

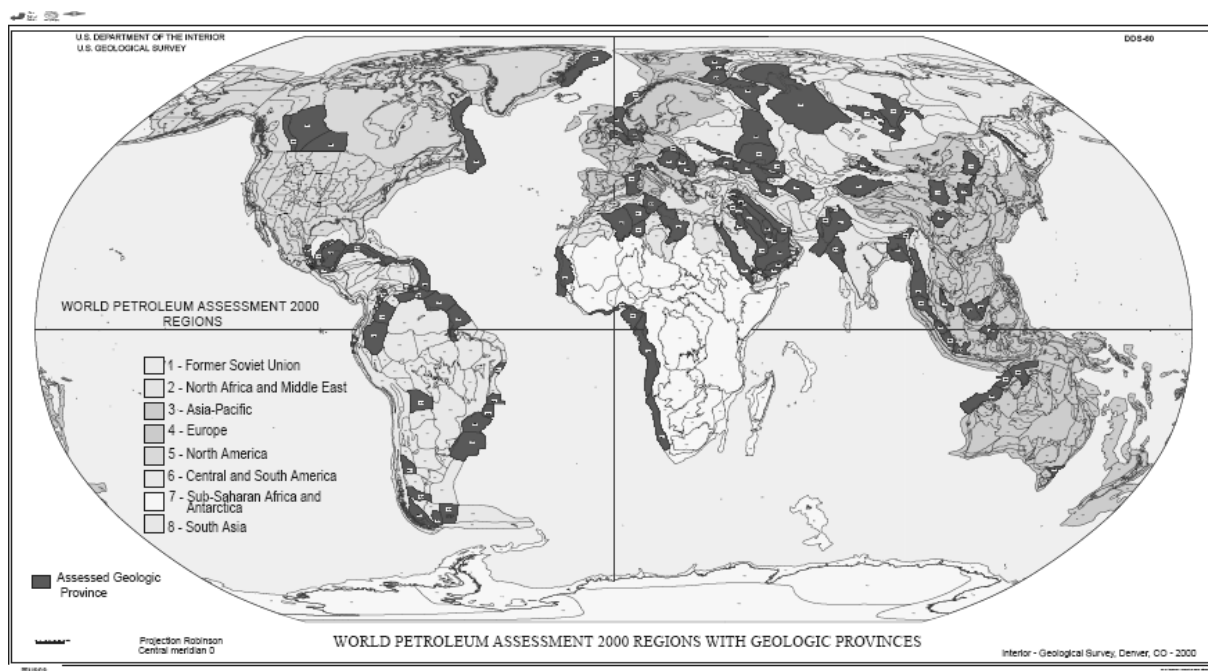
INTERNATIONAL RELATIONS AND SECURITY OF ENERGY SUPPLY: RISKS TO CONTINUITY AND GEOPOLITICAL RISKS

By

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« Nature has bestowed mines on several parts of the World: but their riches are only for the Industrious and Frugal. »

John Locke (1632-1704)

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1. Introduction

The unequal distribution of the world's natural resources whether mines of gold and silver in the 17th century or deposits of oil, gas and uranium today is a longstanding problem. John Locke's insistence on the primacy of contract over conflict in the debate with his mercantilist contemporaries was as valid then as it is now.¹ In comparative terms, nature has served Europe meagrely when it comes to energy resources (see the map on the cover page where promising areas for hydrocarbon exploration are marked in red). In the face of ever-rising demand, the exhaustion of domestic resources and rising import dependency due are the logical consequence. The key question is the following: **Is such import dependency just another part of the global division of labour creating mutual benefits for exporting and importing countries alike, or does this situation constitute a strategic threat to European independence and economic growth?**

This paper proposes to assess this question in seven chapters. Following the Introduction, Chapter 2 will assess the state and security of European energy supplies in the international context. Chapter 3 will provide a conceptual framework for addressing security of supply issues. Chapter 4 will discuss developments in a number of important geopolitical (OPEC, Russia, the United States) that are likely to have a major influence on the security of energy supplies in Europe. Chapter 5 will discuss a number of intra-European issues likely to have a bearing on the demand and supply of energy. Chapter 6 will make a number of concrete proposals that policymakers can adopt now to improve the security of European energy supplies. Chapter 7 will conclude.

A difficult European energy supply situation...

The European energy situation is characterised by growing demand, notably for gas and electricity, and slowly tightening supplies in several facets of the supply spectrum.² Efforts to assure safe and affordable energy supplies in Europe are at a crossroads. While there is no immediate crisis in the energy sector, a number of short-term and long-term pressures are building up and are cause for concern. Specific issues are natural hazards, the political instability of supplier countries as well as threats of sabotage and terrorism to energy installations. By far the greatest threat to the stability of world energy markets is the intermingling of political considerations with the supply of energy resources.

Indigenous European oil and gas resources, never abundant, are dwindling and will be largely depleted by the end of the decade. Coal, Europe's most abundant resources, has problems of environmental acceptability. While alternative supplies are physically available, there exist only a limited number of suppliers, frequently in geopolitically unstable regions (e.g., Middle East, North

¹ A second citation precedes the one on the front-page: "In a country not furnished with mines there are but two ways of growing rich, either conquest, or commerce. By the first the Romans made themselves masters of the riches of the world; but I think that in our present circumstances, nobody is vain enough to entertain a thought of our reaping the profits of the world with our swords, and making the spoil and tribute of vanquished nations, the fund for the supply of the charges of the government, with an overplus for the wants... of the People. Commerce therefore is the only way left to us, either for riches or subsistence..."

² If not otherwise indicated, the terms "Europe" and "EU" refer to the EU-25 with the member countries Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden and the United Kingdom. WE will mention it explicitly, if data refers to other ensembles. See below in chapter 4.5 an appreciation of the changes wrought by the accession of 12 new member countries since 2004

Africa, Central Asia), which complicates the European energy equation. The rapid growth of India and China, with 2.3 billion people between them, and the concomitant energy demand increase is further cause of concern. Observers were also startled by China's dynamism in securing physical energy supplies, in particular in African countries.

In addition, the world has just been through a three-year rise in energy prices, during which the price of crude oil tripled and the prices of gas, electricity and coal all doubled. While higher prices due to increased resource scarcity do not necessarily equate with a decline in the security of physical energy supplies, the sudden and massive increase in energy prices has worried policymakers and the public alike. The decision of Russia to briefly suspend gas deliveries to Ukraine in winter 2005/06 and to suspend oil deliveries to Byelorussia in winter 2006/07, both vital transit countries, has further highlighted the fragility of the European energy supply situation.

Last but not least, the accession of Central and Eastern European countries in 2004 has revealed conflicts of interest in energy policy along historical fault-lines. The decision of Russian gas monopoly Gazprom, German energy company E-ON and German chemicals producer BASF to build a gas pipeline through the Baltic Sea thus bypassing Poland and the Baltic states has been widely interpreted as an act favouring the supply security of Germany over security of the EU as a whole. While the different reactions tend to confuse economic decision-making by industrial actors with strategic political decisions, the issue does raise the question of EU unity on energy security.

...is made worse by the inability of decision-makers to develop a coherent energy policy

The inability of policymakers in the European Commission and national governments to decide between competing – and sometimes contradictory – objectives adds to the objective difficulties Europe is facing. Reducing greenhouse gas emissions, limiting subsidies, decreasing import dependence, phasing out nuclear power, augmenting the use of renewable energies, liberalizing energy markets, increasing economic competitiveness... the wish-list of energy policy objectives is very long indeed and not every addition is carefully considered in all its consequences. Crucially, European efforts to improve energy security are hampered by the lack of an internal consensus about the trade-offs between competing policy objectives (see the illustration of the unsolved European energy triangle below). A key question in this context is the degree of priority that the European Commission and its President José-Manuel Barroso will give to the “Lisbon Strategy”, the European Council's commitment to making the European Union “the most competitive and dynamic knowledge based economy in the world”.

The Triangle of European Energy Decision-Making



Consider, for instance, the share of gas in European energy consumption. Favoured over coal on environmental considerations and over nuclear on cost, natural gas satisfies very well objectives 2 (environmental objectives) and 3 (competitiveness). Unsurprisingly, its share in total primary energy supply is expected to rise from 23 per cent in 2004 to 30 per cent in 2030 (IEA [2006]). Increased natural gas consumption, however, means increased import dependency and thus contradicts objective No. 1 (security of supply). The inability to define lasting trade-offs between the different objectives implies continuing drift.

Internally, a coherent strategy needs to address the price of energy...

A number of parameters particularly affect the risks to the continuity of energy supplies. Most of these parameters are naturally part of two distinct dimensions, the geopolitical dimension and the economic dimension. Internally, the single most important parameter for policymakers to address in this context is the price of energy. Of course, ambitious objectives such as reaching a 20 per cent share of renewable energy sources in power generation, increasing energy efficiency by 20 per cent until 2020 or reducing greenhouse gas emissions by 8 per cent below their 1990-level by 2012 are feasible. Of course, crucial suppliers of hydrocarbons such as Russia or Algeria are willing to give the EU priority status if the conditions are right. The question will always be, “At what price?”

With many European companies operating in highly competitive global markets and the European economy lagging in dynamism, any increase energy prices will have to be argued for very carefully. Without higher energy prices, however, substantially reducing demand increases or lowering energy intensity will remain elusive. **The creation of the European Trading Scheme (ETS) that prices CO₂-emissions and thus implicitly raises the price of carbon-emitting hydrocarbons such as oil and gas is the single most promising policy measure of recent years to improve European energy supply security.** In order to improve on this positive contribution, transport with its massive oil consumption should be included as quickly as possible into the ETS.

Externally, a forceful commitment to free global energy markets is Europe's best strategy

From the point of view of external relations, Europe also has distinctive geopolitical advantages in the securing its energy supplies. It is in “pipeline distance” (3000 km or less) of two thirds of global gas reserves. Diversification of its oil imports has progressed further than the efforts of any other major importing region (see adjacent table). Its consumers are relatively energy efficient and catching up fast with best-in-class-Japan. Europe is the global leader in reducing greenhouse gas emissions, an effort that also reduces hydrocarbon dependence. Several European companies such as BP, Shell or Total are amongst the world leaders in the exploitation of hydrocarbons.

A cold, hard look at European energy realities will reveal that Europe will have to rely on international markets to provide its citizens with heat, transport and electricity for decades to come. Renewable energies might become cheaper, nuclear might make a comeback, energy efficiency might rise dramatically – nothing will change the fact that even under the most optimistic circumstances, Europe will import at least 10 million barrels of oil and around 1 billion cubic metres of gas **per day**. Given that it would be folly to ensure these resources by “conquest” rather than by “commerce”, ensuring that these markets are as liquid, transparent and competitive as possible should be European policymakers’ highest priority.

Europe requires a multilateral approach to energy security. Major importing nations such as the United States, China and India, as well as major producing countries such as Russia, the OPEC countries or the countries surrounding the Caspian Sea need to be part of this effort. Europe, due to history, geography and political culture, has all the right qualities to act as an honest broker in this context. Free global energy markets – in which each supplier has the right to look for the highest price, and each importer the right to ask for the best bargain – are the only way to avoid a global race for resources that would squander most or all of the rents contained in the natural resources nature has provided.

Such an approach requires two important conditions. **First**, a clear distinction needs to be drawn between the *level* of energy prices, the *speed* at which they change and the freedom from physical interruptions of energy flows. In a world of limited resources, in which each importer has equal right to access, economic growth will ensure that prices gradually rise over time. Technological progress can delay this process but not avoid it. Moreover, we should welcome it, as rising economic growth is not only a good thing in itself, but will also provide the means to deal with any issues arising from resource scarcity. What policymakers should be concerned with is that markets react to new information in a rational manner and that they are determined as much as possible by the smooth forces of technology and economy activity, rather than by political or military events with their rhetoric, fear and gyrating hyperbole. Of paramount concern should be the safety of physical flows in a world of commercial contracts. Russia's supply interruption made no difference on the ground, but the wanton disregard for the sanctity of contract was rightly criticised by European political leaders in no uncertain terms.

Second, a strong commitment to a multilateral strengthening of global energy markets needs to put into perspective “dialogues”, “neighbourhood policies”, “special relationships” etc. Of course, diplomacy frequently proceeds on a bilateral basis. Bilateral contract is also the basis of the multilateral institution “the market”. It is crucial, however, to recognise that no single bilateral relationship can be more important than the working of global energy markets, in which each side is free to cater for its own advantage. A mercantilist obsession with the “control” of resources based on bilateral agreements would squander resources both in economic and political terms by engaging in prisoner dilemma-type stalemates. It would furthermore introduce inefficiencies in resource exploitation by limiting investment and technologies to those from “preferred partners”. Furthermore, in the energy field market forces assert themselves in the long run even in the most politically distorted environments (witness the continuing Venezuelan oil exports to the United States). Resisting these forces in the short-run is possible but extremely costly. It is futile in the long run.

Rightly addressed, the debate of energy security spells opportunity for Europe

Nowhere is the old adage that “crisis spells opportunity” thus more applicable than in the case of European energy supply security. Policymakers, experts and the public are slowly preparing for difficult choices. The Commission's Green Papers on Energy Security *Towards a European Strategy for the Security of Energy Supply* in 2000 and 2006 have concentrated minds and sparked a wide-ranging debate. While this debate is far from concluded, there are first indications of the main orientations that will guide European energy policy-making in the coming years. The arrival of ten new member countries provides a window of opportunity for policy leadership from the European political centre. Political commentators and the public begin to voice concern about the

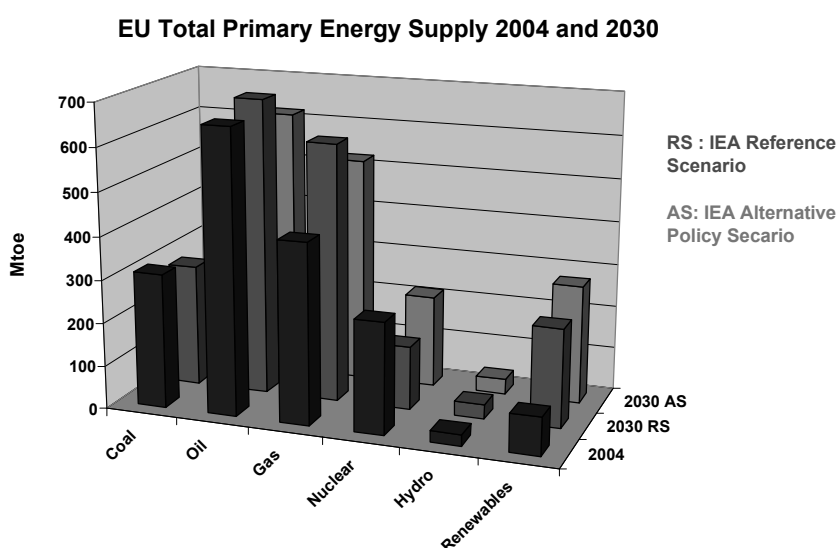
resulting policy vacuum and are ready to contemplate stronger intra-European coordination and a more forceful voice of the Union abroad.

Observers tend to point out, that energy matters played an important role at the birth of modern Europe and that the first common institutions of European countries were the European Coal and Steel Community (ECSC) and European Atomic Energy Community (Euratom) were the precursors of the European Union. However, to reminiscence in this way might do more harm than good. European citizens, unhappy and disoriented as they may be, occasionally appear ahead of their leaders, stuck in an outdated rhetoric, in confronting the new global realities. In the modern energy world, there is no place for visions of manifest destiny. The current situation does not require inward-looking mutual subsidisation but acceptance of global interdependence and the creation of structures that allow responsiveness while safeguarding common goods such as the environment, i.e. appropriate price structures in open markets. The energy security debate thus inserts itself into the wider debate about the nature and the course of the European Union. It could even be a catalyst for an updated European policy identity. Rightly addressed, Europe and the European Union have much to gain from the current debate about energy security.

2. The Energy Security Situation in Europe

2.1 General Overview

The energy consumption of the EU-25 relies heavily on fossil fuels. In 2004, coal constituted roughly 18 per cent of total primary energy supply (TPES), oil 37 per cent, gas 24 per cent and nuclear and renewable energies with about 20 per cent made up the rest. From a security of supply perspective, Europe's heavy reliance on oil and gas poses, of course, the most immediate challenge. Europe currently imports about 80 per cent of the oil it consumes and about 60 per cent of the gas that it consumes. High growth rates in the use of renewable energies of almost 5 per cent per year (compared to growth rates for total TPES of 0.5 per cent in the reference scenario and of less than 0.2 per cent in the more proactive Alternative scenario) will not fundamentally change that picture given that their base is too low.



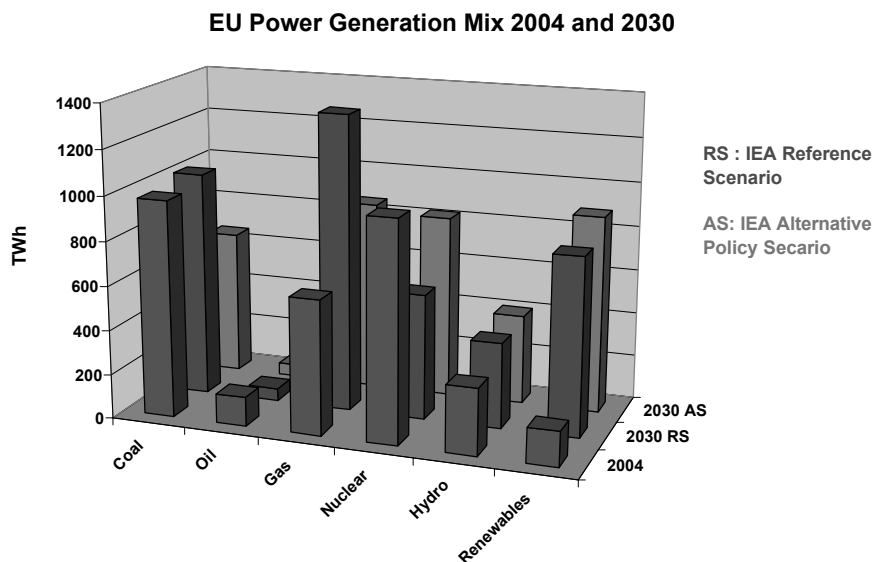
Source: IEA [2006]

Given the historic inelasticity of energy demand in the transport sector, any impulses for significant structural change in Europe's energy sector can only come from the power generation sector. Coal and nuclear each represented 31 per cent of total electricity generation, gas 19 per cent, hydro 10 percent, renewable energies 5 and oil 4 per cent. Expectations are that gas and renewable energies will grow fast (at three and six per cent per year respectively in a market growing at one per cent per year) to reach 32 and 19 per cent respectively of total electricity generation in 2030 in the "policy-as-usual" reference scenario. This will go hand in hand with the decline of the shares of coal and nuclear.

Coal fired-power generation, in particular *new* coal-plants, will be progressively priced out of the market by higher prices for CO₂-emissions. Nuclear energy instead is hampered by political commitments, most notably in Germany and in Sweden, to phase out nuclear power as well as the price risk that private investors in technologies with high fixed costs (such as nuclear) incur in liberalized electricity markets. Gas-fired power generation, which is technology with low fixed costs, does not have such disadvantages but, of course, poses specific questions concerning the security of supply (see below). Gas is thus the variable of adjustment when distinguishing the "reference scenario" from the "alternative policy scenario". Higher gas prices due to political uncertainty and/or fiscal policy, combined with more aggressive efforts to improve the efficiency of power consumption and the competitiveness of renewable energies might lead to much lower

growth of the electricity market (where prices are set at the margin by the marginal fuel for peak-load demand, *i.e.* gas). In such a much smaller market, gas might stay at a share of 20 per cent, overtaken even by renewable energies with 24 per cent, while a slower phase-out of nuclear power would essentially make up the rest.

In summary, however, the modelling results of the International Energy Agency, which reflects to some extent a consensus estimate of energy experts, make for sobering reading from a perspective interested in the security of energy supply. Even assuming the more optimistic “alternative policy scenario”, Europe will consume in 2030 more gas and an equivalent amount of oil compared to today.



Source: IEA [2006]

There are three key reasons why the outlook for European energy does not look very different from the present:

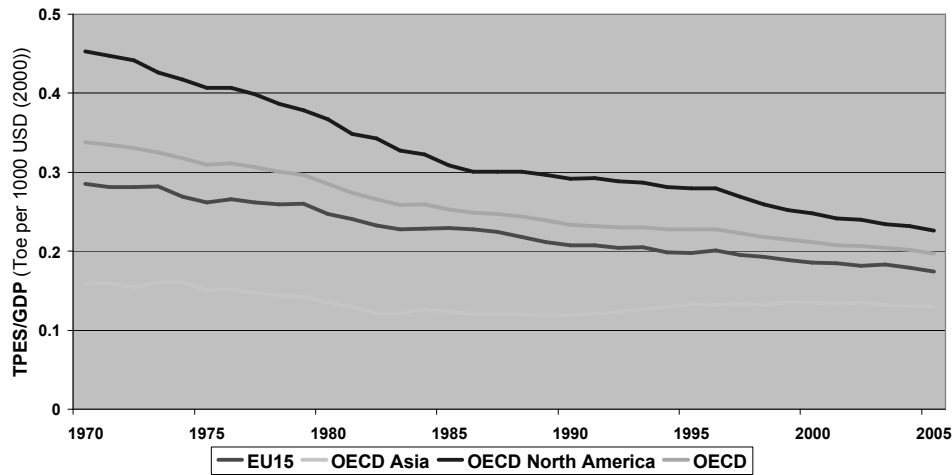
1. The intractable issue of private transport demand for oil, where modest technical improvements are unable to compensate for the rising use of ever-heavier personal vehicles.
2. The fast rise of gas around one per cent per year in both scenarios due to the attractive economics of gas-based CCWG technologies in liberalized (and fast-growing) electricity markets. This fact is linked to the decision of several European countries, to phase out nuclear power.
3. The inability of European policymakers to agree on an effective energy policy that would need to be built around two principles (1) a commitment to liquid and transparent global energy markets and (2) strengthening the commitment to energy efficiency and renewable energies with a pricing strategy that fully incorporates impacts on the environment as well as the economic effects of the risks of physical disruptions and excessive volatility.

Identifying only procrastination as the hallmark of the European energy situation, however, would be unfair. A picture of an essentially stable, or slightly increasing, *total* energy consumption, hides another picture in which economic growth constantly plays catch up with *relative* improvements in the efficiency of energy consumption. Per unit of GDP, Europe uses today only 60 per cent of the energy that it used in 1970. Its energy intensity is still 10 per cent below that of the OECD average,

although the distance to the high-intensity countries of North America has shrunk both in absolute and in relative terms.

Europe has made progress in the past thirty years. However, can it do so in the future? The graph below invites to scepticism. At comparable levels of technology, the high-intensity (and low-price) countries of North America have made enormous progress, the low-intensity (and high-price) countries) of OECD Asia have made little or no progress. There seems to be an intrinsic incompressible boundary to the effort to improve energy efficiency and lower energy intensity.

Europe's Energy Intensity in Comparison (1970-2005)



Source: OECD (2007), BP (2006).

It is up to the inventiveness of engineers and policymakers to prove such scepticism wrong. For the time being, however, Europe will have to contend with the fact that it will need to ensure the continuing supply of large amounts of hydrocarbons for many years. The precise contours of this challenge and the way forward to master by active involvement in the organization of liquid and transparent global energy markets are the topics of the ensuing chapters.

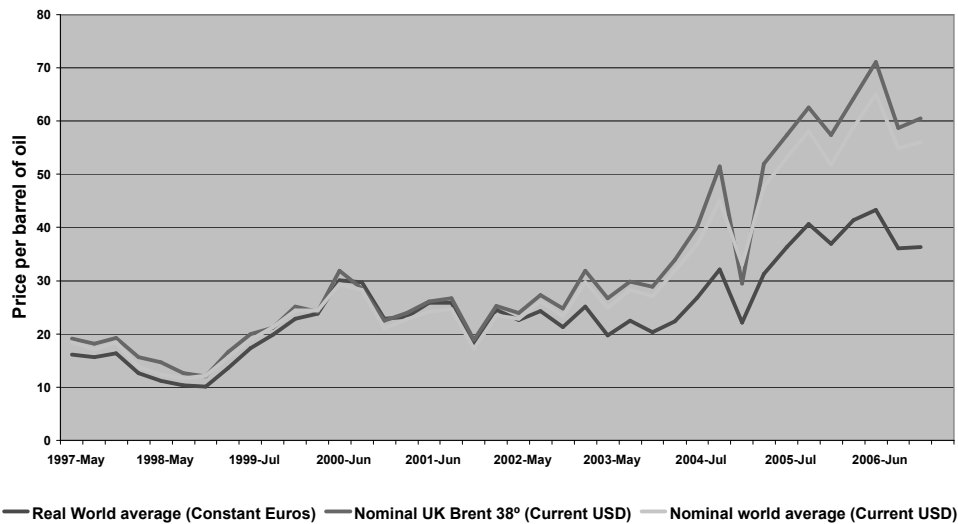
2.2 The Oil Sector

Directly or indirectly, recent concerns about the security of energy supplies have also been prompted by the rapid rise of oil prices during the three last years. As the graph shows global oil prices rose from a historic low of 10 USD per barrel (152 litres) of oil in 1998 to a band between 20 and 30 USD in the period 2000 to 2003, a price level that was close to OPEC's announced target price of 25-35 USD and that was widely considered by experts as sustainable. The three-fold increase of the price to a historic high of 78 USD in spring 2006 caught markets, including OPEC by surprise. Oil is still the world's single most important economy. Its price is to some extent an indicator for the price of energy in general. The rise in oil prices also drove a global boom in commodity prices that is only now coming to a halt. Several factors contributed to its massive increase:

- The inability of producers to increase supply; the oil industry has investment cycles that can span one or two decades; it was unable to respond quickly to any increase in price;
- The inelasticity of oil demand in the short-run; high in energy content, easily transportable and usable, oil is a vital ingredient of modern economies through the transport vector; while changes in behaviour are possible, they take years to be implemented in response to price changes;

- Political uncertainties surrounding key supplier countries including Iran, Iraq, Venezuela, Nigeria and to a lesser extent Russia added a risk premium of up to 20 USD per barrel; while the bulk of oil was still flowing freely, prices are set at the margin, which means that in a tight market the risk of a single country unable to fully service its commitments pushes prices up;
- The fast growth of Asian demand for oil; economic growth of 5 to 10 per cent per year was coupled with a massive one-million-barrel-per-day-increase of demand from China that was rebuilding its strategic petroleum reserves.³ Asian demand was, of course, also a key factor in sustaining the more generalised boom in commodities.
- The technical and geological challenges for alternative supplies (such as deep-sea or Arctic deposits or heavy oil sands in Canada and Venezuela) to come on-stream quickly. In some areas, such as Canada, environmental pressures and the inability to find qualified personnel have limited expansion.

Real and Nominal Oil Prices



Source: DOE [2007], Eurostat [2007]

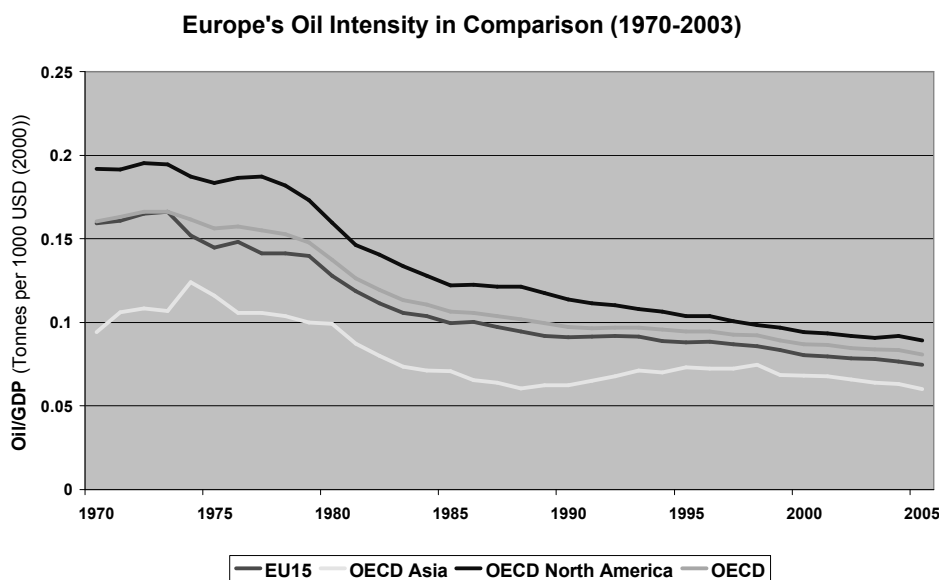
All these factors contributed to the massive price increases the world has seen during the past three years. They need, however, to be put into perspective, by considering the following aspects, most notably when considering them from a European point of view (see graph above):

1. The recent tripling of oil prices in nominal USD terms boils down to a doubling in constant Euro terms (for periods before 2001, the USD/ECU conversion rate was used). Due to (modest) inflation and the substantial 50-per-cent-increase in the value of the Euro against the dollar, Europeans were to some extent shielded of the most dramatic effects of the price increases. Even in constant dollar terms, oil prices have only reached the level of real prices in the early 1980s at their very peak in Spring 2006.
2. The headline numbers that are widely quoted by the media are usually the prices for American West Texas Intermediate (WTI) or for British North Sea Brent. These are light, low sulphur qualities of oil, available only in relatively small quantities, commanding the highest prices of all oil qualities. More importantly, the gap between WTI and Brent and the rest of the market has recently been increasing, due to limited refining capacity for

³ China's strategic oil reserves, with a storage of roughly 20 days of demand, are still far below the level of the stored reserves of most industrialised nations. Members of the International Energy Agency (which include the countries of the European Union with the exception of Bulgaria, Romania and the Baltic States), for instance, have a legal obligation to provide for 90 days of storage.

heavy, high sulphur oils. While the average oil price has certainly seen also a massive increase, it is somewhat less pronounced than the dramatic figures that are widely circulated.

- Most importantly, the oil intensity of all industrialised nations, in particular in Europe and the United States, has declined enormously during the last three decades (see graph below). In Europe, it is now with 0.075 tonnes of oil (corresponding to 0.5 barrel) per 1000 USD worth of economic production (constant dollar terms) only one-half as high as in 1970. This means, a substantial part of the world economy was much better equipped to pay for the price increases and to absorb the inflationary pressures that come with the price increase. In essence, this means that oil and its price are only half as important for the European economy as it was 30 years ago.



Source: OECD (2007), BP (2006).

- Talk of the end of the oil ago was and is irresponsible demagoguery. There will not be a “peak oil” with a subsequent decline into a post-industrial ice age but an “undulating plateau”.⁴ Proved supplies have increased not declined in recent years, albeit at a pace slower than demand (see also the graph in Chapter 4.2). Of course, technological progress will not be always able to outpace the relentless draw on geological stocks that are

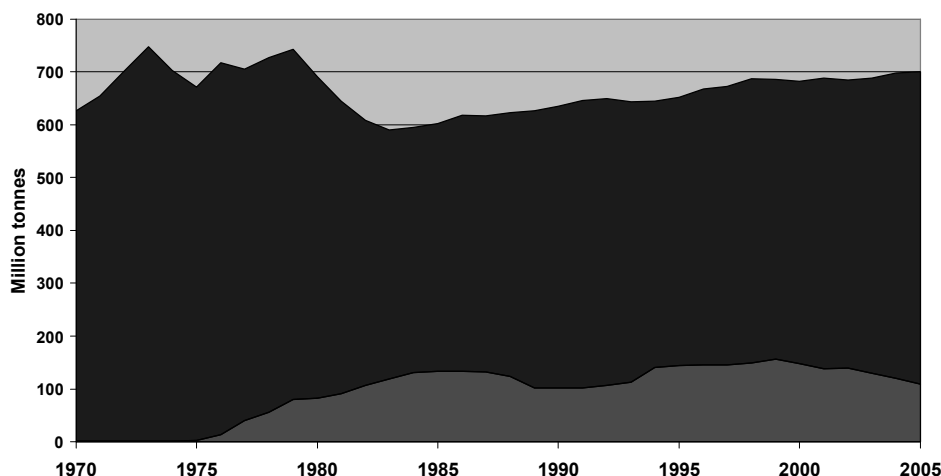
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The much commented on « peak oil » hypothesis of the American geologist Hubbard predicted a bell-shaped oil production profile for the continental United States and predicted the peak of production, by and large correctly, for the early 1970s. Hubbard heuristic prediction based on US national assumptions has little implications for global oil supplies except as far as the obvious is concerned: production will have to decline some day. Experts, however, widely agree on the hypothesis of an “undulating plateau”, in which annual oil production can no longer increase but in which new discoveries and better technologies balance declining production from mature fields. However, even the “undulating plateau”-hypothesis means that global demand will not be able to increase forever. Given continuing economic growth and assuming technological energy efficiency increase will continue at their present rate this means rising prices. Most experts also assume that the onset of the undulating plateau is not too far away (perhaps several years). A return to the very low prices of the late 1990s is thus unlikely. They were the result of the conjunction of two distinct events. (1) the final stages of a cycle of overcapacity in oil production in the wake of the very high prices in the early 1980s in the wake of the 2nd oil shock (it is unlikely that the industry will make the same mistake twice in a decade); (2) the Asian financial crisis that dented global economic growth.

inevitably finite and economic growth will thus provide continuing pressure on oil prices. However, the price mechanism does work in the oil sector in the long run (look also at the decline in European consumption during the high price years of the 1970s and the early 1980s in the graph below), albeit with fits and bursts.

5. Finally, prices are coming down and are today (end of January 2007) with 50 USD per barrel at levels last seen in spring 2005.⁵ This is due to, both, increased supply. Experts indicate that up to 4 million barrels per day (mad) of new or expanded capacity (5 per cent of the global total) are either under construction or already coming on-stream to participate in the bonanza of over 50 USD oil prices. The unusually clement winter weather has certainly also contributed to the recent decline.
6. Markets for oil, once it has come out of the ground, are among the most liquid and flexible markets in the world, oil being easily transportable by pipeline, tanker or truck. Information is passed on immediately and tankers can be redirected for even minimal price differences. Logically, Russia's temporary interruption of the Drushba oil pipeline through Byelorussia (politically worrisome as it was) did not impact prices, which continued to decline from 54 USD to 52 USD per barrel during the three days of interruption.
7. A focus on import dependency ratios is misleading. Certainly, the oil import dependency of the European Union, already high at 80 per cent, will further increase in future years. However, that dependency ratio was already 100 per cent during the 1960s before oil in the North Sea was discovered, not a time when European oil supplies were considered being particularly vulnerable by either policymakers, experts or the public (see graph below).

European Oil Consumption and Production (1965-2005)



Source : BP [2006].

All of these considerations imply that the situation in the oil market is perhaps slightly less dramatic than the media, always on the lookout for the next big story, might want to have it. None of them, however, implies that consuming countries can relax. In the long run, oil prices will stay high to balance increasing global demand with ever more difficult and more costly production conditions. An indicative number for marginal production costs at current demand levels might be 35 USD per

⁵ This writer predicted in January 2006 that oil prices would come down to a 45-50 USD range « in the coming year » (Keppler [2006a]). It looked like a very foolish prediction in the first six months of 2006. Due to a stroke of luck in the notoriously fickle party-game of predicting oil prices, it looks quite good now. What was already observable last year was that supply increases were building up in several parts of the world. Predicting when they would be available and which difference they would make to the price remains a guessing game. See also the preceding footnote.

barrel (average costs in countries such Saudi Arabia can be much lower). It is anybody's guess how high a geopolitical risk premium with its high speculative component needs to be, but it seems safe to say that the figures of early 2006 (i.e. roughly a doubling of cost of production) constitute somewhat of an upper bound. Factors to watch other than geopolitics are the weather, the energy and climate policies in key importing countries and, of course, the dollar exchange rate.

Commenting on the security of European oil supplies, we would like to mention two additional factors. First, the utilisation of rate of oil refineries has been steadily rising in recent years, in particular in Europe and Asia. Europe's refinery utilisation rate rose from 75 per cent in 1995 to 85 per cent in 2005. In Asia, the increase was from 85 per cent to a whopping 93 per cent. Tight refinery capacity exposes the world to sudden price snaps if part of the global refining capacity is no longer available, as happened when in October 2005 the hurricane Katrina temporarily eliminated 15 per cent of US refining capacity, an event that triggered stock releases through the IEA emergency response mechanism. The lack of capacity appropriate to process the heavy sour crude oils that will, and to some extent already do, dominate the global market was also responsible for the widening gap between the WTI and Brent benchmarks and the rest of the market. Some additional refining capacity in Europe or adjacent regions such as North Africa appropriate for heavy fuels capable of processing between 0.5 and 1 mbd would certainly ease some pressure in this field.

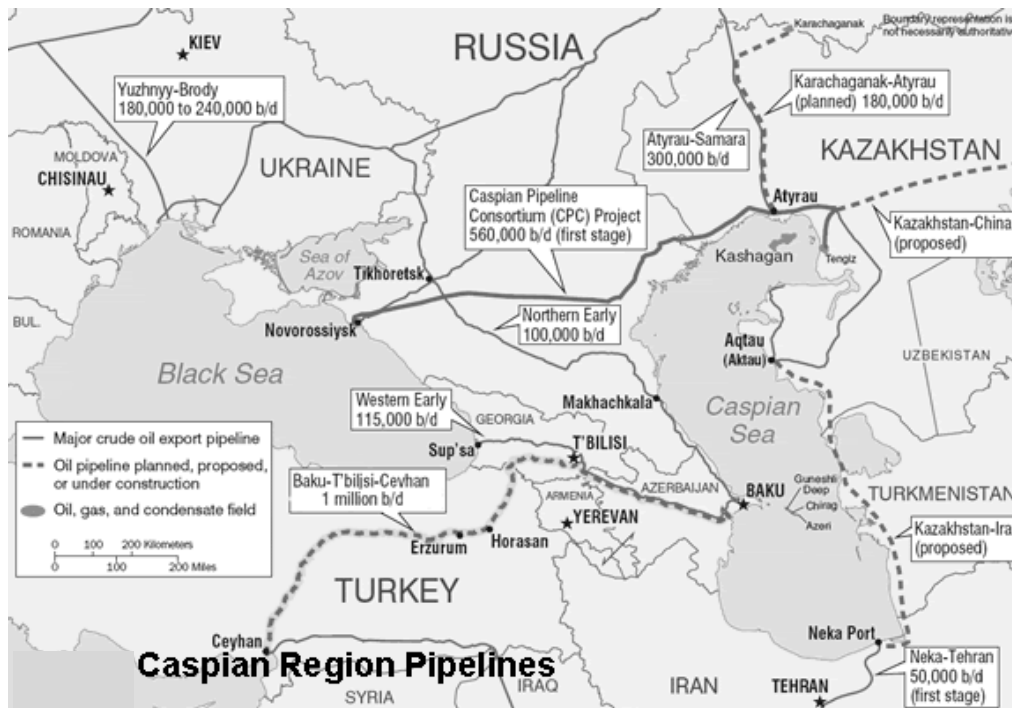
Oil Inter-Area Movements in 2005						
(Thousand barrels per day)						
	To					
	Europe	China	Japan	USA	Rest of World	Total Exports
From						
Former Soviet Union	5 811	398	47	473	347	7 076
Middle East	3 144	1 360	4 269	2 345	8 703	19 821
Africa	2 681	773	142	2 490	1 608	7 694
Rest of World	1 625	853	767	8 217	3 853	15 315
Total Imports	13 261	3 384	5 225	13 525	14511	49 906

Source: BP [2006].

Last but not least, even with a well-working global oil market, oil supplies do not only constitute a price issue but also an issue concerning the continuity of physical flows. The Drushba incident was a potent reminder in this respect. However, even in this respect Europe is not too badly prepared given that its oil supplies are far better diversified than those of other major importing regions (see graph above). Again, this is different from the gas sector, which poses a more immediate challenge to the security of European energy supplies (see next chapter), the greater relative importance of oil supplies notwithstanding. In addition, efforts are underway to diversify oil supplies further. The table above underlines also the growing importance of China in this context. A net exporter of oil until the end of the 1990s, China is rapidly becoming one of the world's largest importers with the impact on price everybody knows.

Unfortunately, one of the most important oil infrastructure projects of the recent decade, the 1 760 km BTC oil pipeline between Baku (Azerbaijan), Tbilisi (Georgia) and Ceyhan (Turkey) was undertaken without any official involvement of the European Union or its member countries. While European companies, BP (31 per cent and project leader), ENI (5 per cent) and Total (5 per cent)

hold major stakes in the project, the difficult geopolitics (see the green-yellow line in map above) were negotiated under an American rather than a European umbrella. The one-million-barrel-per-day BTC oil pipeline that opened in May 2006 is a vital part of unlocking the energy riches of Central Asia and in diversifying the European oil supply routes. One estimate says that up to one quarter of global incremental oil supplies of recent years will flow through BTC (Starr and Cornell [2005], p. 39). The global network for the production and the transport of energy supplies constructs itself one by one by such projects, almost independently of the fact who ultimately owns and operates them.



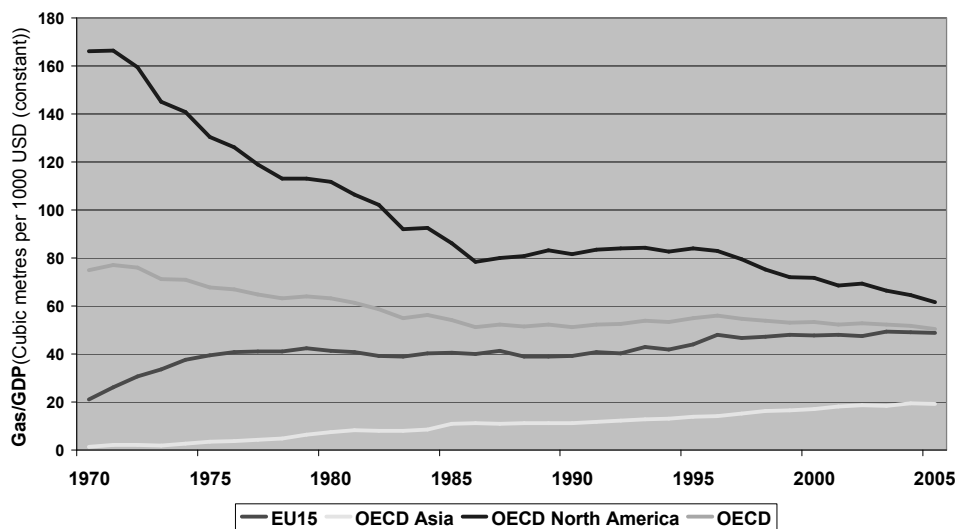
2.3 The Gas Sector

The gas sector is currently the most vulnerable part of the European energy sector. The graph below show that contrary to oil or total energy, the intensity of European's economy has risen since the 1970s. Europeans today use more gas per unit of GDP than thirty years ago. While Europe shares growing gas intensity with the industrialized countries of Asia (Japan and South Korea), its absolute share per unit of GDP is almost three times as high. It is little consolation that the level of European gas intensity is still below that of the United States. The United States have large domestic reserves and import most of the remaining gas they consume from its neighbours, Canada and Mexico. Europe instead needs to import a growing share of the gas it consumes from countries over which it can exert less direct leverage.

One quarter of the gas consumed in Europe comes from Russia. While Russia has been a reliable supplier of hydrocarbons for decades, two recent episodes unsettled Europe. In winter 2005/06, the dispute between Ukraine and Russia over gas tariffs brought interruptions to European supplies for several days. While limited in size and without effect on economic activity, the sole fact an interruption happened, heightened concerns. A similar dispute with Byelorussia one year later did

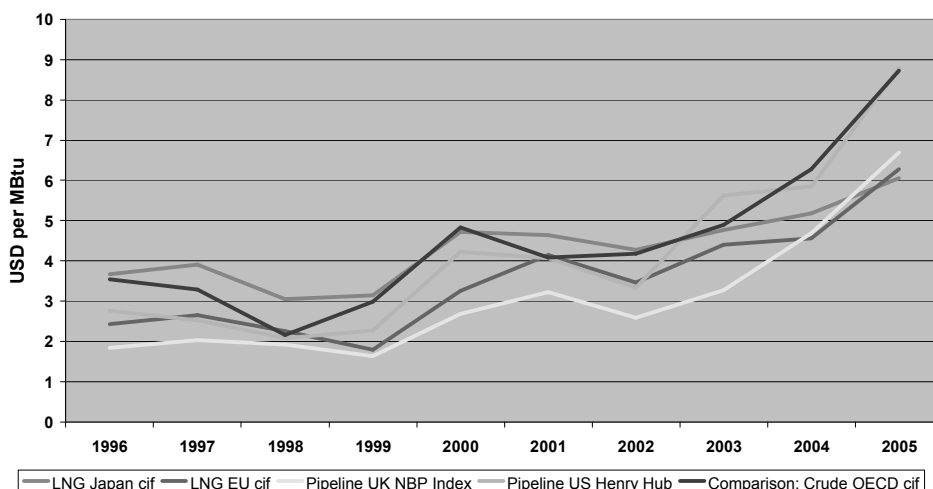
nothing to arrange the situation (even if finally the “Drushba” oil pipeline rather than a gas pipeline was cut for three days). Of less symbolic but potentially greater impact is the Russian effort to diversify their exports to Asia. Of even greater concern, however, is the fact that Russia’s gas production is stagnating. In conjunction with the extremely low efficiency of Russian consumption due to subsidized prices (roughly 25 per cent of international market prices), this puts doubts on the ability to service ever rising gas demand.

Europe's Gas Intensity in Comparison (1970-2005)



Growing gas intensity not only means increased vulnerability to any shocks due to actual or potential disruptions of physical supplies but in a more mundane manner increased economic vulnerability to increases in the price of gas. The sectors using gas intensively, such as the electricity sector, are the ones who will feel the most pressure.

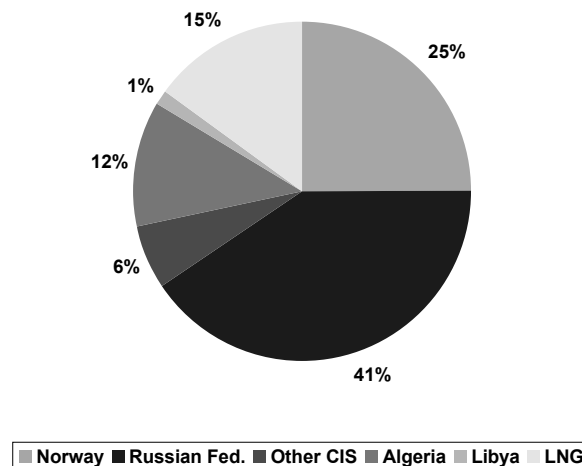
Moving Upwards: Gas Prices in the EU and the US since 1985



Historically gas prices have been linked to the oil price (frequently prices in long-term contracts for pipeline delivery are indexed to a six-month moving average of the oil price). During the past ten years gas prices have more than tripled (the graph below unfortunately does not record the further increases during the first six months of 2006). They roughly doubled in the past three years, before

easing in the second half of 2006. It is no coincidence that politicians and the general public were far more concerned about rising electricity prices (of which rising gas prices are an essential part) than about rising oil prices. As shown earlier, oil intensity has been steadily declining, playing a far smaller role in the budgets of governments and consumers, the trade balance and in determining inflation. The opposite happened in the gas market. Politicians and consumers are thus entirely rational to focus their policy efforts on this point.

Provenance of European Union Gas Imports in 2005



Total gas imports of the 27 member countries of the European Union from outside the EU area (i.e., net of intra-European trade-flows) amount to 317 billion cubic meters (bcm) of which 41 come from Russia. This is certainly a large proportion and an indicator of a certain degree of dependence. However, one should not overlook the fact that the 128 bcm that Russia exports each year to Europe constitute the bulk of Russia total exports of 151. In addition, it constitutes by far the most profitable part of Russia humongous annual production of 598 bcm fuelled by a domestic consumption subsidised with prices of around one quarter of world prices.

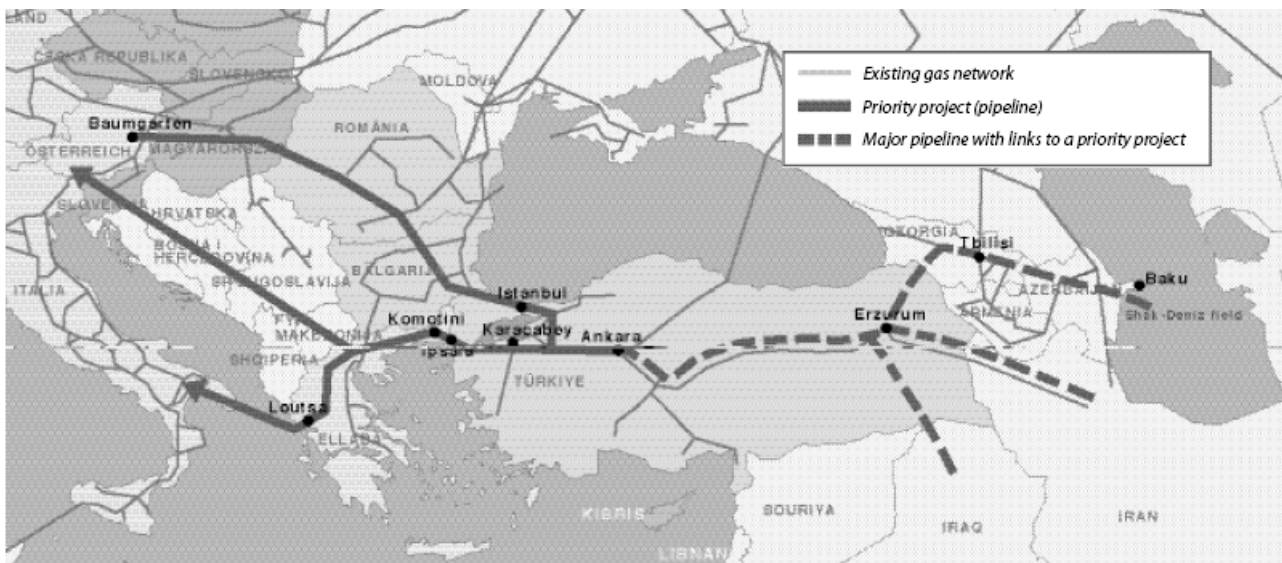
Nowhere is the old adage that dependence is mutual more true than currently in the gas trade between Russia and the European Union. This might change, however. Construction has begun in October 2006 on a massive pipeline linking Russia's gas deposits in Siberia to China that eventually should be capable of exporting as much as 50 billion cubic meters a year. A second pipeline capable of transporting 30 bcm per year is supposed to link the Far Eastern peninsula of Sakhalin to China but construction work has yet to begin. Both pipelines are supposed to be operational in 2011.

On the positive side, Europe is still producing 42 per cent of its gas consumption by itself. In addition, the least problematic source of supplies, globally diversified LNG trade, constitutes already 15 per cent of imports and is rising fast. It is estimated that European LNG imports will rise by 7.5 per cent per year, compared to 5.1 per cent for imports through pipeline and 2.1 per cent for the growth of total demand (Suez [2006], p. 36). Global LNG trade will be fuelled by Qatar's massive "North field" of an estimated 900 trillion cubic meters, which constitutes by itself 14 per cent of proven global reserves.

In addition, Europe is now fully committed to the construction of the 3 300 km Nabucco gas pipeline, which will transport natural gas from Iraq and Iran to South-East (Bulgaria and Romania) and Middle Europe (Austria and Hungary) through Turkey (see map on next page). The European

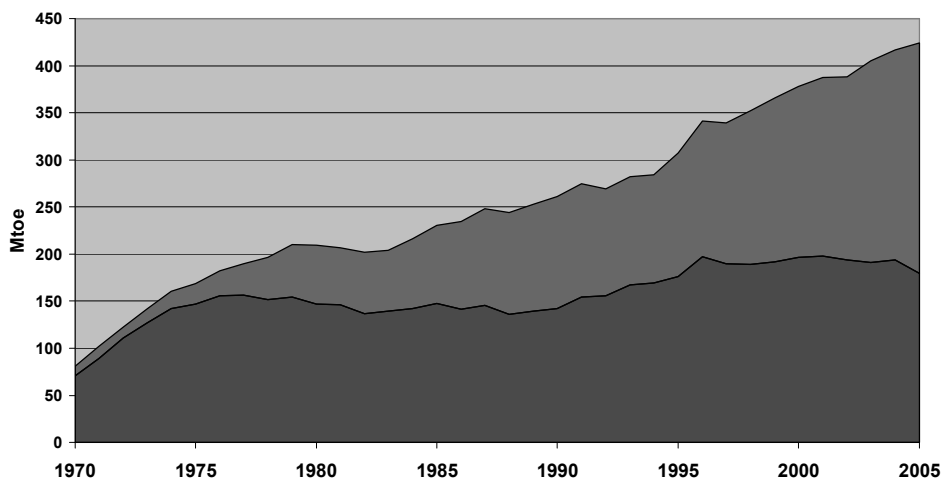
Union signed the construction agreement in June 2006 in Vienna. Construction on the project at an estimated 4.6 billion Euros is expected to begin in 2008, with the first gas flowing in 2011. Its capacity will be to transport 30 billion cubic meters of gas from the Caspian region to Central Europe per year. To some extent, it is a parallel project to the BCT oil pipeline (see above).

Major Contours of the Nabucco Project



The situation with respect to natural gas is clearly the most critical due to the fast rising share of gas in Europe's energy supply, its fast rising dependence (see graph below) and the heavy reliance on one single importing country.

European Gas Consumption and Production (1970-2005)



Source: BP [2006].

3. The Risk Management Approach to the Security of Energy Supplies

This chapter develops a conceptual framework for approaching issues relating to the security of energy supplies. It is built around notions of flexibility, diversification, responsiveness, impact reduction, rather than an excessive focus on any single measures of risk. Although we will be talking about “measures of risk” for reasons of readability, it is essential to understand that the policy relevant parameters are the economic and social impacts of interruptions to energy supply (or the perceived threat thereof). This has four crucial implications.

First, the absolute reduction of individual risk parameters – however eye-catching, media-friendly and desirable in their own right – are of limited interest (say, “How can the EU improve Russian energy policy-making?”). What is important is their impact on the ground in the interplay with other risk factors. An important issue is thus the question, how do different dimensions of risks balance each other out? Let it be said right away: the market – to the extent that it is liquid, transparent and competitive – is an excellent mechanism for pooling and redistributing different risks to supply.

Second, notions of “energy independence” are not only obsolete they can be dangerous. While no one seriously advocates absolute energy independence, decreased energy dependence (occasionally equated with the political or military control of resources) is still considered a positive thing. On the first level of analysis, this implies paying the opportunity cost of not participating in the international division of labour in the form of high prices, high environmental pollution or both. On a second level of analysis, this implies a self-centred inward-looking attitude willing to invest politically (or even militarily) in securing scarce resources. Such a race for resources would squander the rents of natural resources available to producers and consumers.

Third, high prices are not the problem, but large and sudden price increases and physical interruptions are the problem. Much desired high economic growth inevitably means higher energy prices (nobody will want a repeat of the Asian financial crisis that did wonders for energy prices). In an interconnected economic world, one country’s growth cannot be separated from another’s. Neither can one country’s energy demand and its impact on prices be separated from another’s. Focus should be on the transparency and liquidity of the market, which limits the scope for any single information affecting prices and on the security of physical supplies through strong contractual frameworks. Energy taxes, while raising end-use prices, can also shield consumers from variations in wholesale price. The *volatility* of prices instead (as opposed to their level) can skew investment choices and constitute a barrier to the entry of technologies with high fixed costs such as nuclear energy.

Fourth, manage expectations and perceptions as well as facts. Things need to be put into perspective both with respect to time and with respect to economic impact. The greatest disservice politicians did for nuclear power was to hold out the expectation it would produce power “too cheap to meter”. Energy has a cost and will always have; given that increasing growth and demand will progressively exhaust cheaper deposits prices will rise – the faster we grow, the faster energy prices will rise. As long as private economic agents are prepared for this fact of modern economic life, they can begin to deal with it.

When operationalising the risk management approach...

Let us begin with notions the risk management approach to energy supplies should *not* include. Traditional definitions of energy supply security combine a short-term notion of the continuity of physical supplies with long-term notion of “affordable” prices, “competitive” prices” or “adequate prices”. More modestly many economists would settle for prices corresponding to long-term average cost. The difficulty is that these are almost impossible to ascertain in varying technological and geological conditions. In addition, the factor time has an enormous influence on these notions. For practical purposes, it is often useful to take market prices as the real marginal cost of supply including any risk premia due to political, technological or commercial uncertainties.

In addition, there is the issue of resource rents. Observers often distinguish between “legitimate” differential or Ricardian rents due to different extraction cost and “illegitimate” monopoly rents. Again, the notions are very difficult to separate and can be the source of endless disputes. The issue of rent distribution should clearly be left to the private negotiations between supplier countries and investors. For importing countries to raise issues of “open access” can only induce supplier companies to become more defensive, closing themselves to the foreign investment and technology they need as desperately as the rest of the world needs their continuing supplies.⁶

The risk management approach to the security of energy supplies argues that supply security is an issue dependent on the risk-adverseness of consumers, which varies widely between countries. Other things being equal, American consumers prefer lower prices and relatively higher risk, whereas European customers prefer higher prices and relatively lower risk. Its focus is thus not the absolute level of energy prices but the size and impact of changes in energy prices. Obviously, such an approach implies managing the risk all along the supply chain in its different dimensions:

- Supply/production (geopolitical, regulatory and technical risk);
- Transport (safety and technical, risk);
- Distribution (regulatory risk);
- Consumption (price and environmental risk);
- Waste disposal (technical and regulatory risk).

Let it be said, no approach can completely prepare for all circumstances. “The unexpected happens.” No policy is immune from natural disasters such as extreme weather events or political upheavals.

In the perspective, protect risk-adverse energy consumers from unexpected changes, an energy system shall be judged by its ability to withstand shocks and to adapt; the resilience (flexibility, elasticity) of the system thus becomes key. Response options that can be drawn upon for different time horizons such as emergency response systems consisting of physical stocks as well as financial funds must be created to be drawn upon in times of crisis. **Most importantly, a framework for insurance and for allocating risk efficiently between private players (quantifiable risk) and**

⁶ One should not be too concerned with announcements of producer countries of voluntary restraints in production levels in order to maximise rents in an inter-temporal dimension spanning several decades such as in the case of Qatar. More often than not, such announcements hide difficulties to expand production. Even if they are genuine, it is far from obvious that such production constraints constitute a winning strategy considering the vagaries of demand, technology choice and prices over such long timeframes. Since Aristotle defined the capacity to transfer wealth through time as one of the key attributes of money, financial instruments and their ability to participate in economic growth over time are frequently the best means to maximise wealth inter-temporally. What importing countries should be concerned about, however, is the Dutch disease syndrome of economic boom and bust. Institution-building and financial advice on recycling funds, much of it in exports from highly developed oil importing countries, must thus be of concern to the latter.

public players (non-quantifiable risk or uncertainty) must be created given that markets cover risk very well and uncertainty very badly.

Energy supply security in fact is very close to the notion of the “sustainability” of the energy system. In conformity with the precautionary principle, investing in supply security implies to incur current costs in order to avoid greater future cost. Country-specific or regional risk preferences determine the trade-off, e.g. ceteris paribus North American consumers will prefer higher risk and lower prices, European consumers would prefer lower risk and higher prices. The insurance idea is so important because investments in the production, transport and consumption of energy are very long-term in nature and thus impose by default a low degree of flexibility and a high degree of intrinsic investment risk. In addition, much of the energy sector is built around networks. Thus, single technical defaults will affect very large numbers of users. This reinforces the demand for active, forward-looking, even if costly risk management.

Concretely, we can enumerate three categories of policy instruments that can be useful to manage or mitigate supply risks over different time horizons:

1. In the short term, physical stockpiles and interruptible contracts for especially prepared consumers (that are rewarded by lower prices) are useful. Technical cooperation on production technologies, protection of supply routes, as well as most of the concrete proposal to improve the European security of supplies presented in Chapter 6, fall into this category.
2. In the medium term, fiscal instruments can be useful to manage demand and to tip the terms of trade. However, there are tradeoffs. High energy taxes have a price in terms of economic efficiency (this becomes less important if other distorting taxes such as corporate taxes can be reduced due to higher energy taxes).
3. In the long term, technological and geographical diversification of suppliers is the best hedge against supply risks. Infrastructure projects such as the BTC or Nabucco pipelines are necessarily part of such diversification.

...think also of safeguarding viable global energy markets...

At all times, safeguarding and expanding liquid and transparent energy markets must be of primary concern to policymakers. As pointed out above, markets are excellent at managing quantifiable risk. They rely, however, on governments to provide insurance for non-quantifiable risk and for establishing the frameworks (e.g., physical safety and sanctity of contracts) in which they evolve. Unfortunately, the existence of such frameworks cannot be taken as a given in all parts of the energy world and multilateral support for them must be created wherever possible. Bilateral co-operations and contracts are in no way counter to this observation and are necessarily part of a global network of functioning energy markets. However, no single bilateral relationship should be allowed to take precedence over the working of the system as a whole.

At the sale time, there is no insurmountable opposition between bilateral and multilateral approaches, or between “contract” and “competition”. Bilateral contracts between individual parties are the essence of any functioning market. Without taking a contribution to energy policy-making too far into the realm of economic theory, it might be worth recalling the two conditions identified more than a century ago by Edgeworth allowing a system of bilateral contracts to develop into a competitive market: contracts must be “divisible” and it must be possible to “re-contract” them. There is, of course, ample reason to assume that in the energy world those conditions are not fulfilled. (1) Indivisibilities in the construction of projects, each one of which might have features

peculiar to itself, prevent the size of contracts falling very low. (2) Gaps in information, transaction, geopolitical concerns and commercial rivalries prevent re-contracting. Size per se, however impressive from the point of view of everyday experience, is not a critical issue. In policy terms, the second point is the more important one. For a functioning market to exist, each buyer (seller) must find himself confronted with a multitude of other potential sellers (buyers).

Again, the point is not that such well functioning energy markets already widely exist. The point is that Europe and the world have everything to gain in moving towards them by making the terms of contracts as transparent as possible (for instance, through international agreements on disclosure), working wherever possible with open tenders etc. Bilateral contracts (between China and certain African states, Europe and Russia, the United States and India...) do not need to be signs of a dysfunctional energy world if they inscribe itself into a commercial, non-exclusionary logic. They can become a threat to the working of the global energy system if they explicitly aim at excluding third parties and mix commercial logic with political logic.

...most important, however, is to create a strategic consensus at the European level.

From a theoretical point of view, any desired level of stability of energy supplies can be achieved in the long run; the question is “at what price and at which environmental costs?” Europe could easily cover its electricity production by a mix of nuclear, carbon and renewable energies without relying on natural gas. Attractive mass transport options and bio-fuels could eventually substitute for oil imports. Clearly, this would entail at the current stage of technological development unacceptable economic costs. So why pose the question? Because the key challenge in Europe is to make the *political* choices between the competing objectives of security of supply, environmental objectives and cost minimisation. The current focus on improving is too much informed by trying to avoid these choices. Energy efficiency is the result of an aggressive high-price energy policy; it cannot substitute for such a policy by itself. The EU Commission’s *Green Paper* of March 2006 is an important document making a number of useful proposals. Its silence on energy prices, however, confines many of its pronouncements to the status of items on a wish-list rather than the status of objectives of a coherent strategy.

Before European energy policymakers proceed to formulating more proposals (even those contained in this paper), they must come to terms with the internal contradiction that today is at the heart of the unease about the energy policy drift in Europe. They first need to state that wanting to save substantial amounts of energy requires higher energy prices. In a second step, they need to explain how to organise the importation of the large quantities of oil and gas that will be necessary for the foreseeable future even under the most optimistic assumptions.⁷

The key challenge European energy policy making today is to educate the public about the necessity to make choices, about the inevitability of trade-offs and to build consensus around these choices. Once this consensus has been forged, a number of concrete options to improve the security of supply will be at their disposal.

⁷

The hope for a technological solution that will avoid hard choices is misplaced. What is most remarkable about energy markets is the fundamental stability of technologies and their inability to transform the energy sector. With the exception of the combined-cycle gas turbine, the energy technology world of fifty years ago is not fundamentally different from ours today.

4. Developments Likely to Impact EU Security of Energy Supply

The following chapter will briefly review developments in three key regions, Russia, OPEC and the Middle East and the United States, that are likely to affect the security of European energy supplies in the medium term (the next five to ten years).

4.1 Russia – Merits and Limits of a Special Relationship

Russia is Europe's main supplier of both oil and gas. The EU-Russia relationship is such of great importance to the European energy security. The important question, however, is whether this relationship (important as it is) should insert itself into a global commercial logic, in which each side is free to look for the best deal available, or whether it should link the two partners in a binding long-term agreement. This paper argues that the first solution is largely preferable. While Russia is Europe's neighbour and deserves every attention as well as every technical and institutional help it is willing to accept, the energy relationship between the two blocks should be based on a sound commercial rather than a political basis.

The reasons for this choice are not necessarily the obvious ones. The dispute between Russia and the Ukraine of Winter 2005-06, unsettling as it was on a symbolic level, lead only to a minor shortfall of 100 million tonnes, which corresponds to a difference in demand due to a temperature change of 2 degrees Celsius on a single day (Ladoucette [2006], p. 4). Those who like to see the interruption (together with the three-day shut-off of the Drushba pipeline in January 2007) as a sign for increased Russian unreliability or politically motivated blackmail should consider that the current dependence is mutual. Gas exports to Europe constitute 70 per cent of Gazprom's revenues (Finon and Locatelli [2006], p. 8).

No the real reason to advocate a market-based approach to energy-relations with Russia are different. The energy world is changing. By the end of the decade, Russia will be able to export gas to East Asia and Europe will be able to import gas from Central Asia, Iran and Iraq. New centres of supply and demand have emerged and demand to be integrated into world economy. The fast-rising share of LNG transported by tankers further transforms the gas market from a logic of long-term bilateral relationships to a logic of multilateral market relations. So much the better. Contrary to popular opinion, which sees Russia's recent actions on the gas market as politically motivated, they are rather the sign of a transition from a political logic (subsidised prices to friendly nations such as Byelorussia) to a commercial logic (the opportunity cost for a cubic metre of gas is its world market price).

Of course, this transition is messy and marred with mistakes. In addition, Gazprom currently still exercises some limited monopoly power with prices in Europe being slightly higher than, for instance, in North America. Gazprom also has an aggressive strategy of downstream diversification in gas marketing and distribution in Germany, Austria, Estonia, Hungary Italy, Latvia, Lithuania, and the UK mostly through sizeable minority stakes or through 50-50 joint ventures such as in the case of Wintershall (*ibid.*, p.12f). Events like these should be closely monitored and any attempt to monopolise gas distribution in a single European country should be resisted by European cartel authorities.⁸

⁸

The idea of a single-buyer model to transform Gazprom's unilateral monopoly into a bilateral monopoly is also theoretically interesting. In practice, there are questions see how such a model could work in conjunction with the ongoing liberalisation of the European gas market. Internal transaction costs would be high and Europe would do better by increasing competitive pressures through alternative supplier routes such Nabucco or LNG.

In addition, the much-vaunted Energy Dialogue with Russia brought little concrete advances beyond substantial technical help through the TACIS programme. There is now talking of a new Framework Agreement. Of course, this is a good idea – as long as it does not impede the commercial flexibility of both sides concerned. However, beyond the diplomacy a far weightier issue looms. Will Gazprom be able to sustain all by itself Europe's increasing demand for natural gas, in particular if China and Japan will be able to draw on Russia's production? The problem is that Russia's production is not increasing fast enough. Gas prices (including VAT) in Russia to both residential and non-residential consumers vary between 35 and 70 USD per 1 000 cubic metres depending on the administrative zone. Compared to a world price of around 235 USD per 1 000 cubic metres this amounts to subsidisation rate between 70 and 85 per cent. Run-away domestic gas consumption is today Russia's (and with it Europe's) biggest energy problem. Europe should assist Russia with policy and technical advice to solve this problem.

Of course, there are also legal and institutional issues involved. The recent eviction of Shell from the Sakhalin II project poses a worrying precedent. Europe must insist that this is bad policy for Russia, Europe and (in the gas of oil) the world. There are legitimate doubts that Russia can increase its oil and gas output much further without making its sector much more open to foreign direct investment. Oil output growth per cent, for instance, has slowed markedly during the last few years despite a doubling of real world prices and oil exports even *declined* in 2005 according to official figures (Ahrend and Tompson [2006], pp. 11 and 40).⁹

Clearly, the perceived insecurity of property rights (compounded by insecure production licenses) – whatever its legal, political and historical legitimacy -- did nothing to encourage long-term investment. This weighs in particular on new exploration that is now short of production replacement levels. An additional issue is the new tax system introduced in 2002, which taxes physical production rather than profits. While this allows limiting the extent of tax evasion through skewed transfer pricing, it also limits companies' incentive to invest in less profitable production in lower margin fields thus restricting supplies (*ibid.*, 23f).

What happens in Russia remains important. Much has been made of the future role of countries surrounding the Caspian Sea as alternative suppliers to Russia. One should not forget that Russia still produces three quarters of total oil output and exports of the Community of Independent States (CIS) with Kazakhstan making up most of the rest. Azerbaijan, Turkmenistan and Uzbekistan produce *together* one per cent of global production.

They play, however, an increasingly important role in offering with the organisation of their oil and gas sectors to some extent an alternative vision to the heavy-handed command and control structure of Russia's energy sector. Kazakhstan in particular has attracted large amounts of foreign direct investment and *tripled* its oil production from 20 to 60 million metric tonnes. It has also opened up its gas sector (the Tengiz, Kashagan and Karachaganak fields) to foreign direct investment. Nevertheless, it has also begun to vertically integrate the sector by merging the state oil and gas companies with the national transport company to form the national energy giant KMG. Another example is Azerbaijan, which contrast the slowdown in Russia's production growth contrasts with a doubling of its production between 1997 and 2006 (from 10 to 20 million metric tonnes) largely due to the signing of over 20 production agreements with 30 companies from 15 countries. The opening of the BTC pipeline has given an added boost to Azerbaijan production.

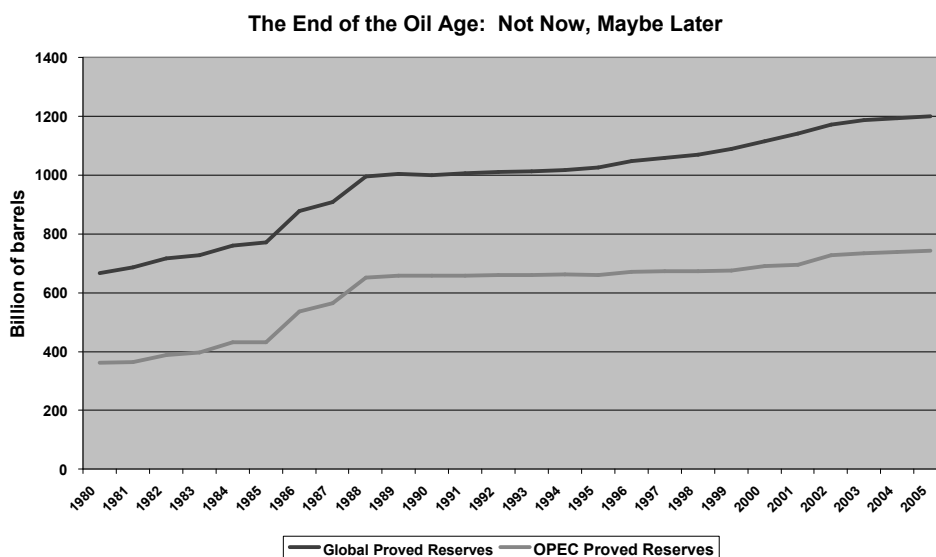
⁹ Nevertheless, one should keep in mind that Russia increased its output between 1995 and 2006 from 300 to about 470 million metric Tonnes in 2005).

To round out the picture, oil production in Turkmenistan and Uzbekistan, where hydrocarbon resources are tightly controlled by the government, *declined* since 2002. Nevertheless, they remain active players. In April 2003, and Turkmenneftgaz (the Turkmen national gas company) signed a large 25-year gas purchase agreement Gazprom. Under this agreement, Gazprom buys 50 bcm in 2006 and 60 bcm in 2007. As indication of the order of magnitude, this corresponds to 50 per cent of Russia's exports to Europe and almost all of the Turkmen gas produced. Clearly, this strengthens Gazprom's position *vis-à-vis* Europe by cooperating with one of the major alternative suppliers. However, not all the cards are in Gazprom's hand. Turkmenistan has in the last few years aggressively pushed for higher prices (now around 100 USD per 1000 cm), about half the level of the world market and double the price of gas on Russia's domestic market.

In the end, Russia is an important player in the world of gas and oil, but its power to determine price should not be overestimated. It is very limited in the oil sector and ever less strong in the gas sector. Its transition towards basing decisions on commercial rather than political logic should be encouraged; its high-handedness regarding direct foreign investment should be strongly resisted. In the long run, the security of foreign direct investment is a much more important issue (for both Russia and Europe) than the issue of third-party access to gas pipelines (the signing of the Transit Protocol of the Energy Charter Treaty) that has made the headlines. To give way on the latter and to ask for solid guarantees for investment with international arbitration would be the EU's best negotiating stance in order to improve the security of its energy supplies.

4.2 OPEC – Still the Centre of the Oil World

Superficially, OPEC looks stronger than ever. Since three years, oil prices are above 50 dollars for a barrel of oil. Since the beginning of the year 2007, Angola has also become the 12th member of the cartel, which now supplies 52 per cent of the oil imports of developed countries – the highest share in five years. Experts agree widely that OPEC's share will rise rather than decline in coming years. Looking at the graph below, one can see that since 25 years most new discoveries of oil reserves have been in OPEC countries.



Source: BP (2006).

Looking closer, however, another picture emerges. Prices are set at the margin, which means the cost of the last, additional tonne produced determines price. If countries are producing at full capacity (which OPEC has in recent years) they have no longer any influence over prices. The oil price rises of the past three years happened entirely independent of any OPEC action, which agreed on production cuts only in the second half of 2006. The organisation initially had even feared a world economic slowdown due to higher oil prices and adjusted its original band of 25 to 35 dollars a barrel only several months after the price changes had happened.

The price rises were due to the ending of a twenty-five year investment cycle that coincided with a strong rise in Asian demand. This pushed global oil production to its capacity limit. Add a 10 to 20 dollar risk premium due to political and military instability and oil prices reached 78 dollars a barrel without OPEC ministers having to move as much as a finger.

Oil Proved Reserves in 2005		
	Billion barrels of oil	Per cent of world total
EU Countries of which	6.0	0.5
Denmark	1.3	0.1
Italy	0.7	0.1
United Kingdom	4.0	0.3
Europe and Eurasia of which	140.5	11.7
Kazakhstan	39.6	3.3
Norway	9.7	0.8
Russia	74.4	6.2
Middle East of which	742.7	61.9
Iran	137.5	11.5
Iraq	115	9.6
Kuwait	101.5	8.5
Saudi Arabia	264.2	22.0
United Arab Emirates	97.8	8.1
Africa of which	114.3	9.5
Algeria	12.2	1.0
Libya	39.1	3.3
Nigeria	35.9	3.0
North America of which	58.5	5
Canada	16.5	1.4
Mexico	13.7	1.1
United States	29.3	2.4
South America of which	103.5	8.6
Brazil	11.8	1.0
Venezuela	79.7	6.6
Asia Pacific of which	40.2	3.4
China	16.0	1.3
Total World	1200.7	100
Source: BP [2006]		

The impacts of political and military conflicts on oil production and prices are both direct and indirect. For instance, in the wake of the US invasion of Iraq, production capacity fell to around 2 mbd (from a peak of 4.5 mbd). More indirectly, we can list the lack of a solution to the conflict between Israel and Palestine, the clash between Hezbollah and Israel in Lebanon, the tension surrounding Iran's nuclear programme, the ongoing tensions in countries such as Saudi Arabia, Egypt and Nigeria, the civil war in Sudan as potential sources for major crises affecting oil production and prices. The relationship is mutual. Oil and the wealth that comes with it are not only affected by these conflicts. In several cases, the control of these resources is one of the issues that complicate solutions to conflict and retard social evolution.

Slowly however, new supplies are coming on stream. Experts estimate the amount of new production capacity currently being built between three and four million barrels per day. That is a substantive increase, easily capable of making a difference. OPEC is well aware of this fact. Its decision, to cut production by 500 000 barrels a day

(about 2 per cent of its total production), beginning in February 2007, is its logical response. The question is (a) whether its members will actually abide by the officially agreed cuts in practice and (b) whether the announced amount is large enough to make a difference. Traders do not seem to think so, since prices have fallen further since the announcement.

Second, more member means more instability. A cartel's power to set prices is only as strong as the discipline of its members to adhere to officially agreed production cuts. That discipline is more difficult to enforce among a larger, less cohesive group of countries. It is open to question whether Angola's producers (currently at 1.5 mbd but expected to increase to 2 mbd by the end of the year) will actually abide by the country's official OPEC quota that, by the way, still needs to be agreed upon (FT, 3/1/07, p. 4).

Despite these factors, OPEC remains at the centre of the oil world and thus the centre of the energy world. The table on the preceding page shows that OPEC controls roughly two thirds of global oil reserves, up from roughly half only in 1980. Overall, global reliance on its resources will thus increase. This does not necessarily mean that OPEC's pricing power will be restored over the medium-run. OPEC countries have not been very dynamic in expanding oil production, partly because of their wariness to attract foreign direct investment and the technological and geological expertise that comes with it. Other regions such as the countries of the Caspian Sea, East Africa, Mexico and Canada have stolen some of the limelight recently. In addition, the OPEC countries receive almost all of their foreign exchange from the oil trade, which makes them vulnerable to price changes. Nevertheless, geology is firmly in OPEC's favour. Its future role, however, will depend on its ability to cooperate with the oil and gas companies of the developed world in order to unlock the energy resources nature has such abundantly provided them.

4.3 The United States – Big Boats Turn Slowly

In recent years, the federal government of the United States has been through a series of high-profile announcements heralding major changes in US energy policy. While announcing the "hydrogen economy", the "alternative fuels initiative" and tackling the "addiction to oil" have failed to make a lasting impact on the ground, they are nevertheless testimony to the fact that energy is high on the lists of priorities of the US government.

For the time being, the United States are the still the world's biggest energy consumer (and carbon emitter), its biggest energy producer and incidentally the world's third greatest oil producer *and* its greatest importer. With five per cent of the world's population, it produces 20 per cent of global energy resources and consumes one quarter of them with a corresponding share of greenhouse gas emissions (see table below). Mechanically, the US economy is thus much more energy-intensive than the comparable economies of Europe, Japan or China. While size, population density and climate can explain part of the difference, the main reason is price. Nominally, taxed end-use prices for energy in the United States, most notably for oil products such as gasoline, are a fraction of those in other developed countries.

Global Blocks in Comparison			
	USA	China	Europe
Population	290	1 280	470
Share of global	5 %	21 %	7 %
TPES (Mtoe)	2 300	1 180	1080
Mtoe/capita	8	1	4
No. of vehicle (million)	220	13	229
Oil consumption (Mbd)	22	5	13
Oil import ratio	50 %	50 %	77 %

Source: CGEMP (2006).

While the US government has generously funded research for new technologies such as biofuels, carbon sequestration and “clean coal” technologies and while the 2005 Energy Act contains substantial subsidies for a new generation of nuclear power plants, the government has so far fiercely resisted any attempts to use fiscal measures. Its refusal to sign the Kyoto Protocol and committing itself to limiting its greenhouse gas emissions by pricing them through a carbon market, equivalent to the European Emission Trading Scheme (ETS), is part of the same policy stance.

More surprisingly, the US government has so far also resisted any tightening of that centrepiece of US energy policy, the Corporate average fuel economy (Cafe) standards, which specify the average efficiency of cars sold in the United States for producing companies. The official reason that a stricter Cafe-standard would penalise already fragile US producers at the extent of Japanese or European producers is obvious. However, low Cafe-standards have also retarded necessary adjustments and contributed to the declining attractiveness of American cars for evermore price-conscious consumers. For let it be said, low gasoline prices may be attractive to consumers at first sight, but they also expose those same consumers much more directly to swings in underlying oil prices, while the high fiscal component of gasoline prices largely shields European consumers from these swings. Unsurprisingly, even 74 per cent of Republicans are now in favour of higher Cafe-standards (FT, 3/1/7, p. 3).

Despite the discouraging slowness of the American government in following up its grand announcements with decisive action, it would be wrong to describe the US situation as a standstill. The initiative on new nuclear energy has already been mentioned. It is seconded by the decision to create a deposit for the long-term storage of spent nuclear fuels at Yucca Mountain, Nevada. This puts the United States ahead of almost all other industrial nations, exceptions are Finland and Sweden, in finding a solution to the vexing issue of nuclear waste. Regional initiatives (California and the Northeastern states), a series of corporate leaders (most notably in the financial industry), public opinion (influenced by Al Gore’s movie “An Inconvenient Truth”) and political initiatives (the only narrowly defeated McCain-Lieberman Act) all build pressure for action on climate change. It is likely that the United States will see a federal limit on greenhouse gas emissions before the end of George Bush’s second term. The “Energy Security Leadership Council”, a high-profile group of industrialists and retired generals, called at the end of 2006 for increasing Cafe-standards.

Big boats turn slowly and in energy terms the United States is a very big boat indeed. Nevertheless, there are a number of concurrent signals, of which even the rhetoric of the current administration is part of, that for reasons of environmental concern, economic efficiency and national security a consensus is forming that cheap, unlimited energy consumption is no longer as central to today’s “American way of life” as it was in the past. If this reading is correct and the different tendencies gather force, this would have an enormous impact on global energy markets in the medium-term. While it is too soon to predict the magnitude and even the nature of the ongoing ground-shift, the authors of this study are convinced that developments in the United States are the single most important factor impacting European (and global) security of tradable energy supplies.

5. Tension in European Power Markets

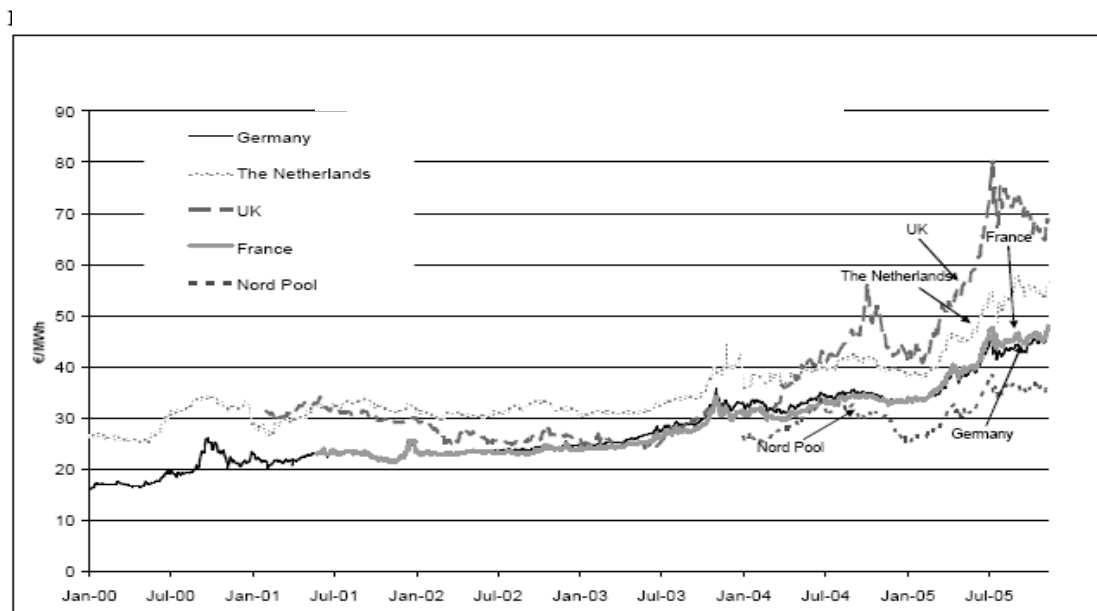
The following chapter will briefly review the situation on Europe's electricity markets with a special focus on nuclear energy. Electricity is the largest energy-consuming sector of the European economy and the one where gas demand is growing the fastest. It therefore deserves some attention.

Tension on European electricity markets is increasing. The simplest indicator is the increasing number of blackouts that Europe has been experiencing in France (1999), London (2003), Denmark and Sweden (2003), Italy (2003), Greece (2004), Spain (2004) Germany (2004) and Western Europe (2006) (Ladoucette [2006], p. 5). This can be explained. Despite an increase in investments, electricity demand continued to outstrip supply in European markets. The standard measure is the capacity margin.

$$\text{Capacity margin} = (\text{Installed capacity} - \text{Peak demand}) / \text{Installed capacity}$$

The average capacity margin in the UCTE region was 4.8 per cent in 2005, down from 5.8 per cent in 2004, which was already a historic low (Capgemini [2006], p. 3). This trends masks great variations in different European countries. In Ireland (21 per cent), Portugal (four per cent) and the United Kingdom (one per cent) capacity margins have improved due to massive investments in power generation of 35, 13 and nine per cent respectively. In Spain instead, the capacity margin decreased by four per cent, despite a capacity increase of 5.5 GW, or eight per cent of total capacity. France, Belgium, Greece and Hungary also remain in fragile equilibrium having depended on imports for more than three months in 2005 (ibid.).

Wholesale Electricity Prices in Europe on the Rise since 2000



Source: information received within the scope of the sector inquiry from Argus Media, platts, and Nord Pool.

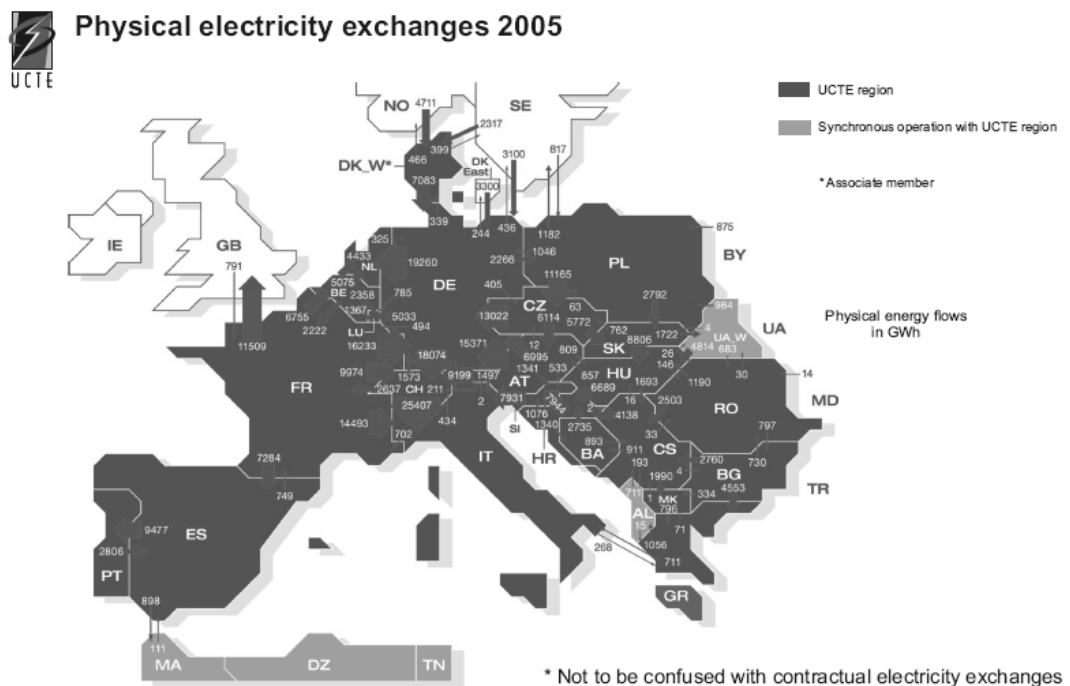
Source: European Commission [2006]

Partly, the factors explaining these imbalances are transitory such as the fall in French power production in early 2005 and in late 2005- early 2006 due to low hydropower reserves during two severe winters. It is unsurprising that under these conditions electricity prices have increased strongly in recent years (by about one-third each year since 2002), a tendency that was reinforced in January 2005 by the European system for CO₂-emissions trading the ETS (see graph below).

Of course, there is no reason why exports and imports should perfectly balance out on a country- by country-basis in an integrated European electricity market. German investments of 16 GW in wind energy and chronic under-capacity in Italy have lead to massive North-South flows of electricity since 2004 without notable impacts on the security of energy supplies (see Keppler [2005a]). In addition, the French situation should improve due to the realisation of 5 GW of planned investments in Combined-cycle gas turbines and the European Pressurised Reactor (EPR) in Flamanville (see Keppler [2006b]). The two key issues are (1) the average capacity margin at the European level and (2) the availability of adequate interconnection capacities between European countries, such that European solidarity through a common market can become a reality.

While internal European electricity trade has steadily progressed over the past five years (see graph on next page), it is still below the average level of 10 per cent of consumption advocated by the Commission. The initiative of the European Commission to press for adequate power infrastructures (EC [2007], p.9) is thus timely and highly welcome. Its key elements are:

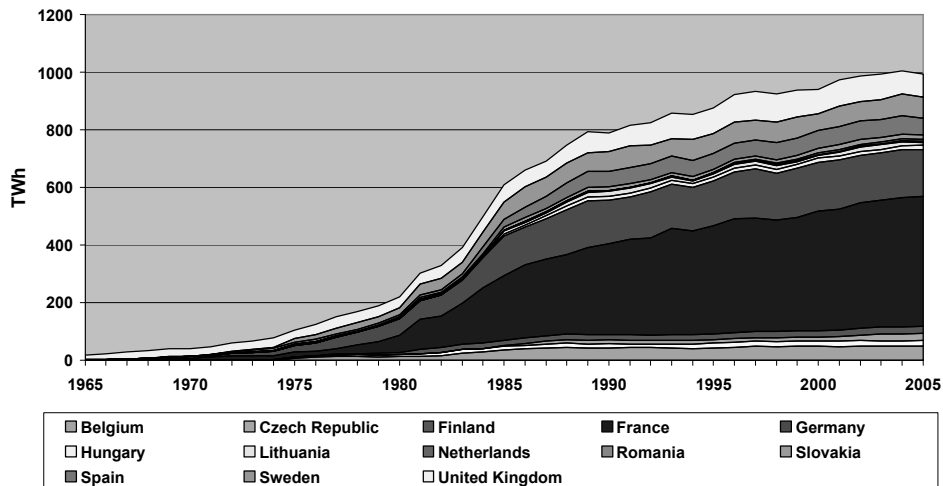
1. Fully linking the electricity grids of Germany, Poland and Lithuania;
2. Substantially expanding the interconnection between Spain and France;
3. Establishing a new Community mechanism for harmonising the technical standards of networks and their operation.



Source: UCTE [2007]

Two key issues for the security of European energy supplies in the electricity sector are the question of nuclear energy and the financing of future investments. As we have seen in Chapter 2.2, Europe's gas demand is driven primarily by the favourable economics of Combined-Cycle Gas Turbines (CCGTs). In a carbon-constrained world, in which the European countries are committed to reach their Kyoto targets (a reduction of eight-per cent below the level of 1990 emissions), an increase of coal-fired power generation is not a viable option. The only real alternative is nuclear power generation with renewable playing an important but not decisive second role.¹⁰

European Nuclear Energy Consumption (1965-2005)



Source: BP[2006].

Contrary to popular opinion, the use of nuclear power has *increased* rather than decreased in recent years (see graph above). A number of positive factors encouraging the use of nuclear have also overcome the stagnation of the industry after the announcement of the phase-out of nuclear power in Germany:

- Rising gas prices have heightened security of supply concerns and make nuclear more competitive;
- Renewable energy sources are still too expensive to provide credible alternative, while nuclear power saves more than 300 million tonnes of CO₂ (eight per cent of the EU total emissions); the EU's commitment to the Kyoto Protocol limits upward potential of coal.
- The decision of Finnish TVO to build new reactor in Europe demonstrates economic competitiveness and demonstrates innovative management of economic risks; France also builds a new European Pressurised Reactors (EPR) with several European partners;
- Fast-growing Chinese electricity demand creates demand for nuclear technology exports; while in the United States the 2005 Energy Bill provides insurance, subsidies (2.5 cents per kWh for new nuclear plants) and waste disposal (Yucca mountain);
- There is greater realism and less emotion in the European debate on nuclear energy.

Nevertheless, nuclear energy remains hampered by the fact that its high fixed cost component penalizes it heavily in the eyes of private investors in the volatile price environment of liberalised

¹⁰ Renewable energy has some very impressive successes, most notably the installation of 16 GW of wind-power in Germany. However considering the cost (more than three billion Euros per year) and given the facts that other technologies are even more expensive and that large hydropower sites are exhausted, the proposal of the Commission to have 20 per cent of power generation based on renewable energies (up from 15 per cent today) sounds like a very expensive proposition for European tax payers.

electricity markets. Long-term producer-consumer consortia must be part of any revival of nuclear power in Europe. In addition, the waste disposal issue must be solved on a European level. Collaboration with Russia that possesses the required geographic and geological conditions on this issue could be a win-win proposal for both parties.

Finally, the issue remains how Europe will generate the funds for investments of 1 400 billion Euro until 2030 in electricity markets, three quarters of it in generation capacity (Baseline Scenario of the EU DG TREN). Current market conditions incite actors to postpone investments rather than aggressively promoting them for two reasons. First, the price volatility raises the implicit rate of return of investors. With inelastic demand in electricity markets, existing producers have every incentive to create a structural under-capacity. Substantial fixed costs that relate to conditions for network access, risk diversification and the combination of technical and financial know-how required in modern electricity markets hamper newcomers. In the absence of European regulator, there is little chance that the situation will change rapidly.

6. Strengthening European Foreign Policy in the Energy Field: A Catalogue of Concrete Measures Improving the Security of European Energy Supplies

For the sake of the security of its own energy supplies, Europe must work to improve the multi-lateral energy trading system and actively promote free, liquid and transparent international energy markets. There is no harm in bilaterally acknowledging mutual interdependence and in agree on common projects. However, such bilateral cooperation must not stand in the way of the working of global energy markers, in which each country and each company may act as an independent profit maximizer.

Wherever possible, the interdependencies between foreign policy and energy policy should be carefully and conservatively managed. Energy will not be “just a commodity” for many years to come. Yet the more normal it is, the more beneficial it will be for all involved. Europe should resist resource nationalism. However, it should not do so on moral, legal or political grounds. Every effort has to be made in explaining that retreating into exclusive bilateral agreements constitutes a sub-optimal solution for both exporting and importing countries. Fortunately, resource nationalism is much less virulent in practice than in rhetoric. Most exporters quickly realise that gaining revenues by exporting their resources is still the best strategy to promote the national interest. In the long run, economic logic naturally wins. In the short-run, however, resources nationalism can constitute a dangerous distraction.

Europe should also acknowledge the limits of bilateralism and “neighbourhood policies” that reach as far as the Western border of China.¹¹ The new Europe requires a more open and more realistic approach. Europe, important as it is, will not sway on its own the countries of Central Asia locked between Russia and China, one way or another. At the same time, Europe should continue to offer technological, financial and institutional freely. Frequently exporting countries, especially smaller ones, are in dire need for it. It is not a coincidence that most of the world’s energy resources come from politically and economically unstable regions of the world. The role of such help is not to advance “influence” but to stabilize vital trading partners. The “resource curse” is not an invention of Malthusian prophets of doom. Too often resource-rich countries adopt rent-skimming behaviour instead of developing productive competitive advantages undoing the social and political fabric in the process. Ultimately, they often fare less well than their resource-poor neighbours do over the long run.

Agreeing on such a radical commitment to an open, market-driven approach would lay the basis for a more secure energy world in the future. It would also contribute to the rationalization of an energy debate that remains too often clouded by superficial pronouncements of “shared responsibilities”. While there are shared responsibilities for securing international energy markets, ensuring its position in international market is a matter of each independent actor: Russian gas exports to Asia are as legitimate as European gas imports from the Middle East. The introduction of moral categories in energy-decision making has only contributed to a deterioration of relations.

¹¹ Generalised bilateral initiatives (as opposed to co-operations on concrete projects) are of limited help at best and can be a distraction and a drain on scarce resources. The number of European “energy dialogues” is currently proliferating without tangible results. Other than the dialogue with Russia, the Commission entertains bilateral initiatives with almost every energy-producing country in the world. SEC(2007)12, a synthetic policy document for high-level decision-makers mentions Memoranda of Understanding with Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan, a Communication to the Black Sea Council, contacts with OPEC, the Gulf Cooperation Council, Latin America and the Caribbean and a special Africa-Europe Energy partnership. The problem, of course, is *not* that these initiatives exist as part of normal international relations. The problem is that these routine diplomatic exercises are currently at the heart of the European policy to safeguard energy supplies, an objective they simply cannot live up to.

A multi-lateral trading system is by far the most likely manner to produce benefits for producers and consumers. Partners in the process securing and strengthening the international energy trading system must be the United States, China, Russia and Saudi Arabia.

A coherent multilateral agenda in five points

Following a phase of excessive euphoria vis-à-vis the special relationship with Russia, European policymakers are now fortunately re-discovering the benefits of multilateral action. Five key elements in this process are:

(1) Continued involvement in multilateral organisations such as the International Energy Agency, the World Bank, the UNFCCC and the World Trade Organisation (WTO). Wherever possible, energy trade disputes should be integrated into the rule-based dispute settlement mechanisms of the WTO. The European Commission should make use of its well-established role and good contacts at the WTO to see to which extent this organisation is capable and ready to play a stronger role in the energy field. The Commission should also try to press for a global summit on the multi-lateral energy trading system.

(2) Europe's leadership in the Kyoto process and the creation of the European Emission Trading Scheme (ETS) for CO₂-emissions is one of the few policy successes of the European Union in the energy field recent years. Its potentially massive contribution to decarbonising the EU economy further and thus reducing dependence from imported hydrocarbons was not always sufficiently underlined in recent years. It is an integral part of an EU energy policy and must be part of any foreign policy initiatives in the energy field. Oil-based carbon emissions in the transport sector (both land and air transport) need to be included into the ETS as quickly as possible both for reasons of security of supply and for environmental reasons. Only with a coherent policy package will Europe be able to continue to exert the global leadership it has displayed in this narrow but symbolically highly important policy area.

(3) Of even greater importance though is the continuing improvement of the conditions for private investment in supplier countries. The European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD) are in their roles supporting energy infrastructures such as the Trans-Caspian energy corridor, including the Nabucco gas pipeline, and the project to link the countries of sub-Saharan Africa to the Mediterranean. More important, however, would be creating the legal and technical infrastructures to enable private investment. This is a task, however, that can only be pursued in cooperation with other major energy-consuming countries, most notably the United States, Saudi Arabia and China.

(4) Europe needs to stay involved in the process of the Energy Charter Treaty. Its focus, however, should switch from an emphasis on "third-party access" to ensuring the sanctity of private investments. While in principle desirable, in practice "third-party access" is an ill-defined notion given that a formal right to access is of little significance as long as the terms are commercially unacceptable. In addition, from an economic point of view, the ownership and use right of a pipeline need to be clearly linked to the incentive of building it in the first place. The Draft Transit Protocol is currently a stumbling block rather than a stepping-stone on the way to improved energy security for the European Union. Ensuring the ownership rights of private foreign investors in Russia and the Central Asian Republics is instead of the highest importance. Without firm property rights, there will be no transfer of the necessary technical and commercial know-how and future energy production will be less in quantity, more expensive and more environmentally damaging.

(5) EU participation in multilateral technical initiatives such as the World Bank's Global Gas Flaring Reduction Partnership (which has both an environmental and a security of supply aspect to it) and the Extractive Industries Transparency Initiative is highly useful. Such initiatives include support for the Financial Action Task Force (FATF) against money laundering as well as broader adoption by EU companies and banking institutions of the *Equator Principles* promulgated by the International Finance Corporation (IFC) promoting environmentally and socially sound investment. The European Union should continue its technical assistance to Russia, East European and Central Asian Countries through the TACIS program. One of the most interesting examples in this context is the Interstate Oil and Gas Transport to Europe (INOGATE) Program that aims at integrating, harmonizing and expanding the oil and gas pipeline system that connects Europe to suppliers in Eastern Europe, Russia and Central Asia as well as the 2004 Baku Initiative (see box below).

The Baku Initiative

The European Union represented by the European Commission's DG Transport and Energy, DG External Relations and EuropeAid Cooperation Office has initiated the Baku Initiative to establish and strengthen a policy dialogue with the countries of the regions of the Black Sea and the Caspian. It goes back to the Energy Ministerial Conference of November 2004 in Baku. Other than the EU, Armenia, Azerbaijan, Belarus, Georgia, Iran, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation (observer), Ukraine, Uzbekistan, Tajikistan, Turkey and Turkmenistan are members of the Baku Initiative. It receives secretarial support from the INOGATE Technical Secretariat Kiev. Its objectives are to contribute to the creation of "predictable and transparent energy markets, capable of stimulating investment and economic growth as well as security of energy supply for the EU and its regional partners." On a practical level, the Baku Initiative aims at:

- Harmonizing the legal and technical standards with the aim to create a functioning integrated energy market in accordance with EU and International legal and regulatory framework;
- Enhancing the safety and security of energy supplies, extending and modernizing existing infrastructure and implementing a modern monitoring system of their operation;
- Improving energy supply and demand management through the integration of efficient and sustainable energy systems;
- Promoting the financing of commercially and environmentally viable energy projects of common interest.

On a political level, the Baku Initiative also accompanies the construction of the Nabucco pipeline (see above).

A list of concrete measure Europe can take to improve its security of energy supply

On a more technical and concrete level, there exist a large number of initiatives Europe can take to improve the security of its energy supplies. The following list is not exhaustive, at this point, it is more important that readers gain an intuition for the direction of the policy shift advocated rather than that they adhere to any specific proposal. Nevertheless, each single proposal constitutes in itself a carefully considered option for improving the security of European energy supplies. In this spirit, Europe should

- a. Take the intellectual leadership in the debate and proclaim forcefully its adherence to an open international trading system. Europe should organise to this purpose a large international conference in which the contours of the existing trading system are underlined and strengthened.
- b. Convince consumer and producer countries that price and ability to pay must be the only criteria for access to precious resources and that an open trading system is the best manner to realise the totality of resource rents.
- c. Provide European actors, experts and decision-makers with the legal, technical, informational and economic infrastructure to participate fully in competitive global energy markets. The creation of a European energy information system is highly welcome in this respect.

- d. Convince European citizens that energy, like other goods, is for those are willing and able to pay for them. There is no escape from rising energy prices due to rising scarcity. Emphasise that rising global demand, the driving force behind higher price, is ultimately a good thing ensuring positive spillovers for everybody. This is the reason for the limited economic impacts of the high oil prices during the period March 2003 – June 2006. Obviously, such a stand does in no way preclude policies to assist the socially most vulnerable groups.
- e. Limit financial speculation by improving market transparency and the energy information infrastructure. While this does not constitute a hedge against permanently higher prices, it can limit speculative bubbles.
- f. Engage other countries in efforts to improve transparency and disclosure of financial flows arising from energy transactions.
- g. Build the credibility and enforcement capacity of international courts such as the Permanent Court of Arbitration, Geneva, or the International Court of Arbitration, London, in case of disputes in cooperation with other international partners.
- h. Promote European energy champions capable of competing in world markets. Energy is a risky, capital-intensive industry that requires sizeable players on either side of the bargaining table. Resist, however, the demand for protection from competition that will come inevitably from those champions and persist with internal energy market liberalisation.
- i. Promote interruptible contracts in energy markets through fiscal incentives. They constitute a vital buffering mechanism in times of crisis – for all forms of energy.
- j. Create a competent European agency for electricity and gas market regulation; coordination between national regulators is not enough; the added transaction costs are outweighing the gains from coordination.
- k. Deepen and broaden the Kyoto Protocol. Continue a forceful policy of reducing CO₂-emissions and expand the ETS to the transport sector. Independent of the environmental merits of this policy, it contributes to reduce the demand for carbon-intensive hydrocarbons. Such a policy demands creating links to other emerging trading systems, in particular the United States, and formulating as quickly as possible proposals for post-2012 policies.
- l. Create an emergency preparedness mechanism for physical interruptions of gas supplies such as it already exists for oil. In the same spirit, each Member country should implement minimum requirements for gas storage.
- m. Appoint a European energy coordinator for negotiations on external energy infrastructures such as the Nabucco project. Nabucco is a test case on how the EU can act concretely in large-scale technical projects.
- n. Facilitate the construction of two or three new re-gasification terminals to take full advantage of the developing LNG markets.
- o. Facilitate also the construction of one more refinery to help remove the global bottleneck in processing heavy and ultra-heavy oils. Such investments are large and risky. They would benefit from European co-ordination as well as public-private cooperation.
- p. Expand intra-European power networks to improve interconnections and flexibility. Insist forcefully on the creation of adequate interconnection capacities between European countries.
- q. Promote a frank and wide-ranging debate on the merits, costs and drawbacks of new nuclear power plants in the European Union. Organise as speedily as possible a European solution to the disposal of nuclear waste.
- r. Continue to fund research in clean coal technologies, carbon storage and nuclear waste disposal. There are large positive spillovers associated with each one of these technologies warranting public involvement.

7. Conclusion

This paper on “International Relations and Security of Energy Supply: Risks to Continuity and Geopolitical Risks” contained five main parts. In the first part, we described the current situation with respect to the continuity of European energy supplies. While putting recent events and price changes in perspective, the paper clearly confirmed the consensus that gas supplies constitute the most vulnerable element of its energy supplies. The reasons are (1) the important rise of gas in the European economy with its *increasing* gas intensity and (2) doubts about Russia’s ability (rather than will) to service European demand increases fully on its own while at the same time developing its Asian market.

In a second part, the paper provides arguments for an approach to the security of supply informed by the negative impacts of “energy insecurity” on private actors rather than by any pre-conceived notions of “dependence”. In the third part, we described key external developments having an influence on European energy supply security. While OPEC remains vitally important in the background, decisive variables in the short- to medium term are whether Russia will be able to reform its domestic gas sector and whether the United States will be able to formulate an energy policy capable of making a difference on the ground. Both developments remain possible, neither of them is certain. For its own benefit, Europe should assist Russia in the reform of its domestic sector without preconceived notions. A fourth part, identified the stabilisation of the European electricity sector as a crucial component of the security of supply. After years of successive drives of “liberalisation”, the sector still has not found a sustainable equilibrium. High profits are not leading to needed investment. Without a constructive and sustained effort, the electricity sector might yet surpass gas supply as the most vulnerable part of Europe’s energy system.

A final part, has listed a number of general policies and a long list of concrete proposals for improving Europe’s security of supply. The common thread that informs these proposals is the insight that strengthening of liquid and transparent international markets for energy markets and an acceptance of the international division of labour in this field are the best way to realise the full rents from nature’s riches for producers and consumers alike. European policymakers have two important tasks in the immediate future (1) formulate a consensus that balances the conflicting objectives of low prices, environmental quality and security of supply and being forthright about the link between energy efficiency and energy prices (2) take the intellectual leadership on the global scene in advocating a multi-lateral approach to open energy markets. Kyoto debate has shown what Europe is capable of if it proceeds on the basis of an internal consensus to careful coalition building and well-prepared action. Member countries, the European Commission and the European Parliament must now decide how to make progress on these two issues in the best possible manner.

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Annex

