

# Eurasian Natural Gas: Significance and Recent Developments

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## Abstract

Article explores the natural gas resources of Central Eurasia and the political and economic issues raised by their general inaccessibility. Central to these issues are the international pipelines required to bring this increasingly important energy source to meet growing world demand, and their intimate connection to the security of all the nations involved. They are complicated by the growing, yet still largely potential, competition from a world LNG market driven by new technologies, and hence natural gas sources, outside of central Eurasia. Each of the major actors in this area, from the producer states and their national energy companies to the wealthy consuming states with an increasing demand for natural gas are pursuing, frequently conflicting, strategies to insure their energy and income security and their development prospects. This paper focusses in particular on the strategies of Russia/Gazprom, the Central Asian producers and the transit states, and on the pipelines, both actual and potential, that intertwine them.

## 1 The ‘Problem’ with Natural Gas

In a world increasingly concerned about the environmental impact of the use of the energy required to maintain modern standards of living, natural gas holds a special place as a carrier of energy. Although a hydro-carbon based source, natural gas is the ‘cleanest’ in exploitation,<sup>1</sup> and is far more readily usable/mobile and available than any ‘cleaner’ fuels. It is also usable without the other, non-GHG, environmental impacts of nuclear, hydro, wind, solar, or battery metals use.<sup>2</sup> The European Commission’s (2012) “Energy Roadmap 2050” asserts that natural gas must play the critical role in the transition to a ‘decarbonized’ basis, indicating a large and growing, if highly uncertain gas demand by the EU. Similarly, it must play a critical and growing role in the developing world’s ‘catching up’ to the living standards of OECD, even as the latter move to constrain material consumption in the pursuit of “sustainability.” Thus there is a growing demand, indeed need, for readily available natural gas.

Further, accessible world reserves of natural gas are growing rapidly in response to growing demand and the development of new extraction technologies, promising potentially abundant supplies in the near future. There is however a problem connecting this supply to the burgeoning demand. It arises from both geography and the technical characteristics of natural gas as an energy source. First, as consumption grows, new sources of natural gas supply become increasingly remote and inaccessible, and hence increasingly costly to access. Further, with few exceptions, the primary net consumers of natural gas are located far from the sources of abundant net supply, requiring long distance transportation of that basic energy source. That is

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<sup>1</sup>Natural gas generates 50% less carbon per unit energy than other hydrocarbons. IEA Energy Report (2010).

<sup>2</sup>All energy sources have environmental side effects, and most are less reliable and less transportable/flexible than hydrocarbon based energy. See, for a brief discussion, Sweet (2011), p. 101-2.

where technical characteristics of natural gas as an energy carrier come in, imposing substantial costs and geopolitical complications on the process of connecting suppliers and users. Gas has low energy content per unit volume, even when substantially compressed, compared to oil and coal. For its energy to be commercially usable outside its production locality, it must be compressed and transported under high pressure, or liquefied and transported under refrigeration. The former involves building high pressure pipelines over vast distances, with supporting pumping and storage stations, requiring substantial initial infrastructure investment. The latter involves substantial liquefaction facilities at the end of supply pipelines and expensive gasification facilities to become usable through a distribution pipeline network, as well as a means of transporting the LNG between those facilities. It is generally only cost efficient by sea, over long distances, in specialized LNG tankers.

Thus, to date, the primary form of supply of Eurasian natural gas is by long distance, high pressure pipeline, and largely to its well-healed European periphery. The initial, and still most substantial, pipelines supplying Europe were geopolitically uncomplicated. The Soviet Union controlled all sources of supply and the full transportation routes to the border of the European Common Market, and both Europe and the Soviet Union saw the mutual advantages of stable and relatively cheap energy for Europe, and long-term stable income therefrom for the Soviet Union (Stern, 2005). The substantial fixed costs of installing the pipelines were substantially financed by Europe, which also supplied much of the high quality pipe and equipment required for the system. These costs were paid for, largely in natural gas deliveries, under long term contracts at a negotiated price. As the price of oil stabilized, following the OPEC oil embargo crises of the 1970s, the price of oil became a mutually acceptable benchmark, generating the so called “net back price” based on the price of oil and the energy content of natural gas delivered to the European border, making oil products and natural gas ‘equivalent cost’ in use.<sup>3</sup>

With the collapse and break-up of the Soviet Union, the geopolitical situation became vastly more complicated. First, while Russia remained the largest single producer and natural gas reserves holder, a substantial amount of natural gas (as well as oil) production and reserves passed to the control of the newly independent states of central Asia and the Caucasus. Further, the unified natural gas and oil pipeline systems were broken up, and each new state of the former Soviet Union gained control over those pipes on its territory, as did the former CMEA members through whose territory the Soviet controlled system passed. This gave those (FSU and CMEA) states to the west of Russia control over export pipelines to Europe, making them “transit states” for the export of both oil and gas from the former Soviet Union. However, Russia retained almost total control over the ability of central Asian states to export to the West, as all their export pipelines passed through Russia before entering the transit states.

This situation and the inherent characteristics of pipelines create a number of economic and political problems that we explore below. First, due to their structure, tying a source to a use destination, high initial fixed costs, and the inherent uncertainties in supply costs and demand, pipeline projects impose substantial risks on all involved while locking both the supplier and user in a relationship that is extraordinarily costly to break. This creates a mutual dependence, a need for risk sharing, and asymmetric leverage — “hold-up” possibilities — that can be used either for cooperative development or geopolitical advantage. This is particularly the case with respect to Eurasian natural gas where there are as yet no substantial alternatives to pipelines for supply, no developed market for alternative supply, and limited substitutability in use in an increasingly “green” world. Eurasian natural gas has been, and will remain for the foreseeable future, central

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<sup>3</sup>This provided substantial surplus to the Soviet Union whose unit costs of extraction and delivery remained well below the net back price.

to meeting world natural gas needs, and critical to European and East Asian supply. It is abundant and centrally located with respect to the ‘Eurasian ring’ of high and rapidly growing demand — Europe, South Asia, and East Asia. While MENA and North American LNG supply capabilities are rapidly growing, they remain a relatively distant and expensive source of gas energy for this ring of demand, presenting Eurasian producers with a growing opportunity. But exploiting that opportunity requires overcoming the geopolitical and economic issues with natural gas we have indicated here and explore below.

## 2 Supply and Demand

### 2.1 Eurasian Reserves and Supply of Natural gas

OECD’s International Energy Agency (2011) has called the next several decades a potential “golden age of gas,” due to the rapidly growing availability of natural gas and its relatively limited ecological impact from its low carbon footprint relative to other hydrocarbon energy sources. In the last decade, partly in response to high energy prices, the global ‘proved’ reserves of natural gas have grown by 24% (BP, 2012), without fully accounting for exploitable shale reserves.

#### 2.1.1 Estimated Natural Gas Reserves

The leading holders of proven natural gas reserves in the world, excluding recently added Turkmen and US reserves, and expected arctic reserves, are shown in Fig. 1. Here the central Asian country with the greatest new increase, Turkmenistan, is highlighted, although that is only about a third of what the most recent estimates attribute to Turkmenistan. BP (2012) estimates Turkmen reserves as 858.8 tcf (24.3 tcm), almost the same as Qatar and about three times proved US reserves (excluding new shale gas).<sup>4</sup> When shale gas is accounted for, however, US reserves grow almost 8-fold. U.S. natural gas reserves, including shale gas, were estimated in 2011 to be 2074 tcf (58.7 tcm), a 90 year supply at current rates, hence larger than even Russian reserves (50 tcm or 1770 tcf), while in 2008, they were estimated at only 245 tcf (6.94 tcm). The exploration of Arctic reserves is expected to provide a major part of future reserves growth, although both technical and political issues that remain to be resolved before they are exploitable.<sup>5</sup> A current USGS estimate of those reserves is contained in Fig. 2. USGS estimated, in July 2006, that the Arctic holds 47 tcm of natural gas (and 90 bil bbl oil). At current consumption rates, BP (2012, p. 20) estimates that world reserves will last 63.6 years, even if no new reserves are added. That horizon extends beyond 90 years once those excluded estimated reserves are added, and can be expected to keep growing with new technologies and new discoveries.

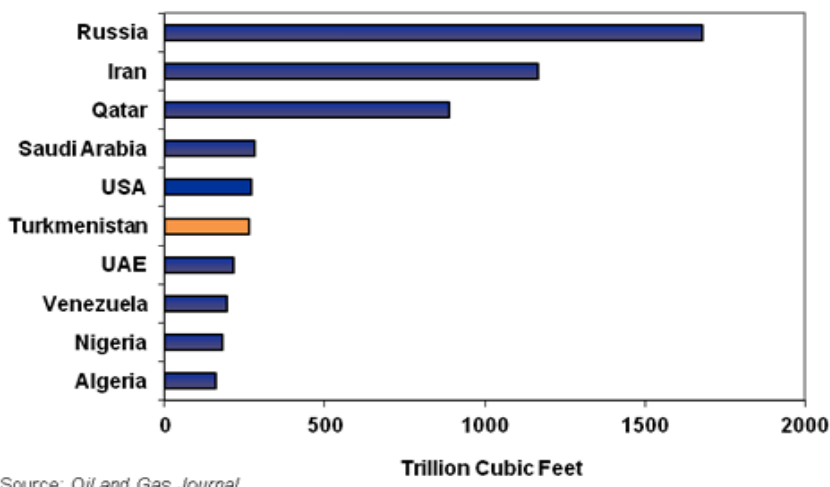
Central Eurasia holds a major part of these plentiful reserves, having 2 of the top 9 producers. It also contains substantial reserves in Kazakhstan (66.4 tcf), Uzbekistan (56.6 tcf), and Azerbaijan (44.9 tcf), with the latter excluding recently developing off-shore Caspian fields (Shah-Deniz 2, Alov, and Inam). Indeed, in 2009, the FSU had about 36% of proved world reserves with 21% in Russia. This region is second only to MENA (Middle East and North Africa), which holds 42% of proven world reserves, before considering newly

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<sup>4</sup>Here and below the following shorthand is used: *tcf* – trillion cubic feet; *bcf* – billion cubic feet; *mcf* – million cubic feet; *tcm* – trillion cubic meters; *bcm* – billion cubic meters; *mcm* – million cubic meters. One cubic meter contains about 35.314 cubic feet.

<sup>5</sup>These include both environmental and production technical issues, and questions of property rights for exploitation of the arctic reserves.

**Top Global Natural Gas Reserves by Country, January 1, 2012**



developing North American and Turkmen reserves (BP, 2012). Thus Eurasian natural gas supply will be a critical component of the energy future of the world.

**Stranded Natural Gas:** Proven reserves are defined as "those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reserves under existing economic and operating conditions." One type of such currently unexploited reserves is what is called "stranded gas," gas that is produced, or readily producible, as by product of existing oil and gas fields, but not commercialized for economic reasons. Central Eurasia holds a particularly significant amount of such gas.<sup>6</sup> A recent study (Attanasi, Freeman, 2012) has explored the conditions for economic viability of its exploitation, noting that this gas is 'stranded' primarily due to a lack of outlet to higher priced world markets. They derive 'supply prices' at the FSU border at which this stranded gas becomes commercially viable, that is delivery prices at which all extraction and transportation costs, and a 'normal profit', are covered. The volumes of such Eurasian natural gas, the price at which each country's stranded reserves begin to become commercially viable, and the volume that is viable at \$10 per thousand cubic feet on Russian-European border, are indicated in Table 1. These are substantial, readily mobilizable reserves, once political and contractual issues are resolved.<sup>7</sup>

<sup>6</sup>This goes beyond "associated gas" from oil fields. See Attansi, Freeman (2012).

<sup>7</sup>These issues are bound up in the strategic interaction between Russia, the central Asian producing and FSU transit states, and their European customers, as discussed below.

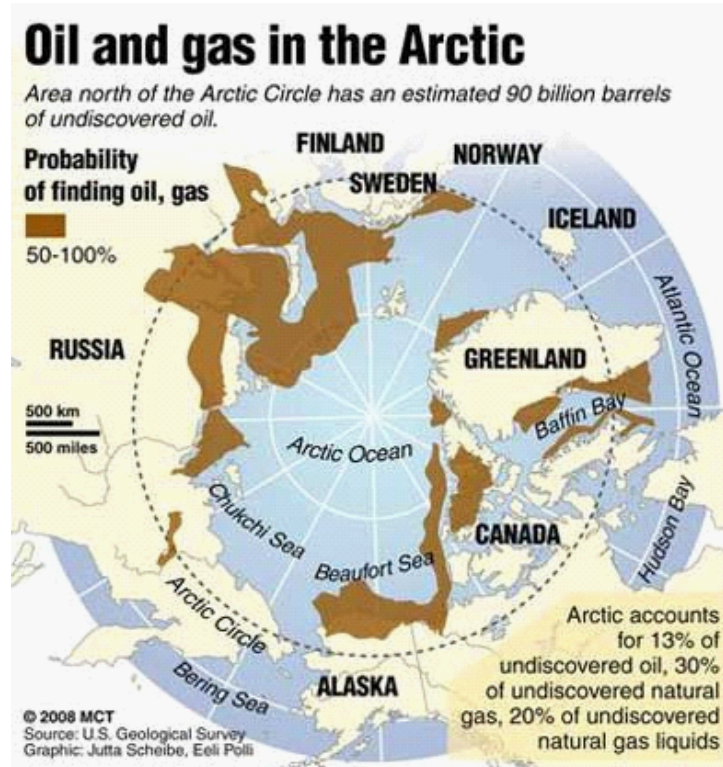


Table 1: Stranded Eurasian Natural Gas Supply Prices

Country/Region	Vol (tcf)	@ (\$/1000cf)	Volume @ \$10/1000cf
Azerbaijan	42.1	4.50	42.1 (1,192 BCM)
Kazakhstan	4.4	3.30	8.9 (252 BCM)
Turkmenistan	181.3	5.00	206.5 (5,848 BCM)
Uzbekistan	4.7	3.20	28.1 (796 BCM)
RF: West Siberia	226.6	7.00	509.5 (14,428 BCM)
RF: West Siberia (OS)	17.3	10.20	0.0
RF: Timan Pechora	8.0	5.60	15.0 (425 BCM)
RF: Volga Urals	0.8	4.20	2.5 (71 BCM)
RF: Caspian	0.5	4.80	0.7 (20 BCM)
RF: Caspian (OS)	5.9	6.50	7.8 (221 BCM)

Source: Adapted by author from Attanasi, Freeman (2012).

### 2.1.2 Annual Supply<sup>8</sup>

These reserves provide the foundation for the volumes of natural gas produced annually and supplied internationally. Eurasia, and in particular Russia, makes a substantial contribution to world production and net supply of natural gas. In 2011, world production was 3,276.2 bcm [ $\sim$ 2,921 million tons oil equivalent], with MENA (esp. Qatar, Iran, Libya) supplying 20.4%, including 9.1% from Qatar and Iran, and 3% from Saudi Arabia. North America provided 26.5%, including 20% from the US (651.3 bcm or 23 tcf) and 4.9% from Canada, and Europe produced 7.7%, about 260 bcm. The FSU produced 23.6% (776.1 bcm or 27.4 tcf)

<sup>8</sup>The statistics in this section are taken from BP (2012) and IEA (2011b).

including 18.5% (607 bcm) from Russia, 1.8% from Turkmenistan, and 1.7% from Uzbekistan.

Most world production, however, is for ‘own’ consumption. The US consumes more than it’s own production, exporting only 2 bcm LNG in 2011. Similarly, Europe only exported 5.3 bcm in 2011, although individual countries, in particular Netherlands and Norway, exported substantial amounts (50.4 and 92.8 bcm, respectively) to other European countries. The major suppliers of international natural gas exports are in Eurasia, MENA, and Asia/Pacific (in particular Myanmar and Indonesia), each providing a substantial share of their production to the world ‘market’. Russia exported, by pipeline, 207 bcm to both Europe (140.6 bcm, including Turkey) and the other FSU states (66.4 bcm), while importing 30.1 bcm of pipeline gas from other FSU states, and exported 14.4 bcm of LNG to the Asia/Pacific region, 13.9 bcm of it to Northeast Asia (Japan, S. Korea, China). Azerbaijan, Kazakhstan, Turkmenistan and other Central Asian states export through pipelines to Russia, Turkey, Iran, China, and each other, with the most substantial exports being to Russia (30 bcm), China (14.3 bcm), and Iran (10.6 bcm).<sup>9</sup> These Eurasian states had no LNG capacity in 2011. Yet they and Russia hold truly vast reserves, far beyond any domestic consumption possibilities, making them potential drivers in the development of natural gas as a primary world energy source.

## 2.2 Projected Demand for Eurasian Natural Gas

Natural gas provides 20.9% of primary energy used, which is expected to grow to 22.4% by 2035 (IEA, 2011b). The BP Energy Outlook 2030 has it growing to 27% by 2030, almost matching the shares of oil and coal, while *Gazprom*, the worlds largest natural gas trader, projects world demand for natural gas to grow to 26% of energy consumption (Gazprom, 2012). In 2010 world consumption was 3.2 tcm, and is forecast to grow to 5.1 tcm in 2030. This growth will be driven by both economic and ecological considerations. In particular, the cost of natural gas per BTU is currently, and is expected to remain, substantially lower than that of oil, with a substantially smaller ‘carbon footprint’.<sup>10</sup> Thus natural gas will increasingly replace oil not only in electric power generation and heating, but also in land and sea transportation as new supporting distribution infrastructure develops. This growth in demand will be particularly strong in the Asia/Pacific region and in the developing world. But two regions stand out as consuming far more than they will produce: Europe and Asia/Oceania, while the FSU, Middle East, and Africa, despite substantial growth in demand, will remain net suppliers to the world. Indeed, Russia and central Asia will need to supply about half of the growing import needs (excess demand) of Europe and Asia/Oceania for natural gas.

Currently, the EU imports some 42% of its compressed (non-LNG) natural gas from/through Russia: 110 bcm in 2010 and 112 bcm in 2011 (well below 2008’s expectations - 160 bcm). If LNG is included, European gas energy imports were about the same (109 bcm in 2010) from MENA and Nigeria. Norway provided 99 bcm to EU countries in 2010, more than in 2011. Overall, imports have been about 67% of consumption (475-500 bcm/year), and this need is expected to grow about 1% per year to 2030, particularly given EU climate policy and aversion (outside France) to nuclear energy. *Gazprom* anticipates European import needs to grow from 270 bcm in 2011 to over 400 bcm in 2030 (Gazprom, 2012). Both Eurasia and MENA are well placed to meet this demand, with Russia dominating the existing infrastructure for meeting it.<sup>11</sup>

<sup>9</sup>In 2011, Azerbaijan supplied Turkey (3.8 bcm) and Iran (0.4 bcm), and Turkmenistan supplied NG to China (14.3 bcm) and Iran (10.2 bcm).

<sup>10</sup>In 2010 to 2012, the cost of natural gas/BTU fluctuated between one-third and one-fifth the cost of oil according to Bloomberg (Gazprom, 2012). It provides the same energy with 53% of the CO<sub>2</sub> emissions of coal and 70% of oil CO<sub>2</sub> emissions (McKinsey for the European Gas Advocacy Forum, 2011).

<sup>11</sup>Currently, the political situation in the middle east, in particular the Iranian nuclear and Arab-Israeli confrontations, poses a substantial obstacle to expansion of middle east gas supply to Europe. The expansion of non-Russian Eurasian natural gas

The Asia/Pacific region is the other major source of net demand for natural gas. The IEA (2012) expects non-OECD Asian natural gas/LNG demand to grow by 3.6% per year to 2030, with both Chinese and Indian demand growing substantially faster (5.8% and 4.8% per year, respectively). Gazprom (2012) anticipates an annual import demand of over 600 bcm in the region in 2030, implying an import growth rate of over 4.7%. This again is demand which Eurasia, given appropriate infrastructure (both pipeline and LNG facilities) development, is well placed to meet. In 2011, about 250 bcm were imported by Asia/Pacific countries, about 83% as LNG, with Japan and South Korea the major consumers (107 and 49.3 bcm LNG respectively), and Taiwan, China, and India each importing 16 to 17 bcm LNG. Currently Russia provides 6.9% of Asia/Pacific LNG, and no pipeline gas; only Turkmenistan is supplying pipeline gas to the region, and only to China (14.3 bcm).<sup>12</sup>

## 2.3 Bringing Them Together: Long-Term Contracting and the Role of Pipelines

Eurasia thus stands in a central position relative to the areas of greatest excess demand for natural gas. However, its reserves remain far from the end points of consumption, without ready sea access and often blocked by rough terrain and political barriers. In addition, as natural gas is an extremely bulky energy carrier,<sup>13</sup> the costs of transportation loom much larger than for other energy sources, particularly over long distances. Finally, those barriers and costs are increasing with the expansion of known reserves, as those reserves (with the exception of some new North American shale gas) are increasingly located in ever more distant and less hospitable terrain.

### 2.3.1 Economics of Pipelines: Risk Sharing in Natural Gas (Large-Scale Investment) Projects

The delivery of natural gas from its source to end use distributors requires substantial infrastructure at very high cost. Pipelines for compressed natural gas (CNG) cost over \$1 million/km, and recent estimates for new pipelines connecting Eurasian natural gas to markets give expected costs of \$5-15 billion. LNG infrastructure is even more expensive in terms of initial fixed costs, which run about \$1000/mmt/year capacity for liquefaction facilities, and about \$1 bil/bcf gasification capacity.<sup>14</sup> In addition, supplying LNG to the market requires specialized transportation vessels costing about \$0.25 bil each. However, sea transport, when possible, renders LNG shipment more cost effective than pipelines when distances are over 4000 km (Masudo, 2009). With the exception of the Russian north and far east (Sakhalin) ‘offshore’ fields, Eurasia doesn’t have this LNG option, and must rely on long distance, compressed gas pipelines for delivery of its natural gas energy. But in either case, vast investments must be made up front, requiring substantial borrowing and/or commitment of own resources, with revenues only beginning to be received years later, for Eurasian (or any other) natural gas supplies to reach end users. This raises a critical question: when the project is completed, with its inevitable delays and cost over-runs, will there be sufficient effective demand to justify those vast initial expenditures?

Energy prices are volatile, and becoming increasingly so, and futures markets for natural gas are extraordinarily ‘thin’, unlike those for oil.<sup>15</sup> Furthermore, actual future physical demand for any specific natural gas supply to Europe is limited by the lack of infrastructure (non-Russian pipelines), as is FSU natural gas supply to Asia.

<sup>12</sup>All the 2011 figures come from BP (2012).

<sup>13</sup>1 million BTU of natural gas is contained in 1000 cubic feet, which is less than 1/6<sup>th</sup> the energy of a single barrel of oil. Although the energy density of LNG is 2.4 times that of natural gas, it is still only about 60% that of oil.

<sup>14</sup>EIA, “LNG Industry Costs Declining,” Report #:DOE/EIA-0637, December 3002, available on <[www.eia.gov/oiaf/analysispaper/global/lngindustry.html](http://www.eia.gov/oiaf/analysispaper/global/lngindustry.html)>.

<sup>15</sup>The only developed natural gas markets are in the United States and Great Britain, although an LNG spot market is rapidly developing in Europe.

source is uncertain (high volatility), creating the serious risk that, after vast expenditures have been made to create the infrastructure, insufficient revenue will be generated to justify the provision of natural gas, particularly if competing energy sources arise. Thus success in the supply of natural gas over long distances requires long-term up-front commitment on both sides of a long-term transaction.

The high and uncertain initial costs, and the uncertainties about future demand, make any natural gas development/export project extremely risky. With compressed natural gas, this riskiness is aggravated by the tie-in effect of a pipeline. A pipeline has the economic structure of a natural monopoly: very high fixed costs, but very low marginal costs, up to pipeline capacity. Thus, once the pipeline is in place, the provision of natural gas, up to built capacity, is far less costly than any other energy source. But unless vast expenditures are made up-front, that cheap energy source will not be available. On the other hand, due to the vast set-up costs and difficulties of transporting commercially usable quantities of natural gas, there will be no alternatives for users who have fitted their equipment for (relatively) cheap natural gas, without incurring high costs of refitting equipment for alternative energy carriers (e.g. oil, coal).

Thus both suppliers and consumers of natural gas face substantial risks, although the benefits to both from a successful relationship can be quite large. A supplier faces *demand/income risk*; after substantial expenditure, he may not be able to earn enough to recoup (capitalized) expenditures on the project, or even to repay the borrowing it required. A consumer faces *energy supply/hold-up risk*; once she is connected to the pipeline, with lock-in to the single source for substantial, needed energy, and very high ‘switching costs’ if that supply is disrupted. Hence, to realize a project and its potential benefits, some form of ‘risk sharing’, insuring against unanticipated changes in supply, demand, or prices, is typically required. A supplier seeks a long-term (25+ years) contract, with some stable pricing formula, and a “take or pay” clause, to guarantee sufficient revenue to justify the project, thereby insuring against income/demand risk. Similarly, a buyer seeks a long-term contract with a stable pricing formula allowing market driven renegotiation, and/or equity in the resource extraction and transportation ventures, giving her some control over the supply and pricing decisions, thereby insuring against the risk of cutoff of needed natural gas supply.

Natural gas pipeline supply faces a further geographic complication: pipelines pass through national territory. Hence, unlike with LNG, there are transit operators who must be paid, but who also have hold-up power and face ‘income risk’ from changes in the flow of natural gas from supplier to end user. This generates *transit risk* that can also be managed through ownership (participation) and/or long-term contracting. Indeed, the “natural monopoly” nature of long-distance pipelines, and the lack of single sovereign control over the pipelines, generates uncertainty that must be ‘managed’ over the long term for the benefits of the pipeline project to be realized.

An expensive ‘solution’ to all these potential hold-up problems lies in “diversification,” a ‘risk mitigation’ rather than ‘risk sharing’ strategy. It involves developing redundant alternatives to each of the pieces of the problem: sources of supply, routes of supply, and other outlets for the product. This is expensive, indeed directly wasteful if there were no hold-up problem on any side, as the natural monopoly nature of pipelines implies that the lowest cost, most efficient way to meet needs and generate income for suppliers is a single route/pipeline (system). But it also provides ‘insurance’, a (second best) alternative, should anything go wrong in the chain of supply/payment.

### **2.3.2 Existing Pipelines and ‘Netback’ Pricing**

Currently almost all Eurasian natural gas is supplied through long-term contracts at pre-determined netback prices. Those contracts are individually negotiated between supplier and user, leading to sometimes sub-



stantial differences among delivery prices to different users, and include regular renegotiation provisions to accommodate changes in the oil product prices on which the netback is based.<sup>16</sup> In almost every case, Russia/*Gazprom* is the supplier and a European country/energy company is the buyer, and supply to Europe's eastern borders is through the massive pipeline system built by the Soviet Union, with European help, beginning in the 1970's (Stern, 2005). The existing system, with its (Russian and NABUCCO) planned extensions, is displayed in Fig. 4 below, where thickness indicates the capacity of the route.<sup>17</sup>

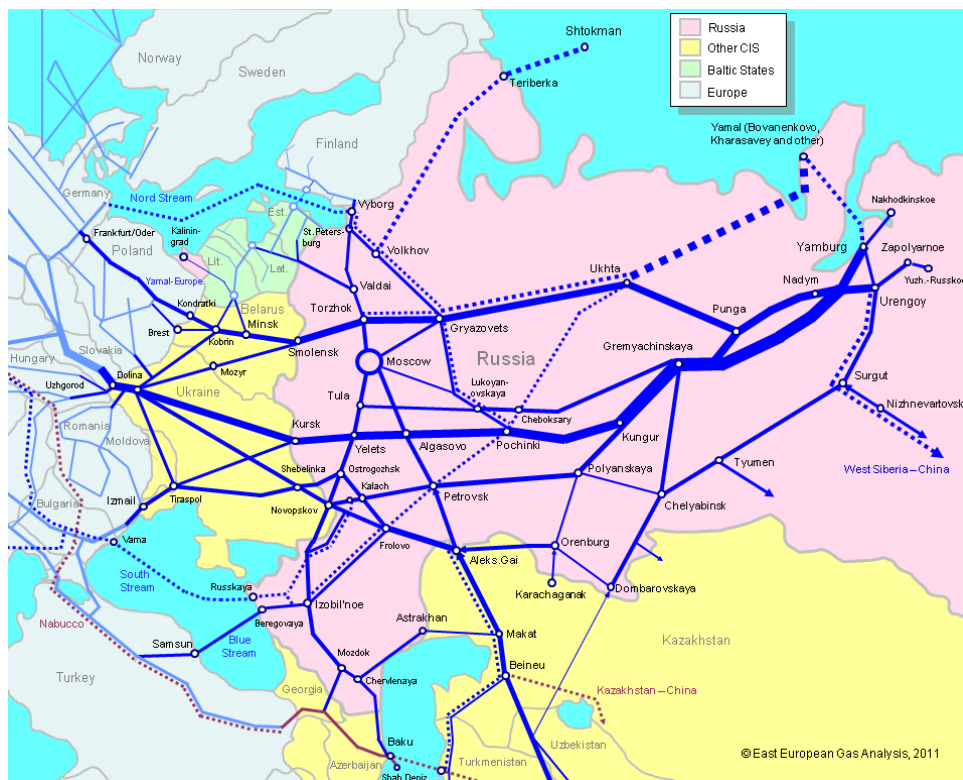


Figure 1: Soviet/Russian Gas Pipelines, Existing (solid) and Planned (dashed)

As oil prices have risen, netback pricing has led to a rise in the average delivery price to Europe, 2005 to 2008, from under \$192/1000 m<sup>3</sup> (\$5.45/1000 ft<sup>3</sup>) to \$407/1000 m<sup>3</sup> (11.55/1000 ft<sup>3</sup>), while Russian domestic gas prices had remained about 1/6 that amount (exchange rate rouble equivalents). Through 2009, FSU states purchasing Russian natural gas faced a subsidized average price rising from about \$49/1000 m<sup>3</sup> to over \$181/1000 m<sup>3</sup> (\$1.40 to \$5.12 per 1000 ft<sup>3</sup>). These prices have continued to steadily rise as Russia/*Gazprom* has moved to eliminate the subsidy.

In 2009, the European average price dropped to \$297/1000 m<sup>3</sup> (8.41/1000 ft<sup>3</sup>) as a result of the collapse in European demand, but has since risen again to over \$415/1000 m<sup>3</sup> (11.75/1000 ft<sup>3</sup>) in 2012 (Gazprom,

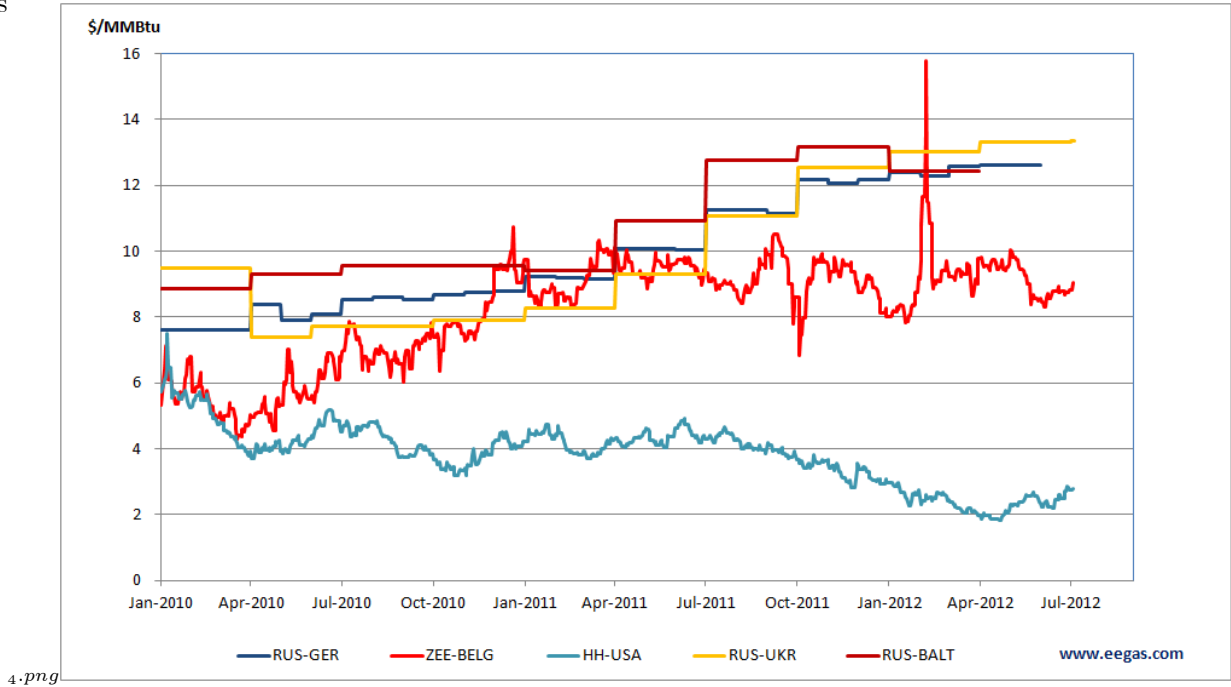
<sup>16</sup>There are 3 main features of long term contracts for pipeline supply of natural gas:

- price formulae take account of oil prices of previous 6-9 months;
- no unilateral termination (except for prolonged *force majeure*);
- take-or-pay provision: must pay for minimum contracted volume, whether taken or not, but can take later, adjusting for new price, after making that period's minimal contracted purchase.

See Gazprom (2012a), Melling (2010), Chapter 1, and Stern (2007) for the history and structure of netback pricing in Europe.

<sup>17</sup>A more detailed map, including detail on access and distribution and the number of parallel pipes on each route, can be found on the *Gazprom* web site, <<http://www.gazprom.com/about/production/transportation/>>.

prices



2012). This rise in price can be seen in Fig. 5 and 6, which illustrate some of the dispersion in prices faced by different consumers, and in particular the extraordinarily high prices now charged the Baltic states and Ukraine. In general, the netback price to non-FSU Europe ranges from \$9 to \$12/1000 ft<sup>3</sup>, while the Russian purchase price from central Asian FSU is about \$7/1000 ft<sup>3</sup> and the Russian domestic price remains frozen at about \$2.40 to industry and \$2.10 to government entities (housing and utility providers, administration, etc.). Some international benchmark (spotmarket) prices for both natural gas and oil are also provided.<sup>18</sup> Recent developments in pricing are also part of the strategic interaction discussed below.

### 2.3.3 Newly Developed (Chinese) Pipelines

Until the last few years, this Soviet-derived network has been the only pipeline outlet for Eurasian natural gas, with the exception of a few limited capacity pipelines to Iran and Turkey for their local use. That has changed dramatically since 2009, as China, in pursuit of energy to support its rapid economic growth, has brought massive investments in energy infrastructure, both domestic and foreign, to fruition. Fig. 6 shows a 2006 map of Chinese planned domestic and connector natural gas pipelines, which were largely completed by 2010 to the west, i.e. toward Kazakhstan.

This domestic development was matched by active engagement in Central Asia, in particular cultivating a relationship with Turkmenistan leading to substantial investment in developing infrastructure and pipelines for the delivery of Turkmen natural gas to China through Uzbekistan and Kazakhstan. This has resulted in the construction of a 1830 km dual pipeline with a capacity of 30 bcm/year, which began transmission in December 2009 will reach full capacity in 2013. The 2006 30-year delivery contract was renegotiated in 2010 to 40 bcm/year through higher pressure, and in 2011 Turkmenistan and China agreed to raise annual

<sup>18</sup>Prices are for energy equivalents, measured in million BTU, where 1 million BTU is carried in 1,000 ft<sup>3</sup> of natural gas. (IEA, 2011)

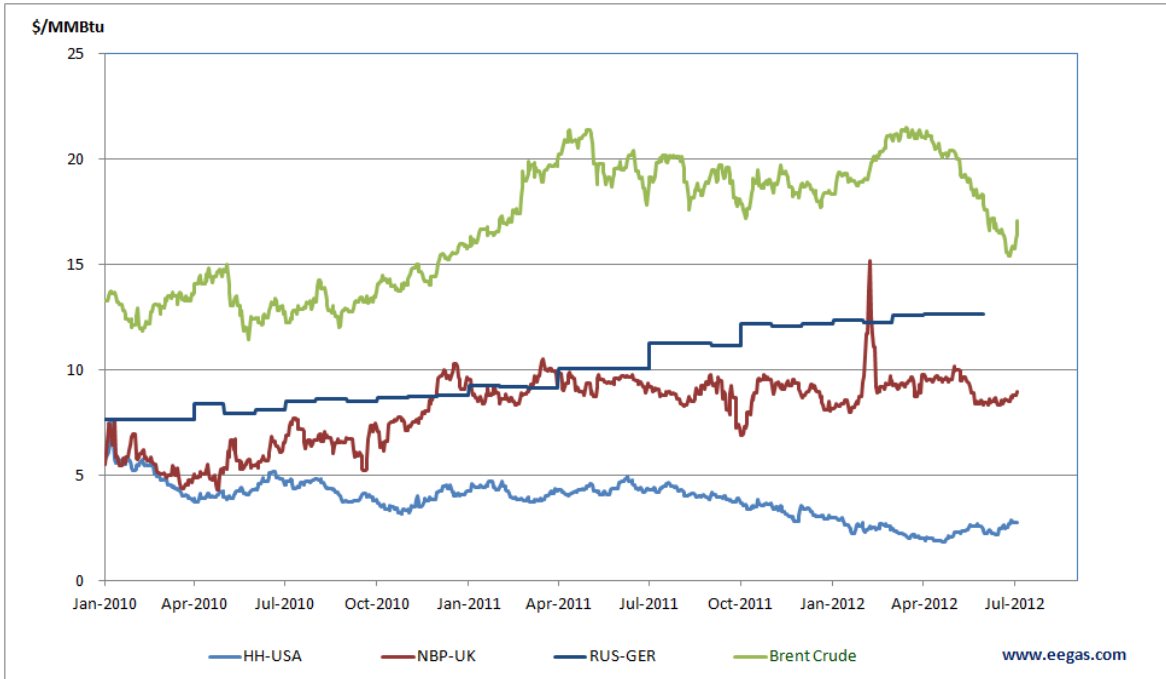


Figure 2: East Asian Natural Gas Pipelines, Existing and Planned 2006



Figure 3: Central Asian Natural Gas Pipelines, Existing and Planned 2011

deliveries to 65 bcm by building a third line reaching capacity of 25 bcm in 2015.<sup>19</sup> This is the only major challenge to date to the Russian monopoly on supply of Eurasian natural gas to the outside world. This system was largely financed and built by China's CNPC, which has also taken an active role in developing new (Bagtyarlyk and South Yolotan) fields in Eastern and central Turkmenistan. This new pipeline, as well as other potential and existing pipelines out of Central Asia are displayed in Fig. 7.

The Chinese challenge to Russian hegemony in delivery of Eurasian natural gas is a boon to the central Asian producers. Kazakhstan and Uzbekistan have already negotiated access to the new Chinese-driven pipeline, which can facilitate development of exports from their reserves and stranded gas.<sup>20</sup> China is also in discussions with Tajikistan and Kyrgyzstan for development of a more eastern route for Turkmen gas to reach China, enhancing the security of Chinese supply and increasing Chinese leverage in these states. China has also shown some interest in the Turkmen and Afghan portions of the TAPI proposed pipeline(s), strengthening cooperation with Turkmenistan and laying the groundwork for greater influence in post-war Afghanistan.<sup>21</sup>

## 2.4 Competing Supplies

Russia and the other Eurasian natural gas producers all face a growing challenge from other suppliers, particularly in supplying Europe but also as they attempt to move into new, rich markets in Asia.

<sup>19</sup>V. Socor, "China to Increase Central Asian Gas Imports through Multiple Pipelines," *EDM* 9(152), 9 August 2012.

<sup>20</sup>V. Socor, "Kazakhstan Expands Gas Transit Pipeline Capacities and Own Exports to China," *EDM*, 9(153), 10 August 2012.

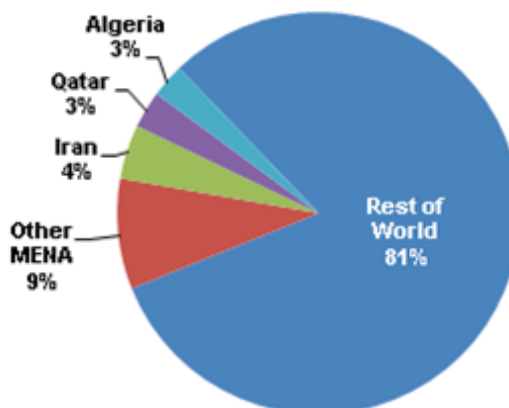
<sup>21</sup>V. Socor, "China to Increase Central Asian Gas Imports through Multiple Pipelines," *EDM* 9(152), 9 August 2012.

### 2.4.1 MENA Pipelines and Problems

As seen above (Fig. 1), half of the top 10 holders of natural gas reserves are MENA (Middle East - North Africa) states, which supply, beyond own consumption, about 19% (Fig. 8) of world natural gas (55 bcf or 1.6 bcm/year). They would be expected to provide greater net supply and hence major competition

Prodn 2009

**MENA share of global dry natural gas production, 2009**



**Source: U.S. Energy Information Administration**

s.png

to Eurasian suppliers, as they do with oil, but for the technical issues of transporting natural gas energy discussed above. Thus, while Algeria and Libya provide trans-Mediterranean pipeline CNG to Europe, the other MENA suppliers must largely provide LNG to the world market; they currently lack large scale international pipelines to the major users.<sup>22</sup> Iran's relations with the West, and the U.S. in particular, pose a major obstacle to further developing the existing limited pipelines for supplying natural gas to Europe, or indeed to South Asia.<sup>23</sup> This presents an opportunity, albeit undoubtedly not long-lasting, for Eurasian natural gas suppliers/producers to strengthen their position in major consumer markets around the Eurasian fringe, and build pipeline systems that would allow them to remain competitive once the Middle East is able to fully compete. It, however, also obstructs the shortest route, across Iran, for Turkmen natural gas to reach world markets, either through pipelines in Turkey or by sea as LNG.

### 2.4.2 LNG: An Emerging market?

Where MENA is apt to have a more immediate impact, barring further major upheaval/war in the region, is through the emerging LNG market. Iran and Qatar currently hold the second and third largest proven and exploited reserves of natural gas with ready access to the sea and rapidly developing LNG capabilities. They are primary suppliers to the Asia/Pacific region, supplying almost 75 bcm LNG of the 207 imported in 2011, including most Indian imports, and almost half of Chinese, Japanese and Korean imports.<sup>24</sup> With its active implementation of new hydraulic fracturing technologies, the U.S. may overtake them through accessing

<sup>22</sup>Both Iran and Qatar have held discussions with India about direct pipelines, stimulated by India's increasingly dire energy situation. The IPI ("Peace") Pipeline (2775 km; \$15+ bil) overland and a pipeline (2670 km) under the Indian Ocean have been discussed. The former is politically complicated and both are extremely expensive, with the under-sea route prohibitively so. See Pandian (2005) and Verma (2007).

<sup>23</sup>These are largely political issues raised by the U.S. active opposition to economic ties with Iran while it pursues development of nuclear weapons potential.

<sup>24</sup>BP (2012). The largest current suppliers to east Asia are regional: Australia, Indonesia, Malaysia, and Brunei. They provided almost 97 bcm in 2011.

shale natural gas, as indicated in the discussion of gas reserves above (Gerard, 2012). However, a substantial portion of U.S. reserves are off shore or in other environmentally protected areas, and the development of shale gas is currently politically contentious, making those reserves inaccessible in the near future. Further, the U.S. is cut off by oceans from the other major users of natural gas, and hence must enter the world LNG market to fully exploit its reserves.<sup>25</sup> When it does, this will be a significant driver of a true world LNG market. While it may take a decade or more for such a unified LNG market to develop, its development is apt to have a depressing effect on natural gas prices through local spot markets, particularly in Europe, limiting the opportunities for market expansion and the earning ability of the Eurasian natural gas suppliers.

### 3 National Strategies

The energy situation in the world economy, coupled with growing environmental/climate concerns about energy use, thus presents both opportunities and threats to Eurasian countries of the FSU. Developments in technology have made natural gas both increasingly plentiful and increasingly necessary to meet environmental goals as ‘alternative energy’ sources remain inadequate, high cost, and problematic in their environmental side effects. Hence there is an opportunity for these countries to profitably exploit their abundant reserves, and for Russia to exploit its strong market position in the richest market, Europe, in pursuit of modernizing development.

As we have noted, however, for most of these countries geography poses a substantial obstacle, and for all these countries the characteristics of gas transportation, the economics of pipelines, create risks and complicate relations between providers and users of natural gas. The lack of a competitive market environment for natural gas, and the lack of quickly accessible alternatives on all sides of pipeline relations, create lock-in, a strong dependence particularly on the part of those receiving and using the natural gas. This opens the door to leverage, to opportunities for “opportunistic behavior” through hold-up, by parties to the relationship — the physical *supply* and *income* risks discussed above. This leverage can be used for both economic (monopolistic/monopsonistic exploitation) and political (influence/change international behavior or domestic policy) ends, and represents a potential threat to both economic well being and national sovereignty.

Thus each of the countries involved with gas energy — as producers, users, and transit providers — naturally develops strategies to deal with this situation, to exploit the opportunities and mitigate the hazards related to their participation in the natural gas energy chain. The structure of the problem leads to 3 sets of strategies, one for each role in the chain, with each country pursuing a mix of strategies depending on its various roles. Here we will briefly discuss the response of the countries in Eurasia to this situation, the strategies that they — suppliers, users, and transit providers — appear to be following in pursuit of natural gas energy and income security. We now look at each of the Eurasian players, starting with the hegemon of Eurasian natural gas supply, the Russian Federation.

#### 3.1 Russia

Russia, because of its location and natural endowment, has been both the largest net supplier and the major transit provider for almost all exported natural gas produced in the FSU. Russia operates through the state-controlled firm, *Gazprom*, which holds a legal monopoly over all gas transportation outside local

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<sup>25</sup>The U.S. imports 88 bcm natural gas from Canada, and a small amount (10 bcm) of LNG from other countries (BP, 2012). As U.S. LNG capacity expands, it will quickly replace these imports and look to outlets in Asia and Europe, given its low cost.

transportation networks.<sup>26</sup> As noted above, it holds a dominant market position in supply to Europe, and a near monopoly in gas supply to the eastern European states.<sup>27</sup> Until 2009, Russia was also a monopsonist with regard to central Asian gas export, controlling the only export pipelines out of the region going to Europe (see Fig. 4). Aside from small amounts piped south to Iran and Turkey, Russia was the sole international purchaser of central Asian natural gas. Russia used this cheap (monopsonistically priced) natural gas both for its own consumption and for supply of western FSU net consumers who, until recently, paid a substantially lower price than Europe.<sup>28</sup> This import allowed Russia to export more of its own gas to Europe where it could receive a higher (netback) price. This advantageous position has allowed Russia to generate substantial, relatively stable revenue that plays a critical role in Russia's national budget and economy.<sup>29</sup> Thus Russian strategies have focussed on maintaining that position, countering the efforts of other Eurasian producing, transit, and consuming states, to develop their own independent access to world/European markets and thereby compete with Russia for those revenues.

Russian strategies in this realm appear to be driven by two primary objectives: (1) Enhance Russian autonomy of behavior, both internationally and domestically, through exercise of influence over energy supplies, thereby restoring Russian influence in the world, and particularly in Eurasia, her "near abroad;" (2) Maintain energy revenues critical to the support of the State Budget, state initiatives and development policies, and social/political stability. The revenues and leverage that Russia's unique position in the supply to Europe of Eurasian natural gas provide are critical components of each. Natural gas pipelines are most significant for the first objective, as most Russian energy revenues derive from oil exports. And the price of oil is a world market phenomenon, not subject to control by Russian state policy, although both oil and gas prices are linked through natural gas price contracts. The lesser importance of gas for state revenues, however, means that it is more useful as a 'lever', since reducing volumes has less significance for the state budget.<sup>30</sup>

The pursuit of both objectives relies on the maintenance of state monopoly control over the export of energy, implemented through *Gazprom*. This allows maintenance of a unified state position on the terms of energy contracts, one embedded in long-term national agreements. The Russian strategy is to maintain long-term netback pricing contracts, with take-or-pay provisions in the contracts, resisting any consideration of spot market gas prices by arguing that they only benefit middleman traders while increasing disruptive volatility (*Gazprom*, 2012). This strategy also involves building, through equity acquisition and operating agreements, down-stream positions controlling as many end-user distribution pipelines as possible, directly selling to final users, thereby securing income flow and influence on both sides of contract negotiations. This strategic objective has faced substantial opposition in Europe, and has met with limited success to date.<sup>31</sup> Indeed, on 4 September 2012, The European Commission announced launching a major anti-trust

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<sup>26</sup> A sole exception may be *Novatek*, a Swiss-registered independent gas trader, which recently signed a contract for export delivery to the German utility, EnBW. It is not clear where this gas is coming from or whether *Gazprom* will give access to its pipeline to implement the contract. See *Vedomosti*, 16 July 2012, and *WSJ*, 6 September 2012.

<sup>27</sup> In 2011, Russia provided 100% of Finish and Baltic gas consumption, over 98% of Bulgarian and Slovakian, 72% of Czech, 65% of Hungarian, about 63% of Polish and Austrian, 56% of Slovenian, and 53% of Greek consumption. It provided nearly 40% of German consumption, and over 26% of EU consumption (CRS, 2012).

<sup>28</sup> Belarus, Moldova, and Ukraine received natural gas at prices near the Russian domestic level through the 1990s and Putin's first presidential term. Since 2004 Russia has pressed to raise gas prices these FSU states pay to European market levels, and by now has substantially succeeded, as can be seen in Fig. 4.

<sup>29</sup> In 2004, oil and gas export revenues amounted to over 25% of GDP and some 40% of the Russian state budget (World Bank, 2006). They still comprise 10.4% of GDP (2011), and comprised half of state budget revenues (World Bank, 2012, p.23). Medvedev has stated that gas provided 20% of state budget revenues in 2008 (*Vedomosti*, 27 May 2008).

<sup>30</sup> This is particularly true as the commercial, albeit state controlled, firm, *Gazprom*, can absorb fluctuations in revenue in ways that the still more decentralized oil industry cannot. As discussed below, this can result in tension between *Gazprom* and the government as they pursue somewhat differing objectives.

<sup>31</sup> By 2008, Russia had secured positions in Armenia, Moldova, southeast Europe, Austria, Italy, Netherlands, Germany, and

investigation against *Gazprom*, which within days was followed by a Russian Presidential Decree blocking *Gazprom*'s direct facilitation of the investigation, raising the matter to the inter-state level.<sup>32</sup> Despite this, *Gazprom* continues to pursue acquisition of distributor assets in western Europe.<sup>33</sup>

These Russian objectives are also furthered by maintaining monopoly/monopsony power over natural gas flows, controlling, where possible pipeline systems, including those in the transit states. Thus Russia has strenuously resisted the European Energy Charter call for 'open access' on demand for other producers, and has rushed to close deals over distribution networks to be 'grandfathered' before the EU "open access" law enters force (end of 2012).<sup>34</sup> And Russia has successfully negotiated, in return for granting contractual price concessions, control over Armenian and Moldovan pipelines, including end-distribution, and the transit pipelines in Poland and Belarus (*Beltransgaz*), and is trying to force Ukraine and Bulgaria to similarly surrender control over their transit pipelines.<sup>35</sup>

This strategy includes building new pipelines, Nord Stream and South Stream, that by-pass the recalcitrant transit states, in particular Ukraine, providing redundant capacity for Russian natural gas supply to Europe, depicted in pink in Fig. 9 below. When these by-passes are completed, they will undercut the 'hold up potential' of the western transit states, eliminating their leverage in price negotiations by insuring that they cannot disrupt deliveries to high paying European customers. They also, by delivering to different points in Europe, allow differentiation among consumers, targeted supply with special terms for political purposes. And finally, they will allow Russia to selectively 'punish' transit states, without jeopardizing her ability to meet contractual obligations to European customers. The northern route, Nord Stream, a joint Russian-German-Dutch-French venture, has now been in operation for over a year, while the southern route, joint with Italy's ENI, has yet to begin construction.<sup>36</sup>

The strategic construction of redundant delivery capacity has been costly in terms of diverted energy production investments, and has raised the question of whether Russia will have the output to eventually fill these pipelines to meet growing European demand. Hence Russian natural gas strategies include plans to greatly expand the development of reserves and the capability to supply new natural gas.<sup>37</sup> The major gas basins intended for further development are illustrated in Fig. 10. Of particular importance for new gas are the Shtokman fields in the Barents Sea, the Kara Sea basin to be accessed from the north shore of Western Siberia including the Bonnavanenko fields of the Yamal Peninsula (See Fig. 11 and 12), Sakhalin, and the

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Great Britain (Ericson, 2009, p. 45). The EU is attempting to separate ownership of supply and of distribution, an effort facing resistance by both Russia and European suppliers. For a concise summary, see "European Pipeline Move Adds to Rift with Russia," *Wall Street Journal*, 20 September 2007, A6. On the lack of Russian success in these efforts, see Vavilov and Trofimov (2012).

<sup>32</sup>See V. Mock, S. Fidler, "EU Opens Antitrust Probe Against Gazprom," *WSJ*, 4 September 2012. On the Russian response see the *RIA Novosti* report from 11 September 2012, on <<http://en.rian.ru/business/>>, and M. Lyutova, et. al., "*Vladimir Putin zashchitil <Gazprom> ot vnimaniia EC*," *Vedomosti*, 12 September 2012.

<sup>33</sup>E. Mazneva, "*Pokhod v Evropu*," *Vedomosti*, 12 September 2012.

<sup>34</sup>See *EDM*, 9(155), 14 August 2012, on *Gazprom* pressure on Croatia to join South Stream as a transit state. Because of the 'Transit Protocol', and subsequent EU 'energy packages' [at <[http://ec.europa.eu/energy/index\\_en.htm](http://ec.europa.eu/energy/index_en.htm)>] enhancing competition in energy markets, Russia has refused to ratify the Energy Charter despite being an early signer.

<sup>35</sup>See *Vedomosti*, "*Belorussia stala gazovoi provintsiei Rossii*," 28 November 2011, on Belarus surrendering its transit pipelines to *Gazprom* in return for a discount in the price and \$10 billion to build a nuclear power station. *Gazprom* is denying a promised 11% price discount to Bulgaria, this year paying almost \$600/1000 m<sup>3</sup>, until it commits to support the South Stream pipeline project, giving *Gazprom* control over the transit pipeline in Bulgaria (*EDM* 9(118), 21 June 2012). Russia is pressuring Ukraine to give over control of her transit pipelines and join the Russia-Belarus-Kazakhstan Customs Union in return for a price reduction from the current \$425/1000 m<sup>3</sup> (*EDM* 9(130), 10 July 2012).

<sup>36</sup>Nord Stream delivered its first gas to the European network on November 11, 2011, finished laying the second undersea pipeline in August 2012, and plans to begin delivering gas 8 October 2012. See *RIA Novosti*, 11 September 2012, and <[www.nord-stream.com](http://www.nord-stream.com)>. South Stream is expected to begin on-shore infrastructure development in Bulgaria in December 2012, after Bulgaria agreed to participation in return for a new lower price contract for Russian gas. See <<http://southstream.info/>> and 29 August 2012 report on <[www.naturalgas.europe.com/](http://www.naturalgas.europe.com/)>.

<sup>37</sup>For a study of the feasibility and expectations related to these efforts, see Sagers (2007). Also see S. Blagov, "Russian Gas Export Plans Face Reality Check," *EDM*, 9(37), 22 February 2012.



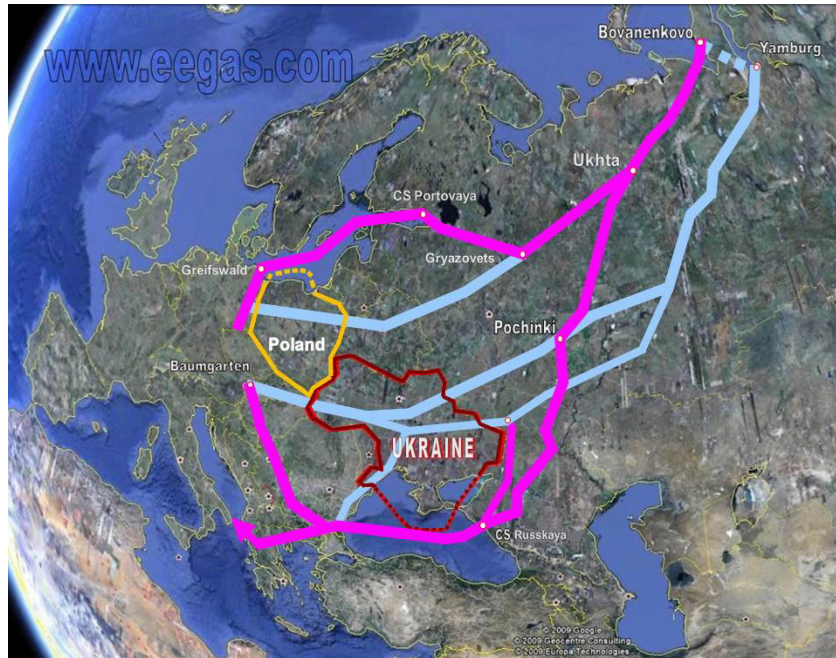


Figure 4: New By-pass Pipelines: Avoiding Belarus & Ukraine (Source: EEG 2012.)

East Siberian Basin (Gazprom, 2012). *Gazprom* plans to be producing 95 bcm additional natural gas from Shtokman, 335 bcm from Yamal, 135 bcm from new fields in Nadym-Pur-Taz West Siberian Region, and 100 bcm from East Siberia and the Far East, by 2030 (Gazprom, 2012). Russia is also taking steps to assert a claim to the reserves under the Arctic Ocean, including planting the Russian flag under the North Pole (New York Times, 2 August 2007).

Shtokman and Yamal were envisioned as supplying Europe through pipelines, as well as supplying the LNG market, although recent *Gazprom* planning has largely focussed on LNG development here. East Siberia and Sakhalin fields are targeted at east Asian demand, both through LNG and through pipelines to China, Korea, and Japan. All of this development has been slower than initially announced, partly due to the demand shocks of the 2008-9 world economic crisis, and partly due to Russia's refusal to allow full production partnerships (production sharing and serious equity participation) by foreign energy majors with the technology and capital to properly develop these fields. Indeed, the development of the Shtokman field appears to have come to a stop, the beginning of production having already been postponed from 2013 to 2018, as Statoil exited the Shtokman Development joint venture on August 7, 2012 (*Kommersant'*, 8 August 2012; *EDM*, 10 August 2012). Total, the other partner in Shtokman Development, has also diversified away from Shtokman by launching a joint LNG venture in Yamal with *Novatek*, an independent Russian gas producer. And on August 29, 2012, the remaining partners decided to cease development, suspending the project indefinitely.<sup>38</sup> Despite *Gazprom's* bravado in making the announcement, saying available gas supplies were sufficient, this raises a serious question about *Gazprom's* ability to meet its future supply commitments.

Russian strategy has also long included securing other FSU producers' natural gas to support its supply to Europe, using control over all the export pipelines out of the region. It was able to exploit its monopoly position to pay extraordinarily low prices (\$80-90/1000 m<sup>3</sup>) for this gas until 2009, when new export pipelines out of the region opened to China, and Turkmenistan was able to demand a higher price. Despite

<sup>38</sup> "Shtokman zamerez," *Vedomosti*, 30 August 2012.

## Major Russian gas basins



Source: IEA

Figure 5: Schematic of Basins and Pipelines, Existing and Proposed

Russia/*Gazprom* then offering \$245/1000 m<sup>3</sup>, Turkmenistan cut its supply to 10 bcm, preferring to supply China, thereby beginning to repay Chinese investment in the pipeline. In addition to raising its offer price, Russia has proposed developing a new Caspian Coastal (*Prikaspiysky*) Pipeline for Turkmen and Kazakh natural gas, and expanding the Soviet Central Asian Centre Pipeline for all central Asian producers, providing an outlet for their expanded reserves and new production capabilities. And *Gazprom* is seeking involvement in the development of those fields to give Russia a say in how the gas is sold.<sup>39</sup> These enhanced pipelines would create relatively low cost export routes for central Asian natural gas, undercutting the economic rationale for their developing new export pipelines, and preserving Russia's market power over natural gas exports to Europe. This strategy is coupled with that of working to block other export routes to the west, in particular the proposed trans-Caspian pipeline to Azerbaijan feeding any "southern route" through Georgia and Turkey to Europe.<sup>40</sup>

In addition to the new and enhanced pipelines securing central Asian gas, Russia is strategically committed to developing new pipelines to east Asia, exploiting its potential development of East Siberian reserves

<sup>39</sup>See, for example, S. Blagov, "Russia Struggles to Revive Energy Ties to Turkmenistan," *EDM*, 6(230), 15 December 2009.

<sup>40</sup>Thus Russia has raised ecological objections to the trans-Caspian route, preventing general agreement of the littoral countries required for development of such a project to begin. See Blagov (2006) and *EDM*, 4(174), 20 September 2007. Also see *EDM*, 8(218), 1 December 2011, on the Russian effort to discourage Western participation in the development of Turkmen natural gas and its export pipeline. Iran has also been an obstacle to an agreement on the use of the Caspian Sea. See *EDM*, 8(88), 6 May 2011.

Fields map



11.pdf

Figure 6: Yamal Fields (Source: EEG, 2012)



Figure 7: Gas Pipelines of Western Siberia (Source: EEG 2012)

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Figure 8: Northeast Asia Pipelines (Source: Economic Research Institute for Northeast Asia in Japan)

and providing alternatives to others' new pipelines to the region. These include an East Siberian-Pacific Gas Pipeline (paralleling the ESPO oil line), the Altai Gas Pipeline proposal to western China, a Sakhalin-Khabarovsk-Vladivostok potentially extending to China, and a recently discussed Korean pipeline (Shin, 2011), serving North Korea as a transit state while supplying the high-price South Korean market. South Korea currently pays among the highest prices, \$715 per metric ton (\$13.75/1000 ft<sup>3</sup> or \$486/1000 m<sup>3</sup>), for imported LNG, its only natural gas source, and hence can be an extremely lucrative market if North Korea cooperates. These largely potential pipelines are displayed in Fig. 13.

An important component of the Russian strategy is the systematic building of excess pipeline capacity for export in all directions, with promises to deliver more than they can expect to produce. For example, 160 bcm/year has been promised to the EU by 2015, and up to 80 bcm/year to China by 2040 which will require development of both Shtokman and east Siberian gas fields, and supporting pipelines, to meet both commitments simultaneously. Thus Nord Stream will add, when completed, 55 bcm delivery capacity<sup>41</sup> and South stream, when fully built, 63 bcm capacity to Europe, for which there are no supplies of natural gas without diversion from the Ukraine and Belarus pipelines. New pipelines from Western Siberian fields are under construction, and a new Murmansk-Volkhov pipeline is planned for Shtokman gas, but there is no indication that there will be enough gas produced to fill these, particularly given the “freezing” of the development of Shtokman, or indeed enough effective demand at the end to justify its production. Still, this development makes strategic sense for Russia, as it mitigates demand risk, reducing the monopsony power

<sup>41</sup>The first line with a capacity of 27.5 bcm was completed in December 2010, and is currently operating, albeit below that capacity. In August 2012 it was used to deliver gas when the Yamal-Europe line was shut down for 40 hours for repairs, demonstration an ability to supply Europe without using the transit states. *WSJ*, 29 August 2012.

of large consumers at the end of supply pipelines.

Finally, the Russian strategy aims to leverage its strong position in natural gas supply to reinforce its autonomy with respect to both domestic policy and its international behavior.<sup>42</sup> Russia insists in international negotiations on agreements respecting sovereign rights over energy decisions of each nation/state, and on block agreements imposing foreign norms on Russian behavior/decisions. Thus Russia has refused to ratify the EU Energy Charter, despite being an initial signatory.<sup>43</sup> Russia appears to systematically, demonstratively, but carefully exercise ‘hold-up’ power to influence others’ policies. Thus the Baltic states, Belarus’, Moldova, Ukraine, and Georgia have faced cutoffs of energy supplies as Russia tries to make a point about their domestic policies or international stance, as well as gas pricing and pipeline control.<sup>44</sup> And this has not gone unnoticed in the European Union, as can be seen in its discussions around the European Energy Program and Charter.<sup>45</sup> Russia has arguably secured European quiescence in the face of its cyber attacks on Estonia, intervention in Ukrainian elections, and active support of separatism, under the guise of ‘peacekeeping’, in both Moldova (Trans-Dnestria) and Georgia (Abkhazia and South Ossetia). The prior provocation and invasion of Georgia in August 2008 faced only mild European protest and later received an EU Commission whitewash.<sup>46</sup> Similarly, Putin’s Russia rejects any outside commentary on its domestic policies and elections, blocking foreign activities in Russia and repressing political opposition without fear of international repercussions. Russia’s strong position as a recognized energy colossus, if not superpower, gives it the confidence to do so. (Saivetz, 2007).

### 3.1.1 Russia vs. *Gazprom*?

Russian strategies with respect to natural gas potential and exports are implemented largely through the state controlled, ostensibly commercial, corporation, *Gazprom*. While from a distance they can appear to be fully united in the pursuit of Russian state interests, tensions occasionally surface between management of the commercial enterprise and the objectives of the state. Russia wants: (1) political leverage; (2) income for state; and (3) support of domestic industry and living standards; *Gazprom* wants its own empire and profitability. The primary issue is thus the extent to which *Gazprom* is able to pursue commercial interests separate from the interests of the Russian state. In part, the tensions arise due to *Gazprom*’s dual roles of monopoly exporter of Russian and much of Eurasian natural gas, and of dominant domestic supplier of natural gas to Russian households, commercial, and governmental organizations. *Gazprom* currently has a 75% share of Russian natural gas production, a near monopoly over distribution to end user networks through its (Soviet inherited) unified gas supply system (UGSS), and a monopoly on exports from and through Russia.

In the latter role, there is little room for tension; maintaining market power with respect an essential product to its users is both profitable and influence enhancing. There might be disagreement over tactics — degree of pricing flexibility and room for renegotiation in long term contracts — but there is ultimate

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<sup>42</sup>Russia’s willingness to use energy as a political instrument is analyzed in Casier (2011).

<sup>43</sup>Putin clearly stated Russia’s objections and unwillingness to be bound by its restrictions in the third Valdai Club Meeting with foreign journalists and specialists in 9 September 2006. *EDM*, 3(170), 15 September 2006.

<sup>44</sup>Such ‘strategic’ use of the new Nord Stream pipeline for political leverage is clearly noted in the editorial, “Advantages and Costs of Nord Stream,” *Vedomosti*, 9 November 2011.

<sup>45</sup>See “Values, Energy Compete as European Parliament Debates Russian Policies,” *RFE/RL Report*, 22 October 2008, and the articles in the symposium on the geopolitics of European energy supply in *Geopolitics*, 16, 2011, especially the symposium editors’ introduction, Bosse and Schmidt-Felzmann (2011).

<sup>46</sup>See “Russia Neutering the Council of Europe after Invasion of Georgia,” *EDM*, 5(184), 25 September 2008. On August 8, 2012, Putin publically admitted that the invasion of Georgia had been long planned, and Georgia was intentionally provoked to provide a pretext. *EDM* 9(152), 9 August 2012.

agreement over the thrust of strategy. That strategy is to maintain production, market share, and a (near) monopoly position in European markets, using by-pass pipelines – a ‘pincer movement’ – to avoid transit disruptions, while maintaining long-term fix-price contracts.<sup>47</sup> *Gazprom* is attempting, with Russian government help, to negotiate more stable long term prices with EU, and indeed has recently succeeded in doing so.<sup>48</sup> *Gazprom* is looking to replace Libya in supplying natural gas to Italy, through South Stream and the BTGI Interconnector pipelines, which will also undercut any European by-pass (e.g. NABUCCO) to Central Asian natural gas, and is also looking to supply new LNG to Japan after Fukushima. All this is integral to the Russian state strategies discussed above. One divergence, however, is in the development of new far eastern pipelines, a strategic interest of the state. Thus there is little chance of East Siberian Gas Pipeline (Kovytkā–Altai–West China) unless forced by Russian state; it, like the Shtokman reserves, appears to *Gazprom* too costly to commercially justify.

There is more room for disagreement about domestic policies. Here *Gazprom*’s profit motive conflicts with the Russian state’s need to provide ‘rents’ to key constituencies, political, economic and social (Gaddy, Ickes, 2005). The state has a primary interest in maintaining domestic tranquility and control, and so is willing to sacrifice (*Gazprom*’s) profits, and delay structural reforms it recognizes as necessary, to avoid social and political unrest. The maintenance of relatively low domestic prices and the redistribution of net export earnings are both critical to achieving this objective. Hence increases in domestic gas prices are limited, and some competition in domestic supply is encouraged, in particular by opening access to *Gazprom*’s domestic pipelines in a new “Law on Associated Gas and Access to UGSS.”<sup>49</sup> *Gazprom*, however, wants equalized export and domestic prices, and until then invests most to maintain export potential ahead of developing new gas. Indeed, for much desired commercial development, *Gazprom* needs capital the Russian State won’t allow it to retain from earnings, or give to it. Thus the main divergence between Russian state and *Gazprom* interests lies in the subsidization of domestic Russian consumption, by both households and producers, of natural gas and the reallocation of *Gazprom*’s export earnings to higher state priorities. In addition, growth in *Gazprom*’s capitalization and profitability requires greater contractual flexibility and commercial risk sharing through equity swaps than Russian state policy currently allows.

### 3.2 Central Asia and Azerbaijan

The other Eurasian net suppliers, as economically underdeveloped, energy-resource rich, and only recently sovereign states, have a common primary objective of maintaining that sovereignty. Their strategies revolve around exploiting those resources to maximize national income and autonomy. However, they were all initially constrained by the legacy of the Soviet Union — a unified Soviet pipeline system channeling all output, beyond local consumption, to and through Russia (Fig. 3 above). And they are all inherently limited in the pursuit of this objective by geography — their location is far from rich consumers, across difficult terrain. This leaves them susceptible to Russian monopsony exploitation, which indeed was practiced for over a decade after the demise of the Soviet Union.

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<sup>47</sup>In 2009, *Gazprom* sacrificed European market share to spot markets in order to maintain the net-back pricing principle. *Gazprom* (2012).

<sup>48</sup>At present, *Gazprom*’s portfolio of signed long-term contracts (apart from prospective volumes through the South Stream gas pipeline) obliges the Company to distribute at least 3.1 trillion cubic meters of gas beyond the FSU during the contracts validity period (up to 25 years), which is equivalent to the export revenue of USD 1 trillion (at current prices). Recent long-term contracts include German, French and Italian energy companies and utilities, under intergovernmental agreements, and most east European and Balkan countries. See <<http://www.gazprom.com/about/marketing/europe/>>

<sup>49</sup>See discussion in Simon Pirani, “Liberalisation Heralds Change in the Gas Market,” *Russian Analytic Digest*, No. 100, 26 July 2011, p. 10-13.

Thus the strategy of each of these states is built on pushing away from the inherited Russian grip on their natural gas resources and policy, breaking dependence on Russian demand. That involves limiting dependence on *Gazprom*, bringing in Western majors as development partners, but maintaining full national sovereignty over resources on their own territory. To maintain and further enhance revenue from natural gas sales, these states initially tried to negotiate higher sales prices to Russia, generally unsuccessfully until 14 December 2009, when the Russian monopsony was broken.<sup>50</sup> That was a consequence of having pursued a strategy of trying to develop new outlets to other consumers than Russia, in particular China, leading Russia/*Gazprom*, as discussed above, to offer a higher price.

There also have been long and inconclusive negotiations with Europe, and each other, on developing a trans-Caspian “southern route” across Turkey (NABUCCO and its competitors – see below) to bring potential Turkmen, Uzbek, and Kazakh natural gas to high-paying European customers. But that remains an unfulfilled promise, despite limited volumes of Azeri gas being delivered to Turkish pipelines through the BZE pipeline. Rather, China has entered as an active Russia/*Gazprom* counterweight. The breakthrough came with the Chinese financed 1822 km Trans-Asia Pipeline through Uzbekistan and Kazakhstan to China, which is managed by a new “Trans Asia Gas Pipeline Company, Ltd.,” owned 50-50 by China and the nation in which it is located (Fig. 7). Kazakhstan and China have also completed a Kazakhstan-China pipeline.<sup>51</sup> And China is proposing diversifying routes out of Turkmenistan, mitigating any transit hazards it may face, by building a new 30 bcm/year pipeline through northern Afghanistan and Tajikistan. In addition to insuring China, this route-diversification will provide Tajikistan an alternative to total dependence on Uzbek natural gas supply and transit.<sup>52</sup>

Another common strategy has been to begin developing new natural gas deposits, enhancing energy sales potential. Azerbaijan and Kazakhstan have actively involved western companies, as well as *Gazprom*, attracting foreign investment without sacrificing control, and after the death of the Turkmenbashi, Nayazev, even Turkmenistan has allowed western estimates and audits of its natural gas potential.<sup>53</sup> And Turkmenistan has recently allow China not only to finance, build, and own pipelines on its territory, but has also allowed CNPC to enter a production sharing agreement for development of a new field (Bagtyarlyk).<sup>54</sup> One consequence has been the vast expansion of known usable natural gas reserves noted (Section 2.1.1) above, and hence strong incentives for foreign investors and energy majors to support its access to world markets.

Without such access, the strategy of expanding gas production is of limited value. Europe, South Asia, and North-East Asia present a substantially higher paying demand than China, but new pipelines across vast distances are needed to access it. While China can potentially absorb all gas sent eastward out of central Eurasia, South Asia (India, Pakistan) presents a pipeline opportunity across Afghanistan. Iran, containing the shortest route from Turkmenistan to the sea and hence to pipelines east and west, once its political issues with the West are resolved, is also a potential valuable route. Thus there have long been discussions with western majors and the relevant countries about TAPI pipelines to the south (Fig. 7) fed by the Turkmen Dauletabad field.<sup>55</sup> This would supply two economies with rapidly growing demand for natural gas, Pakistan

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<sup>50</sup>V. Socor, “Three Central Asian Countries Inaugurate Gas Export Pipeline to China,” *EDM*, 6(230), 15 December 2009.

<sup>51</sup>V. Socor, “Kazakhstan Expands Gas Transit Pipeline Capacity and Own Exports to China,” *EDM*, 9(153), 10 August 2012.

<sup>52</sup>V. Socor, “Beijing Proposes Turkmenistan-China Gas Pipeline Through Northern Afghanistan,” *EDM*, 9(116), 19 June 2012.

<sup>53</sup>The first major revisions were in 2009 and 2011 by Gaffney, Cline, and Associates (*EDM*, 8(128), 1 December 2011). The slightly more conservative BP estimates are presented above. See V. Socor, “BP’s Appraisal Doubles the Proven Reserves of Turkmenistani Gas,” *EDM*, 9(137), 19 July 2012.

<sup>54</sup>“Three Central Asian Countries Inaugurate Gas Export Pipeline to China,” *EDM*, 6(230), 15 December 2009.

<sup>55</sup>See J. Foster, “Afghanistan, the TAPI Pipeline, and Energy Geopolitics,” *Energy Security*, <www.ensec.org>, 23 March 2010.

SMALL

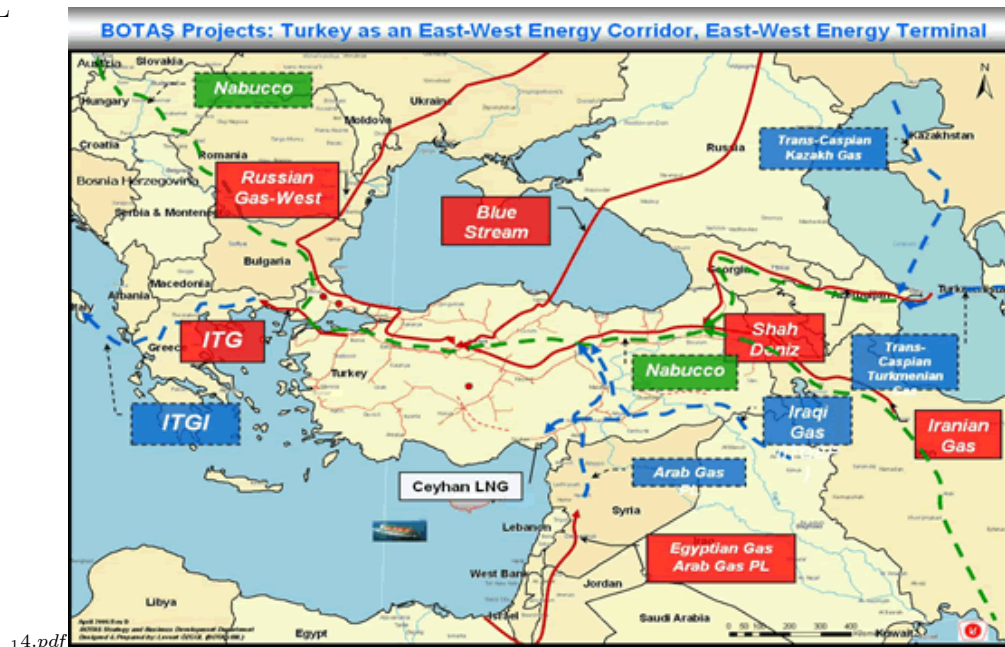


Figure 9: Turkey as Natural Gas Transit State

and India, in competition with potential Iranian and/or Qatari pipeline gas.<sup>56</sup> TAPI development, however, awaits greater political and security stability in the key transit state to the south, Afghanistan. And that route may become dominated by a southern route through Iran, if political change comes there first. The development of new Turkmen gas from new South Yolotan-Osman fields (Galkynysh zone), and Shah-Deniz 2 in the Caspian, has added urgency to developing a new route to the west. The strategic answer is to develop a trans-Caspian pipeline to connect central Asia to Europe through Azerbaijan, Georgia, and Turkey, shown in Fig. 14. In preparation, Turkmenistan has begun building a 30 bcm capacity pipeline from its interior to the Caspian shore. Its trans-Caspian extension has so far been blocked by Russian opposition, a key part of Russia's strategy discussed above.<sup>57</sup>

The European Commission has long focussed on developing access the Eurasian natural gas that avoids dependence on Russia, as a matter of energy security. In October 2002, with EU encouragement, an Austrian (OMV Gas & Power) led consortium, NABUCCO,<sup>58</sup> was formed to develop a "southern by-pass" of the Russian pipeline system, insuring against potential cut-off, whether for economic or political reasons. The project has stumbled along for a decade without real progress toward developing an adequate pipeline,<sup>59</sup> while Russia has substantially expanded its capability to deliver natural gas to Europe, bypassing the transit states. That, together with proposed enhancement of its central Asian pipelines (Centre and *Prikaspiisky*), gives Russia a greater lock on the delivery of Eurasian natural gas to the west, depriving central Asia and Azerbaijan of significant independent access to high paying Western users.

Azerbaijan has found this situation unacceptable as its 'Shah-Deniz 1' field reaches capacity, and 'Shah-

<sup>56</sup> There have been discussions, and some preliminary agreements, about an Iran-Pakistan-India (IPI, aka "peace," pipeline), and looser discussions of a subsea Indian Ocean pipeline, both fed from the South Pars field in the Persian Gulf, split between Qatar and Iran. See Verma (2007).

<sup>57</sup> V. Socor, "Timely Development Essential for Bringing Turkmen Gas to Europe," *EDM*, 8(218), 1 December 2011.

<sup>58</sup> For a brief history of NABUCCO see <<http://www.nabucco-pipeline.com/>>.

<sup>59</sup> See "Confidence in the Nabucco Project Fading," *EDM*, 9(21), 31 January 2012.



Deniz 2' readies for production. It anticipates producing 50-55 bcm per year by 2025, most of which is destined for export (*EDM*, 9(38), 23 February 2012). Thus it is taking the initiative (and risks) in developing a new export route, without specifically contracted demand, based on the success of the BTC oil and BZE (South Caucasus Pipeline to the Turkish border) gas pipelines. In 2011-12, Azerbaijan signed a series of agreements with Turkey to build a new Trans-Anatolia (TANAP, aka BOTAS) pipeline for which it would take primary financing responsibility and ownership (80%). It will begin operating in 2018, when Shah-Deniz 2 will begin producing.<sup>60</sup> This pipeline would run from the Georgian border to the European border, rendering most of NABUCCO irrelevant and reducing it to an extension of the TANAP pipeline (Nabucco West, from May 2012).<sup>61</sup> In support of TANAP, the South Caucasus Pipeline is being expanded from 8 to 23 bcm capacity by 2017, while TANAP will increase its capacity to 24 bcm in 2023, to 31 bcm in 2026, and ultimately to 60 bcm if Turkmen gas becomes fully available.<sup>62</sup> It provides a direct strategic challenge to Russia's South Stream Ukrainian by-pass pipeline, despite its initial small scale, by depriving Russia of the prospect of supplying Caspian natural gas through that pipeline. The TANAP pipeline will thus guarantee Azerbaijan access to external customers independent of Russian energy policy.<sup>63</sup> It has also altered Europe's understanding and approach to its Southern Corridor gas supply diversification project, with the European Commission in early 2012 incorporating TANAP into its southern corridor planning (*EDM*, 9(108), 7 June 2012) and other European pipeline projects adjusting to its reality (*EDM*, 9(148), 3 August 2012).

These strategic developments have begun to level the playing field with Russia. Chinese competition, and the Azeri initiatives, have forced Russia to economically compete for central Asian natural gas, substantially raising the prices it offers, and perhaps stimulating future Russian provision of direct access, through *Gazprom* pipelines, to Europe and beyond. And continuing Russian interest in central Asian gas gives these producers the ability to bargain for better terms from China, once the initial (25 year, with extensions) contracts, paying off Chinese investments, come to an end. This improved situation will only be further enhanced if/when additional outlets to the south and west become available.

### 3.3 Eurasian Transit States

The Eurasian transit states, with the exception of Russia, have a similar strategic energy focus to that of non-Russian Eurasian producers – to maintain and enhance sovereignty, and to stimulate economic growth and development. Russia, as argued above, uses its unique transit position in the supply of Europe to enhance its market power and leverage over the FSU states. It is working to maintain this position through active *Gazprom* participation in infrastructure, both production and transportation, development in the central Asian gas producers, including enhancing the Asian Centre pipeline and signing preliminary agreements on developing the new *Prikaspiisky* pipeline.<sup>64</sup> While it was unable to forestall Chinese infrastructure investment in export pipelines to China, Russia has begun actively competing on price to attract natural gas supplies through its pipelines, taking advantage of the fact that Europe pays a far higher price than China. And as we have seen, Russia actively opposes development of the trans-Caspian pipeline that would give central

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<sup>60</sup>It will initially upgrade and use existing Turkish pipes, but later develop second and third parallel lines. 6 bcm/year is intended for Turkish consumption and the rest for export to Europe. See S. Kardas, "Turkey Reiterates Commitment to South Corridor with Trans-Anatolia Pipeline," *EDM*, 9(1), 3 January 2012, and V. Socor, "Direct Road to Europe: Azerbaijan's Trans-Anatolia Gas Pipeline," *EDM*, 9(2), 4 January 2012.

<sup>61</sup>See V. Socor, "Post-Nabucco Era in Caspian Pipeline Business and Politics," *EDM*, 9(24) 3 February 2012, and "Nabucco West Selected for Caspian Gas Delivery to Central Europe," *EDM*, 9(124), 29 June 2012..

<sup>62</sup>V. Socor, "Aliyev, Ergodan Sign Inter-Governmental Agreement on Trans-Anatolia Gas Pipeline to Europe," *EDM*, 9(122), 27 June 2012.

<sup>63</sup>Of course, a Russian invasion of Georgia could cut Azeri access to this pipeline, forcing gas back through Russian pipelines.

<sup>64</sup>See *NYT*, 13 May 2007, and *EDM*, 4(96), 16 May 2007.

Asian producers alternative access to Europe.

The other central Asian states serve as both end users and transit routes for Uzbek and Turkmen natural gas, as it moves to Russia or, since 2009, to China. All seek to enhance revenue through alternatives to Russian export routes, and all are actively engaging China in development of export routes. Tajikistan and Kyrgyzstan, not currently transit states, have recently been seeking transit roles to partake in revenues from export to China, apparently with Chinese encouragement. They also seek greater energy security in diversifying from dependence on supply through Uzbekistan alone. Afghanistan, another potential transit state, has expressed interest in the various TAPI proposals and a Chinese proposed Turkmen-China pipeline that would provide it with energy as well as earn transit revenues.<sup>65</sup> Their interests and strategies are fully consonant with those, discussed above, of the central Asian producers.

The critical transit states in posing problems for the realization of Russia's strategic objectives, have been those to the west, between Russia and Europe. Ukraine, Moldova, and Belarus all sit astride parts of the natural gas pipeline system the Soviet Union built for energy exports to Europe. This makes them both overwhelmingly dependent on Russia for natural gas energy, and critical components of Russia's ability to sell to the European market. Moldova, the poorest country in Europe with limited transit capacity, has sought accommodation, surrendering control of its pipelines for fading price guarantees.<sup>66</sup> Belarus, despite much rhetorical bluster to the contrary, has abandoned resistance to Russian encroachment, turning over its energy infrastructure, and seeking salvation through an economic union with Russia.<sup>67</sup> It hopes to maintain transit relevance, despite being rendered unnecessary for gas supply to western Europe by the Nord Stream by-pass pipelines, by being 'lower cost' and 'more secure' for Russia than the alternatives (Nord Stream and Ukraine, respectively). And Belarus remains a critical conduit for sale of Russian oil to western Europe through major pipelines now again under Russian control. In return, Belarus has secured continuing subsidization of its natural gas consumption, and numerous other direct and indirect subsidies for its unreformed economy.

The most important transit state, with some 80% of pipeline capacity to Europe, is Ukraine, which is also a substantial consumer of Russian supplied natural gas (37.6 bcm in 2009; 40 bcm in 2011). Following the collapse of the Soviet Union, Ukraine provided low cost transportation for Russian gas to central, western, and southeastern Europe, and paid a very low price for the gas it received. As Russia has sought to raise the price to European levels, Ukraine has faced substantial pressure, including supply cutoffs in January 2006 and 2009, to sign new high price long-term contracts. Russia has offered continued lower prices for control of Ukrainian gas transport infrastructure, but Ukraine has resisted, resulting in the disruption of gas supply to Europe.<sup>68</sup> In 2010, following the February election of Viktor Yanukovich, the Russian supported candidate, as President of Ukraine, Russia delayed price increases, turning to annual contracts, in return for political concessions, including a new long-term lease giving Russia control over the Sevastopol Naval base until 2042 (*RIA Novosti*, 21 April 2010) Thus Ukraine has received a series of contracts in which the price it pays has risen inexorable to above western European levels in 2012.

The Ukrainian strategy of attempting to use transit leverage to negotiate long term lower natural gas prices has failed, although Ukraine retains ownership of its own gas transportation infrastructure.<sup>69</sup> That

<sup>65</sup> *EDM*, 9(116), June 19, 2012, and Foster (2010).

<sup>66</sup> Here, as in Georgia, Russia has protected a break-away province, Trans-Dnestria, blocking OSCE activity on the issue, and pressuring Moldova to accept this division of its sovereignty.

<sup>67</sup> "Gas Deal with Belarus Gives Control of Pipeline to Russia," *NYT*, 25 November 2011, <[www.naturalgaseurope.com/russia-belarus-gas-discounts](http://www.naturalgaseurope.com/russia-belarus-gas-discounts)>, 17 August 2011, on price discounts offered by Russia, and the Belarussian *BelaPAN* report on resulting enhanced transit revenues, <<http://udf.by/english/economy/61067>>.

<sup>68</sup> *Gazprom* has explicitly stated that the "fate of South Stream depends on Ukraine" – if Ukraine gives its natural gas infrastructure into Russian control, then there is no need for the costly "by-pass" route. See *Vedomosti*, 27 December 2011.

<sup>69</sup> Also see the discussion of negotiations over purchase and transit prices, which Ukraine hopes to raise, in *EDM*, 8(86), 4

infrastructure is now, however, quite old and increasingly prone to breakdown. *Gazprom* has argued that it should have some ownership and sufficient control to maintain that infrastructure, as the pipelines are largely used to support its sales to Europe. Unwilling to give up control, Ukraine has made inviting the European Union into management/maintenance of its pipelines as part of its strategy, proposing a Consortium that would leave Gazprom with a minority share.<sup>70</sup> This would undercut the rationale for the Russian/*Gazprom* pipeline ‘pincer movement’ by bringing the EU to the Russian border with lower costs for transit, without surrendering control over the transportation system to Russia/*Gazprom*. A final critical component of the Ukrainian strategy is reduction of dependence on Russian natural gas. Ukraine is refusing to recognize “take or pay” clauses in its purchase contracts, arguing that E.On, ENI, and other European buyers have been able to negotiate around them, and has cut back substantially on purchases in 2012.<sup>71</sup> The Ukrainian national energy strategy also envisions developing its own natural gas production, including shale gas, and building facilities for LNG import.<sup>72</sup> In particular, Ukraine has been seeking to join the “shale revolution,” inviting western ‘majors’, Shell and Chevron, to extract shale gas (*EDM*, 9(97), 22 May 2012). In 2007 and 2008, Ukraine also proposed a new Black Sea pipeline from Georgia to Odessa, called “White Stream,” to bring Azerbaijani (and potentially Central Asian) natural gas directly to Ukraine without transiting Russia.<sup>73</sup> All these Ukrainian strategies, including the use of pipeline ‘hold-up’ power, are directed at reducing, if not , avoiding pipeline ‘lock-in’ as a dependent of the sole supplier, Russia.

There is one further strategically significant pair of transit states for Eurasian natural gas, Georgia and Turkey. Both must import most of their own consumption of gas, and each is critical for Caspian natural gas. As states sitting on the only transit route substantially free of Russia, they have been central to European discussions of “energy security.” They comprise the “Southern Route” for pipeline supply of Eurasian natural gas to Europe. Even if Iran becomes an acceptable conduit and alternative source of natural gas for Europe, Turkey remains a critical pipeline route. This route solves the European problem of diversification of supply, were it to contain pipelines of sufficiently large capacity supplying natural gas at a competitive cost to the Russian pipeline system. Until a new era of abundant and cheap LNG arrives, this route is essential to the provision of large volumes of Caspian and central Asian natural gas to Europe. Europe’s hesitation and indecisiveness in pursuit of this option, the endless procrastination with respect to NABUCCO, is what led Azerbaijan to assume decisive leadership in beginning to develop this route, as argued above.<sup>74</sup> A critical step in this development has been bringing Turkey actively into the project, as Georgia has long been committed to Shah-Deniz Consortium projects such as the SCP. After a Russian cut-offs in 2006-8, and a doubling of the price at the end of 2006, Georgia now relies on Azerbaijani natural gas supply ([www.naturalgaseurope.com/](http://www.naturalgaseurope.com/), 8 November 2011), and has been an active supporter of transit pipelines, both oil and gas, to the west as a source of significant state revenues.

Turkey has also actively stepped into this strategic transit role.<sup>75</sup> It consumes 36.8 bcm natural gas annually, 35.7 bcm of it imported (2009), and is growing rapidly, raising its demand for natural gas. It imports 5 bcm LNG from both Algeria and Nigeria, and its Petroleum Pipeline Corporation (*Botas*) holds a

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May 2011, and 8(112), 10 June 2011.

<sup>70</sup>See *EDM*, 9(7), 11 January 2011, 9(126), 3 July 2012, and *RIA Novosti*, 11 July 2012.

<sup>71</sup>*EDM*, 9(130), 10 July 2012, on Ukrainian current and intended reductions in purchases of Russian gas. *Gazprom* insists that Ukraine must still pay full price for the full contracted amount, whether it take it or not. See *RIA Novosti*, 13 September 2012, <<http://en.rian.ru/business>>.

<sup>72</sup>O. Varfolomeyev, “Ukraine Reveals Ambitious Plans to Cut Dependence on Russian Gas,” *EDM*, 9(116), 19 June 2012.

<sup>73</sup>Ericson (2009), p. 47.

<sup>74</sup>V. Socor, “Azerbaijan Drives the Planning on Trans-Anatolia Gas Pipeline Project,” *EDM*, 9(164) 11 September 2012, Also see his “Direct Road to Europe: Azerbaijan’s Trans-Anatolia Gas Pipeline,” *EDM*, 9(2), 4 January 2012.

<sup>75</sup>V. Socor, “Turkey Sees Opportunity in Trans-Caspian Gas Pipeline Project,” *EDM*, 9(164), 11 September 2012.

monopoly over the gas market in Turkey, including all transportation. However, by the Intergovernmental, Host Country, and commercial agreements signed by the Turkish and Azerbaijani governments on June 26, 2012, that monopoly will be broken by TANAP (*EDM*, 9(122), 27 June 2012). This will add to the five currently active major transit pipelines through/from Turkey (Fig. 14): (1) BTE (Baku-Tbilisi-Erzurum) from Shah Deniz (30 bcm capacity); (2) Blue Stream from Russia (32 bcm); (3) Iran-Turkey (1.4 bcm); (4) Romania-Bulgaria-Turkey, supplying Russian natural gas, looping from Russian supply to Greece (17.8 bcf); (5) Bursa-Komotini (Turkey-Greece), part of TGI supply to south Europe (11.9 bcm). Thus Turkey is a significant transit player for all sides, Europe, Russia, Azerbaijan, and Central Asia. By diversifying both its natural gas suppliers and sales outlets, Turkey is insuring itself against any ‘hold-up’ while guaranteeing a steady flow of transit revenues and substantial political influence with its neighbors. With TANAP, Turkey is stepping into a role that the EU and NABUCCO never got around to fully offering it. Turkey is now the critical connector and supplier to a shrunk “Nabucco West,” stretching only from her border to the Austrian hub, and a direct competitor to Russia’s South Stream, which is also just getting off the ground (*EDM*, 9(148), 3 August 2012). But TANAP has an advantage in that competition, as its prime mover, Azerbaijan, has direct access to the Caspian region gas that Russia was hoping would fill South Stream.

### 3.4 Consumers’ Strategies

The economic environment in which producer and transit state strategies play out is significantly molded by the policy decisions and actions — the strategies, implicit or explicit — of the major users of Eurasian natural gas. It is their effective demand, and approaches to satisfying it, that provides the current and expected future payoffs to any actions undertaken by producers and or transit suppliers of energy. Thus they have been discussed above in clarifying the strategies pursued by natural gas producing and transit states. Here we close those arguments by summarizing the main thrust of the energy policies of the consuming states as those policies relate to the development and use of Eurasian natural gas.

There are four major consuming regions around and adjacent to the periphery of the Eurasian natural gas suppliers, and hence potential gas pipeline customers. The traditional and still overwhelmingly largest consumer of Eurasian natural gas is Europe to the west, with the remaining centers of, still largely potential, demand in Asia to the south and east. All are, in principle, accessible by pipeline, but almost all existing pipelines move gas to the west, to Europe. As we have seen, most producer strategies, and some transit strategies, are aimed at diversifying this flow, generating new outlets for this invaluable product, although some are working to enhance the flow toward Europe.

As the primary consumer of Eurasian natural gas, the European Union (EU) has been seeking a unified voice in dealing with the primary supplier, Russia. The unified approach is encapsulated in the 1998 European Energy Charter Treaty and its Transit Protocol which by 2004 had been signed onto by 51 European and Asian countries, but not Russia.<sup>76</sup> Since 2000 the EU has considered natural gas supply a security issue, developed in a series of European Council and European Commission documents, communications, and “Green Papers.”<sup>77</sup> The issue took on particular urgency following the Russian gas cutoffs in January 2006 and 2009, stimulating efforts in three strategic directions: diversification of supply, internal gas network restructuring, and a ‘de-monopolization’ drive to insure competitive conditions in gas supply. Each of these undercuts the capability, and/or mitigates the impact, of any effort by Russia to exercise market power or

<sup>76</sup>See Stern (2005), especially p. 137. Ericson (2009), pp. 44-5, discusses Russia’s opposition.

<sup>77</sup>See the European Commission (2000, 2006) “Green Papers” on energy supply and energy security, and the European Council (2003) strategic analysis.

achieve political leverage through the threat of supply reduction of this essential commodity.

Diversification of supply has included the support of a “souther corridor,” route avoiding dependence on Russia for Eurasian natural gas, fed by a trans-Caspian pipeline opening central Asian gas directly to Europe,<sup>78</sup> and encouraging the development of LNG capabilities. This was to be based on NABUCCO, which however received little other than verbal backing, and only inconsistent political support. And it faced the risk that Russian Blue Stream and South Stream (Black Sea) gas pipelines would preempt southern route pipeline capacities, rendering it uneconomical, particularly given the lack of European initiative and real support for developing the trans-Caspian pipeline to insure adequate supply to this southern route. Only in the past year has the European southern by-pass of Russia been given new life, through the Azerbaijani entrepreneurship and capital, as a shorter continuation pipeline from TANAP.<sup>79</sup>

The second strategic direction is complementary to the first. It involves building reversible pipeline interconnections, and expanding storage capacity, to allow gas shortages, for whatever reason, in vulnerable parts of the European Union to be countered by redirecting supplies from other areas and sources.<sup>80</sup> This would render the eastern European countries far less vulnerable to stoppages of gas flow (hold-up) from the east, by allowing redirection from other sources, including imported LNG.

Finally, and most objectionable from the Russian/*Gazprom* perspective, is the de-monopolization (EU Energy Charter and Transit Protocol) strategy. Among other provisions, EU law implementing the charter treaty will force separation of ownership of production and transportation, which would force *Gazprom* out of the pipeline business within Europe, the opposite of one of its primary strategic objectives (see above).<sup>81</sup> It also forces pipeline owners to grant automatic third-party access to their pipelines on non-discriminatory terms, which would loosen *Gazprom*’s grip over non-Russian Eurasian, and independent Russian producer’s (e.g. *Novatek*), gas passing through its pipelines to Europe, effectively eliminating any pipeline access monopsony power. And it regulates the kind of gas contracts that can be signed, directly attacking seller’s market power and again running directly counter to *Gazprom*’s marketing strategy (see above).<sup>82</sup>

The second most significant consumer of Eurasian natural gas is China. China, in the pursuit of energy for economic development as well as regional and international influence, has been active world wide in efforts to secure access to, and where possible, control over, a broad range of energy supplies. This has included active participation in exploration, development, and processing of energy resources in virtually every continent except Europe.<sup>83</sup> In Central Asia, as we have seen, it has been an active driver and facilitator of the strategies of both producers and transit states, as it pursues its strategic objectives of securing new energy resources through investment in new development initiatives in energy fields (Turkmenistan) and investment in new international pipelines (Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzia). China has also been actively negotiating with Russia for over a decade about terms of supply of natural gas, where it seeks a commitment

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<sup>78</sup>For more discussion of these, see Ericson (2009), pp. 46-7.

<sup>79</sup>See the Nabucco Company site, <[http://www.nabucco-pipeline.com/portal/page/portal/en/press/Nabucco\\_West\\_Scenario](http://www.nabucco-pipeline.com/portal/page/portal/en/press/Nabucco_West_Scenario)>. For analysis, see V. Socor, “Nabucco-West in Synergy with Trans-Anatolia Project,” *EDM*, 9(90), 11 May 2012.

<sup>80</sup>The threat this two-way pipeline capability poses to *Gazprom* is analyzed in Kh. Omarova, “Rossiia zhdët gazovyi perevorot,” *Novaya gazeta*, 12 September 2012.

<sup>81</sup>*Gazprom* is being forced to give up two pipelines in Europe (*EDM*, 9(56), 20 March 2012), but is moving to expand ownership of distributors in Germany, *Vedomosti*, 12 September 2012.

<sup>82</sup>The European Commission has recently announced an anti-trust investigation of *Gazprom*’s contracts with European users. <[www.naturalgaseurope.com](http://www.naturalgaseurope.com)>, 5 September 2012. Putin immediately responded with a Decree preventing *Gazprom* from providing any information to the EU Commission with explicit government approval (*Vedomosti*, 12 September 2012).

<sup>83</sup>China’s most recent move has been to invest in Canada’s Nexen Inc. and Oklahoma based Devon Energy Corp. in the U.S., giving it access to shale deposits and technologies for both oil and natural gas. For a discussion of these and other Chinese acquisitions, see B. Spegele, W. Ma, “China Fuels Oil Production,” *WSJ*, 31 July 2012. For an overview see Jiang and Sinton (2011).

of 40-80 bcm/year at a price substantially below both European netback and Asian LNG prices.<sup>84</sup> While China has been able to come to agreement with Russia on oil supply, and indeed provide some investment toward that end,<sup>85</sup> the absence of a world market for natural gas is allowing it to exercise some monopsony power before it is tied into Russian pipeline gas supply. Indeed, with its rapidly expanding access to relatively low cost Turkmen gas (see above), and its active development of LNG capability and other energy resources across the world, China is in a strong market position with respect to natural gas, despite its rapidly rising demand. This strategy of diversification of supply is moving toward insuring China against supply risk, while providing it the ability to play existing and potential suppliers against each other, thereby lowering the costs of development of the Chinese economy and Chinese national power.

The remaining ring of demand for Eurasian natural gas is currently more potential than actual. It encompasses two parts in very different strategic positions: northeast Asia (Japan and Korea) and South Asia (India and Pakistan). The former are economically developed and willing to pay a high price — they are now importing extremely expensive LNG, as seen above. 40% of South Korean and 25% of Japanese LNG imports come from the middle east, and most of the rest from the Asian-Pacific region. Russia in 2011 supplied under 8% and 9%, respectively, of Korean and Japanese LNG imports. Both Korea and Japan have a strategic interest in increasing Eurasian LNG supply, and in accessing Russian pipeline gas from Sakhalin, and perhaps East Siberia, should it be developed to supply China. South Korea also hopes that a Russian pipeline through the North, will ease tensions and help unite the Koreas (Shin, 2011). But the potential pipelines, discussed above under Russian strategies — the Trans-Korean and Sakhalin-Japan pipelines, are blocked by political considerations, i.e. the nature of the North Korean state and the territorial dispute over Japan's Northern Territories, aka Kurile Islands, respectively.

In the wake of the Fukushima tsunami disaster, Japan has faced the domestic political necessity of moving away from nuclear power, a primary domestic energy source (30% of its electricity in 2010; IEA, 2011b)). Thus Japan has actively engaged Russia, reaching agreement at the 2012 APEC Summit in Vladivostok to build a \$13 billion, 10 million ton/year LNG terminal for supply of Japan to be completed in 2018.<sup>86</sup> This will provide about 12 % of Japan's current LNG imports. In addition, discussions were begun on the potential development of an 800 km undersea pipeline from Vladivostok to Niigata on the Japanese coast, which should substantially reduce energy costs in Japan. Japan's strategy, however, also includes further diversification of LNG supply, as it looks to the potential development of North American exports from an abundance of shale gas. Such exports, should they be politically allowed to develop, could dramatically lower LNG costs in Asia, spurring a true world market, and reducing the value of pipeline connections to Eurasia/Russia. Once, however, pipelines are put in place, they could remain competitive due to the low unit (marginal) cost of supplying gas through existing infrastructure.

South Asia remains much less of a strategic player, despite its rapidly growing need for natural gas. Despite vast population and development needs, neither India nor Pakistan have sufficient infrastructure for large scale import of natural gas. Pakistan currently consumes all it produces (39.2 bcm), importing no gas, while India consumes 50% more than it produces (41.5 bcm), importing the rest as high priced LNG, largely from MENA. Both underconsume substantially per capita, and want to increase consumption. Thus both have expressed interest in pipeline gas from Central Asia, and indeed from the middle east. There are 3 major pipelines that have been discussed, with some preliminary, exploratory agreements signed: TAPI

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<sup>84</sup>On the 7 years of so far inconclusive price negotiations between Russia and China, see S. Blagov, "Russian Gas Export Plans Face Reality check," *EDM*, 9(37), 22 February 2012.

<sup>85</sup>On 17 February 2009, a \$25 billion 'loan for oil' deal was signed between *Rosneft* and CNPC, investing in the development of Russian oil export infrastructure.

<sup>86</sup>Mirsuru Obe, "Thirst for Energy Shapes Japan's Ties," *WSJ*, 5 September 2012.

from Turkmenistan through Afghanistan; IPI from Iran; an undersea trans-Indian Ocean pipeline from Qatar.<sup>87</sup> India and Pakistan, however, are in no position financially to take an active role in developing such pipelines. And each of these pipelines faces enormous political and technical obstacles. TAPI must overcome the political instability and unrest in war-torn Afghanistan and the Northwestern Territories of Pakistan, IPI faces political unrest (low grade insurrection) in Baluchistan (western Pakistan), and both must overcome the distrust, indeed enmity, between India and Pakistan.<sup>88</sup> And the undersea pipeline from Qatar's South Pars field would face huge technical complications as the longest and most expensive undersea pipeline yet, despite avoiding most political complications. TAPI also faces technical difficulties due to the extreme terrain through which it must pass. Thus the primary strategy of these countries, recognizing their growing need for natural gas, is to develop internal infrastructure and present that growing demand as an opportunity to producers and suppliers of natural gas, including those in Eurasia. In pursuit of this strategy they are actively developing LNG import capacity to take advantage of Australian, Indonesian, MENA, and potentially cheap North American LNG.

## 4 Summary and Conclusion

The Eurasian FSU states sit astride vast natural wealth, an essential input into economic development and prosperity in the foreseeable future, in their reserves of natural gas. Because it provides transportable high-energy content with a relatively low environmental impact, natural gas provides an essential bridge fuel to any 'green', non-hydro carbon powered future over the next 50 or more years. That is particularly important to the developed states of Europe and east Asia, where a primary non-hydro carbon energy source, nuclear, is increasingly being rejected. But it is also critically important for providing relatively "clean power" for economic development in middle and lower income countries, reducing the environmental and climate impact of their inevitable growth. And it is in Eurasia where the greatest net supply of this resource is currently available.

This source of energy is also surrounded by the areas with the largest net demand for this energy, the Eurasian periphery of Europe, South Asia, and East Asia. However, as we have argued, their access to Eurasian natural gas is bedeviled by geographic, technological, economic, and geopolitical difficulties. Geography forces access over long distances across difficult terrain, which necessitates large-capacity pipelines to make that access economically feasible. The scale and location of these pipelines impact whole nations, not just the producing, transporting, and using companies. And they generate 'lock-in' among participants, and hence exploitable market power (opportunities for "opportunistic behavior"), creating risks for all involved. All must act to insure against these problems, and/or mitigate their consequences. Hence state actors with national interests become involved, each pursuing those interests strategically within a framework forced by the locations of natural gas resources and their most valuable uses.

Russia, with its agent *Gazprom*, comprise the central player, in every sense, in this interaction. Russia is working to maintain its dominance as supplier to the world's most lucrative European gas markets by enhancing its ability to supply gas to Europe and warding off (detering) threats to its European markets from other sources, including EU regulations. The EU has taken a legalistic approach to defending its interests, but has done little, other than rhetorically, to encourage development of alternatives to Russian supply. The primary (potential) challenges to Russian gas supply dominance are currently coming from

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<sup>87</sup>For an analysis of TAPI and its competitors, especially IPI, see Foster (2010).

<sup>88</sup>Verma (2007) provides an excellent discussion of the issues around IPI.

Turkmenistan and Azerbaijan. In collaboration with China, Turkmenistan has undercut Russian ability to use central Asian gas to support supply to Europe. Azerbaijan is providing a more direct challenge. Working with Turkey, it has taken the initiative to provide Europe with its “southern route,” bringing soon to be plentiful Caspian gas to Europe ahead of Russia’s South Stream. And it has come to agreement with Turkmenistan on pushing forward toward sending trans-Caspian, primarily Turkmen, to Europe through that route. Turkey has also expressed support, as has the European Commission in 2011 (*EDM*, 9(137), 19 July, and 9(164), 11 September 2012). This will, however, require some Caspian littoral states agreement on the use of that sea, overcoming Russian and Iranian objections.

The biggest challenge to all these Eurasian producers is growing outside the region. It comes from the rapid development of new shale gas extraction and deep sea drilling technologies, and the falling costs of LNG supply. There is the prospect of both new, local shale gas supply, reducing demand for pipeline gas from far away, and a flexible LNG market able to satisfy demand at a moderate price anywhere accessible from the sea. Both of those prospects put substantial pressure on Eurasian producers to develop infrastructure rapidly, while gas prices are still high, so that they will remain competitive in the new market environment due to the low variable cost of gas supply through already built infrastructure.

What are the likely prospects here? Within a decade, due to Chinese initiatives, we can expect substantially more central Eurasian pipeline gas to be delivered to China, while Russia will focus largely on LNG to northeast Asia to its east. Similarly, the Azeri-Turkish initiatives should open new substantial supply to southern Europe, giving Europe greater leverage in negotiating with *Gazprom*. Russia/*Gazprom* will thus be forced to price more competitively, abandoning the oil products net-back principle, and perhaps even opening its pipelines to other producers, in order to remain competitive and economically justify the construction of the by-pass pipelines’ extra capacity. Further, we can expect a relatively competitive world LNG market to develop, unifying gas prices around the lowest cost delivered in sufficient quantity in each market/region, driven by ‘new technology’ gas production. Having maintained pipeline infrastructure in place will allow the Eurasian natural gas producers to remain competitive in this new environment, but only if they take advantage of the next five to ten years to fully develop the requisite infrastructure in cooperation with the transit states.



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