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Climate Change Policy Uncertainty and the Electricity Industry: Implications and Unintended Consequences

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Summary

- Power generation companies are among the biggest emitters of greenhouse gases and are, therefore, potentially among the most exposed companies when it comes to regulatory risk and uncertainties in climate change policy. In practice, however, their risk exposure is reduced by the ability of power companies to pass through the additional costs to the price of electricity.
- Uncertainties in climate change policy create a financial incentive for power generation companies to delay new build and to keep old plant running for longer. This may, in turn, lead to greenhouse gas emissions remaining higher for longer than would otherwise be the case.
- The challenge for policy-makers is to balance climate change policy goals with issues such as the impacts of climate change on competitiveness and uncertainty over the future international framework for responding to climate change.
- While the EU Emissions Trading Scheme (EU ETS) has established a price for carbon dioxide (CO₂) emissions, CO₂ prices have not yet resulted in a significant degree of fuel-switching or changes in investment patterns. This is partly due to the high price of gas at present, but is also caused by the risk that current CO₂ prices will not be sustained for long enough to give a return on investment in low emitting technologies.
- In order to address the issues caused by policy uncertainty, policy-makers need to make it clear that emissions trading is an integral part of the policy framework for responding to climate change; clearly communicate the post-2012 ambition – including the establishment of clear national and international greenhouse gas emission targets for 2020; and signal their willingness to provide public money to support action on climate change, at least over the short and medium term.

Setting the scene

Climate change presents risks and opportunities for businesses both because of the physical impacts of climate change and because of government action to encourage companies to reduce their greenhouse gas emissions. Companies will respond differently to these challenges with consequences for earnings and shareholder value and, hence, for institutional investors (e.g. pension funds, fund managers, insurance companies). A number of institutional investors have used their influence as shareholders or bondholders to encourage companies to improve their disclosure and management of greenhouse gas emissions, as well as engaging – both individually and through collaborative initiatives such as the Institutional Investors Group on Climate Change (IIGCC)¹ – directly with policy-makers on issues such as the European Union Emissions Trading Scheme (EU ETS). A recurring theme in these discussions has been the importance of having in place a clear, long-term climate change policy framework, including emissions reduction targets, as an essential part of ensuring the delivery of climate policy goals in an economically efficient manner.² In the absence of such a framework, companies face uncertainty regarding the extent, timing and cost of any controls on emissions of greenhouse gases. This, in turn, creates significant uncertainty about their optimum investment strategy.

Power generation companies are among the biggest emitters of greenhouse gases³ and are therefore among the most exposed companies when it comes to regulatory risk and uncertainties in climate change policy. The characteristics of power sector investments – capital-intensive, long-lived and involving technologies likely to be strongly affected by future emissions controls – mean that uncertainties regarding the extent, timing and cost of any controls on emissions of greenhouse gases may hinder electricity utilities' ability to design and implement optimum investment strategies. From a public policy perspective, these investment decisions can have long-term impacts on the sector's greenhouse gas emissions, and policy uncertainty may lead to electricity companies making sub-optimal investment decisions (e.g. investing in technologies that potentially run counter to climate policy goals).

The aims of this Briefing Paper are to provide an overview of how climate change policy uncertainty – in particular, the EU Emissions Trading Scheme – is affecting investment decisions within the electricity industry, to provide an assessment of the implications of this uncertainty for climate policy goals and to present some suggestions on how the unintended consequences of this uncertainty may be addressed. The paper draws on ongoing work by the

International Energy Agency (IEA) on this subject⁴ and a separate workshop held on 22 March 2006 at Chatham House – 'Addressing Uncertainty in Climate Change Policy: A Dialogue between Institutional Investors, Companies and Policy-makers', sponsored by Insight Investment. The quotes in the text are comments and reflections by the seminar participants.

Climate change policy and the electricity industry

Investment risks in the power sector: an overview

Companies face a range of risks and uncertainties when making investment decisions. Probably the most fundamental risk for power generation companies, particularly in competitive market conditions, is price risk. The primary short-term objective of power generation companies is to maximize profits by optimizing the use of their generation assets given the price they can receive at any given time. Operational decisions on a day-to-day (or even hour-by-hour) basis are driven by this optimization requirement. These decisions, in turn, determine the rate at which each plant in the company's portfolio will be run in any given period.

When it comes to longer-term investment decisions, companies have to decide whether to build new power plant, and how and when to retire old plant. Because of economies of scale and the historical development of the sector towards large centralized generating plant with very long lifetimes, these investments have tended to be capital-intensive and long-lived. Given the long timescales that can be required to repay the capital, these decisions have to be taken with quite significant levels of uncertainty, particularly relating to the price and volume of electricity sales, and the price of input fuels. The broad investment options for electricity companies are summarized in Box 1.

Different generating assets come with different types of risk. For example, coal plant is very capital intensive, but the fuel costs (and, therefore, operating costs) are relatively low, and traditionally coal prices have had very low volatility. Coal-fired power stations are therefore more exposed to the financial risks of whether they can repay the capital based on the volume/price of electricity off-take from the project. Renewable technologies such as wind and solar power have zero fuel cost, and hence low operating costs, and, again, the cost is mostly up-front capital. Gas generation, on the other hand, has relatively low capital costs and relatively flexible operations, but such projects are exposed to uncertainty in gas prices which form the largest part

BOX 1: INVESTMENT OPTIONS FOR ELECTRICITY COMPANIES

The investment choices facing existing fossil-fuel fired plant (coal, gas and oil) include:

- Converting coal plant to gas-firing
- Converting oil plant to coal or gas-firing
- Heat rate improvements
- Biomass co-firing
- Early abandonment
- Plant life extension

The investment choices for new build include:

- Combined cycle gas turbines
- Advanced-super-critical coal plant, with or without carbon capture and storage
- Nuclear
- IGCC (integrated gasification combined cycle) for coal, with or without carbon capture and storage
- Renewables (wind, solar, etc.)

of the project's cash flow. A qualitative comparison of the risk characteristics of different types of generating technology is presented in Table 1.

Apart from price risk, electricity companies are faced with a range of other risks (see Table 2). While certain of these risks are specific to the individual investment and are not related to the general market or economic factors (e.g. parts of the construction or operating risks listed in the table), the market, macroeconomic and political risks listed are more likely to be common to all firms, and this type of risk does attract a premium. In very general terms, firms or projects that are exposed to greater levels of risk simply need to provide a higher return on investment in order to attract capital. The level of risk faced by a particular project or for a company as a whole is, therefore, reflected in its cost of capital. In most cases, risk is considered a 'natural' part of the investment decision, with well-established market mechanisms for handling it and no need for government intervention to mitigate the effects.

Government decisions can have important implications for systematic/market risk, such as those

TABLE 1: QUALITATIVE COMPARISON OF THE RISK CHARACTERISTICS OF DIFFERENT GENERATING TECHNOLOGIES

Technology	Unit size	Lead time	Capital cost/kW	Operating cost	Fuel cost	CO ₂ emissions	Regulatory risk
CCGT	Medium	Short	Low	Low	High	Medium	Low
Coal	Large	Long	High	Medium	Medium	High	High
Nuclear	Very large	Long	High	Medium	Low	Nil	High
Hydro	Very large	Long	Very high	Very low	Nil	Nil	High
Wind	Small	Short	High	Very low	Nil	Nil	Medium

Source: International Energy Agency, *Power Generation Investment in Electricity Markets* (Paris: IEA, 2003).

TABLE 2: RISKS FACING ENERGY SECTOR INVESTMENTS

Economic risk	Market risk	<ul style="list-style-type: none"> • Inadequate price and/or demand to cover investment and production costs • Increase in input cost
	Construction risk	<ul style="list-style-type: none"> • Cost overruns • Project completion delays
	Operation risk	<ul style="list-style-type: none"> • Insufficient reserves • Unsatisfactory plant performance • Lack of capacity of operating entities • Cost of environmental degradation
	Macroeconomic risk	<ul style="list-style-type: none"> • Abrupt depreciation or appreciation of exchange rates • Changes in inflation and interest rates
Political risk	Regulatory risk	<ul style="list-style-type: none"> • Changes in price controls and environmental obligations • Cumbersome administrative procedures
	Transfer-of-profit risk	<ul style="list-style-type: none"> • Foreign exchange convertibility • Restrictions on transferring funds
	Expropriation or nationalization risk	<ul style="list-style-type: none"> • Changing title of ownership of the assets
Legal risk	Documentation or contract risk	<ul style="list-style-type: none"> • Terms and validity of contracts, such as purchase/supply, credit facilities, lending agreements and security/collateral agreements
	Jurisdictional risk	<ul style="list-style-type: none"> • Choice of jurisdiction • Enforcement risk • Lack of a dispute-settlement mechanism
Force majeure risk		<ul style="list-style-type: none"> • Natural disaster • Civil unrest • Strikes

Source: International Energy Agency, *World Energy Investment Outlook* (Paris: IEA, 2003).

relating to macro-economic policy, and will be one of the risk factors taken into account in such appraisals. More specific regulatory actions, on the other hand, may affect individual sectors, or even individual firms with less impact on the general market. Regulatory risk can increase as a result of frequent policy or rule changes, which would tend to increase the rate of return required from firms and new investments. In the case of a fully liberalized electricity market, for example, such increases in rates of return might be met through increases in electricity prices to consumers. Political and regulatory uncertainty, while not necessarily creating barriers to investment, can in principle therefore have undesirable outcomes, and where appropriate should be minimized.

What are the sources of uncertainty in climate change policy?

There are many uncertainties in climate policy, such as the political context within which climate policy is developed (e.g. the level of government support for climate policy measures, concerns about energy security or wider competitiveness issues), the policy instruments chosen and the manner in which they are implemented, and perceptions of the credibility of the different actors (e.g. is government seen as committed to climate policy, are companies committed to minimizing greenhouse gas emissions?).⁵ Some of the specific sources of uncertainty faced by electricity utilities include:

- The degree of government support for policy action on climate change, over the short and long term.
- Whether there will be a post-2012 international regime, and whether this will be target- or process-based.
- The specific policy instruments used.
- Differences in implementation between different countries.
- The future price of carbon.
- Allocation rules.
- Subsidy levels for specific technologies.
- The timing of policy responses.
- The response of other companies to specific policy measures.
- The response of other sectors of the economy (i.e. how much burden will be borne by electricity utilities *vis-à-vis* other sectors?).
- The degree of support for climate policy measures among companies and investors.
- The relationship between climate policy goals and other policy goals such as energy security.

Efforts to evaluate in advance the effectiveness of policy measures relating to climate change are

complicated by factors such as uncertainties in technology costs and uncertainties in the responses of the parties affected by the policy measures. The fact that climate policy costs and outcomes are uncertain creates pressure on policy-makers to maintain policy flexibility in order to allow them to respond appropriately to new information. If governments are too fixed in their approach, they risk committing themselves to policy actions that may turn out to be either too stringent or not stringent enough, with limited freedom to adapt or change policy in response to these outcomes. On the other hand, flexible approaches to policy may create an additional cost to companies which will have to make decisions based on a changing policy environment. Ultimately, a balance needs to be achieved between flexibility and certainty. A move towards greater policy clarity may need to take account of the potential for 'nasty surprises', as the flexibility of policy-makers to respond to such events may be constrained. That is, a consequence of moving towards greater policy certainty may be that targets would have to be more stringent than if a fully flexible policy approach were taken.

How do these uncertainties affect electricity companies? The value of waiting

Standard project appraisal uses a discounted cash-flow (DCF) model (comprising elements such as electricity prices, fuel prices, environmental charges, taxes, tax credits and other fixed and variable operating costs) to derive an estimate of the present value of the project's future income compared with the initial capital outlay. The simple investment rule is that if the present value of the cash flow is greater than the initial capital outlay for the project (such that the 'net present value' – NPV – is positive), then the project should go ahead. If it is not, then the project should not go ahead. However, in situations of uncertainty (e.g. a new allocation period in an emissions trading scheme), the standard project appraisal method does not capture the value of optimizing the timing of an investment.

In reality, flexibility in timing can be a critical factor in electricity utilities' responses to risk.⁶ The reason is that investments are more or less irreversible, since the plant generally cannot be resold without losing considerable value. In these situations, a greater project payoff may be obtained by waiting until the uncertainty has been resolved (or reduced) than by investing immediately. Hence, in order to stimulate immediate investment, a project would need to achieve not only a positive NPV, but also an additional return on investment sufficient to exceed the value of waiting caused by the uncertainty. This could mean that the prices (e.g. electricity or carbon

prices) required to stimulate investment in low-carbon technology may be higher than expected based on normal discounted cash-flow analysis. That is, companies faced with a risky irreversible decision will probably wait for new information about what the future might bring. In this case, their response may take a number of different forms, such as delaying investment, delaying plant closure/replacement, giving greater preference to phased investment (e.g. preferring flexible/modular plant over economies of scale) or requiring greater project cash flow for immediate investment (leading to higher prices). From a public policy perspective, if investments in new technologies are deferred as a result of policy uncertainty, this could affect the emissions reductions path of the sector, while higher than expected carbon prices could have wider economic implications both for the power sector and for consumers.

The IEA's research⁷ also indicates that uncertainties a significant time into the future, e.g. 10 years ahead, do not materially add to investment risk, but that the project profitability needed to overcome the investment threshold increases as one gets nearer to the point at which the uncertainty will be resolved. In practice, this means there would be a greater incentive to invest near the beginning of an emissions trading period than near the end. In an emissions trading scheme with regular allocation periods, there would be multiple 'information events', leading to a sawtooth-shaped investment threshold, which in turn could encourage periodic investment cycles as a response.

Some of the results from this analysis are summarized in Box 2.

BOX 2: THE IMPLICATIONS OF UNCERTAINTY

- Uncertainty creates a financial incentive to delay investment in order to gain more information which would allow a more optimal investment choice.
- In situations of uncertainty, in order to justify immediate investment, a project would have to overcome this value of waiting – the gross margin would need to exceed not only the capital cost, but an additional threshold level above that.
- The bigger the possible 'shock' to carbon prices, the greater the value of waiting.
- The less time there is available before the 'shock', the higher the gross margin would have to be to overcome the value of waiting.

Case study: the EU Emissions Trading Scheme

Overview of the EU ETS

The EU ETS, which came into force on 1 January 2005, is a 'cap and trade' regime which sets limits on carbon dioxide emissions from more than 12,000 installations in the EU-25, representing almost half of the EU's greenhouse gas emissions. It currently includes combustion plants, oil refineries, coke ovens, iron and steel plants, and factories making cement, glass, lime, brick, ceramics, and pulp and paper. Other sectors, e.g. aviation, may be brought into the EU ETS at a later stage. Within these sectors, all facilities above a certain size (the specific thresholds are set by national governments) must hold emission certificates to cover their CO₂ emissions. Under the scheme, each member state allocates a certain number of allowances (allowances to emit one tonne of CO₂ equivalent, referred to as European allowances or EUAs) to its industrial installations based on the country's National Allocation Plan (NAP).

In Phase I of the EU ETS (2005–7), EUAs were allocated free to the individual installations and most facilities were granted EUAs sufficient to cover most but not all of their emissions.

Under the scheme, operators have to either reduce their emissions of CO₂ to the amount allocated or buy allowances in the market to cover the shortfall. When companies' allowances exceed their total emissions, they are able to sell them. The financial implications for individual companies depend on the size of their allocations, the method of allocation (in the future, allowances may be auctioned rather than allocated free), their ability to reduce emissions, their ability to pass on the costs of meeting the requirements to their customers, and the price of the allowances.

The price of CO₂ allowances has fluctuated since the scheme was introduced, reaching almost €30 per tonne in June 2005, subsequently settling back to €20–22 at the end of 2005, and then gradually rising to almost €30 per tonne in April 2006. The following month, the price dropped sharply to around €10 per tonne as evidence emerged that most European

'Why do governments need to provide a free allocation at all? The reason is that it is difficult for governments to take action that would be economically rational because of incumbent effects. The New Entrant Reserve is necessary so as not to disincentivize new entrants to the market and to avoid perverse effects.'

countries had over-allocated EUAs for the first phase, although prices subsequently recovered to €15–20 per tonne by the end of May 2006.

The second phase of the EU ETS will run from 2008 to 2012, with National Allocation Plans for these due to be submitted to

the European Commission in mid-2006.⁸ The Phase II National Allocation Plans will specify the allocations to be made to different companies, as well as issues such as how many EUAs will be reserved for new facilities (the New Entrant Reserve) and how much use can be made of the Kyoto

'What should the European level of ambition be given that China and the US are not in the Kyoto Protocol? Europe has markers of ambition and broad targets. That is, the map is not entirely blank. For example, reducing greenhouse gas emissions by 60% is a major UK policy commitment which will remain. This has led to copycat statements by others with, for example, France aiming for a 75% reduction and South Australia and New South Wales having 60% targets.'

flexibility mechanisms (which allow emissions to be offset against emissions reductions elsewhere). In Phase II, at least 90% of the emissions allowances will be distributed free and governments can auction up to 10% of the emissions allowances. These factors will determine the number of CO₂ permits that need to be purchased and the cost of these permits to companies.

Beyond 2012, the situation is uncertain. While the EU ETS will continue, it is not clear what the level of ambition (in terms of emissions reductions) will be, in particular given the lack of clarity regarding the international climate change policy regime beyond this time (the end of the Kyoto commitment period).

Experience to date with Phase I of the EU ETS

In liberalized wholesale power markets, power prices are set by the cost

of the marginal producing unit (which, in most European markets, is either coal or gas). In the

liberalized European energy markets, most or all of the CO₂ price has been internalized in power prices,⁹ with UBS indicating that CO₂ costs now comprise approximately one-third of the currently prevailing power prices.¹⁰ The price of electricity on wholesale markets has, as a consequence, risen significantly.

Significant revenue benefits have accrued to electricity generators as a result of both higher electricity prices and the free allocations. In the short

'We estimate that the free carbon allocation represents somewhere between a third and half of the market capitalization of RWE and E.On.'

term, the primary effect of emissions trading has been to boost the cash flow and profits of European generation companies that

operate in countries in which power markets have been fully liberalized.¹¹ The reason for the windfall profits is that fossil fuel generators have been grandfathered (or allocated) a certain amount of free CO₂ allowances.¹² However, when generators bid their plants into the wholesale market, their pricing strategy is based on the marginal cost of generation. This includes fuel, variable operating and maintenance costs and emission costs. Although a generator may have received emissions allowances, it still prices emissions costs as if this allowance had been purchased from the market. As a result, the introduction of emissions costs raises wholesale power prices regardless of the amount of free allowances the generator is granted. While CO₂-free forms of generation (e.g. nuclear, renewables) do not receive free allowances, they benefit from the higher wholesale electricity prices. For many generators, these higher wholesale prices translate directly to improvements in their bottom lines.¹³ Windfall profits have been controversial, with suggestions in some countries that retail prices should be capped or that full feed-through of costs should not be permitted (i.e. constraining the windfall profits achieved by generators). However, it is relevant to note that, even in Phase II of the EU ETS, there will be significant allocations of free permits to the electricity industries and so the discussion about windfall profits is likely to continue.

Overall, emissions trading has been effective in the sense that it has established a price for pollution and has created a price signal in those countries where it has been factored into power prices. However, despite the introduction of the EU ETS and the creation of a price for CO₂, electricity companies remain unclear regarding their optimum strategy for responding. The fact that CO₂ prices have not achieved the level to encourage fuel-switching,¹⁴ and

the significant uncertainties around the future direction and ambition of climate change policy,¹⁵ are acting as significant barriers to investment. As a consequence there has, as yet, been little abatement or changes in the generating mix (e.g. there has been

'We see windfall profits continuing in Germany, the UK, the Nordic countries and other liberalized markets, and so ETS is generally positive for companies that are long on generation.'

'The rush to build FGD [flue gas desulphurization] is a delaying option to keep coal in generating portfolios.'

virtually no switching from coal to gas) as a result of the introduction of the EU ETS. Climate change policy has, however, had the effect of further encouraging investment in renewables, although these investment decisions have had relatively little to do with emissions trading and have been driven primarily by the subsidy regimes available for investments in renewables.

It should be noted that high gas prices and concerns about energy security create further uncertainty about what to build; while current commodity prices would drive a return to coal for power generation, uncertainty over the future price of gas and the future direction of climate change policy means that companies are unwilling to invest in new generating assets

'In the face of climate policy uncertainty, we would build gas as it represents the "cheapest mistake".'

because of the risk of ending up with stranded assets over the longer term.¹⁶ The result is that electricity

generators appear to be adopting a strategy of keeping all of their options open.¹⁷ If the uncertainty persists, industry probably will build to meet demand, but will tend to build later and may delay any investment that can be delayed. At present, if new generating capacity is required, electricity utilities are most likely to build gas-fired power stations as they represent the cheapest – and hence the lowest-risk – option. Another option is to build plant that is ready or suitable for carbon capture and storage to be retrofitted at a later date. While carbon capture and storage is not commercially viable at current CO₂ prices, the option of retrofitting it is seen as a hedge against future CO₂ prices.¹⁸

The challenges faced by policy-makers

From a climate policy perspective, the risk is that all electricity companies will try to keep their options open for as long as possible through delaying new build and keeping old plant running for longer. This may, in turn, lead to greenhouse gas emissions remaining higher for longer than would otherwise be the case. Delays in investment present another issue as many European countries need sustained investment in new electricity generation capacity, given that continued growth in European electricity demand is generally anticipated (although this could be moderated by action by residential and business

'There is no question of the ETS not carrying on as the barriers at the European level are too great ... but this comfort must be tempered by concerns about the level of ambition.'

customers) and that there are a number of planned closures of plant (e.g. planned closures of Magnox reactors and non-FGD coal and oil in the UK, and planned nuclear decommissioning in Germany).

However, the solution is not as clear cut as simply advocating a higher price for CO₂ or governments providing greater certainty over the future direction of policy in this area. Policy-makers seeking to address the issue of climate change policy uncertainty face a number of difficult challenges. First, driven by concerns about competitiveness, they may be unwilling to accept higher electricity prices as a consequence of emissions trading. Higher wholesale prices will result in lower demand and lower demand growth (and such an outcome is in line with the overall goals of the EU ETS). If sustained over the medium term, this may lead to the relocation of energy-intensive businesses – in particular those in internationally traded sectors – to regions with lower energy prices. Policy-makers may consider this outcome unacceptable, and as a consequence, may seek to reduce the ambition of the EU ETS.

Secondly, the EU ETS will effectively treat emissions reductions within the EU and outside the EU (i.e. through the Clean Development Mechanism) as equivalent. The use of significant quantities of credits from the CDM process may have the effect of exerting significant downward pressure on EUA prices, through allowing companies to offset rather than reduce their emissions. This, in turn, may reduce the incentive for companies to switch to lower CO₂ emitting fuels

'Capping prices may provide political certainty but may damage the case for investment in low-carbon technology.'

or to stimulate investment in lower CO₂ options.

The third challenge is that policy discussions around the international framework for responding to climate change continue to cast a shadow over the efforts of EU policy-makers to develop longer-term responses to climate change. It is not clear whether countries such as the United States, Australia, China, India and Brazil will be willing to sign up to a binding, target-based regime post-2012. This creates a strong

disincentive for EU policy-makers to implement measures that may affect the competitiveness of

'Are the public policy strains imposed by climate change simply too great to bear in a competitiveness-sensitive world?'

EU companies¹⁹ and may result in an international policy hiatus. Some of the participants at the Insight/Chatham House seminar suggested that an international regime to follow the Kyoto Protocol might not be in place until 2017.

One of the consequences of the challenges faced by policy-makers is that it creates the perception that governments are not strongly committed to reducing greenhouse gas emissions and will be unwilling to allow CO₂ prices to rise to a level that will trigger significant abatement or fuel-switching.

Addressing policy uncertainty

Perhaps the most important conclusion is that the longer-term direction of climate change policy is not seen as fixed or certain, leading to companies delaying investment. The various players – companies, institutional investors and even policy-makers – see uncertainties around the future of the emissions trading scheme itself, as well as more general uncertainty around whether CO₂ prices will (or will be allowed to) rise to a sufficiently high level for companies to change their dispatch decisions or their future investment patterns. This raises the prospect that further policy intervention will be required to stimulate further emissions reductions in the electricity sector. However, policy in this area is complicated by the fact that reducing greenhouse gas emissions is not the sole goal of energy policy. Specifically, issues such as energy security and, in certain countries, job creation/protection in areas such as mining, may create tensions that run counter to climate policy goals.

Policy design and communication

It is clear that the uncertainties in climate change policy at both global and EU levels are a significant barrier to encouraging companies to invest in new generating capacity. As general recommendations, policy-makers and governments should:

- Seek to avoid policy disconnects (e.g. avoiding a post-2012 hiatus in the international policy

'How do you justify political leadership? Is it possible to create a common endeavour to overcome the competitiveness concerns?'

framework). While the politics around the specific links between EU ETS and the Kyoto Protocol are sensitive, there

should be a clear EU commitment to ensuring the two remain linked and there should also be a fallback plan in the event of a hiatus in the international process which would be very damaging for momentum in private markets.

- Make it clear that emissions trading is an integral part of the policy framework for responding to climate change.
- Clearly communicate the post-2012 ambition even

if the policy mechanisms remain unclear. This should include the establishment of clear national and international greenhouse gas emission targets for 2020. While targets for 2050 (such as the 60% reduction in greenhouse gas emissions over 1990 levels specified in the UK Energy White Paper²⁰) provide a broad framework, 2020 (i.e. a 10–15-year time horizon) is critical in terms of companies' investment decision-making.

- Establish the credibility of emissions trading and other measures directed at reducing greenhouse gas emissions through explicitly considering competitiveness issues as a key part of the design and implementation of these policy measures. This may be through maximizing participation in international

initiatives or considering intensity-based allocations at the national level (i.e. so that the net impacts are minimized but lower greenhouse gas emitters are rewarded).

'Confidence, not certainty, is the key, and the 2020 timeframe is more important than the 2050 timeframe. There is a need to create visibility on what will trigger reviews of targets and to create a tighter feedback between emissions and policy reviews/updates.'

- Signal their willingness, across the political spectrum and across different government departments, to provide public money to support action on climate change. Without that explicit support, companies will not take government commitments seriously.

Policy-makers also need to recognize that climate change policy uncertainty can alter the investment case for power technology if companies are fully exposed to the price of carbon. In order to incentivize investment in low-carbon technologies, carbon prices may need to be substantially higher than expected under a normal discounted cash-flow analysis. In addition, electricity prices may need to be higher than expected to incentivize investment in traditional (gas and coal) power generation. A specific issue is that the EU ETS, on its own (even if there is a high degree of confidence that it will remain as a key element of the policy framework for responding to climate change), is unlikely to stimulate significant investments in lower CO₂ emitting forms of power generation. The consequence is that policy-makers may need to consider other policy instruments to sit alongside emissions trading. These may include regulations relating to maximum emissions from different types of generating plant, or subsidies (e.g. for carbon capture and storage).²¹

In terms of policy design, extending the allocation period under the EU ETS (e.g. changing from a 5-year to a 10-year trading/allocation period) could significantly reduce the investment thresholds in the early years of the allocation period. However, any periodic allocation could encourage undesirable cyclical investment patterns. A possible solution might be to explore setting allocations on a rolling 10-year basis.

Company and investor actions

Responding to climate change is not simply a matter of 'government dictating and companies acting' but requires that companies and investors play a role in supporting effective and efficient policy in this area.

There are practical actions that can be taken by power companies that allow them to respond to future directions in policy, in particular to policy measures directed at reducing greenhouse gas emissions. Perhaps most importantly, companies need to explicitly consider current and future climate change and energy policy in their investment decisions, and to consider how they can effectively manage the risk of higher future CO₂ prices. This may involve investing in lower greenhouse gas emitting technologies (e.g. preferring renewables over coal or gas) or identifying opportunities to hedge against higher than expected prices. One option that appears particularly promising, in particular in the context of high gas prices, is the ability to retrofit carbon capture and storage to coal plant.²² The presence of carbon capture and storage as a retrofit investment option makes investment in new coal plant less risky (reducing the investment threshold in the face of uncertainty), and could accelerate investment in coal. Investment in the carbon capture and storage plant itself, however, is very sensitive to carbon price, so there is an incentive to wait to gain more information about future prices before retrofitting the technology.

Notwithstanding initiatives such as the Carbon Disclosure Project and the Institutional Investors group on Climate Change, there is a general perception that institutional investors are often unaware of and uninterested in climate change policy and the implications for business. This relative lack of interest, compounded by the primary focus of investors on short-term (generally one year) financial

performance,²³ has been seen by companies as a barrier to taking a strategic long-term approach to climate change and by policy-makers as a signal that institutional investors are not supportive of stronger policy measures on climate change. There are, however, some signs of change: a number of institutional investors are starting to engage explicitly with the companies in which they are invested to encourage them to take a more strategic and longer-term approach to climate change issues.²⁴ In

'In many fund managers, there is a level of complete incomprehension and hostility to climate change policy. Things have changed, but not completely. We [policy-makers] get a more sympathetic response in London compared to other countries.'

addition, in sectors covered by the EU ETS, the financial implications of CO₂ emissions are increasingly seen as a standard part of the investment analysis for these sectors.

More generally, companies and institutional investors have an important role to play in the public policy process. This is not just a matter of contributing to discussions around the details of specific policy instruments. Perhaps more importantly, they need to unequivocally communicate their support for the establishment of a clear, long-term climate change

'All of the government's efforts to create a cheap carbon supply are not valued by the market ... [we] need cheap sources of carbon supply to assuage doubts among the political elite regarding continuing with the process.'

policy framework – including emissions reduction targets – as an essential part of ensuring the delivery of climate policy goals in an economically efficient manner.

It is important that companies and investors clearly indicate that 'economically efficient' does not simply mean 'no cost', that they recognize that effective action on climate change will cost money, which may have some impacts on individual companies, and that they are prepared to accept this as a necessary part of ensuring an effective policy response to climate change.²⁵

Endnotes

¹ <http://www.iigcc.org/>.

² For example, the IIGCC has stated: 'Uncertainty about climate change policy means that institutional investors will tend to discount the risks and opportunities posed by climate change in their investment analysis. A credible long-term policy framework is essential for both investors and companies to plan how to respond to climate change risks and opportunities, in a manner that delivers on the government's longer-term climate policy goals ... Investment decision-making would benefit from early certainty about the implementation of Phase II of the EU ETS as well as the long-term future of the scheme beyond 2012'. IIGCC statement on Phase II of the European Emissions Trading Scheme, 9 January 2006 (London: IIGCC, 2006). See, more generally, R. Sullivan, N. Robins, D. Russell and H. Barnes, 'Investor Collaboration on Climate Change: The Work of the IIGCC', in K. Tang (ed.), *The Finance of Climate Change: A Guide for Governments, Corporations and Investors* (London: Risk Books, 2005), pp. 197–210.

³ In 2002, electricity accounted for 39% of global greenhouse gas emissions: see *Beyond Kyoto: Energy Dynamics and Climate Stabilisation* (Paris: IEA/OECD, 2002), p. 49.

⁴ W. Blyth and M. Yang, *Impact of Climate Change Policy Uncertainty on Power Generation Investments: Interim Report* (Paris: IEA, forthcoming).

⁵ It is important to recognize that there is also scientific uncertainty about the magnitude of climate change and how changes in climate will translate into impacts on human society.

⁶ Blyth and Yang (note 4).

⁷ *Ibid.*

⁸ EU member states were required to notify their National Allocation Plans for 2008–12 to the European Commission by 30 June 2006, although not all member states met this deadline. The Commission needs to approve these plans and has the power to require changes if required. See further http://europa-eu-un.org/articles/en/article_5545_en.htm (last visited 1 August 2006).

⁹ IPA Energy Consulting, *Implications of the EU Emission Trading Scheme for the UK Power Generation Sector. Report to the Department of Trade and Industry. 11 November 2005* (Edinburgh: IPA Energy Consulting, 2005), p. 1.

¹⁰ UBS research indicates that, in Germany, the forward electricity price at 1 January 2006 was €51/MWh, an increase of €20/MWh over the price at 1 January 2005. Of this increase, some €14/MWh could be attributed directly to the effects of purchasing CO₂ permits. P. Lekander and V. Gilles, 'ETS Update: EU Phase II Guidance – Another 20% to Go on the Power Price? 12 January 2006' (London: UBS Investment Research, 2006); see also P. Wirtz and M. Koebernick, 'RWE & E.On. 30 March 2006' (Düsseldorf: WestLB Equity Research, 2006).

¹¹ P. Kernan, A. Zsiga and T. Hsieh, 'Targets and Trading: The EU's Response to Climate Change', in Standard and Poor's, *Climate Change Credit Survey. A Study of Emissions Trading, Nuclear Power, and Renewable Energy* (London: Standard and Poor's, 2005), pp. 3–5; IPA Energy Consulting (note 9), pp. 1–2.

¹² Somewhat perversely, the dirtiest plants (i.e. those with the highest greenhouse gas emissions) have been the greatest beneficiaries, at least to date, as permits have generally been allocated on the basis of historical emissions rather than on the basis of greenhouse gas emission intensities (i.e. greenhouse gas emissions per unit of electricity generated).

¹³ The specific level of windfall profits depends on the country in which the generator is operating. Windfall profits are most likely in the deregulated and competitive markets of the UK, the Nordic countries, Germany and Italy, and less likely in the more regulated domestic markets of France and Spain. In competitive markets, there is a clear connection between the marginal generation cost, the whole market's clearing price and the retail price. An open and competitive market allows rational economic behaviour to translate into price signals, regardless of the actual price and ultimate beneficiary. In a less liberalized market, the retail process may still be regulated, so even if a utility is able to make windfall profits from the wholesale market, it may not be able to pass on the increases to the retail market (Kernan et al. (note 11)).

¹⁴ At the Insight/Chatham House seminar on 22 March 2006, it was suggested that, at current gas and coal prices, a price of €50/tonne of CO₂ would be required to encourage companies to switch their generation from coal to gas.

¹⁵ Long-term forecasts of CO₂ prices are crucial to new build investment decisions. There is limited visibility in CO₂ prices beyond 2008 and none beyond 2012. This lack of visibility means that there is insufficient incentive for companies to invest in CO₂ emission reductions, and so decisions are being delayed where possible.

¹⁶ As noted by a number of participants at the Insight/Chatham House seminar, the key short-term uncertainty is fuel price, while the key long-term uncertainty is climate change policy (specifically, the cost that is attached to CO₂ emissions).

¹⁷ As noted by Standard and Poor's: 'Uncertainties about the future direction of climate change policies are, however, complicating the planning process for the coming cycle of new generation capacity build because it is unclear which generation technologies will be favored. This is creating uncertainties about long-term power prices. Standard and Poor's Rating Services believes this may also be resulting in delays to generation investment decisions and expenditure.' (Kernan et al. (note 11)).

¹⁸ This requires that the proximity of CO₂ disposal sites (e.g. old gas reservoirs) is considered as part of the decision on where to locate new generating assets.

¹⁹ Although the EU may be able to take steps to offset competitive losses through, for example, border tax adjustments.

²⁰ UK Department of Trade and Industry, *Our Energy Future: Creating a Low Carbon Economy* (London: DTI, 2003).

²¹ For example, EDF, in its response to the UK Climate Change Programme, stated: '[W]e consider that the present ETS market is too fragile and fragmented to provide long term price signals or to sustain the necessary long term investment. We think that the EU ETS will function best as a clearing market, enabling operators to balance their portfolios over a 3-5 year time horizon, and allowing the "invisible hand" of the market to seek out low cost opportunities that would not be seen by policymakers ... Accordingly, we are driven to the conclusion that while the EU ETS is an important component in a GHG [greenhouse gas] reduction strategy, at its

present stage of development it cannot by itself drive the long term investments needed to make deep cuts in carbon. We believe that, for now, the EU ETS should stand as one of a package of measures to reduce greenhouse gas emissions'. 'EDF Energy Position on UK Climate Change Programme' (EDF, London, letter to Lisa Stratford, 2 March 2005).

²² The World Business Council for Sustainable Development (WBCSD) has argued that fossil fuels will remain a primary source of energy for several decades and that carbon capture and storage is a crucial bridge to new energy systems. 'Energy and Climate Change: Sharpening the Focus for Action – A Business Perspective' (Geneva: WBCSD, 2005).

²³ For a discussion of the issue of how investor time horizons affect the manner in which investors look at social and environmental issues, see generally R. Sullivan and C. Mackenzie (eds), *Responsible Investment* (Sheffield: Greenleaf, 2006), in particular Chapters 2 and 32.

²⁴ See, further, S. Pfeifer and R. Sullivan, 'Climate Change: Investors Taking Note (Slowly)', *Ethical Corporation*, 26 October 2005. http://www.ethicalcorp.com/content_print.asp?ContentID=3936; S. Pfeifer, 'Institutional Investors and Climate Change: An Analysis of the Integration of Climate Change Risks and Opportunities into Investment Decision-Making', dissertation submitted as part of the MSc in Environmental Change and Management, University of Oxford.

²⁵ It is interesting to note that a number of the major UK electricity utilities have started to make these arguments to government. For example, Centrica has argued that the government should set 'bold' targets for cutting greenhouse gas emissions from 2008 onwards, and RWE has emphasized that companies need greater regulatory certainty and transparency regarding the EU ETS. See, for example, R. Bream and F. Harvey, 'Call for More Certainty on Future Energy Policy', *Financial Times*, 13 April 2006, p. 3.

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