ELSEVIER

Energy Policy 34 (2006) 532–543

ENERGY POLICY

www.elsevier.com/locate/enpol

Energy supply security and geopolitics: A European perspective

Aad Correljé[a,b,*], Coby van der Linde[b,c]

[a]*Faculty Technology, Policy and Management, Delft University of Technology, Postbus 5015, 2600 GA Delft, The Netherlands*
[b]*Clingendael International Energy Programme, PO Box 93080, 2509 AB, The Hague, The Netherlands*
[c]*Faculty of Arts, Groningen University, The Netherlands*

Abstract

The security of energy supply to the EU is examined in the context of two storylines. *Markets and Institutions* exemplifies an economically and politically integrated, multilateral world with effective institutions and markets. *Regions and Empires* involves a world broken up in rival political and economic blocks, competing for resources and markets via political, economic and military power. It is shown that these storylines have a significant impact on the development of the energy market, on the way in which energy supply may be secured and on the effect and applicability of the several types of instruments available. The current EU is geared towards enlargement and a deepening of economic integration, based on the tenets of the post-1945 multilateral world system. The present world tends towards *Regions and Empires* and suggests that the EU may have to reorient its energy security policy. Energy policy must become an integral part of EU external trade and foreign relations and security policy. The EU should develop its own strategy, actively investing in dialogues with producer countries in the Persian Gulf and Africa and with Russia. Sustainable prosperity and governance in these regions will support EU energy security.

Keywords: Energy security; Oil; Natural gas

1. Introduction

Security of energy supply is one of the core elements of energy policy. It is closely related to micro- and macro-economic developments. Imports and export of energy may have an enormous impact on the balance of payments. Subsidies, taxation and the costs or revenues of state-owned companies may have a considerable influence on the state budget. Moreover, the costs of energy are an important factor in the rate of inflation and in the international competitive position of a country's economy (Bohi and Toman, 1993, 1996; Jones et al., 2004). These days, more than 30 years after the First Oil Crisis, widespread concerns are expressed again about the security of oil supply. In the face of a set of radically new challenges, doubts are expressed about the ability of the energy industry to timely and adequately invest in the production, transport and conversion facilities required to meet the expected growth in demand. This paper seeks to identify and evaluate the position of the EU in respect of its objective to maintain security of energy supply (CEC, 2001), in this new context.

We will argue that the challenges to the position of the EU emerge from a set of internal and external developments of geopolitical and economic origin (Van der Linde et al., 2004). The EU internal developments involve the process of dual integration, including the Union's enlargement towards central Europe, in combination with a continuous deepening of market integration. The process of enlargement brings new Member States into the EU, with specific patterns of energy supply and demand, based on their former orientation towards the Soviet Union. The ongoing integration of markets and policies in the EU influences the scope and the effectiveness of the instruments and approaches available to its Member States and the Commission, to achieve their energy policy objectives.

*Corresponding author at. Faculty Technology, Policy and Management, Delft University of Technology, Postbus 5015, 2600 GA Delft, The Netherlands. Tel.: +31 15 278 7924; fax: +31 15 278 7925.
E-mail address: a.correlje@tbm.tudelft.nl (A. Correljé).

0301-4215/$ - see front matter © 2005 Elsevier Ltd. All rights reserved.
doi:10.1016/j.enpol.2005.11.008

The external context, to start with, involves a changing world, in which new relationships are emerging among the main world powers, the US, Russia, the EU, Japan and China and their 'back-yards', in Asia, the Middle East, Africa and Latin America. These new roles are influenced to some extent by the position that local political, ideological and religious movements take vis-á-vis the ambitions and policies of these main powers. The shifting structure of the world oil market is the second main component of the external context. In the presence of an ongoing growth in oil consumption, investments to replace production capacity in decline and to satisfy additional demand have not been forthcoming to the scale required. Consequently, the buffer in oil production and handling capacity, that allowed for the relatively stable development of oil prices over the 1984–1990 period, has evaporated. Meanwhile, large energy consumers, like the US, EU and Japan, experience a growth in their oil and gas imports, as a consequence of ongoing demand growth and a relatively lagging indigenous production. Fast economic growth in China and India induces a rapidly rising demand for energy, particularly electric power and transport fuels. Moreover, as is expected on the basis of current estimates of the world oil and gas reserves, lower cost oil and gas production will be concentrated in only a few areas in the future (BP, 2004; IEA, 2004).

This study evaluates the position of the EU among other consumers and vis-à-vis the energy producers, in respect of its security of energy supply. We will argue that countries respond to the evolving situation in the energy market, adopting reflexive strategies and taking account of each other. Energy policy-making cannot be seen in isolation from what goes on in the international system. Energy relations in the world will take shape along the lines of the organization of the future international political and economic system. Therefore we will examine the consequences of geopolitical developments for the security of oil and natural gas supply and the adequacy of potential policy instruments in the context of two contrasting storylines along which the world system may develop. These are called, respectively, *Markets and Institutions* and *Regions and Empires*. The first storyline represents a continuation and intensification of the international system based on multilateral relations and a globalization of markets. The second one represents the break-up of the international system into competing blocks, which may engage in rivalry over the control of energy resources and markets.

Section 2 provides the general assumptions and background to the analysis, conceptualizing the link between geopolitical events, the evolution of oil and gas markets and main security of supply issues. Section 3 presents the storylines under which the developments of the world order and the energy market are elaborated. Section 4 examines the nature of energy supply disruptions, within the context of the storylines. Section 5 examines the potential use of policy instruments aimed at prevention, deterrence, containment and management of energy crises under the two scenarios. Section 6 will shed light on the consequences for EU Security of Energy Supply Policy. Section 7 concludes.

2. Oil and gas markets, geopolitics and security of supply

2.1. Demand, reserves and supply

World demand for oil and gas is commonly expected to grow over the foreseeable future. This growth will predominantly take place in the emerging economies and developing countries and to a lesser extent in industrialized countries. In the latter countries, it is mainly the demand for gas that will grow, used as a fuel in the electricity generation sector. In non-OECD countries like China and India, demand for oil is rapidly increasing in association with economic growth and transport needs. The relative contribution of gas will grow, while the role of oil will decline slightly (Shell, 2001, 2005; IEA, 2003; CEC, 2003).

It is generally argued that in many OECD countries, including the US and the EU member states, indigenous oil and gas production are maturing and that demand for oil and gas are to be satisfied to an increasing extent by imports from non-OECD producers. On the basis of recent estimates of proven oil and gas reserves, at current prices and technology, reserves to production ratios of, respectively, 40 and 60 years suggest that we should not expect supply problems to arise over the medium term (BP, 2004; IHS, 2004).

However, proven reserves of oil and gas are rather unevenly distributed and only a few countries and regions will remain surplus exporting producers in the future. The overall picture suggests that the supply of non-OPEC oil will decline more rapidly, resulting in an increasing call on OPEC oil, of which the Persian Gulf contains about 60 per cent of the current proven reserves. Gas reserves are less concentrated, but Russia plus the Caspian Sea Region and the Middle East account for about a two-thirds of total. As a consequence, the large consuming areas, the US, the EU and Japan will become dependent on the same oil and gas resources in the Persian Gulf, Russia and the Caspian Sea region (BP, 2004). Over time, the growth in additional demand from China and India will have to be met from these sources too. So, whereas the aggregate stock of known reserves suggest a likely absence of supply problems over the medium term, the concentration of these reserves in only a few specific regions raises a set of questions regarding the extent to which these reserves can be produced and the timing thereof.

It this respect, it is necessary to make a distinction between the short term and the longer term. Over the short term, the stability of the oil market basically depends on the ability and willingness of OPEC and Saudi Arabia to meet demand at a reasonable price and on the predictable use of available spare capacity to adjust supply to any temporary production losses, or sudden surges in demand. Adequate strategic oil stocks for consumers and practical

rules of employment may be helpful too. Because spare capacity was available, the world has been able to cope with reduced supplies from Iran since 1979, the temporary losses of Iraqi supplies in the 1980s, 1990s and 2003 and other occasional disturbances (see Aït-Laoussine, 2002; Gately, 2004). Over the past decade, however, spare capacity was increasingly concentrated in Saudi Arabia and recently it has been reduced to virtually zero. Lagging investments in new capacity were caused, in part, by the lack of belief in ongoing significant demand growth over the 1990s, in part by continuing political difficulties in a number of main oil producing countries, like Venezuela, Nigeria, and lately Russia, and in part by uncertainty about the return of Iraq as a potentially large supplier (Horsnell, 2004).

Over the longer term, as is shown by Odell (1997), the size and the location of the future (and current) oil and gas production are less associated with the current (and past) distribution of proven reserves than is often suggested. The dynamics of the supply chain, involving geological analysis, the exploration, the creation of reserves in the ground, the development of production capacity and production and transport, are a function of demand, price outlook, investment climate (including political and economic stability), technological development and the all-encompassing concept of the comparative advantage of regional resource regimes (Adelman, 1993, 1995; Odell, 2001, 2002). The long-term security of oil supply to the EU and other consuming countries, thus, largely depends on the attractiveness and accessibility of producing areas, like Russia, the Persian Gulf and Africa, to investments, either indigenously generated or via foreign direct investments (FDIs) by the international oil industry, and the ability of the companies to bring the oil and gas to the market (see also Stevens, 2005).

2.2. Oil supply and political stability

The concentration of oil reserves and potential additional supply capacity in the Persian Gulf increases the future dependence on this area. Alternative supplies from Russia, Africa and Asia may offer some degree of diversification, but they cannot compensate for substantial supply disruptions in the Persian Gulf. Moreover, the risk of major oil or gas supply disruptions increases if international cooperation is difficult and when the main producer countries are plagued by political and economic instability. A number of developments are relevant in this respect.

Firstly, many oil-producing countries are dependent on the production of one single product for the world market. Large inflows of oil and gas revenues provoke internal political pressures to spend this income on creating employment, subsidizing consumption and corruption. Many producing countries are characterized by a centralist political structure, a lack of effective political institutions and a weak civil society. The need to finance non-oil budgetary expenditure reduces the capacity to invest in new production and transportation facilities. Moreover, the position of the elites and the large amounts of money involved render these countries more vulnerable to corruption and socially instable, thus scaring away potential foreign investments (Leite and Weidman, 1999; Rose-Ackerman, 1999; Anechiarico and Jacobs, 1996; Johnston, 1997; Shleifer and Vishny, 1998; Stevens, 2005).

Secondly, the reluctance of a considerable number of oil and gas producing countries to allow FDIs in new oil and gas production facilities may create capacity shortages. In the gas sector, FDI is less difficult, but the economics of the projects, including the investment climate and the distance form markets, and the political risk, have so far limited the investments (Morse and Richard, 2002).

A third major factor is the governance of oil prices. Since the end of the 1990s, price volatility has become a major problem for consumers and producers. Moreover, the 'right' level of the oil price has become an issue of discussion, again (Van der Linde, 2000). Asymmetric interest in specific levels of production and price among the players in the oil value chain (OPEC, Non-OPEC producers and consumers) has fuelled discussions between producer and consumer countries (Aït-Laoussine, 2002). Domestic economic pressures in producer countries have become an increasingly forceful driver of oil policies and could potentially undermine a cooperative oil policy among main producer countries.

Oil market stability has further worsened after the attacks on New York and Washington of 9/11/2001. The special US–Saudi relationship has deteriorated, as is exemplified by the withdrawal of American troops from Saudi Arabia in 2003. This change in the US–Saudi relationship makes a consensus on oil market policy less firm than a few years ago, when Saudi security was guaranteed in return for oil market stability.

Of course, the situation in Iraq has a strong impact on the international oil market. If Iraq is successfully stabilized and international oil companies are allowed to invest in Iraq, the share of oil and gas produced for the world market, in Iraq, by private international oil companies will increase considerably. Yet, if Iraq is not stabilized, ongoing political instability will put off investments and keep the production of Iraq far below its potential (Van der Linde et al., 2004, pp. 47–49).

2.3. Gas security of supply

Unlike oil, the supply of natural gas to the EU is essentially a regional issue, as the EU is structurally dependent indigenous production in Norway, the Netherlands and the UK and on large volumes of imported gas from Russia and Algeria. Large gas fields in Russia are maturing and new investments have to compensate a possible decline in the supply from these fields. Future supplies from the Caspian Sea region may be purchased by Russia to fulfil whatever gas demand, rather than being

offered on the European market as additional supplies (CIEP, 2004). Any temporary disruption, or a slowly emerging decline in supply from these countries as a consequence of lagging capacity replacements, will jeopardize the EU security of supply. Strategic gas reserves are very costly to maintain in most EU countries. In the absence of a large indigenous excess gas production capacity in the future and the consequent reliance on imported long distance gas, liquefied natural gas (LNG) may allow for some diversification.[1] Yet, a quick shift away from the two main external suppliers is not feasible (see also Stern, 2002).

Over the longer term, the projected expansion of EU gas consumption requires considerable investments in production as well as transport capacity. These capital-intensive international projects will only emerge in the context of an adequate investment climate, along the whole of the gas value chain. Such a climate will have to integrate a number of components, starting with a mutually convincing commitment in respect of levels of supply and demand, at acceptable financial-economic criteria, based on sufficient insights regarding the size of the market and the timing of its development. Other important components are the existence of acceptable and stable frameworks for contracting and business governance and for market regulation in production, transit and consuming countries. Of course, political and socio-economic stability are major determinants for such frameworks to be effective (CIEP, 2003a; Van der Linde and Stern, 2004). These components point to a number of factors on the supply as well as on the demand side.

To start with the latter, it is a main question as to what extent the EU Single Energy Market project will contribute to the stable demand context for the gas market and provide the economic incentives necessary to encourage the required investments in production and transmission capacity. It remains to be seen whether spot markets and gas-to-gas competition will make new, diversified gas supplies available and what kind of regulatory solutions will be required (CIEP, 2003a).

Regarding the supply side, security of gas supply largely depends on stable deliveries from Russia and Algeria. The break-up of the former Soviet Union has increased the number of transit countries and enhanced the political and commercial risk of projects in the area. The supply of new gas from the Caspian Sea region gas to Europe is complex, either through the Russian Gazprom system, or via the new route from Baku in Azerbaijan to Tbilisi in Georgia and Ceyhan in Turkey (Amineh, 2003). Even though the Middle East has vast gas resources, there are significant obstacles to a rapid increase in supply via pipelines and LNG. Moreover, the investment climate in the Middle East is not much better than in Russia and the Caspian Sea Region, despite the fact that a number of new supply projects are underway (Van der Linde et al., 2004, pp. 58–61; CIEP, 2004).

3. Two storylines and the supply of oil and gas

Above, we have argued that countries respond to the evolving situation in the energy market, adopting reflexive strategies and taking account of each other. The history of the energy market clearly demonstrates that the *state of the world* does matter for what is—and will be—happening in the world oil and gas industry (See Clarke, 1990). To capture this influence, we will consider the future of oil and gas industry, within the context of the international political and economic system, along two 'storylines', called *Markets and Institutions* and *Regions and Empires* (see Van der Linde et al., 2004, pp. 81–107).[2]

The *Markets and Institutions* storyline assumes that there is a continuous intensification of the social, cultural and economic internationalization or 'globalization' of markets. This also implies an enduring cooperation in the international political and economic institutions, supporting a constant development of the multilateral system that governs international relations. Ideology, religion and political conflicts continually take place at the international, the national and the local level, but effective international and regional institutions (like the UN, EU) manage to deal with most of these conflicts. Further liberalization of markets allows the international flow of goods, persons and capital to grow. These flows are coordinated by 'market forces', facilitated by strong economic institutions, including the WTO, the IEA, OPEC, the IMF and regional free trade organizations such as EU, NAFTA, MERCOSUR and SADC. Generally, international firms' subsidiaries will be operating in a loosely connected manner, purchasing and selling their respective inputs and production on intermediary markets. Collective pressures for good governance and effective financial institutions manage to establish increasingly sound governments. Whilst initially developed as the most probable storyline, from today's perspective *Markets and Institutions* surely is the best-case storyline for the EU. It would require only minor changes to the EU security of supply policy, while offering the policy space for the completion of the internal energy market and the eastern enlargement. Under a growing risk of disruptions of supply, in the *Markets and Institutions* storyline, EU oil and gas supply would be easier to secure, particularly

[1] Most of the LNG is still supplied under long-term contracts, or via self-contracting within the large vertically integrated oil and gas companies. In Europe, currently, LNG is used predominantly in the southern European gas market, where it competes with pipelined gas from Russia, Norway and Algeria. In the future, alongside the dominant supply of volumes under long-term contracts, a short term market of moderate scale may develop arbitrating between the main markets in the US, Europe and Asia (Jensen, 2004; CIEP, 2003b).

[2] These scenario are inspired by the IEA *World Energy Outlook* (2002), the Shell scenarios up to 2050 (2001), a scenario developed by the Dutch Bureau of Planning (Manders and Mulder, 2003), a United Nations *Global Environmental Outlook* (2002) and the IPCC, *Emissions Scenarios* (2000).

because it foresees a deeper economic integration with Russia. In the *Markets and Institutions* storyline it would be possible to imagine a Kyoto Protocol agreement-driven development.

The *Regions and Empire* storyline elaborated a more pessimistic view on the international political and economic system. It involves, essentially, a division of the world into countries and regions, on the basis of ideology, religion and political arguments. Political and military strategy, bilateralism and regionalism divide the world up into competing US, EU, Russian and Asian spheres of influence. National and international security concerns and conflicts impede international economic integration, through the regulation of activities and the control over flows of goods, persons and capital. The absence of effective world markets for strategic goods further stimulates the establishment of bilateral trade relationships and treaties, thus reinforcing the formation of more or less integrated blocks with satellite regions that compete for markets and energy resources. Firms will be less international, but operate from a more national perspective. Moreover, to a greater extent, their subsidiaries will operate in vertically and horizontally coordinated structures, with internal transfers of inputs and production. The weakened Trans-Atlantic relationship may be replaced by political-strategic rivalry.

In the course of the study, this storyline was rapidly gaining credibility. Factors like UN Security Council decision-making over Iraq, the lack of progress in the WTO negotiations, the difficult ratification process of the Kyoto agreements, the difficult progress of EU power and gas market liberalization, the unilateral approach of foreign relations of the US after the attacks on New York and Washington, developing relations between China and the rest of the world, all suggest that real world developments would be more in line with the *Regions and Empires* world than with *Markets and Institutions*.

Each of these storylines represents a characterization of the way in which main oil and gas producing and consuming countries or areas would manifest themselves, in the context of an increasingly tighter and more concentrated market for oil and gas. The areas and countries taken into consideration below are, respectively, the Persian Gulf, Russia, the Caspian Sea area, the US, China, Japan and India. Thereafter, it will be possible to elaborate on the consequences for the position of the EU under each of the storylines.

3.1. The Persian Gulf

In respect of the Persian Gulf region, it can be argued that under both storylines there would be a risk of the Persian Gulf slipping into turmoil. Yet, the likelihood is somewhat greater under the *Regions and Empires* storyline, as a consequence of the rivalry that will break out between the main 'empires', the large consuming blocks. Moreover, multilateral 'peacekeeping' actions will not be effective, or even impossible. Under such circumstances, a tendency to unilaterally intervene in the region may emerge, invoking defensive reactions from Persian Gulf countries, in turn. Our analysis suggests that these countries consider such conflicts and the need for deterrence seriously, indicating that they take a *Regions and Empires* storyline into account. In a world of *Markets and Institutions*, in contrast, a gradual stabilization of the Persian Gulf economies and the inflow of FDI from a variety of sources in their energy industry would eventually facilitate a process of societal and economic modernization. Nevertheless, the politically and socially fragile, oil and gas-dependent Middle East states remain vulnerable to internal and external instability.

3.2. Russia

In both storylines, Russia will play a crucial role in supplying oil and gas to the EU. It is the world's second largest producer and exporter of oil. It is, moreover, not associated with OPEC and thus seen as alternative source of oil. Russia, as an energy producer, is to be considered as very strong, because it is the only 'empire' that is able to export oil and gas in significant volumes. In contrast, the other blocks, the US, the EU and India and China, will have to compete for resources outside their territories. The risk of a Russian collapse as a major producer and exporter is considered fairly low in both storylines. Exports may, however, be reduced when indigenous demand starts to grow again, or when Russia proves unable, or unwilling, to replace and expand its current capacity.

The main difference between the two storylines is that in a *Markets and Institutions* world, Russia will become deeper and broader integrated in the EU market, whereas in a *Regions and Empire* world Russia will develop its own 'empire'. A position as 'empire' in the context of the *Regions and Empires* storyline is not unfamiliar to Russia. Russian politics, thus, can relatively easily adapt to such a situation, in contrast to the EU, which is still firmly embedded in the multilateral, liberal approach. Of course, the *Markets and Institutions* storyline is more difficult to follow for Russia. The ability for Russia to forge strategic alliances with consumers in the EU, Asia and even North America, is large in both storylines.

The role of Russia as a re-emerging world power and its economic recovery will largely determine the position of the Caspian Sea region. The role of the Caspian Sea region may not be that different under either of the storylines, as both cases allow for re-integration into the Russian energy system (Amineh, 2003) In a *Regions and Empires* world, or in case of conflict in the Persian Gulf, Russia will want to secure the stability of its borders and neighbouring countries by integrating the area. In a *Markets and Institutions* world, it will be the emancipation of Russia and its economic recovery that will drive the re-integration of the Caspian Sea region.

3.3. Asia

Asia is unlikely to develop into one single coherent region, because the inter-regional competition and political incompatibilities are too large (see Wybrew Bond and Stern, 2002). Traditionally, the security of supply policies of the main Asian countries, like Japan and China fit a *Regions and Empires* approach rather than *Markets and Institutions* (Andrews-Speed et al., 2002). Dedicated investments and participations by local firms have secured much of the oil and LNG requirements. Nevertheless, the ability to effectively secure oil and gas supplies is larger in the latter storyline, because Japanese and Chinese companies can invest in firms to produce and purchase oil and gas requirement, without fully participating in the competitively strained international system via determinate locally specific investments (Horsnell, 2000). Rivalry between Japan, China and other countries, for oil and gas in the region itself and from the Persian Gulf and Russia, will be harsh anyway. Moreover, Japan and China will want to secure their maritime supply routes, like the Strait of Malacca, and use their naval forces to do so. India will also compete for resources and employ military power in the region (see Van der Linde et al., 2004, pp. 211–19).

3.4. The United States

Energy security is a vital interest and has been identified as such by the US (Armitage, 2002). The US, as the world's largest energy importer, seeks to enhance its security of supply through diversity of supply according to source. Therefore, the US purchases crude oil from more than 60 different countries. A main worry constitutes of the domestic fragility of key energy-producing countries, as it is predicted that by 2020 half of the world oil production will originate in countries that have a high risk of internal instability (Ebel, 2002).

In respect of natural gas, the supply of gas from the indigenous and Canadian production is expected to decline, and generally, LNG is seen as a major substitute. An enhanced dependence on LNG, would further extend the strategic interest of the US towards those countries and areas where gas production and gasification will take place (for example Qatar, Abu Dhabi, Oman, Algeria, Libya, Nigeria, Angola, Equatorial Guinea), as well as towards the maritime routes via which the gas would be transported to the US.

Such an external projection of the national US interest has different implications under the two storylines. In a *Markets and Institutions* context, the US should manifest itself in taking the initiative to enhance the effect of the international institutions and to support third countries in establishing stable political and economic institutions. Moreover, it would be instrumental in creating and maintaining open markets in which a variety of actors would be willing to invest. Under a *Regions and Empires* storyline, the sheer size of the US would turn the country in a truly, ideologically driven, determining power in international stability and in (energy) security policy. Seen from the perspective of important groups in the US, the security interests in the Persian Gulf were in jeopardy already since the early 1990s, because of the stalemate over the political and strategic position of both Iran and Iraq. In the UN Security Council, the diverging views of the best way to deal with Iraq were long-standing and led to the failure to agree on a 'smart sanction' regime in June 2001. The attacks of 9/11/2001 on New York and Washington further articulated the underlying changes in the US perspective on the international system, as it convinced the US administration that a crisis in the relations with Saudi Arabia was imminent, making the Persian Gulf fully hostile to American interests. The intervention in March 2003 in Iraq highlighted the tensions among the members of the UN Security Council. With hindsight, the broad coalition of the early 1990s was not the beginning of a new international order, able to deal with failed states like Iraq (Cooper, 2003; Ignatieff, 2003; Kagan, 2004).

Recent developments have reaffirmed the US predisposition towards a unilateral foreign and energy policy. Unfortunately for the preferred multilateral approach of the EU, the US role in the Persian Gulf is a clear example of the world moving in a *Regions and Empires* direction. The complicated Trans-Atlantic relationship, the serious efforts to intensify US energy relations with alternative oil and gas producers in Africa and Latin America and the 'sudden' breakthrough in the relation with Libya underpin this notion. Finally, whereas the outcome of the Iraq conflict is still unclear, it will have a great impact on the way the international political and economic system is developing and the role of the US in that system.

3.5. The European Union

It will be shown below that the perspective on EU oil and gas supply security differs between the two storylines, while the usefulness of policy tools also varies significantly. In brief, in the *Markets and Institutions* context, the EU should create a climate that invites market participants to invest in efficient measures of security of supply, consistent with their economic interests. Under a *Regions and Empires* storyline, the growing dependence on energy imports will politicize inter- or *intra-empire* energy markets, turning energy security into an integral part of foreign and security policy-making and requiring national, or EU, authorities to engage actively in security of supply measures. These approaches will be discussed below.

4. Energy security disruptions

Several types of disruptions can be identified (see Van der Linde et al., 2004, pp. 35–44; Bielecky, 2002; Horsnell, 2000; Stern 2002; IEA, 1995, 2002). We distinguish (1) *sudden disruptions*, may arise as a result of a political decision not to offer oil on the market, or an international

military conflict, or as a result of technical and operational problems; (2) s*lowly emerging supply gaps* may arise, either as a result of lagging investments in production and/or transport capacity; or (3) as a result of ideological choices of producer governments. Each of the two storylines has specific consequences, in respect of the likelihood that it occurs, the consequences and strategies for abatement.

4.1. Sudden disruptions

Sudden disruptions of oil as well as gas supply are possible under both storylines. This may cause more or less difficulties; depending on the scale of the disruption, the specific infrastructural facilities and region(s) involved, and the presence of alternative production and transport capacity that allows for a re-scheduling of deliveries (see NERA, 2002). Under the *Regions and Empires* storyline, rigid contractual trade structures may, however, impede a flexible adjustment of trade flows (Balke et al., 2002; Jones et al., 2004). The coordinative effect of the price mechanism is reduced, as prices are mainly set in bilateral contracts. Moreover, there are great difficulties in the operation of the IEA and EU emergency schemes, because countries involved all have different interests. So, they will have to maintain relatively large strategic stocks, as they cannot rely on collective systems (Jaffe and Soligo, 2002). If a major OPEC supplier is hit by a disruption, lack of agreement will render the ability of OPEC to manage production less effective. Eventually, disruptions may invite military intervention to secure access to oil production capacity. In respect of the gas production in Russia, Algeria, Norway, the Netherlands or the UK, the use of military force seems out of the question in the current geopolitical context. Moreover, the existing gas infrastructure does not allow for radical flow adjustments (IEA, 1995, 2002).

Under the *Markets and Institutions* storyline, in contrast, a sudden disruption in oil supply will induce market reactions and a re-allocation through prices. The IEA and EU emergency schemes may be effective in reducing the price impacts, possibly in cooperation with OPEC. So, via higher prices, alternative producers are rewarded for their ability to provide oil to the world market. Eventually, collective decisions can be taken to achieve access via military means to unlock blocked production capacity. In case of a disruption of gas supply, market driven reactions are severely limited by the presence of rigid pipelines and facilities (IEA, 1995, 2002). Also, the IEA and EU will have difficulties in solving supply problems through cooperation and security schemes as the gas infrastructure does not allow for radical flow adjustments.

4.2. Slowly emerging supply gaps

Under the *Regions and Empires* storyline, a weak climate for investments in production of transport facilities in specific regions, or countries, may induce a s*lowly emerging supply gap*. Such an emerging *gap* will either have to be filled by alternative supplies, or it will drive up prices, possibly curbing demand. Such a situation may be caused by general economic and political instability, or motivated by ideological and religious choices of groups in the producing areas. In countries like Nigeria, conflicts over economic rents have stimulated such counter forces against oil exploitation, which is seen as the main cause of political and social rivalry. If Saudi Arabia after a radical regime change turns away from the world market, the ability to close the supply gap with oil supplies from somewhere else in world is nihil, while OPEC will become ineffective as a market regulator. A decline in (excess) production and transport capacity may cause rivalry among consumers and suppliers trying to bilaterally secure exclusive supply contracts. This may stimulate an increasing involvement of consumers' states and state oil companies, leading to a more politicized oil trade, reinforcing the problem. Within the IEA and the EU, but also OPEC, it will become increasingly difficult to calibrate the oil market management schemes, strategic stocks and information systems. The ensuing rigid contractual state-to-state trade structure may impede a flexible adjustment of trade flows. In addition, international conflict may arise over the exclusive relations of oil and gas producers with the several empires and regions and the associated oil companies. Attempts will be made to unilaterally open up alternative areas for exploration and production, like in Alaska and Antarctica, and/or to develop other energy resources, like nuclear energy.

In respect of natural gas, the *Regions and Empires* storyline may cause a slowly emerging supply gap, as a result of lagging investments as a consequence of ideological and religious contrasts, particular with regard to the North African suppliers, the potential suppliers in the Persian Gulf and the Caspian Sea region. A lack of trust and concerns about inadequate regulatory structures between the producers' and transit countries and consumers may arise over time (CIEP, 2003a). Capacity shortage is not an immediate problem. It just implies that no new consumers will turn to natural gas and that other energy options are pursued. It is not until initial resources are depleted, without any replacement having been achieved, that real inconveniences may emerge. By then, diplomatic and economic initiatives will have to be undertaken and states and state oil companies will become increasingly involved to compensate for the lack of private initiative. This will cause an increasingly politicized trade in gas.

Such developments are less likely to occur under the *Markets and Institutions* storyline. Indeed, shifts in supply and demand are translated efficiently into shifts in (forward) prices in liquid markets. These higher prices induce market reactions and a re-allocation of supplies or investments in new production and transport capacity. The IEA and EU oil market schemes, plus a number of commercial agents, maintain an effective system of

information sharing. Industry and the governments co-operate in establishing effective procedures for planning, emergency schemes and environmental purposes. However, also under the *Markets and Institutions* storyline, a local oil or gas supply gap may evolve when ideological and religious unrest reduces the appetite to invest in specific areas. Yet, in this case, these circumstances will gradually develop and the market will react. Scarcity is translated efficiently into shifts in (forward) prices in liquid markets, which induce market reactions and investments in new production and transport capacity to 'unaffected' promising areas.[3]

A slowly emerging supply gap for gas will occur in a *Markets and Institutions* context only when the regulatory system fails to offer sufficient long-term security to investors, or when local political instability in production or transition countries brings about general uncertainty. Shifts in supply and demand are then translated into highly volatile movements in prices. Yet, as a consequence of this uncertainty, these higher prices fail to induce market reactions and investments in new production and transport capacity. If the regulatory uncertainty originates within the EU, potential additional supply from producers, like Russia or countries in the Persian Gulf and the Caspian Sea region may not come about.

Different worlds and different levels of energy security of supply emerge from the two storylines, as a consequence of aspects like the degree of multilateralism in the world, the stability of institutions, the effect and credibility of information systems, the strength of trust supporting international agreements and collective action, the investment climate and the degree of economic and technical flexibility of the energy systems. It is clear that the security of oil and gas supply will be the greatest in a *Markets and Institutions* world, as a consequence of the multilateral approach and the strength of the collective policies in the context of a functional market. Under the statistic interventionism and power politics of the Regions *and Empires* storyline, security of oil and gas supplies is much harder to achieve for the EU.

5. Energy security instruments

Energy policy in consumer countries involves three main components: (a) low supply costs, (b) security of supply, i.e. the continuity of supply and the dispersion of risks and, more recently, (c) environmental considerations. In general terms, these basic aims are shared widely (see Van der Linde et al., 2004, pp. 63–79; Helm, 2002, 2005). It can be argued that the energy security policy tools available can be subdivided into tools that aim at: *prevention*, *deterrence*, *containment* and *crisis management*. Nevertheless, in addition to energy policy specifically, trade and foreign relations and security policy are also part of the energy security toolset, as is environmental policy. As will be shown below, under the respective storylines, strategies of prevention, deterrence, containment and crisis management strategies are not likely to be realized in the same manner (see Van der Linde et al., 2004, pp. 114–122).

5.1. Prevention

The use of prevention policy tools is highly effective under the *Markets and Institutions* storyline. Import dependency is not a large strategic issue because oil and gas are made available through the market. Multilateralism as a main principle of governance in the international political and economic system is undisputed. The governance of the international political and economic system, including energy issues, relies on international cooperation and strong institutions, like the International Energy Forum (IEF), the International Energy Agency (IEA) and the IMF, World Bank and WTO. These organizations support an adequate, stable climate for investments. The UN Security Council is effectively policing the world, with sanctions and/or interventions in regional conflicts, reducing the danger of failing state power in oil and gas producing and transit countries. International governance structures are thus likely to soften the prevalence of strategic national energy objectives. FDI is the main instrument to develop production and transportation infrastructures and to disseminate technology. Horizontal and vertical integration are based on considerations of efficiency, while the multitude of companies from producer and consumer countries is able to operate in each other's markets.

In this perspective, the EU will focus on strengthening the international institutions and ensuring the completion of its internal energy market. Oil trade is free. Adequately regulated unbundling of distribution networks from production and trade will result in an increasingly efficient market for gas (and power). This market, based on a mix of long-term, short-term and spot contracts, effectively coordinates demand and supply. In an expanding EU gas market, the storage capacity is enlarged to balance seasonal and daily supply and demand, because of the growing share of gas supplied from remote locations requiring a high level of infrastructure capacity utilization. In this *Markets and Institutions* environment, the maintenance of specifically strategic reserves—in addition to the operational storage—is considered too costly. Indeed, there is a high degree of integration of the EU-Russian and EU-Algerian natural gas networks and the relations are good. The process of integrating eastward is continued. Turkey as a main transit country enters the EU, while Russia becomes part of the Common European Economic Space (CEES), perhaps in preparation for membership at a later date.

[3]In case the Kyoto variant prevails, the expectations of a (obligatory) lower share of hydrocarbons in overall energy use—or emission trading—plus the reduced availability of oil, as capacity will be shut in for ideological reasons, may cause investments in (surplus) production and transport capacity for oil to be delayed, or not taking place at all.

Conversely, in a *Regions and Empires* storyline the oil and gas industry will not be coordinated by the international market, but by means of strategic bilateral agreements and long-term contracts between the main companies in the EU, Russia and Algeria. The level of distrust among the nations is large and the international organizations are weak. As competition for scarce resources between consumer countries will stimulate conflict, the risk of key producing regions or countries slipping into chaos is high. Unilateral foreign policy is strategically motivated by security of supply issues, while bilateral trade agreements mostly serve the domestic interests of the *Regions and Empires*. From a strategic point of view, a high degree of horizontal and vertical integration of international energy companies is seen as a key tool to gain access to resources. Exemptions from EU competition policy are widely allowed and giant firms dominate the EU market. Such large firms are functional in maintaining spheres of influence in oil and gas producing regions, while foreign policy efforts in turn are increasingly underpinning the FDI of the national energy companies. International trade in oil and gas is therefore taking place to a large extent within the regions and the empires of allies.

Bilateral relations with Russia, Algeria and other North African countries become even more important than in a *Markets and Institutions* storyline. Russia will develop in a strong 'empire' itself and strategic, mutually advantageous, relations between the EU and Russia can reduce the security of supply and demand risks. Long-term contracts not only secure supplies for a longer period and solidify the producer–consumer relation; they also support investments in new oil and gas supplies. Domestic oil and gas production will be stimulated, while coal and nuclear power generation will continue to play a significant role in the energy mix, to offset dependence on imported gas. Indigenously produced sustainable energy is now stimulated for security of supply reasons, rather than for environmental reasons alone. Research and development efforts are basically geared towards reducing the import dependency and increasing energy system flexibility.

5.2. Deterrence

The deterrence option is much less important in a world of *Markets and Institutions* than in the *Regions and Empire*. In the former situation, the UN Security Council is the competent and effective tool and sanctions and peacekeeping interventions are implemented and executed under UN responsibility. OPEC, the EU and other regional or functional organization have credible frameworks for economic conflict resolution too.

In the *Regions and Empires* storyline, however, unilateral security policy plays a much more important role. The capacity to intervene in key producer regions depends both on the strength of the military forces, as well as the level of deterrence that the producer countries themselves can arrange, possibly from supportive 'empires'. Contested areas in the Middle East and North Africa that have not been brought under any sphere of influence may easily become politically unstable regions. The ambition of Persian Gulf countries to develop their own means of deterrence plus internal safety systems must be understood in this context. Russia also upholds a considerable deterrence capacity, despite the problems to fund and staff its army. Another important tool in the *Regions and Empires* storyline is the ability to embark on unilateral political and economic sanctions. Producing countries' need for security of demand may be asymmetric to the security of supply of certain consuming countries, making the former vulnerable for sanctions. The level of mutual dependence of the EU and Russia and Algeria in respect of gas is and will remain large. In a *Regions and Empires* storyline the future dependence on the relevant suppliers will be a decisive factor in the strength of this tool. Also strategic (bilateral) alliances between countries, regions and empires, in respect of emergence and storage schemes will be important elements in the level of deterrence they are able to establish vis-á-vis their opponents.

5.3. Containment

Containment policy is less relevant in a *Markets and Institutions* context, as effective and efficient market reactions will coordinate supply and demand. It is, however, a fundamental policy objective under the *Regions and Empires* storyline, where it serves to reduce the impact of a supply disruption, via instruments like diversification to source and origin, stand-by contracts, storage, energy system flexibility, energy saving and the stimulation of domestic production (Leiby et al., 2002). Whereas diversification and certain levels of storage capacity may be rational from an economic efficiency or a competition perspective, most of these instruments require an active role of the national or EU authorities. Examples are incentives to the indigenous industry and to consumers for the use of certain technologies, or fuels, additional stocks, etc. It may also involve the establishment of (bilateral) relations to underscore emergence supply schemes with producer countries, like Russia or the North African countries. Generally, however, such arrangements will depend on the strategic alliances with those 'empires' or with specific countries. Market relations will only be moderately significant.

5.4. Crisis management

The management of crises is not really dependent on the storylines, as the components are basically the same: the use of strategic stocks, demand management, energy allocation schemes and pricing strategies. The main difference is that under *Regions and Empires* strategic stocks are built up and applied by a domestic regime or 'empire', rather than under the wider aegis of the IEA.

Hence, the effectiveness of the EU strategic oil reserves is more limited than in a *Markets and Institutions* situation, where the collective strength of the IEA system creates benefits. In the more uncertain world of *Regions and Empires,* lack of solidarity among IEA member states may imply that the EU must increase the volume of the strategic oil stocks to compensate for reduced effectiveness. As regards gas supply, good relations with Russia and Algeria that include standby arrangements offer more security of supply at a reasonable cost than costly strategic gas reserves, under both scenarios. Also the development and implementation of new dual-firing capacity in electricity generation could be a rational alternative to strategic gas reserves. Strategic oil reserves and gas supply arrangements could be maintained in proportions reflecting the geological, technical and flexibility capability of a country, or a region. In general, the larger the area and the more coherent the consensus on policy objectives and the use of instruments, the easier and more effective the instruments will be applied. It is clear that the lesser degree of polarization and politicization under a *Markets and Institutions* scenario will facilitate this coherence.

6. Consequences for EU security of energy supply policy

Security of energy supply is a vital interest to states. We have argued that the viewpoints on EU oil and gas supply security will radically differ in the two storylines. Moreover, the applicability and effect of the policy tools will vary significantly. Under the *Markets and Institutions* storyline, import dependence is not seen as a major geopolitical or economic risk for the EU security of energy supply. Markets facilitate the mobilization of capital for the expansion of production, transportation and distribution capacities and assume price and other types of risk. Energy policy should focus on maintaining good market conditions and securing public services. The emphasis in energy security policy is on prevention and crisis management, as a response to operational or technical disruptions and natural calamities, and to disruptions caused by temporary political conflicts. The emphasis of EU foreign policy and trade relations, thus, will be on maintaining good relations with producer countries in the IEF and with consuming countries in the IEA. Multilateral cooperation in the UN will keep local or regional conflicts at bay.

In the *Regions and Empires* storyline, EU energy policy will require the strategic use of a set of energy policy tools and the active use of foreign and security policies, to achieve the objectives of prevention, deterrence, containment and crisis management. The strategic goal to secure vital energy supplies will override arguments of market efficiency, generally. Backward integration of energy companies is encouraged by their mother countries, to create market players strong enough to operate outside the EU. The internal energy market of the EU will reflect this strategy, as oligopoly competition among a limited number of national champions will be the outcome (Thomas, 2003). Strategic bilateral alliances among consumer and producer countries and among consuming country blocks are important tools to secure supplies. Import dependency is considered a major risk to security of supply and domestic production is preferred the over import of energy. As a result, indigenous oil and natural gas projects and possibly non-fossil alternatives are supported more widely than in a *Markets and Institutions* storyline.

A crucial observation as regards the 'fit' of these storylines is that the EU as a project is fully embedded in the multilateral post-1945 world system. Indeed, external multilateralism and free trade, combined with a fundamental reliance on an effective single internal market are the main characteristics of the context in which EU enlargement and a deepening of market integration will take place, preferably. A less multilateral and market-oriented world system, like *Regions and Empires*, will require the EU to transform itself to a certain extent from a economically driven project into a project, driven by geopolitics and the strategic use of state and economic power. Whereas such a transformation may not be altogether incompatible with the nature of the EU, it will yield significant political hardship and internal conflict. The divergence in strategic thinking among the member states and the difficulty of the EU to address the power question may imply that the political-strategic project may not succeed.

Moreover, if the security of energy supply becomes uncertain for (some of) the member states, the urge to implement national energy policy again may become stronger. Yet, in the meantime, EU energy market integration and the dismantling of national structures will have reduced the scope for national policies significantly. Moreover, if member states revert to national approaches, including energy related foreign policy-making, this strategy may not only interfere with EU energy policy, it could also affect the broader EU foreign and security policy. This implies that, given the energy dependency of the EU and the internal market, the EU has no alternative but to develop a coherent energy security policy that adequately addresses the asymmetry in exposure among its member states.

A number of elements stand out in such a policy. These involve, first of all, that EU policies in respect of external trade, foreign relations and security will become instrumental in securing the supply of oil and gas, by underpinning the political and economic stability in producer countries and maintaining good relations. Security of demand is of vital interest to the producer countries, which has to be acknowledged. EU security of supply would, thus, benefit from the further development of the multilateral producer-consumer cooperation in the IEF. In parallel, the EU should seek to build a dynamic foreign and trade policy towards North Africa, the Persian Gulf, the Caspian Sea region, Russia and Turkey, as neighbours and trading partners of the enlarged EU, focusing on long-term political and economic stability in these regions. This also

includes bilateral cooperation and dialogue with other important consumer countries, particularly China, Japan and India in order to support a common approach concerning stability at the global oil and gas markets and global warming.

A second element concerns the EU internal conception of energy security. It is obvious that member states' energy systems and consumption patterns will never be similarly structured and that variations in their exposure to supply risk will continue to exist. Approaches to energy security should be functional in respect of these different circumstances and allow the general abstract objectives and priorities of energy policy to be met. This may involve the establishment of a security policy geared towards achieving access to aggregate forms of *energy*, via indigenous production, storage, contracting, etc., as opposed to fixed requirements for strategic oil and gas stocks. Moreover, the EU could develop standards that allow the member states and the industry to respond to specific dependencies in an efficient, flexible and tailor-made manner. The management of *essential* demand should be a counterpart of security of supply, stimulating consumers to opt for dual-firing capacity, local storage of fuels and/or interruptible contracts, in accordance with their specific risk profile.

A third element constitutes the transatlantic relationship with the US, which has always incorporated energy security, while discouraging independent EU energy initiatives, like the 1970s Euro-Arab Dialogue and the original Energy Charter approach. It is justified to enquire what the consequences of the current tensions between the EU and US are for the EU energy interests. A main question is then as to whether the EU can accept the consequences of carrying out an independent policy. If EU finds itself unable to act really independently from the US, efforts should be made to re-constitute the Trans-Atlantic relationship. If, in contrast, the answer is that an independent EU policy is considered feasible, then efforts should be directed towards establishing more independent bilateral relationships with producer countries. It is obvious that such an independent approach could be seen as running against the US vital interests. Yet, in a strong Trans-Atlantic relationship, a more independent EU path could eventually strengthen US security of supply, when such a course would make more oil and gas available to the international market.

7. Concluding observations

The main message of this paper is that energy must become an integral part of the EU policy in respect of external trade, foreign relations and security, as these are crucial to achieve security of energy supply. It has been argued that, as a consequence of the geopolitical developments in the period to 2020, the probability of events affecting the security of energy supply, the exposure of the EU and the vulnerability of society to energy supply disruptions are likely to increase. In this context, we have shown how the effectiveness of the policy instruments and approaches not only depends on the investment climate, on indigenous energy supply, on transportation and import facilities and on access to foreign oil and gas supplies, but also on the geopolitical setting in which these policies must perform. Yet, under the mounting pressures of a less multilateral oriented geopolitical system, the EU member states may find out that the time to realize a necessary re-orientation does not fit the traditional process of Community consultations. Notably, the absence of agreement on a common direction in political-strategic issues could jeopardize the formulation of a EU security of energy supply policy and fuel the preference for adverse national approaches. Given the dynamics of international political and economic relations, a static singular approach to energy security may not suffice.

Acknowledgments

This paper is based on a study prepared for the EU Directorate General Transport and Energy, "Study on Energy Supply Security and Geopolitics" in 2003, by the *Clingendael International Energy Programme* (CIEP), of the Institute for International Relations 'Clingendael', The Hague, the Netherlands. The full study can be downloaded from

〈http://www.clingendael.nl/ciep/publications/Studies/CIEP_Study_01/pdf/CIEP_Final_Report_Complete_Version_2004.pdf〉 or 〈http://europa.eu.int/comm/energy_transport/doc/2004_lv_ciep_report_en.pdf〉.

We thank the other contributors to the study: Mehdi Amineh (University of Amsterdam and Leiden), Dick de Jong (CIEP) and Sander Hansen (CIEP) and an anonymous referee. This paper is also facilitated by the Foundation Next Generation Infrastructures (TU Delft).

References

Adelman, M.A., 1993. The Economics of Petroleum Supply: Papers by M.A. Adelman 1962–1993. The MIT Press, Cambridge Mass.

Adelman, M.A., 1995. The Genie out of the Bottle. The MIT Press, Cambridge, Mass.

Aït-Laoussine, N., 2002. OPEC and Dialogue, Oxford Energy Forum Issue 51, November 2002, pp. 7–9.

Amineh, M.P., 2003. Globalisation, Geopolitics and Energy security in the Central Eurasia and the Caspian region, Clingendael International Energy Programme, The Hague.

Andrews-Speed, Ph., Liao, X., Dannreuther, R., 2002. The Strategic Implications of China's Energy Needs, Adelphi Paper 346, The International Institute for Strategic Studies. Oxford University Press, Oxford.

Anechiarico, F., Jacobs, J.B., 1996. The Pursuit of Absolute Integrity, How Corruption Control makes Government Ineffective. The University of Chicago Press, Chicago/London.

Armitage, R., 2002. The new geopolitics, introduction. In: Bloomfield, L.P. (Ed.), Global Markets and National Interests, the new geopolitics of energy, Capital, and Information, Significant Issues Series, Vol. 24(3). Center for Strategic and International Studies (CSIS), Washington, DC.

Balke, N.S., Brown, S.P.A., Yücel, M.K., 2002. Oil price shocks and the US economy: where does the asymetry originate? Energy Journal 23 (3).

Bielecky, J., 2002. Energy security: is the wolf at the door? Quarterly Review of Economics and Finance 42, 235–250.

Bohi, D.R., Toman, M.A., 1993. Energy security: externalities and policies. Energy Policy 21 (11).

Bohi, D.R., Toman, M.A., 1996. The Economics of Energy Security. Kluwer Academic Publishers, Deventer.

BP Statistical Review of World Energy, 2004.

CEC, 2001. Green Paper. Towards a European Strategy for the Security of Energy Supply, COM 769 final, 2001.

CEC, 2003. European energy and transport: trends to 2030. DG TREN, Brussels.

CIEP, 2003a. The Case for Gas is not Self-Fulfilling! Clingendael International Energy Programme, The Hague.

CIEP, 2003b. The role of liquefied natural gas (LNG) in the European gas market. Clingendael International Energy Programme, The Hague.

CIEP, 2004. Natural gas supply for the EU in the short to medium term. Clingendael International Energy Programme, The Hague.

Clarke, J.G., 1990. The Political Economy of World Energy: A Twentieth Century Perspective. Harvester, Wheatsheaf.

Cooper, R., 2003. The Breaking of Nations: Order and Chaos in the Twenty-first Century. Atlantic Books, London.

Ebel, R.E., 2002. The Geopolitics of Energy into the 21st Century. CSIS, Washington D.C.

Gately, D., 2004. OPEC's incentives for faster output growth. The Energy Journal 25 (2), 75–96.

Helm, D., 2002. Energy policy: security of supply, sustainability and competition. Energy Policy 30, 173–184.

Helm, D., 2005. The assessment: the new energy paradigm. Oxford Review of Economic Policy 21 (1), 1–13.

Horsnell, P., 2000. The Probability of Oil Market Disruption: With an Emphasis on the Middle East'. Working Paper for Japanese Energy Security and Changing Global Energy Markets: An Analysis of Northeast Asian Energy Cooperation and Japan's Evolving Leadership Role in the Region, The James A. Baker III Institute for Public Policy, Rice University.

Horsnell, P., 2004. Why oil prices have moved higher. Oxford Energy Forum August, 10–12.

IEA, 1995. The IEA Natural Gas Security Study. IEA/OECD, Paris.

IEA, 2002. Flexibility in Natural Gas Supply and Demand. IEA/OECD, Paris.

IEA, 2003. International Energy Outlook 2002. IEA/OECD, Paris.

IEA, 2004. World Energy Outlook 2005. IEA/OECD, Paris.

Ignatieff, M., 2003. Empire Lite: Nation-Building in Bosnia, Kosovo and Afghanistan. Penguin, Harmondstworth.

IHS, 2004. Report on 10-Year Petroleum Trends (1994–2003). IHS Energy, Houston.

IPCC, 2000. Emissions Scenarios. Cambridge University Press, Cambridge.

Jaffe, A.M., Soligo, R., 2002. The role of inventories in oil market stability. The Quarterly Review of Economics and Finance 42, 401–415.

Jensen, J.T., 2004. The Development of A Global LNG Market: Is it Likely? If so When? Oxford Institute of Energy Studies, Oxford.

Johnston, M., 1997. Public officials, private interests and sustainable democracy: when politics and corruption meet. In: Elliott, K.A. (Ed.), Corruption and the Global Economy. Institute for International Economics, Berkeley.

Jones, D.W., Leiby, P.N., Paik, I.K., 2004. Oil price shocks and the macroeconomy: what has been learned since 1996. The Energy Journal 25 (2), 1–32.

Kagan, R., 2004. Paradise and Power: America and Europe in the New World Order. Atlantic Books, London.

Leiby, P.N., Bowman, D., Jones, D.W., 2002. Improving Energy Security Through an International Cooperative Approach to Emergency Oil Stockpiling. In: Proceedings of the 25th Annual IAEE International Conference, June 26–29, Aberdeen, Scotland.

Leite, C., Weidman, J., 1999. Does Mother Nature Corrupt? Natural Resources, Corruption and Economic Growth. IMF Working Paper, WP/99/85, Washington, DC.

Manders, T., Mulder, M., 2003. Long term Scenarios for Energy Markets. Paper prepared for the 26th Annual International Conference of the International Association of Energy Economics, Prague, Czech Republic, June 4–7.

Morse, E.L., Richard, J., 2002. The battle for energy dominance. Foreign Affairs 81 (2).

NERA, 2002. Security in Gas and Electricity Markets, final report for the Department of Trade and Industry. Ref: 003/08 SGEM/DH, National Economic Research Associates, London.

Odell, P.R., 1997. The Global oil industry: the location of production—middle east domination or regionalization. Regional Studies 31 (3), 311–322.

Odell, P.R., 2001. Oil and Gas: Crisis and Controversies 1961–2000, Volume 1: Global Issues. Multi Science Publishing Company Ltd., Brentwood, England.

Odell, P.R., 2002. Oil and Gas: Crisis and Controversies 1961–2000, Volume 2: Europe's Entanglement. Multi Science Publishing Company Ltd., Brentwood, England.

Rose-Ackerman, S., 1999. Corruption and Government, Causes, Consequences and Reform. Cambridge University Press, Cambridge.

Shell, 2001. Exploring the Future: Energy Needs, Choices and Possibilities—Scenarios to 2050. Global Business Environment, Shell International.

Shell, 2005. Shell Global Scenarios to 2025: The Future Business Environment—Trends, Trade-offs and Choices. The Institute for International Economics.

Shleifer, A., Vishny, R.W., 1998. The Grabbing Hand, Government Pathologies and their Cures. Harvard University Press, Cambridge (Mass).

Stern, J., 2002. The Security of European Natural Gas Supplies. The Royal Institute for International Affairs.

Stevens, P., 2005. Oil markets. Oxford Review of Economic Policy 21 (1), 19–42.

Thomas, S., 2003. The seven brothers. Energy Policy 31, 393–403.

United Nations, 2002. Global Environmental Outlook 3, Past, Present and Future. Earthscan Publications, London.

Van der Linde, C., 2000. The State and the International Oil Market, Competition and the Changing Ownership of Crude Oil Assets. Kluwer Academic Publishers, Boston/Dordrecht/London.

Van der Linde, J.G., Stern, J., 2004. The Future of Gas: Will Reality Meet Expectation? Background Paper for the 9th International Energy Forum, 22–24 May 2004. IEF, Amsterdam.

Van der Linde, J.G., Amineh, M., Correljé, A.F., de Jong, D., 2004. Study on Energy Supply Security and Geopolitics. Final Report, January 2004, Report prepared for DG TREN, Contract number TREN/C1-06-2002, ETAP programme. The Clingendael International Energy Programme (CIEP), The Hague. 〈http://europa.eu.int/comm/energy_transport/doc/2004_lv_ciep_report_en.pdf〉.

Wybrew Bond, I., Stern, J., 2002. Natural Gas in Asia, OIES 25. Oxford Institute for Energy Studies, Oxford.