RESEARCH PAPER 07/42
9 MAY 2007

Energy Security

The term ‘energy security' is used widely to mean a number of different things, including the pressures on supply from rapidly industrialising China and India, liberalising markets to produce interdependence between countries, protecting pipelines from attack and diversifying from fossil fuels to renewables.

The paper sets out developing energy policy in the UK and Europe, which is being driven by the need to secure energy supplies and deliver clean, affordable energy to combat climate change. It also considers the risks of dwindling reserves of oil, gas and coal which, environmental considerations notwithstanding, will continue to be burnt for many years.

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ISSN 1368-8456

Summary of main points

In recent years there have been two energy reviews, both driven in large part by the need for energy security in the UK. To set these in context, the UK faces two major long-term energy challenges: climate change which requires a cut in damaging emissions; and the need to deliver secure supplies of clean energy at affordable prices. North Sea reserves are in decline and the UK will become increasingly dependent upon imported oil and gas. In addition, current nuclear power stations, the UK's largest source of low-carbon electricity, are approaching the end of their lives and are due to close.

The first of the reviews was in 2002 and preceded the Energy White Paper of 2003. This placed emphasis on developing renewable sources and energy efficiency, while nuclear replacement was put on hold. More recently, the government acknowledged the need to reconsider and refine its policy and initiated a second review which culminated in the Energy Review published in July 2006 entitled *The Energy Challenge*. This Review sets out the government's approach to meeting energy needs over the next 30-40 years. Many of the proposals require consultation and the Government intends to publish a White Paper subsequently.

Besides the UK, many countries are concerned about securing their energy supplies because of dwindling supplies and international tensions. In the light of this the European Union (EU) proposed an integrated energy and climate change package for Europe in January 2007. The Commission launched a range of strategic documents and their annexes covering a number of issues linked to EC energy policy. Most notable were two linked documents: the strategic review of energy policy and the sector inquiry into competition in gas and electricity markets. Policy is under negotiation and development.

Energy policy is inextricably linked to the availability of resources. Estimates and definitions of oil and gas reserves vary. On the narrowest definition they would meet current levels of production for 41 and 65 years respectively – projected increases in production would reduce these times. Coal reserves are more abundant. The political risks militating against the secure supplies of oil and gas worldwide are:

- heightened competition over depleting energy sources
- the new scramble for Africa's oil and gas
- the security of supplies from the Middle East and the instability of their governments' dependency on "petrodollars"
- the future of Iraq, with the world's second largest oil reserves
- the energy-rich countries using energy supply and price as a political weapon
- potential dangers of liberalisation of energy supplies and distribution

Although there are considerable national differences in tackling the issue in European countries, particularly since supplies of gas from Russia to Ukraine were disrupted in early 2006, generally European Union countries are committed to liberalising and diversifying their energy markets as a way of increasing interdependence and ensuring security of supply.

Energy security is a key policy objective for both China and the United States of America. The Chinese are latecomers to Africa, yet their energy companies are increasingly active in

the region. It is not yet known what the long-tem effect on Africa will be. Conflict zones in the African continent are however associated with the possession of gas and oil; and future superpower rivalries may result from the competition.

Middle East gas and oil may be affected by internal dissent in the region and by external events arising from the violence and instability in Iraq and its impact on oil supply. Some observers believe a number of countries, including Russia and Venezuela, are using their control of energy resources as a tool of foreign policy to further their own strategic interests. As the European Union imports nearly half of its gas from Russia, Europe is likely to feel the effect of Russian policies. For its part, the United States has become frustrated at the direct control that Venezuela, with the seventh largest proven oil reserves in the world, exercises with significant political effect.

“Non-state actors”, including indigenous groups who are fighting for a share of the financial benefits oil and gas bring, politically motivated terrorists, and environmentalists can present an effective and significant threat to production.

This paper sets out developing energy policy in the UK and Europe, which is being driven by the need to secure energy supplies and deliver clean, affordable energy to combat climate change. It also considers the risks of dwindling reserves of oil, gas and coal which, environmental considerations notwithstanding, will continue to be burnt for many years.

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I Introduction

The International Energy Agency (IEA) summarises the issues of energy security facing the world as insufficient and secure supplies at affordable prices

- environmental harm caused by consuming too much fossil-fuel energy
- the need to diversify production and consumption both by geographical location and fuel type
- the impact of rising oil and gas demand increasing the vulnerability of consumers to disruption and price shock[1]

The IEA's principal concerns are environmental and economic. Other observers of the world energy scene have raised concomitant political risks:

- heightened competition over depleting energy sources
- the new scramble for Africa's oil and gas
- the security of supplies from the Middle East and instability of their governments' dependency on "petrodollars"
- the future of Iraq, with the second largest world oil reserves
- energy-rich countries using energy supply and price as a political weapon

Despite national differences of approach, the trend in European Union countries in recent years has been to open up their gas and electricity utilities to competition, promoting cheaper gas and electricity. The UK is advanced on this path and some of its utility companies now have European parent companies. This policy of liberalising energy markets took a step forward this year with the European Commission's attempt to secure agreement for a common energy policy across the EU with its Strategic European Energy Review.

However the Commission's determination to increase market liberalisation may conflict with the aim of securing security of supply, due to the political realities in supplier countries. Particular attention has been paid in recent years to policy-making in Moscow and the impact that can have on the flow of oil and gas from Russia and Central Asia. State concentration under President Putin (whose tenure ends in 2008) has ensured the state has a controlling stake in its largest energy companies, the ostensible rationale being to "ensure that the Russian people – and not oil companies or end-consumers – reap the benefits of Russia's natural wealth."[2] What is more, liberalisation in Europe has made companies potentially vulnerable to cross-border mergers and takeovers from outside the EU, and this development seems to have taken Europe by surprise. In the UK there was much speculation in 2006 that *Centrica*, Britain's largest energy supplier, could be bought by Gazprom,[3] the Russian state gas company; and UK Coal has been the target of interest by the Russian minerals group, *Kuzbassrazrezugol*. At the same time, political considerations have entered British energy companies' commercial

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1 International Energy Agency, *World Energy Outlook* 2006 (OECD/IEA 2006)
2 *Oxford Analytica* analysis 21 September 2006
3 Gazprom is also currently bidding for the NHS gas contract, which could ultimately have consequences for patients.

relationships abroad. In March 2007 the *Observer* reported that the Foreign Office had advised *Centrica Energy* not to buy gas from Iran,[4] a move that Russia regards as unfair. A further security issue could therefore be described as "the impact of liberalisation of energy supplies and distribution".

The EU is unlikely to draw back on its liberalisation programme; instead, a strong framework of regulation and compliance, which would apply to companies from outside the EU which acquire energy interests, is likely to be adopted to ensure that they do not abuse their ownership. This benign view of liberalisation is not shared across the board, particularly by the newer eastern European Member States.

NATO was prompted to undertake its first serious discussion of the issue at its Heads of State and Government Summit in November 2006. The role for the Alliance, if any, in ensuring energy security, was also discussed. The Riga Summit Communiqué stated:

> As underscored in NATO's Strategic Concept, Alliance security interests can also be affected by the disruption of the flow of vital resources. We support a coordinated, international effort to assess risks to energy infrastructures and to promote energy infrastructure security. With this in mind, we direct the Council in Permanent Session to consult on the most immediate risks in the field of energy security, in order to define those areas where NATO may add value to safeguard the security interests of the Allies and, upon request, assist national and international efforts.[5]

In this paper a consideration of UK and EU responses to energy insecurity is followed by a look at broader political factors which might affect energy use in the West. It also looks at OPEC supply and demand policies which have helped push the price of oil to $70 a barrel, mainly in relation to political risks.

II UK energy policy

A. Energy reviews

In recent years there have been two energy reviews, both driven in large part by the need for energy security in the UK. The first of these was the Energy Review of 2002[6] which preceded the Energy White Paper of 2003.[7] More recently, the Government acknowledged the need to reconsider and refine its policy and initiated the Energy Review 2006 entitled *The Energy Challenge*, which was published on 11 July 2006. The full report and supporting documents are online.[8]

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4 Oliver Morgan, "Ministers tell Centric not to buy Iranian gas" *Observer* 4 March 2007

5 NATO, Riga Summit Declaration, 29 November 2006. See Brooks Tigner, 'Allies struggle to define energy security", *Defense News* 5 March 2007 for further discussion of the opinion of NATO Member States.

6 See SN/SC/1038

7 See SN/SC/1825

8 "The Energy Challenge", DTI, July 2006, http://www.dti.gov.uk/energy/review/page31995.html. For full details up to the Review see SN/SC/3864, and for the Review and subsequent consultations see SN/SC/4166.

Announcing the publication of the 2006 Review in the House of Commons,[9] the Secretary of State for Trade and Industry, Alistair Darling, said the UK faces two major long-term energy challenges: climate change, which requires a cut in damaging emissions; and the need to deliver secure supplies of clean energy at affordable prices. North Sea reserves are in decline and the UK will become increasingly dependent upon imported oil and gas. The Review sets out the Government's approach to meeting energy needs over the next 30-40 years. Many of the proposals require consultation and the Government intends to publish a White Paper subsequently.

In an accompanying press notice, Alistair Darling said:

> "First, we must **save energy**. The new measures we're bringing forward will help us save energy in our homes, in businesses and in our public buildings, saving carbon and saving money. There'll be more help for homeowners to understand and reduce their energy bills, the phasing out of inefficient electrical goods and a consultation on new incentives to reduce emissions from large organisations like supermarkets and hotel chains.
>
> "In parallel we're proposing measures to ensure that the **energy we do use is secure and emits as little carbon as possible**. It is clear that we need a mix of energy and that the challenges are so great that we cannot afford to rule out any low-carbon energy source that could help.
>
> "The proportion of electricity generated from renewables needs to increase substantially so we are strengthening and **reforming the Renewables Obligation** to push this towards 20% - a five-fold increase on today's level. We're proposing major reforms to promote this and other clean energy sources, including steps to remove barriers to carbon capture to ensure cleaner coal and gas. And, although the North Sea oil fields are mature, we will press ahead with measures to exploit remaining reserves, including west of Shetland.
>
> "**Nuclear power** already accounts for almost a fifth of our electricity but this is likely to drop to just 6% by 2020. Our analysis suggests that, alongside other low carbon generating options, a new generation of nuclear power stations could make a contribution to reducing carbon emissions and reducing our reliance on imported energy.
>
> "At the heart of our policy will be the incentives we give business and individuals to reduce carbon emissions. **The EU Emissions Trading Scheme** generates a value for carbon which helps to drive improvements in energy efficiency, investment in renewable electricity and other technologies that reduce carbon emissions. We need to strengthen the scheme so it can do this more effectively.
>
> "Critically, the **planning system needs to be streamlined** and it needs to deliver. We'll be acting to ensure that energy companies, whether seeking to build gas storage facilities, wind farms or any other kind of large energy installation, are not faced with costly uncertainties and delay. Local concerns

[9] HC Deb 11 July 2006 cc1261-1280.

about specific sites must be taken into consideration but the right balance has to be struck with the national need for our vital energy infrastructure."[10]

Major proposals, many requiring consultation, include:

* Driving the least efficient domestic appliances and consumer electronics out of the market.
* Further work on a radical plan to transform energy supply companies into champions of emissions reduction.
* Strengthening the EU Emissions Trading Scheme post 2012.
* Measures to incentivise carbon savings for large organisations like supermarkets and hotel chains and large local authorities.
* Using Government's purchasing power to drive efficiency standards.
* Changes to boost renewables investment - reshaping the Renewables Obligation, banding the support to give more benefit to emerging technologies such as offshore wind, wave and tidal projects, and a new Statement of Need.
* Aggressive implementation of the Microgeneration Strategy to remove barriers to household renewables.
* A series of measures and review of ways to bring on more localised 'distributed' generation.
* Fundamental change to the planning system for all types of energy projects, including timelines for inquiries and a high-powered inspector for complex and controversial projects.
* Measures to facilitate new nuclear power stations - streamlining the licensing process, clarifying the strategy on decommissioning and waste. A consultation is launched today on a policy framework, including a Statement of Need. It will lead to an Energy White Paper around the turn of the year.
* Removing regulatory barriers to carbon capture and storage, intensifying international cooperation with partners such as Norway and further work on the costs of demonstration.
* Maximising exploitation of North Sea reserves, refocusing the Stewardship initiative and a Taskforce with industry on infrastructure to the west of Shetland.
* A new Coal Forum bringing together coal-fired generators, coal producers, power plant suppliers, trade unions and others to seek solutions to securing the long-term future of coal-fired generation and UK coal production.
* Pressing the European Commission to bring road transport into the EU Emissions Trading Scheme. Also a Transport Innovation Strategy to bring on alternative fuels and possible extension of the Renewable Transport Fuel Obligation.
* A review of the effectiveness of current gas security of supply arrangements.[11]

Further information with links to consultation documents is available on the DTI Energy Review webpage.[12]

The White Paper is expected to be published in May 2007.[13]

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10 DTI press notice P/2006/163, *UK Energy policy shapes up to new global energy landscape,* 11 July 2006.
11 Ibid
12 DTI webpage: http://www.dti.gov.uk/energy/review/page31995.html
13 HC Deb 23 April 2007 cc945-6W

B. Joint Energy Security of Supply Working Group

In July 2001 the Government set up a working group to monitor security of energy supply and report to it on a regular basis. The Joint Energy Security of Supply Working Group (JESS) is run jointly by the Department for Trade and Industry and the energy regulator, Ofgem.[14]

The group's terms of reference are:

- To assess the available data relevant to security of supply, to identify the gaps in that data and develop appropriate indicators

- To monitor at a strategic level, over a timescale of at least seven years ahead:

  a) The availability of supplies of gas
  b) The availability of supplies of electricity and fuels used for electricity generation
  c) The adequacy of generating capacity
  d) The adequacy of the UK's gas and electricity infrastructure

- To assess whether appropriate market-based mechanisms are bringing forward timely investment to address any weaknesses in the supply chain that are anticipated

- To identify relevant policy issues and consider implications

- To report twice yearly to the Secretary of State and the Gas and Electricity Market Authority

JESS has published a range of reports to inform Government policy, which are available online.[15]

The Government is now reviewing the role of JESS and the future provision of projected market information following the recommendations in the Energy Review.

III EU energy policy

Angela Merkel, the German Chancellor, was reported as saying that Germany would use its six-month EU Presidency to improve energy security on the continent.[16] The Presidency signalled its intention to put energy at the heart of policy by adding the adoption of a European Action Plan for energy to the agenda of the Spring European Council in March 2007. Its working programme states that the context is "the continued

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14 The Office of Gas and Electricity Markets, Ofgem
15 DTI webpage: http://www.dti.gov.uk/energy/reliability/security-supply/jess/index.html
16 Tony Halpin and Roger Boyes, " Russians turn off Europe's oil supply", *Times,* 9 January 2007, p1

high prices of oil and gas, the increasing rarity of fossil fuels, the consideration of their impact on climate change and growing instability in certain regions of the world".[17]

The opening of Europe's energy markets to competition is considered to be a key element in securing its energy supplies. Although it is several years since the implementation of the EU gas and electricity directives,[18] which were intended to deliver competitive energy markets, the EU's own goal to liberalise European energy markets by July 2007 is far from being achieved.

This was recognised when the EU proposed an integrated energy and climate change package for Europe on 10 January 2007. The Commission launched a range of strategic documents covering a number of issues linked to EU energy policy. Most notable were two linked documents: the strategic review of energy policy and the sector inquiry into competition in gas and electricity markets.[19] An EU press release summarised the package as follows:

> The package of proposals set a series of ambitious targets on greenhouse gas emissions and renewable energy and aim to create a true internal market for energy and strengthen effective regulation. The Commission believes that when an international agreement is reached on the post-2012 framework this should lead to a 30% cut in emissions from developed countries by 2020. To further underline its commitment the Commission proposes that the European Union commits now to cut greenhouse gas emissions by at least 20% by 2020, in particular through energy measures.
>
> Commission President José Manuel Barroso said: "Today marks a step change for the European Union. Energy policy was a core area at the start of the European project. We must now return it to centre stage. The challenges of climate change, increasing import dependence and higher energy prices are faced by all EU members. A common European response is necessary to deliver sustainable, secure and competitive energy. The proposals put forward by the Commission today demonstrate our commitment to leadership and a long-term vision for a new Energy Policy for Europe that responds to climate change. We must act now, to shape tomorrow's world".[20]

The proposed package is based on three central pillars set out in subsections A-C:

A. A true internal energy market

The Commission believes that the opening of individual energy markets to competition will produce a true European internal energy market that will ensure fair prices and

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17 Hughes Belin, "Germany pushes for the opening of markets on 1 January 2007", *Europolitics Environment,* 10 November 2006, p28

18 Directives 2003/54/EC and 2003/55/EC concerning common rules on the internal market in electricity and gas respectively

19 All the documents are available online at http://europa.eu/press_room/presspacks/energy/index_en.htm

20 EU press release IP/07/29, *Commission proposes an integrated energy and climate change package to cut emissions for the 21st Century,* 10 January 2007, at http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/29&format=HTML&aged=0&language=EN&guiLanguage=en

choice to citizens and industries. This is a policy that has long been advocated and practised in the UK. It will guarantee that even smaller companies, for instance those that invest in renewable energy, have access to the energy market. A well functioning market also ensures sufficient investments in power plants and transmission networks, in order to avoid interruptions in electricity or gas supply. The single market is good, not just for competitiveness, but also for sustainability and security.

The competition sector enquiry[21] and the Commission's 2001 Communication on completing the internal energy market[22] indicate that further action is required to deliver these aims through a clearer separation of energy supply from distribution. It is believed that suppliers who also control crucial transmission infrastructure, such as pipelines, have used their grip on the networks to freeze out new entrants and stifle competition. Nellie Kroes, the EU Competition Commissioner, who has long been a critic of integrated energy companies, said that she could use her powers to break up such large groups in the interests of competition.[23]

A need has also been identified for stronger independent regulatory control, as well as national measures identifying key bottlenecks and appointing coordinators, in order to deliver the EU's target of 10% minimum interconnection levels. More needs to be done to create a real European gas and electricity grid:

> The Commission's main objective is to have a complete internal energy market with open competition and effective regulation in place by January 2009. A real European grid should work as a one single grid. A number of measures are needed to achieve these objectives, mostly of a rather technical nature:
>
> - New rules to avoid discrimination are needed, for instance through a clearer separation of energy production from energy distribution. Two unbundling options are considered to redress the problem with a clear preference for ownership unbundling.[24]

The favoured option of 'ownership unbundling' involves separating the gas and electricity networks from the supply businesses, but this is certain to face stiff opposition from some Member States. The less radical alternative is the creation of separate companies to manage networks that could still be owned by large suppliers. This may be the fall-back position if some Member States, notably France, back their large energy companies which do not want to break up their vertically integrated monopolies. The celebrated energy economist, Dieter Helm of Oxford University, is quoted as commenting on the proposals:

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21 EU press release IP/07/26, *Competition: Commission energy sector inquiry confirms serious competition problems*, 10 January 2006, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/26&format=HTML&aged=0&language=EN&guiLanguage=fr

22 COM(2001) 125 final, 13 March 2001 at http://eur-lex.europa.eu/LexUriServ/site/en/com/2001/com2001_0125en01.pdf

23 Tobias Buck, "Kroes threatens antitrust action to break power groups", *Financial Times,* 11 January 2007. p6

24 EU press release MEMO/07/09, *EC sets out a new impetus for the internal market,* 10 January 2007, http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/07/9&format=HTML&aged=0&language=EN&guiLanguage=en

the Commission knew it would eventually lose the argument over ownership unbundling but was staking out a negotiating position for the compromise that will follow.

"This is a game in which the Commission thinks: 'How far do we go in demanding full ownership unbundling, in order to get the guarantees and regulatory framework that we want?'," he said.

The "Scottish model", proposed as the Commission's less favoured alternative yesterday, is seen by advocates of liberalised energy markets as a second-best solution. Under the proposal, the large energy suppliers would be allowed to retain ownership of the transmission assets but the management of the networks would be taken over by separate companies called independent system operators.

That should help overcome some of the problems of the present system, such as the inability of new entrants to get access to the networks on fair terms, and the incumbents' privileged access to market-sensitive information. But concerns would remain, including doubts over whether there would be enough new investment to create the capacity for new competitors to enter a market, and whether the "Chinese walls" protecting valuable information would be genuinely secure.[25]

The Commission's proposals included further measures:

- It is also important to have the European wide regulation functioning, not least to facilitate cross-border electricity trade. The Commission considers that it is necessary to establish a new single body at EU level or, at a minimum, a European network of Independent Regulators which would need to take due account of the European interest and have the appropriate involvement of the Commission.

- Electricity and gas networks are at the heart of a well functioning European market. Several actions are proposed to speed up investments in key bottlenecks, which typically occur at borders between countries. A number of the most problematic missing links has been identified, such as power links between Germany, Poland and Lithuania, off-shore wind power connections in Northern Europe, electricity connections between Spain and France, gas pipelines from the Caspian to central Europe.

- Transparency is essential to market functioning. New legislation will be needed to establish minimum requirements.

- Common minimum, binding network security standards are necessary.

All the measures above are essential for ensuring that sufficient new power generation capacity is built throughout Europe. The Commission is convinced that high investments are needed to ensure the capacity and transmission. Finally, the

[25] Ed Crooks, "EU's plan for the 'unbundling' of assets might prove a catalyst", *Financial Times,* 11 January 2007, p6

> Commission will pay special attention to the rights of consumers' and energy as a public service. An Energy Customers' Charter will be launched - this will include measures to address fuel poverty, information for customers to choose a supplier and supply options, actions to lower red tape when changing energy suppliers and to protect citizens from unfair selling practices. A specific information campaign will be launched to support this initiative.[26]

Speaking in a House of Commons debate about energy prices, the Minister for Science and Innovation, Malcolm Wicks, endorsed the Commission's policy:

> … we are pleased by the progress being made by the Commission. The lack of gas flowing through the interconnector last winter, when the British economy and the British public needed it, was a matter of concern. We are pleased by the tough action being taken by the Commission, which includes the seizure of documents in dawn raids on the offices of big European energy companies. Although there is much to be done, the Commission is now moving in the right direction.[27]

B. Accelerating the shift to low carbon energy

The Commission proposed a binding target of 20% of the EU's overall energy mix to be sourced from renewable energy by 2020. This will require huge growth in all three renewable energy sectors: electricity, biofuels and heating and cooling. This renewables target will be supplemented by a minimum target for biofuels of 10%. Additionally, a renewables legislative package planned for 2007 will include specific measures to facilitate the market penetration of both biofuels and heating and cooling.

Research will underpin the policy:

> Research is also crucial to lower the cost of clean energy and to put EU industry at the forefront of the rapidly growing low carbon technology sector. To meet these objectives, the Commission will propose a strategic European Energy Technology Plan. The European Union will also increase by at least 50% its annual spending on energy research for the next seven years.[28]

The Commission left policy on nuclear power and low-carbon alternatives to renewables to individual States:

> At present, nuclear electricity makes up 14% of EU energy consumption and 30% of EU electricity. The Commission proposals underline that it is for each member state to decide whether or not to rely on nuclear electricity. The Commission recommends that where the level of nuclear energy reduces in the EU this must be offset by the introduction of other low-carbon energy sources otherwise the

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26 EU press release MEMO/07/09, *EC sets out a new impetus for the internal market,* 10 January 2007, http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/07/9&format=HTML&aged=0&language=EN&guiLanguage=en

27 HC Deb 23 January 2007 c402WH

28 EU press release IP/07/29, *Commission proposes an integrated energy and climate change package to cut emissions for the 21st Century,* 10 January 2007, at http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/29&format=HTML&aged=0&language=EN&guiLanguage=en

> objective of cutting greenhouse gas emissions will become even more challenging.[29]

C. Energy efficiency

The Commission reiterated its aim of reducing primary energy consumption by 20% from 1990 levels by 2020. This would mean that the EU would use about 13% less energy in 2020 than currently, which would save 780 tonnes of CO_2 annually and save 100 billion euros:

> The Commission proposes that the use of fuel efficient vehicles for transport is accelerated; tougher standards and better labelling on appliances; improved energy performance of the EU's existing buildings and improved efficiency of heat and electricity generation, transmission and distribution. The Commission also proposes a new international agreement on energy efficiency.[30]

D. EU external energy policy

The above proposals would need to be supported by a coherent and credible international energy policy where the EU speaks with one voice. The EU's vulnerability has been underlined by Russia's willingness to use oil and gas supplies as political instruments against Ukraine, Georgia and Belarus. The Commission noted:

> The European Union cannot achieve its energy and climate change objectives on its own. It needs to work with both developed and developing countries and energy consumers and producers. The European Union will develop effective solidarity mechanisms to deal with any energy supply crisis and actively develop a common external energy policy to increasingly "speak with one voice" with third countries. It will endeavour to develop real energy partnerships with suppliers based on transparency, predictability and reciprocity.
>
> Drawing on the consultation process on its Green Paper issued in 2006, the Commission has already made progress towards a more coherent external energy policy as demonstrated by the creation of a network of energy security correspondents. The Commission proposes a whole series of concrete measures to strengthen international agreements including the Energy Charter Treaty, post-Kyoto climate regime and extension of emissions trading to global partners and further extend bilateral agreements with third countries so that energy becomes an integral part of all external EU relations and especially of the European Neighbourhood Policy. As major new initiatives the Commission proposes to develop a comprehensive Africa-Europe partnership and an international agreement on energy efficiency.
>
> Concrete action is required urgently. Taken together, the sector enquiry, strategic review and action plan represent the core of a proposed new European Energy Policy. This process seeks to move from principles into concrete legislative proposals. The Commission will seek endorsement of the energy and climate

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[29] EU press release IP/07/29, 10 January 2007
[30] Ibid

> change proposals during the Spring European Council and will come forward with legislation in light of these discussions.[31]

E. British Government response

Besides the endorsement of the proposed EU policy for opening the market in the sector inquiry (see section A above), in answer to a parliamentary question Malcolm Wicks extended his endorsement to the whole package of measures, including those in the strategic energy review:

> The UK welcomes the publication of the Strategic Energy Review, which delivers on the mandate first given to the Commission at Hampton Court under the UK presidency of the European Council; the publication of the climate change communication; and the final report of the sector inquiry. The publication of these documents together serves to underline that climate change and energy policy are mutually reinforcing as well as setting out concrete steps towards a coherent common energy policy for the EU so that all EU citizens can benefit from environmentally sustainable, secure and affordable energy.
>
> We particularly welcome the Commission placing climate change at the heart of energy policy, and the emphasis on putting the EU on track to a low carbon energy future. Tackling climate change is the greatest challenge we face and requires an international response, but it is achievable and affordable with the right policies in place, as Sir Nicholas Stern's report recently outlined.
>
> The UK believes that the Commission has got the overall thrust of the proposals right and that the SER can be welcomed by Heads of State and Government at the spring European Council meeting.[32]

F. EU Council

1. The Extraordinary European Energy Council

An Extraordinary EU Energy Council was held in Brussels on 15 February 2007 at which Energy Ministers agreed conclusions on a contribution to the Spring European Council to be held on 8-9 March. Alistair Darling, the Secretary of State for Trade and Industry, agreed to the pre-Council basis for the conclusions, and Lord Truscott, the Minister for Energy, represented the UK at the meeting. The following written statement sums up the meeting:

> **Discussion at the Council focused on effective unbundling of gas and electricity network operators**, in the context of the development of the single gas and electricity market; **and on targets for renewable energy and biofuels**.
>
> On unbundling, Commissioners Piebalgs and Kroes set out the case for full ownership unbundling. For the UK, Lord Truscott underlined that effective

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31 EU press release IP/07/29

32 HC Deb 6 February 2007 c891W

separation of networks from supply activities would be crucial in creating a functioning single market that provided incentives for new investment.

Following a debate, **Ministers agreed Council conclusions that gave the Commission a mandate to bring forward proposals for effective separation of supply and production activities from network operations**, based on independent and adequately regulated network operation systems and on equal and open access to infrastructure. This was a good outcome for the UK.

On renewable energy, the Commission pressed for a mandatory target for renewable energy (electricity generation, heating and cooling, and biofuels) and the Presidency for a binding target for biofuels. However, there was strong opposition to binding targets from many member states. For the UK, Lord Truscott, in emphasising the importance of the overall strategic objective of reducing greenhouse gas emissions, noted that all low-carbon technologies—including renewables, carbon capture and storage, and nuclear energy—could contribute to this objective. Member States should have flexibility to develop and deploy them in a way suited to their national circumstances. The UK underlined the need to ensure that the target agreed was credible and realistic, and would lead to sustainable production, as well as being affordable and technically feasible. The Conclusions reflected the majority of member states opposition to binding targets. **The text endorsed a 20 per cent target of renewable energies in overall EU energy consumption by 2020 without specifying if the target should be binding. Differentiated national targets were to be derived from this EU target, taking into consideration individual circumstances, starting points and potentials. A 10 per cent binding minimum target to be achieved by all member states for the share of biofuels in overall EU transport petrol and diesel consumption by 2020 was agreed, with the binding element being subject to production being sustainable, second generation biofuels becoming commercially available and adequate levels of blending being possible. The Commission, having argued strongly for a binding renewable energy target, explicitly reserved its position on the lack of this commitment in the Conclusions.**

In discussion of the Commission's forthcoming Strategic Energy Technology Plan, many member states took the opportunity to draw attention to technologies of particular interest to them.

The **Conclusions go forward to the Spring European Council with agreement on most of the energy elements clearly settled. The Presidency will use the Conclusions to draw up the Energy Action Plan**, which will be attached to the European Council conclusions. The Environment Council on 20 February will have considered the greenhouse gas emissions reductions targets not dealt with in the energy text as well as other energy relevant issues that were.

A copy of the full Conclusions is in the Libraries of both Houses.[33]

[33] HC Deb 21 February 2007 cc 52-54WS

2. The Spring European Council

At the Heads of State and Government meeting on 8-9 March 2007 two energy issues were contentious: the target for renewables, and energy market liberalisation. Many Member State governments would have preferred the 20% renewables target to be voluntary rather than mandatory. In favour of the proposal were Germany, the UK, Italy and Sweden. Against were France, Poland, the Czech Republic and Slovakia. France would only agree to a binding target if its large nuclear sector, which is low-carbon, was given the same status as renewables.

A binding 20% EU overall renewables target by 2020 was agreed. Nuclear power is to count towards the target and there is to be 'burden sharing' to allow countries to make different contributions to the overall target. Future negotiations on this will be contentious.

The European Council agreed the less radical of the two options to open the energy market. France and Germany joined forces to block the most radical option, ownership unbundling, which would have forced the break-up of vertically integrated companies which generate power and also own the network. The agreement will enable the Commission president, José Manuel Barroso, to press ahead with a package of alternative measures which will inject some competition into the sector by separating distribution from generation and supply. These changes "are expected to include laws allowing companies such as Eon and EDF to continue to own their power grids but forcing them to hive off management to a genuinely independent operator".[34]

Mr Barroso believes that ownership of grids has been used by some companies to deter rivals from developing a place in the market and to deny them information

Summarising the outcome, Tony Blair said:

> The centrepiece is to free up the distribution of energy across the European Union to create a genuinely competitive, interconnected and Europe-wide internal energy market. That will bring major benefits for EU consumers, improve the security of supply, and strengthen European competitiveness. The European Council decided in particular that supply and production activities should be separated from network distribution to allow competition on the networks, as already happens in the UK.
>
> (…) this means that for the first time, at least at distribution level, British companies can compete on equal terms with French or German companies—in particular, in France and Germany, not just here in the UK. That will bring reduced costs to business and to customers, and again it has our full support.[35]

The arrangement is to be regulated by independent systems operators:

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[34] George Parker, "Energy groups face new pressure", *Financial Times,* 12 March 2006, p6
[35] HC Deb 12 March 2007 c23

> Separate legislation would provide for national regulators to co-operate on a European level, taking binding decisions on cross-border issues, including the development of the EU's feeble international power connections. (…)
>
> Europe's leaders agreed the new system should be based on "independently run and adequately regulated network operation systems which guarantee equal and open access to transport infrastructure and independence of decisions on investment in infrastructure (…)
>
> (Barroso) hopes a new breed of "independent systems operators" would have the incentive to encourage new suppliers to use their services and to build cross-border interconnectors to import power from other countries.[36]

The Government also announced that the European Council had agreed:

> a 20 per cent increase in energy efficiency, again by 2020. It also recognised the importance of clean coal technology. We welcomed the Commission's undertaking to support, by 2015, the construction and operation of up to a dozen commercial-scale clean coal demonstration plants, with a view to all new coal-fired power stations being fitted with carbon capture and storage technology by 2020. That technology must be a crucial element in the overall response to the climate change challenge, and it is important that we signal that to investors now. Clean coal can be part of the future.[37]

IV Oil and Gas Reserves

1. Background

There is considerable uncertainty about the size of oil reserves and hence how long they might last. Most global estimates refer to 'proven reserves'. These are the most certain category of reserves and their definition is relatively consistent across different sources. Other categories, as defined by the DTI, are illustrated below.[38]

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[36] George Parker, "Energy groups face new pressure", *Financial Times,* 12 March 2006, p6
[37] HC Deb 12 March 2007 c24
[38] DTI Oil and Gas directorate www.og.dti.gov.uk

	Reserves	Potential additional reserves	Undiscovered resources
	Discovered, remaining reserves which are recoverable and commercial. Can be proven, probable or possible depending on confidence level (as described below).	Discovered reserves that are not currently technically or economically producible.	Undiscovered potentially recoverable resources in mapped leads.
Proven	Reserves which on the available evidence are virtually certain to be technically and commercially producible, i.e. have a better than 90% chance of being produced.		
Probable	Reserves which are not yet proven, but which are estimated to have a better than 50% chance of being technically and commercially producible.		
Possible	Reserves which at present cannot be regarded as probable, but which are estimated to have a significant but less than 50% chance of being technically and commercially producible.		

Reserves are categorised by confidence level, and beyond this there are further categories of 'potential additional reserves' and 'undiscovered resources' (both of which can be estimated to different confidence levels). Changes in technology and/or economics can shift particular reserves from one category to another and hence lead to growth in proven reserves. New discoveries effectively shift estimates of resources to reserves. A change (improvement) in estimation methods could change the amount of oil thought to exist in each category.

This uncertainty fuels the debate about how long reserves might last, when oil production might peak and how it will decline thereafter. This polarised debate is often based around the concept of 'peak oil'. In 1956 the geophysicist Dr Marion King Hubbert predicted that US oil production would peak in around 1970 and decline afterwards. His predictions proved accurate: US production peaked in 1970 at 11.3 million barrels a day and stood at 6.8 million barrels a day in 2005.[39] This concept became known as 'peak oil' or 'Hubbert's peak'. The same model was also used to predict that world oil production would peak in around the year 2000.[40]

Oil production has continued to increase past the projected peak year, but the debate about peak oil has only intensified. One side of this debate - the 'pessimists'- believe that such a peak is close and that production will fall rapidly after this peak with disastrous economic and social consequences. This argument has been taken up more recently by some environmentalists who use it to argue against the perceived dependence on oil. On the other side, the 'optimists' predict a much later peak and a softer post-peak 'landing' where market signals (higher prices in response to scarcity) promote greater efficiency and substitution for other sources of energy. The first group calls for, among

[39] *BP Statistical review of world energy June 2006*
[40] M King Hubbert *Nuclear Energy and the Fossil Fuels*

other things, cuts in energy use and development of new, largely non-fossil fuel, sources of energy. The second adopts a more *laissez faire* approach to policy.

Oil is a finite resource in human timescales, so production will peak at some point. The uncertainty about reserves means the market does not have perfect information. This, alongside the difficulty in switching to other sources of energy and political influence in oil supply, means that perfect market conditions do not exist, and the market response to falling supplies will differ from that predicted by the simplest economic models. However, production peaks in individual countries may not be the best guide to the global situation. After production peaked in the US, imports increased to substitute for domestic production, so demand could continue to increase. The same would not be possible after a global peak. The large question marks over the size of oil reserves have in the past led some commentators to question the usefulness of estimates in informing policy or analysis.

The British Government's view of the issue was set out in the following written answer:

> **John Hemming**: To ask the Secretary of State for Trade and Industry in which year the Government expect *(a)* global conventional oil production and *(b)* global total oil production to peak; and what the Government expect to be the level of peak global oil production.
>
> **Malcolm Wicks**: The Government consider that the world's oil resources are sufficient to prevent global total oil production peaking before 2030, by which time the International Energy Agency's reference case scenario in its 2005 World Energy Outlook shows global oil demand reaching 115.4 million barrel per day, nearly 40 per cent. higher than current levels. The exact levels and years of the peaks in global conventional and total oil production will depend on assumptions about a number of factors, including the rate of global oil demand growth, the rate of investment in the global oil sector, and technological developments in finding and producing oil.
>
> Market mechanisms will ration the remaining global supplies of oil and provide the incentive for a shift to alternative sources of energy. This process needs to be supported by Governments. The UK Government are already putting in place policies that will help ease the UK economy away from power supplied primarily through fossil fuels and is also promoting international efforts, for example through the G8 Gleneagles Plan of Action, to develop cleaner energy technologies and promote energy efficiency. [41]

As mentioned, the Government is already taking, and expecting to introduce, a range of measures to reduce dependence on fossil fuels in the UK. This has been driven primarily by the need to reduce carbon dioxide emissions linked to global warming, but it will have the added benefits of improving the UK's energy security and reducing any future effects of oil depletion on the economy.

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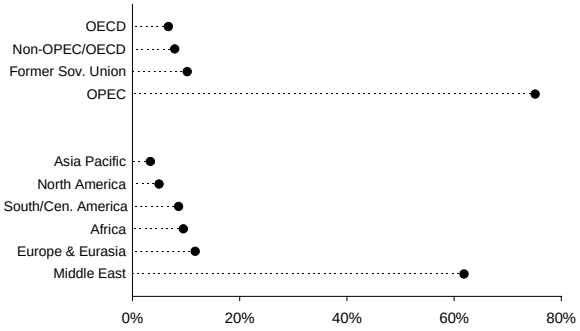
[41] HC Deb 17 July 2006 c 136W

2. Oil reserves

Recent estimates of world proven oil reserves have put the total at 1,120 billion barrels (source: *World Oil*), 1,200 billion barrels (source: *BP Statistical Review*) and 1,320 (source: *Oil & Gas Journal*).[42] Much of the difference is in the treatment of Canadian oil sands, but there are many smaller differences in national estimates between these sources. The rest of this section uses the BP data from their 2006 *Statistical Review of World Energy*. These figures exclude most of Canada's large oil sands reserves.

Estimates of proven reserves from the end of 2005 were geographically concentrated in the Middle East, which had 62% of the estimated total. The regional breakdown is illustrated opposite. Given current levels of production, global reserves would be enough to last for around 41 years. This is known as the "reserves to production ratio". At the end of 2005 this ratio was highest in the Middle East (81 years) and lowest in North America (12 years).[43]

Proven oil reserves by country grouping and region

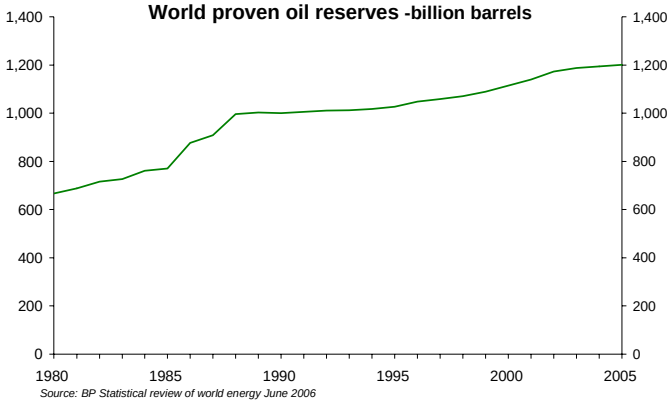


Source: BP Statistical review of world energy June 2006

Such ratios show how long oil would last if nothing changed and estimates of reserves were perfect. However, reserve estimates have tended to increase over time (see opposite) due to new discoveries and changes in technology, economic circumstances and revised estimation methods. Against this, production is also expected to rise. In the IEA 'reference scenario'[44] it is projected to increase at a rate of 1.3% a year to 2030. IEA analysts state that this would be enough to meet all the oil consumed in their reference scenario to 2030, although "more oil would need to be found were conventional production not to peak before then."[45]

The reserves to production ratio has not followed any distinct trend over the last two decades. It was 39.8 years in 1986 and 40.6 in 2005.[46] Over the whole of this period it has varied by less than 3.5 years, as the trend in reserves has been broadly matched by the trend in production.

World proven oil reserves -billion barrels



Source: BP Statistical review of world energy June 2006

National and regional estimate methods can differ to a greater extent for undiscovered resources, but the US Geological Survey has estimated that global undiscovered

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42 *World Proved Reserves of Oil and Natural Gas, Most Recent Estimates*, US Energy Information Administration 2006

43 *BP Statistical review of world energy* June 2006

44 Projection of energy supply and demand if current policies continue

45 *World Energy Outlook 2006*, IEA. Chapter 2

46 *BP Statistical review of world energy* June 2006

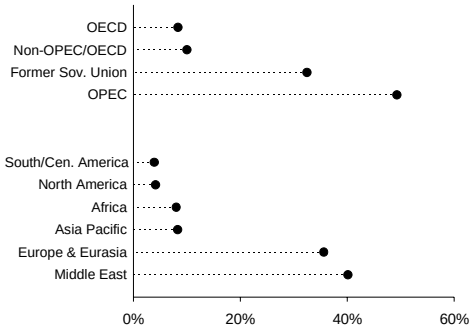
conventional resources and reserve growth could be in the region of 1,400 billion barrels of oil in its mean case.[47]

3. Gas reserves

Estimates of world proven gas reserves are in the region of 175-180 trillion cubic metres.[48] This section uses the BP *Statistical Review of World Energy 2006* data, which gave a total figure of 179.8 trillion cubic metres for the end of 2005.

These reserves are mainly in the Middle East and Europe/Eurasia, as illustrated opposite. Russia has by far the largest reserves of any single country, with 27%. The global reserves to production ratio has been estimated at 65 years.

Proven gas reserves by country grouping and region

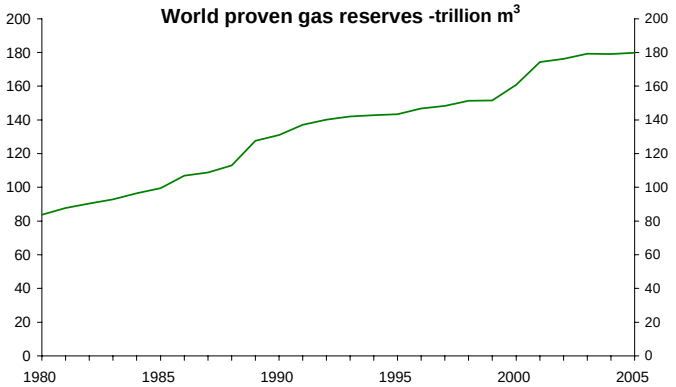


Source: BP Statistical review of world energy June 2006

Gas reserves are categorised in the same way as oil reserves and hence there is also uncertainty about the ultimate level of gas resources. The heated debate about peak oil is not yet apparent for gas. The heated debate around peak oil is not yet apparent for gas. Gas consumption is relatively less important (oil made up 36% of world energy consumption in 2005, gas 23%), reserves are expected to last longer, there is less international trade in gas and it is more easily substituted for other fuels in some of its main uses.

Estimated proven reserves of gas have also increased, more than doubling since 1980 (see opposite). This growth in reserves was greater than that seen for oil and has led to a clear increase in the reserves to production ratio from 58 years in 1980 to a peak of 70 years in 2001. Since then reserves have remained static and the continued increase in production has led to a fall in the ratio of five years.

World proven gas reserves -trillion m^3



Source: BP Statistical review of world energy June 2006

The IEA has projected that world gas demand will increase at 2% a year to 2030 (faster than demand for oil). This would make current estimates of proven reserves more than enough to last over this period and, given continued 2% annual growth in production,

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47 *US Geological Survey World petroleum assessment 2000 – summary* at http://pubs.usgs.gov/dds/dds-060/

48 *World Proved Reserves of Oil and Natural Gas, Most Recent Estimates*, US Energy Information Administration 2006

enough to last around 40 years. The largest growth in production up to 2030 is projected to be from the Middle East, Africa and Latin America.[49]

V Security concerns

A. Depletion of resources

Not all security threats with a strong energy component necessarily materialise. However, nobody questions that the world faces a major challenge over the coming decades from the progressive depletion of oil and gas resources. As discussed in Section IV, estimates of the time it will take for world oil and gas resources – proven and unproven – to run out vary considerably and are dependent on a range of complex assumptions.[50] By contrast to oil and gas, coal is abundant (over half of the world's proven reserves are in the US, Russia and China) and will take far longer to run out than oil and gas, but energy from coal is not a substitute for all other fossil fuels and it has higher unit carbon emissions.

Efforts continue in the industrialised world to develop and expand alternative sources of energy such as renewables or nuclear power and to limit the use of coal. Industrialising countries such as China and India are beginning to do the same – or are claiming that they are prepared and trying to do so.[51] However, in the short to medium-term, oil and gas will remain a crucial part of the energy equation for the high energy consuming nations. Most of this oil and gas is located in parts of the world characterised by conflict and political instability, or which have significant potential for both. The ten countries with the greatest proven oil reserves are Saudi Arabia, Canada (if all oil sands reserves are included), Iran, Iraq, Kuwait, United Arab Emirates, Venezuela, Russia, Libya and Nigeria. The greatest gas reserves are found in Russia, Iran and Qatar.[52]

B. Non-state actors

In zones of conflict and political instability there is considerable scope for 'non-state actors' to target oil and gas resources in pursuit of their objectives. This applies both to non-state actors which have international agendas and local non-state actors which have national or local agendas. 'Non-state actors' refers to those groups other than states, national or international oil companies whose actions have an impact on energy sources and infrastructure. This impact can arise from international terrorism or the threat of terrorist attacks, such as the threats by *Al-Qaeda* against Saudi Arabia and Yemeni facilities. Activity by non-state actors can also take the form of campaigns, sometimes involving violence, by local groups opposed to exploration for oil or gas, or who seek a larger share of the benefits of exploration.

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49 *World Energy Outlook 2006*, IEA. Chapter 4

50 'Proven' means discovered hydrocarbons which it is highly likely to be economically viable to produce.

51 For more detail on China and India, see Library Research Papers 06/36, *A Political and Economic Introduction to China*, 19 June 2006; 07/40, *An economic introduction to India*, 2 May 2007; and 07/41, *A political introduction to India*, 2 May 2007.

52 *World Proved Reserves of Oil and Natural Gas, Most Recent Estimates*, US Energy Information Administration 2006

The US takes threats by non-state actors very seriously, including those in parts of the world that are not currently at the centre of attention. For example, the American Trans-Sahara Initiative Fund is providing $100 million between 2007-11 for counter-terrorism training and equipment in Algeria, Chad, Mali, Mauritania, Niger, Nigeria, Senegal and Tunisia.[53] Much has been written about how primary resources such as oil and gas often generate conflict in fragile states. For some, Sudan is a classic case in point, both in relation to the North-South conflict and the conflict in Darfur:

> Some political analysts believe that untapped oil reserves might have been an underlying factor in the Darfur conflict all along, explaining why a seemingly barren wasteland of western Sudan would spark such a bitter tug of war between government forces and rebels, eventually drawing the intervention of international players such as the United States, Libya and the United Nations.
>
> … Salih Osman, a human rights attorney from Darfur, said government suspicions about oil in Darfur explain why regime officials reacted so strongly to rebel attacks in the region, starting in 2003. "I fear this will only make matters worse," he said, referring to the newly expanded exploration.[54]

Two countries where local groups have been targeting foreign oil companies are Colombia and Nigeria. The *Oil and Gas Review 2005* noted that from 1996 to 2004 "US and British oil companies in Nigeria and Colombia were more attacked than any other oil companies in the world" while "attacks against French, Italian and Venezuelan and other transnational companies was also significant".[55] Half the attacks in Colombia during this period were carried out by two rebel groups, the Revolutionary Armed Forces of Colombia (FARC) and the National Liberation Army (ENL). Nigeria has become a particularly dangerous environment for oil companies and their staff over the past decade:

> In 2003 Royal Dutch/Shell closed their operations in the western Niger Delta region of Nigeria due to increasingly violent unrest… and clashes between Ijaw ethnic militants and Nigerian security forces. Following the extrication by Shell, the Ijaw group threatened to destroy evacuated oilfields if the government failed to meet its demands for greater political representation.[56]

The *Observer* has described the crisis in Nigeria as

> … threatening to halt oil production in the world's eight largest oil exporter. .. Militants up the labyrinthine creeks of the Scotland-sized Delta region and in the oil port of Harcourt said that their patience with the government and multinationals had run out. They will intensify the fight until they get electricity, schools, roads and medical clinics (…).

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53 "The scramble for African oil", *New African,* July 2006. Some of these states are oil producing, but the initiative is largely determined by the challenge to the US of Islamic fundamentalism.

54 "A search for oil raises the stakes in war-torn Darfur" *Los Angeles Times,* 3 March 2007

55 Mark Lindsay, "The security threat to oil companies in and out of conflict zones", *Oil and Gas Review 2005*, Issue 2

56 Ibid

> At the heart of the anger is what they see as decades of exploitation and corruption by the government and foreign firms. Last year the Nigerian government earned about $45 billion in oil revenue while more than 70 per cent of Nigerians live on less than $1 a day.
>
> World Bank President Paul Wolfowitz said [in October] that over the past 40 years about $300 billion in oil wealth had "disappeared" from Nigeria. Much has gone into overseas bank accounts but some is spilled in accidents or sabotage.[57]

C. Consuming nations - import dependency

Many industrialised nations have little or no oil/gas resources; others increasingly rely on imported fuel as they have used up most of their natural resources, or what they have can no longer support increasing demand. Only a minority of OECD countries are currently net exporters of energy, including Canada, Australia and Norway. The UK was a net exporter for most of the 1980s and 1990s and the start of this century, but declining North Sea production meant it became a net importer in 2004.[58] This section briefly quantifies their levels of import dependency and includes projections of how this will develop.

The table opposite looks at oil import dependency[59] on crude oil. The highest levels of dependency were in the EU and Japan. The US saw a relatively large increase compared to other industrialised countries. Both China and India saw large increases in dependency as their demand increased rapidly over this period. The IEA projects that by 2030 oil import dependency will reach 65% for the OECD as a whole, 92% in the EU-15, 74% in the US and 77% in China.[60]

Oil import dependency of selected countries/groups

	1990	2000	2004
OECD	51%	52%	55%
US	45%	58%	64%
EU15	78%	73%	79%
Japan	100%	100%	99%
China	-18%	28%	40%
India	39%	70%	74%

Source: IEA extended energy balances 2006

Trade in natural gas tends to be more localised – within, rather than between, regions. Gas transportation costs are higher than those of oil. Most gas trade is via pipelines, and while shipments of Liquefied Natural Gas offer potentially lower costs over greater distances, they also need significant infrastructure investment. The table opposite looks at levels of gas import dependency. Other

Gas import dependency of selected countries/groups

	1990	2000	2004
OECD	17%	20%	23%
US	8%	15%	15%
EU15	41%	46%	51%
Japan	96%	97%	96%
China	0%	-8%	-4%
India	0%	0%	0%

Source: IEA extended energy balances 2006

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57 "Rebels threaten all-out attack on Nigeria's oil", *Observer,* 5 November 2006. For further background, see Library Standard Note SN/IA/4275, 6 March 2007, "Nigeria at Election Time"

58 *Digest of UK energy statistics 2006*, DTI

59 Net imports as a proportion of total primary energy supply from crude oil

60 *World Energy Outlook 2006*, IEA. Table 3.4

than Japan most areas had a lower gas import dependency. The EU15 saw the largest increase over the period. Trade in natural gas is still very limited in China and India. IEA projections look at inter-regional trade and give figures for regions as a whole. Europe is expected to see the largest increase in imports, with its import dependency increasing by more than 20 percentage points between 2004 and 2030. North America (as a whole) was broadly self-sufficient in gas in 2004 and by 2030 is projected to rely on imports for 16% of supply. Africa is expected to overtake Russia as the largest supplying region in the world and the largest regional supplier to Europe by 2030.[61]

VI Regional overview

This section is a brief survey of some of the regions currently considered to have the largest energy reserves and the main threats to security that may emanate from those regions. Cumulatively, they could have serious implications for the energy supplies of the UK and other EU Member States. The survey is far from comprehensive in its coverage. For example, it does not look at the Caspian region, which is the subject of a separate Research Paper,[62] and does not consider the security implications – positive or negative – of switching to bio-fuels. Neither is the survey exhaustive in its treatment of the threats that are discussed. Rather, the aim is to show that contemporary threats to energy security are complex and varied.

A. Africa

1. Reserves and output

Most of Africa's proven oil and gas reserves are found in the North of the continent and Nigeria. Africa's share of world output has increased over the last decade, with particularly large increases from Nigeria, Algeria and Angola. Most oil exports from North Africa go to Europe. The US and China are the largest single export markets from the rest of the continent.

African oil 2005
Proven reserves: 114 billion barrels; 9.5% of world total
-concentrated in Libya, Nigeria and Algeria
Production: 9.8 million barrels/day; 12% of world total
-average +2.8%/year in decade to 2005
Reserves/production ratio: 32 years
Exports: 18% of world total
-main markets Europe and the US

African gas 2005
Proven reserves: 8% of world total
-Concentrated in Nigeria and Algeria
Production: 6% of world total
Reserves/production ratio: 88 years
Exports: Europe the main market, Italy largest importer

Source: BP Statistical Review of World Energy

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61 *World Energy Outlook 2006*, IEA, Chapter 4

62 Library Research Paper 05/24, *'The Caspian Basin, Energy Reserves and Potential Conflicts'*, 16 March 2005

2. The new 'scramble for Africa'

The *New African* has described Africa as "the final frontier as far as the world's supplies of energy (both oil and natural gas) are concerned."[63] Although Malaysian, Indian and Russian oil and gas companies are involved in this new 'scramble for Africa', China and the US are at the fore in competing for access and control over Africa's resources. As global energy supplies tighten, tensions between these two countries could rise.

a. China's presence in Africa.[64]

China's economic expansion relies principally for energy upon its own abundant coal resources. However, these are insufficient to sustain all aspects of its current rapid growth rate. This has led China to look for new sources of energy abroad, not least in Africa. Angola has become a crucial supplier of oil to China. China is also active in other African countries with oil or gas, such as Gabon, Nigeria, Sudan, Chad, Algeria and Equatorial Guinea.

Chinese energy companies are state-owned and can therefore operate as an arm of the Chinese Government. They offer 'soft loans', provide credit and no-strings-attached development aid to African countries. They also buy assets, filling the exchequers of African governments. For example, the Chinese National Off-shore Oil Corporation paid $2.3bn for a 45% stake in Nigeria's Akpo oil field (which India was also bidding for) in April 2006. Yet at the same time as they call upon the support of the state, Chinese energy companies sometimes appear subject to little effective control by the Chinese Government in their operations. For example, China was the target of criticism for its activities in Gabon, when it was revealed that its oil company *Sinopec* had been prospecting illegally for oil, and dynamiting and clearing large tracts of land.[65]

One attraction for many African Governments is the fact that, in contrast to Western Governments, China is said not to be instinctively interested in issues of human rights, corruption or transparency. One analyst has written:

> Non-intrusive China presents an attractive partner for African governments: not only for plainly authoritarian leaders but for the great many African governments presiding over hybrid regimes for whom the distribution of patronage remains an exigency of political survival… the patchy record of western-driven reform efforts in Africa will inadvertently facilitate Chinese advances on the continent.[66]

China has also been criticised for using its position as a permanent member of the UN Security Council to protect both its own interests and those of allied African

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63 "The scramble for African oil", *New African*, July 2006

64 See also Library Standard Note SN/IA/4238, 24 January 2007, "China and Africa: A Quick Guide"

65 H. French, "Commentary: China and Africa", *African Affairs*, Vol. 104, No. 422, January 2007, pp. 129-30

66 Denis Tull, "China's engagement in Africa: scope, significance and consequences" *Journal of Modern African Studies*, Vol. 44, No. 3, 2006

governments. This is what China has been accused of doing in relation to the Government of Sudan in the context of the crisis in Darfur. Two thirds of Sudan's current oil is purchased by the Chinese National Petroleum Company, but Chinese interests are not immune from the violence in that country. In November 2006 rebel fighters from Darfur attacked Chinese oil facilities.

Some observers argue that China's burgeoning demand for energy in Africa and elsewhere will ultimately bring it into direct conflict with the US. Richard Heinberg, in his book, *The Party's Over*, writes:

> American strategists would prefer to avoid direct confrontation as China's increasing share of the global economy and its massive production of export goods for the US market ensure that open conflict would inevitably harm both sides. Nevertheless since China is capable of absorbing a quickly growing share of the available global oil exports, economic and possibly military conflict with the US is likely sooner or later.[67]

Other analysts are less pessimistic, arguing that the odds are that China and the US will be able to find ways of reducing and mitigating competitive tensions over energy supplies.

b. US energy interests in Africa

The US has been seeking to diversify its energy supplies by developing alternative sources outside the Middle East. One element of that approach has seen private US oil and gas companies increase their involvement in West Africa (eg Angola, Nigeria, Gabon, Equatorial Guinea) and Central Africa (excluding Sudan).[68] Oil and gas from West Africa has less distance to travel to the US than it does from the Middle East, although West and Central Africa are similarly affected by political instability. Among the major American companies with investments in production, exploration and service activities across West Africa are Chevron Texaco, Amerada Hess, Exxon-Mobil, Marathon Oil and Deven Energy.

In 2003 Matthew McManus, Acting Director of International Energy and Commodity Policy at the Office Economic and Business Affairs Bureau of the US Department of State, told the Senate Foreign Relations Subcommittee on International Economic Policy, Export and Trade Promotion:

> New energy resources, from existing producers such as Canada, Venezuela, Nigeria, and Angola combined with those from emerging producers of oil and gas such as Peru, Equatorial Guinea and Chad, among others, are helping to meet our energy security goals by diversifying global energy supplies. […] we are working with host governments, both in Washington and through our Embassies overseas, to build and support open and stable business environments for U.S.

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[67] Richard Heinberg, *The Party's Over: Oil, War and the Fate of Industrial Societies* (British Columbia, 2003)

[68] Sudan was listed as a "state sponsor of terrorism" by the United States in 1993. American oil companies have suspended their operations or sold their interests in the country (principally to the benefit of Chinese companies).

> firms to play a role in developing energy resources throughout the world. We are building on the National Energy Strategy goal of maintaining a diverse global energy market that enhances economic growth and stability.[69]

Nigeria and Angola are the leading current sub-Saharan African suppliers of oil to the US. The US also has growing interests in the Gulf of Guinea, including around the islands of São Tomé e Príncipe. Significant oil is thought to lie under the seabed there. In 2001 São Tomé e Príncipe and Nigeria reached agreement on joint exploration. In April 2003 a joint development zone (JDZ) was established, which Angola joined in 2006. Chevron Texaco, Exxon-Mobil and the Norwegian firm Equity Energy have been granted exploration rights in the JDZ. Chevron Texaco became the first firm to start exploratory drilling in January 2006.

The US is cementing its links with African states involved in the Gulf of Guinea through a range of strategies. The *Voice of America* radio station broadcasts to much of Africa from São Tomé e Príncipe. In October 2004 US Europe Command (EURCOM) hosted a Gulf of Guinea maritime security conference in Naples. This was followed by several exercises involving US naval or coast guard patrols. The US justifies its maritime activity in the Gulf of Guinea on the grounds that it is protecting energy sources in West Africa. Admiral Harry Ulrich, Commander of US Naval Forces Europe, said in 2006: "In all parts of the world, the US and any good nations want a safe coast for those countries who are supplying energy, and that is why we are often there. So there is nothing to fear."[70] There have been reports that the US is planning to build a base on São Tomé e Príncipe.[71] Although President de Menezes was reported to have announced plans for a base, there have been no apparent developments.[72]

B. The Middle East

1. Reserves and output

Middle East dominance of oil reserves is well known. The five countries with the largest proven conventional oil reserves are all in the region. At current production levels these reserves will last longer than most others, but the reserves to production

Middle East oil 2005
Proven reserves: 740 billion barrels; 62% of world total
-concentrated in Saudi Arabia, Iran and Iraq
Production: 25.1 million barrels/day; 31% of world total
- average +2.0%/year in decade to 2005
Reserves/production ratio: 81 years
Exports: 46% of world total
-main market is the rest of Asia

Middle East gas 2005
Proven reserves: 40% of world total
-Concentrated in Iran and Qatar
Production: 11% of world total
Reserves/production ratio: 246 years
Exports: Japan and Taiwan are the major markets

Source: BP Statistical Review of World Energy

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69 Testimony of Matthew McManus, 21 October 2003, at http://www.senate.gov/~foreign/testimony/2003/McManusTestimony031021.pdf

70 "The Scramble for African Oil", *New African*, July 2006

71 Matthew Yeomans, "Oil: Anatomy of an Industry", 2004

72 "Sao Tome e Principe", *Global Security.org* (no date given)
Available at: http://www.globalsecurity.org/military/facility/stp.htm
In February 2007 the US upgraded its military arrangements for Africa by establishing an Africa Command.

ratio varies within the region from 65 years in Saudi Arabia to 173 years in Iraq. Middle East dominance of gas reserves, trade and production is less significant than for oil.

Saudi Arabia has the largest oil reserves in the world and is by a long way the largest exporter of oil. It has always been the dominant player within OPEC in adjusting production in line with market stability. Its economy is highly dependent on oil production, with the petroleum sector accounting for approximately 75% of budget revenues, 45% of GDP and 90% of export earnings. An interruption of Saudi supplies would cause serious problems for the high energy consuming countries, so close attention has been paid in recent years to the growth of domestic terrorism linked to al-Qaeda and to the threat of extremist violence spilling across the border from Iraq.

Iraq's oil reserves are considerable, with listed proven reserves of 115 billion barrels (around 10% of the world's total) and more than 200 billion barrels of unproven reserves. However, realising that potential remains fraught with difficulty. Extensive UN sanctions, imposed in 1990 after Iraq's invasion of Kuwait, prevented any significant development of the Iraqi oil sector, while the extreme violence that has affected the country since the US-led invasion in 2003 has hindered efforts at reconstruction and resulted in repeated acts of sabotage against the oil infrastructure. The chronic insecurity and the absence of a robust legal framework have deterred foreign investment. Further instability may arise as a result of the proposed referendum on the status of the oil-rich northern city of Kirkuk and whether it should be incorporated into the Kurdish region.

The adoption of a new Iraqi Hydrocarbon Law may help resolve some of the difficulties, although there has been hostile reaction to it from some quarters, particularly with regard to the introduction of production-sharing agreements:

> Iraqi unions have expressed their opposition to the proposed law. In a speech earlier this month to a conference, Hassan Jumaa, head of the Federation of Oil Unions, said: "We strongly warn all the foreign companies and foreign capital in the form of American companies against coming into our lands under the guise of production-sharing agreements."
>
> The proposed introduction of production-sharing agreements in Iraq is controversial because they are usually used in challenging regions where oil is difficult and expensive to access, such as the Amazon. By contrast, much of Iraq's 112 billion barrels of proven oil reserves – the second-largest in the world – has already been discovered and is cheap to drill.[73]

In any event, a significant breakthrough in the oil sector is likely to occur only once the violence abates. As of mid-2007 there were few signs that the security situation was improving significantly.

The threat of further conflict and instability in the Gulf region cannot be excluded either, given the ongoing tension over Iran's nuclear programme and warnings from both the United States and Israel that they might resort to military action to disrupt an Iranian attempt to acquire nuclear weapons. Some observers warn of the threat to Gulf oil

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[73] Tim Webb, *Independent on Sunday*, 25 February 2007

supplies in the event of conflict, fearing that Iran may seek to interdict shipping by blockading the Straits of Hormuz at the mouth of the Gulf. Other commentators express greater concern over the poor state of the Iranian oil and gas sector, highlighting the risk that internal political wrangling or the diplomatic disputes with the international community could cause many of its oil fields to go into decline and could further hinder development of the world's biggest natural gas deposit.[74]

2. Dependency on "petrodollars" and the Euro

Recently speculation has grown about the effect on the dollar - and the American financial system - of the euro, which now challenges the dollar in its global reach. In 2006 the surplus earned by the Gulf Cooperation Council members (Saudi Arabia, UAE, Kuwait, Bahrain, Qatar and Oman) was estimated at $227 billion[75] and in the past year some of these countries have transferred a proportion of their central bank reserves from dollars to euros. Also, Iran in recent months has been diversifying its $45 billion reserve into other currencies, particularly the euro. The impact of the development is disputed; diversifying reserves would help protect countries from a drop in the value of dollar. The Qatar-based Arab news network, *Al Jazeera*, believes the move to be significant:

> The switch will include… foreign as well as oil trade, and assets abroad, ending Iran's dollar dependence. Will other oil producing countries in the Middle East, members of the Organization of Petroleum Exporting Countries (OPEC), follow suit? A switch by OPEC members from the U.S. currency to the Euro could enhance the value of the Euro, ending the Dollar supremacy.
>
> Analysts aroused fears over Iran's move, warning it would prompt another U.S. war in the region. When other countries, like Iran, sought payment of oil in other currencies, most notably Euro, the punitive action was in order. The American President George W. Bush's Shock-and-Awe in Iraq was not about Saddam's nuclear ambitions, or the alleged link to Al Qaeda network which the U.S. blames for September 11 attacks, it's about defending the dollar, and setting an example that anyone who seeks payment for oil in currencies other than U.S. Dollars, which is what Saddam did in 2000, would be likewise punished.[76]

The *Oil and Gas Journal* concluded in 2005 that: "The combination of burgeoning future oil revenues and growing hostility to the US in the [Middle East] region is not conducive to major capacity expansion and will not provide a stable investment environment or offer easy opportunities to the major international oil companies to assist in any capacity expansion projects."[77] The *Journal* added that the consequences include the likelihood of further military interventions and conflicts within the Middle East.

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74 See, for example, the speech to the IP Conference, 19 February 2007, by Carola Hoyas, Chief Energy Correspondent at the *Financial Times*.

75 "Institute of International Finance prediction", *Financial Times* 16 August 2006

76 *Al Jazeera* 22 December 2006 http://www.aljazeera.com/me.asp?service_ID=12635

77 *Oil and Gas Journal*, 7 March 2005

C. Russia

1. Reserves and output

Russian reserves of oil are relatively small compared to its gas reserves. Output has increased faster over the last decade than in any other region. But it still remains below the Soviet era peaks. Its gas resources are larger and less exploited, at current rates they will last 60 years longer than Russian oil.

Russian oil 2005
Proven reserves: 74 billion barrels; 6.2% of world total
Production: 9.8 million barrels a day; 12% of world total
- average +4.6%/year in decade to 2005

Reserves/production ratio: 21 years
Exports: 14% of world total
-Europe took over 80% of its exports

Russian gas 2005
Proven reserves: 27% of world total
Production: 22% of world total
Reserves/production ratio: 80 years
Exports: All went to Europe
-Germany and Italy the largest importers

Source: BP Statistical Review of World Energy

2. Supply interruptions and Russian policy

The European Union imports half of its gas from Russia, and 80% of that gas comes through a Ukrainian pipeline. When disruption occurs, such as during the brief suspension of gas to Ukraine in January 2006 (which Russia claims was done for legitimate commercial reasons, and Ukraine claims was an act of political revenge), Europe is likely to feel the effect.

The growing energy dependence of the EU on Russia ensures that close attention is paid by western observers to Russian internal developments, particularly as presidential elections approach in March 2008, and to its perceived reliability as a supplier. Some point to the 2003 'Russian Energy Strategy to 2020' as proof that the administration of President Vladimir Putin believes the role of the country in world energy markets to a large extent determines its geopolitical influence, and that it sees energy policy as an instrument for the conduct of internal and external policy.[78]

It is argued that Russia's sensitivity to its reduced status since the Cold War era, coupled with the decline in its military capability, means that energy policy now has greater

[78] Energy Strategy of Russia to 2020 [*Energeticheskaya strategiya rossii na period do 2020*], Government of the Russian Federation, 28 August 2003, No 1234-g. An English language summary is online at: http://ec.europa.eu/energy/russia/events/doc/2003_strategy_2020_en.pdf

prominence as a tool for averting threats and ensuring that the country cannot be pressured or subjected to economic or energy blackmail. Oil and gas may also be seen in the Kremlin as a means of re-establishing its influence over the former Soviet states in Eastern Europe, the Trans-Caucasus and Central Asia, although Russia insists it has legitimate commercial interests in demanding that those countries pay for their energy at levels that are closer to world market prices. Nonetheless, one comprehensive assessment by Robert Larsson of the Swedish Defence Research Agency suggests that political considerations played a part in more than half of the incidents and disruptions to Russian supplies that occurred between 1991 and early 2006.[79] Larsson concluded that:

> Russia's coercive energy policy should be understood in a long-term geopolitical and strategic context under which political, economic and market drivers coexist. Russia has strategic priorities to keep its influence over the [former Soviet states of the] CIS [Commonwealth of Independent States] and its energy policy is one of the means used for this reason.[80]

He assessed that the risk of partial and/or short-term supply interruptions to the states of the former Soviet Union was high, especially against Belarus, Ukraine, Moldova and Georgia, and suggested there was a high risk that such interruptions would affect Europe. However, he believed the risk of supply interruptions being aimed specifically at EU states was low and that a permanent cut in supply to Europe would have to be preceded by a serious degeneration in relations, in combination with a developed technical ability for Russia to export energy elsewhere, such as China.[81]

Another significant factor is the extent to which the Kremlin has reasserted its control over the energy sector since 2000, following the anarchic market reforms and privatizations of the Yeltsin era during the 1990s. All of Russia's gas and 30% of its oil is controlled by the Russian state. Larsson commented:

> The Kremlin's influence is larger than it appears, as subtle and informal means are used to control the energy sector. Self-censorship and politically fine-tuned market action by the energy corporations underpins the markets' responsiveness. The state and energy companies often act in tune in strategic matters. […] A goal appears to be a market that acts in line with the Kremlin's agenda, but where the 'need' for the Kremlin's explicit interference is diminishing.[82]

He warned that the concentration of power by the Kremlin had created an illusion of political and economic stability and that the country's lack of democracy and lack of the rule of law would only aggravate the problems of dependency on Russian energy. Jeremy Page of *The Times* expressed similar concerns, arguing in a 2005 article that:

> Within the next ten years Russia aims to be at the centre of a spider's web of oil and gas pipelines feeding all the major world markets. That would be welcomed

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79 Robert L Larsson, *Russia's Energy Policy: Security Dimensions and Russia's Reliability as an Energy Supplier*, FOI, Swedish Defence Research Agency, March 2006

80 *ibid.* p.5

81 *ibid.* p.3

82 *ibid.* p.6

> by countries anxious to meet the growing demand for gas and to reduce their reliance on the volatile Middle East.
>
> But it leaves the EU dangerously dependent on a country with a history of political instability and aspirations to reclaim its superpower status.[83]

Others argue that such assessments are overly gloomy and fail to take account of Russia's legitimate fears about foreign influence and the concerns in Moscow that the US is intent on ensuring Russia does not regain an influential role on the world stage. Some commentators also seek to place recent developments within a longer-term historical context. Thane Gustafson of Georgetown University commented in April 2006 that: "Russia is emerging from a 20-year cycle of decay, and it is rebuilding a strong central state in a way that future historians will probably decide was inevitable". He concluded that Russia's decisions to reassert state control over energy and use its riches to pursue traditional security interests were also probably inevitable, adding that: "Energy is all the Russians have got."[84]

D. The Americas

1. Reserves and production

The Americas are a varied region in oil and gas terms and the only net importer of oil in the regions summarised in this paper. In the North, US oil production is in long term decline and Canada has very large, but mainly unexploited, reserves. Venezuela dominates gas and oil reserves in the rest of the continent, but its output has changed little over the last decade**.** In the rest of the continent production has increased. The US relies on imports from the rest of the Americas for just under half of its total imports and it consumes 86% of all oil exports from the region's countries.

The Americas oil 2005
Proven reserves: 163 billion barrels; 14% of world total
-Venezuela has half this total
-excludes most Canadian oil sands which would double the total
Production: 20.6 million barrels/ day; 26% of world total
-average +0.2%/year in decade to 2005
Reserves/production ratio: North America 12 years
-Central/South America 41 years
Exports: Largely within region; US the main consumer

The Americas gas 2005
Proven reserves: 8% of world total
-Venezuela and the US
Production: 32% of world total
Reserves/production ratio: North America 10 years
-Central/South America 50 years
Exports: Main flow from Canada to the US.

Source: BP Statistical Review of World Energy

2. Canada

Canada has proven reserves estimated to be 180 billion barrels (including oil sands reserves), making it the world's second largest holder of reserves after Saudi Arabia. The vast majority of these reserves are in oil sands, which make it relatively expensive to

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83 Jeremy Page, *Times* 30 December 2005
84 Quoted in 'A confident Russia emerges from its lair', *International Herald Tribune*, 10 April 2006

extract in both financial and environmental terms. Higher oil prices over the last few years have made these reserves relatively more economic to exploit. Despite this complexity, the US continues to regard Canada as one of its leading and most reliable sources of future energy.

Following the terrorist attacks on the US in September 2001, the US Ambassador to Canada, Paul Cellucci, announced that he wanted to promote Canada as the main source of US energy, and he recommended that Canada renounce the Kyoto Protocol to reduce greenhouse gas emissions in favour of a joint 'North American' strategy with the US, which has refused to ratify the Protocol.[85] In his October 2003 testimony to the US Senate Sub-committee, Matthew McManus elaborated on this position:

> Canada […] remains our leading supplier of imported electricity, natural gas and petroleum. All three flow across the border in both directions. The Canadian energy sector is developing its heavy oil reserves, with production expected to reach nearly one million barrels per day by year-end. These heavy oil reserves are anchoring Canada as a pillar of hemispheric energy security. Canada's heavy oil is important to our energy security. Over time this number will rise as advances in technology make even more heavy oil reserves recoverable at prevailing market prices. Including Canada's heavy oil reserves raises North America's share of the world's proven reserves from 6 to 18 percent (and the Western Hemisphere's from 13 to 26 percent), while those in the Middle East fall from 66 to 57 percent.
>
> World-class oil and natural gas projects are also underway in the Canadian Maritimes, which until recently had no oil or gas production, but is now the fastest-growing source of natural gas for New England, the region of our country most dependent on home heating oil. In 2000 Nova Scotia began producing natural gas and shipping it southwest by pipeline to the Boston area.
>
> Newfoundland began producing oil from its offshore continental shelf less than a decade ago, and it is showing increasing promise as a long-term component of North America's energy supply picture…
>
> … Given the importance of our energy partnership with Canada, the State Department has for years chaired an interagency bilateral "Energy Consultative Mechanism" between the two federal governments, allowing each side to work towards common ends and to address issues of-concern.[86]

However, concern about US dependence on Canadian oil has been growing in Canada, particularly in the light of the 2005 "Security and Prosperity Partnership of North America", between the US, Mexico and Canada.[87] Although some opposition has come from groups which fear that oil agreements with the United States represent an

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85 "Don't Worry Canada, We Still Want Your Oil", Susan Thompson, *Global Policy Forum*, 4 April 2003 at http://www.globalpolicy.org/security/natres/oil/2003/0408canada.htm

86 Matthew McManus, at http://www.senate.gov/~foreign/testimony/2003/McManusTestimony031021.pdf

87 For further information on the partnership (SPP), see http://www.spp.gov/

increasing loss of sovereignty, most oppose it on environmental grounds. A citizens' group called the "Council of Canadians" is campaigning on the former:

> Canada currently produces about 40 per cent more oil than it consumes and so should not have to worry about shortages. Yet, Canada now exports 70 per cent of its supply to the U.S., and imports almost 60 per cent of the oil it consumes. The Mexicans were smart and got an exemption from [NAFTA] energy sharing in times of shortage. Consider the respect that the exemption got Mexico in the U.S. national energy task force report: "Mexico will make its own sovereign decisions on the breadth, pace, and extent to which it will expand and reform its electricity and oil and gas capacities."
>
> Contrast this with the U.S. NEP report's assessment of Canada: "Canada's deregulated energy sector has become America's largest overall energy trading partner, and our leading foreign supplier of natural gas, oil and electricity." A national energy policy for the U.S. and a continental energy market for Canada is a raw deal for Canada. Instead of negotiating further integration with the U.S., why not push for a Mexican-style exemption for Canada?[88]

Environmental objections have concentrated for some years on the proposals to open up the American Arctic National Wildlife Refuge in Alaska, which shares a north western border with Canada. However, as one commentator has put it, "most industry analysts agree that despite political attention focused elsewhere, the oil sands are North America's main energy gamble for the next century". He continues:

> "Oil sands production is very expensive and complicated, but with prices as high as they are now, it finally is highly profitable," said Roland George, an analyst at Purvin & Gertz, a petroleum industry consulting firm in Calgary.
>
> "In addition," he said, "it's so close to major markets, and it's in Canada, where you don't have to worry about a revolution or terrorism or getting your investment confiscated tomorrow. And finally, because the reserves are so huge, you know your investment will pay off for a very long time."
>
> Dion, the environment minister, said that the federal government's plan for complying with the Kyoto Protocol includes a mandate for the oil sands industry to reduce its output of greenhouse gases by 12 percent a barrel over its expected 2010 level. But [technical efficiency improvements to reduce pollution] are many years from being ready for wide use. In addition, analysts say, efficiency improvements from new technologies are likely to be partly offset by a gradual switch to the more energy-intensive in- situ methods and by a shift in refining to higher-grade synthetic blends.
>
> The oil sands industry now consumes about 400 billion cubic feet of natural gas per year, an amount that could triple by 2015 as oil production rises by the same amount.
>
> "The fact remains that the oil sands are the most dirty, wasteful way of obtaining energy on the planet," said Elizabeth May, executive director of the Sierra Club of

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[88] Gordon Laxer, Professor of Political Economy at the University of Alberta, member of the Board of Directors of The Council of Canadians, February 2005

> Canada. "At a time when global warming is an increasing problem, why should this industry be expanded willy-nilly to make the problem worse?"[89]

In addition to the apparent US reliance on Canadian oil reserves, estimates of the potential energy reserves under the Arctic polar ice cap have also begun to dominate the energy security debate in Canada. The US, Canada, Russia, Denmark and Norway all share a border with the Arctic Circle, an area which the US Geological Survey has estimated contains one quarter of the world's undiscovered energy resources. To date, however, the exact sovereign status of the region and each country's exclusive economic rights in the area are unclear.[90] An article from *BBC News Online* in October 2005 outlined the sovereignty dispute in the Arctic:

> The US and Canada argue over rights in the North West Passage, Norway and Russia over the Barents Sea, Canada and Denmark are competing over a small island off Greenland, the Russian parliament is refusing to ratify an agreement with the US over the Bering Sea and Denmark is seeking to trump everyone by claiming the North Pole itself.
>
> "It's the way the geography works" said Peter Croker, an Irish government petroleum expert who is also chairman of the UN's Commission on the Limits of the Continental Shelf, a body set up to arbitrate on how far a country's coastal rights extend. "It's the only place where a number of countries encircle an enclosed ocean. There is a lot of overlap. If you take a normal coastal state, the issues are limited to adjoining states and an outer boundary. In the Arctic, it is quite different".[91]

With the thawing of the Arctic ice cap new shipping routes could potentially open up in the region, along with prime areas for natural resource exploration. Indeed, an "Arctic Climate Impact Assessment" by the Arctic Council and the International Arctic Science Committee in 2004 suggested that the summer Arctic ice cap could have completely melted by the end of the 21st century.[92]

The potential for climate change and future energy security issues to heighten the existing dispute over the status of the region is widely acknowledged. A January 2006 briefing note by the Parliamentary Information and Research Service of the Canadian Parliament commented:

> The impacts of climate change heighten the existing dispute over the status of the Northwest Passage. Canada claims that the Arctic waters of the Northwest Passage constitute "historic internal waters," and thus fall under Canadian jurisdiction and control. However, this claim has been disputed, especially by the United States and the European Union. The United States has consistently argued that the Northwest Passage represents an international strait (international waters), which allows the right of transit passage (beyond "innocent passage") […]

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89 Robert Collier, "Fuelling America Oil's Dirty Future" *San Francisco Chronicle*, 22 May 2005

90 Article 57 of the 1982 UN Convention on the Law of the Sea sets out the Exclusive Economic Zone of a state as no more than 200 nautical miles from its coastline, including any territorial waters.

91 "The Arctic's new gold rush", *BBC News Online,* 25 October 2005

92 A copy of that report is available online at http://www.acia.uaf.edu/

> Canada's Arctic territory and waters have garnered increasing attention as areas for the exploration and shipping of resources, including oil, gas, minerals, and fish […] Indeed, some [analysts] have suggested that "up to 50 per cent of the earth's remaining undiscovered reserves of hydrocarbons are located north of 60º latitude." However, these commentators also note that there are difficulties and expenses posed by the extraction and transportation of Arctic resources.
>
> Canada and the United States have disputed the maritime boundary in the Beaufort Sea, an area that potentially has strong oil and gas resources. Exploration licences and competing claims to jurisdiction could be an ongoing issue. Canada has committed $51 million to map and identify the boundary of its continental shelf in the Arctic, pursuant to the United Nations Convention on the Law of the Sea (UNCLOS) Canada ratified the UNCLOS in 2003 and has 10 years from that date to determine the extent of its continental shelf. This "mapping" will help to determine Canada's exact sovereign rights in terms of economic control (beyond the UNCLOS-defined 200-nautical-mile "exclusive economic zone") and resource exploration. The United States has not ratified the UNCLOS, despite a vote in 2004 by the U.S. Senate Foreign Relations Committee recommending ratification.[93]

Indeed, in the last few years the importance of the Arctic region in Canadian domestic and foreign policy has gained prominence. In 2005 the Canadian Government published its "International Policy Statement" setting out the country's strategic interests and foreign policy objectives for the 21st century. This document placed a greater emphasis on the Arctic region and Canada's sovereignty concerns. According to the Defence section of the Policy Statement:

> The demands of sovereignty and security for the Government could become even more pressing as activity in the North continues to rise. The mining of diamonds, for example, is expanding the region's economy and spurring population growth. Air traffic over the high Arctic is increasing, and climate change could lead to more commercial vessel traffic in our northern waters. These developments will not result in the type of military threat to the North that we saw during the Cold War, but they could have long-term security implications. Although the primary responsibility for dealing with issues such as sovereignty and environmental protection, organized crime, and people and drug smuggling rests with other departments, the Canadian Forces will be affected in a number of ways. There will, for example, be a greater requirement for surveillance and control, as well as for search and rescue. Adversaries could be tempted to take advantage of new opportunities unless we are prepared to deal with asymmetric threats that are staged through the North.[94]

3. Venezuela

Venezuela has the seventh largest proven oil reserves in the world. In 2003, when a national strike inspired by opposition to the Government of Hugo Chavez had halved oil production, the US State Department's Economic and Business Affairs Bureau voiced

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93 Matthew Carnaghan and Allison Goody, *Canadian Arctic Sovereignty,* 26 January 2006.

94 Government of Canada, *International Policy Statement: A Role of Pride and Influence in the World,* 2005. The defence statement is available at: http://www.forces.gc.ca/site/reports/dps/pdf/dps_e.pdf

US frustration at the direct control exercised by the Venezuelan Government over its huge oil resources.

> The United States will continue to work to help Venezuelans resolve their political differences. The key to reversing the severe economic and political decline in Venezuela, and the key to recapturing their oil sector reliability, is a continued dedication to finding a constitutional, democratic, peaceful and electoral solution to the crisis, as called for in Organization of American States.[95]

Venezuela is a member of OPEC and has accumulated vast revenues from high oil prices. President Chavez has, however, used cheap oil to influence the outcome of elections in South America. *Jane's Foreign Report* commented:

> Although it is difficult to measure the significance of this influence, the Venezuelan president saw his favoured candidates triumph in Nicaragua and Ecuador during 2006 and can now count on these countries as strong allies in multilateral fora.[96]

The report continued:

> Chavez has struck various overtly political agreements with Cuba, including an 'oil for workers' arrangement whereby Havana buys Venezuelan oil below market price in exchange for supplying Caracas with the doctors, nurses and teachers it needs to extend its '21st Century Bolivarian Revolution' into the Venezuelan interior. Yet Chavez has not restricted his largesse to leftist allies, and has signed a series of agreements with Central American and Caribbean governments of varying political persuasions to supply Venezuelan oil on favourable terms.
>
> Bolivian President Evo Morales, Chavez's closest South American ally, requires little tutelage from Chavez on leveraging energy resources for political gain. Bolivia has the second largest gas reserves in South America (after Venezuela) and gas has been one of the main sources of political dispute within the country for many decades. A promise to nationalise the Bolivian gas industry was one of the key factors leading to Morales' victory in the December 2005 presidential elections. His promise was honoured in May 2006 with a nationalisation decree requiring Brazil's Petobras, Exxon Mobil of the US, Repsol of Spain, BP of the UK and Total of France effectively to renegotiate contracts with the Bolivian government as services providers rather than owners of the assets.[97]

The US regards nationalised energy resources in the hands of socialist leaders in Latin America (Ecuador, Venezuela, Bolivia and Nicaragua) as an economic and political challenge.[98]

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95 Matthew McManus, 21 October 2003 at http://www.senate.gov/~foreign/testimony/2003/McManusTestimony031021.pdf

96 *Jane's Foreign Report* 15 March 2007

97 Ibid

98 To emphasise their increasing regional influence, Bolivia, Venezuela and Cuba agreed at a December 2006 meeting of heads of state to a "People's Free Trade Agreement" to exchange goods and services, rejecting a US plan for a free-trade agreement of the Americas.

Appendix Suggested Reading and web links

European Union energy policy documents at http://europa.eu/pol/ener/index_en.htm with summary of legislation at http://europa.eu/scadplus/leg/en/s14000.htm

"Energy Policy in the EU", *EUBusiness.com* at http://www.eubusiness.com/energy

Euractiv.com EU energy policy section at http://www.euractiv.com/en/energy

Euractiv.com "Geopolitics of EU energy supply", updated: Monday 7 May 2007 at http://www.euractiv.com/en/energy/geopolitics-eu-energy-supply/article-142665

Brooks Tigner, 'Allies struggle to define energy security, *Defense News* 5 March 2007

Foreign and Commonwealth Office, "Energy Security and Climate Change", at http://www.fco.gov.uk/servlet/Front?pagename=OpenMarket/Xcelerate/ShowPage&c=Page&cid=1109167092662

Department of Trade and Industry energy section at http://www.dti.gov.uk/energy/

BP Statistical Review of World Energy 2006 http://www.bp.com/productlanding.do?categoryId=6842&contentId=7021390

International Energy Agency - Energy security material http://www.iea.org/Textbase/subjectqueries/keyresult.asp?KEYWORD_ID=4103

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