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The European Union's Energy Security Challenges

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Summary

Recent increases in energy prices and a steady escalation in world energy demand that is expected to rise by nearly 60% over the next twenty years has led U.S. policy-makers to engage in a wide ranging debate over how best to address this nation's future energy requirements. Similarly, the European Union, along with its member states, is also engaged in an intense discussion of Europe's future energy challenges.

The United States and the European Union, together, represent the world's largest energy market. Today, the United States and the EU produce approximately 23% of the world's energy but consume almost 40% of the world's supply of energy. The EU consumes approximately 18% of global oil consumption and 19% of gas produced.

In 2005, the EU imported approximately 50% of its energy needs. That figure is expected to rise to 70% by 2030. Almost 50% of the EU's imported energy in the form of oil and natural gas comes from Russia. Europe's growing dependency on Russian energy supplies has led some observers to express their concern that Moscow could use the "energy weapon" to try to influence future foreign or economic policy in Europe.

In March 2006, the European Commission released a "Green Paper" outlining policy options which could lead to a common European strategy for energy security. By the end of 2006, the Commission will issue a "Strategic Energy Review" designed to set out specific policy actions that both the EU and its member states could take in order to begin to implement an effective and coordinated energy policy.

The United States and the European Union have steadily increased the transatlantic energy dialogue on issues such as energy efficiency and alternative energy sources. Both want to explore ways in which the U.S. and EU can cooperate in the world energy market (such as liquified natural gas) and how to deal with Russia and other politically unstable regions where large energy supplies are located.

At the conclusion of the US-EU Summit held in Vienna, Austria in June, 2006, both sides issued a joint statement which declared that the United States and the EU recognized the strategic role of security of supply, competitiveness and sustainability in the energy sector. In this connection, both sides reaffirmed their commitment to energy security and to cooperate to ensure sufficient, reliable and environmentally responsible supplies of energy.

This report examines some of Europe's critical energy challenges and how the EU is attempting to address those challenges through an effort to coordinate a European energy strategy. It also includes an overview of broader transatlantic energy security cooperation. This report may be updated as needed. For additional information, see CRS Report RS22378, *Russia's Cutoff of Natural Gas to Ukraine: Context and Implications*, by Jim Nichol, Steven Woehrel, and Bernard Gelb and CRS Report RS22409, *NATO and Energy Security*, by Paul Gallis.

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Introduction

Although the 25 member states of the European Union have ceded a certain level of sovereignty (or competencies) to the EU institutional structure, energy policy for the most part, remains primarily the responsibility of the member states. Decisions such as entering into long-term oil or gas purchases, developing or improving energy-related infrastructure, initiating or terminating the use of a particular energy fuel or developing alternative fuels and technologies continue to be taken by individual member states.

The European Commission has been able to exercise a significant amount of influence over energy policy through its authority to pursue internal market competition, environment and consumer protection policies. However, the continued practice of individual members states to make energy-related decisions without consulting with or assessing the impact of such decisions on other member states is viewed by some as making it difficult for the EU to coordinate a set of common goals or practices for the Union as a whole. For instance, developing a common policy has proven to be an especially difficult task in areas such as the implementation of gas and electricity market reform and conducting external relations with energy producing nations. This has led to an increasing debate within Europe over whether the EU should assume more authority in developing and implementing a common European approach to energy policy. In the proposed EU Constitution, energy policy would be elevated to a "shared" competency meaning that while the EU cannot act on specific energy policy alone it could exert more influence over a broader array of energy policy decision-making.

Like the United States, most European countries are heavily reliant upon imported energy[1] and are sensitive to events which would drive up the price of energy or delay or disrupt the delivery of current or future energy supplies. The renewed interest in energy security within Europe has been influenced by both internal and external factors. Steadily rising energy prices, declining European energy production and a fragmented internal energy market have contributed to anxieties over the ability of Europe to meet future energy demand. Emerging economies such as China and India which have added to the global demand for energy, persistent instability in energy producing regions, the threat of terrorist strikes against energy infrastructure, and Russia's apparent willingness to use its energy power for political ends, are all

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[1] For additional background see CRS Report RS22409, *NATO and Energy Security*, by Paul Gallis.

raising concerns in Europe over how to address external influences that could affect Europe's future energy requirements.[2]

Today, 80% of the energy consumed by the member states of the European Union is provided by oil, natural gas and coal. The EU imports approximately 50% of its energy needs. That figure is expected to rise to close to 70% by 2030.[3]

Europe relies for energy imports mostly on Russia and the Middle East where approximately 70% of global oil and gas supplies originate. Yet, the Middle East region is fraught with war, terrorism and politically unstable regimes. Iraq's oil production has not reached pre-war levels, and there is fear that terrorist groups could target pipelines and production facilities throughout the region. Iran has threatened to cut back oil production for the West if Tehran is forced to abandon its nuclear power program. With regard to Russia, recent political and economic behavior exhibited by Moscow has raised the dual specter of reliability and "energy politics."

High global demand for energy has also raised questions regarding the amount and future availability of global oil and gas reserves. There does not appear to be any projected shortages of either resources for the next several decades. However, uncertainties over future investments in new exploration or production in regions such as Russia and the Middle East have raised concerns about the long-term availability of future supplies. The International Energy Agency estimates that close to $16 trillion in new investments may be needed over the next 30 years to meet future global energy demand.[4]

All of these issues have led Europeans to begin to plan more seriously for their energy future and to give energy policy a higher priority within the European Union.

The Congress has also taken an interest in the relationship between the United States and Europe with respect to the issue of energy security by holding several oversight hearings on this subject. In May 2006, two Subcommittees of the House Government Reform Committee held a joint hearing entitled "Russian Energy Policy and Its Challenges to Western Policymakers." In late June, the Senate Foreign Relations Committee held a hearing on the "Future of Russia" in which energy policy was extensively discussed. Finally, in July 2006, the Middle East and Central Asia Subcommittee of the House International Relations Committee held a hearing entitled "Energy and Security Issues in Central Asia." Each of these hearings touched on Europe's energy challenges. In addition, congressional participation in several transatlantic dialogues such as the NATO Parliamentary Assembly and the Transatlantic Legislators' Dialogue has kept the issue of energy security and US-EU cooperation on the agenda in order to provide a better understanding of the importance of this issue to both the United States and Europe.

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[2] Jos Van Gennip, *Energy Security*, NATO Parliamentary Assembly paper, 2006.

[3] See *Energy Overview*, Council of the European Commission, June 2006.

[4] See International Energy Agency (IEA), World Energy Investment Outlook, 2005.

The Context of Europe's Energy Security Debate

Ongoing Issue for Europe

The Arab oil embargo of the early 1970s made three issues clear to the nations of Europe. First, there was a need for more collaboration on energy policies among the nations of Europe and between Europe and the energy producing world. Second, increased coordination among nations in the event of future supply disruptions was essential. Third, Europe had to prepare strategies intended to prevent Europe from becoming the victim of future attempts to use energy as a political or economic weapon by exporting nations.[5] The creation of the International Energy Agency (IEA) in 1974 was one response to the embargo. The IEA has become Europe's primary instrument for monitoring and analyzing world energy markets.

The embargo also highlighted the need for Europe to develop strategies to diversify its sources of energy supplies. During the post-embargo period, Russia and other nations in Eurasia began to loom as potential future suppliers of energy to Europe. Soviet Russia at the time was beginning to realize its energy producing potential but needed major investments in its energy sector. The Europeans understood that key aspects to the development of Soviet Russia as a supplier of future energy for Europe was how to manage relations with Moscow and how to develop a framework for cooperation in the energy field.

In 1991, the European Union launched an initiative to promote energy cooperation among the member states, and to diversify Europe's energy supply in order to reduce their dependence on any one area of the world for energy. These principles were incorporated into the Energy Charter Declaration of 1991.[6] The Declaration was an expression of an intention to establish a framework of rules and agreements designed to promote energy cooperation. The Declaration soon gave way to the Energy Charter Treaty that was signed in 1994 and that entered into legal force in 1998. Thus far, 51 nations plus the EU have signed or acceded to the Treaty. The purpose of the Energy Charter Treaty is to strengthen the rule of law on energy issues by creating a level playing field of rules regarding the promotion of foreign energy investments; free trade in energy materials, products and equipment; freedom of energy transit through pipelines and grids; promoting energy efficiency, and providing mechanisms for addressing disputes.[7]

Since the signing of the Energy Charter Treaty in 1994, the EU has pursued a plan to develop a coordinated approach to energy policy and security. Through its existing authorities in competition and environment policy, the European Commission has attempted to shape a European energy policy by pursuing the completion of its work on an internal gas and electricity market, by encouraging the development of alternative energy supplies, and in cooperation with the office of the

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[5] Daniel Yergin, "Ensuring Energy Security," *Foreign Affairs*, March/April 2006.

[6] For more detailed information on the Treaty see *The Energy Charter Treaty: An Introduction*, Energy Charter Organization at [http://www.encharter.org].

[7] *The Energy Charter Treaty: An Introduction, Op. Cit.*

High Representative for External Affairs, by pursuing a more cooperative approach to external relations with current and future energy suppliers.

Turning Point

Efforts by the Commission to shape a more common approach to energy policy within the Union was making slow but steady progress in areas of the Commission's competencies such as competition in the gas and electricity market, the environment, and in the promotion of alternative fuels. In 2005, the German government signed a bilateral agreement with Russia to build a gas pipeline from Russia to Germany under the Baltic Sea. Germany argued that the Baltic Sea pipeline was in the best interest of Germany. Poland and Lithuania countered that Germany made no attempt to coordinate a pipeline strategy within Europe prior to signing the agreement and that the pipeline deal had failed to take into consideration the energy and security needs of the Baltic states and Poland which the proposed pipeline would bypass.[8] The German decision set off a debate within the Union over Europe's need for a more coordinated external energy policy.

As the internal dispute over the German pipeline decision continued, another dispute, this time between, Russia and Ukraine, had a sobering impact on Europe.

In late 2005, Russia notified the government in Kiev that the price of Russian natural gas to Ukraine would be significantly increased. Ukraine protested and accused Russia of trying to destabilize the pro-western government of Viktor Yushchenko. The dispute over the price of gas did not directly involve Europe. However, on December 31, 2005, when Russia's gas monopoly, Gazprom, temporarily shut off the supply of gas to Ukraine, the gas supply to Europe, which travels through the same pipeline, was temporarily interrupted. Within hours of the gas shut off to Ukraine, several countries in Europe including Austria, Italy, Poland, Slovakia and Germany, reported drops in their own pipeline pressure by as much as 30%.[9] The gas crisis lasted only a few days and after Russia and Ukraine reached an agreement on future prices for gas, the supply was turned on again.

The Russia-Ukraine gas crisis was characterized by many political and media observers in Europe as a "wake up" call which exposed Europe's energy security vulnerability even to unintended supply disruptions. More importantly, however, the crisis raised the dual questions of whether Russia was a reliable energy partner and whether Moscow would use its energy power as a future political weapon. In an article assessing the Russia-Ukraine gas crisis, Jonathan Stern asked "what security lessons should Europe take away from the crisis...," and then answered by saying, "it is not wise for any country or region to become overly dependent on a single supplier or supply route... and that even disputes which do not directly involve third countries

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[8] "Polish Press Slams Germany's Schroeder over Gas Pipeline Deal," *Agence France Press*, December 12, 2005.

[9] See "Q&A: Ukraine Gas Row," *BBC News*, January 4, 2006.

can affect those countries in the event of a problem between a supplier and a customer which is also a transit country."[10]

The events of the winter of 2005/2006 did not force European leaders to initiate a new effort to rethink European energy policy. What the Ukraine gas crisis did, however, was set into motion a new sense of urgency for action on an EU energy policy. Even before the Ukraine crisis became front page news, EU Energy Commissioner Andris Piebalgs in October 2005 stated that he felt it was time for Europe to "undertake a major review of European energy policy..." to determine if "... current policies correctly balance the EU's core objectives of competitiveness, security of supply and sustainable development."[11] It was at this Forum that the Commissioner announced that a Green Paper addressing those issues would be provided the following spring.

The European Commission Response

The events surrounding the Ukraine gas crisis raised a number of critical policy questions and set in motion a series of events that moved energy security to the forefront of Europe's anticipated energy policy debate. On January 4, 2006, in assessing the impact of the Ukraine gas crisis, EU Energy Commissioner Piebalgs reiterated that Europe needed "a more cohesive policy on security of energy supply."[12]

Today, the 25 EU member states consume approximately 17% of the world's total energy consumption.[13] In 2005, approximately 80% of the energy consumed within the EU was provided by fossil fuels. The following chart provides an overview of the EU's energy consumption by fuel source.

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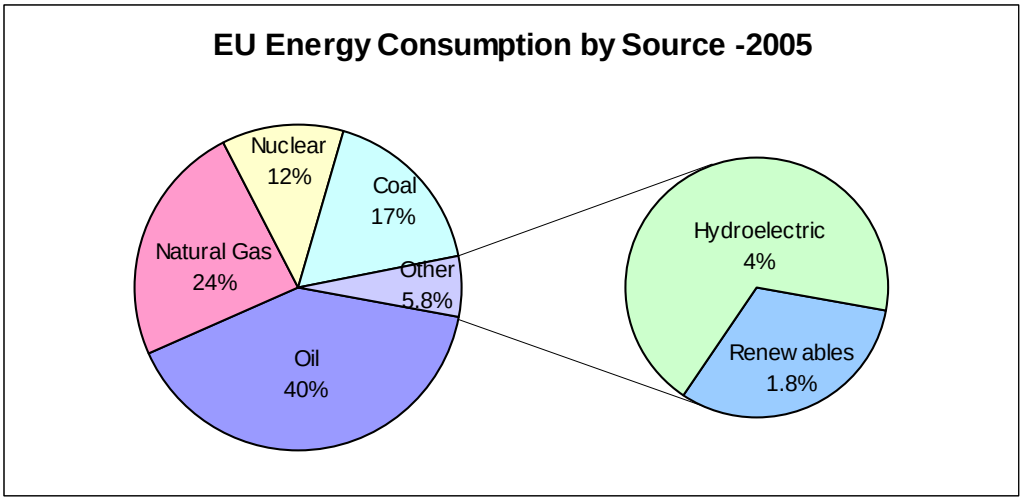
[10] Jonathan Stern, "The Russian-Ukranian Gas Crisis of January 2006," Oxford Institute for Energy Studies, January 2006.

[11] Andris Piebalgs, speech before the European Fossil Fuels Forum, October 19, 2005.

[12] "Lessons for EU from Gas Crisis," *BBC News*, January 4, 2006.

[13] Country Analysis Briefs: European Union, Energy Information Administration, January 2006.

Figure 1. EU Energy Consumption



Source: BP Statistical Review of Energy 2005.

On January 24, 2006, the EU released a Eurobarometer survey, conducted the previous October, well before the Ukraine crisis, which indicated that 47% of the EU citizens polled favored European level decisions on energy policy such as energy supply security, growing energy consumption and climate change. The survey reinforced the conclusions of the EU Commission and many member states that a more comprehensive European energy policy was necessary.[14]

In February 2006, Jose Manuel Barroso, President of the European Commission, speaking at Georgetown University stated: "there are few greater geopolitical challenges confronting us today than energy...we can no longer take secure and affordable energy supplies for granted...global energy demand is rapidly increasing...so it is uncertain how future demand will be met, and at what cost to our economies and the environment."[15] In that same speech, Barroso stated that while EU member states regarded energy policy as a domestic, not European issue, "it was ridiculous to have 25 separate energy policies in the European Union..."[16]

In his speech, President Barroso pointed out that in 2005, 50% of the EU's supply of oil and gas came from external sources and that if the trends continued the EU's dependence on imported oil and gas could rise to 70% by 2030.[17] Russia, the Middle East, North Africa and Norway provide the largest supplies of imported

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[14] "Attitudes Towards Energy," *Eurobarometer Survey*, October-November 2005. See [http://www.ec.europa.eu/public_opinion].

[15] "Speaking with a Common Voice: Energy Policy for the 21st Century," Jose Manuel Barroso, Georgetown University, February 9, 2006.

[16] Ibid.

[17] Barroso, speech at Georgetown, Op. Cit; and "Overview of European Union Activity: Energy," provided by the European Council, 2006.

energy to the EU. Imports of oil from Russia totaled 27% in 2004. This represents 18% of the total EU consumption of oil.[18]

It is projected that the European Union's primary energy demand will grow by 0.7% per year over the next twenty years. Oil and gas will continue to be the dominant fuel sources with gas representing the largest growth market of any fuel. This is due, in part, to the on-going transition from nuclear and coal to gas primarily in the power generation sectors of the economy. By 2030 oil is expected to account for 34% of Europe's total energy consumption while gas will reach 27%.[19]

The EU's increasing dependency on imported energy, especially with respect to natural gas from Russia, has raised serious questions regarding its long-term security of supply, the need to diversify Europe's sources of supply, and the requirement that the EU develop both a broad common internal energy policy and an external energy strategy to deal with Russia and other regions of the world where Europe may turn for future energy supplies.

"The Green Paper"

On March 8, 2006, the EU Commission released a "Green Paper" entitled, "A European Strategy for Sustainable, Competitive and Secure Energy."[20] Commission President Barroso took the lead in presenting the paper thus placing energy policy at the top of the Commission's priority list.

The Commission's Paper identified several priority objectives for pursuing an energy policy in Europe and suggested several options to achieve those objectives. For example, the paper called for member states to complete the process of opening their energy markets, dismantling protectionist policies, and creating a single European electricity and gas market by mid-2007. Other priorities included measures to encourage an efficient "mix" of energy fuels in Member states, to foster an integrated approach to climate change, to develop new energy efficient technologies, and to create a coherent external energy policy, especially regarding Russia. The Commission proposed to use the ideas presented in the Paper as the vehicle to stimulate the debate on energy policy. At the end of 2006 the Commission intends to present an energy strategy review as the basis for developing a common European energy policy.

At its March 23-24 European Council meeting, the Heads of State and Government of the 25 EU member states gave qualified support to Barroso's assertion that it was no longer satisfactory to continue to approach solving Europe's long-term energy challenges based on 25 individual energy policies. In endorsing the Green Paper, the Council called for the creation of an "Energy Policy for Europe" and requested a prioritized Action Plan to be adopted at its 2007 spring meeting.

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[18] See *Statistical Review of World Energy*, British Petroleum (BP), June 2006.

[19] Andris Piebalgs, "What Are the EU Energy Challenges," speech to the Offshore Northern Sea Conference, August 2006.

[20] See EU Energy Directorate General at [http://www.ec.europa.eu/energy].

According to some observers, before a successful common approach to European energy policy can be achieved, a higher level of coordination between all three institutions of the EU (Council, Commission, Parliament) and among the member states needs to be developed. To do this, it is necessary to frame the issue. The starting point for this is to define energy security. A somewhat simplistic approach could define energy security as the ability to maintain the continuation of supply during periods of excess demand or disruption and the ability to ensure that future energy demand can be met by a combination of indigenous energy sources and the reliable supply and transit of imported energy. For the EU, this definition poses three basic energy challenges. First, how to develop strong partnerships with energy producing and transit regions; second, how to utilize existing indigenous energy resources; and third, how to establish an internal system to provide dependable and secure energy supplies to all of Europe. The ability to work together to meet these challenges will determine just how far the member states will be willing to go to support a common European energy policy.

Challenge 1: An External Policy for Energy Security

The European Union's demand for energy continues to grow. But Europe is not the only region where growth has resulted in additional demand for energy. Growth in China and India has added significant levels of new demand for energy. Even in the energy rich region of the Middle East, growth in population along with economic modernization have resulted in a higher demand for energy. As living conditions and economies in Africa and Latin America continue to improve, the global demand for energy will increase. Europeans must compete for existing and new sources of energy supply.

A significant energy development over the past several years has been the rapid growth in the global demand for natural gas. Forecasters predict that the consumption of natural gas is expected to double over the next 25 years. Gas has rapidly become Europe's fuel of choice for power generation. The consumption of gas in Europe represents 17% of the total world consumption. The EU as a whole currently receives slightly less than half of its natural gas from the United Kingdom, the Netherlands and other EU member states. Around 50% of the gas consumed by the member states of the European Union is imported. Gas imports are expected to reach 80% by 2030. Three countries, Russia, Norway and Algeria provide Europe with the bulk of its gas imports. Russia currently provides 25% of that imported gas and that is expected to rise to over 30% by 2015. Several EU member states are totally dependent on Russian natural gas for their domestic energy consumption. The following chart illustrates the levels of dependency on Russian natural gas in selected nations of the EU.

Table 1: Imported Gas and Gas from Russia

Country	Dependence on Imported Gas, 2005	Total Gas Consumed, Imported from Russia
Austria	88%	74%
Czech Republic	98%	70%
Estonia	100%	100%
France	98%	26%
Finland	100%	100%
Germany	81%	39%
Italy	85%	30%
Poland	70%	50%

Source: International Energy Agency; Eurostat; British Petroleum.

Without a significant effort to diversify Europe's sources of energy, most of the future increases in gas imports will likely be supplied by Russia. Taking the projections of European energy consumption and supply into account, it becomes clear that the most important energy security challenge facing the European Union for the next 20 years will be Europe's ability to diversify the sources of its energy imports and the modes of transit which will bring those supplies to Europe.

The challenge of guaranteeing the future supply of imported energy was recognized in the EU Commission's Green Paper. The Paper stated that "the energy challenges facing Europe need a coherent external policy to enable Europe to play a more effective international role in tackling common problems with energy partners worldwide. A coherent external policy is essential to deliver ... secure energy."[21]

The Commission's arguments for an EU external policy on energy was endorsed in June 2006 by the European Council, which said, "The development of a coherent and focused external EU energy policy, drawing on the full range of EU internal and external policies, would enhance the collective external energy security of the Union."[22] In its endorsement of an external EU energy policy, the Council made it clear that member states of the Union had the right to pursue their own external relations in their pursuit of future energy supplies. However, the Council made the case that by including energy as a part of the Union's Common Foreign and Security Policy (CFSP), which also takes into consideration other concerns such as democracy, human rights and competitive markets, the EU could better define and

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[21] "Green Paper, "A European Strategy for Sustainable, Competitive and Secure Energy," European Commission, Brussels, March 8, 2006.

[22] "An External Policy to Serve Europe's Energy Interests," Office of the High Representative, European Council, June 2006.

determine what leverage could be used in furthering the interests of the Union and its 25 member states.

Diversification of supply is the key for Europe's future energy security. The bulk of the world's energy resources, located in Russia, the Caspian region, the Middle East and North Africa, are all well within the economic reach of the European Union. In fact, Europe already receives energy supplies from each of these regions. Several European member states, however, have expressed alarm over Europe's growing dependence on Russia and have suggested the EU turn its attention to securing more supplies of gas and oil from these other regions. The key for Europe is to determine the equilibrium point for supply from each geographic region and how to best manage relations with the governments in those regions that control the energy resources. By engaging in more robust relationships with these other regions the EU does open additional options for its external energy strategy.

Russia. Russia is a major player in world energy markets. In 2004, its 1,700 trillion cubic feet (tcf) of natural gas reserves were the largest of any country, making Russia the world's largest gas producer and the world's largest gas exporter. Russia is also the world's second largest oil exporter.[23]

The EU, on the other hand, needs available and reliable supplies of energy to support European economic growth. Russia's resources and proximity to Europe make an EU-Russian energy partnership a necessity. For Europe, managing relations between Brussels and Moscow has become the EU's top energy security priority. This relationship was formalized in 2000 with the creation of the EU-Russia Energy Dialogue. The results of that Dialogue have been mixed to date. At the last meeting in May 2006, neither side was able to resolve differences regarding supply security or investments in each others energy sectors. Compounding Europe's dilemma is the fact that 100% of Europe's current supply of gas from Russia is provided by the state-owned energy enterprise, Gazprom.

Russian President Putin has come to believe that Russia's vast energy resources, which not only can supply the needs of Europe but can also meet a good portion of the demands of Asia and the United States, will aid Russia in regaining its stature as a major force in global affairs. Thus, Russia sees energy as an important political force as much as it is the force driving Russia's economic development. For some, it is acknowledged that "the Putin government has made it clear that it intends to use its energy export power to regain Russia's cold war influence around the world."[24]

One of Russia's priorities is to control as much of Europe's energy infrastructure as possible in return for Russia's delivery of a reliable supply of energy. Moscow knows that if the EU is successful in creating a Europe-wide single market for electricity and gas, which is discussed later in this report, "it will be presented with opportunities to become part of the world's largest and most

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[23] For additional information on Russia's energy situation see CRS Report RS22378 by Jim Nichol, Steve Woehrel and Bernard Gelb.

[24] "Russian Energy Policy and its Challenges to Western Policy Affairs," Keith Smith, Center for Strategic and International Studies, testimony before the Congress, May 16, 2006.

integrated energy market right on its border."[25] Thus, according to Daniel Yergin, "Putin believes that energy security is about [Russia's] retaking control of the 'commanding heights' of the energy industry and extending that control downstream..."[26]

The political dimension of energy is evident in the fact that the two major Russian energy giants, Gazprom and Rosneft, have close ties to the Kremlin and in particular to President Putin himself. Rosneft is led by a close associate and former KGB colleague of Putin. Gazprom, is run by Alexy Miller, a close Putin ally and Dimitry Medvedev, Russia's First Deputy Prime Minister who according to some is being groomed by Putin to become his successor in 2008 when Putin would step down as President. Gazprom totally dominates the Russian gas sector and controls Russia's export pipelines.

On the investment side, Russia, according to some, is also playing the political card. The International Energy Agency has estimated that the Russian gas sector will require upwards of $10 billion in annual investment to meet future global demands for Russian gas. The EU has urged Russia to provide European energy companies the opportunity to invest in the total range of the energy sector from oil and gas fields to the pipeline system. The European Union has also insisted that Russia ratify the Energy Charter Treaty that guarantees open competition throughout the energy sector, and to adhere to the EU's competition and anti-monopoly rules. Thus far, Russia has refused to meet EU demands and in turn has warned the EU not to attempt to block Gazprom's plans to buy or invest in Europe's energy sector.

Brushing aside the EU's policies regarding competition and monopoly practices, as well as the Energy Charter, Gazprom CEO Miller told EU Ambassadors in a not so veiled attempt to exert its energy-driven influence that "attempts to limit Gazprom's activities in the European market...will not produce good results...it is no coincidence that competition for energy resources is growing...and it should not be forgotten that we [Gazprom] are actively seeking new markets such as China..."[27]

Russia's reluctance to agree to meet the EU's terms for open and competitive markets has led many in the EU to express concern over Russia's political reliability as a long-term supplier.

Energy is an important key to Europe's future economic stability. Europe knows that Russia simply cannot divert gas currently flowing into Europe via an extensive pipeline system to Asia where no comparable pipeline system from its current gas fields exists. Russia's recent decision to build the new Baltic Sea pipeline to Germany, its development of the large Shtokman gas field in the Barents Sea, the recent purchase of gas storage facilities in Hungary from Germany and its continuing

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[25] "Russia-EU Relations: An Emerging Energy Security Dilemma," Andrew Monagham, *Russia Research Network*, London, 2006.

[26] "What Does Energy Security Really Mean?," Daniel Yergin, *Wall Street Journal*, July 11, 2006.

[27] Gasprom CEO Miller in a speech to EU Ambassadors in Brussels as reported by the BBC News, April 4, 2006.

interest in the British energy market all confirm the fact that Moscow understands that Europe will continue to play an important role in Russia's long-term global political and economic strategy. Thus, Russia, with its vast resources, especially gas, will likely continue to be Europe's primary supplier of gas for the indefinite future. For Europe, trying to construct an overall common energy policy with a common external energy strategy, directed especially at Russia, could be critical.

Europe's understanding of Russia's dependence on Europe as a stable customer for Russia's energy resources and an eager investor in Russia's economy presents the EU with several options regarding its energy relations with Russia.

First, Gazprom is a government owned monopoly. It thinks, acts and makes business decisions like a monopoly. Recently, legislation passed by the Russian Duma granted exclusive rights to Gazprom to export Russian gas to Europe.[28] As this is inconsistent with EU business practices, many question how far the EU will attempt to push Russia (and Gazprom) to adopt the EU's principles of competition, open its energy sector to outside investment, and ratify the Energy Charter. Some analysts believe Russia cannot develop its vast energy reserves without assistance from the west in terms of both capital and technology. Can the EU leverage its resources to win concessions from Russia on market opening? Some believe without those demands for concessions, Europe will ultimately find its energy security largely influenced by an energy monopoly controlled by the Russian government.

A second issue involves the ability of the EU to influence the attitudes and actions of its 25 member states as it tries to establish a coherent policy toward Russia. This question may be the most problematic and perplexing issue for the EU as it has become clear that the 25 member states of the Union are split on how best to proceed. Even as the EU leadership in Brussels is moving forward with its ideas on how to develop a common external energy strategy to be presented at the end of 2006, several of the member states are moving forward with their own bilateral energy deals with Russia that will commit them to long term agreements for the supply of gas or oil. Many of these arrangements will increase the dependency of the individual nations on Russia for years to come, even before the proposed common external strategy is presented.

Germany and Italy, are the largest importers of Russian gas and both have recently negotiated long-term deals with Russia to lock in future gas supplies. For Germany and a few others, "Russia's role as a key supplier of oil and gas makes Putin a vital strategic partner who cannot be ignored or antagonized."[29] Such deals are not limited to the major energy consumers. Slovenia and Belgium have entered into negotiations with Gazprom to build a pipeline across the former and to enter the gas distribution market in the latter. Hungary's oil and gas company, Mol, has joined with Gazprom to extend Gazprom's Blue Stream pipeline across the Black Sea through the Balkans into Hungary.

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[28] "Gazprom Given Rights to Russian Gas Exports," *International Herald Tribune*, July 6, 2006.

[29] "Russia: More Awkward, But Still Indispensable," William Drozdiak, *European Affairs*, Spring/Summer 2006.

These examples of individual member states dealing with Russia have drawn harsh criticism from other member states, such as Poland and the Baltic states. They have warned their European colleagues not to cut energy deals that will give Russia an undue and possibly dangerous amount of political influence over European decision-making. Many of these nations understand that Europe's dependence on Russian energy is likely to last no matter what alternatives are included in an EU energy policy. But they also feel Europe does not gain real security by becoming more dependent on Russia. In fact, the growing presence of Gazprom throughout the entire energy market in Europe has led many to worry about the ability of the EU to develop an EU energy policy which would be insulated from Gazprom's influence.[30] In a July speech, Romania's President Basescu went so far as to warn that "Europe's dependence on Russian gas monopoly Gazprom ...could be the biggest threat to the region since the former Soviet Union's army."[31]

Critics of Europe's growing dependence on Russian energy, especially on gas, point out that the 2005/2006 gas crisis with Ukraine was not the only example of Russia's growing use of energy as a tool of its foreign policy. As Ambassador Keith Smith has suggested, Russia's practice of purchasing gas from the Central Asian Republics is designed to deny the west the ability to buy less expensive gas from other sources. He also points out that Russia's decisions to halt shipments of oil from Kazakhstan to Lithuania through Russian oil pipelines has been an expression of displeasure with Lithuanian policy.[32]

Several nations are attempting to diversify their energy supplies but are concerned that Gazprom could use its influence to block EU decisions on alternative energy initiatives that would lower Europe's dependence on Russia or that would compete against Gazprom's interests. For instance the Russia-Hungary pipeline agreement will compete with the EU-endorsed Nabucco pipeline which would bring gas from the Caspian region and Iran to Europe via Turkey and the Balkans.

Concerned critics of Gazprom activities, such as Vladimir Socor, believe that Gazprom's strategy is to "establish permanent control of the [Hungary/Balkans] markets before Caspian gas can reach them through the proposed Nabucco pipeline..."[33] In moving ahead with this deal, critics believe Gazprom will try to convince the other nations that agreed to fund the Nabucco pipeline to withdraw their commitments and rely on the Russia-Hungary pipeline instead.

The energy situation with Russia is not dire. Russia will continue to be Europe's major supplier of energy for the long-term and good European relations with Russia

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[30] Comments provided through discussions with representatives of several European member states.

[31] Traian Basescu, President of Romania in a speech to the Jamestown Foundation in Washington, D.C. July 2006.

[32] "Security Implications of Russian Energy Policy," Keith Smith, Policy Brief, Center for European Policy Studies, January 2006.

[33] "Gazprom Broadens, Deepens Inroads Into European Union's Internal Markets, Transport Systems," Vladimir Socor, *Eurasia Dailey Monitor*, March 21, 2006.

are important. However, some are likely to resist the urge to become Russia's best customer or Europe's only supplier at the expense of Europe's independence. If a common external EU energy security policy is to emerge, two options may be considered. First, Europe may move to lessen its dependence on Russian energy by increasing its diversification to other regions without threatening Russia's own market security in Europe. In doing so, Europe might ask if there is a point at which Russia could decide that the EU's commitment to diversification no longer makes it financially attractive for Russia to continue to invest in new supplies destined for the European market. Second, Europe may attempt to adapt the behavior and practices of Gazprom as it becomes more of a dominant energy player in Europe. Thus far, few European countries have demonstrated restraint in seeking bilateral deals with the Russian monopoly that would do just that. If this continues, Europe could risk having Gazprom interfere more and more in Europe's internal political decision-making. To avoid this, the European Union will likely continue to apply pressure on Gazprom to play by Europe's rules on competition and work to change Gazprom's corporate mentality by allowing European firms to invest in Russia's gas industry.

Caspian Region/Black Sea. Consideration of an EU energy strategy intended to diversify supply will likely place more emphasis on the important contributions the Caspian Sea region can make to that strategy.

The Caspian Sea in central Asia is bordered by Azerbaijan, Iran, Kazakhstan, Russia and Turkmenistan. After the collapse of the Soviet Union, the international energy community took an active interest in the region because of the potential oil and gas reserves thought to be located in at least six identified hydrocarbon fields beneath the Caspian Sea.

The Caspian Sea region presently is a significant, but not major, supplier of crude oil to world markets The untapped reserves held by four of these nations might offer Europe an opportunity to move away from increased dependence on Russian energy. Estimates of the Caspian Sea region's proven oil reserves range between 40 and 50 billion barrels. Production levels in 2005 were estimated to be around 2 million barrels per day. The Caspian Sea region's natural gas reserves are estimated at 232 trillion cubic feet (Tcf). Natural gas production in 2004 was approximately 5 Tcf.

Europe's formal interest in the energy resources of the region dates back to 1995 with the creation of the Interstate Oil and Gas Transport to Europe program (Inogate), This EU initiative (currently with 21 member countries) was designed to promote the construction of regional pipeline systems in order to facilitate the transport of oil and gas to Europe.[34] This was followed by another EU proposal, the "Baku Initiative," which was launched in November 2004 with the participation of the European Commission and the Black Sea and Caspian Littoral States. The Baku Initiative was designed to facilitate the progressive integration of the energy markets of this region into the EU market as well as the transportation of the extensive Caspian oil and gas resources towards Europe.

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[34] A more detailed account of the activities of Inogate is available from its website at [http://www.inogate.org].

In forming the Inogate, Europe recognized that the primary problem in taking advantage of the energy potential of the region, once investment was made to extract the resources, was how to deliver the oil and gas to the European market in a reliable and financially sensible way.

At the time Inogate was formed, Russia dominated both oil and gas production and distribution in the region. Since most of the countries are landlocked, their oil and gas had to be transported via pipelines. Reflecting Soviet era dictates and infrastructure, nearly all Caspian crude oil traveled north and/or west via pipeline to and/or through Russia to European markets. Some oil also went by tanker through the Bosporus straits to Western European markets via the Mediterranean. Natural gas transportation was tied to pipelines traveling mainly north and/or west through Russia and its monopoly pipeline system — Gazprom. This has provided Russia with the market power to dictate, in part, the price it is willing to pay for the oil or gas, to set transit fees on Caspian energy shipped through its transportation network, and to determine in some cases how much, if any, it is willing to transport. This latter point was evident in 2005 when Russia's oil pipeline company, Transneft, refused to allow oil from Kazakhstan to be shipped through its pipeline system to Lithuania for refining. The Caspian region nations thus have incentives to develop alternatives to routes through Russia to reach European and other markets and provide leverage in negotiating transit fees on shipments that do go through the Russian pipeline system.[35]

Changing the region's energy flow from the existing North-South axis to an East-West axis towards Europe is integral to the development goals of these newly independent states and Europe's energy strategy. Currently, the region relies on three big pipeline projects which will reduce the region's dependence on Russia. The Caspian Pipeline Consortium (CPC) project connects Kazakhstan's Caspian Sea area oil deposits with Russia's Black Sea port of Novorossiysk. Oil loaded at Novorossiysk is then taken by tanker to world markets via the congested Bosporus Straits.[36]

The Baku-Tbilisi-Ceyhan oil pipeline (BTC), which opened in July 2006, exports oil from Azerbaijan and up to 600,000 bl/d from Kazakhstan along a 1,040-mile route from Baku, Azerbaijan via Georgia to the Turkish Mediterranean port of Ceyhan. This will allow oil to bypass the Bosporus Straits.

The South Caucasus Pipeline (SCP), a new gas pipeline venture due to be completed at the end of 2006, will run parallel to the BTC oil pipeline for most of its route before connecting to the Turkish energy infrastructure and on to Europe via a transit pipeline through Greece.

In addition to these pipelines already in service or soon to be, there are a few additional projects in which Europe could be involved.

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[35] For additional information see CRS Report RS21190, *Caspian Oil and Gas: Production and Prospects*, written by Bernard A. Gelb.

[36] Additional analysis of the Caspian region can be found at, "Country Analysis Brief: Caspian Sea," Energy Information Administration, U.S. Department of Energy, 2005.

One option for additional oil transport would be to upgrade the existing oil pipeline which runs from Baku in Azerbaijan to Supsa in Georgia. That line could be extended under the Black Sea or the oil could be loaded onto tankers and shipped to Odessa, Ukraine. The oil could then be pumped through the Odessa-Brody pipeline into Poland. Some, including the Poles, have suggested that the Brody line be extended to northern Poland and possibly into the Baltic states for use at the Mazeikai refinery in Lithuania.

On the gas front, two additional projects offer important options for Europe. One, the Trans-Caspian pipeline is intended to bring additional gas from the Caspian to Georgia and across the Black Sea to Romania and the Balkans. The other pipeline, Nabucco, is scheduled to be built in 2008 and would carry gas through Turkey into Bulgaria and on to Austria. This project has the financial backing of several European nations and the endorsement of the EU. Both pipelines have been opposed by Russia, and Gazprom is trying to peel off the support of at least Hungary by offering an alternative service.

There can be no doubt that the energy resources of the Caspian Sea region can offer Europe a viable alternative source of energy supply. However, the full realization of the energy potential of the region could be impeded by several factors.

One issue that continues to raise questions regarding regional stability is the unresolved legal status of the Caspian Sea. Despite a number of efforts, so far only Azerbaijan, Kazakhstan, and Russia among the littoral states have reached agreement on delineating ownership of the Sea's resources or their rights of development. The EU could offer its legal assistance to help resolve the remaining outstanding issues.

A second issue is the ability of the EU to work to ensure the long-term political stability of the region. The conflict between Azerbaijan and Armenia over Nagorno-Karabaugh leaves the BTC and the future SCP pipelines vulnerable to sabotage. Internal political strife involving Georgia and its two breakaway regions also threatens future pipelines through that country. Continued political uncertainty in Ukraine and growing Iranian influence in the southern Caucasus could deter future long-term investment by the private sector. The entry of Romania and Bulgaria into the European Union and the EU's special relationship with Turkey should help keep the Black Sea region settled.

A third issue involves the willingness of the EU to compete with Russia for political and economic influence in the region and to prevent Gazprom from closing off the Caspian market, or at least the Central Asian part of the region, to Europe and its private sector. Russia's higher priced gas exports to Europe depend on Gazprom's ability to control gas exports from Kazakhstan and Turkmenistan. This dependency is expected to increase over the next 7-10 years until Russia's huge gas fields in the Barents Sea come on line.[37] According to some, although Gazprom was unable to prevent the BTC pipeline from being completed, Gazprom intends to continue to press the countries around the Black and Caspian Sea region to agree to gas supply and transit arrangements that satisfy the company's goals of channeling lower-cost

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[37] Keith Smith, *Op. Cit*.

Central Asia gas to Russian customers and protecting its lucrative European market.[38] Gazprom has already locked-up much of Turkmenistan's gas in a 25-year contract and is pursuing a similar strategy toward Kazakhstan.

The final issue revolves around whether Europe is the optimal market for Caspian oil and natural gas. Oil demand over the next 10 to 15 years in Europe is expected to grow by little more than 1 million bl/d. Oil exports eastward, on the other hand, could serve Asian markets, where demand for oil is expected to grow by roughly 10 million bl/d over the next 15 years.[39] In fact, China, which opened an oil pipeline to Kazakhstan in 2005, sees Kazakhstan as a major source of oil for the long term.

The Caspian region will continue to be an important source of energy production for the foreseeable future, especially if the estimates of its reserves, particularly its gas reserves, are accurate. Thus, the region can contribute to the diversification of oil and gas supplies to Europe, which will add to Europe's energy security. Taking full advantage of this potential will require a strong commitment on the part of the EU to encourage the private sector to take the financial risks associated with securing a share of the Caspian energy market for Europe and to set forth an external strategy that is fully prepared to address the dynamics of the entire region. For some, "a credible energy [strategy] needs to demonstrate that the EU means business in the Caspian/Black Sea regions. Brussels must include energy supply and transit as high priorities... for the region.[40]

Middle East/North Africa. The EU's desire to seek alternative sources of energy in order to lessen Europe's dependence on Russia confirms the need expressed by many in Europe that relations with the Middle East and North Africa require a stronger political and economic commitment.

The Persian Gulf countries (Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates) hold approximately 715 billion barrels (bb) of proven oil reserves, representing over half (57%) of the world's oil reserves. The region produces about 31% of the world's oil. It is estimated that by 2020, the Persian Gulf region will produce about 35 million barrels of oil per day.[41] In addition, Libya is estimated to hold 40bb and Algeria 12bb. In addition to its oil capacity, the Persian Gulf region holds an estimated 2,400 trillion cubic feet (tcf) of natural gas reserves, representing 45% of the world total gas. Algeria is estimated to hold (161tcf), and Libya (52tcf).[42]

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[38] "Energy Supplies to Eurasia and Implications for U.S. Energy Security," Zeyno Baran, testimony before the Senate Foreign Relations Committee, September 2005.

[39] CRS Report RS21190, *Op. Cit.*

[40] "What Role for the Black Sea Region in the European Union's Energy Strategy," *Eurasia Dailey Monitor*, March 3, 2006.

[41] For additional information see "Persian Gulf Oil and Gas Exports Fact Sheet," Energy Information Administration, U.S. Department of Energy.

[42] BP *Statistical Review, Op. Cit*.

Europe already depends on the Middle East/North Africa region for approximately 30% of its oil imports and 10% of its piped gas. In 2005, Europe imported approximately 3.1million b/day of oil from the region. The largest portion of that oil comes from Saudi Arabia followed by Kuwait and Algeria. Europe's primary supplier of natural gas has been Algeria via two pipelines that enter Europe through Italy and Spain. A smaller amount comes from Libya via pipelines to Italy. Two additional gas pipelines from Algeria to Spain and Italy are under construction.

Perhaps the most important development for Europe in this region has been the growing availability of liquified natural gas (LNG). Today, Europe consumes approximately 8% of the world's total consumption of LNG. Spain and Italy are the primary importers of LNG. Europe's LNG infrastructure of terminals and re-gasification facilities is relatively modern especially along the Mediterranean coast. Italy is currently engaged in a partnership with British Gas to build a modern facility in the port of Brindisi and has a plan for up to ten additional facilities. The principal suppliers of LNG to Europe include Algeria, Egypt, Oman and Qatar. Algeria is the world's third largest exporter of LNG with almost all of its gas (25b cubic meters) going to Europe. Recently, the Algerian national oil company, Sonatrach, signed a 20-year LNG supply contract with the Spanish power company Endessa.[43]

LNG has also become a major factor in the development of gas exports from the Persian Gulf. Although nations such as Qatar, Oman and the United Arab Emerites have produced LNG for the Asian market, European energy companies have begun to express more of an interest in purchasing LNG from the Gulf as well. With vast amounts of gas reserves the Gulf states are positioned to meet a portion of Europe's future demand.

European relations with the states of the Persian Gulf and North Africa have steadily improved over the years. EU relations with North Africa were formalized in 1995 with the creation of the Euro-Mediterranean Energy Partnership. The EU has also created the EU-Gulf Cooperation Council (GCC) Dialogue with the states of the Persian Gulf and has initiated a formal dialogue with the nations of OPEC. European energy companies have also become more involved in the Middle East.

The potential for growth in Europe's energy diversification strategy with respect to the Middle East and North Africa is significant. European competition with Asia and North America for increased supplies of Middle Eastern energy will be difficult and long-term political instability throughout the region will likely temper the level of dependency Europe will develop with the region. Nevertheless, as with the Caspian region, if the EU is serious about lowering its dependency on any one source, it must turn more and more to the Middle East. Parenthetically, Europe's growing interest in energy resources in North Africa has not gone unnoticed by Russia and Gazprom. Just as in the Caspian region, Russia is working overtime to try to inject itself in Europe's energy plans. In March 2006, President Putin, along with Gazprom officials, traveled to Algeria to discuss Russian participation in Algeria's future oil and gas projects, including its LNG export markets. It appears that because Russia intends to make Europe a major market for LNG produced from

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[43] As reported by Lloyd's List, May 25, 2006.

its Shtockman gas field in the Barents Sea Russia wants to be in a position to influence Algeria's future role as a major supplier of energy to Europe.

Norway. According to industry estimates, Norway had 8.5 billion barrels of proven oil reserves as of January 2005, the largest in Western Europe. The bulk of Norway's oil production occurs in the North Sea, with smaller amounts in the Norwegian Sea. In 2005, Norway's oil production averaged 2.95 million bl/d. As North Sea fields continue to mature, Norwegian oil production will likely remain steady for several more years and then begin to decline. There is some hope that new developments in the Barents Sea will offset some of this decline. The largest single recipient of Norway's exports is the United Kingdom, which imports around 814,000 bl/d from Norway, or 34% of Norway's total exports. Other significant destinations include the Netherlands and Germany.

Norway had 73.6 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2005. The North Sea holds the majority of these reserves, but there are also significant quantities in the Norwegian and Barents Seas. Norway is the eighth-largest natural gas producer in the world, producing 2.59 Tcf in 2003.[44] The United States Geological Survey has estimated that almost 25% of the globe's yet to be discovered resources are located in the Arctic region. Norway's recently opened Snohvit gas field along with Russia's field at Shtockman will make the Barents Sea a new European energy region.

Norway, a non EU member state, is the second-largest exporter of natural gas to the EU, behind Russia. Norway exported, via pipeline, approximately 2.0tcf of natural gas to the EU in 2004 representing 15% of European gas consumption. Germany (25%) France (30%) and the United Kingdom (30%) are the largest buyers of Norway's gas exports.[45]

Norway's entry into the LNG export market opens a new opportunity for the EU to work with its northern neighbor on energy security issues. Norway's energy giant, Statoil, plans to construct the first large-scale LNG export terminal in Europe, with connections to the Snohvit project. Although the initial LNG production from the Snohvit project has been committed to the United States, follow-on production and future fields in the Barents Sea could be shipped to facilities in Europe. The EU has recognized the growing importance of Norway in Europe's energy security debate and has expressed interest in "facilitating Norway's efforts to develop resources in the high north of Europe."[46] Individual European nations have also recognized Norway's potential future role in providing secure energy. Poland, along with the Baltic states, has already begun discussing with industry the construction of an LNG terminal along the Polish coast to receive LNG from Norway for transport to other parts of Europe.

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[44] Energy Information Administration.

[45] "The High North-Top of the Agenda," Jonas Store, Minister of Foreign Affairs, Norway in a speech at the Center for Strategic and International Studies, Washington, D.C., June 2006.

[46] EU Commission Green Paper, *Op. Cit.*

External Strategy Conclusion. Europe's reliance on available and secure sources of imported energy without becoming totally dependent on any one source, has become the foremost challenge for the nations of Europe and its Union. Europe is fortunate in one sense in that it has the largest sources of available energy within a relatively small geographical space. However, like everyone else, Europe faces the same fact that for the foreseeable future those energy producing nations all come with their own levels of risk ranging from outright political instability to more subtle questions of political reliability and long term intentions.

The EU, through its Common Foreign and Security Policy (CFSP), can continue to work on the political stability and security of Europe's energy suppliers by offering stronger foreign and trade relations. However, perspectives on energy security policy differ among the 25 member states themselves and between the states and the EU.

Long term energy security for the EU may rest on the development of a common, coordinated EU energy policy, an objective hindered by the actions of a few member states. Long-term bilateral energy agreements such as the Baltic pipeline agreement between Russia and Germany, and the LNG contract signed between a Spanish energy company and Algeria, are examples of member states acting on their own energy supply security. These decisions may or may not take into account the broader needs of Union security. Bilateral agreements between member states and Russia, Algeria, the Middle East or the Caspian producers could become more commonplace unless the EU can effectively convince the member states that the continued uncoordinated practice of bilateral energy policies may not bring long-term energy security to the Union as a whole, especially if the member states out of convenience gravitate to only one energy supplier.

One analysis of the European Union's dilemma on forming a common energy policy concluded: " if member states revert to national approaches, including energy related foreign policy making, this strategy may not only interfere with EU energy policy, it could also effect broader EU foreign and security policy... this implies that the EU has no alternative but to develop a coherent energy security policy..."[47] For many, the EU Commission's Green Paper proposal that serious consideration be given to a common European energy policy makes sense. Nevertheless, it would seem that the EU's case for a common external energy security strategy tied to the EU's CFSP will require much more work.

[47] "Energy Supply Security and Geopolitics: A European Perspective," Aad Correlje and Coby van der Linde, *Energy Policy*, 34, 2006.

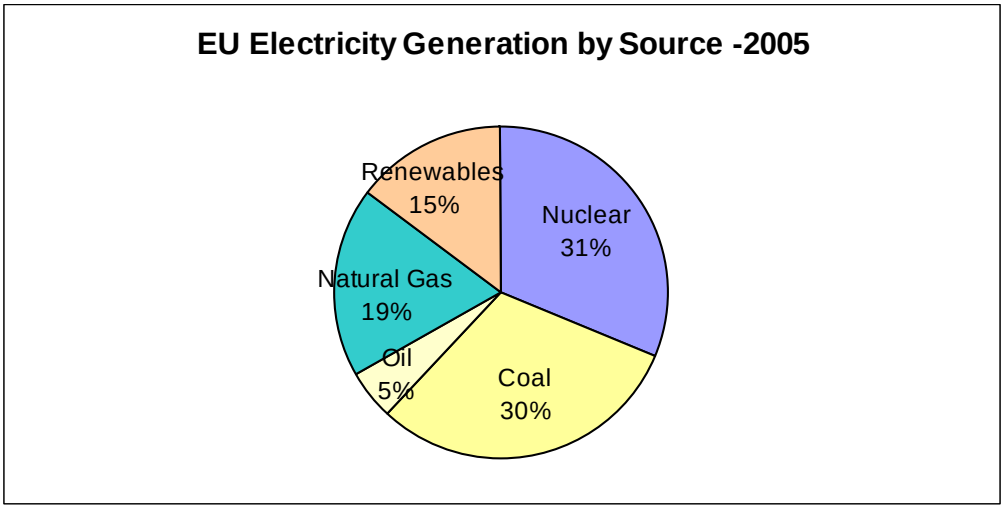
Challenge 2: Promoting Indigenous Energy Supply

Europe's dependence on imported energy, especially gas, will continue to grow. Some estimates suggest that if nothing is done to address energy dependence, Europe will import up to 70% of its energy requirements by 2030. A paper prepared in 2003 by Oxford Analytica reviewed the impact of the EU Commission's drive to open Europe's energy markets. The study suggested that "liberalization tends to favor lower capital cost commitments (as opposed to the longer-term investments). The major beneficiary of liberalization has been natural gas..."[48] The report implied that due to its competitive price and the lower investment cost to deliver gas as opposed to oil or renewable fuels, market forces would encourage nations to switch to gas. The paper concluded that this "has serious implications for energy security due to increased reliance on a fuel which is increasingly secured from outside the EU".[49]

Thus, while Europe's first priority for energy security is to develop a strong and coherent external energy policy toward energy producing and transit regions, the EU must look inward to determine how its future dependency on imported energy can be mitigated in part through the availability of indigenous energy supply, the efficient use of energy and the development of alternative energy supplies, including a strategy for renewable energy.

Roughly 60% of power generation throughout Europe in 2005 was produced by either nuclear energy or the burning of coal. The following chart illustrates the break down of power generation by fuel.

Figure 2. EU Electricity Generation



Source: IEA.

[48] "European Union: Energy Market Poses Policy Challenges," Oxford Analytica, August 2003.

[49] Oxford Analytica, *Op. Cit.*

The mix of these different fuels as a source of electrical generation varies greatly among the 25 member states. Each national government or energy company within a nation decides what mix of energy will actually be utilized. Those decisions are often based on availability of a fuel or its price. In France, for instance, nuclear power accounts for over 70% of all electrical generation while in Poland and the Czech Republic coal is the dominant fuel. Member state decisions on the mix of energy for power generation will also be driven by Europe's commitment to the environment and its obligations under the Kyoto Protocol. Under the 1997 Protocol, the EU, by 2012, is obligated to reduce its gas emissions by 8% from its 1990 levels. To the extent Europe intends to meet its obligations, decisions regarding the energy mix utilized by the member states will be important.

Nuclear. Nuclear power accounts for roughly one-third of Europe's overall electrical generation. There are approximately 175 nuclear reactors in operation in Europe today. Some nations such as France, Finland, Sweden and the UK rely heavily on nuclear power. Nuclear energy is considered clean energy and viewed by many as good for the environment. Others oppose nuclear power on the grounds that it is dangerous and creates a difficult waste disposal problem. Several countries such as Germany and Spain have committed to phasing out all of their nuclear reactors over the next several years and replacing those with gas powered facilities, although a few of those countries are rethinking their decisions or are at least looking at extending the timetable for the phase out. Other countries such as the United Kingdom, Finland and Lithuania by contrast, have decided to add new reactors. Given the required up-front cost of putting a nuclear reactor on line and the controversial nature of nuclear waste, it is unlikely that Europe will see a resurgence of new nuclear reactors in nations where nuclear power does not already play a role. At best, those nations that already utilize nuclear power will either replace or upgrade existing reactors.

One promising alternative for the future could be found in the International Thermonuclear Experimental Reactor (ITER) program. The EU along with the United States and several other nations have joined in this effort to produce electrical power from nuclear fusion which unlike current nuclear power does not generate dangerous waste. The first facility will be constructed in France but the first results of the program are not expected for at least 15-20 years.

Coal. Just over one-third of the total electricity generated in Europe is coal fired. Coal is plentiful in Europe with proven reserves of close to 40 billion tons.[50] However, coal burning is a major source of carbon dioxide and so for environmental purposes a European Commission Directive was put into force years ago which could force many coal fired plants to be shut down unless they install clean burning technology. That technology, although expensive, does exist and can capture 80-90% of the carbon (CO2) by -products of burning coal. While several electricity producers in a few countries which currently rely on coal for power generation, such as Spain 22%, Germany 52%, UK 35% and the Czech Republic 62%, have indicated an interest in upgrading their generation facilities with new clean coal technology, none of the European countries has adopted this technology on a broad commercial basis.

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[50] Coal Market Outlook, EU Commission, 2005.

Coal is likely to remain a source of fuel for energy production for the foreseeable future in those countries where it already plays a role. Germany, for instance has plans to build 8 new coal burning facilities. But, for the long term, the ability of member states to meet their commitments to lowering carbon emissions, the potential for using renewable energy, the price of natural gas, and the cost of installing clean coal burning technologies will likely dictate whether coal can remain a viable alternative energy source for Europe.

Renewable Energy. Hydro, wind, solar and bio-mass energy currently accounts for approximately 15% of Europe's total electrical generation. Although Europe is fairly energy efficient today, the EU has set rather ambitious targets to reduce greenhouse gas emissions by mandating that 21% of all electricity generated by 2010 should be fueled by renewable energy sources. The EU has asked each member state to set its own target for the use of renewable energy in order to help achieve the overall EU target. Some countries have set ambitious targets such as Austria (78%) and Sweden (60%) while others have set more modest targets such as the United Kingdom (10%) and Ireland (4%).[51] The EU has also set a goal that by 2010, 5.75% of all petroleum and diesel should be bio-fuels.

The use of renewable energy is supported by each country in Europe but thus far the practical application of such energy has been mixed. For instance, Austria and Latvia rely on hydro power while the Czech Republic and Portugal have committed financial support to large solar energy facilities. Germany, Sweden and the UK support major wind farms along their coasts. Bio-mass and bio-fuel programs are becoming more attractive. In December 2005, the European Commission adopted an "action plan" designed to increase the use of energy from forestry, agriculture and waste materials. Although bio-fuels are more expensive to produce, their use is increasing especially in the transport sector. However, bio-mass and bio-fuel programs represent only a fraction of electricity production in Europe and the future for these programs will depend on cost of production and whether the EU or member states are willing to subsidize their development on a large scale.

With the encouragement and financial support of the European Commission, each EU member states has committed itself to developing programs to support the use of renewable energy in part because they provide an environmentally favorable option to fossil fuels and because they can help lessen the dependence on imported energy. Long-term support for the increased use of these alternatives, however, will depend on the future price of imported gas, whether that price will make public or private investment in renewable energy more cost attractive and whether the electricity produced from these sources can be efficiently and cost-effectively integrated into Europe's internal electricity market. These decisions could be made a little easier if the EU continues to increase its financial stake in the development of these renewable sources on a Europe-wide basis. However, it is unclear at this time whether the use of renewable energy will provide a significant alternative to the use of oil, gas or coal for peak electrical generation or heating throughout Europe for the foreseeable future.

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[51] "Renewable Energy Targets for 2010," International Energy Agency, World Energy Outlook, 2004.

Challenge 3: Providing Energy Security through An Internal Energy Market

Developing stable and reliable external energy partnerships and encouraging the development and use of alternative energy supplies, including safe nuclear power, clean coal and renewable energy, will likely help meet Europe's energy security goals. A third challenge for the EU then is to develop a comprehensive and efficient Europe-wide internal market for gas and electricity transmission and distribution regardless of the source of the energy supply.

To address this particular challenge the Commission considers the completion of the internal energy market as a major priority of the proposed EU energy policy.[52] The concept of a 'single market,' which would remove barriers to trade and allow the free movement of capital, services and labor throughout the EU, first emerged in 1985 under then EU Commission President Jacques Delors. The debate over extending that concept to a "liberalized" internal energy market debuted in 1989 and culminated in two 'Directives' issued by the Commission in 1996 and 1998 respectively and updated in 2003.[53] The goal of the Directives was a fully open and competitive energy market.

The Directives had four objectives: (1) to implement the single market for energy by promoting competition and efficiency in the production and delivery of electricity and gas; (2) to lower prices and give all EU customers the opportunity to choose their energy supplier by 2007; (3) to help improve the environment; and (4) to enhance energy security. To accomplish these, the EU and its member states will have to agree on a clear set of guidelines as to who owns, controls, regulates and has access to the electrical energy grids, pipelines and emergency energy storage facilities.

Since implementation of the gas and electric Directives, many EU member states have opened their markets at varying speeds and have demonstrated a mixed record of achievement. Part of the reason for the slow pace of market liberalization in some nations has been due to an unenthusiastic commitment from many governments and their energy industries. Most member states regard energy policy as too important to their own economic development and thus have to proceed at a pace each state is comfortable with. In Europe, traditional industries have, for the most part, provided stability in the energy market. Because of their dominant positions, they have been viewed as essential industries by some of their respective governments. The EU's imposition of the Energy Directives threatened to change the secure position many of these industries had enjoyed. In reaction, some national

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[52] "Green Paper, A European Strategy for Sustainable, Competitive and Secure Energy," European Commission, Brussels, March 8, 2006.

[53] See Directives 2003/54/EC and 2003/55/EC of the European Parliament and Council 2003, European Commission website [http://www.eurunion.org].

governments have taken measures to try to protect their industries, even while subscribing to the theory of open market competition.[54]

This problem was highlighted in November 2005 when Energy Commissioner Piebalgs stated that "cross-border competition is not sufficiently developed... [due to] the failure of member states to implement the Directives on time or with sufficient determination."[55]

Energy Interconnection. As a liberalized European energy market progresses, the issue of energy security for EU member states will likely turn to the internal market's ability to deliver energy supplies to Europe's citizens through mechanisms such as the interconnection of pipelines and electricity grids and to provide infrastructure security and emergency supply.

The EU's energy security strategy continues to focus on the current insufficient electricity and gas interconnection between the member states of the Union. In 2005, only about 10% of the currently installed electrical generation capacity of Europe could be delivered across national borders. The European power transmission grid is divided into 7 regional "pools" which, according to the EU Commission, are only weakly connected. Cross-border energy exchanges have increased recently such as when the French electricity sector purchased additional power from Germany to offset the demand in France brought on by the heat wave in July 2006. Although there are examples of the system working, especially in regions such as in the Nordic pool, the EU believes that over the past few years Europe's experience with a wave of blackouts were caused by weak links in Europe's power grids, poor coordination between national and regional power markets, not enough generation capacity and the lack of electricity transmission capacity that limits the exchange of power among member states. Interconnections between grids increase grid and distribution reliability. As such a priority for the EU will continue to be to encourage investors to support the building of more commercially competitive interconnections in order to create an integrated electricity market with cross-border electricity exchange.

With respect to gas, the EU will promote greater interconnection between Europe's existing pipeline system between member states. Additionally, as new pipelines are built and new LNG terminals opened, gas and oil entering Europe will likely be connected to the single market. When Gazprom shut off the supply of gas to Ukraine in December 2005, several European nations, whose gas transits through the same pipeline as Ukraine's, experienced a drop in their gas pressure. Had the dispute between Gazprom and Ukraine lasted more than a few days, those European countries may have had a difficult time replacing that gas with a backup supply, even if there was an alternative source of gas available. This happened in part because several of the states served by the pipeline running through Ukraine into Europe are not connected to any other source of gas. The Baltic states rely almost entirely on

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[54] For additional information see CRS Report RS22468, *Europe: Rising Economic Nationalism?*, by Raymond J. Ahearn.

[55] "Energy: Member States Must Do More," Press statement of Commissioner Piebalgs, November 15, 2005.

Russia for energy. Since there are no pipelines or electrical grids that connect them to Poland or the rest of Europe, their energy security is difficult to guarantee.

As Bulgaria and Romania move closer to joining the Union and other nations in the Balkans region anticipate membership, the EU Commission has seen a need to extend the concept of a single electricity and gas market to Southeast Europe. A Treaty establishing the Energy Community was signed in October 2005. This Treaty aims to extend the EU internal energy market to the South East Europe region. The main goals are to create a stable regulatory market framework capable of attracting investment; to improve the environmental situation and to develop electricity and gas market competition on a broader geographical scale. It is also intended to help stabilize a region through which new sources of energy are likely to transit.

Storage. Another important dimension in the strategy to provide energy security will be the ability of the EU and its member states to react to the loss of energy supply either through a short-term disruption caused, for instance, by a technical failure, or an act of terrorism or to a longer-term disruption caused by an economic or political event in either a producer or transit nation. In either case, the EU's energy security strategy could focus on the adequacy of energy storage capacity and the ability to share that stored energy in times of emergency. Europe has a strategic petroleum reserve, which was activated in anticipation of possible oil shortages when Hurricane Katrina hit the United States. On the other hand, there is no such reserve for natural gas. There are over 100 gas storage facilities identified throughout Europe and while some EU member states are serious about maintaining strategic storage for gas, others find it expensive to store gas and only maintain partially filled reserves depending on projected seasonal demand. The EU is working to find a way to oblige owners of storage facilities to meet a minimum level of emergency supply.

A major issue with the storage requirement is access. Many nations consider energy storage facilities as security assets and are reluctant to open them to other member states in times of emergency. The EU believes this issue of 'solidarity' is critical to the overall energy security of all member states and has insisted that available supplies be shared within the Union when needed. Any future EU-led energy security strategy would have to include a minimum level of oil and gas stocks to meet any type of disruption, an agreed upon plan for member state contributions to the storage requirements and an emergency withdrawal and distribution scheme.

TEN-E Program. The ability of the EU internal market to provide energy to all EU citizens through a stronger linkage of power transmission from a variety of energy sources especially during times of interruption or shortage would be a significant step towards the EU's goal of providing energy security. The mechanism the EU uses to promote gas and electricity interconnection between EU member states is known as the Trans-European Energy Network (Ten-E). The Ten-E framework accomplishes two objectives. First, it promotes increased coordination and exchange of information between member states on energy supply and demand. Second, it identifies and supports projects that will boost cross-border gas and electricity connections. Currently, 42 projects with cross-border transmission goals have been proposed for funding through the Ten-E budget and other sources such as the European Investment Bank. The EU expects to spend around 25 million euro on

projects such as a France-Belgium, a Poland-Lithuania and Poland-Germany electricity connection. They also support an undersea cable connecting the UK with the Netherlands and an Italy-Slovenia connection. Ten-E has also helped promote the North European Pipeline (Norway-Denmark-Sweden) and the Medgas pipeline (Algeria-Spain-France) as priority projects.

As stated in the Commission's Green Paper, while progress has been made, the internal European market for electricity and gas is not complete. Despite the continued apprehensions among some member states and the numerous obstacles yet to be overcome, the Commission believes that a Europe-wide internal energy market would offer Europe, as a whole, more security than maintaining the current individual member state markets. The Commission's view seems to be based on the theory that a larger market, served by a larger number of suppliers, inter-connected and regulated would be more stable and would serve to encourage competition, lower prices and provide energy choice. Open markets and competition can guarantee a certain level of security if the competitive forces are successful in providing energy from a variety of different sources. In a paper that appeared in 2004, Giacomo Luciani, referring to the European gas market, suggested that as long as only two sources of energy (Russia and Algeria) continued to dominate gas imports to Europe, it was unlikely that real competition could exist but more importantly that increasing dependence on the established suppliers (as Europe is becoming with Russia) is incompatible with competition.[56] Nevertheless, the idea of an internal market has been around for a long time and the Commission is determined to complete the internal electricity and gas market by 2007 as planned.

Assessment

Europe's demand for energy, like global demand, is increasing. Over the next 30 years, the EU's dependency on imported energy will continue to rise. The EU, like most of the rest of the energy consuming world, faces a future of higher energy prices, more demands to address the environment and potential uncertainties, and threats to the security of its energy supplies. In turn, energy producing states will continue to pursue secure markets for their resources. The European Commission has suggested that a Union-wide approach to energy based on 25 individual energy polices will not work and that a more common European approach to energy policy will be required.

Most EU member states have long held that energy policy should be the primary responsibility of the states themselves. However, the growing reliance by Europe on imported, especially Russian, energy supplies coupled with recent Russian actions regarding the political manipulation of the flow of energy to nations such as Ukraine, Moldova and Belarus have forced Europe not only to re- think energy as an element of its own national security but as an element of the EU's common foreign and security policy (CFSP). As such, it seems more nations of Europe are beginning to share the Commission's view that a more common approach may make sense and can

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[56] Giacomo Luciani, "Security of Supply for Natural Gas Markets," Indes Working Paper, Center for European Policy Studies, March 2004.

be achieved without turning control of energy policy over to the EU in its entirety. In 2006, the EU member states did agree in principle to pursue options toward creating a common energy policy for Europe and endorsed the principles of the Commission's Green Paper as the starting point for the debate over the development of a more common policy.

Some skeptics doubt the ability of EU member states to ultimately come to agreement on a host of energy-related issues. Open and competitive energy markets are desired but protection of national energy industries still prevails in several nations. Some nations which have reluctantly agreed to open their energy sectors to allow the market to participate in the energy decisions of the nation are not sure they now wish to turn those decisions over to bureaucrats in Brussels. Finally, there is still disagreement on how to deal with Russia or into which other of the world's energy producing regions Europe should entrust its energy future.

The EU Commission's Green Paper has offered several approaches for a discussion that the EU-25 will begin in more depth at the end of 2006. Ultimately, it would appear that energy policy will become more of a shared responsibility. At the EU level, a single Europe-wide market for electricity and gas will continue to its completion with an integrated and efficient gas and electric transmission and distribution system. The European member states could create a powerful but independent regulatory body which would oversee the operation of electricity and gas flows, the pricing of energy, and the development and operation of LNG facilities.

The EU could be more involved in coordinating and financing the development of renewable energy, the development of emergency energy storage and the issuance of rules on the use of those emergency supplies. The member states and their energy industries will still retain the role of ultimately determining which energy mix makes the most sense for the nation, but how customers will be tied into the energy grids and what level of investments in energy supplies and infrastructure will be pursued could become more of an EU responsibility. Lastly, most of the decisions regarding sources of supply and contract terms will likely remain the property of the member states and their energy sector.

Energy policy will likely become an important element of the EU's common foreign and security policy. Enhanced energy dialogues with Russia and other energy producing and transit regions and could be pursued in a more open and coordinated manner between the Office of the High Representative and the individual member states in order to create environments in which energy companies can operate in accordance with market practices and the security of supply made more reliable.

As the Commission's Green Paper concludes, "each member state will make choices based on its own national preferences. However, in a world of global interdependence, energy policy necessarily has a European dimension."[57]

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[57] EU Commission Green Paper, *Op. Cit.*

Energy Security In The Transatlantic Context

Over the past 55 years, relations between the United States and the EU have steadily broadened and deepened so that today, they remain inextricably linked. Nowhere has this transatlantic integration manifested itself more than in the economic relationship between the United States and the European Union. This economic partnership has been described by many as the single most important influence on worldwide economic growth, prosperity and trade.[58] Within the continually deepening transatlantic economic relationship, common concerns with and shared developments in energy security policy have become a high priority for both the United States and the European Union. The United States and the European Union, together, represent the world's largest energy market. The United States and the EU produce approximately 23% of the world's energy and combine for almost 40% of the world consumption of energy. The United States' share of global oil consumption is approximately 43% while the EU consumes 18%. The United States consumes 23% of the world's production of natural gas. The EU consumes close to 19%. The United States and the EU combined represent over 40% of the electricity consumed world-wide and produce almost 40% of the global CO2 emissions.[59]

This is a critical period for the transatlantic partnership. The long-term implications of the energy debates taking place within the United States and Europe are so similar in scope that the United States and the European Union have found common cause to join together in a cooperative transatlantic energy dialogue, not only to promote competitive markets and market-based policies of producing nations, but more importantly to develop common strategies to provide for the security of energy sources and supply for both Europe and the United States.

At the conclusion of the US-EU Summit held in Vienna, Austria in June, 2006 a joint statement was issued which declared that the US and the EU " recognize the strategic role of security of supply, competitiveness and sustainability in the energy sector. In this connection, we strongly reaffirm our commitment to energy security... and to cooperate to ensure sufficient, reliable and environmentally responsible supplies of energy..."[60]

At the Summit, the United States and the EU further agreed to cooperate to improve energy security by "enhancing the dialogue with the main transit, producer and consumer countries and by promoting diversification of energy sources and supply routes worldwide, notably in the Caspian sea region, Middle East, and

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[58] For a more detailed explanation of the economic relationship see "Deep Integration: How Transatlantic Markets are Leading Globalization," Hamilton and Quinlan, Johns Hopkins University School of Advanced International Studies, 2004.

[59] See *BP Statistical Review, Op. Cit.*

[60] 2006 Vienna Summit Declaration, issued by the United States government and the European Union, 21 June 2006. For additional information see the websites of the White House and European Commission.

continental Africa..."[61] Along these lines, Senator Richard Lugar, Chairman of the Senate Foreign Relations Committee, has introduced the Energy Diplomacy and Security Act (S. 2435), which recognizes energy security as a central element of national security and calls for enhanced cooperation through the development of international energy partnerships.

The United States-EU energy partnership is pursued at the multilateral level through organizations such as the International Energy Agency, the G-8 Initiatives, and the Bonn Renewables 2004 Action Plan. At the bilateral level, the United States has 35 bilateral energy agreements with 11 nations of Europe and 7 formal agreements with the European Commission. Most of these agreements address nuclear and renewable energy or energy efficiency programs, such as the Energy Star agreement for the promotion of energy efficient office equipment. The United States and the EU are also engaged in a formal Bio-Fuels Dialogue and a Dialogue on Climate Change, Clean Energy and Sustainable Development.

At the same time, of particular concern to the United States is the potential long-term threat to transatlantic relations that could emerge should the EU become too dependent on energy supplies from Russia or if Gazprom succeeds in wielding too much influence in large segments of Europe's energy infrastructure. Mindful of the EU's growing dependence on Russian energy, the United States and the EU have joined together to better understand at what point reliance on Russia could threaten Europe's overall energy security and weaken the EU's ability to deal with Russia on a whole host of non-energy related policy issues. The United States and the EU could take actions to ensure that Moscow cannot be in position to exploit future opportunities to use energy as a policy tool for intimidation or coercion against any one particular member of the EU or any nation constituting Europe's immediate neighborhood. The United States and the EU could also work in harmony to encourage Russia and in particular, Gazprom, to accept standard open market business practices, competition and foreign investment in Russia's energy sector. Russia could also be pressed to ratify the Energy Charter Treaty. On the other hand, the United States and the EU could also differ on their approaches to Russia, especially given Europe's reliance on Russia for energy.

Finally, transatlantic cooperation on energy security does not just mean working together to promote energy efficiency, the use of alternative fuels or the securing of reliable supplies of energy from a diversified array of energy producers.

Security of supply also requires a dialogue on energy crisis management and infrastructure protection. In this context, a military dimension to energy security has begun to be included in the transatlantic dialogue, including a potential role for NATO to play in energy security. Both the EU and NATO have begun to address the issue of energy security and options to secure supply sources, distribution routes, and storage facilities, all of which would require enhanced multi-national cooperation. NATO's role in energy security could be complementary to the EU's effort to strengthen market forces and interdependence in the international energy sector by offering assistance for the protection of pipelines or sea lanes during times of

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[61] Conclusions of the US-EU Summit Declaration, June 21, 2006.

political unrest or conflict. Partnership for Peace countries, such as Kazakhstan and Turkmenistan, which are important energy producers are seeking ways to associate themselves more closely with NATO, in part to diminish Russian influence and in part to develop reliable partners in an unstable region. NATO has the ability to help secure the energy infrastructure of such countries.[62]

[62] CRS Report RS22409 *Op. Cit*.