UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

A STRATEGIC ENERGY POLICY FOR EUROPE

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Structure of the memo

SECTION 1. GUIDING PRINCIPLES

Our analyses and proposals are presented in sections 2 to 4 of this memo. In this first section, we present the four principles which have guided our reflection on Europe's strategic energy challenges.

1. Energy security and climate change are distinct problems

A former prime minister of one of the EU member states once declared that "energy security and climate change are two sides of the same coin". We believe that this is not necessarily true.

Most energy security risks are associated to our economies' reliance on energy markets, especially markets for oil products, natural gas and electricity. Climate change policies, even ambitious ones, would probably not lead to a meaningful reduction of our reliance on these particular markets, at least not before the late 2020s.

Irrespective of whether we will succeed in placing the world on a path towards climate stabilisation, we can succeed or fail in addressing the energy security problems linked to how energy markets (local, regional and global) work.

2. Energy markets are strategic institutions

Markets for energy products and services play a fundamental role in the working of the international energy system. This role cannot be replicated by administrative planning.

Global commodity markets for energy products (especially crude oil and refined products but also, increasingly, natural gas) allow the price mechanism to effectively co-ordinate millions of decisions by sellers and buyers around the world. They provide collective security of supply by transforming localised physical shortages into global price increases. Finally, they provide a means (the only one at our disposal) to peacefully allocate available physical supply between buyers.

The emergence and development of these market institutions (from the mid-1970s onwards in the case of oil) have transformed the political economy of international energy by suppressing the need for national governments of importing economies to secure 'access to' and 'control of' oil reserves through foreign and military policies.

International energy markets are strategic institutions. To the extent possible they should be built when they don't exist, strengthened and protected as appropriate. Well-functioning energy markets, global and European, will remain a key condition for sustaining the energy well-being of Europe and the world in the coming decades. This is true irrespective of whether energy prices will remain high, deflate or go even higher; irrespective, also, of whether European energy imports will continue to grow, stagnate or start to decline.

3. Energy independence should not be pursued

Reducing energy imports should not be an objective of our policy. Ample theoretical and empirical evidence allows us to affirm that, other things being equal, a lower rate of 'import dependence' does not translate into a higher level of energy security, and almost necessarily translates into higher energy prices.

Europe derives very large benefits from its deep integration into international energy markets. The costs in terms of political independence (or ability to devise a common European foreign policy) are limited to the EU-Russia gas relationship. They can be reduced significantly by reforming the EU natural gas markets (see our analysis and proposals below) and would not be lowered meaningfully by marginally reducing our imports of Russian gas.

We do not see Europe's reliance on the global oil market as posing any specific, serious foreign policy challenge to European countries.

4. Europe can not solve climate change on its own

Greenhouse gases are global "pollutants" of which Europe generates roughly 20% of global emissions, and this share is declining by the year. It is not reasonable for Europe to unilaterally derive an energy strategy from the need to aggressively reduce global emissions. This approach only makes sense in the context of a global agreement ensuring that all major economic powers share in the global effort. Otherwise it is environmentally futile and economically suicidal. The intensity of Europe's effort towards reducing global emissions should be an outcome of the international negotiation, not an input into it.

SECTION 2. NATURAL GAS: A STRATEGIC CHALLENGE FOR EUROPE

Natural gas presents Europe with its most pressing energy challenge, maybe the only truly strategic one.

Gas is bound to remain a highly desirable fuel in Europe from an energy and environmental perspective. Yet Europe faces a relatively high risk of supply disruptions which it is ill-prepared to cope with. Furthermore, the dynamics of the EU-Russia relationship makes gas as politically problematic as it is energetically attractive.

Fixing our natural gas problem should be the top priority of our energy strategy.

1. Natural gas will remain important for Europe

Gas amounts to a quarter of our primary energy supply and this share has been rising steadily over the past forty years. Over the past twenty years demand for natural gas (in the EU27) has grown five times faster than total primary energy demand. Unlike oil, natural gas faces competition from other fuels in all of its usages (though, like oil, the *short-term* elasticity of demand can be very low).

Natural gas should continue to be an attractive fuel for electricity generation in Europe, for three reasons: 1) Modern gas-fired power plants are particularly attractive to investors in a liberalised electricity market (relatively short pay-back time; can be operated flexibly), 2) Natural gas is the least carbon-intensive of fossil fuels, generating roughly half the amount of CO_2 per KWh than a modern coal-fired plant, and 3) Natural gas is the perfect complement of wind power: as the share of non-despatchable, intermittent generation grows, so does the value of highly flexible power plants.

2. Yet it is problematic

a. Security of supply: probability and impact of supply shocks

The gas supply security risk, defined as the probability of supply disruptions times their economic and political impact, is a major issue for Europe. This problem is not linked to our overall level of dependence on Russian gas or imported gas in general, but to a combination of two main factors.

1. The lack of integration between national gas markets and underdeveloped market institutions (gas hubs and spot markets) which prevent efficient market responses to supply shocks. As a consequence, the economic impact of any supply disruption would be much larger than it should. The political impact would be magnified too as various EU countries would be very unequally impacted.

2. A heavy dependence on the increasingly unreliable transit corridor through Ukraine (more than 20% of our gas consumption) which creates a real probability of large-scale disruption to European supplies.

We have to act on factors affecting both the probability and the impact of gas supply disruptions.

b. Natural gas and the EU-Russia relationship

As the evolution of post-Soviet Russia takes a less Western-friendly turn, the EU-Russia gas relationship becomes very divisive in Europe. Some member-states see it as an opportunity to structure a broader EU-Russia partnership for the long term. Others see the dependence on Russian gas as a major weakness for Europe and call for diversification and the institutionalisation of 'energy solidarity' at EU (and sometimes NATO) level.

Russia is an important supplier but does not dominate the EU gas market. It supplies slightly more than 40% of our imports or a quarter of our gas consumption (which amounts to 6.5% of the EU's primary energy supply). Even as Russia rapidly expanded its exports to Europe, its share of European imports (for the 27 current member states) has roughly been halved since 1980. Since 1990, 80% of the rise in EU gas imports has been from non-Russian sources. Europe already enjoys a diversified natural gas supply.

The problem is that Russia's gas exports define three different Europes. Several countries in Western Europe consume little or no Russian gas; the UK and Spain are the two largest gas markets in this situation. Germany, Italy and to a lesser extent France import huge volumes from Russia (54% of all Russian gas consumed in Europe) which amount to a significant percentage of their very large gas consumption. Finally, Eastern European countries generally have small gas markets, highly or entirely dependent on Russia.

The latter group is in the most difficult situation as Russian gas matters much more to them than their market matters to Gazprom. Among them are countries with the most difficult historical relationship with Russia, like Poland or the Baltic countries. They were on the wrong side of the iron curtain (or even the Soviet border) and they are on the wrong side of the gas divide. They resent the strategic partnerships between Gazprom and large gas

companies in Germany or Italy, as well as the relatively pro-Russian stance of their governments, as a betrayal of the European solidarity.

Russia has become one of the most divisive issues in EU politics and should remain Europe's biggest foreign policy challenge. If Europe is to develop a common political and strategic approach to Russia – and if natural gas is to remain a politically acceptable fuel in Europe – the divisiveness of Russian gas has to be addressed. Our strategy should aim at alleviating the energy insecurity syndrome of Eastern European countries and maximising collective gas supply security in the EU as a whole.

3. Building an integrated and competitive European gas market

The single most important contribution to addressing this strategic energy challenge is for Europe to build an integrated and competitive gas market in place of current patchwork of mostly national, loosely linked and rather uncompetitive markets.

a. Benefits

An integrated and competitive European market would deliver the following benefits:

- Gas supply diversity would be "exported" from Western to Eastern Europe.
- It would create the highest possible level of solidarity between European gas consumers – gas would be able to flow from relatively "long" to relatively "short" parts of the market.
- Bilateral deals between large utility buyers and Gazprom would be "Europeanised", bringing gas into Europe as a whole, not Germany, Italy or France.
- It would drastically enhance the ability of the European gas system to cope with supply shocks as localised shortages would be transformed into a price increase across the whole market.

Eastern European countries highly dependent on Russia would benefit disproportionately but not at the expense of other European countries.

b. How to achieve it

Amongst the many conditions to the emergence of an integrated and competitive European gas market, three seem essential:

- Breaking the grip of dominant supply companies on transmission pipelines ("unbundling");
- Harmonise standards and technical procedures among transmission system operators and create a single, on-line platform for gas trading in Europe;
- Increase the power of national regulators and the co-ordination between them, with the view to moving eventually to a European regulator with jurisdiction over all transmission pipelines, storage sites and LNG re-gasification facilities.

c. A strategic priority

The European gas policy debate has been dominated by the economic impact of the lack of market integration and competition. It is important to appreciate the benefits of a well-functioning gas market in terms of collective security of supply, solidarity between member states and political unity of Europe vis-à-vis Russia.

Building a European gas market should be a top priority of our strategic energy policy.

4. Additional gas security measures

The security of gas supply in Europe (and especially in Eastern European countries) could also be enhanced by other measures, such as:

- Investing into new or enhanced storage capacity;
- Mandating the maintenance (physical or contractual) of backup gasoil for power plants and large industrial customers (also valid for Western European countries);
- Developing interruptible contracts;
- Phasing out uneconomic gas-intensive industry (Poland, Baltic countries);
- Moving out of natural gas altogether (only available to very small gas markets which can increase their electricity supply and oil product imports).

Such measures would be all the more important if we failed to build an integrated and competitive European market. Even if we succeed, some of them will be required in some particularly exposed countries.

5. Fixing gas transit through Ukraine and dealing with Gazprom's bypassing pipelines

a. Ukraine has become unreliable and Gazprom wants to bypass it

Russian gas exports to the EU amount to 25% of the EU's gas consumption and generate about 90% of Gazprom's profits. 80% of these exports transit through Ukraine. Because of underinvestment in the infrastructure, widespread corruption in the Ukrainian gas establishment and, since the "Orange Revolution", heightened political tensions with Russia, the reliability of the Ukrainian transit corridor has sharply eroded. The crisis of January 2006 – almost repeated in February-March 2008 – revealed to the world a problem which has been going on for fifteen years.

To deal with this problem Gazprom has launched, in co-operation with large utility importers of Russian gas in Germany and Italy, major new pipelines projects that would by-pass Ukraine: Nord Stream under the Baltic Sea and South Stream under the Black Sea. If both routes eventually reach the announced capacity and, as is now widely expected, Russian exports to the EU do not increase, by 2020 Ukraine could be largely bypassed.

b. Europe should not defend the status quo nor abandon Ukraine

It leaves the EU in a difficult position. The technical unreliability, political instability and complete opacity of gas transit through Ukraine amount to a serious supply security issue for Europe. The fact that Ukraine, in the context of its bargaining with Russia over repayment of its debt and the price of gas, has never hesitated to divert gas that did not belong to it from the transit infrastructure – essentially taking Europe hostage – makes it impossible for the EU to defend the status quo. Yet bypassing Ukraine would radically change the relationship between Russia and a country which sees its future as part of Europe.

Ukraine's gas security situation would become very precarious. The very large dependence on Russian gas and Central Asian gas transiting through Russia would create a strong incentive for Ukraine to either go squarely back under Russian political influence or, on the contrary, integrate Ukraine into the European gas market as a way to preserve the condition of its political independence.

c. A European strategy

We propose that the EU take the future bypassing of Ukraine as a gas transit country as an opportunity to put it decisively on a path towards Europe. There are two key conditions to Ukraine's integration into the European gas market:

1. Ukraine should contract with Gazprom and exclusively with Gazprom, irrespective of whether the gas is produced in Russia or Central Asian countries, and pay European prices (adjusted for transport costs) for its imported gas. Abandoning entirely the scheme under which Ukraine has accessed cheaper Turkmen gas (through Itera, Eural Trans Gas and finally RosUkrEnergo) is a key condition for suppressing gas corruption in Ukraine. When Ukraine is no longer a key transit country and pays European prices for its imports, the Russia-Ukraine gas relationship becomes a purely commercial one, highly profitable for Gazprom.

2. Once Ukraine is no longer a significant transit country for Russian gas, the pipelines between Ukraine and the EU must be operated as "interconnectors" which can transport gas in either direction depending on market conditions. As part of the Association Agreement that the EU would propose to Ukraine, pipelines and storage sites should be put under EU regulations.

In case of a structural shortage of gas in Russia, there is a clear risk that Gazprom would treat Ukraine as an adjustment variable to protect its ability to service the contracts with Western Europe. This is why it is so important that there is a well-functioning wholesale market in Europe. When Ukraine is short of gas, companies and traders active on the Ukrainian market should be able to bid up the price on European gas hubs and make gas move west to east. The market would transform a shortage in Ukraine into a pan-European price increase. Energy solidarity is an outcome of the market working.

Such a drastic re-organisation of the Ukrainian gas industry will be painful. Gas prices would increase significantly. This is why the Association Agreement with the EU should include an ambitious package of economic, technical and policy assistance to ensure the transition is as smooth and rapid as possible. Progress on reforming the gas industry should be

made a condition for moving to the next steps of economic and political integration with Europe. For Ukraine the alternative is rather difficult to contemplate.

6. Summary and conclusion

As we look forward to 2020, natural gas presents Europe with its most serious energy challenge, probably the only truly strategic one. The segmented and uncompetitive nature of our gas market makes it particularly unresponsive to supply shocks and leaves most Eastern European countries (which are highly dependent on Russian gas) in an especially risky situation. Even in Western Europe the market does not respond adequately to price signals, increasing the economic cost of localised supply-demand imbalances.

Furthermore, natural gas is the only form of primary energy for which our situation and choices have direct foreign policy implications. Because there is no European gas market and national situations vis-à-vis Russian gas are so different, the issue of bilateral relationships with Gazprom and Russia has become extremely divisive in Europe.

The bypassing of Ukraine as a transit country between Russia and the EU is probably unavoidable – by 2020 it could be complete or well advanced. It would create very serious energy security and political independence risks for Ukraine. They can only be dealt with through a very ambitious EU initiative to integrate Ukraine into the EU gas market and put the country decisively on a path towards Europe.

SECTION 3. EUROPE AND THE GLOBAL OIL MARKET

1. A new era for world oil

Over the next 25 years, the situation of the oil market will be very different from the past 25 years, in two important respects:

1. The probability of price spikes will be higher because of a structurally lower level of spare capacity to tap on in case of supply disruption. The probability of supply disruptions may also increase as the share of world production coming from politically unstable regions increases with the decline of OECD provinces.

2. The supply-demand balance will be extremely tight, carrying the risk of extremely high prices incompatible with sustained economic growth and poverty alleviation. On the supply side, production outside OPEC and the Former Soviet Union is declining, probably irreversibly. There is certainly still some potential for growth in Russia but it is more likely to be transformed into a longer plateau. The vast expansion of production capacities in the Middle East that many were expecting until recently will not happen. Some capacity will

certainly be added in Iraq but Iran, Koweit and the UAE will decline; Saudi Arabia has made public that its production capacity will never go beyond 12.5 mmbd. Expanding world oil supply from the current 86 mmbd to 100 mmbd will be a serious challenge. It is unlikely that global oil production, including non-conventionals, will ever surpass 100 mmbd. After 2020 at the latest, the world supply of liquid fuels will decline at a rate difficult to predict.

On the demand side, the potential for growth is immense. Per capita consumption in emerging economies is only a fraction of what it is in the OECD. In all previous experiences of rapid industrialisation since 1945 (Western Europe, Japan, South Korea) oil consumption per capita has risen steadily with the rise in GDP per capita. Even if China's consumption per capita grows much less rapidly than it did in OECD countries (in relation to GDP per capita), China alone could add 10 mmbd to world oil demand by 2020.

Economically, "peak oil" means that the price of oil will no longer be determined by the marginal cost of supply but by the marginal cost of destroying demand, which is much higher.

2. Renewing the international oil security regime

Hence there are two main challenges: 1) to increase our level of insurance against oil supply disruptions, and 2) to lower the cost of containing and eventually contracting world oil consumption by accelerating the emergence and deployment of alternative transportation technologies. (We take the view that there is very little that can be done to change the supply picture, either on a bilateral or multilateral level. Energy policy reform in resource-rich countries would certainly be in our interest but our ability to push for that in a context of very high prices and sharpened political sensitivity is close to nil.)

These challenges are not fundamentally new. After 1973, the International Energy Agency was created to stimulate and co-ordinate investment in emergency storage and demand-control policies. We don't need to build a new oil security regime but to renew the existing one. The EU should be a strong advocate of this renewal.

a. Bringing China and India into the IEA

There is an important institutional dimension to the renewal of the oil security regime. In 1974 when the IEA was created, OECD countries accounted for more than 70% of world oil demand; in 2006 the share was down to 58%. Between 1996 and 2006 OECD countries accounted for about a quarter of world oil demand growth, and less than 20% since 2000. In 2006 and 2007, demand growth in the OECD was actually negative. Over the past ten years China alone accounted for more than a third of global demand growth and its oil imports have grown by almost 25% a year.

To continue to play its role, the International Energy Agency needs to expand its membership to large emerging economies, especially China and India. The IEA has started to work constructively with these two countries and a lot of progress has been done. The EU, directly through its participation in the work of the IEA and indirectly through its member-states that are IEA members, should strongly encourage the continuation and acceleration of

this process. The goal should be to welcome at least China as a member by 2015. There are additional benefits to bringing large emerging economies into the IEA, especially on the technology and climate policy fronts. But the oil security rationale is overwhelming.

b. Investing in emergency storage

The structural decline in spare production capacity reduced the ability of the market to cope with supply disruptions, which calls for a new wave of investment in emergency inventories.

The United States has made a large effort since 2001 (adding 150 million barrels of crude oil into the Strategic Petroleum Reserve) and is planning significant increases in capacity. China has started to invest into an emergency oil inventory though it will likely remain small in the near future.

Europe has to do its part in increasing the level of collective insurance against oil price spikes by investing into the expansion of its own stocks. It should also encourage China to move more aggressively towards building strategic stocks and make the case that co-ordinating the operation of emergency storage within the IEA increases the value that China gets for its investment. Bilateral schemes between exporting countries and China to finance emergency storage in China (such as the one envisioned with Saudi Arabia) should also be encouraged.

c. Oil demand

Europe should:

- Maintain and continue to toughen its stringent fuel economy standards, combined with high fuel taxes;
- Push for an international initiative to accelerate the deployment of electric personal transportation, especially plug-in hybrid and purely electric vehicles;
- Push, in its bilateral and multilateral energy dialogues, for the phasing out of subsidies on oil products in emerging economies.

SECTION 4. ELECTRICITY GENERATION AND CARBON EMISSIONS

We want Europe to be in a position to make substantial reductions in its carbon emissions (in the context of an international agreement) at the lowest possible cost. A comprehensive strategy to achieve this objective is beyond the scope of this memo. We concentrate here on the decarbonisation of energy supply, which is only one aspect of emissions control.

Over the past forty years the EU's primary energy supply has been significantly decarbonised as natural gas and nuclear power developed, mostly at the expense of coal. The fact that natural gas is very likely to be in short supply and expensive over the next few decades and that nuclear power remains politically problematic in a number of European countries, create a difficult situation. The continuation of the decarbonisation trend – let alone

its acceleration – will depend on further deployment of renewable generation, expansion of nuclear power where it is possible and commercial availability of carbon capture and sequestration (CCS) technologies.

To address this situation, we make the following recommendations:

- The EU should substantially increase, over a multi-year period, its funding for energy technology research, development, demonstration and deployment.

- The EU should make a priority of the integration of its electricity grid. It would reduce the supply security implications of large-scale penetration of intermittent (wind) power. It would also allow large-scale export capacity from countries where nuclear power plants can be built to countries where they can't.