantic markets.* This is a development that will carry major policy implications: the EU needs a stable political and security relationship with Russia within which energy trade and investment can develop, while also developing policies that combine or pre-empt the policies of individual member states in relations affecting gas and oil supply from Russia and the pivotal supply areas.

In contrast to Europe, where falling North Sea production will cause its import dependency to increase, *North America's imports of oil are unlikely to grow*, as the slow growth in demand for liquid fuels can be met by the expansion of offshore and non-conventional oil supplies.

These shifts are likely to alter the character of the global oil market, as Asian markets grow in importance, and investment in increasing supplies from the Middle East, Russia and the 'pivotal' areas is dominated by state-controlled exporting and importing companies in these markets. The strategies of governments and businesses will therefore have to incorporate these new realities.

Overall, gas presents a more complex picture than oil. Although the liquefied natural gas (LNG) trade will increase in both the Atlantic and Pacific regions, the development of shale gas in North America will limit its global growth. Shale development will mean that North America is likely to become self-sufficient, while European deficits will be met mainly by LNG from North and West Africa. *The possibility of a global gas price remains problematic.* Although up to 20% of European gas supplies may come from internationally traded LNG, most of continental gas imports are priced according to oil-related formulae, and more than two-thirds of global LNG is traded in the Asia-Pacific region, it is unlikely that gas prices there can be maintained by formulae linked to spot oil prices on commodity exchanges in New York and London. But there is no alternative in sight.

The growth of Asian LNG markets will enhance the market power of countries – Saudi Arabia for oil, Qatar for gas – that are low-cost, state-controlled producers, able to vary production and investment plans relatively easily, and to divert marginal exports to the European and North American markets in order to support prices in their prime markets in Asia. The importance of this shift should not be underestimated as it changes the balance between the private sector, diverse and open markets and a less competitive system in which governments and state companies play a larger role.

These shifts raise questions about the security of supply for importers (and of demand for exporters) and about the role of the private sector in investment and trade – which is not the same question. In 'normal times' the diversity and flexibility of international trade provide security both for importers against disruptions of supply, and for exporters against sanctions or discriminatory import policies. In 'abnormal' times it is the overall political relationship between the governments concerned that is likely to prevail over business investments and contracts – and the sovereignty of governments over their resources is absolute. Given that times are seldom wholly 'normal' everywhere, *companies and governments need to recalibrate their strategies and policies to recognize the impact of Asia's larger share of the world's oil and gas in the future.*

1 Introduction

Security

Dependence on imports is regarded as a source of energy insecurity. According to the International Energy Agency (IEA), ‘Energy security can be described as “the uninterrupted physical availability at a price which is affordable, while respecting environment concerns”’.¹ The policies of importing countries focus on reducing imports because they may be interrupted by events abroad. Importing countries may have to pay higher prices to maintain supplies at the levels to which their consumers have been accustomed. The governments of exporting countries may use the threat of embargoes and sanctions to influence importing countries. And some exporting countries may simply be prone to instability that could diminish supply.² Energy importers therefore build strategic stocks of oil and gas to respond to interruptions. They promote an inconsistent rhetoric of reducing and diversifying imports while promoting free and open markets for internationally traded fuels³ and seeking opportunities for their companies to invest in exporting and transit countries. Reducing imports is also seen as a security objective and as a side-benefit of climate policy,⁴ although traditional energy security policies appear to be a defence of ‘business as usual’ in an energy system that will never materialize because of the climate threat and reactions to it.⁵

Typically, the energy security policies of importers, and the numerous studies that contribute to them, do not assess the effects of import-reducing policies on the exporting countries.⁶ (China is an exception, however.⁷) Some recent studies by European think-tanks pay attention to the instabilities and unsustainability of many oil and gas exporters, derived from their dependence on these export revenues and their distorting effect on economic and political development. This has led some representatives of exporting countries to talk of security of demand.⁸ As the OPEC Secretary General, Abdalla Salem El-Badri, told the 12th Ministerial Meeting of the International Energy Forum (IEF) in March 2010:

Energy security is reciprocal. It is a two-way street. Security of demand is as important to producers as security of supply is to consumers. The two need to go hand-in-hand. ... From the demand perspective, consuming countries must be clearer about the impact of their policies on future oil consumption levels and overall energy demand. There is a need for consistency with credible and reliable signals: one cannot ask for more crude oil investments, while at the same time advocating the need to reduce its use, increasing subsidies for alternatives, and calling for less oil imports from specific regions.⁹

1 http://www.iea.org/Textbase/subjectqueries/keyresult.asp?KEYWORD_ID=4103.

2 John Deutsch, *Towards a National Energy Policy: Assessing the Options*, Background Paper, National Energy Policy Institute/Resources for the Future: NEPI/RFF, June 2010: ‘Additional strains arise between producer and consumer states if resources are located in parts of the world, such as the Persian Gulf, that may be unstable and not particularly friendly to the United States and its Allies or their objectives.’

3 EU 2nd Strategic Energy Review, EN COM(2008)781 Final 13.12.2008.

4 Deutsch, *Towards a National Energy Policy*.

5 John V. Mitchell: *Europe’s Energy Security after Copenhagen: Time for a Retrofit*, Chatham House Briefing Paper, November 2009.

6 National Petroleum Council, *Hard Truths: Facing the Hard Truths about Energy* (Washington, DC: NPC, 2007); National Commission on Energy Strategy, *Ending the Energy Stalemate*, 2004; Ladislav, Zyla, Pershing, Verrastro, Woodward, Pumphrey and Staley: *A Road Map For A Secure, Low-Carbon Energy Economy* (Washington, DC: World Resources Institute, Center for Strategic and International Studies, 2010).

7 *China’s Energy Conditions and Policies* (2007), <http://www.china.org.cn/english/environment/236955.htm>. ‘The international community should work collaboratively to maintain stability in oil producing and exporting countries, especially those in the Middle East, to ensure the security of international energy transport routes and avoid geopolitical conflicts that affect the world’s energy supply.’

8 Sascha Müller-Kraenner, *Energy Security* (London: Earthscan, 2008); Cédric de Lestrangé, Christophe-Alexandre Paillard and Pierre Zelenko, *Géopolitique du pétrole: un nouveau marché, de nouveaux risques* (Paris: Editions Technip, 2005); Jean-Marie Chevalier (ed.), *The New Energy Crisis* (London: Palgrave Macmillan, 2009); John V. Mitchell and Paul Stevens, *Ending Dependence: Hard Choices For Oil Exporting States* (London: Chatham House 2008).

9 Speech by OPEC Secretary General, HE Abdalla Salem El-Badri, to the 12th IEF Ministerial Meeting, 30–31 March 2010, Cancun, Mexico, www.opec.org/opec_web/en/1712.htm.

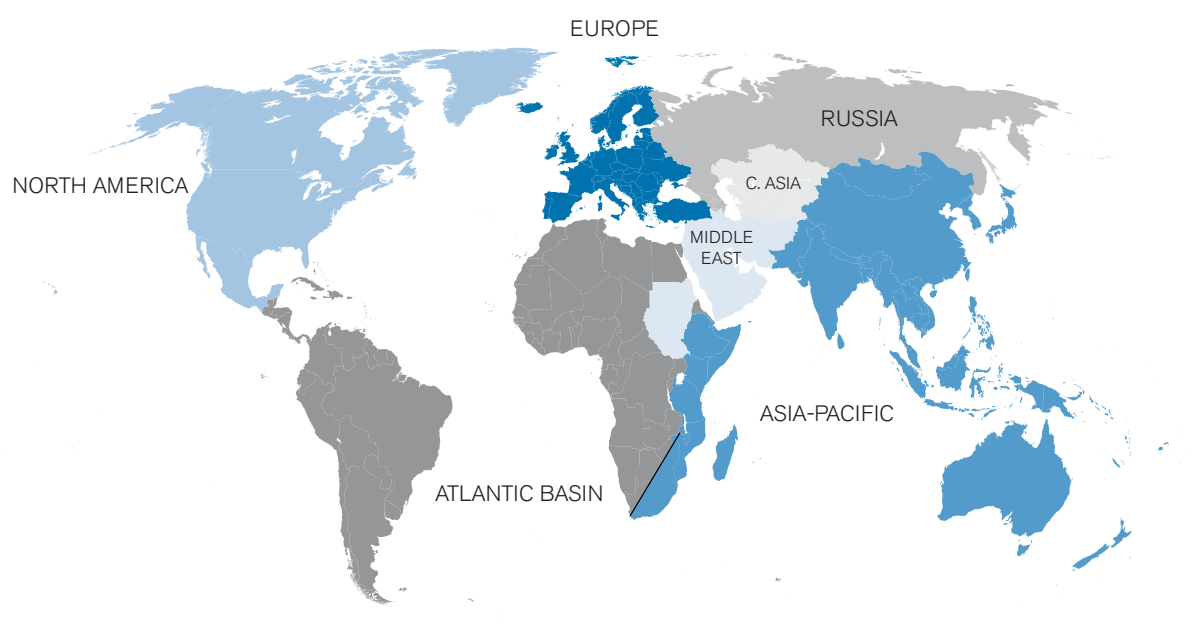
This report focuses on the economic insecurity resulting from the risks that importers (or exporters) of oil and gas may be at a disadvantage relative to their competitors. Different countries are becoming more critical as markets or suppliers, as the balance of international oil and gas supply, demand and investment shifts towards Asia. This shift changes the balance between private-sector, diverse and open markets towards a less competitive system in which governments and state companies play a larger role.

The regions

In this report, regions are mainly defined by the prevailing logistics of oil and gas trade. These matter, especially for gas, because its transport costs are much higher and its value is lower per unit of energy than oil. Even for oil, differences in transport costs are significant in relation to the small margin allowed to state or private-sector oil-producing companies after taxes, royalties and profits taken by the governments of producer countries. It is therefore in the interests of exporters and importers to minimize transport costs, preferring nearby to distant markets and supplies. Sea transport is cheaper than pipeline transport for long distances. It is provided by the international market for oil tankers and LNG carriers, where independent shipowners compete with company fleets. Seaborne trade therefore provides exporting and importing companies with the opportunity to shop around for supplies and markets, and to arbitrage between them. Pipelines are less flexible, normally locking in supply patterns between the exporters and importers attached to – and often invested in – the pipelines. These pipeline-oriented patterns are represented in this paper as add-ons to regions that are mainly defined by ocean-going transport costs.

Geography and logistics divide oil- and gas-importing markets between East (the *Asia-Pacific*) and West (with *North America* and *Europe* divided by the costs of transatlantic arbitrage). Supplies are divided between the *Middle East* (all east-facing ocean-going exporters), and *Russia* and *Central Asia* (all pipeline exporters). The *Atlantic Basin* (which includes the Mediterranean) contains some importing countries, but is a net exporter as a region. These regions are shown on Map 1.

Map 1: Oil and gas trading regions



This paper analyses the oil and gas surpluses and deficits of the different regions. Strictly speaking, this refers to their *potential*; actual trade does not match this exactly and global trade is greater than the sum of these basic surpluses and deficits.¹⁰ Moreover, there are differences in oil quality that are more important than differences in transport costs, so that oil surpluses may not simply move to the nearest deficit region. Nearly 20% of oil in international trade is exported as products that may follow a different pattern, depending on the mix of product demand. Some countries, such as Nigeria and Iran, are exporters of crude but importers of oil products, owing to lack of investment in domestic refineries or the inefficient use of existing capacity.

The details behind the headline figures are also important, as the following examples indicate. Western Canada exports oil but Eastern Canada imports it. Russia's net surplus logistically divides between east-facing and west-facing markets, according to the location of production and the tariff policy (and existence) of transport infrastructure. Most Russian reserves face west logistically; all are expensive to deliver to markets. There is entrepôt trade that is difficult to disentangle from the trade figures. Buyers may diversify their purchases to avoid dependence on a single source. The underlying surpluses or deficits nevertheless remain the basis for these deviations.

Why consider oil and gas together?

Oil and gas are considered together because many countries produce, consume and trade both commodities, which are subject to the same political regime and economic constraints. Most private-sector companies – the so-called international oil companies (IOCs) – and many state companies explore for both oil and gas, and invest in their development. There are differences. The energy density of oil is greater than that of gas, so that it is cheaper to transport energy in oil than in gas. Almost every country is either an importer or an exporter of oil. It is conventional to describe oil as a global commodity and gas as a regional one. Outside Europe, the number of gas-exporting and gas-importing countries is relatively small. Since distant gas is expensive to reach, the share of gas in energy markets is low where there is no domestic or intra-regional supply.¹¹

Table 1 shows that in 2009 the global market (the interregional trade shown on the map) took 60% of exporting countries' production but only 20% of their gas production. Global (interregional) trade supplied almost 60% of importers' oil consumption, but only 13% of gas consumption. Sea-borne – and therefore flexible – trade supplied less than half of the global gas market, compared with around 90% of the global oil market. In both commodities, some individual countries are much more dependent on either global trade for supplies (e.g. Japan, Korea, most European countries) or markets (e.g. Saudi Arabia, Kuwait, the United Arab Emirates, Iraq, West African and Central Asian countries).

Table 1: Oil and gas supply

To	Exporting regions % of production		From	Importing regions % of consumption	
	Oil	Gas		Oil	Gas
Domestic market	37	78	Own production	36	71
Regional market	3	2	Regional supplies	5	16
Global market	60	20	Global market	59	13

Sources: EIA international trade statistics for oil (2009) and gas (2008); *BP Statistical Review 2010*. Author's adaptation.

10 *The BP Statistical Review, 2010*, identifies 53 mbd of 'inter-area' oil movements. This includes some entrepôt trade and compares with our balance analysis of 35 mbd global and 5 mbd regional trade.

11 Wei Lv, 'Comparative Study on Chinese and Foreign Natural Gas Consumption', *International Journal of Marketing Studies*, Vol. 1, No. 2, November 2009.

Thus global oil is more important for producers and consumers than global gas. International trade for gas is more likely to be a balancing item than the motor of future developments. (Some commentators take a different view, based on the projected growth of the LNG trade, which is discussed in Section 3.) It also follows that international oil prices are more important for the oil industry than international gas prices are for the gas industry, where domestic prices will have most effect on revenues.

Scenarios for oil and gas

The calculations used in the scenarios that follow should be treated as broad indications, given the uncertainties and approximations. They are projected to 2030 for oil and to 2020 for gas, where there are great long-run uncertainties about the scale of shale gas development,¹² US climate change policies and future demand for gas in China.¹³

The scenarios broadly use the US Energy Intelligence Agency (US EIA) 2010 *International Energy Outlook* (IEO) reference case, with modifications and interpolations to reflect geographical factors (see Boxes 1 and 2) The IEO is based on existing policy at the end of 2009 and does not reflect any reduction in demand that may flow from new climate change policies in the United States. It also does not reflect any slowdown in the growth of domestic offshore production that may follow new regulations introduced in the United States or elsewhere as a result of the Macondo well blowout in the Gulf of Mexico in April 2010.

Box 1: Oil pipeline assumptions for 2020-30

Key sensitivities are discussed in sections 2 and 3 for oil and gas respectively. Technology is another dimension of uncertainty: greater understanding of the technology of the climate is likely to lead to mitigation strategies which will change the level of demand for various forms of energy, with different effects on oil and gas. An estimate of these implications is given in the International Energy Agency (IEA) 2009 *World Energy Outlook (WEO), 450 ppm case*^a and the IEA *Energy Technology Perspectives 2010*.^b However, both oil and gas will remain a dominant part of most countries' energy supply until 2030, and oil and gas strategies and geopolitics will therefore be important. The calculations used here are based on the following assumptions about oil pipelines:

- Iraq: By 2020 pipeline export capacity for export from Northern Iraq to the Mediterranean is assumed to be restored to 1.5 mbd (1.1 Ceyhan, 0.4 Lebanon). 1 mbd of production (one-third of the total assumed production of 3 mbd) is assigned to these pipelines for export to the Atlantic Basin via the Mediterranean.
- Azerbaijan: All production is assigned to Atlantic Basin through the Baku–Tbilisi–Ceyhan (BTC) line to the Mediterranean.
- Russia: Eastern production is assigned to the Asia-Pacific region: the capacity of the East Siberia-Pacific Oil Pipeline (ESPO) is assumed to grow as planned to 1.6 mbd: Sakhalin (shipped from Sakhalin or Nakhoda) 0.51 mbd and Druzhba–Europe assumed at 1.2 mbd.
- Kazakhstan: The Kazakhstan–China pipeline is assumed to remain at its present capacity of 0.4 mbd.

a International Energy Agency, *World Energy Outlook 2009*, Paris, 2009. The geographical detail is not matched to the regions in our study

b IEA, Paris, July 2010.

12 Paul Stevens: *The Shale Gas Revolution: Hype and Reality* (London: Chatham House, 2010).

13 BinBin Jang et al., 'The Future of Natural Gas Consumption in Beijing, Guangdong and Shanghai', *Energy Policy* 36 (2008).

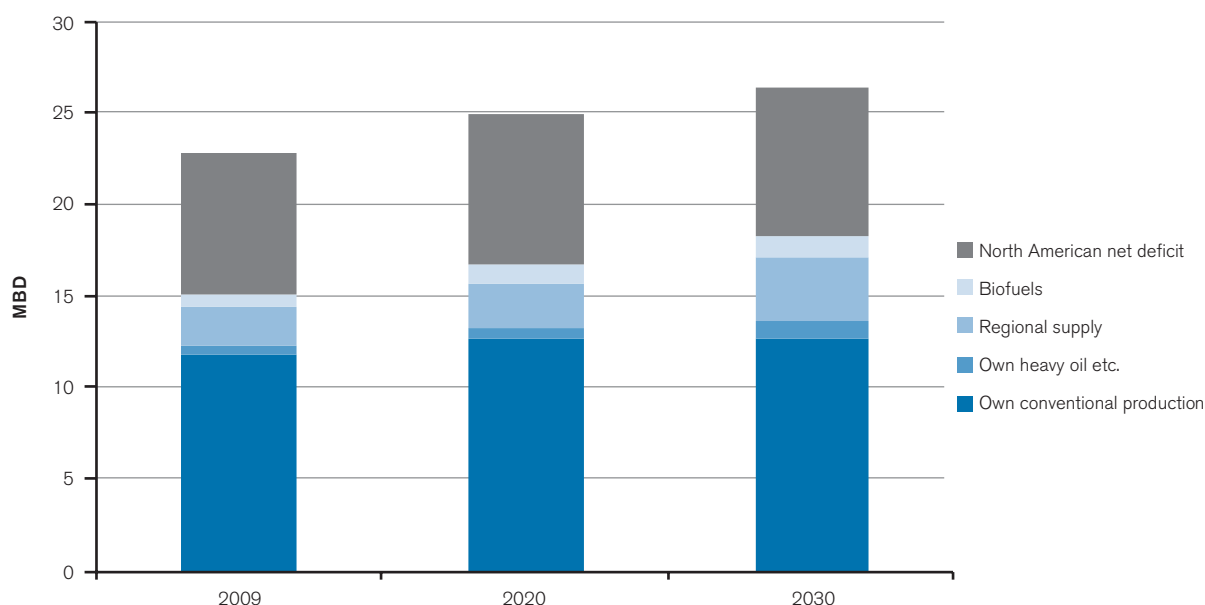
2 Oil balances

Regional analysis brings out different trends very clearly. Dependence (as a percentage of consumption) on global oil supplies falls for North America, thanks mainly to the assumed expansion in production of heavy oil and biofuels. Despite falling consumption, dependence in Europe increases, because of falling North Sea production. In the Asia-Pacific region, the whole increase in demand of around 30% must be met from global supplies.

North America

The projection of continuing near self-sufficiency in oil supplies in the Atlantic Basin is heavily dependent on the EIA's scenario for North America. In turn this includes an expansion of heavy oil, shale oil and bitumen production in Canada, which supports higher exports to the United States, notwithstanding a rapid fall in Canadian production of conventional crude. The EIA also projects a growing production of biofuels in the United States. The result is that, although consumption grows by 16% to 2030, the North American deficit falls slightly, from 34% to 30% of consumption. This is illustrated in Figure 1.

Figure 1: North American liquids supply, 2009–30

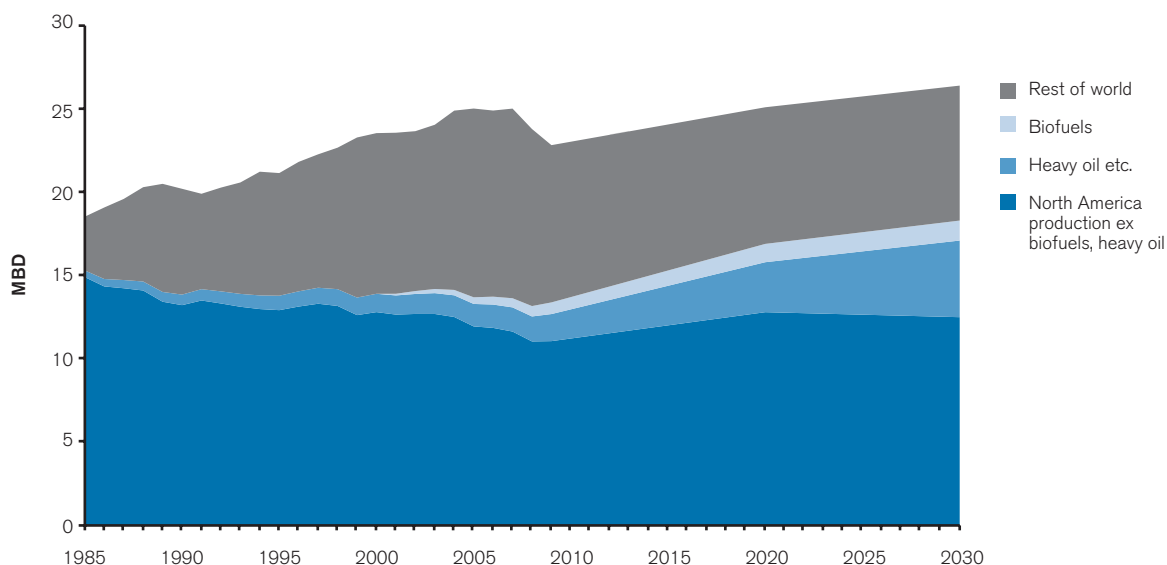


Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Roughly half the regional supply in 2009, and all of it in 2020 and 2030, comes from unconventional oil exports from Canada to the United States. (By 2030 Mexico is a net importer in this scenario, owing to the continuing predicted failure to invest in exploration and development.)

It is the growth of offshore oil, heavy oil, shale oil and oil sands production – as well as some bio-fuels – in the IEO scenario that reverses the historical growth in North American oil deficits after the recession-induced fall of 2009–20, as shown in Figure 2.

Figure 2: North American liquids balances, 1985–2030

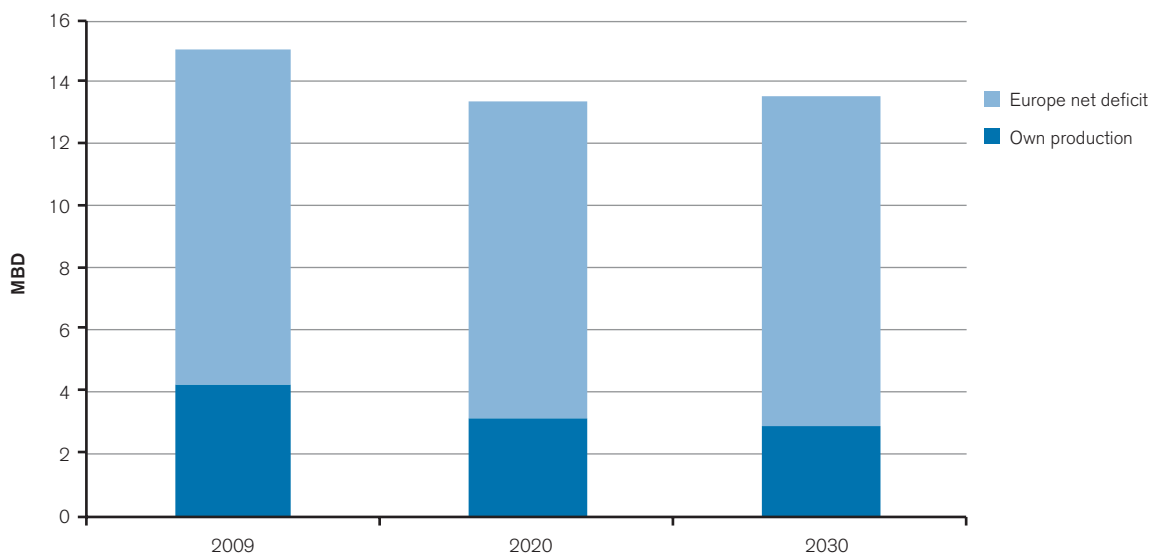


Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Europe

In Europe consumption is projected to fall by 2 mbd while European production falls by 1 mbd. The deficit rises from just over 70% to just under 80% of consumption, as shown in Figure 3.

Figure 3: European oil balances, 2009–30



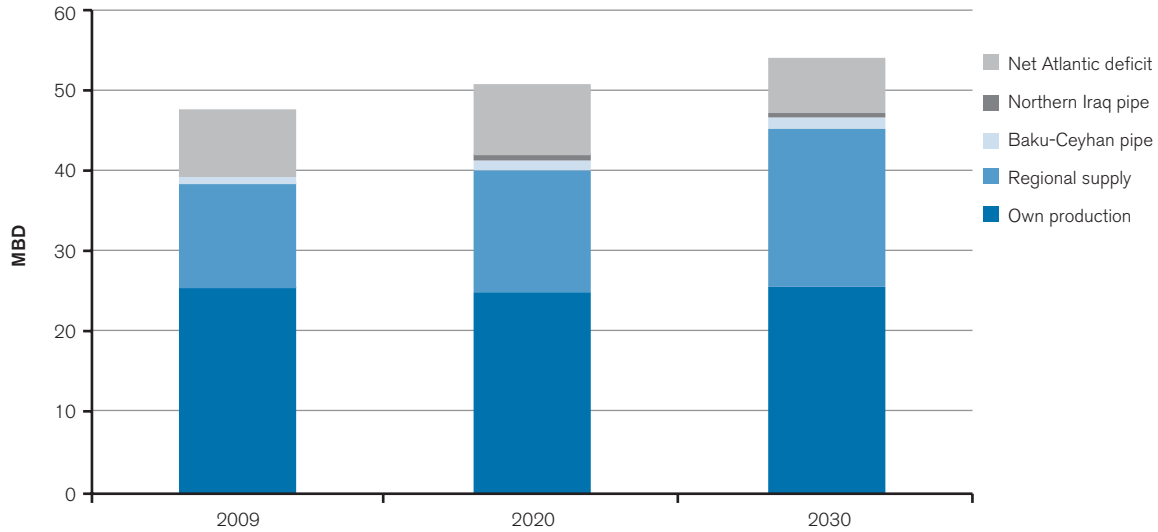
Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Atlantic Basin

In the Atlantic Basin, the deficits of Europe and North America can be compared with the supplies available (see Figure 4). In this scenario the Atlantic Basin increases its oil consumption overall by 5 mbd, the fall in European demand of nearly 2 mbd being offset by increases in North America, South America and Africa. Much of the increase within the component areas is met from within their regions, and within each country, thanks in part

to the increases in supply of heavy oil in North America, biofuels in Brazil and deepwater oil offshore Brazil and West Africa. With supplies from Azerbaijan and (optimistically) Northern Iraq, the net Atlantic Basin deficit is cut by nearly half. Supplies from outside the Atlantic Basin fall from 20% to 11% of consumption in North America and Europe. These supplies must come from Russia, Central Asia or the Middle East. But, as the next section shows, surpluses from the Middle East may not be available.

Figure 4: Atlantic Basin balances

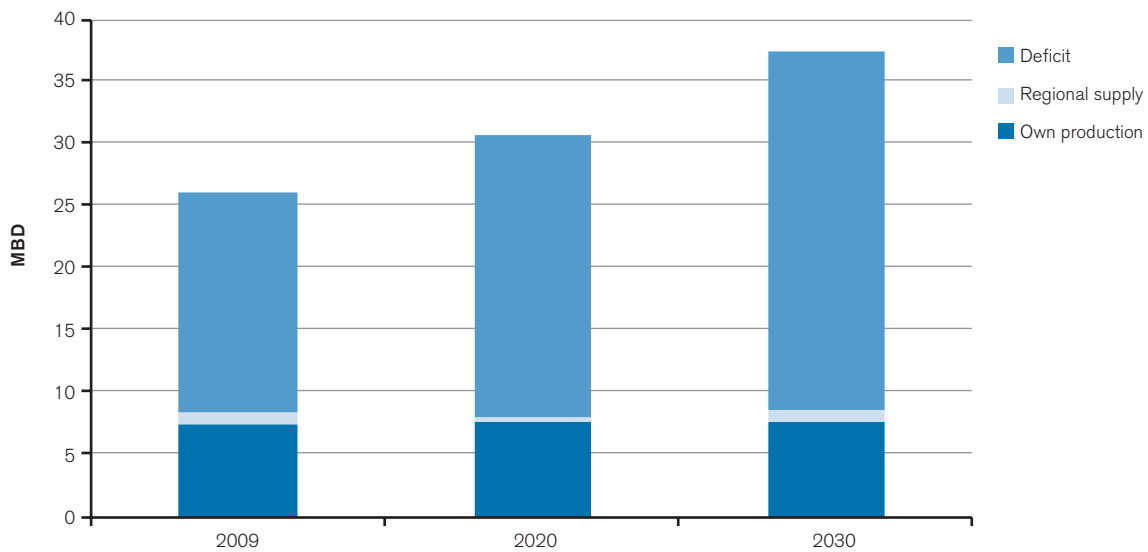


Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Asia-Pacific region

In the Asia-Pacific region there is a different picture, as shown in Figure 5. Its own production does not increase and the whole growth in Chinese, Indian and Asian demand must be met from global supplies in order to balance the region's net deficits, which rise from 85% of consumption in 2009 to over 90% by 2030.

Figure 5: Asia-Pacific oil supply, 2009–30

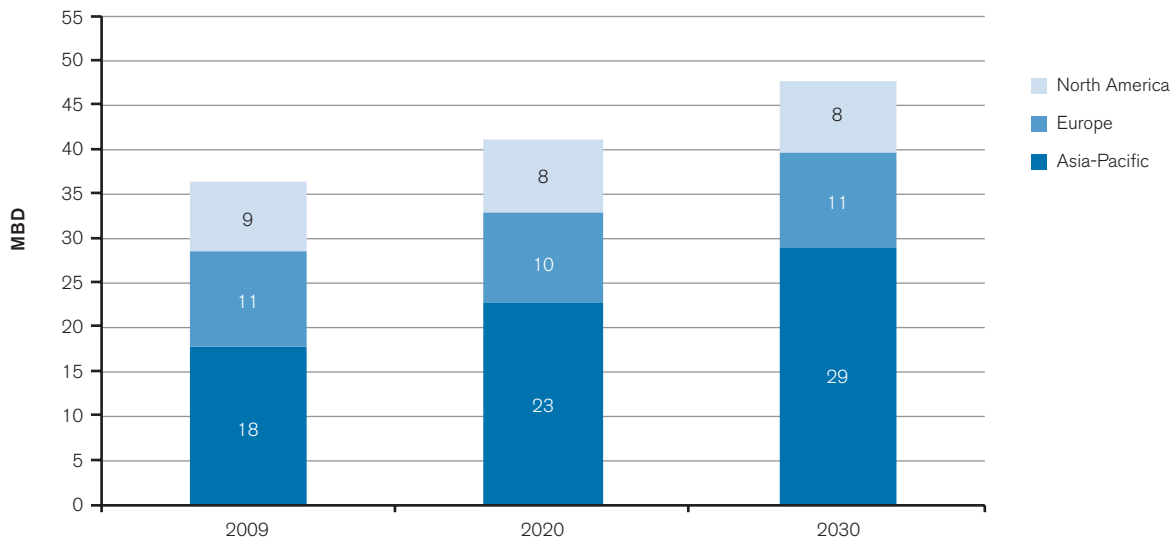


Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Global oil balances

From these results it is possible to compare the trends in regional deficits (see Figure 6). Regional deficits underlie the global market and are met by global supply. In 2009, the Asia-Pacific accounted for half the net regional deficits, and by 2030 its share of global deficits will rise to 60% because its deficits are predicted to grow while those in other regions do not change significantly. These 'global' deficits form the basis for international oil trade (excluding intra-regional trade and cross-trade for reasons of quality, refined product balances, etc.).

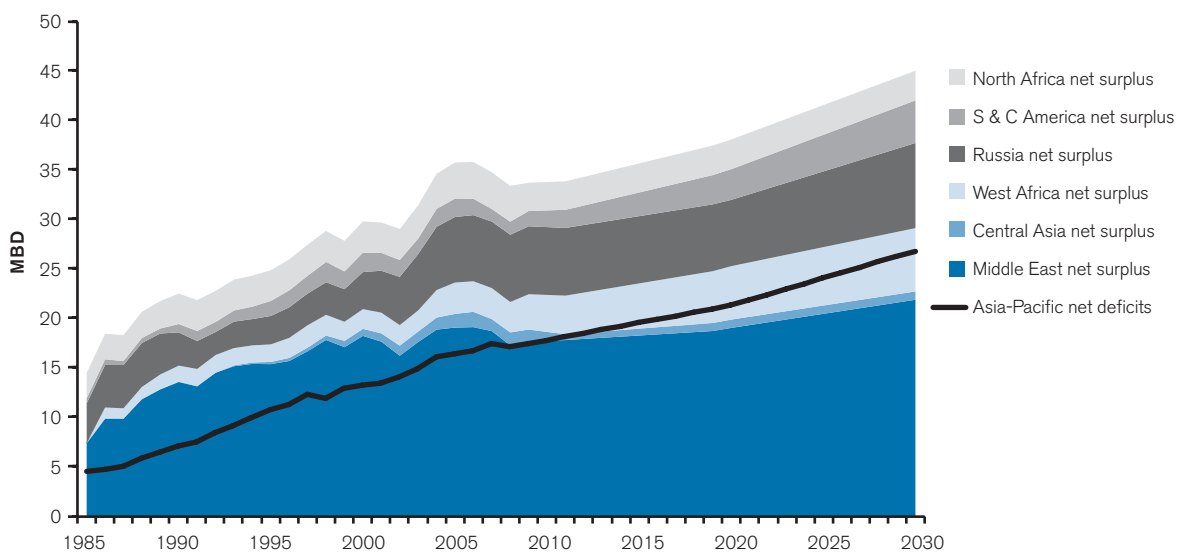
Figure 6: Oil deficits dependent on global supply



Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications

Figure 7 compares the trend in Asia-Pacific deficits with the surpluses of various regions after allowing for intra-regional trade. The scenario suggests that the Asia-Pacific oil deficits will exceed and outgrow the surpluses available from the Middle East. (For the next few years there is surplus Middle East capacity and supplies could be higher, with other supplies correspondingly lower than

Figure 7: Global oil balances, 1985–2030



Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

in this scenario.) The Asia-Pacific deficits will therefore inevitably be met in part from other regions as well as the Middle East: by more pipeline supplies from Russia and Central Asia, and by sea from West Africa and probably Brazil.

Clearly, until now, some Middle East surpluses have been available for the Atlantic Basin market. In 1990 almost half the deficits outside the Asia-Pacific were covered by Middle East surpluses; by 2020 more than half of these will be covered, directly or indirectly, by Russian surpluses. This will not be so in the future (though for diversification, quality and commercial reasons actual trade will not exactly reflect the underlying surpluses and deficits). Russia, not the Middle East, will be the default supplier of Europe's oil deficits.

Sensitivities

Iraq

According to the EIA reference scenario, Iraq's production will increase to 3.1 mbd by 2020 and 5.1 mbd by 2030, overtaking that of Iran (estimated at 2.5 mbd for 2009). The goal announced by Iraq's oil minister, Hussein Al-Shahrastan, is 12 mbd by 2017.¹⁴ The bids for development awarded by the Iraqi government to foreign companies in the 2009 auctions, together with the bids awarded by the Kurdistan Regional Government, could technically provide this level of production, but not necessarily by 2017. It is possible that production from Iraq by 2020 and 2030 could be double the much lower EIA reference projections.¹⁵ However, lower production plateaus could be chosen by the government to achieve prudent depletion rates.¹⁶ Oil industry representatives have stressed the difficulties: the need to develop a master plan for water management, rehabilitate and expand storage and pipelines, improve security for imported goods, speed up permission for opening local offices and for foreign skilled workers, and involve the defence ministry in providing security for operations. Unusually, the contracts call for extensive expenditure by the foreign companies on schools, hospitals and local infrastructure, to be agreed with local and tribal authorities.¹⁷ Iraq still lacks a basic oil law; contracts are awarded on the basis of the draft law. Procedures for selling future oil exports are also uncertain. Currently all oil exports (except from Kurdistan, *de facto*) are sold by the State Oil Marketing Organization and the proceeds paid through the International Advisory and Monitoring Board into the Development Fund for Iraq, which is protected from lawsuits and claims against the Iraq government for post-war and similar damages. However, this UN-mandated system is only renewed on an annual basis and will eventually be dismantled in favour of Iraqi government procedures. Even so, Iraq's proven and potential oil reserves, and the emergence of a set of awards to international companies, are powerful drivers that might lead to lower prices than in the EIA reference case. There is, of course, always the possibility of a short-term mismatch between supply and demand, with a price spike. Higher production from Iraq would mean more of a surplus available to cover the growth in Asian demand. In this scenario, Iraq's own consumption would also grow rapidly, and as a result not all of the higher production would be available for export.

Middle East capacity and production

The Middle East supply in the EIA reference scenario assumes a reduction of spare capacity in the short term (as consumption rises while OPEC controls production to support the price), with a slow growth from additional capacity in the long term.¹⁸ Figures for individual countries imply increases in production in all of them, but within the limits likely to be set by reserves and depletion policies that keep production at 2–5% of remaining reserves.¹⁹ With slow increases in capacity there is, again, always the possibility of a price spike.²⁰

14 EIA Country Analysis Brief, Iraq, September 2010, <http://www.eia.doe.gov/cabs/iraq/Full.html>.

15 For a field-by-field review, see Stuart Staniford, *Iraq Could Delay Peak Oil by a Decade*, 10 January 2010, <http://www.theoilrum.com/node/6101>.

16 Peter Wells, 'Iraq's Technical Service Contracts: A Good Deal from Iraq?', *Middle East Economic Survey*, 23 November 2009.

17 Ben Lando, *Iraq Oil Report*, 21 July 2010, www.iraqoilreport.com/oil/production-exports/tocs-and-ministries-air-concerns-in-long-haul-to-12-5-m-bpd-4847/.

18 Estimate by the EIA at 5 bd at end 2009, of which 1.5–2 mbd should be regarded as Saudi strategic storage.

19 Mitchell and Stevens, *Ending Dependence*.

20 Paul Stevens, *The Coming Oil Supply Crunch* (London: Chatham House, 2008).

Effect of prices

Projections of regional oil balances cannot be divorced from the global supply–demand balance and global oil price. Higher prices than those envisaged in the EIA scenario – \$108 per barrel in 2020, and \$133 in 2030 (in 2008 dollars) – would depress demand and increase supply. But there would be differences between regions, with proportionately more reductions of demand and increases of supply in North America and Europe, and fewer in China. High price spikes would accelerate investment in alternatives, putting in place production capacities that could subsequently compete on a cash (variable cost) basis with imports. Higher prices will improve the Atlantic Basin’s supply balances.

Unconventional oil

If increases in the supply of unconventional oil do not materialize for economic or technical reasons, prices may be higher than in the EIA scenario, but additional production will come from conventional oil – probably from Russia and Central Asia, with their large undeveloped resource bases. The impact on regional balances will depend mainly on the effect of prices on demand in North America and Europe.

Climate change policies

Stringent policies to curb carbon emissions across all regions, especially in Europe and North America, will depress demand, but also depress the development of sources such as non-conventional crude oil and tar sands that are emission-heavy. The effect on the Atlantic Basin’s deficit may be roughly neutral. Successful and cheap diffusion of carbon capture and storage (CCS) technology may depress demand for oil in coal-rich countries such as the United States and Russia, and slow the growth of demand in China and India. In terms of comparing the Atlantic Basin and the Asia-Pacific region, the effect may also be roughly neutral.

Conclusions on oil

Four main conclusions can be drawn from the oil scenarios:

- The balance of surpluses and deficits supporting the global oil market is shifting decisively to the trade between the Asia-Pacific region and the Middle East region.
- The Middle East is ceasing to be a strategic source of supply for Europe and North America, to be replaced by Russia, which does not have the low costs and financial flexibility of Middle East exporters.
- It is inevitable that Asian demand will be met more and more from investments in supplies from West Africa, Northern Iraq, Central Asia and Eastern Siberia. These regions will be the pivots of supply between the Middle East and the Atlantic Basin.
- These projections, though bullish on North American production, have so far discounted the potential of the foreign investment in Iraq for which contracts have been awarded. Higher production in Iraq would ease the competition for supplies from the pivotal areas above.

3 Global and Regional Gas Balances

As with oil, most countries are either exporters or importers of gas (some are both) with few entirely self-sufficient. Unlike oil, however, gas is traded mainly within regional markets because the transport of energy is more expensive in gas than in oil. Transport costs are a large part of the final cost of delivery and have a big effect on profits.

The United States, which consumed 22% of the world's gas in 2009, imported (net) 13%, almost entirely from Canada and the Caribbean. Countries in the Asia-Pacific region imported almost 40% of their supplies, more than half from within the region. Countries within the European Economic Area imported 46% of their supply, of which a quarter came from North Africa and half from Russia.

The ubiquitous LNG trade loosely connects the regions. There is cross-regional trade with sellers and buyers diversifying their business to reduce risks (for example, Trinidad LNG to Europe and Egyptian LNG to the northeastern United States). LNG trade has expanded rapidly, almost doubling over ten years. The impact of the recession on demand and the development of US shale gas have left surplus LNG import capacity in the United States and Europe. This could facilitate a further rapid increase of demand for LNG if consumption in these areas were to grow more rapidly than expected, for instance in response to slower-than-expected growth in wind power and other low-carbon sources of power.

The 2020 gas scenario

Our scenario runs to 2020, because of uncertainty about the potential for developing shale gas use in the longer term. The scenario broadly uses the US EIA 2010 *International Energy Outlook* (IEO) reference case to establish gas surpluses and deficits. Where country data in the IEO 2010 are not as detailed as in the *BP Statistical Review*, pro-rata allocation of regional totals has been used, using EIA national data. As before, given the uncertainties and approximations, the estimates should be treated as broad indications.

Pipelines are important in inter regional gas trade. The main assumptions are shown in Box 2.

Box 2: Gas pipeline assumptions for 2020

- Continuing pipeline supply from Russia and Eurasia: 170 bcm (similar to the present), assuming that Nord Stream, South Stream and other pipelines change the export routes rather than the absolute volumes.
- Central Asia–China pipelines: 30 bcm (current projects actual and committed).
- North African pipeline and LNG capacities consist of existing and firm projects (the Gasli pipeline), not used to full capacity.
- Exports from Russia and Central Asia to Europe are assumed at 150 bcm, near the present level. Russian domestic demand is not assumed to fall as a result of carbon or pricing policies. (The IEO actually implies a deficit in Russia and Ukraine together.)
- Pipeline exports from Central Asia to Asia are assumed at 30 bcm (existing pipelines and those under construction). A Russia–China pipeline is not assumed. There is no trans-Saharan pipeline.

Gas scenario balances

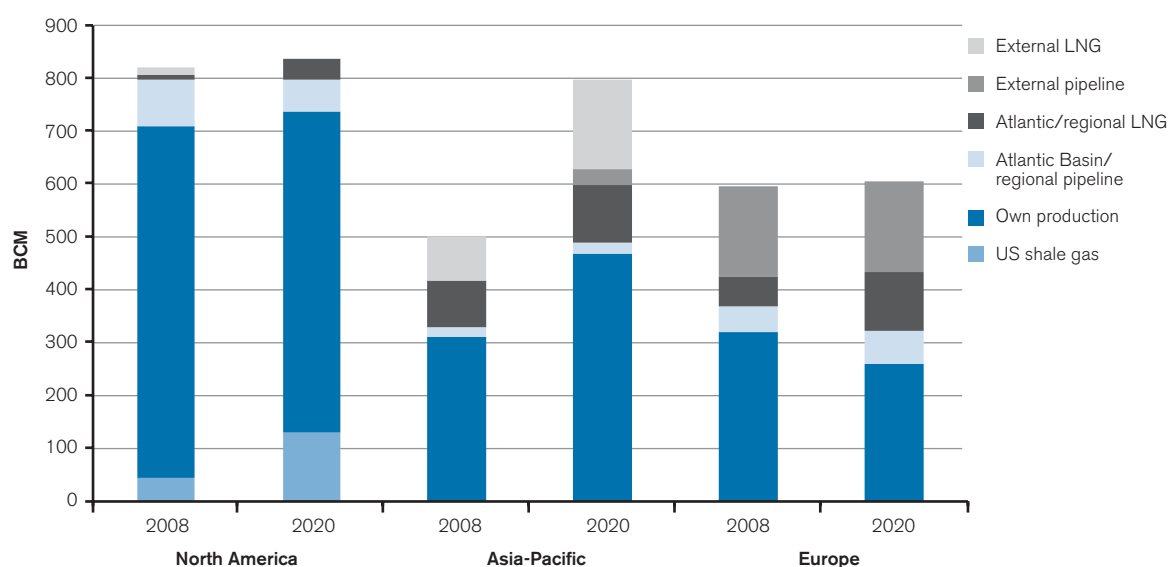
In *North America* domestic production holds up as shale gas is assumed to replace declining conventional gas, though the speed, extent and cost of this are uncertain.²¹ Imports from Canada – where production is declining – are replaced by higher production in the United States and around 30 bcm of additional imports from the Atlantic Basin. The region is balancing on the edge of export capability. For this region, dependence on the Middle East is not a problem.

In the *Asia-Pacific region*, increased production in Australia is necessary to match growing demand, if Qatar maintains a moratorium on further expansion. Pipelines from Central Asia introduce a new source of supply but LNG continues to meet about 35% of Asia-Pacific gas demand. The Asia-Pacific share of global LNG trade falls from about 75% to about 64%, reflecting the increased dependence of Europe on Atlantic Basin supplies.

For *Europe* things do not get better. Its own share of production falls. There are limited increases in pipeline supplies from Algeria and Libya (and no increase from Russia and Central Asia). LNG imports from the Atlantic Basin double, bringing the LNG share of European gas supplies from 9% to 19%.

Figure 8 compares the development of gas supplies in the three importing regions, and their shares in percentage terms are shown in Table 2.

Figure 8: Gas balances, 2008 and 2020



Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Table 2: Percentage share of gas supplies

	North America		Asia-Pacific		Europe	
	2008	2020	2008	2020	2008	2020
Own production	88	88	62	59	54	43
Regional pipeline	11	7	3	3	8	10
Atlantic/Regional LNG	1	5	18	14	9	19
External pipeline	0	0	0	4	29	28
External LNG	0	0	16	21	0	0

Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Note: Totals may not add to 100%, owing to rounding.

21 See Stevens, *The Shale Gas Revolution*.

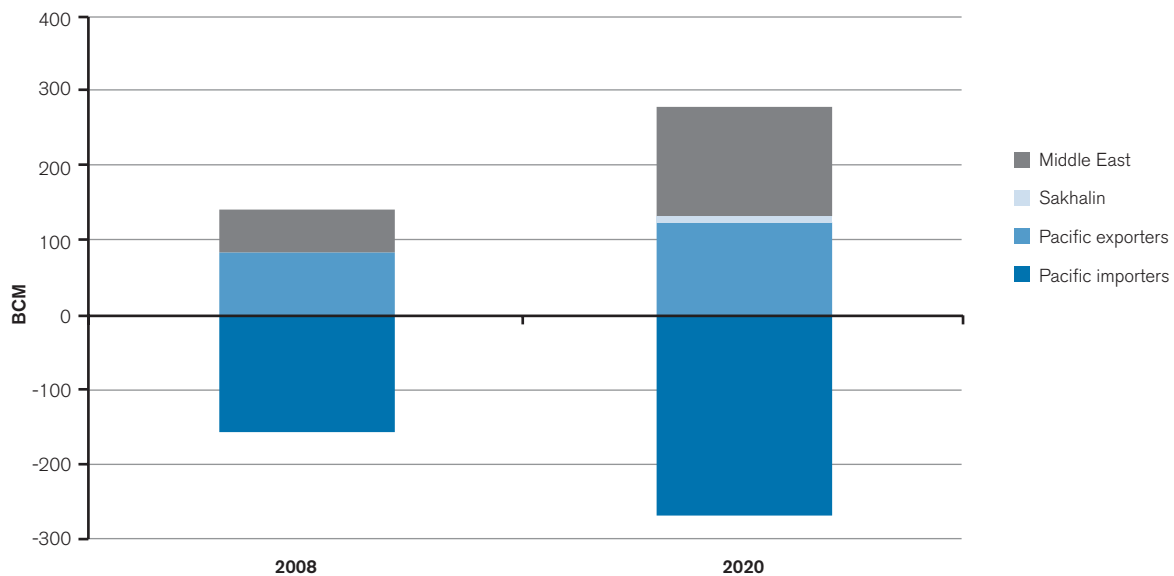
LNG

The 2020 scenario implies slightly more than a doubling of world LNG trade (new pipelines do not match increasing consumption), half in the Atlantic Basin and half in the Asia-Pacific. LNG will account for about 47% of all inter- and intra-regional gas trade, and about two-thirds of the global LNG trade will be in the Asia-Pacific region. More shale gas, or less from renewables than assumed, could change this projection.

Actual trade would vary from the underlying surpluses and deficits as sellers and buyers diversify their business, but probably not by much. With the Atlantic Basin and Asia-Pacific regions each roughly in balance, there is nevertheless likely to be enough trade between east and west – for arbitrage and diversification – to keep prices in the two markets connected, though not exactly aligned.

In the Asia-Pacific region, over half the total LNG demand of 270 bcm in the 2020 scenario could be supplied from the Middle East (see Figure 9), but if future expansion in Qatar does not take place as the EIA IEO assumes, regional supplies (from Australia) would take the greater share.

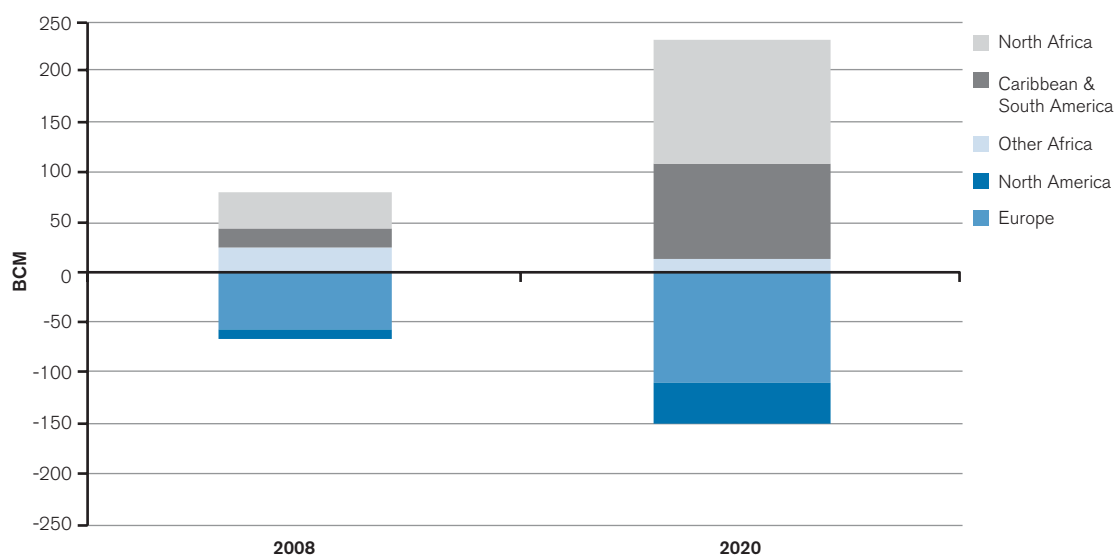
Figure 9: 2020 scenario – underlying Asia-Pacific LNG balances



Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

In the Atlantic Basin, the scenario increases European LNG demand by 50 bcm to 110 bcm (see Figure 10). The apparent supply of LNG increases more than the scenario demand, which assumes slow growth. If these increases in supplies were realized, there would be scope for LNG to penetrate more easily into the European market at the expense of pipeline imports from Russia and Central Asia. To realize this possibility, and the benefits in terms of competition and security, the German and Italian markets would need to be more open to LNG imports, either directly or through enhanced capacity and access in trans-European networks. These scenarios are roughly in line with current estimates of nominal liquefaction and re-gasification capacity (both existing and committed) in the regions concerned. Higher quantities could be accommodated without major investment in plants and terminals.

Figure 10: Atlantic Basin LNG balances



Sources: BP Statistical Review 2010, EIA International Energy Outlook 2010. Author's modifications.

Regional or global gas prices

Prices (and price expectations) are formed in different ways in the different regions. Because of transport costs, arbitrage between regional gas markets is not continuous, but the potential for it exists.²² In the Atlantic Basin the proportion of LNG available as equity or 'branded' LNG has risen rapidly to almost 40% of the imports into those markets and can potentially be switched both within the region and to the Far East.²³ If prices at Chinese ports are significantly higher than in Northwest Europe, Nigerian gas may be switched to China. If prices in Northwest Europe are significantly higher than in Chinese ports, Qatar gas may switch to European markets. Even without a link to oil prices, global gas price convergence is therefore likely to be loose.²⁴ Convergence with oil prices (themselves unstable), as advocated by the Algerian and Qatari energy ministers, is unlikely when arbitrage is possible and gas-on-gas competition prevails in large regions – North America and Northwest Europe – where oil and gas prices are not regularly aligned.²⁵

Gas-balance sensitivities

Shale gas

Shale gas is formed by the decomposition of organic material in shale deposits, of which there are very large volumes worldwide. In the United States, technically recoverable shale gas resources are estimated at around 40% of the conventional gas resource base.²⁶ Production from the Marcellus and other basins has proved the efficacy of new technology – horizontal drilling – transferred from conventional reserves, combined with 'fracking' – the injection of water and chemical particles that fracture the shale and enable the gas to flow. Production from individual wells declines rapidly, so that overall production

22 Howard Rogers, *LNG Trade Flows in the Atlantic Basin: Trends and Discontinuities* (Oxford Institute for Energy Studies, March 2010); Akira Miyamoto and Chikako Ishiguro, *A New Paradigm for Natural Gas Pricing in Asia* (Oxford Institute for Energy Studies, 2009); Morten Frisch, 'Europe Spot Gas Prices: A GECF Challenge', *Middle East Economic Survey*, 3 May 2010.

23 Yoshikazu Kobayashi, 'Natural Gas Situation and LNG Supply/Demand Trends in Asia-Pacific and Atlantic Markets', Institute of Energy Economics of Japan, *Energy Journal*, Vol. 5, No. 1, 2010.

24 James Jensen, *Recent Developments in LNG Trade* (Energy Charter Secretariat, 2008).

25 'Factors Affecting the Relationship between Crude Oil and Natural Gas Prices', US EIA *Annual Energy Outlook 2010 with Projections to 2035*, May 2010; Jonathan Stern, *Continental Long-term Gas Contracts: Is a Transition Away from Product-linked Pricing Inevitable and Imminent?* (Oxford Institute for Energy Studies, September 2009).

26 US EIA, *Annual Energy Outlook 2010*, Table 9.1.

from a deposit depends on a continuous programme of new drilling – an incremental cost that would make shale gas production sensitive to price and easily able to respond to changing prices. In the United States and Canada, access to the existing gas-transport infrastructure allows for easy substitution by shale gas for declining conventional gas. There are environmental concerns about the effect of fracking materials on groundwater, and the huge water requirements.²⁷ The EIA's *Annual Energy Outlook 2010* gives a range of 0.8–4.5 TCF of natural gas imports to the United States (compared with its reference case of 1.5 TCF), depending on US shale gas economic and technical results, and price.²⁸ There are potential shale gas resources in Germany, Poland, China, Russia, India and elsewhere that may prove economic to develop.²⁹ Major international oil and gas companies have been acquiring shale properties worldwide. The diversity of physical characteristics and the stepwise nature of development projects indicate an incremental supply curve for shale gas. It is not a technology requiring massive projects for reservoir development.

Conclusions on gas

Four main conclusions can be drawn from the gas scenarios:

- Global gas markets will continue to divide regionally between the Atlantic Basin and the Asia-Pacific region, with each area roughly in balance, given the expected growth of US shale gas. In the longer term, shale gas development in importing countries such as China and India and in Central Europe may reduce growth in the international gas trade.
- In the Atlantic Basin market, the division between pure gas markets in North America and the United Kingdom, and Continental Europe with oil-related price formulae, will be in conflict with the emergence of a single European gas market where the LNG share of supply will double to around 20%.
- The Asia-Pacific market will be dominated by competition between state-controlled investment and supplies from Qatar and private-sector supplies from a variety of projects in Australia.
- With more than two-thirds of global LNG traded in the Asia-Pacific, it is unlikely that gas prices there can be maintained by formulae linked to spot oil prices on commodity exchanges in New York and London. But there is no alternative in sight.

²⁷ Stevens, *The Shale Gas Revolution*.

²⁸ Howard Gruenspecht, Presentation to Kentucky Oil and Gas Association, 18 June 2010, www.eia.gov/pressroom/presentations.cfm.

²⁹ Wood Mackenzie, *China Gas Study*, reported in press release 26 July 2010, www.woodmacresearch.com/cgi-bin/corp/portal/corp/corpPressDetail.jsp?oid=2092548.

4 Securing Access to Resources: Investment Strategy

Since importing countries cannot eliminate the need for oil imports and many cannot reduce the need for gas imports, questions arise as to whether imports can be 'secured'. The rhetoric often confuses two strategies. One is investment by foreign companies from importing countries in projects in exporting countries. The other is securing non-discriminatory access to exports in the global or regional market, where WTO and other international obligations apply. The two strategies are to some extent in conflict: privileged access is inconsistent with open competitive markets. This section discusses investment strategy; trade strategy is the subject of Section 5.

Governments have no control over the location of oil and gas resources, but they can determine what happens to them. For exporting countries, control over their natural resources is a matter of sovereignty little constrained by international obligations. (Even in the EU, control over the exploitation of natural resources is reserved for member governments.) In most of the world all mineral rights belong to the state (except the United States and Canada, where the state owns only minerals under state land).³⁰ Investors are given access through exploration licences, leases, concessions, joint ventures and production-sharing agreements or contracts (PSAs or PSCs) with state-controlled companies that are granted rights by the state.³¹ Everywhere regulations are designed to protect the prudent management of the resource, the environment and, in some cases, the impact on local communities.

OPEC

There is no OPEC prescription for the terms on which foreign investment will be allowed or contracts granted to foreign companies, as shown in the variations outlined in Table 3. OPEC was created in 1960 in response to a price reduction imposed by the foreign companies that controlled, through concessions, the developments, export and pricing of the member countries' petroleum. All the founder members, except Venezuela, had been subject to foreign rule, control or intervention in the preceding half-century. The struggle to gain control of their natural resources was an integral part of asserting their independence. Later members also had a recent history of colonial rule. Early OPEC actions concerned building a common front against the companies on matters of royalty expensing and taxation. In 1968 a Declaration of Petroleum Policy was adopted that included the principle of participation in the ownership of the foreign concessions, and the principle of regulation of production. Events moved rapidly in the 1970s and 1980s, through two oil crises and the ending of foreign concessions (and of collective negotiations on prices with international companies) in most countries. Subsequently OPEC members tried to control international prices through the actual regulation of production. Foreign companies investing in the limited opportunities available in OPEC countries are normally subject to OPEC production quotas.³²

The argument of OPEC governments that uncertainty about demand inhibits their state companies' investments is not matched by any willingness to create opportunities for foreign companies to take the investment risks.

30 In the United States and Canada, subsurface rights under federal and state lands and offshore resources in the economic zone beyond state waters.

31 In these countries, governments generally control the rate of development indirectly, through the supply of acreage (leases on government lands), approval of private-sector development loans, and taxation. Except in Norway, state-controlled companies do not invest directly in projects. In Norway, the government, through depletion policy, has regulated the pace of development, in which the state participates directly through its state-controlled company Statoil Hydro, which controls 80% of Norway's oil and gas production, and Petoro (a state vehicle which invests directly in Statoil and its projects).

32 Unless their agreement with the state company provides that the latter bear all the country's production cuts.

Gas Exporters' Forum

The role of the Gas Exporting Countries Forum (GECF) is likely to be limited. The situation is not the same as for oil and OPEC. One of OPEC's principal original objectives – to secure sovereignty over natural resources and state participation in their development – was achieved for the gas exporters without the existence of the GECF. The ability of the Forum to influence prices by reducing regulation is not the same as OPEC's ability to do so: 70% of gas consumption does not enter into international trade (compared with 35% in the case of oil). Any formula for pricing needs to bridge the divide between gas-on-gas markets and oil-related pricing (which the GECF appears to advocate); any production control would have to deal with the different impacts of controls on production for LNG and production for other uses; and controls on exports would for most exporters contradict their GATT/WTO obligations.

State companies

Where investments in exploration and production depend on participation by state companies, either exclusively (as in Algeria for oil, Saudi Arabia, Kuwait or Mexico) or in controlling interests (as in Russia, Norway, Brazil, Central Asia, Indonesia, other Middle Eastern countries and West Africa), there is a double key to development by foreign investors: the willingness and capability of the state-controlled company and that of the private-sector investment partner. In some countries, private-sector investment is allowed in export refineries. Restrictions on foreign-service companies and technical exports may affect the state-controlled companies in the resource country as well as foreign investors. There are no state oil or gas companies in the United States, Canada, the United Kingdom and Australia. There, the rate of investment in oil and gas production and export depends entirely on the private sector, within a framework of licences, taxes and development permits.

Governments differ widely in making resources available for investment and in their treatment of investments made. National differences matter and a very broad regional pattern in *oil* can be observed:

- In North American countries (excluding Mexico) domestic oil production is exclusively by the private sector, which supplied about 50% of consumption in 2009, rising in the scenario to 57% in 2030, owing to the development of unconventional oil.
- In the Asia-Pacific region, outside Australia, almost all domestic production was from state or state-controlled companies. In 2009, 87% of Asia-Pacific net oil deficits were met by surpluses from state-sector countries in the Middle East (excluding the United Arab Emirates). In the 2030 scenario, the Middle East percentage falls to 74%, as the Asia-Pacific region needs to tap the oil surpluses of other exporting regions. Opportunities for private-sector investment are in practice limited to contracts for incremental production from Iraq and Iran, which offer foreign companies fixed fees per barrel and a right to buy oil at international prices.³³
- Exports from Russia and the other 'pivotal' areas (West Africa, Iraq, Central Asia) depend on investment in a variety of mixed private- and public-sector arrangements, with a bias towards control by state companies.

The terms for investment in *gas* supplies also differ between regions.

- In North America, almost 100% of gas consumption in the United States and Canada is supplied by the private sector.
- In Europe, about two-thirds of own production (about 40% of consumption) is provided by private-sector investments. Russia's Gazprom meets just over 60% of Europe's gas deficits, and

33 In the United Arab Emirates, the current participation agreements effectively work like contract agreements.

- pipelines from state companies in Nigeria and Libya meet a further 17%.
- Surpluses from exporters to the Atlantic Basin depend on investments in mixed-sector countries including the ‘pivotal’ areas (Russia, West Africa, Iraq, and Central Asia).
 - In the Asia-Pacific region, Australian private-sector supplies met 14% of the deficits in 2008, a share expected to increase to 27% in the 2020 scenario. The remainder is supplied by mixed companies in the region (in Indonesia and Malaysia) and the Middle East (the United Arab Emirates, Qatar and Oman).

In some countries the mix between state and private companies is different for oil and for gas; the latter is sometimes more open to the private sector (as in Saudi Arabia). Governments may have a stronger or exclusive interest in gas production than in liquefaction plants or pipelines, where investors from importing countries may be partners.³⁴

Discrimination in favour of the state company of the country owning the resource is a fact of life. Legislation in Algeria and Brazil to put the state company on an equal footing with private-sector investors in bidding for licences has been reversed.

Conditions of access

For companies from importing countries, the terms of access, conditions of competition and security of investment are important: they determine the size and competitiveness of the companies’ business, and vary from country to country. The key features are outlined below.

Licensing, leasing and contracts

Countries wishing to attract foreign investment in oil and gas exploration and development have incentives to widen the field of potential investors by offering access through a transparent bidding process open to investors from all countries. Cases of exclusions from such processes have mainly been due to sanctions imposed by foreign governments (such as the US sanctions in Iran and UN sanctions in Iraq). In a number of countries the process of allocation has not been transparent and companies may be disadvantaged as a result. A further problem is that agreements with foreign investors focus on oil and do not precisely cover a situation where there are significant discoveries of gas in the project, and obligations for local content and participation are not well defined in advance.

Contribution to the local economy

In some countries (e.g. Angola and Nigeria) bidding has been bypassed by agreements with Chinese state-controlled companies whose activities are linked to investment in infrastructure by the Chinese government, banks or development agencies – without the kind of conditionality based on human rights or revenue transparency that is now required by many Western investors and lending agencies. The terms available for foreign investment in Iraq include requirements for foreign investment to assume large (but not yet specified) obligations for local infrastructure and social service investment.

Costs and government ‘take’

The economic advantages or disadvantages of access to exploration and development projects for resource owners, investors, and oil and gas consumers depend on costs, bid terms, work obligations, taxes and royalties (or equivalent government ‘take’) and prices. All of these may be affected by local political and governance developments. Bidding for projects includes bidding on one or more of these variables. There is a degree of competition between some governments to attract private-sector investment. The opening of Iraq to foreign investment enlarges the opportunities available to foreign companies, but does not mean that Iraq need offer better terms than, say, Iran if foreign companies are competing intensely for investment opportunities.

34 A checklist of private and state participation in world LNG production and gasification appears in Kobayashi, ‘Natural Gas Situation’.

Table 3: Types of investment access

	Oil	Gas
North America		
US and Canada	Private sector; leases from state for federal and state lands	Same as oil
Mexico	State monopoly (PEMEX)	Same as oil
Europe		
United Kingdom	State owns oil; licenses private sector	Same as oil
Norway	State owns oil; state-controlled company (STATOIL) and state investment interest. Private sector licensed with STATOIL participation	Same as oil
Russia	State-controlled company (ROSNEFT) dominant partner with private-sector local and foreign companies. Pipelines controlled by state company (TRANSNEFT)	State-controlled company (GAZPROM) has pipeline monopoly and controls most production
Central Asia and Azerbaijan	State companies with private-sector partners in PSCs	Same as oil
Atlantic Basin		
Algeria*	State company with private-sector partners in PSCs	As for oil, but state company (SONATRACH) has monopoly of gas exports and controls gas export terminals
Nigeria,* Angola* and West Africa	State participation in old concessions (under review) State companies with joint ventures or PSCs	LNG company with majority private-sector shareholders
Brazil	State-controlled company; PSCs with private sector	Same as oil
Venezuela	State company, contracts with private sector	Same as oil
Asia-Pacific		
China	State-controlled companies, contracts with private sector	Same as oil
Australia	State licenses private-sector companies	Same as oil
India	State-controlled companies; licences to private sector	Same as oil
Middle East		
Saudi Arabia*	State monopoly (Saudi Aramco)	Some private-sector contractors with Saudi Aramco
Kuwait*	State monopoly (KPC)	Same as oil (on gas
Iran*	State monopoly (NIOC), limited service contracts for private sector	State monopoly (NIGC) partnering private sector in LNG projects
Qatar*	State monopoly (QP) with PSCs	State company (Qatargas) in consortia with private sector
United Arab Emirates*	State participation in old concessions	Same as oil

*OPEC member

Access to technology

Costs depend to some extent on the terms of access to technology and capital in producing countries: access to technology is an advantage for foreign investors, and some may rank higher than others. If the United States has the 'best in the world', then other countries may be indexed in terms of their ease

of access to US technology and capital, though this may be offset by local advantages in terms of lower material, personnel and energy costs (comparisons are also affected by exchange rates, for example in the case of China). Access to technology may be limited by sanctions applied by the United States or the UN (e.g. in relation to Iran, Iraq, Libya and Sudan) or by policies in resource countries, which limit access for technicians and technical service companies. (This is a current problem in Iraq, whereas the scope for such restrictions is limited in countries, such as Saudi Arabia, that are members of the WTO and the General Agreement on Trade in Services (GATS).)

Protection of foreign investors

The decisions of resource-rich countries over access to their natural resources are excluded from the EU treaties and from agreements such as the North American Free Trade Agreement (NAFTA). Once access is granted, foreign investors in resource projects are, in many countries, protected by international obligations regarding non-discrimination, dispute settlement and expropriation (see Box 3). Very broadly, such treaties may increase the political costs to a host country of damaging private-sector foreign interests, but cannot completely prevent such damage.

Box 3: Investment-protection treaties

- NAFTA guarantees national treatment (with some exceptions) for US and Canadian investors.
- The United States has bilateral investment protection agreements covering gas (among other things) with Trinidad and the United Kingdom.
- Some European countries have agreements with Nigeria, which is also a member of the World Bank's Multilateral Investment Guarantee Agency (MIGA).
- Most gas-exporting countries, but not Qatar, are parties to the 1965 Convention on the Settlement of Investment Disputes between States and Nationals of Other States (ICSID Convention).
- Kazakhstan and Turkmenistan are the main significant oil- or gas-exporting countries which have ratified the Energy Charter Treaty.

Private-sector companies

Foreign companies are competing intensely for investment opportunities abroad but their 'scramble for resources' is in fact a scramble for investment opportunities rather than a scramble for supplies. Success rewards the shareholders rather than consumers in importing countries.

Companies investing outside their own country are likely to prefer projects whose costs are lower than those of other suppliers: larger pre-take margins provide more security against future increases in government take and against lower prices. The geographical analysis suggests that competitive costs within the region are the most critical for gas, and exporting governments' policies the most critical for oil: prices can be influenced by the policy of dominant suppliers, which are state companies.

5 Access to Supply and Markets: Trade Strategy

Governance

International trade is governed differently from the exploitation of natural resources. A government's power is limited to control over its exports and imports. For many countries this control is limited by obligations under international agreements such as the WTO or regional and bilateral trade agreements, which generally prohibit discrimination among trading partners.³⁵ Broadly speaking and under normal conditions, such discrimination does not appear to be a problem. Policy rhetoric has focused on underlying factors that affect the supply of exports and the demand for imports to global markets, rather than advantages or disadvantages for individual countries. On these general issues, it is the exporters who feel insecure, as indicated by OPEC Secretary-General Abdalla Salem El-Badri.³⁶

In future more trade will be subject to the policies of Asia-Pacific importers, notably China, than to those of the United States and European importers. The investments of oil exporters in overseas refining provide some security of markets. But Saudi Aramco, Kuwait International Petroleum and Petroleos de Venezuela have in the past focused on the United States and Europe, which are no longer the most important targets. Saudi Aramco has secured over half a million barrels per day of equity-equivalent interest in refineries in Japan, China and Korea (although achieving this has been hard going). Much of Saudi Aramco's 2 mbd of domestic refining for export is directed at Asian markets. Downstream operations allow crude-oil-exporting state companies to practise price discrimination by allowing prices to their subsidiaries below those charged to third parties (at the risk of challenge under the WTO or EU anti-dumping legislation), or to accept low or negative profits in their overseas downstream or product export operations.

The demand for imports of oil or gas may be limited by taxation or subsidies and incentives for substitutes. These do not (and may not, under the WTO) discriminate between countries, but do discriminate between fuels (e.g. restricting or differentially taxing consumption of fuels according to their carbon content). These policies are constantly criticized by OPEC countries. They might be challenged on the basis of a demonstrably damaging trade effect, or made the subject of WTO litigation, but oil-exporting countries have not taken this route.³⁷

Problems may arise under 'abnormal' conditions where political conflicts are intergovernmental. How far these lead governments to override normal trade frameworks depends on the conflict, the priorities of the governments concerned and the likely retaliation. The possibility of legal retaliation within the WTO could deter the escalation of sanctions or embargoes into an oil- or gas-related 'trade war' between particular countries. If the Energy Charter Treaty had wide participation by exporting countries, it might provide similar deterrence.³⁸ A policy of pre-emption – permanently reducing imports (or exports) for all countries because of the risk of conflict with some – would be very costly. The economic benefits of trade are very large; it would be difficult to single out trade or investment in a potential conflict with any given country because of WTO obligations on non-discrimination and the administrative problems of making discrimination effective.

35 Almost all significant oil and gas exporters are members of the WTO except Algeria, Russia, Algeria, Iran and Libya, which have initiated access processes. Non-OECD countries Belarus, Brazil, China, India and South Africa are WTO members.

36 See note 9 above.

37 See Sherzod Shadikhodjaev, *National Treatment on Internal Taxation: Revisiting GATT Part III*: Trade Working Papers 1970:1, East Asian Bureau of Economic Research, 2008.

38 As of August 2010, Azerbaijan, Kazakhstan and Turkmenistan were the only significant oil exporters that had ratified the Treaty. Norway has signed but not ratified.

The shift in global balances does change the importance of particular trading partnerships and therefore of the political environments surrounding them. For the United States, dependence on global imports is not expected to grow if the projections of unconventional oil and gas are fulfilled. For Europe, the shift of Middle East oil to Asian markets increases dependence on Russia, and the importance of achieving a stable political and security relationship between the EU and Russia within which energy trade and investment can develop. The dependence of Asian importers on the Middle East is less threatening because they are free from the legacy of the Israel–Palestine conflict.

Market structures

For both oil and gas, the shift of the global trade eastwards also means a shift to market structures that are more dominated by governments and state-controlled companies on both export and import sides. This is more the case for gas than for oil.

Dominant suppliers

Saudi Arabia for Asia-Pacific oil

Exceptionally, in the case of Saudi Arabia, state and state-company investment policy may influence world oil prices through the country's dominance of the Asia-Pacific market. Saudi Arabia supplies 13–15% of the world trade in oil, and as a matter of policy maintains 1.5 mbd (2–3% of world oil trade) of strategic spare capacity,³⁹ which can be used to limit price increases in times of scarcity. Because of this dominant position, Saudi Arabia has a leading position in OPEC, whose members influence prices by agreeing quotas for oil production.⁴⁰

Through its export terminal on the Red Sea at Yanbu, Saudi Arabia also has a relatively cheap option to divert oil to the Atlantic Basin market to avoid short-term surpluses in the Asian markets, thereby maintaining the premium pricing that has prevailed in the Asian markets for many years. As the Atlantic market diminishes in importance for Saudi Arabia and other Middle East producers, exports to the Atlantic region may become a balancing item in their attempts to support Pacific prices – which is complicated if indexation of Pacific prices to New York and London exchanges continues.

Saudi Arabia's normal export capacity by 2020 will be equivalent to about a third of the Asia-Pacific region's oil deficit. It has the potential capacity to increase production, by developing known reserves, at prices below \$75. This gives it an influence over longer-term prices in the Pacific. Its policy can be a deterrent to investment elsewhere that would only be profitable, or offer only narrow pre-take margins, at higher prices.

Qatar and Asia-Pacific gas

In the Asia-Pacific region the policies of Qatar, a major low-cost external gas supplier, have some potential to influence price expectations and therefore investment by competing suppliers in the region (some of whom are also investors in Qatar). Though there are foreign investors in Qatar's gas projects, the Qatar national company is a majority partner in all projects, and directs trade through control of the nation's joint export marketing company.

By 2020 Qatar may control around a third of LNG trade in the Asia-Pacific region from capacity in existence and under construction. Qatar has the ability further to expand production very cheaply. (The EIA scenario has Qatar capacity almost doubling by 2020.) It is the only major supplier with the financial capacity to endure cutbacks in production, if necessary, to stabilize the market. It may adapt its own expansion plans to secure prices that affect expansion elsewhere in the region, seeking prices low enough to moderate Australian expansion, but high enough too satisfy its neighbour and competitor, Iran. Investment in Qatar has to be measured against a view of the country's future policy; it has less

39 Speech by Saudi Petroleum Minister HE Ali Al-Naimi, Business Opportunity Forum, Chicago, 30 June 2010, reported in *MENAFN – Arab News*.

40 OPEC members accounted for 41 % of world oil production in 2009. Members (in order of production, 2009) are: Saudi Arabia, Iran, United Arab Emirates, Venezuela, Iraq, Kuwait, Nigeria, Angola, Libya, Qatar, Ecuador and Gabon.

than a million citizens, a large sovereign wealth fund,⁴¹ little other economic activity, and a need to weigh its depletion policy against the needs of future generations. Its resource base, though large, is subject to uncertainty as to volume and cost at higher levels of production.

Alongside the global market, regional market structures create obstacles, which vary significantly between regions.

Price mechanisms

The nearest equivalent to a ‘world price’ for internationally traded crude oil is the price for ‘dated Brent blend’. This is the price for a cargo of Brent Blend crude oil with a date for delivery in Northwest Europe), published daily by Platts, a commercial monitoring organization.⁴² It is closely linked to the prices for future contracts for Brent Blend traded on the London International Petroleum Exchange. The New York Commodity Exchange also trades futures contracts for West Texas Intermediate (WTI) crude, delivered at Cushing in the US. Other types of crude oil are traded internationally at discounts or premia relative to one of these indexes or to the new commercial index (the Argus Sour Crude Index) set up to reflect the value of Saudi heavy crude in the United States. The oil commodity exchange in the Middle East (in Dubai) has a limited impact given the absence of a supply of unrestricted oil, though the differential between Dubai and Brent (European) prices may give an indication of the balance between Eastern and Western markets.

The complexity of this fragile pricing system reflects the difference between an open competitive market for freely traded crude in the Atlantic region, and the rigidities of the Asian markets dominated by state-controlled sellers who prevent the resale of their crude in open markets (see below). Asian importers have in the past paid an ‘Asian Premium’, meaning that Middle East exporters get higher f.o.b. prices for exports to Saudi Arabia than to Europe or North America – and LNG prices are linked to these oil prices. This may change as Saudi Aramco shifts its exports towards Asia.⁴³

There is no ‘world price’ for gas. Prices in Asian and continental European markets are fixed by formulae based on world oil prices. In North America and the United Kingdom, gas prices are fixed by daily prices on gas commodity exchanges. Future gas pricing mechanisms in Europe are uncertain as imported LNG becomes more important in Europe (see Section 3 above).

Market imperfections: resale restrictions

State and state-controlled companies normally impose restrictions on the resale of their exports (‘destination restrictions’) that prohibit their oil or gas from being traded on commodity exchanges. It would be illegal for US and EU private-sector companies to impose such restrictions, however.

Dominance of a few companies in importing countries

Today this is mainly an issue in the Asia-Pacific region, where a few state-controlled companies dominate the market. In countries such as China, efforts by some exporting companies (such as Saudi Aramco) to acquire or establish refining and marketing operations have had limited success, though Saudi Aramco has downstream outlets in China, South Korea and the Philippines. Exporting refineries in Saudi Arabia and Kuwait also access distribution companies and industrial importers in Asian markets. By contrast, the refining and marketing sectors in North America and, to a lesser extent, Europe and Japan are open to new entrants through acquisitions. Saudi Aramco and Petroleos de Venezuela have acquired substantial refining and marketing assets in the United States.

Pipelines

Pipelines immobilize markets for oil and gas for the regions at either end; this means that interdependence is greater than for exporters or importers in aggregate, as Table 4 shows. The main pipeline flows in oil

41 \$85 bn at the end of 2007: estimate by Institute of International Finance, Washington (equivalent to 2 years’ natural gas exports)

42 ‘Dated Brent prices are used, directly and indirectly, as a benchmark for a large proportion of the crude oil that is traded internationally’, Reuters Financial Glossary, http://glossary.reuters.com/index.php/Dated_Brent, accessed 1.10.2010.

43 ‘Asian Premium: Gone for Good?’, *Petroleum Intelligence Weekly*, 1 November 2010.

and gas are between Canada and the United States and between Russia/Central Asia and Europe. Within regions, individual countries may be even more dependent (for instance Germany in relation to Russia).

Table 4: Importance of interregional pipelines

	Pipeline share of exporting regions' production (%)		Pipeline share of importing regions' consumption (%)	
	Oil	Gas	Oil	Gas
All exporters/importers	4	11	5	9
Pipeline exporters/importers	15	19	20	29

Source: Author's estimates.

The problem is most severe for Central Asian exporters of oil and gas. They have access to the European market, but only through the Russian pipeline systems, which is monopolized by Gazprom and Transneft.⁴⁴ Bilateral lines from Kazakhstan and Turkmenistan to China create alternative outlets, supported by the importer's commitments. The projected shift towards LNG in both European and Asian markets will weaken the impact of the rigidities in gas outlets, as would the construction of the Nabucco line (favoured by the EU) from Central Asia to Turkey. The private-sector BTC and South Caucasus lines bring oil and gas exports from Azerbaijan to the Atlantic and Mediterranean Basin.

44 Or through the Caspian Pipeline Consortium (CPC) line to the Black Sea.

6 Energy Security

The common perception that investment in exporting countries by companies from importing countries contributes to the energy security of the importers is difficult to justify.

In 'normal times' these companies' foreign oil will be priced at market prices (the governments of exporting countries will ensure that), and be available for sale on the international market, or through the refining and marketing outlets for the private-sector companies, many of which may not be in their home country. The integrated companies may gain some economic advantage through better intelligence about crude and product market conditions, and an ability to optimize their trade and refining operations to make the best of the markets available to them. Some part of this advantage may filter through to the taxes paid by these companies in their home countries but the advantage (though large for the companies) will be small relative to the value of the oil, most of which is appropriated by taxation in the producing countries.

In 'abnormal times' importing governments may have security interests, but whether their companies' foreign production is of any help will depend mainly on the degree to which the government of the exporting country is involved.

In the event of a disruption of supply in some other part of the world, the government of an unaffected exporting country may allow some increase in production (if under OPEC quota: this would affect foreign production in Nigeria or the United Arab Emirates, for example.) The foreign company would have some discretion to increase its exports to the most profitable market; this might not be the company's 'home' country, so that the latter would have to rely on the IEA/EU sharing mechanisms (if the disruption were large enough to trigger these). Whether the government of an importing country could direct 'its' private-sector company to favour its 'home markets' is partly a political and partly a legal question; the company may have contractual obligations to existing customers or a general obligation to treat them equally.⁴⁵

If the government of the exporting country is involved, for example as the subject of a UN action, or as a participant in a political upheaval or civil war, or in some international political action, then that government has to decide whether to interfere with the production and export of oil from foreign projects. As far as exports are concerned, that government may be influenced by treaty obligations such as the WTO.

The existence of the foreign projects will act as a constraint on the policy of the foreign importing companies' home countries in exactly the way that energy security policy is supposed to avoid. They will in effect be hostages for the companies' home government's policy on any internal issue in which two governments are involved.

From the public policy point of view, it is therefore difficult to see that project investment in an exporting country makes a significant contribution to the importing country's energy security. It may in fact constrain its foreign policy options if the two countries are in dispute.

The converse of this analysis is that investment by exporting countries' state companies in refining and marketing in importing countries contributes to the importers' energy security. In normal times importing countries' consumers are not worse off. In abnormal times, if governments are in conflict, the downstream investments are 'hostages' to the importing countries, which may constrain the policy choices of exporting-country governments.

45 See the BP-UK dispute of 1973 in James Bamberg, *British Petroleum and Global Oil, 1950-1975: The Challenge of Nationalism* (Cambridge University Press, 2000), pp. 481-4.

The international energy security policy matrix

Governments face a diversity of challenges. Non-discriminatory policies that are beneficial under ‘normal’ conditions of international trade and investment differ from, and may contradict, those necessary to deal with abnormal conditions resulting from conflict between particular countries.

- Under ‘normal’ conditions the threat of accidental or temporary *disruptions* can be limited by strategic storage and by the cooperation of countries like Saudi Arabia, which maintain strategic reserves of capacity and have an interest in price stability.
- Investments in export projects by companies from importing countries to achieve *access to resources* do not contribute to security of supply if the governments are in conflict. They create hostages that affect the importing country’s foreign policy choices. The sovereignty of exporting countries over their natural resource is not limited by such investments, and is rarely subject to international treaty obligations.
- *Access to international trade* in oil and gas under ‘normal’ conditions is governed by the WTO, and the diversity of suppliers and markets should be better security against discrimination or unexpected events than any bilateral arrangement could be.
- Exporting countries in general are concerned that, even under ‘normal’ conditions their *security of markets* is threatened – in many importing countries by policies affecting the demand for oil and gas by taxation, by caps on the use of fossil fuels and by subsidies for alternatives. Some of these might be addressed by negotiations through the WTO,
- Governments of individual exporting and importing countries need to take account of the threat of *sanctions or embargoes* on oil and gas trade and investment in the development of their foreign policy with particular countries. The shift in the geographic pattern of balances raises the importance of Russia to Europe, diminishes the importance of the Middle East to both Europe and the United States, and raises the importance of the ‘pivotal suppliers’ in the balance between the Atlantic and Asia-Pacific regions.

7 Conclusions

Outlook

There are many uncertainties for oil and gas worldwide: the effect of future policies to restrict carbon emissions, the scale and cost of shale gas developments, the speed of development of Iraq's oil resources, the rate of growth of demand in China and the risk of geopolitical conflict.

Over the next 10 years, the global balances of oil and gas will shift to Asia, away from Europe and North America, which can no longer expect their oil deficits to be met from Middle East surpluses. This is also a shift from regions where the private sector and commodity markets play a major role to those, such as the Middle East and Asia, where governments and state-controlled companies play major roles.

North America's dependence on imports will not increase, however, given the growth of non-conventional and offshore oil and gas supplies in that region. Meanwhile, Europe will need to compete with Asian importers for supplies from 'pivotal zones' – Russia, West Africa, Iraq and Central Asia (Kazakhstan) – where state and private sector are in fragile balance.

The development of shale gas in North America will limit the growth of the global LNG trade so that regional gas markets will remain important. It is not inevitable that gas-to-gas competition will end oil-related pricing in Asia and Continental Europe.

Implications

The shift in the growth of export markets away from Europe will enhance the market power of countries – Saudi Arabia for oil, Qatar for gas – that are low-cost, state-controlled producers, able to vary production and investment plans relatively easily, and to divert marginal exports to the Atlantic Basin in order to support prices in their prime markets in Asia.

This market power can be used to enhance stability in investment, trade and price trends within a framework of a 'producer-consumer dialogue'. The International Energy Forum, which brings governments of importing and exporting governments together, may play a more important role in the future.

For the United States, the outlook promises reduced dependence on imports in both oil and gas, owing to competing private-sector companies expanding domestic production of conventional oil (notwithstanding closer regulation of deepwater drilling), and on biofuels. Production of heavy oil and shale oil in both the US and Canada is likely to expand (including through the private sector).

For Asian governments and companies, the prospect is one of increasing dependence on supplies from state-controlled companies in the Middle East, and from Central Asia and West Africa.

For Europe, as dependence on oil supplies from the Middle East falls away, the main issue is how to develop an EU policy that combines or pre-empts different member-state policies in relations with Russia – affecting gas and oil supply – and in supporting European companies in 'pivotal countries' where they are expected to contribute to wider economic development, as Chinese companies and government agencies are doing now. Chinese companies can also offer exporters opportunities in expanding downstream markets in China, which are not available in Europe.

Strategic challenges

Continuing competition for companies

International oil and gas companies, including Asian companies operating overseas, face competition which is geographically diverse, requiring different strategies and strengths and different degrees of cooperation with governments and support for national objectives:

- Competition in technology for safe developments of conventional oil and gas in deep waters, mainly in the Atlantic Basin;
- Competition with, and being contractors for, state-controlled upstream companies in the Middle East and Russia;
- Competition in unconventional oil and gas, mainly in the Americas (including Venezuela and Brazil), but possibly in future in Asia;
- Competition in 'pivotal countries' where Chinese companies are able to bring government support for wider economic development in exporting countries.

Further responsibilities for governments

The changing global balance of oil and gas challenges governments to consider:

- How to develop, through producer–consumer dialogue (specifically through the International Energy Forum), an international context within which market forces, and market power, can operate in an efficient and non-discriminatory manner;
- How to frame cooperation between state-controlled and private-sector companies, particularly regarding developments in the Middle East and Russia;
- How to develop policy frameworks within which the investment in oil and gas for export could contribute to the balanced and sustainable long-term development of the exporting countries.



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