

Powering the future

Enabling the UK energy market to deliver

Throughout the 1990s and early 2000s, the UK's market-led approach to energy served business well. A competitive market remains the best way to meet the UK's needs in the face of future challenges, but government decisions are needed now to improve the fiscal and regulatory framework in which the energy market operates.

Energy is the lifeblood of a modern economy. The UK's market-led approach has helped deliver greater diversity in energy supply, a 40% fall in energy prices and a 15% cut in power sector CO₂ emissions.

But the last 18-24 months have seen past falls in energy prices reversed, and the UK faces a tight winter in terms of the supply of gas (which is needed both as primary fuel and for generating electricity).

With the right approach, these short-term pressures should ease. But they serve as a wake-up call about the longer-term challenges which need to be addressed.

By 2020, one third of UK generating capacity will need to be replaced. The UK could also be importing up to 80% of its gas needs, much of which will come from EU markets which

have yet to liberalise fully. And significant cuts in carbon emissions will be needed if the UK is to play its part in the global response to climate change.

There are risks associated with all of these developments. But risk is a fact of business life, in the field of energy as elsewhere. What business users and producers of energy require is a clear policy framework which enables them to manage risk in the most efficient way possible.

The government's 2003 Energy White Paper sought to set out how these challenges might be addressed, but has been found wanting. A more effective strategy is needed which signals neither a change in fundamental direction nor greater intervention, but which provides greater clarity and substance on key issues.

Recommendations for government

In order that the UK can better meet its long-term energy needs, government must act now to:

- Minimise regulatory risk to encourage investors to take on commercial risks
- Lead a national debate which resolves the future of nuclear by the end of 2006
- Promote a wider range of low carbon technology, and increase energy R&D investment
- Prioritise EU energy market liberalisation in EU political negotiations
- Work with industry to assess in more detail the risks to security of supply
- Improve emergency planning
- Make the economy more resilient to price rises by increasing the efficiency of energy use
- Streamline the process for determining planning applications for energy infrastructure projects
- Promote a stronger engineering skills base for the energy industry.

‘Government must seize the opportunity afforded by greater awareness of energy issues to take the important steps needed now to enable the UK to meet the longer-term challenges.’

Introduction

Energy is the lifeblood of a modern economy. It provides the power needed for industrial processes; delivers light, heat and power to our offices and shops; and enables the movement of goods and people. The availability of secure, reliable and environmentally sustainable energy supplies, at prices that are internationally competitive over the long term, is critically important to business (see Exhibit 1, page 3).

In the UK, these needs are met through market forces operating within both an international context and a policy framework determined by government.

In the case of gas and electricity, UK market liberalisation and sustained capital investment in energy production from the late 1980s to the early 2000s has helped to transform the efficiency of the energy sector, which has delivered:

- Secure and increasingly diverse energy supplies, including a move away from the predominant use of coal in electricity generation (from 65% in 1990 to 30% today), a corresponding rise in gas-fired generation, and maintenance of a healthy margin of generating capacity over demand
- A 40% fall in energy prices, with the introduction of retail competition, as well as new gas and electricity trading arrangements
- A fall in power sector CO₂ emissions of about 15% in the 1990s, with improved generation efficiency and the ‘dash for gas’.

Against such a background, energy was not a major concern for business for a decade or more. But now a number of short and longer-term challenges have emerged which business needs to see addressed.

Past falls in energy prices have recently been reversed

The last 18-24 months have seen business users exposed to rising gas and electricity prices, with volatility and price spikes a feature of the forward gas market in particular. This situation has come about as four factors have combined at the same time:

- The end of just over a decade of UK energy self-sufficiency as gas production from the UK Continental Shelf (UKCS) matures and declines, together with market sentiment about tightness in the gas market
- A doubling of the global oil price from \$30 to \$60/barrel

- A near doubling of international coal prices (from approximately \$33 per tonne in April 2003 to \$54.50 in October 2005)
- The introduction of significant environmental measures, such as the EU Emissions Trading Scheme and the Large Combustion Plant Directive, in addition to the Renewables Obligation and the Climate Change Levy.

The upward pressure on prices has in turn coincided with a period when the UK gas market has been especially vulnerable to price spikes due to:

- The impact of inefficiencies in EU energy markets (some of which have not liberalised as quickly as in the UK) being felt in the UK
- Delays in the provision of some new gas import infrastructure resulting from the time needed to secure approvals through the UK land use planning system.

EXHIBIT: 1

Energy consumption

In the UK, industry and commerce account for about one-quarter of the final consumption of primary energy (for example, in the form of gas and electricity). Transport makes up another third (mainly in the form of petroleum products), with the domestic sector responsible for 28% of final consumption.

Five sectors – including chemicals, manufacturing and food – are responsible for more than 50% of industrial energy use. Industry and commerce account for 47% of final consumer demand for electricity, and industry makes up 13% of the demand for natural gas.

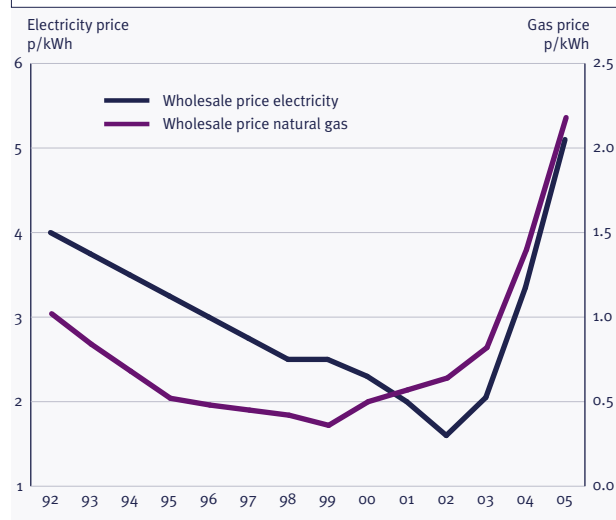
Energy costs for many businesses (particularly in the service sector) may only represent a small proportion of operating costs, but increases in energy costs can have an impact on balance sheets. This is particularly true for large and small energy intensive companies: energy purchases account for approximately 25% of production costs for steel and paper, and 40% for aluminium smelting and some chemical processes.

The UK's energy industry is also an important part of the economy in its own right: final consumers spent £75bn on energy products in 2004.

Source: DTI

EXHIBIT: 2

Wholesale spot energy prices (based on annual averages)



This combination of circumstances has created heightened uncertainty, particularly in UK forward gas markets. The result has been not only rising gas prices for consumers, but also high electricity prices, as more than one third of UK electricity comes from gas-fired power stations (see Exhibit 2).

Ofgem has estimated that over the winter of 2004/05 alone, UK business and domestic consumers paid £5.2bn more for their gas and electricity than they had the previous year. A recent survey of the manufacturing sector by the Engineering Employers Federation found that 93% of firms experienced an increase in their energy prices over the past year. Large industrial users have been hardest hit by price increases – with average unit price increases for gas and electricity of 42% over the last year, compared with 38% for medium companies and 20-25% for small companies.

Official data shows that energy prices are rising across Europe. The DTI's most recent statistics (September 2005) show UK industrial electricity and gas spot prices remain at/or below the EU median and continue to outperform spot prices in Germany and France. But UK industry – in particular very large users of gas and electricity – are losing their recent price advantage. For example, UK industrial electricity prices for extra-large users (consuming 420 GWh/annum) have slipped three rankings to sixth lowest over the past year and industrial gas prices for large consumers (consuming 116.3 GWh/annum) have slipped four rankings to fifth position.

DTI statistics also focus on spot rather than forward prices, yet the latter are particularly important for the most energy intensive users – such as steel, cement, glass, chemicals, aluminium and paper. Since 2004, a gap has opened up between forward energy prices in the UK and those elsewhere.

EXHIBIT: 3***How secure are energy supplies this winter (2005/06)?***

The National Grid's Winter Outlook Report for 2005/2006 confirms that gas and electricity supplies to households and smaller businesses are expected to be maintained under any credible cold winter scenarios, but in an average winter (such as last year), some gas generators (CCGT) will need to be interrupted or could choose to sell contracted gas back to the market in response to high prices – a normal function of the market.

In a colder than average winter, both CCGT and large industrial energy users will need to respond. This is likely to be a combination of firms opting to sell back gas to the market at high prices and firms with interruptible contracts being interrupted

The scale of the response required by industry will depend on the severity of the winter and the CCGT response:

- In a '1 in 10 cold' winter (temperatures averaging -2°C for a week and around 0°C for two months), National Grid estimates that a demand-side response of 2.2 billion cubic meters (bcm) of gas would be required, with a

potential contribution of 1.3 bcm from the CCGT sector and the remainder from large industrial and commercial users: this means, on average, 30% of the non-power daily metered market (ie energy-intensive sector) would need to respond over 40 days, either by restricting production or by switching to alternative backup fuels.

- In a '1 in 50 cold' winter (temperatures averaging -2°C over a month and +2°C over a further two months), a demand-side response of 3.7 bcm of gas would be needed, with a potential contribution of 1.8 bcm from the CCGT sector and the remainder from large industrial and commercial users: this means that, on average, half of the non-power daily metered market sector will need to respond over 50 days – a more significant response than in a 1-in-10 cold winter, with many more companies required to restrict production and for longer.

In the event of a very cold winter, large industrial users of energy who are currently purchasing gas in the spot market – owing to very high forward prices – might, in the face of high energy prices, have little option but to restrict or shut down operations.

Source: CBI, based on National Grid's Winter Outlook Report

For example, UK forward power prices rose from €33.6/MWh in September 2004 to €58.2/MWh in October 2005. Over the same period, German prices rose from €32/MWh to €48/MWh – nearly 20% cheaper than in the UK.

Gas supply will be tight this winter

Alongside the alarm over rapid price rises, there has been concern over the short-term security of our energy supplies. National Grid's Winter Outlook Report for 2005/2006 confirms that, with UK Continental Shelf production declining from its peak and the length of time needed to get planning permission to bring new gas import infrastructure on line, the balance between gas demand and supply this winter will be tight. And while there remains a healthy margin of around 21% electricity generation capacity over peak winter demand, the importance of gas to generation has a bearing on the provision of electricity in UK.

Exhibit 3 shows that in the event of a very cold winter, a significant gas demand-side response will be required. This is a normal part of the market, but the scale of response needed could be unprecedented. Large industrial energy users in particular are concerned that, in such a scenario, they may see

their operations significantly disrupted in the absence of any alternative arrangements for meeting their energy needs.

Short-term pressures should ease, though government can do more to help

The UK Offshore Operators Association estimate that the industry is already committed to invest £10bn in new gas import and storage infrastructure (see Annex, page 15). This will reduce the tightness in the gas market, even in cold winters, and make price spikes less likely. A fall in oil prices would also moderate EU gas prices, and – indirectly – UK electricity prices.

Government cannot change the fundamental gas market tightness for this winter, but it can minimise the potential effects by ensuring that:

- Businesses are factually aware of possible scenarios resulting from the tight winter supply-demand balance, and that there is good communication between DTI, suppliers and large users. In particular, government should work with private sector players and regulators to ensure that UK gas markets are working as smoothly as possible and that

the chance of price spikes based on unfounded market sentiment is minimised (Ofgem estimated that around half of the forward gas price spike in autumn 2003 was caused by market perceptions of risk, particularly associated with winter supply-demand balance)

- The Environment Agency, Scottish Environment Protection Agency and the Northern Ireland Environment and Heritage Service progress decisions now on any short-term emergency derogations from environmental limits, allowing generators to put coal- and oil-fired generation ahead of gas-fired generation, thus taking some of the pressure off gas supplies
- There is targeted relief from the climate change levy (CCL) for energy intensive industries, with full exemption for those covered by the EU Emissions Trading Scheme (EU ETS).

But major challenges still lie ahead

While the combination of circumstances which has caused recent problems should ease, it is a wake-up call. Many of the underlying challenges will remain over the longer term – eg rising total demand, managing the move from being an exporter to a major importer of gas, ageing UK power plants and climate change. The risks associated with five key issues threaten to undermine the ability of UK policymakers and energy companies to respond effectively to these challenges:

- **Scale and timing of replacement capacity for ageing UK power stations.** Approximately one third of UK generating capacity will need to be replaced by 2020. While market participants are prepared to invest, lack of policy clarity raises questions as to whether investment will come at the right time and at the most efficient cost. Oxera estimates required investment in generation capacity by 2010 to be between £2.1bn and £8.8bn, depending on generation mix
- **Degree of reliance on gas imports.** By 2020, the UK could be importing 75-80% of its gas needs (as a primary fuel for industry and households, and as a fuel source for power stations). For the next ten years, imports from Norwegian gas fields will be a key source of supply, but over time more is due to come from EU markets largely supplied by Russian gas. Future political or financial instability affecting the supply of gas from Russia is a possibility that cannot be ruled out, but the UK will also have access to ship-borne imports of Liquefied Natural Gas (LNG) which can be sourced from a wider range of countries (see Exhibit 4, page 6)

- **Possibility of a domestic system incident.** Terrorism, emergency planning failures or technical failures could all cause an interruption of electricity or gas supply. As an essential service, the energy supply sector has a key role to play in ensuring ongoing delivery, or restoration, of supplies in case of emergency – and must be adequately involved to avoid the escalation of a pre-emergency state into a crisis
- **Pace of EU market liberalisation.** Several EU directives require member states to liberalise their energy markets, although implementation has been slow due to political resistance in some countries. If progress stalls, and the EU market is permanently less liberalised than the UK market – at the same time as the UK starts to rely increasingly on gas imports – this could potentially lead to permanently higher UK gas and electricity prices than on the Continent
- **Implications of moving towards a low-carbon future.** The CBI supports the UK government's target for a 60% reduction of carbon emissions by 2050, but the measures needed to meet this goal must be cost-effective and intelligently designed. An economic evaluation of the response to climate change is needed, and to this end, the Stern review is welcomed. The right approach should be built on greater energy efficiency and take up of low-carbon power generation, which might potentially embrace a wide range of technologies, including nuclear, renewables, combined heat and power, clean coal, and carbon capture and storage. A key risk is that in trying to provide a stimulus to new technologies, the government ends up effectively picking winners which turn out not to be commercially viable without significant subsidy.

The Energy White Paper was an inadequate response

The government's 2003 Energy White Paper sought to set out how some of the challenges identified above might be addressed. But on a number of fronts, it has been found wanting:

- **Energy price rises:** These have significantly exceeded the white paper projections for overall increases in unit electricity and gas prices of 10-25% and 15-30% by 2020. The doubling of the rate of energy efficiency required to offset these price rises is yet to materialise
- **Security of energy supply:** The white paper did not analyse in depth the implications of a change in generation mix – such as the shifts towards large volumes of imported gas, or the need to retain some flexible coal plant to provide reserve alongside an increasing proportion of largely

EXHIBIT: 4***How secure are gas imports?***

In any likely scenario for replacing the generating capacity due to come out of service over the next 15 years, there will remain a strong demand for gas as a primary fuel – and as production from the North Sea declines, significant quantities of gas imports will be required.

In 2020, total UK annual gas demand is estimated to be 140bcm. Assuming a stable fiscal climate, approximately 25% of this annual demand is projected to be met by continuing North Sea production. This will leave 105bcm of imports annually.

How can this import demand be met securely?

- **Existing pipelines** (Bacton-Zeebrugge and Vesterled) currently provide a total of 19.5bcm capacity
- **New pipelines** (under construction or planned) will add a further 59bcm by 2012. This will include an upgrade to the Bacton-Zeebrugge interconnector, and new pipelines from the Norwegian and Dutch fields
- **New and planned LNG terminals** will add a further 49.5bcm of capacity by around 2012.

The physical infrastructure to import the gas needed into the UK should therefore be in place. But this leaves the question of how secure the gas supplies sourced through these pipelines and terminals are.

The Dutch and Norwegian imports can be regarded as secure supplies, and LNG terminals allow access to the growing Atlantic basin LNG market.

The Bacton-Zeebrugge interconnector accesses the continental gas market. On present expectations this is likely to be supplied mostly by Russian gas exports by 2020. The historical reliability of Russian exports is good, and Russia has an economic incentive to provide reliable exports, but interruption due to political events cannot be completely ruled out in the future.

Research by Prof John Gittus, based on Lloyds Insurance country risk premia, estimates that a complete interruption of Russian gas exports might happen once every 41 years. Such a risk may be seen as too high – if such an interruption would threaten UK supply security. The question is whether the risk can be reduced to lower, more acceptable levels.

There are two ways this might be done:

- **Increased storage.** UK gas storage capacity is planned to increase to 8.9bcm, sufficient for around 2 months supply – enough to cope with a short-term interruption
- **Diversifying the sources of gas imports to spread risk.** Seventy percent of proved global gas reserves lie within currently economic transportation distance of the UK and there are increasing options for greater flexibility:
 - Non-Russian gas exports to EU: Imports from nearby gas exporters such as Algeria could become a part of the EU gas market if the needed pipelines were built (through Spain in the case of Algeria). This might offset any future interruption in Russian supplies
 - Surplus LNG capacity: If a longer-term interruption of Bacton-Zeebrugge supplies did occur, a surplus of LNG terminal capacity would be a way to make up any shortfall. Given the range of countries exporting LNG, the chance of a large-scale interruption of both LNG imports and Russian gas exports at the same time falls to once every 348 years, using the same Lloyds risk premia calculations.

While these options would allow the potential risks of gas import interruptions to be minimised, as a gas importer the UK will be more directly exposed to international gas price movements. However, where these price movements are truly international, their impact on UK international competitiveness will be limited.

Source: DTI (2003) and Gittus, J, *Keeping the lights burning* (2004)

intermittent renewable generation. The white paper also avoided a decision on whether nuclear power had a longer-term future

- **Climate change:** The white paper relied on very substantial energy efficiency gains and a major expansion of renewables, while the government's energy efficiency action plan was more a statement of intentions than a plan for implementation.

A more effective government strategy is urgently needed

Government must seize the opportunity afforded by greater awareness of energy issues to take the important steps needed now to enable the UK to meet the longer-term challenges. A more effective strategy does not mean abandoning the direction signalled by the white paper. This would only introduce new uncertainties, undermining the value of commercial decisions taken in the last two years and increasing the degree of perceived political risk (and hence cost of future private sector investment) in UK energy markets.

Equally, a more effective strategy does not mean abandoning a market-based approach to meeting the UK's energy needs. A well-functioning market remains essential to ensuring responsiveness to changing circumstances and to ensuring that prices – even where they might rise justifiably (eg to facilitate investment) – can be set as efficiently as possible.

The aim should be to enable market players to manage better the sort of risks identified above, by removing the obstacles which currently prevent them from doing so. The key to success lies in government establishing greater clarity on certain aspects of policy through early decisions on key issues, and developing greater substance in other important parts of the white paper agenda.

This should be seen not as an excuse for greater intervention in general by government, but as a better way of exercising responsibilities where government already has a legitimate role – eg in foreign and fiscal policy, use of target-based economic instruments and granting planning approval for energy infrastructure. The final section of this brief identifies what needs to be done, with particular focus on action to:

- 1 Minimise regulatory risk to encourage investors to take on commercial risks
- 2 Lead a national debate which resolves the future of nuclear by the end of 2006
- 3 Promote a wider range of low-carbon technology and increased energy R&D investment
- 4 Prioritise EU energy market liberalisation in EU political negotiations
- 5 Work with industry to assess in more detail the risks to security of supply
- 6 Improve emergency planning to minimise the impact of short-term interruptions
- 7 Make the economy more resilient to price rises by increasing the efficiency of energy use
- 8 Streamline the process for determining planning applications for energy infrastructure projects
- 9 Promote a stronger engineering skills base for the energy industry.

Recommendations to government

1 Minimise regulatory risk to encourage investors to take on commercial risks. The £20bn of total new energy investment needed by 2010 must come from energy businesses and investors looking to make commercial returns. A significant deterrent to such investment is the lack of clarity surrounding parts of the policy framework and perceived risk of inappropriate government intervention in response to short-term political pressures.

Ensure a stable, supportive North Sea fiscal regime

While UK Continental Shelf (UKCS) production has peaked, there are still substantial opportunities to develop new gas production. To maximise the potential of the UKCS, the government must avoid precipitous changes to the UKCS fiscal regime. Changes made in 2001 resulted in a significant drop-off in new entrants in 2002 and corresponding fall off in exploration and appraisal (E&A) activity in 2002 and 2003 (Exhibit 5, page 8).

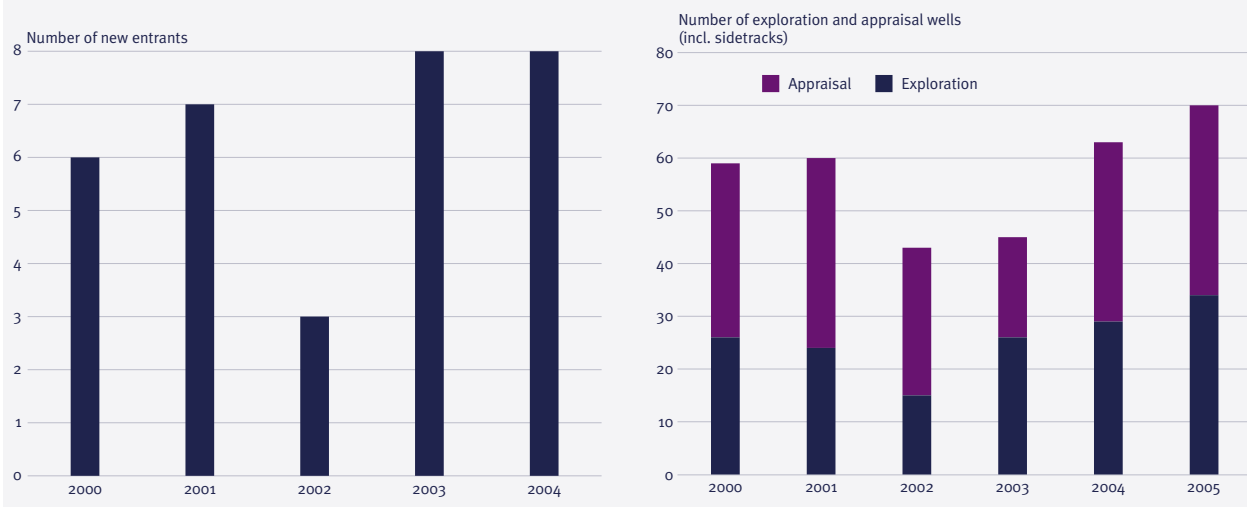
With a more stable environment since then, there was a 40% increase in E&A activity in 2004. If the current rate of investment can be sustained, the UK could still be producing 25% of its gas needs from the UKCS in 2020. But if investment levels fall in 2005-10, the consequent degradation in infrastructure could prevent the UKCS contributing more than 10% of UK needs in 2020.

Clarify key environmental policy measures

The EU Emissions Trading Scheme (EU ETS) and the Large Combustion Plants Directive (LCPD) will influence investment in the power generation sector. But greater clarity is required in both the short and longer terms to encourage power companies to start investments in much needed, cleaner plant to replace retiring coal plant.

The 3-5 year horizon of EU ETS phases is not sufficiently long term to take into account the investment cycles in the power generation sector. Decisions are needed now on the generation sector's Phase 2 allowances to allow a market for CO₂ and power post-2007 to open. More clarity is also required for the EU ETS post-2012 on issues such as:

- Longer-term targets which will affect allocations in the period beyond current phases of the EU ETS
- The extent to which the EU ETS will be the core policy for achieving government's climate change objectives
- The balance between trading and non-trading sectors, taking account of the coverage of the EU ETS
- Rules or principles that will underpin future allocations and the treatment of 'early action'.

EXHIBIT: 5***New entrants to UKCS, and UKCS exploration and appraisal activity***

Source: UKOIA Economic Report 2005

A decision on how the LCPD will be implemented in the UK has taken 15 months to reach. In September 2005, the Commission finally accepted the UK's hybrid approach, with emission reductions being met through either emission limit values or a national emissions reduction plan. But the Commission continues to challenge the government's definition of combustion as a 'plant boiler' rather than as a 'stack'. This has serious implications for security of supply as it could result in unnecessarily rapid closure of coal plant. It is important that the government provides clarity now about how the LCPD will be implemented so that generators can plan necessary investment.

Keep the Renewables Obligation (RO) stable for the short to medium term, but review in the longer term

The introduction of the EU ETS, which should develop a common price for carbon, raises questions as to what happens to existing policy measures such as the RO.

The RO has worked reasonably well in bringing forward renewable investment, bringing on stream 1501 Megawatts (MW) of new renewables capacity in the first three years of its operation. Significant changes now would undermine the market and commercial investments made, and in the short to medium term, stability of the RO is important to minimise risk to business investment.

Longer term, there could be value in reform into a tool covering a wider range of low carbon technologies. But changes to the rules (including withdrawal of support for specific technologies) should be made over a time-scale that realistically reflects development lead times, protects business invest-

ments called for by government, and recognises the impact on the government's target to reduce carbon emissions.

2

Lead a national debate to resolve the future of nuclear by 2006.

The scheduled closure of nuclear plant raises serious issues. Some commentators question the merits of nuclear generation on grounds of safety and cost, but nuclear does offer a scalable carbon-free form of power generation – suggesting significant opportunities in moving towards our climate change goals and sustaining security of supply. However, whether nuclear has a future alongside other energy sources beyond the lifetime of the current fleet was deferred in the Energy White Paper. This is unsatisfactory for all market players. Government, with the energy industry and the country at large, must establish whether nuclear has a future – and if not, what instead will meet our energy needs in a sustainable manner.

We welcome recent reports that the government intends to carry out a review of energy policy next year. The ten-year lead-time for nuclear build and the ongoing lack of clarity for potential energy market investors means that dialogue on the future of nuclear relative to other sources of energy supply needs to be started as soon as possible and a conclusion reached by the end of 2006.

In the interim, government should take the practical steps required to start the debate and to keep the nuclear option open should it conclude in its favour, such as:

- **Agree a strategy on disposal of nuclear waste:** The Nuclear Decommissioning Authority recently published a draft strategy on decommissioning and clean up, but urgent progress is required on the Committee on Radioactive Waste Management's work to inform government decisions on long-term options for managing the UK's radioactive waste legacy. Decisions on this issue are needed whether or not nuclear is used to generate electricity beyond the lifetime of the existing power stations. Even if a new fleet of nuclear power stations continued to generate 25% of the UK's electricity for a further 60 years, our nuclear waste stock would only increase by 10%
- **Clarify the economics of new nuclear build:** A study should be undertaken to explore the relative costs of different generation sources, and we welcome the recent inquiry by the House of Commons Environmental Audit Committee in this regard. The adoption of standard, internationally recognised designs with minimal customisation means that nuclear plants are now being built to time and cost. But without vigilance over (or modification to) the planning, regulatory and construction regimes there is risk of repeating the acknowledged poor performance of UK nuclear in the 1960s and 1970s
- **Retain a skilled and experienced workforce:** The recommendations from the DTT's 2002 *Nuclear Skills* study must be acted on, in particular the encouragement for engineering sciences, technology, and mathematics in schools, the introduction and promotion of modern apprenticeships and the promotion of relevant specialist subjects in universities
- **Ensure that planning, regulatory and other approvals consents are achievable on realistic timelines:** Lead times for securing planning approval and licensing arrangements should be shortened – eg by pre-licensing leading candidate reactor system designs, ensuring adequate (and appropriately skilled) staffing of licensing agencies, and limiting the scope of public planning enquiries to site-specific issues
- **Provide positive leadership to increase public awareness and ensure public ownership of the outcome of the debate.**

3 Encourage development of a wider range of low-carbon technologies. Fossil fuels will remain a significant part of our immediate energy future. But business also recognises the need for investment in lower-carbon technologies – whether nuclear, carbon capture and storage, combined heat and power (CHP), microgeneration, hydrogen or renewables (including wind, geothermal, wave and tidal). Such investment enhances the energy sector's contribution to meeting UK climate change objectives, with the added benefit of increasing diversity of electricity supply. To unleash innovation in these technologies, two changes are needed.

EXHIBIT: 6

Fossil fuels will remain a significant part of our of immediate energy future

The International Energy Agency's 2004 World Energy Outlook showed that 80% of total world primary energy demand was met by fossil fuels. Demand in 2030 is expected to increase by 60%, with fossil fuels continuing to meet more than 80% of demand (ie 22% coal, 35% oil and 25% natural gas). The implication of this trend is for energy-related CO₂ to increase by 62% from 23.6Gt per year to 38.2Gt per year.

In the UK, total final energy consumption is due to increase by 13% between 2000 and 2020, with electricity generation increasing by about 10%. By 2020, the UK is still projected to be very dependent on fossil fuels for the bulk of its electricity generation, with about 75% of electricity coming from fossil fuels – predominantly gas, but also some coal.

Within this context, carbon abatement technologies could have a significant role to play in achieving large reductions in CO₂ emissions, while prolonging the life

of coal generation (thus increasing diversity of energy supply) as we move toward a low CO₂ energy system.

The DTT's recently published Carbon Abatement Technologies (CAT) strategy identifies a range of different CATs, including higher efficiency conversion processes, fuel switching to lower carbon alternatives (including co-firing) and carbon capture and storage (CCS). The strategy aims to encourage the development and commercialisation of CATs through a range of different actions, including:

- Support for R&D of CATs
- Support for the demonstration of CO₂ capture ready plant and of CO₂ storage
- Examination of possible measures to encourage the initial commercial deployment of CCS technologies in the UK.

Ensure more equitable treatment across different low-carbon technologies

In contrast to renewables, the low-carbon nature of nuclear generation, for example, has not been explicitly recognised in the current market framework. There should be equitable treatment of all low-carbon technologies under emissions trading and the climate change levy.

In addition, government must reaffirm its commitment to combined heat and power (CHP), providing clear delivery plans for achieving its 10GWe 2010 CHP target – including proper recognition for the carbon saving delivered through the use of CHP, a long-term guarantee of CHP exemption from the climate change levy, and revisiting the treatment of CHP under the EU ETS to remove perverse incentives.

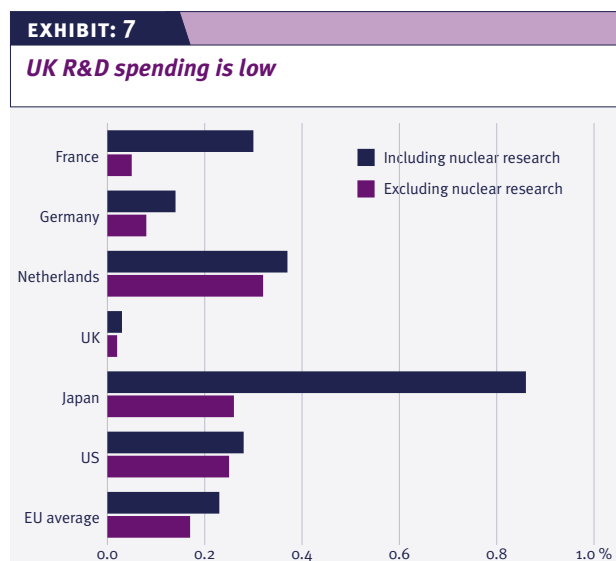
Promote greater R&D in new energy technologies

UK government energy research fell by 80% between 1990 and 2001. The government recognised this decline, with the DTI's current energy R&D budget for 2002-2008 (£62-£84m per annum) roughly double the 2001 level.

While we welcome this additional funding commitment, public energy R&D spend in the UK is still only 0.02% of GDP – less than a tenth of the proportion spent in the US (see Exhibit 7). Of the EU-15, only Portugal scores worse than the UK.

UK investment in energy research and technology funding should be increased towards the levels of the EU average in GDP terms in the first instance and then towards the levels of the US.

Funding for energy R&D initiatives, and for the development of specific energy sources or fuels, by government is highly fragmented (see Exhibit 8).



Government has made moves to bring together public and private funders of energy research to enhance collaboration – with the UK Energy Research Centre being set up in February 2003 to integrate research on the sustainable energy economy and the announcement in the March 2005 Budget statement of the formation of an Energy Research Partnership.

Better funding and clearer institutional structures will help. But government must use them effectively to set broad multi-year priorities for UK energy research. It should also seek, as a user of energy and funder of research, to catalyse further private sector investment in energy R&D.

4 **Prioritise EU energy market liberalisation in EU negotiations.** The continued reluctance of some member states to open up their energy markets is detrimental to UK consumers. Interaction between the liberalised UK market and the less-liberalised Continental energy market distorts UK energy prices, and as we become more reliant on imported gas supplies – transported through pipelines from Russia and Ukraine – a liberalised EU energy market will become increasingly important to ensure security of energy supply.

The EU has a clear time-table for full liberalisation of energy markets by 2007, but the track record of some member states to date is poor, with the Commission having recently referred five countries (Estonia, Ireland, Greece, Spain and Luxembourg) to the European Court of Justice for not having transposed the 2003 energy directives.

Although transposition of the EU directives is a necessary pre-requisite for the Commission to start monitoring the degree of integration and market opening, it does not guarantee actual opening up of the markets.

The Commission's fourth Benchmarking Report, published in January 2005, showed a lack of integration between national gas markets, resulting in disappointing progress on the opening up of German and Austrian markets in particular. In addition, although many of the necessary measures to implement competition have been taken, or are in process, significant obstacles to competition in European electricity markets remain (see Exhibit 9).

The UK government has been a champion of market liberalisation, but needs to redouble its efforts both in its EU Presidency and beyond by:

- Increasing the political significance of this policy area and placing it firmly at the centre of the Lisbon agenda and other EU debates

EXHIBIT: 8**Government funding of R&D activity is fragmented**

The DTI Technology Strategy (November 2004) has £370m funding from 2005 to 2008 in order to drive forward the government's innovation agenda. Part of this funding will promote the further liberalisation of international energy markets and the use of sustainable energy to secure a diverse range of future energy supplies. It includes a collaborative R&D funding element of £8m for new and renewable energy sources (April 2004) and £7m for energy research (November 2004).

Since 2001, EPSRC, ESRC, NERC and BBSRC have funded the **Sustainable Power Generation and Supply programme (SUPERGEN)** at a level of £25m over five years.

Towards a Sustainable Energy Economy (TSEC) has an overall budget of £28m for 2003-06 to achieve a lead in research on sustainable energy so that the UK may access a secure, diverse and competitive energy supply, while meeting the challenge of global warming. TSEC is funded by EPSRC, ESRC and NERC.

The **Carbon Trust's** annual funding currently amounts to over £60m per year, largely in the form of grants from government. A key element of the Trust's activities includes supporting the development of innovative low-carbon technologies, accounting for nearly £12m of total programme expenditure in 2005.

Development of renewable energy will receive £60m in each year up to 2007-08 to deliver the projects identified under the **Renewables Innovation Review**.

Source: Council for Science & Technology

EXHIBIT: 9**Summary of main obstacles to competition in EU electricity markets**

No major issues	Sweden, Finland, Denmark, Norway, UK
Unbundling/regulation	Luxembourg, Austria, Germany
Market structure or lack of integration	France, Belgium, Greece, Ireland, Spain, Netherlands, Italy, Czech Republic, Slovakia, Lithuania, Latvia, Slovenia
Long-term power purchasing arrangements/regulated end-user prices	Portugal, Estonia, Poland, Hungary

Source: Commission 4th Benchmarking Report (2005)

- Ensuring that the European Commission report on implementation of the energy markets directives (due for December 2005) underlines that failure to implement in full the requirements of the 2003 directives will not be acceptable
- Encouraging DG Competition to act speedily on any evidence of anti-competitive behaviour.

5 Assess in more detail the risks to security of supply. There is currently no reliable holistic analysis of the challenges facing security of supply. The NERA analysis underpinning the white paper made little attempt clearly to identify the probability of interruptions to energy supply, the damage costs of such interruptions, and the costs of any remedial measures.

Government should work with industry to review the range and scale of possible interruption events, the physical impacts (in terms of loss of supply to different classes of consumer) and their financial implications, and it should evaluate the case for establishing standards for security of supply, storage, management of resources, network strengthening, diversity criteria and any policy measures which might be needed as a consequence.

In addition, the Joint Energy Security of Supply working group (JESS) should be explicitly charged with monitoring the risks to gas imports in terms of diversity of import source and adequacy of storage and import capacity. If such risks develop into unacceptable threats to security of supply, it is important that measures are in place to tackle the problem.

EXHIBIT: 10***What do we want from EU energy market liberalisation?***

Full liberalisation of EU energy markets could benefit UK businesses in various ways. By removing barriers to both investment in and access to transmission, distribution and storage systems, in principle it should:

- Provide customers with a wider range of suppliers and service offerings to choose from
- Encourage greater liquidity in gas and electricity wholesale markets, leading to more efficient price setting.

To realise these benefits, government should focus in particular on achieving the following in the short-medium term:

- Fair and equal access for all companies to the monopoly energy infrastructure across Europe – allowing easier access to pipelines for companies who either wish to compete with the incumbent suppliers or who need to transport gas to where it is needed most
- Access for producers, suppliers and large energy consumers to liquid wholesale energy markets
- Transparency of information – subject to commercial confidentiality, information available to regulated network operators should be made available to all market participants at the same time (for example, on overall network supply and demand forecasts, gas and power flows, amount of infrastructure booked and capacity available, and system congestion).

Source: CBI

6 **Improve emergency planning.** Environmental limits on the use of alternative fuels (such as oil) could restrict the demand response of energy-intensive consumers to system stress. In the generation sector, environmental limits – which are designed to limit certain types of emissions – could reduce the ability of generating companies to use coal and oil-fired plant ahead of gas-fired plant in the event of a shortage of gas supply. To minimise the effects of potential energy supply security emergencies, government should:

- Work with bodies, such as the Environment Agency, to introduce pre-determined derogations from environmental limits (eg a short-duration increase in emissions such as NO_x and dust). These would be automatically triggered at times of system stress, resulting in supply failure that has direct health and safety implications for vulnerable individuals and/or a potentially large economic impact
- Engage the energy supply industry – and key large energy users – more effectively in the development of plans for emergency preparedness.

7 **Make the economy more resilient to price rises by increasing efficiency of energy use.** There are likely to be periods in future where UK energy prices may well be higher and more volatile than they were during the 1990s. Greater energy efficiency would reduce the exposure of all users to any such changes and would contribute towards security of supply. Many businesses have already made significant progress in this regard, but there is still scope for further cost-effective improvements across some business sectors

– as there is among domestic consumers, where there are significant potential gains. The Carbon Trust estimates that approximately 60% of cost-effective abatement opportunity in the business sector exists outside of the traditional energy-intensive industry sectors. Government needs to develop a range of energy efficiency measures targeted at different types of energy user. Key elements should include actions to:

- Improve and streamline existing measures aimed at industry
- Provide particular assistance to SMEs (industrial or otherwise)
- Improve incentives for energy efficiency in commercial and household sectors
- Enhance public sector market leadership.

Improve and streamline existing measures aimed at industry

The proliferation of policy measures seeking to address industrial emissions, means that many industrial firms find themselves affected by a number of policy measures at once – Integrated Pollution Prevention and Control regulations (IPPC), CCL and Climate Change Agreements (CCA), and the EU ETS. This has led to double regulation, environmental anomalies and to additional paperwork where verification procedures differ.

To reduce overlaps, emissions trading should become over time the main route for delivery of carbon reductions, with industry covered by the scheme exempt from the CCL.

But the relatively high monitoring, reporting and verification costs under the EU ETS means that it is not suitable for all industry sectors. Consequently, government should simplify the CCA eligibility criteria and procedures, to allow any company which wishes to enter into an agreement to access the CCL discount.

Provide particular assistance to SMEs

Recent surveys by RWE npower and E.ON UK found that lack of expertise and resource in the SME market (even in those SME sectors that are relatively energy intensive) was a major barrier to improving energy efficiency.

Lack of awareness of which schemes are available is a major barrier to the uptake of existing advice and incentives, with only half of SMEs interviewed in a 2004 E.ON survey having heard of existing government measures to promote energy efficiency. Better publicising of government schemes and initiatives will help ensure SMEs are aware of the options and support open to them.

In addition, the Carbon Trust should make available more grant finance for their existing SME interest-free loan scheme, which is currently over-subscribed.

Improve incentives for energy efficiency in commercial and household sectors

With the exception of the domestic aviation sector, the commercial sector has the fastest growing energy use in the UK. The framework set by government through planning and building regulations has already helped to raise the bar on energy efficiency, but more can be done to encourage changes in occupier behaviour and accelerate energy efficiency improvements by investor and developer companies, including:

- Better enforcement of and compliance with existing building regulations in both the commercial and household sector: with 5% of commercial buildings responsible for 80% of commercial energy use, a focused enforcement regime (including random pressure testing) could be implemented at relatively low cost
- Widen the scope of list of processes/products eligible for enhanced capital allowances (ECAs) to include the building fabric, lighting and energy services

- Introduce fiscal incentives to encourage energy efficiency. A reduced VAT rate on selected energy efficient products and services could improve uptake. Currently energy conservation – particularly DIY – is not. In addition, there is a disparity between VAT on new build at zero and on refurbishments at full rate. Measures to improve a building therefore attract VAT at 17.5%, acting as a barrier to improving existing stock. In the domestic sector, a reduction in stamp duty for energy efficient homes could also drive the market
- Enhanced awareness campaigns making clear the scope for personal action by consumers to improve energy efficiency.

The public sector can also play a role

The public sector has an important role to play, through its own practices, in helping to shape the market for energy efficient buildings and encourage the development of energy services companies. For government policy to occupy only property in the top quartile of energy ratings is symbolically important, and an even more significant impact can be made through procurement policies on energy products and energy services. This should be addressed through the government's current taskforce on sustainable procurement.

8

Streamline the process for determining planning applications for energy infrastructure projects.

Major energy infrastructure items are strategic national assets, and must be treated as such by the planning system. 'Lumpy' investments, with just-in-time delivery of major energy infrastructure, are a feature of a market-led approach to energy provision. While this might be economically efficient, it also means that it is crucial that there are no barriers to delivery.

Investment in gas storage facilities and wind farms, as well as key onshore infrastructure, has been delayed by planning problems. For example, a lengthy public inquiry delayed the development of the Cheshire gas storage facility by two years. In addition, protracted pre-planning consultation has delayed necessary transmission – eg the Beaulieu to Denny replacement transmission line, necessary to connect new renewable generation capacity in the north of Scotland, has been subject to 18 months of public consultation before a planning application has been submitted.

Any future nuclear build could face even more difficulty, unless measures are put in place to prevent this, since it faces

additional hurdles such as securing a nuclear site licence from the Nuclear Installations Inspectorate.

To ensure the delivery of strategic energy infrastructure, government should:

- Establish the need for additional infrastructure capacity at the national level to remove challenges ‘on principle’ – for example, at the local public enquiry
- Ensure that there is sufficient resource, and technical expertise, in the planning system (eg inspectors) to deal with the flow of planning applications likely to arise for projects to replace old plant.

9 Promote a stronger engineering skills base for the energy industry. The engineering capacity necessary to ensure ongoing maintenance and delivery of new generation and network infrastructure, and to assess the technical and regulatory requirements of the energy system, is in short supply. A professional engineer requires ten years of training and with very small numbers of graduates coming through each year, the industry is facing a severe skills shortage.

Government should work with the industry to undertake a survey of the skills needs in this area – including the key strengths and weaknesses affecting delivery of solutions related both to energy supply and conservation. In addition, government should provide support for industry initiatives, such as the Power Academy – established by the UK’s electricity network companies and three leading engineering universities to provide an engineering scholarship fund for students – to combat the shortfall of power engineers in the UK.

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Glossary of terms

bcm	billion cubic meters
CAT	Carbon Abatement Technologies
CCA	Climate Change Agreement
CCGT	Combined Cycle Gas Turbine
CCL	Climate Change Levy
CCS	Carbon Capture and Storage
CHP	Combined Heat and Power
ECA	Enhanced Capital Allowance
EU ETS	EU Emissions Trading Scheme
GWh	Gigawatt hour
IPPC	Integrated Pollution Prevention and Control
JESS	Joint Energy Security of Supply working group
LCPD	Large Combustion Plants Directive
LNG	Liquefied Natural Gas
MW	Megawatts
RO	Renewables Obligation
UKCS	United Kingdom Continental Shelf

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ISBN 0 85201 618 2 Price £10

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Annex

EXHIBIT: 11		
<i>Gas import and storage infrastructure under construction/planned</i>		
New import projects	Target dates	Capacity (bcm/year)
Langeled pipeline (from Ormen Lange and other Norwegian fields)	2006 & 2007	23
BBL pipeline (from Balgzand in the Netherlands to Bacton)	2006-07	10-15
Bacton interconnector upgrading	Phase 1 2005-06	8
	Phase 2 2008	8
Isle of Grain LNG import and storage facility	Phase 1 2005	4
	Phase 2 2008	10
South Hook LNG terminal at Milford Haven	Phase 1 2007	10
	Phase 2 2008	10
Dragon LNG terminal at Milford Haven	Phase 1 2007	6
	Phase 2 2010-12	6
Statfjord – FLAGS	2007	5
Canvey Island LNG	2009-10	5.4
Total		71-110.4
Gas storage infrastructure	Target dates	Capacity (bcm)
(Under construction)		
Aldbrough storage	2007	0.42
Humbly Grove storage	2005	0.28
Byley storage, Cheshire	2008	0.17
(Planning/pre-planning phase)		
Welton storage facility	2008	0.44
Preesall storage facility	2009/10	1.7
Albury Phase 1	2007/08	0.16
Bletchingly storage facility	2009	0.9
Albury phase 2	2010	0.72
Saltfleeby gas storage	2008	0.6
Caythorpe gas storage	2007	0.21
Total		5.6

Source: DTI/UKOIA

