# EUROPEAN ENERGY POLICY:

## Securing supplies and meeting the challenge of climate change

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## I. THE ENERGY CHALLENGES FACING EUROPE

For the past two decades Europe has focussed overwhelmingly on the completion of the European energy market, and in particular on liberalisation of electricity and gas markets.[2] This process is close to completion, subject to the last phases of market opening and a number of "difficult" cases. Europe's energy is now supplied overwhelmingly by private companies competing in liberalised markets.

Though the internal energy market has yielded considerable benefits, it has been hampered by the fact that in an importance sense there is no integrated European market yet, but rather a string of national markets with bilateral connections. Thus physical trade has been limited, and as a result Europeans have not reaped the full benefits of a fully integrated internal market, and competitiveness has suffered.

This major gap did not matter so much in the 1980s and 1990s because most member states had excess capacity, and world energy prices were very low. But now it does matter, because the energy sector in Europe has changed fundamentally since the 1980s and 1990s. The decades of abundant low-priced fossil fuels, combined with the overhang of the power stations built in (or before) the 1970s and early 1980s, has given way to a new set of challenges.

There are three main challenges: *the oil shock, security of supply* and *climate change*. These will require a major wave of investment, and need to be met in ways which do not undermine Europe's competitiveness. Europe's energy policy should focus on this new energy reality, rather than on continuing to find ever more effective solutions to yesterday's problems of excess supply and low prices.

Taking each in turn:

### (i) The oil shock

(a) The oil price shock, from 2000, has ushered in sustained higher prices. The peak of world oil production is now within the planning horizon of the sector. Few new big reserves are being found, whilst the growth of demand from China, India and other fast developing countries will underpin prices. By 2030,

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[1] This paper has been prepared for the UK Presidency of the EU. For further analysis of the issues, see Helm (2004, chapter 20), Helm and Hepburn (2005), and Helm (2005a, 2005b). See also www.dieterhelm.co.uk. Comments welcome to dieter@dhelm.co.uk

[2] Commission of the European Communities (1998, 1996).

the IEA forecasts that world energy demand will rise by 60% from current levels.[3]

(b) The gas price shock follows that of oil, and gas continues to be priced in contracts which are indexed to the oil price. With European supplies heavily concentrated in Russia and Norway, and new LNG supplies at a premium to pipeline gas, this linkage is likely to remain for the foreseeable future.

(c) Electricity prices have risen to reflect gas costs, since in most European countries, gas is the marginal fuel. The tightening supply/demand balance has also begun to be reflected in prices, which will have to sustain new investment.

The European economy has developed in the last two decades on the basis of low prices: it will need to adapt to a very different set of assumptions.

**(ii) Security of supply**

Since the oil embargoes of the 1970s, much of Europe has not faced any serious threat to the security of its energy supplies. The North Sea has provided oil and gas, whilst world markets in coal and oil have been benign. With the exception of the first Gulf War, the only threats have been internal and temporary, and focussed largely on labour problems.

These conditions have now changed, and security of supply is threatened in a number of ways:

(a) The external dependency on gas, notably from Russia, and the reliance on long pipelines through sometimes politically difficult territories

(b) The external dependency on oil supplies, with production increasingly concentrated in the Middle East

(c) Terrorist threats to key energy installations

(d) Network failures, due to the decades of asset sweating in the low return years of the 1980s and 1990s

(e) Aging oil refineries and power stations, and low investment in the last two decades

(f) Poor interconnections between European electricity and gas grids

(g) Lack of effective European-wide mechanisms for addressing security of supply risks and coordination of infrastructure investment.

Addressing the multi-dimensional security of supply problems will require a major investment programme across Europe and much greater cooperation between member countries, and between the EU and its partners, notably Russia.[4]

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[3] IEA (2004).

[4] The EU White Paper on security of supply sets out some of these issues (Commission of the European Communities, 2000).

### (iii) Climate change

Climate change was recognised in the EU back in the 1980s, but the constraints have only begun to bite in this decade. The EU has endorsed the ambition of stabilising emissions of greenhouse gases, adopting specific Kyoto targets, and introduced the world's most advanced emissions trading scheme.[5] It has also adopted a directive on renewables.[6]

These initiatives pose major challenges to Europe's energy sector, in particular:

(a) The Kyoto targets, which in the context of global warming trends are modest, are nevertheless proving very hard for most member countries to achieve

(b) The majority of European electricity assets are based upon fossil fuels, and most are old and coming up to replacement

(c) Renewables technologies have proved expensive relative to fossil fuels, adding to pressure on competitiveness[7]

(d) The first generation of nuclear power stations are coming towards the end of their lives, taking out significant zero carbon emissions capacity, and some countries are considering a new wave of investment.

The challenge of climate change arises at the historical point when much plant needs replacing anyway. This provides an opportunity to use this point of the investment cycle to invest in substantial non-carbon sources. Thus, both security of supply and the climate change challenges need to be met with major new investment.

## II. MEETING THE CHALLENGES: SECURITY OF SUPPLY

### (i) The critical role of interconnection – creating the European electricity grid

Each member state has built up its own national electricity network in the twentieth century. These nationally integrated networks enable the shocks to demand and supply to be managed, so that spare capacity on the national system allows peak demand to be met. The greater the interconnection, the lower the margin of spare capacity needed. Thus historically, the move from town to regional and then to country-wide networks led to a reduction in the overall costs of the system for a given level of security of supply. Risk is reduced through the diversification of sources of supply, and there is a portfolio effect.

To date, interconnection between member countries has been limited largely to bilateral links. The internal energy market is not much more than a series of national markets with limited cross-border trade. As a result, each country carries a high burden in spare capacity, physical trading is limited and the resulting security of supply is lower. (Competition is also inevitably limited too.)

Each new interconnection adds security, and this has a system-wide – European – benefit as well as between the two countries thereby connected. Electricity networks are system-wide in their effects, and it makes economic sense to think of them from a system (European)

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[5] Commission of the European Communities (2003a).
[6] Commission of the European Communities (2001).
[7] See for example NAO (2005) on renewables in the UK.

perspective. The European gains are in addition to the national ones, and these need to be reflected in the determination of investments – and their finance.

Europe should therefore identify the missing links in the European electricity networks, creating a framework or plan for a fully integrated network over the next decade. There should then be a priority ordering for investments, and infrastructure finance to support these investments should be considered.

**(ii) Gas storage and mutual support – a regional IEA for European Gas**

Unlike electricity, gas can be stored, both directly and through LNG capacity. Storage provides insurance against physical interruptions to supply, and the ability to smooth out extraordinary price movements. It provides a bargaining counter too against dominant suppliers.

As with electricity networks, storage has advantages *to the system as a whole* as well as to individual member countries and companies. These aspects have long been recognised in oil markets, with major countries carrying strategic reserves in the event of major shocks to world oil markets, under the auspices of the International Energy Authority (IEA), created as a result of the oil shocks of the 1970s.

In contrast to oil, gas is a *regional* energy source, and it makes sense to consider security of supply on a regional level too. The EU could provide the forum for the cooperation between members on gas storage. This could either be through the ceding of formal powers of control, or through an inter-government agreement. The latter, having worked well for oil, would probably be adequate for gas in Europe.

**(iii) Exchanging information – a European capacity statement**

As the internal energy market develops through greater physical interconnection (and as a result the level of the capacity margin can be reduced), each new power station investment has a greater effect on the European market as a whole, and there are, in consequence, greater benefits to coordination and cooperation.

In each member country, some form of planning is typically utilised. At one extreme, there is formal capacity planning; at the other, regular statements collating information on investment planning. Member countries also have security of supply institutional structures – whether ministerial, regulator or grid operator based. In all of these, the exchange of information is central.

The EU should consider the creation of a centre for information exchange on capacity planning and prospective investments, and issue a ten-year statement on a rolling basis, summarising prospective levels of capacity and investment across the EU. Such an exchange could also provide the basis for collating other information relevant to the security of supply.

**(iv) Negotiating with Russia – a framework for cooperation**

For the foreseeable future, one company in one country will dominate the European gas – and therefore – energy scene. That company is GazProm, itself with close political ties to the Russian government. It is therefore inevitable that there will be a core political element in securing Russian gas supplies, complicated by the fact that a number of governments will be involved in transit issues in relation to pipelines.

This concentration of monopoly power requires a response, if European countries and companies are to maximise their negotiating power. Such a response could have several dimensions. There should at minimum be an exchange of information for all substantive gas contracts, so that each is aware of the total contracted position, and European authorities can gauge the total energy security exposure amongst EU countries. This could be a further dimension of the information exchange proposed above.

It is also inevitable – and desirable – that transit of gas will require a developing framework of political agreements, and this inevitably has a European dimension.[8]

## III. EUROPE'S LEAD IN TACKLING CLIMATE CHANGE

### (i) Building on the EU Emissions Trading Scheme (EU ETS)

The EU has pioneered emissions trading on a regional level as a market-driven solution to meeting the Kyoto targets at minimum cost. Getting the EU ETS up and running is a major success, and the market architecture is now in place to widen and deepen the scheme.

Building on the EU ETS does however pose a number of difficult problems. So far, it is time-limited scheme, and allowances have only been granted until 2008, with negotiations under way for 2008-12. For companies, this is largely *outside* the investment horizon and well outside the R&D horizon. To build on the EU ETS requires active consideration *now* of its evolution after 2012, so that markets can factor in the implied cost of carbon into the major investment programme now beginning to get under way across the European energy sector.

As part of the considerations for 2008-12, and as the EU builds up its position in the post-Kyoto international negotiations, there are a number of new policy initiatives which need to be considered. These include:

(a) Longer term carbon contracts after 2012, let by governments or EU institutions, which can be sold back into the market after 2012 as the formal national allocation plans eventually emerge[9]

(b) The integration of air transport and road and rail travel into the EU ETS

(c) Developing proposals to bring in other, non-EU countries as part of the post-Kyoto negotiations

(d) The use of Clean Development Mechanisms and Joint Implementation on a wider scale.

It is also important that the competition aspects of the internal energy market are brought to bear on the emissions trading market, to prevent abuse or anti-competitive behaviour, and the EU sectoral inquiry into the energy sector[10] should be encouraged to take emissions trading into account in finalising its report to the Commission.

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[8] Transit is already covered by the Commission of the European Communities (2003b).
[9] See Helm and Hepburn (2005).
[10] European Commission (2005), currently underway.

### (ii) Building on Europe's renewables

Almost all member countries have pursued policies aimed at boosting investment in renewables, and these are set within the framework of the EU directive on renewable energy. To date, these policies have overwhelmingly focussed on wind technology.

In taking this approach to energy policy forward, the EU should consider widening the scope of renewables towards a definition that includes a number of emissions-reduction technologies, and to consider how, over time, the renewables obligation and the EU ETS may converge to provide the least-cost carbon reduction outcomes for the EU.

There is considerable scope for cooperation across the EU in R&D. For some large-scale technologies – like hydrogen, clean coal and nuclear – the economies of scale are likely to be considerable, and the EU is currently at a competitive disadvantage to the US because of its fragmented approach.

### (iii) Taking nuclear forward on a European basis

As a number of EU members consider new nuclear build programmes, there are several European dimensions which will affect its costs and the timing. At the European level, it makes sense to have a Europe-wide licensing regime, with mutual recognition of safety standards, and to consider a Europe-wide safety inspectorate.

There are also technology gains from cooperation, and the choice of reactor, its manufacture and construction display the kinds of cost structures familiar in the airline industry.

As a new investment phase begins to develop momentum, there is a case for the EU to modernise its nuclear legislation, and to consider how best to create the conditions which minimise the costs of the inevitable regulatory burden. A nuclear task force to identify barriers and areas for improved cooperation would be timely.

### (iv) Negotiating a post-Kyoto framework

An extremely important factor shaping the future of European energy markets is what happens at the end of the Kyoto period in 2012. The negotiations under the United Nations Framework Convention on Climate Change (UNFCC) are now getting under way, and the EU is a natural focus for these discussions.

What however is missing is the ability at the European level to model the impact of various outcomes on the European energy market. The EU needs to develop this modelling capability quickly, bringing together the appropriate expertise. During the two decades of low prices and abundant supplies in the 1980s and 1990s, there was little need for much expertise in energy markets. That has now changed, and the Commission will need to build up its expertise quickly ahead of these negotiations – and consistent with the considerations above on information exchanges.

## IV. PROVIDING AN INVESTMENT-FRIENDLY FRAMEWORK

Meeting security of supply and addressing climate change requires a massive investment programme, and this – fortunately as noted above – coincides with a turning point in the investment cycle, when much of the capacity built in the 1970s comes to the end of its life. What is required is an investment-friendly policy and regulatory framework.

### (i) Recognising that energy investments are "sunk costs" and need long-term contracts

The core problems with energy investments are that they are typically long-lived and specific to the energy systems in which they are embedded. This means that energy investments are very vulnerable to changes in future circumstances (political intervention, technology change and other investments). They are, in the economist's sense, "sunk".

In such circumstances, investors seek protection from these kinds of risk through long-term contracts in competitive markets, and through regulation in monopoly infrastructures. European energy policy has not been particularly conducive to the former, and the latter is as yet immature. There is considerable variance between member states on both. It is not therefore surprising that companies have sought to increase their size through a massive merger wave to gain some protection for their sunk costs.

European energy policy needs to adapt to the new investment agenda, and in large measure this means a combination of changes in the regulation of monopolies and the treatment of long-term contracts. Whilst competition policy has focussed on short-term spot market competition and freedom to switch suppliers in the short run, it needs to take full account of the impacts on longer-term investment (see (v) below).

### (ii) Investment-friendly interconnector regimes

Interconnectors are risky investments. They are sunk costs and, in crossing boundaries, have political risk and are high in transaction costs (such as national planning and national regulations). There is a strong case for taking these investments out of purely national hands, and treating them as "European", analogous to the way "European" mergers are considered.

Such investments yield gains above and beyond the immediate parties, and these need to be captured in returns to investors. This could be by preferential treatment for funding, or tax exemptions.

### (iii) Developing longer-term energy markets

The focus on longer-term energy markets, rather than spot markets, requires a rethink of the architecture of market design. This has proved very effective with the EU ETS, but the presence of a whole host of different types of energy markets across the EU provides a barrier to trade and to the realisation of the benefits of the internal energy market. There are different energy and capacity markets, ranging from pools to voluntary trading markets, and specific longer-term tariffs. (Even within countries, electricity markets can vary – for example the England and Wales system has radically changed twice in the last fifteen years, and a different approach is to be adopted in the all-Ireland market.)

The EU should initiate a work programme to identify the costs of this plurality of market designs, and bring forward proposals for a gradual harmonisation in trading arrangements, analogous to the harmonised approach to the EU ETS.

### (iv) Minimising regulatory burdens

Regulatory burdens in the EU on energy are considerable. Each country has its own regulatory systems, and as energy companies increasingly operate on a pan-European basis, there are considerable costs involved. In some countries, regulation is designed still with a pre-liberalisation agenda in mind, and it can prove an obstacle to competition and entry.

It is recommended that the EU initiate a regulatory review to compare the regulation of energy in each member state and identify as a priority any regulations which inhibit competition. Such a cooperative exercise should seek to help each member reduce its own regulatory burden.

In specific areas – such as nuclear regulation –there is a strong case for a European approach to regulation, as discussed above.

### (v) Combining liberalisation, regulation and investment

Liberalisation is a fact which is likely to remain in European energy markets for decades to come. The challenge is to design a policy and regulatory framework which promotes investment *within the liberalisation context*. As discussed above, allowing investors to recover sunk costs may require an element of longer-term contracting, whilst it is important to ensure that regulated third party access to new infrastructure permits the investor to pass on the full capacity costs. Inevitably, this requires a considerable rethink across the Commission as to how to interpret competition rules in the context of investment, and it is important to signal to the market how this might work – though it does not mean that regulated third party access should be curtailed as currently happens with exemptions. It is recommended that, given the importance of these issues, and the confusion that exists in amongst investors, that the Commission consider issuing further guidelines on competition matters in relation to interconnectors and infrastructure investments, and in respect of new large scale power projects, notably nuclear.

## V. ENHANCING COMPETITIVENESS

Security of supply and climate change are important drivers for energy policy. The consequences show up in the costs to businesses and households, and the ways in which different parts of the international trading system deal with these will greatly impact on international competitiveness. Europe's energy policy must be designed with these international competitiveness dimensions in mind.

### (i) The portfolio advantages of interconnection

Perhaps the greatest single contribution to enhancing the efficiency of the European energy market and reducing costs is the physical interconnection of the member states' individual markets, as discussed above. The portfolio effects are likely to be large.

In the US, and in South-East Asia the benefits are being recognised. China's energy sector is being planned with interconnection in mind. In the US, progress is slow, hampered by the conflicts between federal and state level regulation. Europe has an enormous opportunity to gain competitive advantage through interconnection and the creation of the European electricity and gas grids – completing the *physical* internal energy market.

### (ii) Longer-term price stability and longer-term contracts

In a world of excess supply and low prices, short-term contracting is cost-reducing and gives competitive advantage. In the 1990s, those European countries which liberalised fast gained

these competitive advantages over those which stuck to longer-term contracts. However, going forward, competitive advantage may derive from longer term contracting.[11]

It is important for the EU to avoid undermining further longer-term contracting arrangements as the underlying market conditions change. Rather than prohibiting or breaking up long-term contracts, the EU should seek ways of encouraging a competitive longer-term market to develop.

### (iii) Stabilising the carbon price

For investors in the energy sector, the carbon price is extremely uncertain, and the short-term nature of the EU ETS has led to considerable volatility. Stabilising the carbon price, and hence reducing uncertainty, would reduce risk and hence improve competitiveness. Most of this risk is political, and at the EU level. Competitiveness would be enhanced by a clear framework for the post-2012 climate change regime.

## VI. MODERNISING EUROPEAN ENERGY POLICY: SPECIFIC PROPOSALS FOR ACTION

This paper has argued that the EU has a considerable opportunity to modernise its energy policy, in the new context of the oil shock and higher prices, greater threats to security of supply which come from external dependency, and the challenge of climate change.

It has been argued that, given the need to replace much of the old energy capacity anyway, the energy policy framework needs at its core the theme of investment – investment to enhance security of supply and make the transition to a lower carbon European economy. This can, properly designed, enhance competitiveness too.

The paper has made a number of proposals, notably:

**(i) The completion of the physical interconnection of the electricity grid, with a ten-year plan, and appropriate investment and regulatory incentives.**

**(ii) The creation of a European gas security and storage regime, analogous on a regional level to the IEA for oil.**

**(iii) The deepening and widening of the EU ETS and the consideration of longer-term carbon contracts.**

**(iv) Reform of the market and regulatory frameworks, including the application of competition policy, to encourage investment and facilitate longer-term contracting.**

**(v) A European information exchange on future capacity plans, feeding into the ten-year statement detailed above, providing a European focus for the coordination of investment and security of supply, and substantially increasing energy expertise.**

[11] Indeed, this has already been witnessed as gas margins have tightened in the North Sea in late 2005.

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