TEXAS A&M UNIVERSITY

EUCE Research 2006-2007
Working Paper

Dealing with the Bear: European Union's Increasing Energy Dependence on Russia

Allen Hodges
Bush School of Government
and Public Service
Texas A&M University

Dealing with the Bear: The European Union's Increasing Energy Dependence on Russia

Allen Hodges
Bush School of Government and Public Service
Texas A&M University

Abstract

Nowhere is the issue of energy security being more intensely debated than in Europe. The combination of the decline of the European energy sector and European concerns about climate change has made energy security an important subject for the future of the EU. In the short run the phrase "the EU is energy dependent on Russia" is misleading. Currently, the energy relationship between the EU and Russia is characterized by interdependence. Russia is dependent on the EU for its energy market and Europe is dependent on Russian natural gas. However, in the long run this period of interdependence will not last. Russia is looking to develop the Chinese energy market. When Russia establishes a natural gas pipeline infrastructure to China, it will have an alternative energy market to Europe of immense size. Therefore, the EU needs to develop alternative or at least supplemental energy suppliers and sources to prepare for the day when Russia is no longer dependent on the EU energy market and this period of interdependence ends.

Why natural gas?

Petroleum has been the primary energy resource of the 20th century. Coal is still important in many parts of the world particularly for power generation, but it lacks petroleum's versatility as a fuel source. Many countries also pursued nuclear energy or hydroelectric energy as alternatives to petroleum, but nuclear energy is viewed with apprehension by many, while the potential hydroelectric power of the developed world has largely been harnessed. However, petroleum's dominance of the world's energy market began to slip during the late 20th century as natural gas provided a viable alternative energy source for power generation. While global estimates of oil and natural gas are roughly equal in total energy potential, the world's petroleum sector is far more developed than the natural gas sector.[1] Unless this situation drastically changes and global natural gas consumption begins to approach that of petroleum, natural gas will remain an important source of energy after many petroleum reserves are exhausted.

However, natural gas is becoming the fuel of choice for more reasons than calculations of future reserves. Just looking at power generation potential for the long run, coal is logical choice because it is plentiful and scattered relatively equally across the globe unlike oil or natural gas. Although coal is likely to maintain its role as an important energy source in the 21st century, coal is also the dirtiest of the major fossil fuels. Conversely, natural gas is considered a relatively clean fuel which gives off half the carbon emissions of an equivalent amount of coal and does not release other pollutants such as sulfur dioxide.[2] In an era where reducing carbon emissions to help combat climate change is being viewed as increasingly important, the environmentally friendly image of natural gas is driving the global rise in natural gas consumption.

European Energy Overview

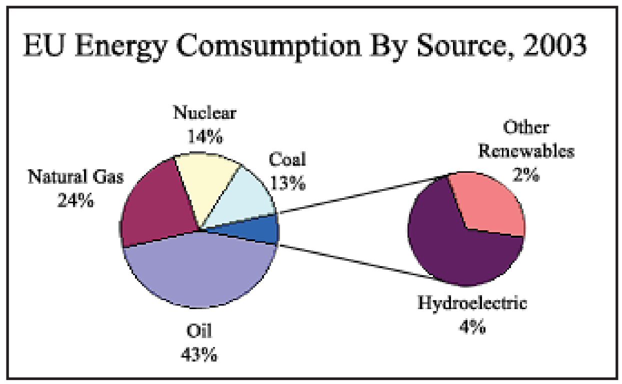
Europe's pursuit of energy diversification will be difficult. Europe is a net importer for energy.

Allen Hodges graduated in May 2007 with an M.A. in International Affairs with a concentration in National Security from the George Bush School of Government and Public Serivce at Texas A&M University. During the summer of 2006 he served as an intern in the Political Section with the State Department at the U.S. Embassy in Tegucigalpa, Honduras. Currently, he is working for Americorps in Tucson, Arizona.

European Union countries control a paltry 0.6% of the world's oil reserves and 2.0% of the world's natural gas reserves. Currently, coal provides 13% of and nuclear power 14% of Europe's energy consumption.[4] Most European countries have been unwilling to expand their usage of coal because of Europe's environmentally conscious approach to energy security. The debate over the future of nuclear energy in Europe highlights the reluctance of many countries to rely on nuclear power despite its lack of carbon emissions. Germany became the first major European country to renounce nuclear energy when it declared that all nuclear power plants would shutdown by 2020.[5] While often touted, renewable energy sources play a small role in meeting European energy consumption. With the exception of a few Scandinavian countries, hydroelectric power is not an important source of energy. The majority of Europe's energy consumption comes from petroleum or natural gas with almost a quarter of European energy consumption coming from natural gas alone. Natural gas is projected to be the fastest growing fuel source in Europe over the next 25 years, because it has lower carbon emissions than coal or oil and is more cost effective than any alternative form of renewable energy.[6]

Under the German presidency of the European Union, combating climate change and creating a sustainable energy policy has become one of the top priorities of the EU. In March of 2006 the EU Commission published a Green Paper which would help create a common, coordinated energy policy for the EU-25 now 27 member states. The Green Paper projected that, "in the next 20 to 30 years around 70% of the Union's energy requirements… will be met by imported products."[7] A year later on March 9, 2007 the European Council approved the most proactive, environmentally sensitive energy policy of any nation or group nation in the world. The new European energy policy has four main policy objectives. First, the EU has set the target goal of reducing EU-27 emissions by 20% by 2020.[8] If a global agreement (including the US, China, and India) is negotiated to succeed the Kyoto Treaty in 2012 the EU would reduce emissions by 30% instead. Second, the EU will improve energy efficiency by 20%. Third, the EU aims to "triple the share of renewable energy from under 7% today to 20% in 2020.[9] For the purposes of the new European energy policy, nuclear energy is not considered to be renewable. Fourth, the EU plans to increase the level of biofuels used in transport to 10% by 2020.

While Europe's decision to favor the use of natural gas is environmentally sound, it severely limits Europe's flexibility in establishing a sustainable and reliable energy security strategy. Natural gas production in the EU is largely limited to the United Kingdom and Britain's North Sea gas fields have peaked and are in decline. Europe currently imports over 50% of its natural gas consumption and this amount is expected to increase to 75% by 2020.[10] Almost all of Europe's natural gas imports come from just three countries: Norway, Algeria, and Russia.[11]



Source: EIA European Union Energy

Norway

Norway is the ideal energy supplier for the European Union because Norway has such close relations with the European Union that it almost functions like the EU's 28th member. In many ways Norway fulfills a similar role for the EU that Canada does for the U.S. Both Norway and Canada have relatively limited internal energy demand allowing them to export vast amounts of energy resources to their neighbors to the south. In 2005 Norway was the world's 3rd largest exporter of petroleum and natural gas with the majority of both resources going to Europe.[12] However, the North Sea is a mature region where energy production has peaked and has entered a long slow process of decline. While Norway will continue to be an important energy supplier to the European Union, it will not be able to keep pace with the EU's growing demand.

Russia

During the 1980's Russia first emerged as an important player for the European energy market.[13] Today, it is poised to play a crucial role as the primary supplier of European energy. Already Russia supplies 24% of the EU's natural gas consumption and 27% of the EU's oil consumption.[14] However, these numbers only begin to illustrate the potential influence Russia may be able to exert on the global, and especially the European energy market. Russia has the world's largest natural gas reserves with an estimated 27.5% of the world's total gas reserves.[15] This places Russia in a position of influence over the world's natural gas market comparable to Saudi Arabia in the global petroleum market.

Over 60% of Russian natural gas production is exported outside the Commonwealth of Independent States (CIS). Europe is Russia's primary export market for natural gas. However, the European market generates a greater percentage of revenue for Russia than it suggests, because Russia sells natural gas in Europe for $250 per 1000 cubic meters while until 2006 CIS states paid $50 per 1000 cubic meters.[16] Russia is an important supplier of natural gas to many countries in the EU including: Germany, Italy, France, Hungary, Finland, Slovakia, Poland, Czech Republic and Austria.[17] In all countries listed above except for Italy and France, the majority of natural gas consumed originated in Russia.

Pipeline Transit Countries

Natural gas has one major disadvantage versus petroleum as an energy source. Crude petroleum is much easier to transport from the source to the global market than natural gas. While crude petroleum is pumped into tankers and shipped around the world, natural gas is best moved by pipelines. Pipelines require an extensive amount of infrastructure and therefore financial investment to bring natural gas to the consumer. However, given current technological restraints there are no transoceanic pipelines because pipelines are best built on land or relatively shallow bodies of water.[18] This means that for natural gas to be shipped across oceans it must be chilled into Liquefied Natural Gas or (LNG). LNG is a rapidly growing area of the energy sector, but it is still relatively expensive when compared to pipeline transportation so most natural gas is still moved by pipelines.[19] The ramifications of pipeline based infrastructure for natural gas versus a tanker infrastructure for petroleum means that natural gas is much more geographically restricted. Whereas petroleum can be shipped around the world, natural gas tends to be sold in markets close, or at least on the same continent as its source. This means that for example the United States does not buy natural gas from Russia, and Europe does not buy natural from Canada. Therefore, until LNG becoming economically competitive, the EU will buy its natural gas from Russia, North Africa, the Middle East, or Central Asia.

Source: EIA "Russia Maps"

Ukraine

The Ukraine traditionally has been the primary transit country for Russian gas en route to Europe.[20] During the late 1970s when the Soviet Union began supplying Europe with natural gas, the Politburo decided to route the main Soviet natural gas export pipelines through Ukraine.[21] Most Russian natural gas exported to Europe continues to be shipped through the Ukraine to this day. With Ukrainian independence in 1991, Moscow and Kiev reached an agreement that the Ukraine would receive Russian natural gas at a discount in exchange for Russia's continued ability to ship natural gas to its primary export markets in Central Europe.[22] This arrangement continued until 2006 as Russia effectively subsidized natural gas exports to Ukraine as the transit fee for shipping natural gas to Europe.

After the breakup on the Soviet Union and Ukrainian independence, Russia began looking for ways to break Ukraine's transit monopoly on Russia natural gas exports to Europe. The first significance step towards reducing Russian dependence on Ukrainian transit to Europe occurred in 1999 when Russia completed the Yamal-Europe pipeline through Belarus.[23] The completion of the Yamal-Europe Pipeline began the process of diversifying Russia's energy supply options to Europe while marginalizing Ukrainian control of Russian energy exports.

Growing tensions between Russia and the Orange Revolution government in Ukraine spilled over into the energy sector on January 1, 2006, when Russian gas company Gazprom suspended gas shipments to the Ukraine. Russia accused Ukraine of stealing gas meant for export to Central Europe. The effects of Gazprom's decision soon reached Central Europe where gas supplies fell by one-third leaving thousands without power (or heat) in the middle of winter.[24] "The flow of natural gas depends on the routes and control of pipelines, as European consumers were reminded when Russia switched off the gas supply to Ukraine just over a year ago."[25] Although Russia quickly restored gas shipments due to international pressure, the shut off illustrated Europe's reliance on Russian energy. The suspension of gas shipments also caused many in Europe to question Russia's reliability as a supplier.[26]

At first glance, Russia seemed to have a legitimate grievance against Ukraine. No one doubts that Ukraine has tapped large amounts of Russian gas meant for European consumption.[27] While gas prices in Europe had risen to $250 per 1000 cubic meters, Ukraine's price had remained fixed at $50 per 1000 cubic meters.[28] Still Ukraine is notorious for falling behind on its relatively cheap gas payments to Gazprom. "Russia says it is simply asking Ukraine to pay the market price for its gas, not the subsidized rate it paid as a former Soviet satellite. But by seeking to quadruple the price for democratic Ukraine…Mr. Putin looks to be punishing the Ukrainians for having taken a pro-western direction."[29] If Russia decided to press for a uniform price increase for all former Soviet states to world market, gradually reducing subsidies, that might be justified. Instead, Russia has used a case by case basis, increasingly gas prices dramatically for some countries while working cooperatively with others.

Since cutting off gas supplies to Ukraine in January 2006, Russia has used energy for leverage against Georgia and Belarus. In Western oriented Georgia, Gazprom announced that gas prices would double to $200 per 1000 cubic meters in November 2006.[30] However, in neighboring pro-Russian Armenia, gas prices remained fixed around $110 cubic meters. In January 2007 Russia suspended gas shipments to Belarus in a similar dispute to what happened in Ukraine 12 months before.[31] After Russia doubled the price of natural gas sold to Belarus, Belarus responded by enacting a transit fee. When Russia refused to pay, Belarus began siphoning the gas pipelines. Russia regarded this action by Belarus to constitute stealing Russian gas and suspended gas shipments through Belarus. Since Poland and Germany also import natural gas through Belarusian pipelines, their gas reserves were depleted as well. The haphazard manner in which Russia has raised gas prices for its neighbors over the past 18 months, casts doubt on the claim that Russia just wants to eliminate Soviet era subsidies. Instead, Russia appears to be using energy as leverage against neighbors following pro-Western policies like Ukraine and Georgia.

While the Ukrainian gas suspension may have shown Europe's dependence on Russian natural gas, it also had the effect of demonstrating Russia's reliance on the European gas market. Russia quickly responded to Western pressure to restore gas shipments after each disruption and has worked to avoid antagonizing its major energy buyers in Europe.[32] Russia's recent experience demonstrates how the natural gas market functions differently than the petroleum market. "Oil is reasonably easy to trade, but in most gas markets the pipeline between the gas field and the gas burner locks producers and consumers in an exclusive embrace."[33] Russia has discovered that it needs the European gas market as much as Europe needs Russian natural gas. Just as Europe does not have another viable source of natural gas, Russia has learned that it has no comparable alternative to the European gas market given the current infrastructure.

Therefore, Europe and Russia currently exist in a partnership of energy interdependence. This leaves both actors with two options: one, strengthen the existing relationship to create even greater interdependence, or two, diversify and develop other suppliers and markets to create energy independence. The assumption behind increasing interdependence believes that that the European and Russian energy sectors must become so interconnected that costs become too high to break up the relationship. Conversely, the rationale behind diversification is that as long as Russia and Europe are working from relatively equal positions, interdependence is beneficial. However, the energy business is constantly evolving making a long term commitment to interdependence risky because one partner could soon gain the advantage over the other. In the case of Europe and Russia, both actors are pursuing both strategies with varying levels of success.

Strengthening Interdependence

Since Russia built the Yamal Europe pipeline through Belarus in late 1999, Russia has been working to develop an alternative pipeline infrastructure to Central Europe that is not exclusively controlled by Ukraine. The Yamal Europe pipeline gives Russia greater flexibility but still forces Russia to deal with a transit country before its gas exports reach Russia's primary export in Central Europe. For Russia, the January 2006 gas suspension to Ukraine demonstrated Ukraine's unreliability as a transit partner.[34] "Overall, tenuous relationships between Russia and the transit countries have created fear of polit¬ical complications between supplier and transit countries, causing another gas shutoff to Western Europe and thereby generating both consumer and supplier support for a new pipeline that will bypass Central and Eastern Europe and link Western Europe directly to Russia."[35]

Therefore, Russia is working with Germany to develop the Nord Stream or North European Gas Pipeline which will transport Russian gas exports to Germany via the Baltic Sea. A pipeline traversing the Baltic Sea would allow Russia to avoid the expensive transit fees across Eastern Europe. Germany is already the largest European consumer of Russian natural gas, but the Nord Stream pipeline would greatly strengthen this relationship.[36] On September 8, 2005, Russian President Vladimir Putin and German Chancellor Gerhard Schroeder witnessed the signing of the "gas pipeline of the century" in Berlin.[37] The Nord Stream pipeline will carry 55 Billion cubic meters of natural gas per year, which is enough to supply 20 million households. The Nord Stream pipeline is projected to cost $4.7-5.7 billion.[38] If construction continues on schedule, the Nord Stream pipeline should be completed by 2010.[39] Nord Stream is heralded as being, "more than just a pipeline. It is a new channel for Russian natural gas exports, and a major infrastructure project which sets a new benchmark in EU-Russia cooperation." Supporters of Nord Stream state that, "it will not only eliminate transit fees payable to Ukraine and other East European countries, but also reduce Gaz¬prom's dependence on those countries for export¬ing gas, to the economic benefit of both importer and exporter."[40] Nord Stream's proponents believe avoiding problematic countries in Eastern Europe should help make a Russia a more reliable supplier to Central Europe.

The Nord Stream pipeline is also one of the most controversial pipelines ever built. Environmental groups have condemned the Nord Stream project because the pipeline would pass through the environmentally sensitive Baltic Sea.[41] Poland and the Baltic states have been extremely critical of the project, because it would allow Russia to supply Germany while bypassing the traditional transit states in Eastern Europe.[42] This will have the impact of giving Russia greater leverage over traditional transit states such as Ukraine, Belarus, and Poland as Russia will be able to cut off gas to Eastern Europe while still supplying its primary markets in Germany and Italy.[43] Estimates state that building the pipeline under the Baltic Sea rather than a land route through the Baltic States and Poland triples the expense of the pipeline.[44] The Nord Stream pipeline could also divide the EU prevented a unified European policy towards Russia. Nord Stream "would make Germany the primary distributor of Russian gas in Europe.[45] Traditional transit countries like Poland, Czech Republic, Slovakia, and Hungary will lose revenue as Germany becomes the transit country for much of Central Europe. However, the main criticism of the Nord Stream pipeline is that it promotes long term European energy dependence on Russia. "In Western Europe…a false sense of security brought on by a more stable supply of fossil fuels might deflect attention away from the urgent need to find new energy-saving technologies and new sources of energy."[46] While both Russia and the EU would benefit in the short-run, the long run impacts of Nord Stream could give Russia leverage over Europe.

Diversifying Suppliers

Given Europe's growing concerns over energy dependence on Russia, many countries in the EU are strongly campaigning to develop alternative energy suppliers of natural gas. Norway's energy will remain a critical component of the EU energy security strategy. Europe is working to develop its pipeline infrastructure with Algeria. To this point most natural gas shipped to Europe from Algeria has been in the form of LNG, making it more expensive than Russian gas.[47] However, the EU is also working to develop new suppliers of natural gas in the Middle East and the Caspian Sea Basin. If either of these regions are going to become important suppliers for the European gas market, Turkey will become an vital transit state.[48]

Turkey

Europe has been disappointed with its inability to access Middle Eastern natural gas reserves. Despite the fact that Iran and Qatar have the world's second and third largest natural gas reserves respectively, it has struggled to bring these gas resources to the world market.[49] Instability in Iraq and the international pariah status of Iran and Syria continues to make constructing the necessary pipeline infrastructure impossible. Qatar has been more successful than Iran in developing its natural gas reserves due to its reliance on LNG.[50] While using LNG means that this gas is more expensive than most gas transported by pipeline, rising global prices have caused a development boom in Qatar. To this point, however, Qatar has not become an important exporter of natural gas to Europe due to limitations in Europe's LNG infrastructure.

Central Asia's Caspian Sea Basin has been more productive in the EU's efforts to diversify its natural gas sources and develop new suppliers. The isolated nature of the land-locked Caspian Sea basin from the world's major natural gas market has made development difficult. Traditionally, Central Asian natural gas resources were shipped through the Russia, giving it control over these energy resources as their transit state.[51] Nevertheless, the fact that the Caspian Sea region possesses an estimated 230 trillion cubic feet of natural gas (more than Algeria's or Norway's reserves) makes it one of the largest underdeveloped natural gas reserves in the world.[52] Given Europe's concerns of reliance on Russia, an alternative shipment infrastructure must be developed which avoids Russia must be developed to make the Caspian Sea a viable alternative. Because of Iran's problematic status in the international community, Europe has avoided developed southbound pipelines from the Caspian Sea to the Persian Gulf to export Caspian Sea natural gas.

This means that the construction of a westward bound pipeline infrastructure through Turkey to the European market has been the overriding goal of European policy makers. "Any EU strategy must recognize the centrality of Caspian oil and gas to the problem of diversification away from dependency on Russia."[53] However, to this point the United States has taken the lead in building the necessary infrastructure to access the Caspian Sea region's energy reserves. The completion of the Baku-T'bilisi-Ceyhan (BTC) pipeline in 2005 and the parallel Shah Deniz natural gas pipeline brings natural gas from Azerbaijan to Turkey where it can be exported to Europe. The EU is starting to recognize the crucial role Turkey could play as the primary transit state for Central Asian natural gas. Europe has even more to gain from the establishment of an "East-West Gas Transportation Corridor" than the United States, because natural gas from the Caspian Sea cannot be efficiently transported to America.[54] Turkey also has much to gain if it is able to become a major transit point for energy bound for Europe. "As well as diversifying its energy suppliers and meeting its energy needs, Turkey would benefit from transit revenues and could enhance its political influence in the Caspian Region."[55]

However, Europe should not regard Turkey as the ideal solution for all their problems. Despite Turkey's growing role as an important energy transit state, it is becoming increasingly dependent on Russian natural gas to meet its domestic energy demands.[56] Turkey now imports 65% of its rapidly increasing natural gas consumption from Russia.[57] Most Central Asian energy is bound by contract for the European market, leaving Turkey to rely on Russia. Turkey's dependence on Russia is compounded by the inadequate pipeline structure from Turkey to Europe. Several countries in the EU are working with Turkey to develop the Nabucco pipeline which would carry natural gas from the Caspian Sea region to Austria via Turkey.[58] Upon its approval in June 2006, EU Energy Commissioner Andris Piebalgs stated, "Nabucco concretely contributes to [the EU's] energy security."[59] The $5.8 billion project is expected to be built in 2008. "Nabucco has been one of the EU's few concerted responses to Russian domination of its gas supplies: it would be filled up with gas from Central Asia and thus bypass Russia altogether."[60]

Diversifying Markets

The European pursuit of alternative natural gas suppliers is predicated on the fact that the interdependence which characterizes the Russian European energy relationship is unlikely to last in the long run. The primary reason why Russia is expected to break its dependence on the European natural gas market is a number of formative natural gas deals which would bring Russian natural gas to the burgeoning Chinese energy market. China is the world's second largest consumer of energy.[61] However, natural gas only constitutes 3% of Chinese energy consumption.[62] Instead, China has traditionally relied on coal as its primary source for power generation. Approximately 70% of China's energy is generated by coal making China the world's largest consumer of coal.[63] In part because of this reliance on coal China is set to pass the United States as largest emitter of carbon emissions by 2008.[64] China's emphasis is focused on maximizing economic growth regardless of environmental consequences. To this point it has chosen to use coal because it possesses substantial coal reserves. Conversely, natural gas has not been an important factor in the Chinese energy market because, "Russia had no access to this lucrative market for a long period due to the lack of infrastructure in East Siberia and its Far East."[65] Therefore, if Russia and China worked to build the pipeline infrastructure necessary to ship Russian natural gas to the China, China would almost immediately become one of Russia's principle energy markets.

Russia has stalled on its proposals to ship natural gas for China. Russia has struggled to determine how to balance supplying energy to both China and Japan. Over the past several years China and Japan have competed to be the primary market for Russian energy in East Asia.[66] Because of this tension, it appears that gas pipelines connecting China to Siberian gas fields will not be completed until 2012. This has allowed Kazakhstan to beat Russia in constructing the first major natural gas pipeline to China. In 2005 Kazakhstan and China signed a major gas deal that would ship natural gas from the Caspian Sea basin across the country of Kazakhstan to Xinjiang Autonomous Region in far Northwestern China.[67] This pipeline could be completed as quickly as 2009, several years ahead of the scheduled completion date for the Russian pipeline. However, the tremendous size of the Chinese energy market means that China could absorb natural gas from Kazakhstan and Russia.

Conclusion

The EU has a window of time to develop alternative suppliers of natural gas and other energy sources while the European and Russian natural gas economies are still interdependent. "Europe may depend on Russia for half its gas imports, but Russia is dependent on Europe for the bulk of its export revenues. Repeated threats by the Kremlin to divert the flow of gas to China mean little without pipelines that it would take many years to build."[68] However, Russia will eventually establish alternative eastward bound pipeline infrastructure capable of supplying a substantial portion of Chinese energy demand. If Europe does not take proactive approach now to developing alternative energy sources to natural gas, Russia may be using energy blackmail against Germany and Italy rather than Ukraine and Belarus in the not too distant future.

Endnotes

1. Klare, Michael. "The Geopolitics of Natural Gas." The Nation. 2006. 18-23.

2. Ibid.

3. EIA European Union Energy http://www.eia.doe.gov/emeu/cabs/European_Union/Energy.html

4. EIA European Union Energy http://www.eia.doe.gov/emeu/cabs/European_Union/Energy.

5. "Germany Renounces Nuclear Power." BBC News. June 15, 2000. http://news.bbc.co.uk/2/hi/europe/791597.stm

6. EIA International Energy Outlook http://www.eia.doe.gov/oiaf/ieo/nat_gas.html

7. "Green Paper: A European Strategy for Sustainable, Competitive and Secure Energy." Commission of the European Communities. 2006.

8. "Energy for a Changing World." European Commission. 2007 http://ec.europa.eu/energy/energy_policy/doc/2007_03_02_energy_leaflet_en.pdf

9. "Energy for a Changing World." European Commission. 2007 http://ec.europa.eu/energy/energy_policy/doc/2007_03_02_energy_leaflet_en.p

10. Ibid.

11. "An External Policy to Serve Europe's Energy Interests." European Commission 2006

12. EIA Norway Natural Gas http://www.eia.doe.gov/emeu/cabs/Norway/NaturalGas.html

13. "A Bear at the Throat." The Economist. April 12, 2007.

14. "An External Policy to Serve Europe's Energy Interests." European Commission 2006

15. EIA International Energy Outlook 2006 http://www.eia.doe.gov/oiaf/ieo/nat_gas.html

16. "Nervous Energy." The Economist. January 7, 2006. 61-62.

17. EIA Russia Natural Gas http://www.eia.doe.gov/emeu/cabs/Russia/NaturalGas.html

18. Klare, Michael T. "The Geopolitics of Natural Gas." The Nation. 2006. 18-23.

19. "A Bear at the Throat." The Economist. April 12, 2007

20. EIA Ukraine Natural Gas http://www.eia.doe.gov/emeu/cabs/Ukraine/NaturalGas.html

21. Tomberg, Igor. "The North European Gas Pipeline Project in the Geopolitical Context." International Affairs.

22. Tomberg, Igor. "The North European Gas Pipeline Project in the Geopolitical Context." International Affairs.

23. Hirschhausen et. al. "Transporting Russian Gas to Western Europe – A Simulation Analysis." The Energy Journal. 26 (2005): 2, 49-68.

24. "Nervous Energy." The Economist. 378 (2006): 8459, 61-62.

25. "A Bear at the Throat." The Economist. April 12, 2007.

26. Reed, Stanley. "This Gas Dispute Could Burn Russia." Business Week Online. (2006) 6.

27. "Nervous Energy." The Economist. 378 (2006): 8459, 61-62.

28. Tomberg, Igor. "The North European Gas Pipeline Project in the Geopolitical Context." International Affairs.

29. "Power Games." The Economist 378 (2006): 8459, 12-13.

30. Mulvey, Stephen. "Georgia Faces a Haggle for Gas." BBC News. 2006.

31. "Russian Oil Row Hits European Supply." BBC News. 2007.

32. "Nervous Energy." The Economist. 378 (2006): 8459, 61-62.

33. Ibid.

34. Tomberg, Igor. "The North European Gas Pipeline Project in the Geopolitical Context." International Affairs.

35. Cohen, Ariel. "The North European Gas Pipeline Threatens Europe's Energy Security." Heritage Foundation. 2006.

36. EIA Russia Natural Gas http://www.eia.doe.gov/emeu/cabs/Russia/NaturalGas.html

37. Tomberg, Igor. "The North European Gas Pipeline Project in the Geopolitical Context." International Affairs.

38. Tomberg, Igor. "The North European Gas Pipeline Project in the Geopolitical Context." International Affairs.

39. Cohen, Ariel. "The North European Gas Pipeline Threatens Europe's Energy Security." Heritage Foundation. 2006.

40. Cohen, Ariel. "The North European Gas Pipeline Threatens Europe's Energy Security." Heritage Foundation. 2006.

41. Cohen, Ariel. "The North European Gas Pipeline Threatens Europe's Energy Security." Heritage Foundation. 2006.

42. "Jobs in the Pipeline." The Economist. 377 (2005): 8457, 49-50.

43. Cohen, Ariel. "The North European Gas Pipeline Threatens Europe's Energy Security." Heritage Foundation. 2006.

44. Ibid.

45. Ibid.

46. Ibid.

47. EIA Algeria Natural Gas http://www.eia.doe.gov/emeu/cabs/Algeria/Background.html

48. Winrow, Gareth M. "Turkey and the East-West Gas Transportation Corridor." Turkish Studies 5: (2004) 23-42.

49. EIA Iran Natural Gas http://www.eia.doe.gov/emeu/cabs/Iran/NaturalGas.html

50. EIA Qatar Natural Gas http://www.eia.doe.gov/emeu/cabs/Qatar/NaturalGas.html

51. EIA Caspian Sea Export Issues http://www.eia.doe.gov/emeu/cabs/Caspian/ExportIssues.html

52. EIA Caspian Sea Natural Gas http://www.eia.doe.gov/emeu/cabs/Caspian/NaturalGas.html

53. Socor, Vladimir. What Role for the Black Sea Region in the European Union's Energy Strategy. (2006) 2.

54. Winrow, Gareth M. "Turkey and the East-West Gas Transportation Corridor." Turkish Studies 5: (2004) 23-42.

55. Winrow, Gareth M. "Turkey and the East-West Gas Transportation Corridor." Turkish Studies 5: (2004) 23-42.

56. Kuser, Michael. "Turkey Boots its Role as Strategic Energy Hub." Business Weekly Online. 2006.

57. EIA Turkey Natural Gas http://www.eia.doe.gov/emeu/cabs/Turkey/NaturalGas.html

58. EIA Turkey Natural Gas http://www.eia.doe.gov/emeu/cabs/Turkey/NaturalGas.html

59. "Nabucco Gas Pipeline is Approved." BBC News. 2006.

60. "A Bear at the Throat." The Economist. April 12, 2007.

61. EIA China Background http://www.eia.doe.gov/emeu/cabs/China/Background.html

62. EIA China Natural Gas http://www.eia.doe.gov/emeu/cabs/China/NaturalGas.html

63. EIA China Coal http://www.eia.doe.gov/emeu/cabs/China/Coal.html

64. McGregor, Richard. "Rampant growth spurs emissions." Financial Times. April 19, 2007.

65. Paik, Keun-Wook. "Russia's Oil and Gas Export to Northeast Asia." Asia Pacific Review. (2005) 58-70.

66. Goldstein, Lyle and Vitaly Kozyrev. "China, Japan and the Scramble for Siberia. Survival. 48 (2006) 163-177.

67. EIA Kazakhstan Natural Gas http://www.eia.doe.gov/emeu/cabs/Kazakhstan/NaturalGas.html

68. "A Bear at the Throat." The Economist. April 12, 2007.

References

"A Bear at the Throat." The Economist. April 12, 2007.

"An External Policy to Serve Europe's Energy Interests." European Commission 2006

Cohen, Ariel. "The North European Gas Pipeline Threatens Europe's Energy Security." Heritage Foundation. 2006.

EIA "Russia Maps" http://www.eia.doe.gov/emeu/cabs/Russia/Maps.html

EIA Algeria Natural Gas http://www.eia.doe.gov/emeu/cabs/Algeria/Background.html

EIA Caspian Sea Export Issues http://www.eia.doe.gov/emeu/cabs/Caspian/ExportIssues.html

EIA China Background http://www.eia.doe.gov/emeu/cabs/China/Background.html

EIA European Union Energy http://www.eia.doe.gov/emeu/cabs/European_Union/Energy.html

EIA International Energy Outlook 2006. http://www.eia.doe.gov/oiaf/ieo/nat_gas.html

EIA Iran Natural Gas http://www.eia.doe.gov/emeu/cabs/Iran/NaturalGas.html

EIA Kazakhstan Natural Gas http://www.eia.doe.gov/emeu/cabs/Kazakhstan/NaturalGas.html

EIA Norway Natural Gas http://www.eia.doe.gov/emeu/cabs/Norway/NaturalGas.html

EIA Qatar Natural Gas http://www.eia.doe.gov/emeu/cabs/Qatar/NaturalGas.html

EIA Russia Natural Gas http://www.eia.doe.gov/emeu/cabs/Russia/NaturalGas.html

EIA Turkey Natural Gas http://www.eia.doe.gov/emeu/cabs/Turkey/NaturalGas.html

EIA Ukraine Natural Gas http://www.eia.doe.gov/emeu/cabs/Ukraine/NaturalGas.html

"Energy for a Changing World." European Commission. 2007. http://ec.europa.eu/energy/energy_policy/doc/2007_03_02_energy_leaflet_en.pdf

"Germany Renounces Nuclear Power." BBC News. June 15, 2000. http://news.bbc.co.uk/2/hi/europe/791597.stm

Goldstein, Lyle and Vitaly Kozyrev. "China, Japan and the Scramble for Siberia. Survival. 48 (2006) 163-177.

"Green Paper: A European Strategy for Sustainable, Competitive and Secure Energy." Commission of the European Communities. 2006.

Hirschhausen et. al. "Transporting Russian Gas to Western Europe – A Simulation Analysis." The Energy Journal. 26 (2005): 2, 49-68.

"Jobs in the Pipeline." The Economist. 377 (2005): 8457, 49-50.

Klare, Michael. "The Geopolitics of Natural Gas." The Nation. 2006.

Kuser, Michael. "Turkey Boots its Role as Strategic Energy Hub." Business Weekly Online. 2006.

McGregor, Richard. "Rampant growth spurs emissions." Financial Times. April 19, 2007.

Mulvey, Stephen. "Georgia Faces a Haggle for Gas." BBC News. 2006.

"Nabucco Gas Pipeline is Approved." BBC News. 2006.

"Nervous Energy." The Economist. January 7, 2006. 378 (2006): 8459, 61-62.

Paik, Keun-Wook. "Russia's Oil and Gas Export to Northeast Asia." Asia Pacific Review. (2005) 58-70.

"Power Games." The Economist 378 (2006): 8459, 12-13.

Reed, Stanley. "This Gas Dispute Could Burn Russia." Business Week Online. (2006) 6.

"Russian Oil Row Hits European Supply." BBC News. 2007.

Socor, Vladimir. "What Role for the Black Sea Region in the European Union's Energy Strategy?" (2006) 2.

Tomberg, Igor. "The North European Gas Pipeline Project in the Geopolitical Context." International Affairs.

Winrow, Gareth M. "Turkey and the East-West Gas Transportation Corridor." Turkish Studies 5: (2004) 23-42.

European Union Center of Excellence
Texas A&M University
Bush Presidential Library Center
College Station, TX 77843-1245
Phone: (+1) 979.862.6701 s Fax: (+1) 979.862.6705
Email: eucenter@tamu.edu
Website: http://eucenter.tamu.edu