2. EUROPEAN ENERGY SECURITY IN THE GEOPOLITICAL LANDSCAPE

At present rates of consumption, Europe's short- to medium-term energy security will be determined by its relations with external oil and gas producers. The argument laid out in this chapter describes Europe's energy dependencies as an evolving 'great game' over oil and gas. Increased domestic demand in producer countries, resource nationalism, and production shortfalls are precipitating a race for energy. Increased competition between European consumers and growth in producers' domestic energy markets will see less oil and gas dedicated for export to Europe. Most significantly, depressed investment in bringing new production on-stream as the world's economy slows down and before demand recovers, could create a serious energy crunch long before world oil and gas production peaks.

By giving an overview of the ongoing dialogues between the EU and its key regional energy partners, this chapter identifies the core challenges Europe faces in securing long-term energy supplies, the hurdles to overcome, and the mistakes to be avoided. To negotiate these realities, the EU must engage in coherent 'energy diplomacy' putting energy security, which is closely related to climate, food and water security, at the top of the foreign policy agenda.

European Energy Dependency

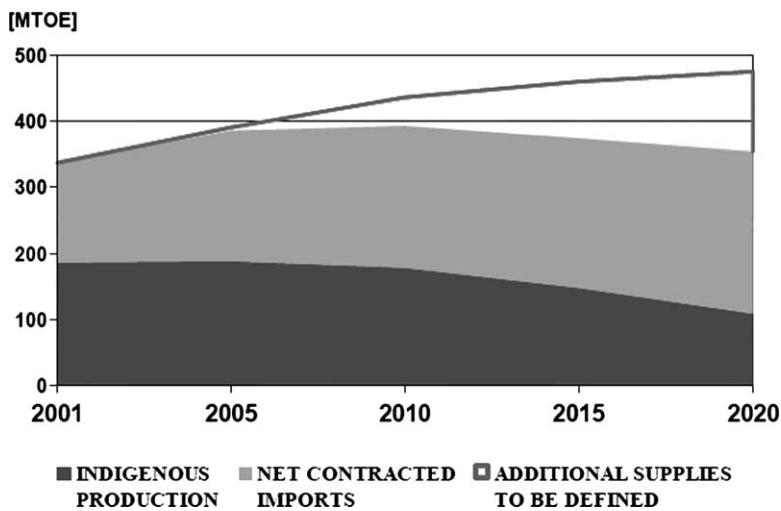
In 2005, Europe supplied 43 per cent of its natural gas needs from internal sources. The ability to do so will, however, decline substantially in the near future. EU-zone gas production peaked

in 1996, plateauing until 2004. EU production in 2020 is projected to be 39 per cent below 2005 levels, as illuminated in Graph 1 below.

Europe's main gas suppliers are Russia, Norway and Algeria. Together they supply 84 per cent of gas imports to the EU. Russia is the most important supplier, accounting for 42 per cent of imports, exclusively through pipelines. Algerian gas reaches Europe via a mix of pipeline gas and LNG into Spain, Italy, France and Greece. LNG makes up nearly 13 per cent of imports with Algeria, Libya, Qatar and Nigeria as important suppliers. Norwegian gas is imported through pipelines to the UK and the Benelux.

Europe's increasing dependency on external energy sources, especially oil and gas, was the subject of two significant European Commission green papers. The first, published in 2000, raised concerns over Europe's increasing reliance on

Graph 1: Natural Gas Demand and Supply Outlook 2001–20, European Union



Source: From presentation by Elena Telegina, 'International Investment in Russia's Gas Industry: New Directions of Energy Security in Eurasia', Paris, 25 November 2003, <http://www.iea.org/textbase/work/2003/soyuzgaz/proceedings/Telegina_slides.pdf>, accessed 1 October 2009.

foreign sources of fossil fuels.[1] However, the catalyst for action came in January 2006, when deliveries of Russian gas to large parts of Western Europe were disrupted after a pricing conflict between Moscow and Kiev – a development that cast serious question marks over Russia's reliability.[2] These events were repeated on 1 January 2009 when Gazprom halted the supply of gas for domestic consumption to Ukraine, again demonstrating the vulnerability of the EU to politically volatile regions. Since then, concerns over Europe's security of supply have crystallised, prompting a second energy green paper in 2006, which established energy as a major fixture of EU external relations.[3] As a result, energy security has enjoyed a meteoric rise up the EU's policy agenda. The EU has now established, or is in the process of establishing, energy agreements with Azerbaijan, Kazakhstan, Turkmenistan, Algeria and Nigeria. EU-OPEC dialogue has deepened and an EU-Africa energy partnership is currently being negotiated. Further packages and agreements are due to come into effect in 2009.[4] As one analyst observes, 'Energy is now a prominent issue in nearly all the EU's external political dialogues, whereas it barely appeared on the agenda five years ago'.[5]

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[1] European Commission, 'Towards a European Strategy for the Security of Energy Supply', Green Paper, COM(2000) 769, 29 November 2000.

[2] Russia is Europe's largest single external provider, supplying 25 per cent of European oil and gas.

[3] European Commission, 'A European Strategy for Sustainable, Competitive & Secure Energy', Green Paper, COM(2006) 105, 8 March 2006.

[4] European Commission, 'An Energy Policy for Europe: Commission steps up to the Energy Challenges of the 21st Century', MEMO/07/7, 10 January 2007; Council of the European Union, 'Brussels European Council 8/9 March 2007: Presidency Conclusions', 7224/1/07 REV 1, 2 May 2007.

[5] Richard Youngs, 'Europe's External Energy Policy: Between Geopolitics and the Market' (Centre for European Policy Studies, November 2007).

A New Great Game

The urgency behind the ascent of energy to the top of the European policy agenda is a response to Europe waking-up late to a new great game over energy. Playing out from Central Asia to the Gulf of Guinea in capital cities and energy ministries, we are seeing producers pitted against consumers in a scramble to secure access to oil and gas. As economist Joseph Stanislaw suggests:[6]

> The rules of this game are still being written, but its broad outlines are already clear. It is no longer confined to Central Asia – as was the original Great Game of the 19th century, pitting the British and Russian empires against each other. Today, while the energy resources of the Caspian feature prominently in the game, both the chessboard and the number of players have expanded.

Major consumers from the EU, the United States and the emerging Asian economies are increasingly anxious to secure long-term energy supplies. India's Oil and Natural Gas Corporation's acquisition of Imperial Energy to gain a stake in Russian energy reserves was just one chapter in an unfolding story in which Indian and Chinese state-run energy monopolies have looked to meet domestic demand by securing energy from Kazakhstan to Turkmenistan and Russia to curb dependency on world markets.[7] In response, exporters such as OPEC and Russia are husbanding their resources ever more closely, and mobilising the state into key energy sectors to ensure maximum returns. There are fears that we will see an emergence of a gas cartel, similar to OPEC, formed from leading producers of the Gas Exporting Countries Forum (GECF). Russia, Iran and Qatar have already agreed to work more closely together in a major gas troika dubbed the 'Gas OPEC' bringing together the first, second and third biggest holders of natural gas reserves respectively (and more than half the global total). The initial idea was to focus on joint projects including exploration, refining and selling gas.

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[6] Joseph Stanislaw, 'Power Play: Resource Nationalism, the Global Scramble for Energy, and the Need for Mutual Interdependence' (Deloitte, 2008).

[7] *Financial Times*, 'ONGC enters Modern Great Game', 1 September 2008.

Whilst the development of a fully operating gas cartel remains unlikely, the initiative was symptomatic of the fermenting distrust between European consumers and external energy producers.[8]

The high prices of mid-2008, fuelled by concerns over the future availability of oil and gas, are pushing downstream consumers to take steps that are threatening producers' security of demand. The reduction of future demand growth, the building up of diverse supply portfolios, increased efficiency, promotion of renewable alternatives, and an emphasis on maximising domestic production are all leading producers to fear that fossil fuel markets could severely shrink within the next generation. In response, producers are moving downstream to acquire markets so that they can lock up demand, exacerbating the security dilemma. Soaring demand and constrained supply saw oil prices hit record highs in 2008, reaching the $147 per barrel mark. This came on the back of global energy demand in 2007 that was above average for the fifth successive year as the global economy experienced the largest growth period since the early 1970s.

Financial Crisis and Production Decline

This trend is now reversing. Recessions in major industrialised economies have led to weaker deliveries to Organisation for Economic Co-operation and Development (OECD) countries. In

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[8] The potential for GECF to be transformed into a cartel that can control export prices and export volumes seems mainly based on aspiration. As Jonathan Stern argues, the GECF has proven an unstable and somewhat chaotic organisation with an unpredictable membership group and initiatives that have rarely been enforced. See Jonathan Stern, 'Gas-OPEC: A Distraction from Important Issues of Russian Gas Supply to Europe' (Oxford Institute for Energy Studies, February 2007). The nature of gas as a commodity, sold as it currently is on long-term contracts, rather than on-the-spot markets like oil, makes it difficult to form a cartel. More realistically, the GECF could be transformed into a platform for co-ordination and co-operation between gas exporters principally to prevent competition. See *Economist Intelligence Unit*, 'Why There Will Be No Effective Global Gas Cartel', 5 February 2007; see also *Upstreamonline.com*, 'Gas OPEC on the Cards', 21 October 2008.

turn, oil prices have fallen from 2008 highs. Back in 2008, the International Monetary Fund (IMF) was already forecasting that a major global slowdown, with no predicted growth in advanced economies, would last until mid-2009.[9] The European Commission revised its growth forecasts for Europe with average growth of 0.2 per cent in 2009, picking up slightly to 1.1 per cent in 2010.[10] Alarmingly, this coincided with a global decline in production. In its 2008 annual report, the International Energy Agency (IEA) warned that without extra investment to increase production, world oil output could decline by 9.1 per cent.[11] This comes at a time when energy companies are struggling to *maintain* investment, as the financial crisis delays projects leading to a potentially serious supply crunch later. The seizing up of global credit markets will further push back investment in bringing new production on-stream.

Large energy projects bring with them a high degree of risk. Pipelines, for example, are now multi-billion dollar investments that involve long paybacks, take several years to build and can overrun in terms of costs and time. Exposure to risk is compounded by an end product whose value is subject to price volatility. The credit crunch makes it difficult to find the money to invest in complex, multi-billion dollar projects. High exploitation and production costs and falling energy prices will ensure that a whole wave of supply is held back as producers' risk increases, rendering higher cost, harder-to-exploit assets unattractive.

The respite from high oil prices will not outlive the destruction of short-term demand. Fundamental economics higher up the value-chain, in other words high cost inflation

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[9] International Monetary Fund, 'IMF predicts Major Global Slowdown amid Financial Crisis', 8 October 2008, <http://www.imf.org/external/pubs/ft/survey/so/2008/RES100808A.htm>; International Energy Agency (IEA), 'Oil Market Report', 10 October 2008, <http://omrpublic.iea.org/currentissues/full.pdf>.

[10] European Commission, 'Economic Forecast, Autumn 2008', *European Economy* No. 6 (Luxembourg: Office for Official Publications of the EC, 2008).

[11] IEA, *World Energy Outlook 2008* (Paris: International Energy Agency, 2008).

from shortages of staff, equipment and materials for exploration and extraction, will ensure that if oil prices were to remain consistently below the $70 per barrel mark (despite OPEC saying the world can afford $75–80 per barrel), companies will scale-back investment in bringing new production on-stream as it becomes sub-economic. Taken together, this could expedite a subsequently dramatic rise in oil and gas prices. Production decline will be masked over the next two years as demand slows down, but as it picks up, stalled investment now means the eventual effect will be amplified later on.

As the world's largest importer of fossil fuels, Europe is vulnerable to an oil and gas crunch. Over the past fifty years Europe's economy, once synonymous with coal and steel, has (like much of the developed world) made the transition to oil and gas as the central drivers of growth and heat provision.[12] In the past ten years, declining coal use has been compensated for with large increases in natural gas (from 18 to 25 per cent of Europe's energy mix) and modest increases in nuclear (from 12 to 14 per cent) and renewables (4 to 7 per cent).[13] Oil and gas now account for 61 per cent of Europe's energy inputs.[14] This appetite for fossil fuels has seen Europe's market share of world consumption climb to 19.4 per cent of natural gas and 21.8 per cent of oil.[15] Left unchecked, projected rates of consumption would see energy dependency on non-European sources grow from 50 per cent in 2000 to 70 per cent by 2030. By 2030, 90 per cent of oil consumption would have to be met by imports; gas

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[12] Daniel Yergin and Joseph Stanislaw, *The Commanding Heights: The Battle for the World Economy* (New York: Touchstone, 2002); *Reuters*, 'OPEC $75–80 oil', 27 May 2009.

[13] IEA, *The European Union 2008* (Paris: International Energy Agency, 2008), p. 20.

[14] European Commission, *Statistical Pocketbook 2007/2008* (Luxembourg: Office for Official Publications of the EC, 2008), p. 30.

[15] This compares with 6.4 per cent of world oil and 2.8 per cent of natural gas consumption in Africa (population 922 million); and 9.3 per cent of oil and 2.3 per cent of natural gas consumption in China (population 1.3 billion). British Petroleum, 'BP Statistical Review of World Energy', June 2008.

dependency would rise to 80 per cent, with projected imports from Russia expected to reach 60 per cent; 66 per cent of coal usage would come from foreign sources.[16] With varying levels of dependency across member states, some EU members (in particular the Baltic States and Bulgaria) are already nearly totally dependent on energy imports from outside the EU.[17]

As Europe looks to develop a coherent and co-ordinated external voice over its energy supplies, it has had to confront the geopolitical reality of hydrocarbon deposits and the implications of this evolving great game. External dependency is in part a consequence of maturing indigenous oil and gas assets. Only a minority of OECD countries remain net exporters of energy, including Norway, Canada and Australia. The EU can only currently cover 14 per cent of oil and 43 per cent of natural gas consumption by internal production.[18] European gas production peaked in 1996, levelling off in 2004; it is expected to decline over the next two years.[19] North Sea gas production has suffered year-on-year production declines since 2005.[20] The IEA believes global energy demand will grow between 37 and 50 per cent by 2030, largely due to the rapid expansion of the Chinese and Indian economies. Latin America, Iran, and the former Soviet Union contain major oil exporters, while China is now the world's second largest oil consumer behind the US. The fact that Russia and Iran possess the world's largest natural gas reserves means that the supply of oil and gas will be concentrated in the hands of producers from the Middle East, the former Soviet Union, and Latin America.[21] In addition, new production capacity looks set to come from ever more difficult sources: the Canadian oil sands, the Arctic and the deep waters of the Gulf of Mexico.

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[16] European Commission, *op. cit.* in note 1.

[17] IEA, *op. cit.* in note 13, p. 65.

[18] *Ibid.*, pp. 61, 63.

[19] *Ibid.*, p. 61.

[20] British Petroleum, *op. cit.*

[21] Joshua Kurlantzick, 'Can Public Diplomacy Counter Resource Nationalism?' (USC Center on Public Diplomacy, 28 September 2006).

How viable these deposits are is questionable. We are increasingly witnessing a failure to deploy planned investment due to the conjunction of limited available credit, high capital costs and a depressed oil price. A recent report found that oil and gas companies' capital costs have soared from $139 billion in 2003 to $342 billion last year.[22] Recent casualties include Royal Dutch Shell, an energy company in the vanguard of exploiting non-conventional oil sources, which has announced a delay in investment in Canada's oil sands. The oil sands in Alberta will constitute 15 per cent of Shell's global production by 2015, but are among the world's highest-cost oil developments. Several other companies operating in Alberta, including StatoilHydro, Suncor, Petro-Canada, Nexen and Opti Canada, have also delayed investment plans.[23] In a similar story, BG Group, a world leading gas exploration company, has deferred indefinitely a planned investment in Karachaganak, one of the biggest gas and oil fields in Kazakhstan.

The Situation in Latin America

It is not simply financial constraints that have slowed production. Populist governments in Latin America have affected production through the nationalisation of resources in order to facilitate political and social programmes, stifling foreign investment. In Latin America the 'major driver for resource nationalism has been perceived inequality in the face of commodity price rises'.[24] The 'desire to control natural resources is not just a function of revenue and populist politics, it's also a product of national and

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[22] IHS Herold/Harrison Lovegrove, '2008 Global Upstream Performance Review', September 2008.

[23] *Financial Times*, 'Shell Pulls Back from Oil Sands Investment', 30 October 2008; *Calgary Herald*, 'StatoilHydro Pushes Back Startup', 30 May 2008.

[24] Nick Robson and Elizabeth Stephens, 'Managing Country Risk in an Era of Resource Nationalism', Jardine Lloyd Thompson Group, January 2007, <http://www.jltgroup.com/content/UK/risk_and_insurance/Newsletter/ResourceNationalisation0701.pdf>, accessed 14 September 2009.

strategic interest.'[25] This is not unique to Venezuela, Bolivia or Ecuador and has been symptomatic of developing nations' desire to capitalise on the high price of oil. In comparison to the softer and more internationalist leftisms of Chile and Brazil, the leftist policies exemplified by Presidents Chávez, Morales and Correa are 'nationalist, strident and close-minded'.[26] However, Latin American resource nationalism does not represent one coherent energy strategy. What these Andean leaders do have in common is a desire for greater autonomy from the US economy and global financial institutions. Bolivia and Venezuela both have abundant gas reserves, but the political and other risks associated with undertaking a costly LNG project are considerable, and also subject to unexpected changes by regulators or government. In Venezuela in particular, agreements on paper mean nothing as President Chávez regularly alters the rules of the game.[27]

Whilst South America may be rich in natural resources, only Venezuela, Bolivia and Ecuador export significant amounts of oil and gas. Venezuela ranks among the top ten oil producers in the world and boasts a robust 80 billion barrels in proven reserves.[28] Bolivia holds the second largest natural gas reserves in South America, behind Venezuela. Ecuador has roughly 4.5 billion in oil reserves; it exported 376,000 barrels of oil a day in 2006, over half of which went to the United States.[29]

Brazil, Columbia, Argentina and Peru also produce oil and gas, most of which currently goes towards meeting domestic demand. However, only Brazil with 11.2 billion barrels of proven oil reserves has the potential to become a significant global oil

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[25] Robson and Stephens, *op. cit.*

[26] *Ibid.*

[27] APS Review Oil Market Trends, 'Is Chavez Reversing Resource Nationalism?', 19 January 2009.

[28] Energy Information Administration (EIA), 'Venezuela', <http://www.eia.doe.gov/emeu/cabs/Venezuela/Profile.html>, accessed 14 September 2009.

[29] EIA, 'Ecuador', April 2009, <http://www.eia.doe.gov/cabs/Ecuador/Full.html>, accessed 16 September 2009.

producer in the next decade.[30] Yet Brazil consumes nearly all of the oil it produces, primarily due to a recent increase in demand for energy. The large offshore Tupi discovery holds between 70 and 100 billion barrels of oil, potentially making Brazil an oil exporter and placing it among the world's top ten in terms of total reserves. Even so, these deepwater reserves are difficult to extract and will take years to come into production. In January 2008, Petrobras announced the discovery of the Jupiter field, a huge natural gas and condensate (very light oil) field, which could equal the size of the Tupi oilfield in the Santos Basin. It lies 37 kilometres (23 miles) east of Tupi.[31]

Recent years have seen politics trumping economics in the region, thereby making it difficult for South America's oil and gas producers to sustain, let alone increase, their existing oil and gas production. Those countries with the largest reserves currently have political climates that discourage the private investment necessary to fully exploit those resources. Venezuela, Ecuador and Bolivia have all reversed reforms made in the 1990s, and increased state participation in their oil and gas sectors. Bolivia's ability to supply gas has been imperilled by resource nationalisation. An uncertain investment climate has cooled foreign investment in the country's oil and gas industry, causing a sizable drop in total proven and probable reserves.[32] Similarly, Venezuela has seen a bottleneck in its oil production system, currently producing a mere 600,000 barrels per day (b/d).[33] The government intends to give priority for the use of gas for oil recovery and domestic consumption over export projects. Few investors will be interested in Venezuela's gas sector if they cannot sell gas on the export market. The ability to exploit export opportunities

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[30] EIA, 'Brazil Energy Profile, 18 August 2009', <http:/tonto.eia.doe.gov/country/country_energy_data.cfm?fips=BR&Go=Go>, accessed 16 September 2009.

[31] Gary Duffy, '"Huge" Gas Field found off Brazil', *BBC News Online*, 22 January 2008.

[32] Stephanie Hanson, 'Energy Bottlenecks in South America' (Council on Foreign Relations, 21 April 2008).

[33] Jeremy McDermott, 'Venezuela's Oil Output Slumps under Hugo Chavez', *Daily Telegraph*, 12 October 2008.

would not only reduce risk by providing market diversity, but would also protect investors against currency risks. Venezuela is currently suffering from a lack of contractual stability, with the state as the contracting party (which controls the resource) and where written agreements have become essentially meaningless.

Venezuela

Oil generates about 80 per cent of Venezuela's total export revenue, contributes about half of the central government's income and is responsible for about one-third of the country's GDP.[34] When President Hugo Chávez came to power in 1998, he began reforming Venezuela's oil policy in order to utilise oil revenue to implement his social agenda. Even before President Chávez was first elected he was explicit in describing his views about petroleum: namely that 'oil is a geopolitical weapon'.[35] It can be inferred that he has the same opinion on LNG exports. An LNG project has been discussed since the early 1970s. Shell and Mitsubishi have signed preliminary agreements to develop a 229 billion cubic feet (bcf) per year (4.7 million tonnes per year or tpy) project called Marisal Sucre based on offshore reserves. Discussions have also been held with neighbouring Trinidad and Tobago to bring Venezuelan gas to their Atlantic LNG plant for processing until a Venezuelan LNG plant can be built. Several European and US companies are proposing a project to pipe gas from Bolivia to either Peru or Chile on the Pacific Coast where it could be liquefied and shipped to a terminal on the West Coast of North America.[36] As a potential new source of LNG for Europe, there is the risk that Venezuela will nationalise LNG projects in the future, if demand increases and prices rise.

Historically, high demand and high energy prices can lead a country to believe that it is in its interests to nationalise energy resources. In Venezuela this has meant that not one single oil

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[34] McDermott, *op. cit.*

[35] *Ibid.*

[36] EIA, 'The Global Liquefied Natural Gas Market: Status and Outlook', December 2003, <http://www.eia.doe.gov/oiaf/analysispaper/global/>, accessed 14 September 2009.

project has been built in ten years.[37] As a result of the shrinking rate of crude oil output, President Chávez has recently invited Western International Oil Companies (IOCs) to make submissions to develop the new Orinoco Belt. This is due to the fact that PDVSA (Venezuela's national energy company) has reneged on the funding for oil business maintenance. One negative sign was that Hugo Chávez's latest referendum in February 2009 for indefinite election was successful, signifying that the future for Venezuela as a potentially stable source of LNG and oil supply remains in doubt.

Bolivia

Evo Morales won Bolivia's presidential election in early 2006 on a platform of radical resource nationalism. In a January 2009 referendum 62 per cent of Bolivians voted in favour of a new constitution that will directly affect private investment in the natural resource sector. Bolivia has the second-largest proven natural gas reserves in South America, behind Venezuela.[38] Rising earnings from natural gas exports have been an important driver of Bolivia's economic growth. In comparison to Venezuela, Bolivia's nationalisation programme marks a sharp shift from the liberal openness of the 1990s. The impact of Morales' nationalisation programme has given fellow leftist governments a reality check about the concessions (or lack thereof) that can be extracted from governments of the same ideological spectrum.[39] As a result, Bolivia has been able to secure higher prices for its natural gas exports in the short term, but nationalisation has reportedly deterred foreign investment in the sector and the long-term effects of the move remain to be seen.[40]

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[37] APS Review Oil Market Trends, *op. cit.*; Rory Carroll, 'Hugo Chávez Wins Referendum allowing Indefinite Re-election', *Guardian*, 16 February 2009.

[38] APS Review Oil Market Trends, *op. cit.*

[39] Luisa Palacios, 'An Update on the Reform Process in the Oil and Gas Sector in Latin America' (Japan Bank for International Cooperation, 2003).

[40] *Encyclopedia of Earth*, 'Energy Profile of Bolivia', August 2008.

It is conceivable that the future energy landscape in South America will see regional integration superseded by global integration. South America is currently cut off from the international natural gas market because its abundant regional supplies have limited the need to seek imports from elsewhere. Yet LNG terminals are being developed by some countries, connecting South America to the global LNG market. Whilst this will enhance domestic demand by lowering gas prices in the region, it will facilitate potential openings for LNG exports (both fixed and offshore) to the EU. The main prospects for Venezuelan gas exports to Europe lie in LNG. However, if Venezuela wants to export LNG, it must first develop stable sources of non-associated gas, able to produce enough gas to feed at least two or three LNG trains. An LNG train is the liquefaction and purification facilities in a liquefied natural gas plant. The cost of LNG from a single train would probably be too high to compete with LNG from competitors like Trinidad and Tobago. After the weak response to the gas exploration licensing round in 2001, the Venezuelan government is now pushing ahead the development of two offshore areas in the east thought to be rich in non-associated gas – the Deltana Platform and North Paria – with a view to exporting most of the gas that would be produced there as LNG.

In order to stem the global decline in oil and gas production it is essential that the EU fosters durable diplomatic relationships with future energy producers. If energy production continues to decline, energy security will increasingly be aligned with national security and geostrategic interests.

Peak Oil Theory

In the broader context, the terminal decline of cheap, easily accessible OECD oil and gas has re-ignited a debate over the importance and impact of world peak oil production. Peak oil theory, pioneered by the geologist M King Hubbert, was hitherto synonymous with doomsday theories.[41] Nevertheless, of late, it has gained increasing traction. Distilled, the argument reads thus:

[41] Proponents of peak oil theory wrongly predicted the coming of peak oil in the 1980s, 2000 and 2005.

peak oil theory is not necessarily concerned with the world running out of oil, although that is obviously the teleological endpoint. Rather, it looks to predict the lifecycle of local oil deposits which can then be scaled up to the world level. For any given area, oil production follows a bell-shaped curve. Taking the ultimate recovery value – the amount of oil in a particular area – and past oil production date, we can model when that deposit will peak. This assumes that after discovery and initial extraction, production increases more or less exponentially, as more wells are drilled and more efficient methods and equipment become available. When half of the oil has been extracted, the supply hits the peak, and production begins to decline as it becomes harder and less profitable to extract the oil.

The recent report by the UK industry taskforce on peak oil and energy security paints peak oil as an existential threat to society on a greater magnitude than terrorism or the short-term impacts of climate change.[42] The report argues that a lack of transparency in the world's oil and gas reserves means peak oil could hit between 2011 and 2013.[43] Further, it notes that a fifth of the world's oil and gas reserves are controlled by the private sector. The converse is also startling: four-fifths of global oil and gas reserves are in state hands. The five biggest private oil and gas companies have experienced peak production already (Chevron in 2002, Royal Dutch Shell in 2003, Total in 2004, BP in 2005, and ExxonMobil in 2006).[44] A world-wide audit is not possible. The taskforce voiced particular concern over OPEC

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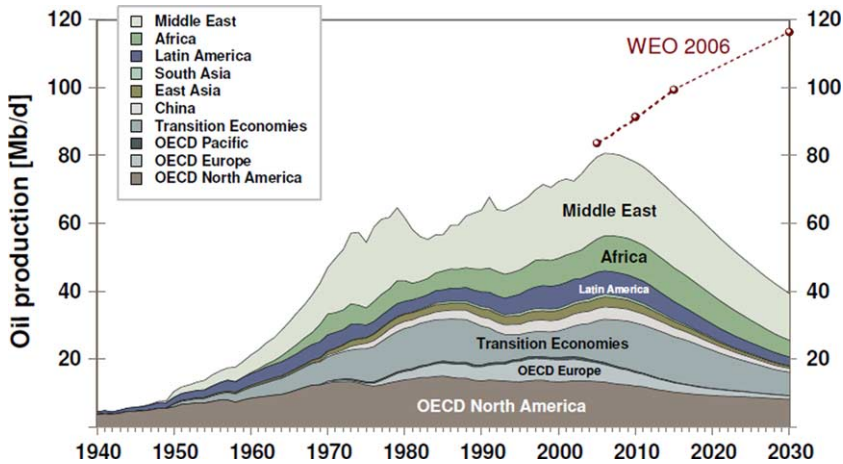
[42] UK Industry Taskforce on Peak Oil and Energy Security, 'The Oil Crunch: Securing the UK's Energy Future', October 2008; IEA, *op. cit.* in note 11.

[43] Royal Dutch Shell, whose estimates were considered and dismissed by the report, projects oil production to rise until 2015 and then to plateau until 2020. See Shell, *Shell Energy Scenarios to 2050* (Shell International, 2008).

[44] Of course, questions of transparency are not only applicable to governments, as exposed by Shell's admission that it had overstated its reserves by 20 per cent. See *The Times*, 'How Shell Blew a Hole in a 100-year Reputation', 10 October 2004.

Graph 2: Oil Production 1940–2030



Source: Energy Watch Group, 'Oil Report', October 2007, <http://www.energywatchgroup.org/Oil-report.32+M5d6371e38d.0.html>, accessed 16 September 2009. The dotted lines refer to the 2006 World Energy projection from the IEA.

members having exaggerated reserves since the 1980s to increase production quotas.

Certainly, hydrocarbon deposits are finite. Moreover, the world's remaining oil and gas reserves are unequally and often inconveniently distributed. As a percentage of production, oil remains overwhelmingly located in the Middle East (30.8 per cent) and Russia (12.6 per cent), with significant production also coming from the United States (8 per cent), Mexico (4.4 per cent), Canada (4.1 per cent), Venezuela (3.4 per cent) and Nigeria (2.9 per cent). Natural gas shares a similar, albeit slightly more diverse story again dominated by Russia (25.2 per cent) but with significant exports from Nigeria (3 per cent), Algeria (2.5 per cent) and Turkmenistan (1.5 per cent) in addition to various Middle Eastern (41.3 per cent) and North American producers (4.5 per cent).[45]

[45] IEA, *Key World Energy Statistics: 2008* (Paris: International Energy Agency, 2008), p. 11; British Petroleum, *op. cit.*

The Untapped Resources of the Arctic

Yet, as the International Energy Agency acknowledges, predicting peak oil is a notoriously difficult task, with estimates ranging to 2050 and beyond.[46] Peak oil theory falls down because it does not consider likely resource growth, application of new technology, basic commercial factors, or the impact of geopolitics on production.[47] Furthermore, according to the US Geological Survey CARA (Circum-Arctic Resource Appraisal) there are nearly 90 billion new barrels of oil in the Arctic as well as 1,700 trillion cubic feet of natural gas. Other figures show around 30 per cent of the world's unexploited gas and 13 per cent of oil lie under the Arctic's seas.[48] The untapped resources of the Antarctic, and specifically the Arctic, embody the tenuous balance that must be reached between exploiting future oil reserves and preserving the environment.

According to the CARA project chief, the Arctic continental shelves 'may constitute the geographically largest unexplored prospective area for petroleum remaining on Earth'.[49] Consequently there has been a scramble for control and territory by Canada, Norway, Sweden, the US and Russia. In 2007 Russia sent a nuclear-powered ship to map a possible undersea connection between Siberia and the North Pole, and used a submarine to plant a flag on the sea bed. The connection would allow Russia

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[46] IEA, *Resources to Reserves: Oil & Gas Technologies for the Energy Markets of the Future* (Paris: International Energy Agency, 2005). The date for peak oil production is still very much dependent on which research one believes. This report takes the International Energy Agency's estimate that there is sufficient global reserves to meet projected increased demand until at least 2030. See IEA, *World Energy Outlook 2007* (Paris: International Energy Agency, 2007).

[47] Cambridge Energy Research Associates, 'Why the Peak Oil Theory Falls Down – Myths, Legends, and the Future of Oil Resources' (CERA, November 2006).

[48] Michael Asher, 'Geologists find 90 billion New Barrels of Oil in Arctic', *Dailytech.com*, 24 July 2008; *Guardian*, 'Frozen Assets: How New Survey of Arctic's Riches could Stoke International Strife', 29 May 2009.

[49] Asher, *op. cit.*

to circumvent the UN 200-mile limit of offshore resource claims.[50] In addition to Russia, Canada, the US, Norway and Greenland (an autonomous part of the Kingdom of Denmark) all border the Arctic, making it imperative that the EU and NATO prepare for the potential geopolitical tensions and the environmental consequences arising from competing ownership claims. Russia's May 2009 security strategy specifically singled-out the Barents Sea shelf and other Arctic regions as potential military battlegrounds in the world's growing struggle for energy reserves. In a more upbeat report, the European Commission recently stated that 'Arctic resources could contribute to enhancing the EU's security of supply concerning energy and raw materials in general'.[51] It remains debatable how such resources can be successfully exploited whilst not having a deleterious effect on the delicate Arctic environment, and without leading to international conflict.

Many analysts believe that conventional oil production outside the Middle East has already peaked, or will do so in the next ten years. The question then becomes whether non-conventional hydrocarbons (such as Canada's oil sands) can be tapped at a reasonable cost so that rather than suffering a steep decline, world production plateaus for long enough for oil demand to be supplanted by other energy sources. Executives at the energy company, ConocoPhilips, for example, have stated their belief that at $100 per barrel, there is a sufficient amount of economically viable oil to avoid the peak oil bell curve scenario.

The challenge is thus not peak oil, but rather getting the remaining oil and gas out of the ground. As Shell explains in its recent report outlining potential energy scenarios to 2050, governments can either be reactive as they scramble for coal and other hydrocarbons to meet the inevitable oil and gas gap, or proactive in setting out a blueprint that tackles production decline by spearheading clean energy alternatives.[52] This challenge is discussed later when the paper suggests that the most

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[50] *Guardian*, 29 May 2009, *op. cit.*

[51] Atlantic Council of the US, 21 November 2008; *Guardian*, 'Kremlin sees Energy as New Battleground in Security Strategy', 14 May 2009.

[52] Shell, *op. cit.*

viable, proactive, medium- to long-term approach is one based around nuclear power. If this is achieved, peak oil becomes irrelevant. The challenge then becomes meeting the short- to medium-term energy needs by maximising both indigenous and foreign reserves to avoid an energy crunch triggered by the world's current economic malaise.

For Europe and the EU, the picture that emerges is an energy geography in which the ongoing financial crisis and volatile oil and gas price undermines attempts to stem production decline. Concurrent trends point to increased consumption and decreasing (and in some cases non-existent) local production. In these circumstances, Europe must negotiate financial crises and production decline and look to new sources of oil and gas in Africa, the Caspian, the Middle East, the Americas and probably the Arctic to ensure long-term energy supply. The development of the Arctic's energy resources will be especially problematic on political, security and environmental grounds.

Conclusions

The urgency behind the ascent of energy to the top of the European policy agenda is a response to Europe waking-up late to the new great game over energy. Resource nationalism will alter traditional global power structures, making it vital that the European Union strengthens its relations with both non-OPEC countries and OPEC producers. In order to stem the global decline in oil and gas production, it is essential that the EU fosters durable diplomatic relationships with future energy producers. If energy production continues to decline, energy security will increasingly be aligned with national security and geopolitical interests. The EU must look to develop a coherent and co-ordinated external voice over its energy supply strategy. Europe must negotiate financial crises and production decline and look to new sources of oil and gas in Africa, the Caspian, the Middle East, the Americas and probably the Arctic to ensure long-term energy supply. Failure to do so will inevitably lead Europe into an oil and gas supply crunch.