Climate and Energy Papers

Berthold Leimbach / Friedemann Müller

European Energy Policy: Balancing national interests and the need for policy change

The current European energy dialogue

DOCUMENTATION
1 | 2008

FRIEDRICH EBERT STIFTUNG

Content

ISBN 978–3–89892–928–8

Impressum

Publisher:
Friedrich-Ebert-Stiftung
International Dialogue
Hiroshimastraße 17
10785 Berlin

Editing:
Berthold Leimbach
Friedemann Müller

© Friedrich-Ebert-Stiftung

Fotos:
dpa Picture Alliance, European Union, FES

Layout:
Pellens Kommunikationsdesign, Bonn

Print:
bub Bonner Universitäts-Buchdruckerei

Printed in Germany 2008

Climate and Energy Papers

DOCUMENTATION 1 | 2008

Berthold Leimbach / Friedemann Müller

European Energy Policy: Balancing national interests and the need for policy change

The current European energy dialogue

MESSAGE

A policy which promotes energy security also promotes peace. For in the 21st century, peace and global security, as well as climate security, will be inextricably linked to energy security. External energy policy is therefore a central issue in Germany's foreign policy. And we have made good progress towards our goals. During Germany's EU and G8 Presidencies the German Government successfully championed global solutions in the sphere of climate change and energy security. The conclusions of the European Council in March 2007 and of the G8 Foreign Ministers Meeting in Berlin last December outline possible solutions. What matters now is that the processes initiated are taken forward, also with the help of civil society.

Even if – as in any debate about the right course – positions and assessments are not always the same, we must bring about a change in how energy is used in order, on the one hand, to achieve the necessary drastic reductions in greenhouse gas emissions and, on the other, to stabilize our society's energy supply in view of the finiteness of fossil fuels. Many of the world's key natural resources are to be found in politically unstable regions. It is the task of German foreign policy to actively tackle the questions this raises. However, it is also clear that Europe as a whole has a vital pioneering role to play.

This work by the Friedrich Ebert Foundation is the result of a series of working meetings and conferences with decision-makers and experts in seven different Member States of the European Union. The Friedrich Ebert Foundation has thus succeeded in providing new insights into the complexity of the problems and in persuading key actors to engage in the necessary dialogue on how to ensure that Europe's energy supplies are secured sustainably in future. The insights gained together and the possible courses of action outlined can bring us much closer to a common policy.

I encourage the Friedrich Ebert Foundation to keep on playing an active part in this crucial sphere and to continue the discourse which has begun so successfully.

Frank-Walter Steinmeier
Federal Minister for Foreign Affairs

1. INTRODUCTION

In the context of the 2007 German EU and G8 Presidencies, the Friedrich Ebert Stiftung organized a series of workshops and conferences in 2007 on the challenges of establishing a common European energy policy. The workshops, which brought together experts and decision makers from industry and government, took place in the capitals of the six largest EU member countries and in Hungary as one of the two newest member countries in the Eastern enlargement group. The seven countries – France, Germany, Hungary, Italy, Poland, Spain, and the United Kingdom – together represent 71 percent of the population of today's EU-27.

Prior to the workshops, senior experts in all seven countries were asked to establish country papers based on a given set of questions, describing the national energy policy of their countries as well as their countries' interests within the framework of a common European Union policy. The results of these studies and subsequent workshop discussions are summarized in this paper, with one chapter devoted to each country.[1] The following chapters summarize the main findings of this dialogue process, explore commonalities and national specifics, and discuss the challenges and necessary elements of a European energy policy, followed by an overview of the energy policy in each country.

The authors are grateful to all participants in this dialogue; without their extensive commitment of precious time and impressive expertise this publication would not have seen the light of the day. We owe special thanks to those who provided country studies on very short notice and were willing to discuss their findings in a series of workshops. We are also very grateful for the sustained support by members of the German Bundestag and the European Parliament, above all Dr. Angelica Schwall-Düren and Reinhardt Schultz whose active participation proved critical from beginning to end.

1 The authors of the country papers are listed in a separate annex. This paper synthesizes and draws directly on the findings of the studies and results of the workshop discussions in such a way as to illustrate relevant national structures and policies; however, it cannot be considered to represent the views of any individual author or workshop participant. External sources are quoted to the extent that the information provided therein was not made available through the country papers and workshop discussions. The information presented in the specific contributions is not necessarily reproduced in its entirety due to the necessity of condensing the information contained therein to provide a more general view. Responsibility for any remaining errors, of course, lies with the authors of the present paper.

2. FINDINGS

2.1 Common Basics

All countries explored here claim to pursue a set of three (or three plus one) goals. These three goals, sometimes called the “magic triangle,” are as follows: security of energy supply, economic efficiency, and environmental sustainability. The United Kingdom adds a fourth goal, namely that “each home has an adequate and affordable supply of heating” (as described in the UK country paper). In the case of France there are also allusions to a social component in its strategy. The fact that in spite of notable differences in balancing these triangles of goals, so much overlap exists in the fundamental objectives of European national policies, provides a solid foundation for a common European Union framework in energy policy. The devil remains in the details, though. All countries examined here are, for instance, committed to a climate policy that will fulfil the goals laid out in Article 2 of the UN Framework Convention on Climate Change, which binds signatory states to prevent dangerous anthropogenic interference with the climate system. However, the means the countries prefer for reaching this goal are rather different. Some states, as France for example, recommend increasing the share of nuclear power in the European energy mix, others, in particular Germany, focus on promoting renewable energy sources and increasing efficiency of energy use; still others give economic development higher priority than climate policy objectives. Even within countries, it cannot be taken for granted that a consensus will exist on how the balance will be struck between the three goals elaborated above; instead, policy reflects a competition between employment concerns and climate policy interests. The contradictions between these interests reveal themselves in discussions on the domestic level, for instance, with respect to CO2 emissions limitations on automobiles. Nevertheless, a real desire is apparent on the part of all seven countries to make use of EU instruments to secure energy supply and organize a common climate policy.

2.2. National Specificities

Above all, the discussions at the seven workshops made clear the divide between the interests of the three biggest countries in the group – France, Germany, and the United Kingdom – and the four smaller countries – Hungary, Italy, Poland, and Spain. The former three make no secret of their ambition to influence European policy, while the latter countries seem to feel that they have little influence in Brussels and therefore adopt a passive or defensive role in the EU policy-making process. For instance, the perception seems to exist in Poland that the limit of the country’s influence lies in modifying and rejecting proposals rather than forging initiatives itself.

Many differences among the member states seem to be the result of differences in resource endowment. The United Kingdom seems to favor a piecemeal approach to European policy. As the most self-sufficient country in terms of energy resources, the United Kingdom has a rather minor interest in a common European policy for securing energy supply as compared to other countries. It does, however, take a great interest and active role in formulating a common European climate policy. France links its energy policy – including its policy's energy security and climate components – strongly to nuclear energy, to the extent that nuclear power has become a core element of all aspects of its energy sector. The only other country that has a similar focus on nuclear energy is Hungary. Coal plays a similar role in Poland as nuclear power in France and Hungary: Poland is likely to accept energy legislation that does not require it to abandon coal as its leading source of energy. The central role played by coal in Poland's energy mix has resulted in a level of greenhouse gas emissions per capita above the EU average in spite of the fact that Poland's energy consumption is still below the EU average (Tables 1 and 2). Italy and Spain do not show much understanding for countries seeking to protect the role of coal in their energy mix. Both of these countries are more dependent on energy imports than most countries in the European Union but have per capita greenhouse gas emissions below the EU average. They argue that the protection of domestic coal has a disproportionate cost in terms of higher greenhouse gas emissions compared to its economic and energy security advantages.

2.2.1 Energy Mix

Substantial variation exists in the distribution of energy sources used by the countries under review here. This variation arises primarily as a result of difference in each country's endowment with natural resources and, in the case of France, a clear commitment to reduce import dependence in the electricity sector by producing nuclear power. Environmental concerns still play a rather minor role in determining the structure of national energy consumption as evidenced by the 10 percent share of renewables (outside of hydropower) in overall consumption. However, both countries with a substantial nuclear power industry – France

Table 1: Energy Consumption*and Distribution in EU Countries 2006

Primary Energy consumption in % of total consumption

	total cons. (mtoe)	per capita (toe)	Oil	Gas	Coal	Renewables	Nuclear
France	262.6	4.41	35.3	15.5	5.0	6.4	38.9
Germany	328.5	3.99	37.6	23.9	25.1	5.1	11.5
Hungary	24.7	2.45	30.0	45.7	11.7	4.9	12.1
Italy	182.2	3.18	47.0	38.1	9.5	6.3	0.0
Poland	94.5	2.47	24.4	13.0	61.8	4.9	0.0
Spain	145.8	3.50	53.6	20.1	12.6	6.0	9.3
United Kingdom	226.6	3.82	36.3	36.1	19.3	1.5	7.5
EU-27	1,781.9	3.63	40.5	24.6	18.0	6.7	12.6

Source: BP Statistical Review of World Energy, June 2007, p. 41; Wikipedia (population numbers), Eurostat (renewables data)

* BP statistics on renewables include hydropower but not other sources of renewable energy. Therefore, statistics on renewables are taken from Eurostat figures for 2005. As a result, total of percentages here is 102.4 percent rather than 100 percent as given by the BP statistics. The conclusion that can be drawn from this fact is that 2.4 percent of energy consumption for the EU average are covered by non-hydro renewables and 4.4 percent in the case of Hungary with its high share of biomass.

and Hungary – justify their continued use of this energy source by reference to environmental arguments. Similarly, the use of coal as a major energy source is linked by Germany and Poland to energy security considerations.

It seems clear that greenhouse gas emissions reductions will not be achieved in the European Union by forcing member states to achieve these reductions entirely through increased use of renewable energy, without allowing some part of this reduction to be achieved through the use of nuclear power. Nor will member states accept an enforced reduction in coal consumption due to climate policy concerns. Energy security and employment arguments appear to carry more weight, all the more since coal-reliant countries favor the option of carbon capture and sequestration. However, research and development into this technology has not advanced to a degree sufficient to guarantee its success.

2.2.2 Market Liberalization

All seven states considered here are committed to the principle of a liberalized energy market, though they do not agree on how such a market should be structured. Consensus exists on the need to provide third-party access to electricity and natural gas transport grids. Little support can be found for the idea of creating a common EU regulatory agency for the European energy markets: Italy is the most in favor of delegating this function to the EU level, while France rejects the idea completely. France insists on national sovereignty over energy transport networks and opposes the unbundling of ownership of energy production and transport infrastructure. Spain takes a more pragmatic approach but is constrained by the fact that its only route to the rest of the European Union runs through France, which has taken a hard line position.

Particularly surprising is the absence of any real discussion about the need for improving natural gas transport infrastructure to Europe. While infrastructure for transporting natural gas from East to West and North to South is relatively well developed in Europe, no means currently exist to transport natural gas from the Mediterranean or from LNG ports in France or Spain to Central and East European EU member states. Market liberalization only makes sense if infrastructure is present to transport natural gas from where it is available to where it is needed. This situation can hardly be said to exist in the European Union at the moment. The spot market for natural gas at Zebrugge is accessible from all corners of the European Union; however, its capacities are insignificant compared to the volumes demanded.

2.2.3 Import Dependence and Security of Supply

Substantial variation exists among the seven countries in their degree of import dependence. The United Kingdom imports only ten percent of the energy it consumes, while Spain and Italy import 80 and 85 percent, respectively. Poland is able to cover almost 60 percent of its energy consumption using domestic coal.

Energy consumption per capita does not vary by more than one third from the EU-27 average of 3.63 tons per capita. Due to differences in the size of economies in the European Union, substantial variation exists in total energy consumption: Germany, the largest consumer of energy in the European Union, uses thirteen times more energy than Hungary, the smallest consumer. Germany is also the largest importer of energy in absolute terms, though its share of imports in energy consumption is not as high as for Italy or Spain.

Import dependence has developed from a merely economic problem into a political dilemma. Today approximately 85 percent of oil and natural gas production is controlled by state-owned companies, which are guided by both economic and political agendas. Their economic agenda is to limit production in order to conserve oil and natural gas for the future, at least to the extent that high prices can be maintained together with reduced investment into oil and natural gas exploration. Doing so creates a win-win situation for state-owned oil and natural gas companies: more profits at reduced costs. Their political agenda is to translate the dependence of consumer countries into political leverage against these countries. The means

Table 2: Energy Consumption*and Net Import in EU Countries 2006

				Primary Energy net import in % of total consumption		
	total cons. (mtoe)	per capita (toe)	Total Import-share**	Oil	Gas	Coal
France	262.6	4.41	54.8	34.8	15.1	4.9
Germany	328.5	3.99	65.9	36.5	19.6	9.8
Hungary	24.7	2.45	63.9	25.9	34.8	3.2
Italy	182.2	3.18	85.8	43.9	32.7	9.2
Poland	94.5	2.47	32.6	23.6	9.0	0.0
Spain	145.8	3.50	82.2	53.4	20.4	8.4
United Kingdom	226.6	3.82	21.1	2.5	4.3	14.3
EU-27	1,781.9	3.63	56.1	34.1	14.4	7.6

Source: BP Statistical Review of World Energy, June 2007, p. 41; Wikipedia (population numbers)

* Consumption here includes hydropower but not other sources of renewable energy, which account for less than 5 percent of total energy consumption in all seven countries considered here.

** Excluding uranium

by which President Hugo Chavez of Venezuela and President Mahmoud Ahmadinejad of Iran use this instrument are clearly provocative. Other leaders such as President Vladimir Putin of Russia are more subtle in their use of oil as a political tool. Nonetheless, the influence Russia wields over European policy is undeniable as can be seen with regard to the Nabucco Pipeline project and in the negotiations between Russia and the European Union on Russia's accession to the World Trade Organization. In light of limited oil and natural gas reserves, it is needless to say that time is on the side of producers and not consumers. At present, few oil and natural gas exporting countries follow "Western" market-oriented approaches as codified in the WTO Treaties and the Energy Charter Treaty, which call for fair competition and equal standing before the law for foreign investors in case of a dispute. As a result, it is critical that a strategy be developed that opens new opportunities in the relationship between oil and natural gas producers and consumers rather than allowing this relationship to become bogged down by the growing imbalance in favor of producer countries. Those member countries with the greatest degree of import dependence, especially those who rely on supplies from unstable countries should feel the urgency to take action most of all and should take the lead in forging a common European energy security policy.

2.2.4 Climate Policy

All countries examined here have committed themselves to principles and rules of the UN Framework Convention on Climate Change and the Kyoto Protocol. However, they can be broken down into three groups according to their progress towards achieving their targets under the Kyoto Protocol. Poland and Hungary belong to a first group of countries that has more than fulfilled its targets, having experienced like most former socialist countries a breakdown of its heavy industry during the 1990s and a resulting plunge in greenhouse gas emissions. France, Germany, and the United Kingdom fall into a second group that is close to meeting its targets. Spain and Italy are part of a third group that is not only not on track to meet its targets but in fact faces a widening gap between its real emissions and its target emissions. The countries in the first group have been widely praised for fulfilling their targets but have the least energy efficient economies. They are also wary of ambitious climate policy initiatives, particularly those that might jeopardize their economic growth, since these countries hope to catch up to West European countries with regard to standards of living. Hungary's emissions per capita are still the lowest among the countries considered here. Poland, however, has a higher level of emissions per capita than the EU-27 average (Table 2), though its level of income per capita is below the EU average.

It must be noted, though, that the two countries that have achieved the greatest reductions in total emissions with respect to emissions in 1990, namely Germany and the United Kingdom, still have the highest levels of emissions per capita among all the seven countries.

2.2.5 Renewables in Electricity Production

All seven countries support an increase in the use of renewable energy sources particularly in electricity production in order to reduce greenhouse gas emissions. Though France accepts that emissions reductions are central to any serious climate policy, it insists that the means of achieving these reductions should be decided by each member state for itself, since national conditions are too different to allow all states to follow the same reduction strategy. France is not prepared to compromise on its nuclear program, and since its greenhouse gas emissions per capita are the lowest in Europe next to Hungary (which also relies heavily on nuclear power), neither country feels that a change of course is needed in its climate policy. France broadly supports efforts to promote the use of renewable energy sources but opposes the notion of imposing minimum requirements for the use of renewables such as a 20 percent share in energy consumption.

Table 3: Greenhouse Gas Emissions in EU Countries 2006

	Greenhouse Gas Emissions			Energy Consumption
	total (mt CO_2 equivalents)	per capita (t)	Per unit GDP (t/million €)	Per unit GDP (t/million €)
France	555.2	9.3	318	150
Germany	1,006.0	12.2	433	141
Hungary	79.8	7.9	897 (518*)	278 (160*)
Italy	576.9	9.9	391	123
Poland	414.0	10.8	1522 (882*)	347 (201*)
Spain	429.2	10.3	438	149
United Kingdom	657.4	11.1	344	119
EU-27	5,192.6	10.6	448	154

Source: Hans J. Ziesing, Energiewirtschaftliche Tagesfragen, Heft 9, 2007; Wikipedia (population numbers), Eurostat (GDP and GDP PPS)

* GDP in Purchasing Power Standard

3. MAIN CHALLENGES FOR A EUROPEAN ENERGY POLICY

To achieve truly European energy policy, a number of structural problems must be overcome; in particular differences in national positions as pointed out in the former chapters must be addressed with respect to the objectives to be pursued by European policy and regarding the still insufficient competences and instruments granted to the European Union and its institutions. Global challenges exacerbate the problems caused by inadequate national energy policies in the European Union.

1. Dependence on imported fossil fuels is an issue that will only grow in its scope and urgency over the coming decades. Some variation exists in the degree of dependence of individual EU member countries (Table 2): The United Kingdom is much more self-sufficient in terms of oil and natural gas than other member states which rely on imports to cover 90 percent of their oil consumption. The overall trend is towards greater and greater dependence across the entire European Union, which as a whole already must import 56 percent of oil and natural gas consumed. This trend can be attributed to declining oil and natural gas production in the United Kingdom and the Netherlands as well as declining coal production in the United Kingdom, Germany and Poland (as shown in the tables in respective country reviews below).
2. Within a space of only a few years, a fundamental shift in power has occurred on the international energy markets from consumers to producers, particularly on the oil market, which in turn determines to a large extent the situation on other markets. While growth in oil supply has slowed due to decreasing production in the United States and United Kingdom, compensated by controlled increases from OPEC countries, the Caspian region and Russia, it has been utterly outpaced by growth in demand from Asian and Latin American emerging economies. The parallel growth in economic and political power of energy resource producing countries is a new phenomenon and one that will become more pronounced in the future due to the consistently high growth in demand from emerging markets that in Asia alone encompass 3 billion inhabitants and due to strengthening state control over oil and natural gas production. In light of limited oil reserves, rapidly being depleted in major consumer countries, a strategy of profit and power maximization dictates that exploration and production investment should be restricted by net producers. At least for natural gas, strengthening supply competition could reduce the power asymmetries in favor of the producer side; this option is not being exercised though – at least not in Central and Eastern Central Europe. The absence of infrastructure, apart from that linking these regions to Russia and the North Sea, prevents the transportation of natural gas from the Mediterranean and Persian Gulf regions thus limiting possibilities for supply diversification and thus for securing supply, while strengthening the hand of Russia.
3. Combustion of fossil fuels is the main cause of disruption to the global climate system. The need to reduce global CO_2 emissions to diminish this disruption limits the choices available in terms of

energy supply. A wide divergence exists in terms of the willingness of different regions to modify their energy policies to reach climate policy objectives. It is hard to imagine, for instance, that emerging economies in Asia will halt their oil-fueled motorization or limit the increase in their use of cheap coal power simply due to the fact that China's emissions growth in a single year outstrips the reduction in emissions achieved in 22 years by industrialized countries with binding targets under the Kyoto Protocol.

To deal with these problems, the European Union must assume greater responsibility, particularly in the global context, in confronting the two cardinal resource challenges of the 21st Century, namely: (a) the transition from the fossil fuel age to a future built on solar energy; and (b) the setting of a global emissions pathway that is compatible with the objectives of the UN Climate Convention. Leadership and commitment from the European Union is indispensable in this context; however, the European Union must use its political and economic clout wisely and carefully evaluate existing options and steps to be taken, if conflicts and major economic disruptions are to be avoided.

4. GENERAL OPTIONS

Given the challenges described above, the following options for European energy policy can be discerned. These options serve both the goals of securing energy supply and preventing dangerous anthropogenic interference with the climate system.

1. Strengthening the demand side of the energy markets by: (a) reducing fossil fuel consumption through increased energy efficiency and substitution of fossil fuels by alternative, preferably renewable energy sources; and (b) establishing a more collective bargaining position on the part of consumer countries and improving competition on the supply side by providing the infrastructure to give suppliers access to the European market as a whole.
2. Increasing energy efficiency by setting corresponding standards and supporting research and development and the deployment of new and more efficient technologies and products.
3. Diversifying the energy mix and supply sources on the national and EU levels, particularly through the integration of the natural gas sector in the European Union. The development of a sufficiently integrated natural gas grid would allow the transportation of gas from where it is available to where it is needed and should thus be given a high priority on the political agenda. The European Union as the by far largest natural gas import market in the world must also ensure that it is linked to all natural gas producers within a radius of 5000 km from Central Europe.
4. Heralding the end of the oil age within the next few decades. Though oil will remain available to the petrochemical industry and for specialized energy needs, it must be phased out as a major fuel in general and as the only significant fuel in the transportation sector. Though non-conventional sources of oil could be tapped, regarding their known reserves and especially the damage their exploitation would cause to the environment and to the climate system in particular, they are no serious option. Considering the enormity of the investment that will be needed to transition to a new sustainable supply system and the need to avoid dramatic and possibly violent distributional conflicts in Africa and the Middle East, it is vital that this transition be well managed. The most advanced regions such as Europe and North America should assume as one of their responsibilities a leadership role in promoting research and development for new energy technologies and promoting related investment.
5. To be successful, international climate policy will require not only a decrease in national and European carbon emissions but also an engagement of the emerging economies in Asia and Latin America into a system of commitments that guarantees a decline in emissions. For good reasons, emerging economies will only accept commitments if these can be made economically attractive to them, for instance through a global emissions trading system that allows these countries to benefit financially if they modernize their energy production capacities in accordance with their emissions commitments.

5. POLICY RECOMMENDATIONS

The following basic options and recommendations can be derived from the analysis provided through the current European energy dialogue:

1. High priority should be given in common European energy policy to the objectives of securing energy supply and preventing anthropogenic interference with the climate system.
2. EU institutions should be committed to a framework of binding targets subject to strict monitoring. Better results should be achieved through this broader framework approach than through the enforcement of specific rules and norms on all levels of national policy, an approach that many member countries feel EU institutions have taken until now.
3. Diversification of supply sources and stock-building are urgently needed and should be made mandatory across the European Union not only for oil, for which members of the International Energy Agency are required to maintain a 90-day stock, but also for natural gas. Member countries that are unable to store such large stocks of natural gas on their own territory for geological reasons could arrange to store the natural gas in neighboring countries.
4. The integration of national energy markets should be promoted, particularly in the electricity and natural gas sectors. The option should remain available for EU member states to support energy-intensive industries and low-income households through targeted subsidies in form of specific price schemes.
5. EU member states should not be required to have the same distribution of energy sources; instead the objective should be an optimal European energy mix taking into account specific national conditions with regard to reserves of raw materials, existing trade structure and economic conditions, all of which provides for an equitable distribution of burdens and opportunities among member states. In practice, this means that countries with a strong tradition of coal use should be allowed to maintain this tradition provided they make use of climate-friendly technologies. The same principle should be applied to countries with a large share of nuclear power in their energy mix, whereas these countries would be required to uphold the strictest safety standards.
6. Given that most member states reject the idea of having a European energy agency and regulatory agency for power transmission grids, institutionalized cooperation between national regulatory agencies should be established, particularly to address the question of cross-border energy transportation.
7. EU member states should significantly increase support for research and development into alternative and renewable energy sources and improved energy efficiency technologies in order to effect a gradual but steady transition from fossil fuels to renewables and make optimal use of the potential for energy savings.
8. The EU Commission should set a target of having a 20 percent share of renewables in the overall EU

energy mix and establish a timetable for achieving this target. This strategy should take into account the geographic and technological conditions of EU member countries as well as the least-cost principle for internalizing the costs of CO_2 emissions abatement and energy security measures.

9. The European Union should assume a leadership role in international climate policy. The common international goal of climate protection can only be achieved if all major greenhouse gas emitters can be brought on board for a post-Kyoto Protocol regime based on binding targets for all countries that are stringent enough to reverse the trend of dramatically increasing emissions. EU leadership will be required in particular to convince emerging economies to adopt such targets.
10. A global emissions trading system should be established based on the strong foundation of the EU Emissions Trading Scheme (EU-ETS), preferably including all emissions sources including, e.g., air transportation. A global system of this sort would be one possibility for providing a net transfer of resources from industrialized countries to developing countries and thus for making emission caps attractive to emerging economies. A consensus must also be established, at least in the long term, on the provision of equal emission rights per capita for all countries. In order to obtain the desired results a Global Emissions Trading Scheme must provide mechanisms to avoid unfair competition and climate dumping. According to the Stern Report and other studies, the costs of mitigating climate change will be lower than the costs of adapting to climate change if a business-as-usual approach is taken; therefore the European Union and its member states should provide the leadership needed to establish a system that is attractive to emerging economies and limits the cost of a net North-South transfer of resources.
11. Given that an emissions trading system alone will not be sufficient to impel the transition to low-carbon energy production, regulatory regimes must also be established that foster research and development as well as the deployment of best-available technologies, so that the necessary infrastructure is in place to reach the desired emissions pathway.
12. The transfer of climate-friendly technologies including technology for improved energy efficiency to emerging economies and other less technologically advanced countries should be accelerated according to mechanisms and programs to be developed jointly between technology providers and recipients.
13. A dialogue between the most important consumer countries should be established with a focus on rule of law, anti-corruption and good governance, and the promotion of fair competition and market transparency. Such a dialogue is particularly important due to the risk that increased pressure on producer regions resulting from surging demand in newly emerging economies might further destabilize these producer regions. It would also help to balance some of the asymmetries that exist in the bargaining position of consumer countries against producer countries. A common interest also exists on the consumer side to improve the functioning of the global market, since doing so would reduce the side payments to be paid in an imperfect market.
14. The European Union should also take a lead in establishing a high-level dialogue with producer countries, for instance by pursuing the goal of incorporating OPEC into circles such as the G8 plus O5. It is clear that an institution like OPEC has a position of global responsibility; the challenge is to channel its policies towards common international goals through a broader international dialogue. This dialogue should take the concerns of producer countries about the predictability of consumer markets and security of demand seriously. Since OPEC member countries lie along the world's sun belt, giving them a particularly strategic position in terms of solar power, and dispose of huge investment means in the form of petrodollars, they should be included in discussions on the shape and form of the post-oil age.

6. COUNTRY REVIEWS

6.1 FRANCE

Compared to other European countries, France has developed a very unusual energy supply structure as a result of its traumatic experience during the oil crisis in 1973/74. In terms of energy resources, France is one of the least endowed countries in Europe, where most countries have considerable reserves of oil, natural gas, or coal. Consequently, its vulnerability was demonstrated most clearly during the oil crisis. No later than 1974, France launched an extensive nuclear power program, designed to ensure a large degree of energy independence at least in the electric power generation sector. This initiative has made France the country with the by far largest share of nuclear power in its energy production capacity worldwide.

In 2005, 78 percent of electricity consumption was covered by nuclear energy. Combined with other domestic power sources such as hydropower and other types of renewable energy, total energy import dependence has been kept at a level not exceeding 50 percent, a level far below that of, for instance, Germany. This fact has had a meaningful influence on the country's energy policy as a whole.

The historic change during the 1970s had major effects on at least two areas relevant for a common European policy. In the area of competition policy, France has come to insist on organizing its energy policy in a monopolistic way, an approach that clashes with the efforts made by the EU Commission to liberalize the EU domestic energy market and provide competitive structures on the production, transportation, and trade side. France is far from being ready to reduce the state influence on the electricity sector and giving up the transportation monopoly of Electricité de France (EDF). At the same time, major energy companies in France do not hesitate to invest into private companies in other countries such as Germany (as demonstrated by the case of EnBW).

In the area of climate policy, the large share of energy production covered in France by nuclear energy has resulted in a CO_2 intensity of energy production that is extraordinarily low by European standards. According to a recent World Energy Council (WEC) study, the CO_2 intensity of energy consumption in France, measured in emissions per consumed energy unit, is only 58 percent of German levels, while CO_2 emission per GDP unit are 59 percent of German levels.[2] This fact makes France resistant to common European standards on the share of renewables in electricity and overall energy production. The basic position held by France is that, while it shares the goal of reducing greenhouse gas emissions, the means of reaching this goal should be decided by individual member states and that increasing the share of renewables not be the only recognized path to reducing emissions.

2 World Energy Council, Deciding the Future: Energy Policy Scenarios to 2050, London, 2007, p. 95. The data summarized in Table 3 above puts these figures at 69 percent and 73 percent, respectively. Though the figures differ somewhat, the general pattern remains the same.

Table 4: France – Oil production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	million b/d	million tons	million b/d	million tons
production	0.025	1.2	0.023	1.1
consumption	2.007	94.9	1.952	92.8
net ex/import	- 1.982	- 93.7	- 1.929	- 91.7

Source: BP Statistical Review of World Energy, June 2007

Table 5: France – Natural Gas production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	billion m³	million toe	billion m³	million toe
production	1.1	1.0	0.9	0.8
consumption	39.7	35.7	45.2	40.6
net ex/import	- 38.6	- 34.7	- 44.3	- 39.8

Source: BP Statistical Review of World Energy, June 2007

Fossil fuel balance

The share of oil in France's energy consumption was 35 percent in 2006, which almost is the same as the EU average (37 percent). Due to the fact that the transportation sector depends almost exclusively on oil as a fuel, the share of oil is determined largely by the size of this sector. Since transport intensity relative to GDP is relatively high and constant across EU countries, it is therefore easy to see why little variation exists in terms of the share of oil in energy consumption in the European Union.

Oil production is almost negligible in France. As Table 1 shows, the share of imports in oil consumption is almost hundred percent. Today, oil is consumed mainly in the transport sector. In the 1970s, France started to eliminate oil from use in electric power generation and, like most other European countries, hardly uses oil for this purpose anymore. Consequently, the potential for reducing dependence on imported oil, except through a partial shift to biofuels and more energy-efficient technologies in the transportation sector, is very slim indeed.

Domestic natural gas production – like domestic oil production – is insignificant in France. The share of domestically produced natural gas in total natural gas consumption was only about two percent in 2006 (Table 2). Correspondingly, 98 percent of natural gas consumed has to be imported. The share of natural gas in total energy production is around 15 percent, which is less than in most EU countries due to its minor role in electricity production in France.

Unlike demand for oil, demand for natural gas is increasing, having risen by 14 percent between 2000 and 2006, or by 2.2 percent annually. The issue of dependence on this fossil fuel is thus becoming more pressing. In contrast to Germany, France has a relatively diversified natural gas import structure. France imports natural gas not only from Russia (from where 19.5 percent of its imported natural gas originates) and

Table 6: France – Coal production, consumption and net export (+) / import (-), 2000–2006 million tons of oil equivalent

	2000	2006
production	2.3	0.2
consumption	13.9	13.1
net ex/import	- 11.6	- 12.9

Source: BP Statistical Review of World Energy, June 2007

the North Sea, as does Germany, but also from the Mediterranean region, in particular from Algeria (which supplies 16 percent of natural gas imported to France). Natural gas imported from the Mediterranean region is transported both by pipeline and as LNG and accounts for 25.2 percent of France's imports not counting the share already covered by Algeria. Therefore France is much less threatened by the risk of a delivery cut from Russia than Germany or Eastern European EU member states.

Coal plays a minor role in French energy production. It accounts for only five percent of total energy consumption. As in the case of oil and natural gas, the contribution of domestic production to total consumption is small for coal; in 2006, domestic production constituted just one and a half percent of coal consumption (Table 3). The rest must be imported.

The small share of coal in France's energy mix helps explain the low CO_2 intensity with respect to energy consumption and GDP.

The three fossil fuels – coal, oil, and natural gas – together comprise only about 56 percent of energy consumption in France. This figure is lower than for all other EU countries considered here.

Electricity market

France produced 547 TWh in 2005, while electricity consumption amounted to 477 TWh. France imports about 30 TWh and exports 90 TWh. With most of its neighbors, such as Belgium, Spain, and Italy, France has a positive net export. In 2005, the net import from Germany was 9.6 TWh. As a consequence of this structure, France is essentially self-sufficient, allowing for a small exchange to satisfy peak demands in France and abroad.

Electricité de France (EDF) has a share of 87 percent in total electric power generation in France. A minimum state share of 70 percent in EDF's capital is required by law. Réseau de transport de électricité (RTE), which has a monopoly on electric power transmission in France, is entirely owned by EDF. The power utility regulation commission, established in 2000, is an independent national agency that supervises the functioning both of the electricity and natural gas markets.

On January 10, 2007 the EU Commission released a proposal to unbundle the ownership of electric production capacities and electric power grids in order to create freer competition on the electricity market. France protested immediately, arguing that electricity prices in France are not above market prices.

Climate policy

France is very much committed to strong standards for European climate policy. Due to the extremely low share of fossil fuel-run power stations in electricity production (about 10 percent), CO_2 emissions per capita are extremely low by EU standards. In addition, France has set itself the target for 2010 of reaching a 10 percent share of renewables (including hydropower) in the overall energy mix and 21 percent in electricity production. The government also subsidizes the private installation of solar collectors and the use of biogas. The long term goal is a reduction of CO_2 emissions to one quarter of current levels by 2050. Public support for research and development should bring progress particularly in the transportation sector. This would contribute not only to solving the climate problem but to reducing dependence on oil imports.

Energy security policy

By building up its nuclear power capacities, France assumes that it has done its part in improving the security of its energy supply. Doing so has given domestically produced energy a 38 percent share in energy consumption.[3] Combined with hydropower and other renewables as well as a small amount of domestic fossil fuel production, France is able to cover more than 45 percent of its energy consumption using domestic sources, almost exactly the EU average. The diversification of energy imports, particularly with respect to natural gas, is far better than in Central and Eastern European EU member states. Consequently, France is less interested in a common European energy security policy than, for instance, Germany.

France, however, supports a number of common EU measures which should contribute to a shift from imported fossil fuels to other, mainly renewable energy sources or to improved energy efficiency. The country is an advocate of reducing energy use for heating in private housing by improving insulation, particularly in old houses, rather than fixing the share of renewables in electricity production to 21 percent by, for instance, subsidizing wind power. It also is in favor of a common European CO2 tax and supports a modernized common agricultural policy that would shift subsidies to biofuels and biomass.

France also proposes to provide more support to research and development in greenhouse gas reducing areas such as nuclear power, second generation biofuels, solar power, and Carbon Capture and Sequestration (CCS). From the French perspective, cooperation between EU member states should be organized according to the same principles as the Schengen agreement: Only those states that are willing and able to contribute should participate in the initiative. Cooperation in the nuclear sector would be a good entry point for such a coalition of the willing.

With regard to securing natural gas supplies, France recommends a different strategy than the EU Commission. It proposes the authorization of long-term contracts between producers and importers in order to encourage the necessary investment into production and transportation capacities (pipelines and LNG ports) to secure future demand.

Conclusions for European energy policy

The French approach to a sustainable and secure energy supply differs to some degree from the mainstream European strategy:

First, instead of seeking to strengthen competition on the supply side from outside Europe by promoting diversification, France advocates long term contracts with producer countries.

Second, instead of calling for an ambitious increase in the share of renewables in electricity production – including the use of subsidies for energy sources such as wind power, France exalts its path to nuclear energy, which so the argument goes, successfully links the security of supply with sustainability.

Third, France completely rejects any policies requiring the liberalization of the EU internal energy market. In particular, France is against an enforced separation of the ownership of energy transportation networks and energy production capacities.

Fourth, instead of insisting on a unified European energy policy, France expects that building coalitions of the willing will meet with more success, particularly in avoiding a further blockade with regard to a modernized nuclear strategy.

In fact, France does not oppose a common policy to shift the energy mix towards a higher share of renewable. On the contrary, France supports a stronger research and development policy that includes renewables.

3 This figure is only valid if nuclear power itself is considered a primary energy source rather than the fuel used in its generation (uranium). This conception relies on the premise that the supply of uranium is more or less unproblematic. This assumption could be falsified if the expected increase in nuclear power production pushes up demand for uranium to such a degree that, given limited reserves, producer countries are put in a quasi-monopoly position comparable to the situation with respect to oil.

6.2 GERMANY

Germany, the largest economy and largest energy consumer in the European Union, is quite average in terms of the distribution of energy sources used to cover its consumption. Oil claims the biggest share among the different energy sources with 36 percent of total energy consumption in 2006, followed by coal (24 percent), and natural gas (23 percent). As in many other economies, fossil fuels dominate the energy mix, accounting for 83 percent of energy consumption. Nuclear energy still has a share of 13 percent, while renewables and others together provide 5.5 percent of energy consumed. The share of oil in the energy mix has remained rather stable, while natural gas and renewables are gaining and coal and nuclear energy are losing shares. Since 1990, energy consumption has stayed relatively constant (declining by only three percent over a space of 16 years between 1990 and 2006). The diversification of energy sources used by Germany is poor compared to most West European countries but better than most East and Southeast European EU member states. The situation with respect to Germany's dependence on natural gas is alarming, given that Germany has no LNG port and present infrastructure does not permit the transportation of natural gas from the Mediterranean area by pipeline.

Germany considers itself a pioneer with regard to climate policy. Indeed, the 19 percent reduction in greenhouse gas emissions achieved in Germany as of 2005 with respect to emission levels in 1990 has not been duplicated by any other EU-15 country, in spite of the common EU commitment to an 8 percent reduction by 2008 to 2012 under the terms of the Kyoto Protocol. This reduction is somewhat less impressive when Poland and Hungary are included in the picture; both countries experienced a decline in emissions of 16 percent and 30 percent, respectively. Germany has benefited in terms of greenhouse gas emissions from the collapse of heavy industry in its Eastern regions, an effect common to a number of former socialist countries. However, modernization in quite a number of industry sectors primarily responsible for the production of greenhouse gases is still very necessary across Germany as a whole.

According to a recent study by the World Energy Council,[4] German CO2 emissions per GDP unit are higher by 19 percent than those in Great Britain and higher by 71 percent than in France. Even if Germany reduces its total greenhouse gas emissions by 40 percent within the framework of a 30 percent reduction by the European Union as a whole, German emissions per GDP unit and per unit of energy consumed will remain above the EU average. Given this fact, Germany's role as a climate policy pioneer in the European Union can be disputed.

Fossil fuel balance

In contrast to the EU-27, which experienced a small rise in oil consumption of 3.6 percent between 2000 and 2006, German consumption declined by 5 percent during the same period and by 10 percent since 1996. This fact is a result of the saturation of the German automobile market, a situation that has not yet occurred in all other EU countries. Transportation is the by far the most important oil consuming sector in all major regions of the world. Germany's domestic oil production continues to play a negligible role in covering oil consumption, accounting for less than three percent of consumption. As a result, dependence on imported oil is nearly complete.

Due to an available pipeline infrastructure and an established trade structure, Russia is the major supplier of oil to Germany, with a 34 percent share in Germany's imports. The next two countries in this ranking, Norway (17 percent) and the United Kingdom (12 percent), together provide less oil to Germany than Russia. The remaining 37 percent are mainly divided between Libya (11 percent), Kazakhstan (7 percent), Saudi Arabia (3.3 percent), Syria, and Nigeria, Algeria, and Azerbaijan (all between 1 and 3 percent). This

4 World Energy Council, Developing the future: Energy Policy Scenarios to 2050, London (November) 2007, p. 95

Table 7: Germany – Oil production, consumption and net export (+) / import (-), 2000-2006

	2000		2006	
	million b/d	million tons	million b/d	million tons
production	0.076	3.6	0.072	3.4
consumption	2.763	129.8	2.622	123.5
net ex/import	- 2.687	- 126.2	- 2.550	- 120.1

Source: BP Statistical Review of World Energy, June 2007

Table 8: Germany – Natural Gas production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	billion m³	million toe	billion m³	million toe
production	16.9	15.2	15.6	14.1
consumption	79.5	71.5	87.2	78.5
net ex/import	- 62.6	- 56.3	- 71.6	- 64.4

Source: BP Statistical Review of World Energy, June 2007

looks like a rather well-diversified energy supply structure, which is true for the time being. It is, however, hard to imagine that this system is sustainable. Norway's oil production has decreased since 2000 by 17 percent and will decline further; the United Kingdom's oil production has declined by as much as 39 percent. Means of substituting oil from these countries will have to be found. Russia is hardly in a position to compensate for shortfalls in North Sea oil imports. The likely result is that Germany will have to import more oil from the Middle East, where the emerging economies of Asia are the main customers.

In contrast to domestic oil production, domestic natural gas production in Germany is not trivial. In 2000, domestic natural gas covered 21 percent of German consumption (Table 2). This share declined to 18 percent in 2006, as a result of a slight decrease in production and a considerable increase in consumption. A further loss in the share of domestic natural gas in overall consumption is probable. Natural gas is the energy source with the highest rate of consumption growth (1.6 percent as an annual average since 2000) next to renewables, whose use is still growing more slowly in absolute terms.

Considering the stagnation in energy consumption as a whole, the growth in natural gas consumption is good news as it indicates a substitution from coal or oil, which is positive from an environmental standpoint. From the perspective of increasing energy security, this trend is of a questionable nature. Germany has access to natural gas only from Russia (41 percent of German imports) and North Sea sources (Norway: 32 percent, Netherlands: 22 percent, UK and Denmark: 5 percent) but not to other sources like Africa or the Middle East due to a lack of infrastructure. The North Sea sources on which Germany relies are rapidly drying up, and Russia has made no secret of its intention to diversify its natural gas deliveries to Asian customers and even to the United States.

The role played by coal in the German energy mix has declined in recent years. Nonetheless, at 24 percent, its share in energy consumption is greater than that of natural gas. Coal in Germany is used almost exclusively in the electric power generation sector. As

Table 9: Germany – Coal production, consumption and net export (+) / import (-), 2000–2006 million tons of oil equivalent

	2000	2006
production	56.5	50.3
consumption	84.9	82.4
net ex/import	-28.4	-32.1

Source: BP Statistical Review of World Energy, June 2007

the least environmentally friendly fossil fuel, coal has lost market shares not only to nuclear energy but also to natural gas and renewables. The decline of domestic production is proceeding faster than the decline of consumption (Table 3). Therefore the import share in domestic consumption is increasing.

The major sources of coal imports are Poland (23 percent), South Africa (20 percent), the Commonwealth of Independent States (18 percent), Australia (18 percent), and Colombia (9 percent).

Electricity market

In 2005, electricity production in Germany totalled 619 TWh.[5] Almost three quarters of this amount was produced using nuclear energy and coal. Nuclear energy contributed 163 TWh, or 26 percent, lignites accounted for 154 TWh (25 percent), and hard coal for 135 TWh (22 percent). Natural gas and renewables have a 13 percent and 9 percent share in electricity production, respectively; their combined share has grown from 16 percent in 1995. Since the lifecycle of a typical power station is around 35 years, sudden changes in production shares should not be expected. On the other hand, decisions made now on the energy source used for new power stations can have a significant impact on import dependence and greenhouse gas emissions for years into the future. Since 2000, gross consumption of electricity has grown by 7 percent, or 1.1 percent annually.

The Renewable Energy Sources Act (EEG) entered into force in Germany in early 2000. The Act is designed to promote the feeding of renewable energy such as wind power into the power grid. Currently about 50 TWh of electricity are supplied through renewable sources. The subsidy paid to producers differs significantly based on the degree of maturity of the renewable energy source in question. As the most established source of energy, hydropower receives the lowest subsidy, while solar power, the least developed technology, receives the greatest financial support. Wind power and biomass lie somewhere between these two. The objective of the Act is to raise the share of renewables in total electricity supply to a 12.5 percent by 2010 and 20 percent by 2020. At the same time, nuclear power is supposed to be phased out completely. The Nuclear Energy Act of April 27, 2002 calls for a reduction in the generation of nuclear power from 164 TWh in 2005 to 23 TWh in 2020, which corresponds to a reduction from a 26 percent share in electricity production to a share of around 4 percent. Given this fact, renewables cannot entirely compensate the decline in electricity production caused by the phasing out of nuclear power, which means that the share of fossil fuels in electricity production must grow. If emissions are to be reduced, the only options are then to increase the efficiency of electric power use or to implement Carbon Capture and Sequestration (CCS), a technology that is still in the process of development and testing. A CCS demonstration site is currently under construc-

5 The data are drawn from the Germany country paper authored by Bernhard Hillebrand.

tion in Eastern Germany, financed by the Swedish energy giant Vattenfall.

Climate policy

Germany considers itself to be a pioneer in the field of climate policy. This applies to energy efficiency and energy saving measures as well as to the promotion of renewable energy industries such as wind power. Among OECD countries, Germany is one of three that can demonstrate the greatest reduction in greenhouse gas emissions between 1990 and 2005 with a decline in emission of 19 percent, after Hungary (30 percent) and Slovakia (29 percent). Germany is a strong proponent of the EU Emission Trading Scheme (EU-ETS) as the most cost effective means of reaching the targets Europe has set for itself under the Kyoto Protocol. It must be pointed out, however, that CO_2 emissions per capita in Germany are still above the EU average; if the year 2000 is taken as the base year for calculating reductions, the emission targets Germany has set for itself are no more ambitious than those set at the EU level. Even in 2020, Germany's greenhouse gas emissions per capita and per unit of GDP should be expected to exceed the EU average.

Energy security policy

The primary measure used by Germany to increase the security of its energy supply is the improvement of efficiency in energy consumption. Germany does not consume more energy today than in 1990, in spite of economic growth of roughly 30 percent during this period. On the other hand, import dependence increased with regard to oil, hard coal, and uranium due to declining domestic production and with respect to natural gas as a result of an expansion in consumption under conditions of stagnating domestic production.

German coal consumption is based to a great extend on lignite, which is very problematic from the standpoint of carbon dioxide emissions. An increase of domestic production is possible only in the case of hard coal but will likely not be pursued. On the contrary, a steady reduction in hard coal production, leading to a complete halt in domestic exploitation by 2018, was decided under federal law in 2007. Deviation from this course is only possible under extraordinary circumstances when the law is reviewed in 2011. From today's perspective, the international hard coal market is not as sensitive from a political and economic perspective as the oil and natural gas markets, since global coal reserves are not comparably concentrated in countries that have excepted their energy industries from WTO rules.

Germany's most pressing problem lies in its dependence on imported oil and natural gas. In the short term, energy savings, which have stagnated over the past few years, cannot reduce the need for imports by more than economic growth would increase it. The consequence is that oil and natural gas imports together will not be reduced during the next ten years. Therefore, if no significant efforts are made to raise energy efficiency to a great extent, as an instrument for securing energy supply only diversification remains as a realistic option. In the case of oil import diversification, the current situation is not far from the optimum. However, since North Sea oil production is steadily declining, the current import structure is not sustainable. Therefore, substitutes to oil will have to be found, at least in the long term. Otherwise dependence on countries like Russia, Iran, and Saudi Arabia will become overwhelming.

The natural gas situation is different. The level of import diversification is very low. This is not a question of available export countries but a question of infrastructure. The liberalization of the EU internal energy market is, of course, meaningless if no natural gas can be transported to Germany from regions to the South and East of Europe due to a lack of infrastructure. The major pipeline routes need significant improvements in order to transport natural gas within the European Union from where it is available to where it is needed. Germany also lacks the necessary infrastructure to allow the importation of LNG.

Germany is in the position to be a driving force in the effort to make the European Union as a whole less dependent on Russian natural gas, which currently covers more than 60 percent of gas imports to Europe, all of which are delivered by pipeline. The present situation is simply not sustainable in light of the need to secure natural gas supply. Although the construction of the Baltic Sea-Pipeline will give Germany and Europe direct access to the producer country and reduce third-party influences, it does not substantially change dependency on Russian supplies and might in fact consolidate this dependency. Due to the decline in natural gas production in Europe (including Norway), import demand from the European Union will increase rapidly, more quickly than Russia can or is willing to increase its exports to the European Union. Major infrastructure programs such as the Nabucco Pipeline project, which would give Germany and Europe access to natural gas from the South Caspian region, should be supported by Germany, even against the resistance of major import companies, which traditionally oriented themselves primarily towards Russia.

Using natural gas is an attractive option from at least two standpoints: Firstly, it is more environmentally friendly than oil, and secondly, global reserves of natural gas are likely to last longer than reserves of oil, since most countries in the world do not have the domestic infrastructure to transport natural gas to the end user. Natural gas is nonetheless a fossil fuel and must eventually be phased out in order to achieve climate policy objectives. Therefore R&D efforts must be stepped up in order to usher in a post-fossil fuel age.

Conclusions for European energy policy

Germany put energy policy high on the agenda of the EU and G8 presidencies in 2007. A solid consensus exists among the population and the political elite that both climate protection and energy security require urgent attention and long-term action and that a common European policy in both fields is indispensable. Germany sees itself as a driving force in forging a common European climate policy since the 1990s. No region that signed the Kyoto Protocol accepted such stringent commitments on greenhouse gas reductions as the European Union at minus 8 percent and, within the framework of the EU burden-sharing scheme, no country accepted a higher reduction target than Germany at minus 21 percent. Germany also was a driving force in the establishment of the EU Emission Trading System (EU-ETS). On the other hand, Germany is only slowly adjusting to the EU average with regard to emissions per capita and per GDP unit.

Nevertheless, the country feels that more must be done in order to forge a leadership position for the European Union with regard to technologies and industries in the renewable energy sector. But even if Germany tries to make use of its weight in order to influence the United States to abandon its rejection of binding multilateral commitments, it has yet to make any real progress in dealing with the major sources of global emissions growth, namely the emerging economies in Asia and Latin America. The EU target of reaching a 20 percent share of renewables in electricity production favored by Germany may also fail due to the resistance of countries like France that can point to their low emissions per capita and per unit of GDP even without the required share of renewables.

With respect to energy security, Germany is in a more precarious situation than the United Kingdom with its high degree of self sufficiency but also as compared to France, Spain, and Italy, which have much more diversified energy imports. Only countries to the East are more dependent than Germany on Russia in particular and in terms of natural gas supply. Given these circumstances, Germany should be particularly interested in securing a truly liberalized European market and infrastructure that allows to transport natural gas from where it is available to where it is needed. Germany, however, has not taken the lead in improving the EU internal or the external infrastructure in order to make the European Union, the world's largest natural gas import market, a completely competitive market. The national champions responsible for the major share of imports to Germany are not interested in competition but in securing and maintaining a special relationship with Gazprom. Germany together with Poland and other Eastern EU member states should be the major advocates of an infrastructure that makes supply for Europe from the major reserve regions, among them the Caspian region, the Middle East, and Northern and West Africa, possible.

In this context, the EU Commission considers the Nabucco Pipeline project to be of particular importance to the European Union but thus far this project has hardly received any support from Berlin. Germany must develop an effective national energy security policy particularly with regard to natural gas and integrate this policy into a common European policy

6.2 HUNGARY

Hungary is the smallest among the seven EU member countries examined here. It is the only landlocked country and has fewer options for diversifying its energy trade than countries with access to the world's oceans. Its domestic energy production covers only 23 percent of consumption; the remaining 77 percent must be covered by imports, a figure above the EU average. Consequently, Hungary is in a precarious position in terms of its energy supply. It is therefore no surprise that Hungary looks to Brussels to alleviate the burden of import dependence. Hungary's import dependence is aggravated by the presence of infrastructure dating back to the period in which Hungary was part of the Soviet-governed economic zone. As in the case of Poland, not much has been done to dismantle this infrastructure since the end of the Cold War except in the electricity sector. In this sector, domestic production covers a far higher share of consumption than is the case for oil and natural gas.

In Hungary, nuclear power accounts for almost 40 percent of electricity production. This puts the country in second position behind France with regard to the share of nuclear power in electricity production. Hungary is therefore interested in progress on the issue of nuclear waste disposal. It sees its potential for producing renewable energy as being rather small, all the more since hydropower cannot supply a large part of the electricity requirements.

Like other former socialist countries, Hungary has no problems to meet its targets under the Kyoto Protocol. In 2006, greenhouse gas emissions were 35.9 percent lower than they had been in 1990, therefore Hungary's target is a reduction of only six percent. As a result, Hungary is much more interested in a common European policy for energy security than in a common policy to combat climate change.

Fossil fuel balance

In contrast to most other EU countries, oil is only second behind natural gas in the Hungarian energy mix. The 30 percent share of oil in energy production is below the average for the European Union, OECD, and the world, while the 87 percent share of fossil fuels in general in energy production is at the upper end in the European Union.

One sixth of oil consumption in Hungary is covered by domestic production (Table 1). Current domestic oil production is only half that of 1990 and has continued to decline at a steady rate.

Oil comes to Hungary principally via two pipelines, the Druzhba (Friendship) Pipeline from Russia, which has two branch pipelines to Hungary, and a newer pipeline, built in 1972. The first branch of the Druzhba pipeline has a capacity of 8 million tons per year, while the second branch has a capacity of 3.5 million tons per year. The latter branch, built in 1961, crosses the Ukraine and Slovakia before reaching Hungary. The newer pipeline reaches Hungary from the South-West, extending from Croatia's Adriatic coast. During the violent conflicts in former Yugoslavia, this pipeline was shut down.

Natural gas, the most important fuel in Hungary, has a share of 46 percent in total energy production. Only 24 percent of natural gas consumed in Hungary is produced domestically (Table 2). About 85 percent of imported natural gas comes from one source, namely Russia. Hungary imports natural gas primarily via Austria by way of a pipeline that links both countries. The natural gas transported through this pipeline originates largely from Russia, on whom Austria is also dependent as its primary supplier of natural gas.

Natural gas imports have been growing consistently at the relatively rapid rate of 5.8 percent annually between 2000 and 2005.

Coal has a share of 12 percent in overall energy consumption. Most of the coal consumed in Hungary is produced domestically. However, the domestic share in coal consumption declined from 90 percent in 2000 to 72 percent in 2006. Coal consumption has also been reduced in absolute terms, so that the overall role of this fossil fuel has diminished (Table 3).

A turnaround may occur with respect to coal consumption, though, if the use of nuclear energy, the largest source of domestic energy at 3.0 mtoe in 2006, is reduced through the closing of nuclear power stations without the construction of new ones.

Table 10: Hungary – Oil production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	million b/d	million tons	million b/d	million tons
production	0.024	1.1	0.020*	1.0*
consumption	0.145	6.8	0.160	7.4
net ex/import	- 0.121	- 5.7	- 0.140	- 6.4

Source: BP Statistical Review of World Energy, June 2007
Barta Hegedüs, Country Study Hungary 2007, p. 4.

* 2005

Table 11: Hungary – Natural Gas production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	billion m³	million toe	billion m³	million toe
production	3.2	2.9	3.0*	2.7*
consumption	10.7	9.7	12.5	11.3
net ex/import	- 7.5	- 6.8	- 9.5	- 8.6

Source: BP Statistical Review of World Energy, June 200
Barta Hegedüs, Hungary Country Study 2007, p. 4

* 2005 figures.

Electricity market

In 2005, Hungary produced 35.8 TWh of electricity and consumed 42.0 TWh. Thermal power plants and gas turbines had a share of 53 percent in electricity production. Nuclear power added another 39 percent. Among renewables, which contributed 5 percent to electricity production, biomass plays a dominant role with a 4 percent share of total electricity production, while hydropower (0.6 percent) is almost as insignificant as wind power. It should be noted, however, that biomass only emerged in 2000, jumping from next to zero percent of electricity production to its present level.

Hungary imported 6.2 TWh of electricity, which means an import share of electricity in overall consumption of 15 percent. This is at the high end in comparison to other EU countries.

Climate policy

Considering the targets to which it committed itself under the Kyoto Protocol, Hungary has no reason to make climate policy a high priority. In 2006, Hungary's greenhouse gas emissions were 36 percent below 1990 levels, while its Kyoto Protocol target is a reduction of only six percent. Since the mid-1990s, greenhouse gas emissions have stabilized at around 80 million tons of CO_2 equivalent, while in 1990 they were still at 115 million tons.[6] On the other hand, energy consumption per capita in Hungary is still low by EU standards. Hungary is expected to close the gap with the Europe-

6 Hans-Joachim Ziesing, Energiewirtschaftliche Tagesfragen, Heft 9 (September), 2007

Table 12: Hungary – Coal production, consumption and net export (+) / import (-), 2000–2006 million tons of oil equivalent

	2000	2006
production	2.9	2.1
consumption	3.2	2.9
net ex/import	- 0.3	- 0.8

Source: BP Statistical Review of World Energy, June 2007

an average in the longer term. The potential for developing renewable energy is limited, at least in the case of hydropower, which remains the major source of renewable energy for most European countries. The rise of biomass over the past six year as an energy source for electric power generation does justify some optimism. It remains to be seen how much of this potential can be realized in the years to come.

Hungary adheres closely to common European climate policy. As a small country, it relies on Brussels to set the agenda with respect to all fields of energy policy. Following the EU lead, Hungary established an energy tax system in 2004 and fixed the share of biofuels to be required as of 2010 at 4 percent. Between 2005 and 2006, the Hungarian energy authority approved the establishment of 300 MW of wind energy capacity, again mirroring moves at the EU level.

Energy security policy

Hungary does not currently have an obvious strategy for securing its energy supply. As a landlocked country, Hungary depends on transborder pipelines for its oil and natural gas supply. For both oil and natural gas Hungary has pipeline access not only to Russia but also to Western sources. To the West, Hungary has access to a natural gas pipeline from Austria and the Adria Pipeline, bringing oil from Croatia. The capacities of the Eastern pipelines from Russia are larger, and therefore Hungary ultimately imports 85 percent of its natural gas and the majority of its oil from Russia. Hungary considers this uncomfortable position a European rather than national problem, which is understandable, considering that the corresponding pipelines cross several European countries.

Hungary plays an ambivalent role in terms of the diversification of European natural gas supply. The situation surrounding the Nabucco Pipeline project from Central Asia to Europe provides a useful illustration of Hungary's role. This project enjoys strong support from the European Union, having been called by the European Commission one of the major infrastructure projects in the energy sector.[7] Russia has been trying to lure away Hungary from this project by offering to extend the Blue Stream Pipeline as far as Hungary (though not as far as Austria, which would be connected through the proposed Nabucco Pipeline route) and offering particularly favorable conditions to Hungary in terms of natural gas supply. The controversy over the competing Blue Stream Pipeline and Nabucco Pipeline projects has divided the European Union and thus effectively paralysed European policy-making aimed at diversifying natural gas transport infrastructure. If Hungary supports a common European energy security policy, it must ensure that its national policy does not further hamstring European policy.

7 EU Commission, An Energy Policy For Europe, p.10

Conclusions for European energy policy

The issue of Hungary's dependence on Russia for energy is obviously so sensitive that hardly any mention of this problem is made at all. The country paper mentions only that Hungary's interests are involved in EU foreign policy towards Russia ("The unanimous and unambiguous condemnation of Russia ... worsened the future bargaining power of the Eastern European countries," p. 18). In fact, Hungary has yet to make a concrete proposal on how to deal with its extensive dependence on Russia. One option would be for Hungary to promote a more geographically diversified pipeline network within Europe to allow transport not only from the North and East, as is presently the case, but also from the South and West. Hungary does, however, support the attempts made by the EU Commission to liberalize the EU energy market by separating ownership of means of energy production from ownership of energy transport infrastructure.

Hungary is resistant to giving up nuclear energy for two reasons: firstly, due to the large 40 percent share of nuclear power in its electricity production, and secondly, due to the lack of opposition to nuclear power from its population.

The country broadly welcomes a more aggressive common EU energy policy. On the foreign affairs side, such a policy would encompass not only a dialogue with Russia but with all relevant producer regions. On the internal market side, Hungary expects more leadership from Brussels in establishing a liberalized, competitive and transparent market. To this end, Hungary is prepared to transfer competences to the European Union, for instance with regard to stock building and burden sharing in terms of necessary investment. As a small country, Hungary does not consider the idea of promoting national champions to be useful to its interests. On the contrary, since national champions from other EU member states have come to dominate the Hungarian energy market, Hungary is hopeful that a stricter framework of common competition rules would be to its advantage.

6.4 ITALY

Among the EU countries considered here, Italy is the country with the highest share of renewables in domestic energy production and electric power generation. Renewable energy, 83 percent of it hydropower[8], accounts for 43 percent of domestic energy production, 6.4 percent of energy consumption, and 18.4 percent of electricity production. All three figures surpass, for instance, the levels for Germany and most other EU countries. As in Germany, domestic oil and natural gas production covers only a small share of consumption, with natural gas accounting for a greater share than oil (14 percent and 6.2 percent, respectively). In contrast to Germany, Italy holds major stakes, for instance, in the Caspian region through its partially state-owned energy giants ENI (oil and natural gas) and ENEL (electricity). In the electricity sector, Italy differs from other big EU countries insofar as 15 percent of its electricity production is based on imported primary energy sources, a higher proportion than other EU countries.

With respect to its climate policy, Italy is on course to fail in reaching the target it set for itself under the Kyoto Protocol. While Italy committed itself to reducing its greenhouse gas emissions by 6.4 percent compared to emission levels in 1990, emissions had in fact risen by 12.3 percent in 2005. Nonetheless, emissions per capita and per unit of GDP are below the EU average, which can be explained by the fact that Italy is still a low energy economy that is only now adjusting to major economies like Germany. Between 1990 and 2005, total energy consumption in Germany declined by a few percentage points, while in Italy it soared by 21 percent. In light of the associated jump in carbon emissions, it will be impossible for Italy to meet its Kyoto Protocol target.

Imports are more diversified in Italy than in Central and East European EU countries. For natural gas imports, Italy relies basically on four sources: Russia, the North Sea, North Africa, and LNG, where North Africa provides the largest proportion of imports.

Fossil fuel balance

In spite of a relatively large share of renewables in overall energy production (6.4 percent), the share of fossil fuels is high compared to the EU average at 88 percent, even if it is lower than in 1990, when they accounted for 90 percent of total energy production. The reason for this high dependence on fossil fuels is that Italy decided to give up nuclear power in the 1980s. Efforts were made to limit fossil fuel consumption and carbon emissions by keeping the share of coal in overall energy production below 10 percent and by reducing oil consumption, while increasing natural gas use. Indeed, oil consumption in Italy decreased by 8 percent between 2000 and 2006, at an average rate of 1.4 percent annually, while for the EU-25 oil consumption increased during the same time period. At the same time, domestic oil production in Italy grew, though only from 4.5 percent to 6.2 percent of total oil consumption. Therefore 94 percent of oil consumed in Italy must be imported (see Table 1).

Between 1990 and 2005, the share of oil in overall energy production declined from 57 percent to 43 percent. Natural gas and renewables filled the gap left by the reduction in oil use. Still the share of oil in energy production is slightly above the EU and OECD averages, which can be explained by the small share of coal in Italy's energy mix. A ranking of oil importers to Italy puts Libya, its neighbor across the Mediterranean Sea, in first position with a 27 percent share (2006). Second is Russia with 16 percent, followed by Saudi Arabia (12 percent) and Iran (11 percent). Together with Iraq (7.3 percent) and Azerbaijan (6.6 percent), these six countries provide 81 percent of the approximately 90 million tons of oil imported to Italy. This diversified import structure appears to be more sustainable than in countries such as Germany, which relies heavily on rapidly declining North Sea oil reserves.

Natural gas is the energy source that has seen the largest increase in usage both in absolute and relative

---

8 Source: BP Statistical Review of World Energy 2007 and Eurostat

Table 13: Italy – Oil production, consumption and net export (+) / import (-), 2000-2006

	2000		2006	
	million b/d	million tons	million b/d	million tons
production	0.088	4.6	0.111	5.8
consumption	1.956	93.5	1.793	85.7
net ex/import	- 1.868	- 88.9	- 1.682	- 79.9

Source: BP Statistical Review of World Energy, June 2007

Table 14: Italy – Natural Gas production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	billion m³	million toe	billion m³	million toe
production	16.2	14.6	1.0	9.9
consumption	64.9	58.5	77.1	69.4
net ex/import	- 48.7	- 43.9	- 66.1	- 59.5

Source: BP Statistical Review of World Energy, June 2007

terms. Consumption of natural gas grew almost two-fold between 1990 and 2005, and its share in energy production grew from 24 percent to 36 percent.

Much of the natural gas used in Italy is absorbed by electricity production. It is by far the biggest primary energy source in electricity production, a position held by coal in most other EU countries and by nuclear energy in France. Natural gas contributes 48 percent to domestic electricity production, up from 18 percent in 1990. The trend towards natural gas power stations has gained an extreme momentum. Natural gas also plays a dominant role in district heating with a share of 69 percent of total heat production in 2005.

86 percent of natural gas used in Italy had been to be imported in 2006. The degree of diversification of imports might be the best among EU countries. In 2005, 23 percent came from the North Sea, 32 percent from Russia, and 37 percent from Algeria. Libya's share is growing again after the end of sanctions. While Libya's share in imports to Italy had reached 9 percent in 1980, it went down to below 1 percent following the imposition of sanctions but reached 6 percent again in 2005. The factor that puts Italy in a better position than other EU countries is the transport infrastructure available to it. Italy can be supplied from all three major sources (North Sea, Russia, and North Africa) by pipeline. In addition, Italy has several LNG ports that could receive natural gas from countries such as Nigeria or Qatar as well.

Coal plays a minor role in the Italian energy sector, both in terms of domestic production and imports. The share of coal in energy production is 9 percent. 97 percent of coal used in Italy is imported.

Coal currently contributes 14 percent to electricity production, which is about the same as in 1990 (15 percent) but more than in 2000 (9 percent).

Table 15: Italy – Coal production, consumption and net export (+) / import (-), 2000–2006 million tons of oil equivalent

	2000	2006
production	0.3	0.6*
consumption	13.0	17.4
net ex/import	-12.7	-16.8

Source: BP Statistical Review of World Energy, June 2007
Clô, Salvemini, and Verde, Italy Country Study, 2007, p. 5

Electricity market

Implementing EU Directive 96/92/EC, Italy put legislation into place in 1999 that broke up ENEL, the former state monopolist on the electricity market, into generation, transmission and distribution elements. Italy considers itself to be one of the most progressive EU countries in implementing EU liberalization directives with respect to its electricity market. The process of liberalization is not completed. On the contrary, obvious inefficiencies and difficulties in coordination mainly between the operator and grid owner turned up during the process. This led to a partial "rebundling" of the transmission system. Nevertheless, ENEL lost its monopoly position, even if it remains the dominant generator and distributor of electricity in Italy. But a number of competitors, among them Edison, ENIpower, Endesa, and Electrabel, are now active on the Italian electricity market. Italy has opened its market to foreign enterprises to a greater degree than other EU countries. This situation has led the government to push for reciprocity and to support a common commitment to liberalize the EU energy market.

The primary energy mix of the Italian electricity power generation sector which produces annually 252 TWh (2005) is dominated by natural gas with a 48 percent share in 2005. In second place are renewables with an 18 percent share, followed by coal, whose 14 percent share in electricity production is unusually low by EU standards as is the relatively high share of imported electricity (15 percent) in electricity consumption.

Climate policy

On the one hand, Italy's share of renewables in energy production is above the EU average and CO_2 emissions per capita and per GDP unit are below the EU average. On the other hand, no progress has been made in reducing emissions during the last years. On the contrary, greenhouse gas emissions increased continuously between 2000 and 2005, as they did during the 1990s. In 2005, emission levels – 584 million tons of CO_2 equivalents at the time – were 98 million tons or 20 percent above the Kyoto Protocol target. Taking this development into consideration, existing national climate policy is clearly not sufficient to reach the target in due time. The target does not seem to play an important role in domestic discussion, as can be deduced from the country paper and the workshop discussions, where neither quantitative targets nor the gap between the targets and actual emissions were mentioned. The paper notes, however, that the European Commission blamed insufficient regulatory framework and administrative obstacles for the absence of progress in a 2007 report on renewable electricity. A number of apparent contradictions exist among policy instruments including Green Certificates (GC), introduced in 1999, and the so-called "Cip6 plants," established in the early 1990s. The former system is based on a market mechanism, the latter on subsidies. In 2001, the Italian legislature introduced a mechanism to support energy efficiency increases through the distribution of Tradable White Certificates (TWC). The market for these Certificates was opened in January 2006, but its functioning is still under scrutiny.

Energy security policy

Apart from trying to limit energy consumption, Italy has no clear strategy to improve its energy supply security. It has urged the European Union to improve the dialogue with foreign suppliers, particularly to secure common and non-discriminatory rules. The 2006 G8 summit in St. Petersburg can be considered a good starting point in this direction.

Conclusions for European energy policy

A coherent European energy policy is generally considered to be advantageous for Italy because European goals as codified, for instance, in the EU Commission paper of January 10, 2007 are in agreement with national Italian goals. Italy is also prepared to transfer to some extend competence to Brussels, as signalled by the fact, for instance, that Italy is not resisting the establishment of a common European regulatory agency for energy markets. The following issues have priority for Italy on the European agenda:

First, to increase interconnection capacities: Italy imports a relatively high share of its electricity and counts on the establishment of a real European internal electricity market with the effect of increasing incentives for competition and decreasing prices.

Second,to improve dialogues with foreign suppliers: Italy considers the EU a sufficiently big player on the international energy market to negotiate with the big suppliers, such as Russia, on common rules that would ensure a de-politicization of the international energy market as well as greater transparency with respect to market developments.

Third, to increase the share of renewable sources in the energy mix: Italy approves of the pressure from the European Union to increase the share of renewables. A common European standard would support existing Italian legislation. It could also help to reduce import dependence and greenhouse gas emissions.

Fourth, to promote an efficient use of energy: Italy has started its TWC system, which Italy feels gives it a pioneering role. Common European standards could diminish competitive disadvantages Italy might experience as a result of its adoption of this system.

Fifth, to support nuclear energy: Italy decided to give up nuclear power generation in 1987, a year after the Chernobyl catastrophe. However, the problem of energy security and the climate change problem have produced second thoughts about this decision. The acquisition of a nuclear plant in Slovakia by ENEL has not encountered resistance in Italy. It is, however, to be expected that opposition would become strong again if a re-nuclearization in Italy were to become a realistic option. Nevertheless, research and development might be supported by a majority in Italy, since no clear solution is on the horizon to overcome the climate change and energy security problem in Europe as a whole. For Italy, however, it is not to be expected that nuclear energy is an option to solve these two problems on a national level.

With regard to the widely discussed question whether EU member states should pursue a policy of national champions or instead seek to create a true European internal market, the position of Italy is split. On the one hand, Italy has in ENI and ENEL two obvious national champions. On the other hand, Italy feels that it has already opened its energy market to a greater degree than other comparable countries in the European Union. As a result, developments in other countries will likely determine whether Italy will further open its market. The balance between the justified goal of a liberalized European market and the interests of national champions is considered a precarious one.

6.5 POLAND

As the biggest and most important country among the European Union's Eastern enlargement group, Poland plays a key role in the formulation of a common European energy policy. One reason, though not an overriding one, is that Poland makes more use than other EU member states of its veto power and thus could be an obstacle in a difficult consensus-building process. The main reason, though, is that Poland faces a particularly precarious political situation arising out of its extreme dependence on the supply of oil and natural gas from Russia. The fact that Poland derives a significant part of its energy supply from domestic coal (62 percent) does not reduce the seriousness of its dependence on oil and natural gas: Switching to coal is no more of an option for the transportation sector, the primary consumer of oil, than it is for users of natural gas heating systems. As a result, Poland has a great interest in the formulation of a common European energy diversification policy – whether this policy calls for a natural gas pipeline that allows Norwegian natural gas to be transported to Poland, the improvement of tanker-based oil supply through the Baltic Sea, or a pipeline from the South (extending the Odessa-Brodi Pipeline), all of which are currently on the European agenda. The impression given by the Polish media is, however, that Polish decision-makers consider preventing the construction of the North Stream (or Baltic Sea) Pipeline to be the most important issue in terms of securing energy supplies for Poland. A less emotional and more comprehensive discussion with Poland in the European Union is indispensable to selecting the best possible option for securing energy supply.

Fossil fuel balance

As was the case in other former socialist countries, primary energy consumption in Poland decreased markedly during the 1990s due to the collapse of heavy industry and improvements in energy efficiency driven by high energy prices after the demise of the Council for Mutual Economic Assistance (COMECON), a system under the leadership of the Soviet Union that had ensured low internal market prices for its member states. The decline in primary energy consumption in Poland was smaller than in most other former COMECON countries, due to Poland's greater reliance on domestic coal, but nevertheless totalled 17 percent between 1990 and 2000. Economic growth from the late 1990s onward led to an increase in energy consumption of around 7 percent between 2000 and 2006.

Poland derives 95 percent of its oil supply from imports. Domestic production is less than one million tons per year (around 16 thousand barrels per day) with a declining tendency, while oil consumption grew by 18 percent between 2000 and 2005, from 427 thousand to 502 thousand barrels per day (b/d).

Russia supplies 97.5 percent of all crude oil imported into Poland, giving Russia near total control over Poland's oil market. The primary consumers of oil in Poland are the transportation sector (54.5 percent) and industry and construction (22 percent). Without oil deliveries from Russia, the Polish economy would break down completely. In contrast to the Czech Republic and Hungary, Poland has not yet fulfilled the requirements for membership in the International Energy Agency (IEA), the OECD-based energy organization to which 26 Western industrialized countries belong. In particular, Poland has not yet built up the required oil stocks equivalent to 90 days of net imports. Consequently, Poland cannot rely on compensation measures called for by IEA rules in emergency situations.

Natural gas accounts for 13 percent of energy consumption, as compared to 24 percent in the case of oil. The import dependence of Poland with respect to natural gas is somewhat lower than with respect to oil, as one third of natural gas consumed is produced domestically.

The distribution of natural gas imports is comparable to the distribution for oil. Only 8 percent come from European sources (Norway, Germany), 66 percent are imported from Russia, and 26 percent come from Central Asia via Russia. Even the deliveries from Germany are partly of Russian origin. The dependence on Russia exceeds 90 percent in terms of imports if both natural gas produced and transported are taken to-

Table 16: Poland – Oil production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	million b/d	million tons	million b/d	million tons
production	0.021	1.0	0.017	0.8
consumption	0.427	20.0	0.502	23.1
net ex/import	- 0.406	- 19.0	- 0.485	- 22.3

Source: BP Statistical Review of World Energy, June 2007

Table 17: Poland – Natural Gas production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	billion m³	million toe	billion m³	million toe
production	3.7	3.3	4.3	3.8
consumption	11.1	10.0	13.7	12.3
net ex/import	- 7.4	- 6.7	- 9.4	- 8.5

Source: BP Statistical Review of World Energy, June 200

gether and 60 percent in terms of total natural gas consumption.

The picture in case of coal looks much brighter. Poland produces more than it consumes, making it a net exporter of coal. As such it is one of the most important suppliers of imported coal to Germany. However, exports are declining, since production decreased by 4.3 million tons of oil equivalents (toe), while consumption increased by 0.8 million toe.

The substantial share of coal in its overall energy consumption (62 percent) raises a number of problems. In Poland as in most other countries, the sector with the highest growth in energy consumption is the transportation sector. Only about 5 percent of energy consumption in the transportation sector is covered by electrical power, which can be generated using coal as a primary energy source. The remaining 95 percent are based on liquid fuels. Coal will play a less and less important role as an energy source due to the requirements of climate policy; among all primary energy sources, coal creates the largest volume of CO_2 emissions per unit of energy produced. Coal combustion is also a major source of air pollution.

Electricity and heating markets

Electricity is produced almost exclusively using one primary energy source, namely coal. Of the total electricity production of 143 GWh in 2000, 96 percent came from coal power stations, only 1.5 percent from hydropower, 1.3 percent from oil, 0.7 percent from natural gas, and 0.4 percent from renewable power sources. The share of renewables grew to 3.5 percent in 2006. Only a small amount of electricity is exported and imported. There are, however, a number of interconnectors that link the Polish electricity market with other EU countries (Germany, Czech Republic, and Slovakia), while the existing 110 kV connection with Belarus and the 750 kV connection with Ukraine are out of operation.

Table 18: Poland – Coal production, consumption and net export (+) / import (-), 2000–2006 million tons of oil equivalent

	2000	2006
production	71.3	67.0
consumption	57.6	58.4
net ex/import	13.7	8.6

Source: BP Statistical Review of World Energy, June 2007

The distribution of primary energy sources in heat production is similar to that for power production. Of total heat production (340 TJ in 2000), 93 percent was derived from coal, 3.6 percent from natural gas, and 2.3 percent from oil, while the share of renewables was only 0.8 percent. This pattern is not just problematic in terms of climate change but also causes problems for the population due to air pollution in cities, which requires a further shift away from coal towards renewables and, more importantly, natural gas. Even though the potential for increases in efficiency in the heating sector is large and should be realized, a shift in the distribution of energy sources away from coal is indispensable.

Climate policy

Poland belongs to a group of countries, mostly former Socialist countries previously under Soviet leadership or command, which experienced a large decline of greenhouse gas emissions after the end of the Cold War. Since 1988, greenhouse gas emission declined by 29.5 percent, as measured in CO_2 equivalents.[9] Deviating from the general rules of the Kyoto Protocol, which designated 1990 as the base year from which emissions reductions are calculated, Poland insisted that 1988 be used as its base year, since the major breakdown of Polish industry already took place between 1988 and 1990. Under the Kyoto Protocol, Poland thus committed to reduce its emissions by 6 percent by 2008–2012 as compared to 1988. As was the case in other former socialist states, after a decline during the 1990s, emissions in Poland began to rise again, growing by 8 percent between 2002 and 2006.

In 2003, when greenhouse gas emissions had already dropped by 30 percent compared to 1988, the Polish government adopted the goal of reducing greenhouse gas emissions by 40 percent by 2020 with respect to their Kyoto Protocol base year. As a result, the current trend of increasing greenhouse gas emissions, which are rising at a rate of approximately 2 percent per year, are a cause of some concern. However, Poland still has 13 years time to reverse this new trend and achieve the necessary ten percent additional reduction. This objective should be easily achieved, since per capita CO_2 emissions in Poland are close to the EU average, while per capita GDP is still far below the EU average. The European Union itself is committed to reducing emissions by an additional amount of around 20 percent from today's emissions.

Energy security policy

Poland is practically self-sufficient in terms of coal and electricity but is almost 100 percent dependent on imports with respect to oil and must import two thirds of the natural gas it consumes. The almost exclusive supplier of both oil and natural gas is Russia. Even given a substantial potential for increases in energy efficiency, imports of these two fuels should be expected to increase as a result of high economic growth rates and the substitution of coal by natural gas as part of a strategy

9 Hans-Joachim Ziesing, Energiewirtschaftliche Tagesfragen, Heft 9 (September), 2007

to meet environmental targets. Given this situation, the main instrument for securing energy supplies should be the diversification of import structures.

Little progress has been achieved so far with regard to import diversification. A natural gas connection with Norway, which would make a real contribution to diversifying imports and diminishing Poland's dependency on Russia, has been under discussion for over ten years now. Given the lack of progress in this matter, it appears that the plan has been suspended. More recently the plans for a LNG terminal in Swinoujscie have been announced. Whether and when these plans will be realized in the future is unclear because the economic costs of the investment and the price for LNG are considerable. The push to have the North Stream Pipeline routed through Poland instead of the Baltic Sea would not contribute in any meaningful way to lowering Poland's dependence on Russia; on the contrary, it might lead to an increase reliance on Russia as it would increase supplies from there. In the case of oil, the most concrete plan for diversification of imports is the proposed extension of the Odessa-Brodi pipeline. Again this extension has been under discussion for at least ten years. The pipeline in operation between Odessa and Brodi (Ukraine) since 2001 could never run economically because the oil arriving from the Caspian oil fields in the Black Sea (Novorossisk and Supsa) was mostly sent to other destinations. Due to the transport capacity limitations of the Bosporus, however, there might in the future be enough oil to fill the Odessa-Brodi pipeline to its capacity of 600–800 thousand barrels per day. The question remains whether this pipeline will be supplied over other potential destinations of Caspian oil. The execution of the original plan to extend the pipeline from Brodi to Gdansk and possibly further into Central Europe could establish the necessary demand. More leadership is required in order for the plan to be realized.

Conclusions for a European energy policy

The general expectations Poland has of EU energy policy are that it will promote a dialogue with other major consumers (China and India) and producers (OPEC and Russia), foster the development of a biofuels market, and support a common nuclear policy. According to Polish demands, the competence of the European Union should be limited by the subsidiarity principle, which dictates that the European Union may only take action "only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States."

When it comes to concrete projects, Poland's expectations are rather vague, guided by the idea that Polish interests should be reflected to a greater degree in European policies, for instance in the case of the North Stream (Baltic Sea) Pipeline. With regard to pipeline projects such as the extension of the Odessa-Brodi oil pipeline to Gdansk or a link that connects Poland with natural gas from Norway, Poland has yet to make a proposal that would harmonize Polish and European interests. Poland has also remained silent on the question of the Nabucco Pipeline project, which is currently at the top of the EU agenda with regard to oil and natural gas infrastructure. A divergence in interests seems to divide Europe on this issue, a situation that is dangerous for the security of European energy supplies. Warsaw has not given any indication on where it stands, which interests it has, and provided that it has any interests, what sort of investment Poland would be willing to make in order to take this project possible.

A similar situation is faced in terms of climate policy. The European Union sees itself as a driving force in forging a global coalition to fight climate change. Apart from committing itself to a target of further reducing its greenhouse gas emissions by a further ten percent by 2020, Poland has not clarified where it stands and how it expects to influence policy in Brussels. It appears that Poland is looking to Brussels primarily to prevent policies that would run counter to Polish interests without accepting at the same time a position of responsibility as one of the larger member states in the European Union. Hopefully, the success Poland has had in catching up economically to other EU countries and the precarious situation it faces as a result of its dependence on Russian energy import will help convince Poland to assume its proper role in helping solve the future problems facing Europe in a globalized world.

6.6 SPAIN

Spain is poor in mineral energy resources. The only fossil fuel that contributes in any significant way to domestic production is coal. In 2006, 6.1 million tons of oil equivalents (toe) were produced in coal, a production level that Spain could maintain for 29 years with its proven reserves. Production has, however, been declining over the past ten years and more. Spain also produces nuclear power, which at 13.6 million toe is one seventh of French nuclear power production but twice the amount generated in Spain through hydropower (5.7 million toe). The low level of domestic production (21 percent of consumption) makes the country extremely dependent on imports, particularly in the case of oil and natural gas with a more than 98 percent import share in domestic consumption. Imports cover 63 percent of coal consumption. Electricity trade across the Spanish border is not significant: Spain had a trade balance with a net export of about 1 percent of its electricity production. The disconnectedness of Spain from the rest of the European Union in terms of energy trade is part of Spain's energy problem. This situation can be explained partly by the country's geographic location but also by the strong, rather monopolistic structure of the energy sector in France, the only potential transit route from Spain to the rest of Europe, which is blamed to hinder a better integration in the European energy market.

Spain experienced a 13 percent increase of its primary energy consumption between 2000 and 2006, which corresponds to an average annual growth of 2 percent. During the 1990s, this rate was even higher. The result has been a dramatic increase in greenhouse gas emissions – 53.8 percent since 1990, the highest among all EU countries. Under the EU internal burden sharing arrangement within the framework of the Kyoto Protocol, Spain was permitted to increase its greenhouse gas emissions by 15 percent. In 2005, Spain's emissions surpassed this mark by 111 million tons of CO_2 equivalents, or by more than a quarter of Spain's total emissions.

Fossil fuel balance

Although practically 100 percent of oil used in Spain must be imported, the share of oil in the Spanish energy mix is extremely high at 49.6 percent. Among the seven EU countries considered here, Spain is the only one with oil accounting for close to half of energy consumption.

The oil imports are rather well diversified. No exporting country has a share of more than one sixth of Spain's imports. Mexico leads the list with 15 percent, followed by Russia (14 percent), Nigeria (12 percent), Saudi Arabia (11 percent), and Libya (10 percent). Iran, Norway, Iraq and Algeria follow on the list of nine countries that together provide 84 percent of the Spanish oil imports.

Natural gas, the second most important fuel, has a share of 20 percent in overall energy consumption. 99 percent of natural gas consumed in Spain is imported.

The growth of natural gas demand has been dramatic: 98 percent within six years, or 12 percent annually. Fortunately, natural gas is the cleanest among fossil fuels, and the growth of natural gas consumption has permitted a small decline in coal consumption and has kept oil consumption below the total energy consumption growth at 1.7 percent annually between 2000 and 2006. Nevertheless natural gas consumption has contributed to a persistently rapid growth in CO_2 emissions in Spain.

Imports of natural gas in Spain are not as diversified as they are in Italy but much more so than in Germany or Poland. The relatively high capacity of LNG infrastructure in Spain allows for the existence of a diversified and relatively competitive market. 65 percent of Spain's natural gas is supplied in the form of LNG. Spain is thus the third largest LNG importer in the world. Its import structure has a completely different geographic orientation than the import structures of North and East European EU member countries. Spain's major supplier is Algeria with a share of 43 percent in natural gas imports, second is Nigeria with 16 percent, followed by Qatar (14 percent), Egypt (10 percent), and only then Norway, the only supplier of

Table 19: Spain – Oil production, consumption and net export (+) / import (-), 2000-2006

	2000		2006	
	million b/d	million tons	million b/d	million tons
production	N.N.	N.N.	0.003*	0.17*
consumption	1.452	70.0	1.602	78.1
net ex/import	- 1.45	- 70	- 1.60	- 77.9

Source: BP Statistical Review of World Energy, June 2007

N.N. negligible, * 2005

Table 20: Spain – Natural Gas production, consumption and net export (+) / import (-), 2000–2006

	2000		2006	
	billion m³	million toe	billion m³	million toe
production	0.4*	0.3*	0.2**	0.15**
consumption	16.9	15.2	33.4	30.0
net ex/import	- 16.5	- 14.9	- 33.2	- 29.8

Source: BP Statistical Review of World Energy, June 2007
Lopez de Sebastian, Spain Country Paper, 2007, p. 3, 7

* 2004, ** 2005

North Sea natural gas, with a share of 6 percent in imports. Together with Oman (5 percent), Libya (3 percent), and Trinidad Tobago (1 percent), these countries belong to the 8 suppliers with a greater than 1 percent share in Spain's imports. There is a clear dominance of North African suppliers (Algeria, Egypt, and Libya) with a combined share of 55 percent in imports. But 20 percent of imports come from the Middle East (Qatar, Oman, and the United Arab Emirates), which makes Spain to the by far largest importer of Middle East natural gas in Europe. This is remarkable insofar as the greatest potential for natural gas production and export increases lies in the Middle East. Two countries in this region, Iran and Qatar, alone have more natural gas reserves than Russia, and these reserves are almost untapped. North Africa, the Middle East, and Nigeria cover more than 90 percent of Spain's imports, three regions to which Central and East European EU countries do not have access due to the absence of necessary infrastructure.

Coal has a share of 12.6 percent in Spain's overall energy consumption. It is the only fossil fuel with a significant share of domestic production. One third of coal consumed in Spain is produced domestically. However, domestic production, imports, and consumption are declining. As coal generates the greatest amount of pollution and greenhouse gas emissions per unit of energy produced, there is no surprise that coal use has been declining.

Most coal used in Spain is consumed by the electric power generation sector, where 23 percent of total energy production is based on coal.

Electricity market

Electricity demand in 2006 was 253 TWh, while production amounted to 268 TWh. Among primary energy sources used in electricity production, the distribution was as follows: 30 percent natural gas, 23 percent coal, 20 percent nuclear power, 10 percent hydro-

Table 21: Spain – Coal production, consumption and net export (+) / import (-), 2000–2006 million tons of oil equivalent

	2000	2006
production	8.0	6.1
consumption	21.6	18.3
net ex/import	- 13.6	-12.2

Source: BP Statistical Review of World Energy, June 2007

power, 7 percent oil, and 10 percent other (non-hydropower) renewable energy sources and waste. That means that 60 percent of electric power came from fossil fuel, 20 percent from nuclear energy, and 20 percent from renewables and waste. Thus the renewables share is relatively high and the fossil fuel share relatively low by European standards. It will not be easy to further change the mix in such a way as to lower CO_2 emissions. Nevertheless Spain has to make progress in this direction in order to avoid being the worst violator of Kyoto Protocol targets in the European Union.

Spain's power exchange infrastructure extends in three directions, towards France, Portugal, and – via underwater cable – to North Africa. The capacity of power exchange infrastructure is 1000 MW between Spain and Portugal, 1200 MW between Spain and France, and 400 MW of capacity are planned with North Africa.

Climate policy

Options and strategies that Spain intends to pursue to contribute to European climate policy are not very clear, as the workshop discussions and the country paper reveal. Instead they deal primarily with the problems and theoretical options for global climate policy. Spain is indeed in an intractable situation. Its economic growth since 1990, the base year for calculating greenhouse gas reductions under the Kyoto Protocol, is far above the EU average and the associated growth in energy consumption does not give much room for limiting greenhouse gas emissions. Changing the distribution of energy sources to increase the share of less carbon intensive sources is also only a limited option. The share of coal in the energy mix has always been low and the renewables share always relatively high; it is unlikely that the use of renewables could be scaled up to a extent required to make any real difference in reducing carbon emissions.

Energy security policy

Spain does not have an explicit policy to ensure security of energy supply. Neither does the country see a chance to reduce oil or natural gas consumption and thus imports, nor does it have a diversification strategy beyond what is already in place. Diversification is already relatively progressive, given the large LNG capacities and ability to draw on many more natural gas suppliers than Central and East European EU member states. Natural gas is gaining market shares in the Spanish energy mix, which is relatively good for the environment and certainly good for the security of energy supply under the given circumstances. Raising energy-efficiency seems to be the only real new option for an effective energy security policy.

Conclusions for European energy policy

Spain does not expect to gain much from a common European energy policy. The main reason for Spain's low expectations in this context is the country's geographic position at the south-western end of the European Union. With France as its only link to the rest of the European Union, Spain does not feel comfortable about the prospect of a liberalized energy market. France keeps its energy market under state control, while quasi-state owned French companies are not above taking over energy companies in other EU countries.

Spain does, however, support a common EU policy for a "sustainable future," particularly in the context of responding to climate change. Spain is aware that its own development over the past one and a half decades cannot be a model in terms of greenhouse gas emissions. It is unclear how Spain can find an emission pathway that is congruent with the EU goals on climate policy. It will certainly reach the target of a 20 percent share of renewables in electricity production by 2020. The targets laid out under the internal burden-sharing scheme established by the European Union in the context of the Kyoto Protocol place an unrealistic burden on Spain, even though they permit an increase in Spanish emissions of 15 percent between 1990 and the period from 2008 to 2012. The European Union may have to rethink its internal burden-sharing scheme in order to get Spain back on board with respect to European climate policy. Spain may have important role to play in Europe due to its geographic position, which favors the use of solar power, an energy source that may gain in importance in the future if further technological progress can be achieved. There is a notable expectation towards the EU to push projects regarding a better integration in the European energy marked by upgrading the transmission infrastructure.

6.7 UNITED KINGDOM

The United Kingdom plays a unique role in Europe as an energy producing and consuming country. In 2000, the country produced more energy than it consumed. However, oil production declined by 39 percent between 2000 and 2006 and natural gas production by 26 percent. The United Kingdom was still self-sufficient and net exporter of oil and natural gas in 2000; now it has become a net importer of both fossil fuels, which together covered 72 percent of total energy consumption in 2006. The share of the United Kingdom in the overall energy consumption of the EU-25 was 13 percent in 2006. The drastic change from net exporter to net importer within a few years has launched the energy security issue to the top of the UK political agenda even though the country's desire to link its problems with European ones is still selective.

Fossil fuel balance

In 2005, the United Kingdom contributed almost 80 percent to the overall EU oil production.[10] If Norway and other European non-EU countries such as Romania (in 2005) are included, Great Britain's share in European oil production was 38 percent. Due to United Kingdom's substantial share in European oil production, the decline in its oil production has translated directly into a decline in European and EU production.

In spite of the change from net exporter to net importer of oil, consumption grew by 5 percent while non-oil energy consumption dropped (by less than one percent) during this six years period. In 2006, oil had a share of 37 percent in UK energy consumption.

The United Kingdom's contribution to European natural gas supply is similar to its role in terms of oil. It contributed slightly more than 40 percent to EU-25 production in 2006 and 28 percent to European (including non-EU) production. The United Kingdom has experienced a decline in natural gas production mirroring the trend in Europe as a whole; only Norway has not yet reached its peak production potential.

Although natural gas consumption – 36 percent of the energy consumption mix in 2006 – declined by six percent between 2000 and 2006, the switch from a net exporting country to a net importer became inevitable due to the much stronger decline of natural gas production (26 percent within the six years).

A similarly dramatic change also took place in the coal sector. While in the late 1980s the United Kingdom still produced more than 60 million tons of oil equivalent (toe), this production went down to 19.0 million toe in 2000 and 11.3 million toe in 2006. Unlike in the case of oil and natural gas, the reason for this production decline is not the depletion of reserves but the lack of profitability. Coal consumption did not decline but instead increased between 2000 and 2006 from 36.7 to 43.8 million toe – to 19 percent of energy consumption – which means that three quarter of the consumption has to be imported now.

The three fossil fuels oil, natural gas, and coal comprise 92 percent of UK energy consumption;[11] almost all of the rest (7.5 percent) is accounted for by nuclear energy.

The electricity market

The fuel mix for power generation, which totaled 400.5 TWh in 2005,[12] is diverse in the United Kingdom: currently, 37 percent is produced using natural gas; 34 percent comes from coal; 20 percent from nuclear and 5 percent from renewables. While the country was until recently a net exporter of natural gas, by 2010 up to 40 percent of natural gas consumed could already be imported. This import share could rise to as much as 80 to 90 percent in 2020. The long-term future of coal depends on technological progress, significant efficiency improvements and Carbon Capture and Storage (CCS). Many key nuclear plants

10 All data in the section on energy capacity are from BP Statistical Review of World Energy, June 2007
11 Excluding renewables besides hydro-electricity
12 Source: Eurostat

Table 22: UK – Oil production, consumption and net export (+) / import (-), 2000–2006 million barrels per day

	2000	2006
production	2.67	1.64
consumption	1.70	1.78
net ex/import	0.97	-0.16

Source: BP Statistical Review of World Energy, June 2007

Table 23: UK – Natural Gas, consumption and net export (+) / import (-), 2000–2006 billion cubic meters

	2000	2006
production	108.4	80.0
consumption	96.9	90.8
net ex/import	11.5	-10.8

Source: BP Statistical Review of World Energy, June 2007

Table 24: UK – Coal production, consumption and net export (+) / import (-), 2000–2006 million tons of oil equivalent

	2000	2006
production	19.0	11.3
consumption	36.7	43.8
net ex/import	- 17.7	-32.5

Source: BP Statistical Review of World Energy, June 2007

will need to be closed down over the next two decades. More than 10 GW of nuclear power capacity will be lost after 2023. The United Kingdom will require about 25 GW of new electric power generation capacity by 2025, mostly to replace the shuttered power stations. This figure is more than 30 percent of current capacity.

As coal emits considerably more carbon than natural gas in power generation, the UK government is keen to encourage the use of clean coal technologies such as CCS. This will require the development of a new legal and regulatory framework, some of which is international in character. The government plans to work on this challenge with the relevant international partners (including the European Union). This also includes a review of the rules for CCS in the EU Emission Trading System (EU-ETS).

With regard to nuclear energy the UK government concluded in its Energy White Paper, the official 2006 energy review, that new nuclear power stations would make a significant contribution to meeting the energy policy goals. This stance is new: The Energy Act of 2004 did not even hint at a possible expansion of nuclear power. There are, of course, still open questions with regard to new constructions. While it is clear that the private sector has to meet the full costs of running a nuclear power plant including the costs of decommissioning, a facilitator role by government would be an essential part in overcoming regulatory barriers with regard to authorisation procedures and planning. A form of "pre-licensing" has been proposed by different agencies prior to committing the large amount of capital required for planning and construction.

Climate policy

A principal goal in UK energy policy is to put the country on a path to cut carbon dioxide emissions by about 60 percent by about 2050, and to see real progress by 2020. Tackling climate change is seen as one of the two major long-term energy challenges (the other being energy security). The "Carbon Challenge" involves working with EU partners, not least because the EU has played an important leadership role in this area. The main goals are strengthening of the EU-ETS after 2012 and to make it the heart of a global carbon market.

The UK government has a target of increasing renewables' share of electricity by 20 percent by 2020. The solution that is being proposed is a strengthening of the government's principal support mechanism called the Renewables Obligation (RO). This was introduced in 2002 and obliges the suppliers of electricity to use a rising percentage of electricity from renewable sources. The policy calls for the required level to rise annually from 6.7 percent to 15.4 percent in 2015/16 and remain at this level until the obligation ceases in 2027. The RO works as follows: for a supplier of energy to show that it has met the requirement to purchase energy from renewable sources, it must present Renewables Obligation Certificates (ROCs) or must make a fixed financial payment called a "buyout price," which rises in line with inflation every year and caps the cost of the obligation to suppliers and ultimately to consumers.

On the basis of current measures in place to address energy efficiency, the United Kingdom's carbon dioxide emissions are expected to fall by 7 percent by 2010 compared with 1990. In order to further strengthen this decline, a concerted effort will be required in terms of climate policy. This may include regulatory interventions (such as building regulations and appliance standards), but also a role for better information (product labelling), incentives (such as the Climate Change Levy) and market mechanisms (such as emissions trading). Some of the measures have to be taken at the EU level. For example, the United Kingdom plans to work at international and EU level and with manufactures and retailers to remove the least energy efficient products from the market. An example of this effort is the work on the framework directive on the Eco Design of Energy-Using Products. In terms of EU legal measures in this area, the United Kingdom is committed to a vigorous approach. For example, under the EC Energy Performance of Buildings Directive, energy performance certificates are required for all buildings on change or occupation. The government has implemented this requirement by including the certificates in Home Information Packs.

Energy security policy

Declining domestic oil and natural gas production and the corresponding increase in dependence on imports are a major source of concern and a driver for change in UK energy policy. The demand for imports is particularly acute with respect to gas, where it is estimated that consumption of imports will reach 80 to 90 percent of the total consumption by 2020. Notably, the origins of natural gas consumed in the United Kingdom will change in the medium to long term: Initially, dependence will shift to Norway, Algeria and Qatar. Later on, Russia, the Caspian Sea region, and Nigeria will become increasingly important. The United Kingdom's exposure to international risk will therefore increase over the medium term and then increase further as imports from less secure countries rise and supply chains lengthen.

The principal sector in which oil is used is transportation. It has a share of 74 percent in energy supply and produces 42 million tons of carbon a year (about one quarter of all UK carbon emissions). The United Kingdom has to be prepared to deal with an increasing import dependence from 2010 on. The current strategy is to reduce the dependence on oil and, at the same time, to tackle high emission levels with a wide variety of policy instruments. Incentives to encourage uptake of lower-carbon transport fuels and vehicles include the Renewable Transport Fuel Obligation, reform to the Company Car Tax, and the Vehicle Excise Duty. However, these national measures are supported by EU measures for voluntary agreements on new car fuel efficiency. This effort is being maximised in the government's mid-term strategy, to focus on four priority areas:

- To reduce the carbon content of transport fuel;
- To reduce the carbon emissions of vehicles;
- To encourage moves toward environmentally-friendly transport;
- To work in the EU to include aviation in emissions trading, and
- To consider the inclusion of surface transport in emissions trading.

Due to its still low import dependence with regard to oil and natural gas, the United Kingdom has the opportunity to prepare for times of higher dependence while other EU countries have to react faster considering their already high dependence.

Conclusions for European energy policy

Due to its basic market-oriented philosophy, the United Kingdom supports EU efforts to promote the liberalisation of the EU energy market. It also is in favor of joint efforts to improve energy security in Europe and take vigorous measures to fight climate change. The former Prime Minister Tony Blair was the first head of state to put fighting climate change on his personal political agenda.

First, with respect to liberalisation, the United Kingdom has strongly supported the EU Commission's programme of deepening the internal market in energy, not only by means of EC legislation and enforcement actions by the Commission but also by supporting an expanded role for the national energy regulators on the European energy scene in the form of the European Regulators' Group for electricity and gas (ERGEG). It has not supported the idea of a single European energy regulator.

Second, with respect to energy security, the United Kingdom has been a supporter of common approaches to ensuring security of supply. However, this has not translated into support for enhanced powers for the EU Commission in this area. Three explicit routes have been attempted: firstly, support for joint actions with other member states within the European Union (security of supply directives, actions through the ERGEG, Prodi-Putin dialogue, etc.); secondly, multilateral initiatives such as those involving the Energy Charter Treaty; thirdly, bilateral (UK-Russia) actions.

Third, with respect to climate change, there is support for an extended role for the EU-ETS, especially in Phase Three (from 2013 onward), for Kyoto and the negotiations on its next phase or a successor treaty, for implementation of the environmental measures on cleaner use of coal, and for enhancing the capacities of Euratom for safety monitoring and research into nuclear energy.

Fourth, with respect to all three of the above, it may be noted that the United Kingdom agreed to the inclusion of the energy chapter in the draft European Constitution, a striking reversal of UK positions on this issue when it was raised in the past (throughout the 1990s). The United Kingdom has also been a robust supporter of a common EU energy policy in the last two to three years.

It is worthwhile to contrast the aspirations and ambitions in UK energy policy with its recognition of "realities." The four declared goals of UK energy policy are: (a) to put the country on a path to reduce carbon dioxide emissions by 60 percent by 2050; (b) to maintain reliable energy supplies; (c) to promote competitive markets in the United Kingdom and beyond; and (d) to ensure that each home has an adequate and affordable supply of heating. There are two challenges that have been singled out: the need for climate change mitigation and energy security at a time of growing energy dependence.

The two challenges invite a supra-national, European or wider response as has been widely recognized in the United Kingdom. However, the United Kingdom's commitment to common solutions is limited by two qualifications that may be identified in UK energy policy:

First, the degree to which there is a commitment to a supra-national response varies: With respect to dealings with non-EU fossil fuel producers (such as Russia) there is evidence of some confusion. The commitment to a robust role for EU institutions on liberalisation and climate change contrasts with a very reluctant commitment to a common approach on security issues.

Second, there is a strong commitment to national solutions to the above problems. This includes a commitment to the development of "home-grown" energy resources (North Sea oil and natural gas) and also to the development of coal, but most strikingly, to a revived role for the nuclear industry.

It is obvious that a readiness exists to delegate functions to the European Union with regard to technical issues such as the coordination of national regulatory systems or the continued development of the EU-ETS, a system that could deliver significant windfalls to the financial service sector, a mainstay of the UK economy. It is unclear how far the United Kingdom is prepared to allow the European Union to assume authority over the geopolitical component of security of energy supply; this facet of energy security includes the planning of energy transport routes to Europe and the development of a post-Kyoto Protocol regime that would extend commitments to China, India and other emerging economies and bring on board the United States, a precondition for reversing the growth in global CO_2 and other greenhouse gas emissions. As long as the United Kingdom remains ambivalent on these issues, it is questionable whether, through national action alone, it will be able to meet its objectives with regard to energy security and climate change.

7. ANNEX

AUTHORS OF THE COUNTRY PAPERS

Judit Barta
Miklós Hegedüs
Hungary

Peter D. Cameron
Great Britain

Alberto Clô
Francesca Salvemini
Stefano Verde
Italy

Bernhard Hillebrand
Germany

Antonio López de Sebastián
Spain

Francis Sorin
Pierre Bacher
France

Krzysztof Żmijewski
Andrzej Kassenberg
Poland

ISBN 978–3–89892–928–8

FRIEDRICH EBERT STIFTUNG