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# Energy Security in the EU and Beyond

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# Contents

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## Abstract

Past episodes of energy insecurity have been fleeting and the fears have been assuaged by market forces or technical change. This paper analyses the nature of the EU's current energy security problems, emphasising the increased importance of natural gas and high level of dependence on Russian supplies through a small number of pipelines. Building alternative pipeline routes is expensive and with finite reserves in any gas field pipelines may be mutually exclusive; especially since China has entered the market for Central Asian gas, new non-Russian pipelines to the EU may not be economically feasible. However, global gas reserves are large, and high energy prices in the 2000s encouraged investment in alternative delivery modes, notable liquefied natural gas (LNG). As a spot market for LNG emerges EU energy-importing countries may face volatile prices, but will not be exposed to insecurity of supply.

# 1. Energy security in the EU and Beyond

Energy security is often presented as a clear and present danger, but episodes of energy insecurity have been fleeting and the fears have been soothed by market forces or technical change. This paper emphasises the shifting nature of energy security. It analyses the nature of the EU's current energy security problems, and the forces that will nullify energy security concerns.

The paper starts by analysing the nature of energy security, paying particular attention to the oil crisis of the 1970s and to current EU concerns about security of gas supplies controlled by Russia. The energy crises of the 1970s had two dimensions: an energy security aspect embodied in the Arab oil embargo of countries supporting Israel in the 1973 War and a cartel-driven increase it the relative price of oil. The energy security threat was brief, as the Arab oil embargo lasted less than six months and was terminated without achieving a primary goal of Israeli withdrawal from occupied territories. The oil price increases of the 1970s led to demand and supply responses which produced an oil glut by 1986, and the plethora of suppliers ensured availability of supply at the world price. The 1998-2008 oilboom had winners and losers, but did not have an energy security dimension; any oil-importing country could obtain as much oil as it wanted at the world price. Meanwhile, the EU had become increasingly reliant on gas imports from Russia, and the disruption of those supplies in January 2006 and more seriously in January 2009 raised concerns about energy security, especially as Russia had become increasingly assertive since the turn of the century.

A feature of oil and gas markets is that both supply and demand respond slowly to price changes, so that any small shift in demand or supply conditions causes a larger short-term change in prices. In the longer term, however, new sources of supply will be discovered and exploited, and energy-users will adopt energy-saving measures or will turn to alternative sources of energy. The surest form of energy security is when alternative supplies can be called upon at relatively low additional cost, but investment in new energy projects is typically lumpy and expensive, whether exploring and exploiting new oil or gas fields or building new pipelines. Thus in the short term there is typically a trade-off between costs and security, which is complicated by uncertainty about future prices and technology which will impact on the financial returns from large investment projects.

The particular features of the gas trade that underlie the current EU energy security fears arise from pipelines being the dominant delivery mode and from specific features of the pipeline network inherited from the Soviet Union which have given Gazprom (and hence

Russia) a dominant supplier position.[1] Because pipelines are expensive to build and have no alternative uses, the contractors require a long-term commitment from both sides on the amount to be traded and the price to be paid. Given the current pipeline network to the EU, when gas supplies from Russia are disrupted there is in the short-term no alternative, while in the longer term EU buyers are committed to purchasing minimum quantities from Russia at the agreed price.

The apparent stability is, however, misleading. Gazprom is a business whose profitability is threatened by declining reserves in existing gas fields and by diminishing ability to purchase gas from Central Asia at lower prices than it receives for its exports to the EU. Although pipelines are expensive, new ones can be built and the EU has options of supporting different pipelines from Russia or Central Asia even though it may be in competition with other energy importers, notably China. Finally, pipelines will lose their position as the dominant transport mode as alternative delivery modes, such as liquefied natural gas (LNG), become technologically and economically feasible; once LNG is readily available by takers from a variety of suppliers, any supplier will have difficulty targeting individual buyers. This paper examines each of these prospects, and its implications for EU energy security.

## 2. Energy Security: A Shifting Concept

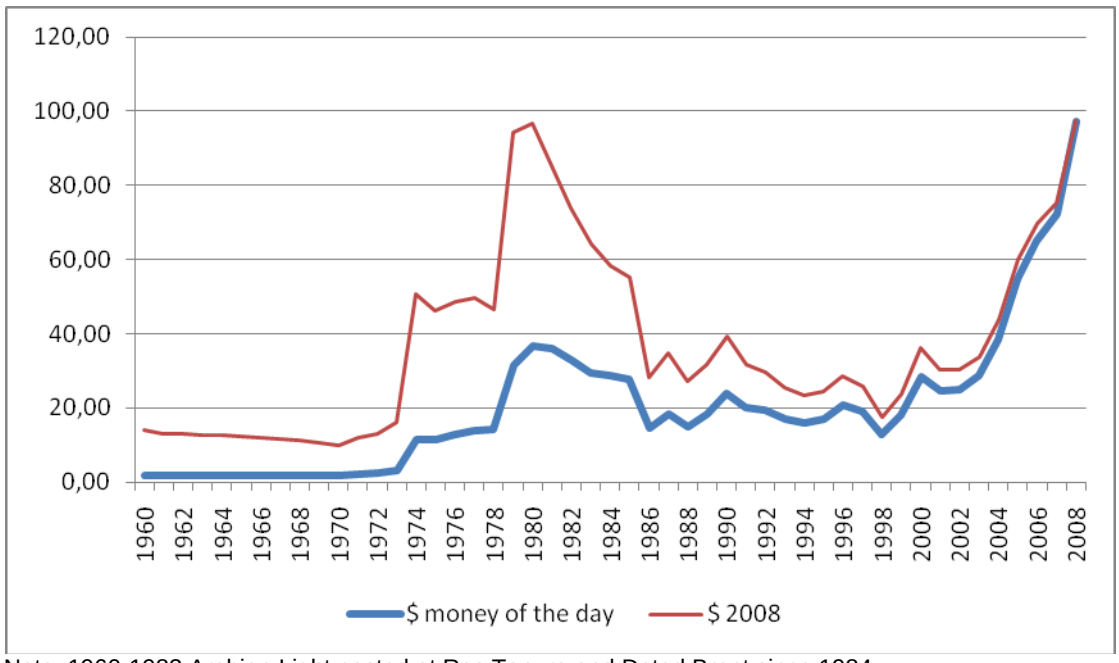
Energy security has meant different things in different eras. Before 1914 coal was king; Stanley Jevons (1865) worried about the "Coal Question", or whether Britain's diminishing coal reserves would undermine its status as a Great Power. Even in the 1950s the Coal and Steel Community was a key precursor of the EU; France, West Germany, Italy and the Benelux countries believed that, if coal production were supervised by a supranational commission, a third intra-European war would be less possible. Such concerns about coal security now seem quaint because technical change has diversified our primary energy sources. Recognizing the increasing importance of nuclear power, the European Atomic Energy Community (Euratom) was established in 1957 as one of the European Communities, although in practice it remained a minor institution and nuclear power's

[1] Here and at several later points Russia and Gazprom are used interchangeably. Gazprom became a joint stock company in 1993 with the government as the main shareholder; the government share was gradually increased until it reached 51% in 2005. While it is clear that Gazprom at times operates as an arm of Russian foreign policy, there are also occasions when Gazprom is serving its own interests or those of its top officials (who may be serving the interest of senior Russian politicians). No attempt is made to disentangle these skeins of decision-making within the Russian gas sector.

acceptance has been constrained by safety concerns (highlighted for Europeans by the 1986 Chernobyl disaster), i.e. a different type of security concern.

In 1973-4 oil took centre-stage with the Arab boycott of countries supporting Israel, which was accompanied by OPEC-driven oil price increases. The Organization of the Petroleum Exporting Countries (OPEC) had been formed in 1960, principally to coordinate negotiations with the seven integrated oil companies that dominated the industry at that time. Following the outbreak of a new round of Arab-Israel conflict on 6 October 1973, the Arab members of OPEC plus Egypt and Syria announced an embargo on oil supplies to countries supporting Israel. The embargo was initially targeted at the USA, which was airlifting replacement equipment and supplies to Israel, but could apply to any other country. Some European nations and Japan sought to disassociate themselves from the US Middle East policy, but the embargo was extended to include the Netherlands which provided landing facilities for US aircraft supplying Israel. More or less simultaneously, OPEC ministers announced an increase in their target price of oil and began production cuts.[2] The market price of oil rose rapidly from $3 to $12 per barrel, and it remained above this level for the remainder of the 1970s (Figure 1).

**Figure 1. Crude oil prices 1960-2008 (current and constant 2008 USD)**




Note: 1960-1983 Arabian Light posted at Ras Tanura and Dated Brent since 1984.
Source: BP, Statistical Review of World Energy 2009.

[2] The chronology is clouded by distinctions between formal announcements of the embargo and of OPEC actions as a cartel to affect price through quantity restrictions, and by the role of Saudi Arabia as the key actor in both cases. According to Yergin (1991, 597) the Saudi government in secret meetings with the Egyptian leadership in August 1973 had already committed itself to using the oil weapon in the event of renewed Arab-Israel warfare, although the embargo was only announced in response to US decisions in October 12-19 to airlift material support and commit $2.2 billion in emergency aid to Israel. The OPEC price increases and production cuts were announced on October 16 after negotiations with the major oil companies had broken down.

The 1973-4 oil price increase was a global economic shock. The magnitude of the price increase constituted a large negative supply shock for oil-importing countries and contributed to the dismal combination of stagnation and inflation that characterized the rest of the 1970s for the high-income countries. Oil exporters benefited from the higher prices, although in some cases inexperience in using the windfall led to "resource curse" outcomes and the world economy had trouble recycling the large new source of global savings.

In the energy security context, the most dramatic element of the post-1973 energy crisis was concern that the western countries could be held to ransom by a handful of oil-rich Middle Eastern countries. The situation was highlighted, despite its brevity, by the Arab oil embargo, and later in the decade and in the 1980s by the increased assertiveness of Iran and Libya (and of the Soviet Union, which invaded Afghanistan in December 1979). In the event, however, concerns about the new global power of oil producing nations proved to be exaggerated. Their economic power increased, as would be the case for any country which experienced a sudden multiplication of the value of its resource base, and increased wealth could be spent on foreign adventures or provide a platform for discarding foreign influence without worrying about the consequences. However, the oil-exporting countries' strategic ability to obtain political goals by threatening oil-importing countries' energy security was fleeting; the Arab oil embargo was lifted in March 1974 and has not been reimposed since then.[3]

Conditions in the world oil market before 1973 had not been favourable to the producing countries. From 1947 to 1967 the world price in US dollars increased by less than two percent per year, barely keeping pace with inflation and discouraging exploration for new oil fields. Between 1967 and 1973, as the US dollar came under increased pressure and was devalued substantially against other major currencies after December 1971, the value of dollar-denominated oil exports fell relative to the cost of manufactured imports from Germany or Japan. Irrespective of the geopolitical situation, the oil exporters were in a strong position once they chose to flex their muscles and support oil price increases by managing supply. The world price of oil remained in the mid-teens from 1974 until 1979, when a fresh round of OPEC-driven supply restrictions pushed the price up to almost $40.

Oil consumers responded by adopting oil-saving technologies as their factories or equipment were renovated and by buying more fuel-efficient cars when it came time to trade in their car. Hydropower, natural gas and other alternatives became more important as primary energy sources. The historically high oil prices provided an incentive to find new deposits, and to develop techniques to better recover oil in adverse conditions, as in Alaska or beneath the

[3] The USA began a parallel set of negotiations with Arab oil producers to end the embargo and with Egypt, Syria and Israel to arrange Israel's withdrawal from some of the territories occupied since 1967. With the promise of a negotiated settlement between Israel and Syria, the Arab oil producers lifted the embargo in March 1974. The Arab goal of Israeli withdrawal from the Golan Heights was not achieved, and remains the case today.

North Sea or the Gulf of Mexico (the Canadian tar sands also entered the picture, although the combination of technology and price has yet to make them really economical). By 1986 there was an oil glut; prices dropped to around $10 per barrel and remained there until 1998. The important point is that market forces worked, but because of the nature of both demand and supply the time lags were measured in years.

With lower prices, there was less incentive to invest in oil, and eventually a new cycle began as demand outstripped supply. The extent of the sustained price increase over the next decade was unforeseen; oil prices peaked at over $140 in spring 2008. However, there was no security of supply issue. All oil-users could obtain as much oil as they wanted as long as they were prepared to pay the price. There were some concerns about over-dependence on the Middle East and on increasingly important Russian oil, reflected in pipeline projects to access oil supply from Central Asia and the Caucasus; notably the Baku-Tbilisi-Ceyhan pipeline which opened in 2005 and the pipeline across Kazakhstan to China, but these could be economically justified at the high oil prices, and the former was as much about reducing the CIS oil exporting countries' dependence on transiting Russia as about security of supply for the West; indeed once oil reaches the Turkish port of Ceyhan it can be shipped by tanker to anywhere in the world.

In sum, the 1998-2008 oil price increase was an important economic event with winners and losers, but less drastic than the 1973-4 and 1979-80 oil price increases because both buyers and sellers were better prepared for the challenges involved. It was neither an oil crisis nor a security challenge, because by 1998 OPEC supplied less than half of the world's oil and transport by tanker meant that no country could hold another hostage by controlling the transport routes. The 1970s oil price hikes encouraged exploration and new entrants into the world oil market and the next big increase in oil prices in 1998-2008 saw no physical supply problem; any customer could purchase oil at the world market price.

In the early 21st. century, energy security issues have centred on gas, especially for the EU. They were highlighted on 1 January 2006 when Gazprom reduced gas supply levels to Ukraine, and about 100 million cubic metres that was expected in countries west of Ukraine was not delivered. Although the supply interruption only lasted three days and was relatively easily coped with from available storage and through fuel-switching, the interruptions raised concerns in Europe regarding energy security (Whist, 2008, 9). Such concerns were re-ignited in January 2009 by a more serious disruption of gas supply from Russia following a commercial dispute between Russia and Ukraine over the size of gas debts owed by Ukraine, the price to be paid by Ukraine for Russian gas and the transit fee to be paid by Russia on gas passing through Ukraine to the EU. On 1 January 2009 Russia cut off gas to Ukraine, and within a few days EU members were reporting reduced pressure in their pipelines. The bilateral dispute was settled on 18 January, but from 7-20 January no gas

supplies from Russia reached the EU. In both 2006 and 2009 the EU was caught as a bystander in a bilateral dispute, which could happen again, or Russia might use the threat of holding up gas supplies to achieve political objectives.[4]

## 3. The Problem with Gas and the Evolution of the CIS Gas Market

Use of natural gas as a fuel has expanded rapidly since 1973, and especially over the last two decades. The trend has been especially pronounced in the EU, where gas accounted for less than 5% of energy consumption in the early 1970s, and about one quarter today. EU consumption increased from under 350 billion cubic metres (bcm) in 1995 to 500 bcm in 2005.[5]

In the 1990s the EU was about 60% self-sufficient in gas, but self-sufficiency dropped sharply in the 2000s. Output in the largest EU producer, the United Kingdom, began to decline after 2000 as its reserves ran out; the UK produced 108 bcm in 2000 and less than 70 bcm in 2008. The next largest EU producers in 2008 were the Netherlands (68 bcm), Germany (13 bcm), Romania 12 bcm and Denmark (10 bcm). Total EU output of around 190 bcm in 2008 covered less than 40% of EU consumption. External supply is heavily concentrated, with Russia, Norway and Algeria accounting for about 26%, 17% and 11% of EU consumption respectively, and all other suppliers about 5%.[6]

The problem with reliance on external sources of gas is that there is no world market, which reflects the importance of bilateral delivery agreements and the difficulty of rerouting supplies. Prices quoted for the US Henry Hub, Alberta, the UK, EU and liquid natural gas (LNG) delivered to Japan differ substantially, e.g. the 2008 EU price was $353 and the Alberta price $224 per thousand cubic metres. Because pipelines are the dominant transport mode, much gas trade is under long-term contracts specifying price and quantity negotiated as part of a pipeline construction agreement. Gas is to some extent a substitute for oil, so that oil and gas prices trend together but the prevalence of long-term agreements means that

[4] As many Russian policymakers pointed out, the idea that Russia would cut off gas supplies may be paranoid, since Russia cannot easily sell the gas elsewhere. The three weeks' lost sales to the EU in January 2009 cost Gazprom around $2 billion. For more details of the 2009 dispute and on the impact on EU members, see the European Communities Commission Staff Working Document *The January 2009 Gas Supply Disruption to the EU: An Assessment* http://ec.europa.eu/danmark/documents/alle_emner/energi/2009_ser2_autre_document_travail_service_part1_ver2.pdf (accessed 3 January 2010).

[5] Unless otherwise stated, all energy data are from *BP Statistical Review of World Energy 2009* - available online at http://www.bp.com/productlanding.do?categoryId=6929&contentId=7044622

[6] The largest European producer, Norway (99 bcm in 2008), is not an EU member.

gas prices are much stickier and respond to oil price increases with a lag. This was very clear in the 1998-2005 phase of the last oilboom, and especially so in the web of arrangements involving European and CIS gas markets.

The price of EU gas imports from Russia is based on a formula which includes the price of oil. The explicit link meant that the delivered (cif) price of Russian gas in the EU increased from a low of $50 in 1999 to $353 in 2008, and has subsequently declined. The increase in prices brought a windfall gain to Russia. However, the monopoly Russian supplier Gazprom was obliged to supply domestic consumers at a far lower price, and domestic demand hampered its ability to maximize profits on EU sales. In 2006, for example, the wholesale prices charged to domestic industrial consumers averaged $44 per thousand $m^3$ and residential consumers paid much less, while the price of gas exported to the EU was on average $240 per thousand $m^3$ (Locatelli, 2008, 11).[7]

An important link in Gazprom's strategy has been to import gas from Central Asia to supply CIS customers such as Ukraine as well as Russia, and hence release Russian gas for sale to the EU. According to Ariel Cohen (2008, 168), Central Asian gas accounts for 22% of Russian exports to Europe. Imports from Central Asia are primarily from Turkmenistan, whose gas production is the second largest in the CIS.[8] The lower the price paid for Turkmen gas and the greater the amount of Turkmen gas that could be sold to Russian domestic consumers, the higher Gazprom's profitability.

Up until 2005 the intra-CIS gas trade was highly non-transparent, with shady intermediaries and barter arrangements. Within Russia, gas markets during the 1990s were opaque; until 1999 Gazprom was not allowed to disconnect companies for non-payment and accounts were often settled by offsets or by barter, with great scope for corruption.[9] On intra-CIS trade Gazprom paid inflated prices to intermediaries, which benefitted well-connected individuals.[10]

After Vladimit Putin became President in June 2000, one of his first steps was to replace the senior Gazprom management (Chairman Viktor Chernomyrdin and CEO Rem Vyakhirev) by

[7] Spanjer (2007) and Tsygankova (2008) analyse the impact of the proposed gradual introduction of netback pricing (i.e. linking Russian domestic price to the export price minus transport costs) between 2008 and 2011. Apart from reducing consumption (452bcm in 2006) and improving Gazprom's balance sheet, the price increases are connected to Russia's WTO accession negotiations in which underpriced domestic gas has been a major issue. Russia also underpriced gas exports to former Soviet republics, but prices were substantially increased for the Baltic countries in 2005, for Ukraine, Moldova, Armenia, Azerbaijan and Georgia in 2006 and for Belarus in 2007; Gazprom intends to bring prices for all of these customers up to levels that provide equal profitability to sales to EU customers by 2011.

[8] Turkmenistan exports 75% of its gas. Uzbekistan produces similar amounts (65 bcm in 2007), but with over five times the population of Turkmenistan it consumes most of this domestically and only exported 15 bcm in 2007. Kazakhstan has had much lower output, 13 bcm in 2007, almost all of which is consumed domestically, but has potential to increase gas output substantially in the coming years.

[9] According to Judith Thornton (2009, 15-16) over half of payments in 1996 were by offsets or barter.

[10] In 2000 Itera (International Trading Energy and Resources Association) bought Turkmenistan gas for $35.37 per thousand cubic metres, and sold about a third of it to Gazprom for $45 per thousand cubic metres. The main holding company of Itera was registered in the Dutch Antilles with over 60% of the shares held in trust for unnamed individuals, one of whom turned out to be a former Deputy Prime Minister of Turkmenistan and others were believed to include high-ranking Gazprom managers (Global Witness, 2006).

his own close associates (Dmitry Medvedev and Alexei Miller), with the aim of reducing asset-stripping and tax evasion and centralizing control over energy rents, but arrangements for intra-CIS gas trade remained very opaque.[11]

During the 1990s, when the bargaining position of energy exporters was weak, Turkmenistan's customers often settled their bills through barter agreements or simply did not pay, leading to Turkmenistan cutting off supplies to Ukraine from March 1997 until January 1999 (Sagers, 1999). Anecdotes of low quality or unusable goods being supplied to satisfy the barter terms abound. In one 1990s deal Ukraine supplied twelve million galoshes in payment for gas; this was to a nation of four million people living in the desert! At the core of these arrangements was the rampant corruption in Ukraine, centred on energy imports (Babanin, Dubrovskiy and Ivaschenko, 2004); managers of inefficient state-owned or recently privatized enterprises would provide unsellable goods in return for gas which had a market value. Many barter goods were passed on; after Russia received Volvo cars in a barter deal with Sweden in the early 1990s, Turkmenistan received Volvo cars in payment for exports to Russia. The role of intermediaries and of barter began to decline after Ukraine's Orange Revolution in late 2004 and early 2005.[12]

In 2002 Russia tried to take advantage of the opaque nature of Turkmenistan's gas deals and its control over pipelines by locking Turkmenistan into a long-term agreement at what was already a low price ($44 per thousand $m^3$, half in hard currency and half barter). As a rule of thumb, the true value of barter may be half its contract value, which would bring the true price for the gas in 2003-5 down to $33 per 1,000 $m^3$. As oil prices and the price received by Gazprom for gas exports to the EU increased, Turkmenistan sought to improve the terms of its gas sales to Russia. In December 2004 Turkmenistan stopped gas supplies to Russia and demanded a price of $58 per 1,000 $m^3$, expecting that Gazprom's inability to meet its export and domestic commitments without Turkmen gas would force it to offer better terms, but Gazprom survived the rest of the winter without Turkmen supplies. In April 2005

[11] After the Gazprom senior management was revamped, Itera lost the Turkmenistan contract to TransUral Gas. According to Blank (2003), under Moscow's 2003 deal with Turkmenistan: "A large quantity of Turkmen gas will be shipped through Russia to Ukraine by a little-known gas company, TransUral, whose major stockholder, Semyon Mogilevich, is one of Russia's most notorious criminal kingpins. The Trans-Ural firm will earn from $320 million to $1 billion from this deal alone. And all the firms involved, including Gazprom, already are contributing to Putin's reelection." On the Turkmenistan side most of the revenue went into non-transparent off-budget funds, including a Deutsche Bank account in Frankfurt in the Turkmenistan President's name. TransUral Gas was displaced in 2004 in favour of RosUkrEnergo, a 50-50 joint venture between Gazprom and a consortium of unnamed Ukrainian and Russian businessmen represented by Austria's Raffeisen Bank; Mogilevich was reputed to have a major interest in RosUkrEnergo. Although Mogilevich was put on the FBI's most wanted list in 2003 for fraud, he lived openly in Moscow until he was arrested in January 2008 on tax evasion charges. The arrest appeared to be a prelude to the March 2008 agreement which eliminated intermediaries from the Russia-Ukraine gas trade.

[12] The new head of the Ukrainian gas company, Naftohaz Ukrainy, announced that the contract with Turkmenistan active from 1st. July 2005 would involve no barter terms. The January 2006 Russia-Ukraine energy dispute ended with what appeared to be a definitive movement towards cash payments on gas transactions involving Russia, Ukraine and Turkmenistan, although the role of the shadowy intermediary RosUkrEnergo remained unclear. Intermediaries were finally eliminated from sales to Ukraine in March 2008 when Naftogaz Ukrainy and Gazprom signed a new agreement.

Russia and Turkmenistan agreed that Gazprom would make all payments in cash instead of the earlier barter arrangements, but the price remained $44 per thousand $m^3$.

In CIS gas markets, greater transparency since 2006 has been accompanied by conflict over price increases, as Central Asian gas suppliers tried to benefit from continuing increases in oil prices. Until 2006 Turkmen President Niyazov, who preferred to be known as Turkmenbashi the Great, appeared content with existing arrangements with Russia.[13] In April 2006 he made a rare foreign trip to Beijing, whose main purpose was to negotiate a gas pipeline and long-term supply contract with China. In May 2006 construction began on the 7,000 kilometre long pipeline from Turkmenistan through Uzbekistan and Kazakhstan to the Chinese border where it connects to the Chinese gas pipeline network. After Turkmenbashi died in December 2006, his successor Gurbanguly Berdymukhamedov continued the process of diversifying export routes for his country's gas (Pomfret, 2008). China became a significant demander of Turkmenistan's future gas output, and in July 2007 China signed a contract to buy 30 bcm a year. At the same time, the China National Petroleum Corporation (CNPC) was granted drilling rights in Turkmenistan.[14]

Russia responded by signing agreements to build a new pipeline to increase Turkmenistan's gas export capacity to Russia, to transfer to the Turkmenistan government Soviet era geological data covering Turkmen energy deposits that had been kept in Moscow, and to increase the gas price received by Turkmenistan. The agreements appeared to be a package deal to keep Turkmenistan within the Russian energy network. The price increases are, however, bound to be destabilizing as they reduce Gazprom's profits from the Turkmen trade.

In May 2007 Russia, Turkmenistan and Kazakhstan signed an agreement to build a ten billion $m^3$ a year pipeline along the eastern coast of the Caspian, the Prikaspiisky route, feeding into the Russian pipeline network. The agreement was widely seen as a pre-emptive move to forestall Caspian gas going to China, but it did not stop the July 2007 Turkmenistan-China agreement. In December 2007 the proposed capacity of the Prikaspiisky pipeline was doubled, to carry 10 bcm from each of Kazakhstan and Turkmenistan. In July 2008 it was increased further in order to accommodate larger deliveries from Turkmenistan. The

[13] Apart from a small pipeline to Iran built in 1997, all of Turkmenistan's gas exports went by pipeline to Russia. Luca Anceschi (2009, 95) observes that after 1998 Russia "de facto became the international patron of the increasingly sultanistic Turkmen regime". No non-Russian pipelines were built after that, confirming Russia's monopoly, but by 2006 the temptation to obtain higher prices had become too great. For more details of the corrupt and often bizarre practices surrounding Turkmenistan's gas trade under Turkmenbashi, see Garcia (2006) and Global Witness (2006).

[14] China's heightened interest in Caspian energy (Kazakhstan's oil as well as Turkmenistan's natural gas) has, in part, been born out of frustration with Russia's failure to guarantee supplies of its Far East energy to China (Blank, 2008). Proposals for an energy club within the Shanghai Cooperation Organization (SCO) are aimed at moderating Russia-China energy conflicts, but the proposals have made no headway and tensions within the SCO are likely to grow after Russia's support for secession by Abkhazia and South Ossetia from Georgia, which is anathema (as "splitism") to China.

December 2007 agreement also called for modernization of the existing Central Asia - Centre pipeline from Turkmenistan through Kazakhstan to Russia, which would increase its annual capacity from the current 50+ bcm a year.

The price from Gazprom was increased to $65 per thousand cubic metres in January 2006, and in September 2006 Turkmenistan negotiated an increase in the price received from Gazprom to $100 per 1,000 $m^3$ for 2007-9. In November 2007 this was raised to $130 for the first half of 2008 and $150 for the second half of 2008.[15] On 28 January 2008 China agreed to pay $195 for the gas that it would obtain from Turkmenistan, but this included a $50 premium to finance the Turkmenistan-China pipeline. On 11 March 2008 Gazprom announced that it would pay 'European' prices for Central Asian gas in 2009, i.e. in the range of $200-300 per 1,000 $m^3$. In sum, between 2006 and 2008 there was a substantial upward shift in the prices being agreed on trade involving Turkmenistan and its major customers, Russia and Ukraine.

Long-term agreements, even if they have become more frequent and more readily adjustable, still lack flexibility to respond to changes in demand and supply conditions. With the rapid decline in oil prices in 2008, Gazprom found that its revenues from the EU under the oil-related index price would fall while it had committed to high dollar amounts (reportedly $375.50 per thousand cubic metres) to Turkmenistan. When Russia President Medvedev visited Turkmenistan in September 2009 it was anticipated that the pricing issue would be resolved, but when Turkmenistan refused to accept the proposed price cut Gazprom announced that it would not purchase any Turkmen gas in the remainder of 2009. In the absence of sufficient completed pipelines to alternative markets, Turkmenistan faces loss of its major export revenue and will have to come to terms with Gazprom. The 2009 dispute between Russia and Turkmenistan is only indirectly related to EU energy security concerns, but it illustrated Russia's willingness to use control over pipelines as a weapon to achieve its goals.[16]

[15] At the same time, Turkmenistan was receiving $75 per 1,000 $m^3$ from Iran and, when Turkmenistan tried to raise the price, Iran offered a super-premium price (reportedly $300) to Azerbaijan in February 2008 to teach Turkmenistan that Iran was not a captive market. The conflict appeared to have been resolved by September 2008 when Reza Kasaei-Zadeh, the Deputy Oil Minister in charge of the National Iranian Gas Company, announced that Iran would import 9.2 bcm from Turkmenistan in 2008 and hoped to increase the flow to14 bcm, the maximum amount set as the trade in the countries' long-term agreement and that as of 1st. January 2009 the price would float according to a formula linked to the price of various fuel products (interview with *Petroleum Intelligence Weekly*, reported in *Tehran Times* 16 September 2008).

[16] Earlier in 2009 a pipeline explosion, which many in Turkmenistan believed to be deliberate Gazprom sabotage, disrupted Turkmen gas exports. The hardball Russia-Turkmenistan negotiations are in a context of increasing gas exports from Kazakhstan and Uzbekistan to Russia. In 2008 the three Central Asian governments, previously noted for their fractious relations, negotiated jointly with Gazprom. In 2009 Gazprom seemed determined to divide the three countries by making differing (and non-transparent) price/quantity offers for their gas.

# 4. EU Gas Security

EU concerns about the security of gas supplies from the CIS were raised in January 2006, when a Russia-Ukraine dispute involving Russia increasing its gas price to Ukraine and ensuing cuts in Russian gas supply to Ukraine had short-run spillover effects on European supplies. The intra-CIS conflicts have often had a geopolitical component as well as pure commercial interests, with Russia more willing to put pressure on Georgia or Ukraine after the rose and orange revolutions of November 2003 and November 2004. The Russian invasion of Georgia in August 2008 did not affect gas exports to the EU, but it did highlight the security risks that might be associated with a TransCaspian pipeline bypassing Russia and connecting Central Asian gas to the Baku-Tbilisi-Erzurum pipeline. The January 2009 dispute over Russian gas supplies to Ukraine, once again and more seriously than in 2006, highlighted the dangers of over-reliance on Russia as a gas supplier to the EU and the disregard in which both Russia and Ukraine appeared to hold contractual obligations.

A politicised gas relationship not only applies to intra-CIS trade, but is a central part of Russia's European strategy. This explains the failure of the EU-Russia "energy dialogue" of the late 1990s, the failure to secure Russia's ratification of the Energy Charter Treaty, and the failure to link Russia's entry into the WTO to liberalisation of its gas sector. At the EU-Russia summit in Sochi on 25 May 2006, Russia explicitly rejected proposals advanced by the EU to restructure and depoliticise the gas relationship (Noël, 2008).

The EU has not been too concerned about gas prices. The formula negotiated with Russia entailed the EU paying higher prices than reported spot prices in North America or Japanese LNG prices, but not by a large margin. What the EU has been concerned with is security of supply. This is in a context of internal disagreement about the appropriate relations with Russia, with countries keen to remain on good terms with Russia led by Germany and Italy, which together purchase almost half of Russian gas exports to the EU, and countries keen to reduce dependence on Russia as an energy supplier led by the UK, with the support of eastern European EU members. The EU debate has thus largely boiled down to one over pipeline routes: should it support the Nord Stream and South Stream pipelines proposed by Russia,[17] or should it encourage construction of a TransCaspian pipeline and the Nabucco project that would allow the EU to import gas from Central Asia without relying on Russia for transit?

[17] The Nord Stream pipeline would pass under the Baltic Sea from Russia to Germany and South Stream would pass under the Black Sea through the Balkans to Italy.

Several proposals to construct a gas pipeline under the Caspian Sea and then through Azerbaijan and Georgia to Turkey were aired during the 1990s and early 2000s, but the project was eventually limited to the Baku-Tbilisi-Erzurum pipeline from Azerbaijan to Turkey which opened in late 2006.[18] The TransCaspian portion was only resurrected after Turkmenbashi's death in December 2006. In August 2007 the USA granted $1.7 million to Azerbaijan for a feasibility study on TransCaspian oil and gas pipelines, and on 29 February 2008 Azerbaijan's state energy company, SOCAR, awarded the feasibility study contract to a US firm, KBR. The TransCaspian would link up to the Baku-Tbilisi-Erzurum pipeline and the proposed Nabucco pipeline from Turkey to Hungary via Bulgaria and Romania. The feasibility of the TransCaspian and Nabucco projects is linked, because Turkmen supplies are needed to justify Nabucco's capacity.[19]

The economic attractiveness of Nabucco to Western European buyers depends upon the capacity of and the terms for Russian gas transiting the proposed, and competing, South Stream pipeline from southern Russia to Italy via Serbia. The prospects for a TransCaspian pipeline connecting Turkmenistan to EU markets also depend upon the support of potential investors within the EU. At the Community level, EU policy has become slightly more active since 2007. In April 2008 the Commission proposed extending the mandate of the European Investment Bank (EIB) to permit lending to Central Asian borrowers; this amendment was approved by the European Parliament, and is believed to be clearing the way for EU investment in energy infrastructure. In January 2009 the Commission President Jose Manuel Barroso commented on the Russia-Ukraine dispute's implications for the EU in strong terms, saying that "If the agreement [to supply EU customers] is not honoured, it means that Russia and Ukraine can no longer be regarded as reliable".[20] The post-2007 rapprochement between Turkmenistan and Azerbaijan should facilitate exploration of the southern Caspian to the benefit of both countries, and could herald a positive commitment to the TransCaspian pipeline by two key Caspian gas producers.[21]

[18] In 1999-2000 the US government funded a $750,000 feasibility study by Enron for a pipeline supplying gas from Azerbaijan and Turkmenistan to Turkey, but the project fell afoul of poor relations between Turkmenbashi and President Heydar Aliev of Azerbaijan.

[19] Some Azeri commentators believe that Azerbaijan's Shah Deniz field could produce enough gas to justify Nabucco's planned capacity of 30 bcm a year, but most observers doubt this. Iran might also provide gas for Nabucco and the EU Energy Commissioner Andris Piebalgs has flagged this prospect (reported in Khadija Ismayilova "Azerbaijan: Baku hesitates on Nabucco pipeline project", posted on www.eurasianet.org 10 April 2008), but even if Iran were willing and able to supply gas it is likely to be effectively vetoed by the USA.

[20] Barroso told the European Parliament that the dispute between Ukraine and Russia was "most unacceptable and incredible" and that, if agreements sponsored by the European Union are not observed "as a matter of urgency", he would advise energy companies that have deals with Gazprom and Naftogaz Ukrainy, to file lawsuits against them; reported on 14 January 2009 at http://news.bbc.co.uk/2/hi/europe/7827829.st In March 2009 the EU and Ukraine issued a joint declaration emphasizing cooperation in gas deliveries, which was resented by Russia

[21] In 2007 relations between Turkmenistan and Azerbaijan warmed as Turkmenistan reopened its Embassy in Baku, which had been closed since 2001, and in June proposals were announced for joint exploration of the Serdar/Kapaz field under the South Caspian Sea. In March 2008 a high level delegation from Turkmenistan visited Baku and reached agreement on the debt disputes between Azerbaijan and Turkmenistan. Although both

Nevertheless, the financial prospects for the pipeline have become less positive in the post-2008 era of lower energy prices. There is also an issue of whether Turkmenistan has sufficient gas, possibly augmented by gas from Kazakhstan or Uzbekistan, to fill an economical pipeline given Turkmenistan's commitments to Russia, China and Iran By the 2020s Turkmenistan has commitments to supply 80 bcm a year through Russia and 30 bcm a year to China as well as up to 14 bcm a year to Iran, and is negotiating perhaps 30 bcm a year through the TransCaspian and perhaps supplies to South Asia. If Turkmenistan's gas production (66 bcm in 2008) can be more than doubled over the next decade and a half, then all these commitments and dreams might be satisfied[22] -- but, if not, then Turkmenistan will have no gas left to supply another new pipeline.

## 5. In the Long-term Russia's Gas Power will Decline - but how far off is that?

Concerns about EU gas security centre on the role of Russia as supplier of a quarter of EU gas through a pipeline system that can be disrupted by conflicts between Russia and Ukraine. The extent to which such concerns continue to be valid depends upon Russia's ability to produce gas (and sell it to EU customers) and the availability of alternative sources of supply.

Estimates of gas reserves and future production costs are uncertain. Russia's existing gas fields are running out and future production will rely on development of the Shtokman field in the Barents Sea, Yamal in the far north of Siberia and Far Eastern gas fields. Some western commentators argue that, especially since 2004, Gazprom has become technically inefficient and incapable of generating the physical capital to implement large new projects, although it is difficult to verify this claim.[23] The erosion of favourable arrangements with Central Asian

countries acknowledged the debts, in 1991-3 they both still used the rouble, whose hard-currency value was disputed. Turkmenistan sought $56 million while Azerbaijan offered $18 million; under the March 2008 agreement Azerbaijan will pay $44.8 million.

[22] External analysts are, not surprisingly given the secrecy surrounding the country's reserves, divided over the long-term potential; Marina Tsygankova (2008) contrasts Turkmen claims of 2030 production levels around 250 bcm with the scepticism of International Energy Agency (IEA) Reports about whether Turkmenistan can increase production at all. In 2008 President Berdymukamedov initiated an independent assessment of the country's gas reserves by a British firm, Gaffney Cline & Associates, whose preliminary findings, based on the South Yolotan field, are optimistic about the extent of Turkmenistan's reserves. In December 2009 Turkmengaz awarded to a group consisting of China National Petroleum Corporation (CNPC), Abu Dhabi's Petrofac Emirates, Dubai's Gulf Oil and Gas, and South Korea's LG International and Hyundai Engineering the rights to develop the South Yolotan field, which is thought to contain about 6 trillion cubic metres of gas.

[23] See, for example, Anders Åslund's speech before the European People's Party, European Parliament, Brussels, 15 May 2008 or Michael Mihalka (2008). Jonathan Stern (2009) is more optimistic about Russian output potential. Alan Riley (2008, 11-12) provides further references on this debate. Judith Thornton (2009)

producers has already put more pressure on Russia to meet its EU commitments out of own resources, and this will be even more true after the Turkmenistan-China pipeline becomes operational.[24] Domestic market reforms will bring Russia's domestic prices closer to world prices, reducing domestic demand and freeing up more gas for export. On the other hand, the location of the new gas fields may favour delivery to Asian rather than European markets. Although prediction is difficult, it seems likely that supply constraints will reduce Russia's share in EU gas markets over the next decade.

A TransCaspian and Nabucco pipeline would further erode Russian market power by providing EU countries, especially those to the south and east, with an alternative pipeline source. Pipeline economics are, however, complex, given the large upfront construction costs, the mutually exclusive nature of projects the long life of pipelines and the uncertainty of future gas prices. On all of these counts the financial viability of the TransCaspian/Nabucco can be questioned, although the political support (from the USA as well as the EU) could help to assuage the doubts.

The biggest challenge to the long-term viability of gas pipelines is technological. The future prospects of Russia, Azerbaijan and Central Asia as gas suppliers to the EU will be affected by technical change in transporting liquefied natural gas (LNG). Advances in liquefying, in specialized ships and in degasification terminals are eroding the dominance of pipelines as the least-cost delivery mode for gas. This will benefit suppliers with ocean port access such as Qatar or Australia, at the cost of landlocked gas suppliers.

The diffusion process for LNG was slow in the three decades after the first liquefication unit came into operation in Algeria in 1964 and the second plant in Alaska in 1969. Mads Greaker and Eirik Lund Sagen (2008) argue that this was due to monopoly behaviour. Additionally, in the 1980s and throughout the 1990s there was little incentive to invest in LNG facilities when energy prices were low. The fall in costs and the rate of construction of new plants accelerated after 1999 when competing technologies became available. Expensive projects need to be coordinated; liquefication facilities have little use without regasification capacity at the point of importation. During the 2000s Qatar took the lead in building LNG liquefication terminals and shipping capacity, as well as co-financing some regasification plants, and this in turn led to greater LNG trade and increased exploration of offshore gas fields.

The biggest liquefication plant, Ras Laffan in Qatar, built at a cost of $60 billion, produces a quarter of the world's LNG. As of 29 December 2008, there were 300 ships engaged in the

argues that under Putin Russia was more concerned about nationalizing natural resource companies, even if this meant discouraging foreign investors with the technical capacity to develop the country's gas reserves. Pauline Jones Luong and Erika Weinthal (2006) also emphasise the role of domestic politics and institutions in determining economic outcomes in CIS energy producing countries.

[24] There are also proposals to link Central Asia to the booming South Asian markets, but progress is unlikely as long as the security situation in Afghanistan remains dubious.

deep-sea movement of LNG (up from 150 in 2003), and there were more than 140 vessels on order at the world's shipyards. The majority of the new ships under construction are in the size of 120,000 $m^3$ to 140,000 $m^3$, but there are orders for ships with capacity up to 260,000 $m^3$. The largest Q-Max tankers, which cost $300 million, not only benefit from scale economies but also have technological advantages, e.g. they carry a unit to capture and liquefy gases that escape from the storage tanks during the journey (on older ships about 0.14% of the LNG escapes every day). Among newly discovered offshore gas fields, the Gorgon project off Western Australia, with Chevron as lead investor in a joint venture which will invest $36 billion, will catapult Australia from its current sixth position in LNG output to second, behind Qatar, in 2014.

There are about a dozen operational LNG regasification terminals in the EU, including five in Spain (Barcelona, Bilbao, Huelva, Sagunto (Valencia), and El Mussel), three in the UK (South Hook and Dragon at Milford Haven in South Wales and Isle of Grain in Kent), two in France (Fos-sur-Mer and Montoir) and one in Belgium. It is difficult to keep track because many are recent, and over fifty LNG regasification terminal projects are either under consideration or have commenced construction in the EU (in Cyprus, Germany, Ireland, Italy, the Netherlands, Poland, Romania, Lithuania and a joint project between Estonia and Finland). The South Hook terminal, a joint venture between Qatar Petroleum, Exxon Mobil and Total which opened in May 2009, is Europe's largest, supplying 11 bcm per year on opening and anticipated to quickly reach a capacity of 21 bcm.

These developments suggest that the era of gas pipelines' domination may be close to extinction. If LNG can be delivered in a spot market at prices that compete with pipeline-delivered gas, then it is unlikely that large new pipelines can be economic and customers for gas delivered along existing pipelines will be less exposed to hold-up tactics in periods of scarcity. This has major implications for the CIS gas suppliers and for EU gas importers.

Russia is already switching its attention in the Far East from pipelines to LNG, which provides greater flexibility in selecting where to sell the gas and avoids dependence on a monopoly buyer.[25] Although much of the publicity had focused on whether pipelines will connect to China or to Japan, ExxonMobil, the lead developer of Sakhalin-I, has placed emphasis since 2004 on LNG and exports have gone to the USA, and Mexico *inter alia*. LNG has also been exported from Sakhalin-II. Looking further ahead, liquefication may become the best option for delivering gas from Russia's Arctic Ocean gas fields if global warming increases the ice-free shipping season. Such options are not available to the landlocked Central Asian and Caspian producers, who may come to rue their failure to build pipelines and develop gas exports while they still had value.

[25] Gazprom has also announced that gas from the Shtokman field in the Barents Sea will be exported as LNG (Riley, 2008, 3).

For the EU the establishment of an efficient LNG world market with virtually unlimited availability at the current spot price will mean the end of gas security concerns, although in the short-term there will be country-specific implications. Until the establishment of a single EU gas market, the LNG option will be especially valuable to countries with their own regasification facilities such as Spain and France. In 2008 Spain purchased LNG from Australia in the spot market, providing striking evidence that the EU's dependence on importing gas by pipeline may be ending and that gas can be sourced worldwide. It is also noteworthy that after 2006 the UK began preparing for the decline of its North Sea gas production by a vigorous regasification plant construction program.[26]

Most striking for the debates about pipeline projects is that Italy too has embraced LNG imports, which is bad news for the viability of either South Stream or Nabucco. Italian energy companies had difficulty obtaining local government permission to build regasification plant, but by 2009 this had been resolved by constructing three large offshore terminals. The first offshore LNG regasification facility was built by the Italian utility Edison in conjunction with ExxonMobil and Qatar Petroleum in the Adriatic Sea 40 kilometres south of Venice. A second regasification plant is under construction near Brindisi, with a proposed capacity of 16 bcm and the third, Toscana Offshore, is near Livorno on Italy's west coast.[27] These projects are especially relevant to the contest between the proposed South Stream and Nabucco pipelines, because added LNG capacity of 20-30 bcm per year is equivalent to a substantial additional pipeline to Italy and thus reduces the likelihood that either new pipeline could be profitable.

The most stubborn resistance to importing LNG among large EU members is from Germany, which remains committed to the Nord Stream project despite opposition from most north-eastern EU members.[28] The cost of the project has escalated since the agreement was signed in 2005, in part because of opposition from Finland and Sweden to the original route

[26] In 2006 the Langeled pipeline was built from Norway to the UK under the North Sea, but after that the UK focus shifted to very large LNG terminals, especially those in South Wales which were located to receive very large ocean-going ships.

[27] Toscana Offshore was delayed by ecological concerns, and is smaller than the others, with a capacity of 3 bcm. Contracts have been signed with Nigeria and Qatar to supply one bcm per year apiece. The project includes the acquisition of an existing LNG carrier and its conversion into a Floating Storage and Re-gasification Unit with a storage capacity of 137,000 $m^3$, at a cost of around 600 million euros, for which the European investment Bank provided a 200 million euro loan in April 2008. The EIB's objectives explicitly mentioned energy security "The project will increase EU and Italy gas import capacity and contribute to meeting the gap resulting from growing demand and declining indigenous gas production in Italy. It will also enhance the security of supply by allowing imports diversification from a growing number of LNG producing countries and enhance competition in the Italian gas market." http://www.eib.europa.eu/projects/pipeline/2006/20060560.htm

[28] Background on Nord Stream is provided by Bendik Solum Whist (2008). The opposition has had differing focus with Sweden concerned about military implications, Finland about environmental issues and the Baltic countries about security of their own energy supplies from the CIS. Poland, which is less directly implicated because it is unaffected by the route and its primary energy is largely provided by domestic coal, seems to be most disturbed by the political implications of closer Russian-German ties. Sweden and Finland have diversified domestically produced primary energy sources, including nuclear energy and hydropower and other renewable energy.

which passed under waters over which they had rights under the Law of the Sea.[29] Nevertheless, German support for the Nord Stream project remains strong, and, although Germany argues that Nord Stream is a European project to enhance EU energy security (and the EU granted it the status of Trans-Europe Network in 2002), German support reflects national concerns about domestic gas supplies and about relations with Russia.[30]

Germany's domestic energy imbalance was exacerbated by the 2000 decision to phase out nuclear power by 2022, which led to increased dependence on imported energy, first and foremost gas from Russia. Alternative solutions to Germany's energy problems include construction of LNG terminals or establishing an integrated EU gas market, in which gas could be imported via pipelines from the large Atlantic or Mediterranean LNG terminals, but Germany has shunned either of these options, and has been, together with France, the principal opponent of deregulation and integration of EU gas markets, preferring to maintain market segregation with national champions enjoying monopoly supplier status. Deregulation and creation of an integrated EU market for gas is, however, the logical EU outcome, undermining both the position of Russian gas in the German market and the profitability of Nord Stream.

Alignments within the EU on the two issues of an integrated EU gas market and a non-confrontational approach to Russia overlap, with the UK and Eastern European countries in favour of the integrated market but sceptical of Russia's intentions, and Germany and France opposing market integration but more accommodating towards Russia. How these positions will be reconciled is unclear and it will take time, but whatever the eventual EU consensus the factors analysed in this section will work against Russia's "Gas Power" because EU countries will diversify their sources of energy away from natural gas and their sources of gas away from Russia.

[29] Finland's requested in 2007 that the pipeline should pass under Estonian waters rather than across the more difficult seabed under Finnish waters, but in 2008 Estonia rejected the request and Nord Stream returned to negotiations with Finland. In 2008 the governments of both Sweden and Finland rejected the initial environmental impact assessments presented by the consortium.

[30] The Nord Stream agreement was signed in September 2005 in the presence of Chancellor Schroeder and Prime Minister Putin. The Schroeder government authorized a loan guarantee of one billion euros to Gazprom, which has a 51% share in the Nord Stream consortium, weeks before the end of the government's term in office. Schroeder subsequently became Chair of the consortium. Despite the project's EU Trans-Europe Network status, the consortium chose to incorporate in Switzerland, where it can benefit from secrecy laws to reduce the project's transparency (Whist, 2008, 18).

# 6. Conclusions

From the perspective of EU energy security there are parallels between current concerns about dependence on Russian gas and 1973, when after decades of artificially low oil prices energy importers suddenly seemed hostage to the power of a few oil exporters (and briefly did suffer insecurity when the Netherlands was subject to an oil embargo). There was, however, a spot market for oil and, as high prices led to the emergence of new producers, OPEC lost its power. Since the early 1980s, any importer can obtain oil, at a price, and energy security issues now focus more on gas, where pipeline networks limit the feasible sources of supply and have left several EU gas importers vulnerable to disruption of supply from Russia.

The ability of any supplier or group of suppliers with monopoly power in the provision of a crucial good to turn this power into political influence sufficient to threaten the security of importers depends upon the time horizon, the existence of substitutes and technological change, which may all be interconnected. Coal in the nineteenth century and oil in the 1970s were prime candidates for security concerns because they were important inputs into a modern economy and appeared to be without close substitutes. In both cases, elasticities of demand and supply were low in the short-run, but the elasticities proved to be higher in the long-run as customers economized in the use of the fuel and as new sources of supply were found and with technological change. Some of the technological change was exogenous, as in the replacement of trains pulled by coal-fired steam engine by the petroleum-driven car as a preferred means of transport, but much was endogenous, e.g. more fuel-efficient cars were developed after the 1970s oil shocks.

As with earlier concerns about energy security, current EU fears of dependence on Russia will be transient. Russia's currently large market share, about a quarter of gas supplies in the EU, will likely fall due to supply-side problems, notably declining yields from Russia's existing gas fields and difficulty developing the new fields. Dependence on Russian gas arises not simply from market share but also from pipelines being the least-cost delivery mode for gas and from the existing pipeline network, which directs not just Russian gas but also Central Asian gas through Russian-controlled pipelines. This situation could change if new pipeline routes were opened, such as the TransCaspian-Nabucco route, although this is likely to require substantial support from Western governments and EU members are split about the desirability of Russian versus non-Russian pipelines.

More importantly, the rapid development of LNG facilities will have huge implications for both sellers and buyers of natural gas. Russia will lose its monopoly power in EU markets, but will

have options to ship gas from its growing Far Eastern and Arctic operations to the customers in Asia, Europe or the Americas willing to pay the best price. The landlocked Central Asian producers, on the other hand, will remain bound by pipeline routes and largely dependent on Russian and Chinese markets. Construction of LNG regasification terminals is giving EU importers the option of buying gas in a spot market with many suppliers, although this development is being embraced to varying degrees by individual EU members and without an integrated EU gas market the LNG option will not be available to all countries. Precisely how the spot market for natural gas will develop is uncertain, but the pipeline issues and the Russian threat to EU energy security will become as anachronistic as 1970s fears of OPEC world domination.

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