REBUILDING SECURITY
CONSERVATIVE ENERGY
POLICY FOR AN
UNCERTAIN WORLD

Policy Green Paper
No.15

VOTE FOR
CHANGE

Conservatives
Foreword by David Cameron

British energy policy is out of date. It was designed almost thirty years ago for a world in which Britain had an excess of generating capacity; in which we enjoyed the benefits of growing North Sea oil and gas production; and in which neither local pollution nor climate change were the concerns they are today.

The most important question facing policy makers at that time was how to exploit resources and sweat assets at the least possible cost to consumers. The energy policy that is still with us now was the answer to that question – and, for a while, it appeared to be the right answer.

However, power plants get old, fossil fuel reserves dwindle away and pollution builds up to critical proportions. The benign conditions that applied a generation ago, do not apply today – and have not done so for at least a decade. The fundamental assumptions that underpin British energy policy have fundamentally changed.

The policy framework should have changed too, but, in thirteen years of Labour government, ministers have consistently ducked the task of reform. As a result, golden opportunities to update Britain’s ageing energy systems have been missed and the major investments needed to ensure the security and sustainability of our energy supplies have yet to be made. Deferring decisions until time is running out is more costly than acting in a planned, timely manner. Thus, in addition to the burden of financial debt, Labour has left behind an ‘energy debt’ – one which consumers will have to pay for in the decades to come.

This green paper sets out a Conservative programme for the long-overdue reform of British energy policy – together with the actions we will take to mobilise the investment required to enact those reforms and our strategy for minimising the cost to consumers.

A year ago, Greg Clark and I launched The Low Carbon Economy – our vision for a clean energy future and Britain’s stake in the high tech industries of the 21st century. Rebuilding Security is a companion paper, focusing on the reliability and resilience of our energy systems over the next decade and beyond.

Together, the papers show that security and sustainability are two sides of the same coin. Unless we diversify our energy sources, unless we upgrade our energy networks, unless we pay as much attention to energy efficiency as we do to energy production, then our energy supplies will be neither secure nor sustainable.

In the wake of unprecedented volatility in global energy prices and the failure of the world’s nations to achieve a meaningful deal on climate change, it is time to embed the long-term objectives of energy policy within a hard-headed, practical approach that meets pressing needs without ever forgetting our responsibility to future generations.
1. Strategic summary

Britain has had no clear energy policy for thirteen years. A succession of eleven energy ministers¹ and eight Secretaries of State² with responsibility for energy have failed to take timely action to prepare us for the coming decade in which, by 2020:

- We will become increasingly reliant on imports as North Sea oil and gas production goes into steep decline
- One third of our current electricity generating capacity will close³
- We are required to raise our proportion of renewably-sourced energy to 15%⁴ from 2.5% today⁵
- We have committed to reduce our greenhouse gas emissions by at least 34% from 1990 levels⁶
- Between £100 and £200 billion of new investment in our energy infrastructure is needed according to Ofgem⁷

All of these challenges came with ample warning. Yet because they were comprehensively ignored we face an energy crisis in which:

- The Government said, last summer, that it expected electricity power cuts for the first time since the 1970s⁸
- The energy regulator has warned that Britain is now vulnerable to disruptions to gas and other energy supplies⁹
- Consumers face higher costs because vital investments were not made in a planned, timely and, therefore, more cost-effective way

This strategy paper, on which we will consult during the weeks ahead, offers a way out of the looming energy crunch. It sets out the urgent actions that we propose to take to keep the lights on and meet Britain’s energy needs over the next decade. However, merely catching up with the present is not enough. This is also a plan for putting Britain back on track towards the development of the low carbon economy on which our prosperity ultimately depends.

This strategy paper lays out our agenda for reforming British energy policy. It describes how a Conservative Government will keep faith with the market, but will, where necessary, intervene decisively to safeguard our energy security.

In this strategy paper we provide a six part overview of the energy crisis we face and our response to it:

- How Britain consumes energy today and how we obtain it
- Why our energy security over the next decade is in jeopardy
- What will happen if we don’t take urgent action
- The objectives of a Conservative energy policy and the principles by which we will act to secure them
- The twelve key actions we will take to rebuild Britain’s energy security
- How these actions can minimise the cost consumers will pay for energy, compared with what they would pay if current policies were to persist
The energy we depend on

All of our lives and livelihoods depend on energy. In 2008, Britain’s total demand for energy was equivalent to one and a half billion barrels of oil.\textsuperscript{10}

Of this total, 36\% was used to produce electricity. Another 38\% was used to produce heat – for heating homes and other buildings, for hot water and cooking and for various industrial processes.\textsuperscript{11} The remaining 26\% was used in the form of transport fuels.\textsuperscript{12}

Where does this energy come from? In the case of transport fuels, almost all of it is oil, with a tiny contribution from biofuels. The production of heat is dominated by gas, which has a near three-quarters share; oil fuels most of the rest.\textsuperscript{13}
For fuels used to generate electricity, gas and coal are dominant – with respective shares of 39% and 37%. Nuclear (14%) and renewable power (6%) supply most of the rest.\textsuperscript{14,15}

\begin{figure}
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\includegraphics[width=\textwidth]{chart2.png}
\caption{Energy mix – electricity}
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\begin{figure}
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\includegraphics[width=\textwidth]{chart2d.png}
\caption{Overall energy mix}
\end{figure}

Source: DECC, Digest of UK energy statistics 2009

Taken together, these energy inputs mean that Britain is still hugely dependent on fossil fuels.

Despite the advent of nuclear and renewables, the biggest change in our mix over the last forty years has been in the balance \textit{between} the different fossil fuels – i.e. gas has displaced a great deal of coal and oil from the generation of heat and power.

For all of Labour’s promises on climate change, Britain became more, not less, dependent on fossil fuels in the decade to 2008 – with the combined share of coal, oil and gas in the energy mix rising from 88% to 91%.\textsuperscript{16}

\begin{figure}
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\includegraphics[width=\textwidth]{chart3.png}
\caption{Changes in the energy mix}
\end{figure}

Source: DECC, Digest of UK energy statistics 2009
The threat to our energy security

Britain’s energy security faces two major threats that, if we do nothing in response, can only increase in severity: firstly, our growing dependence on potentially unreliable fossil fuel imports; and, secondly, the retirement of much of our electricity generating capacity.

Growing import dependency

Though fossil fuels still dominate our consumption of energy, our production of them is now in decline. UK coal production peaked as far back as 1952, oil in 1999 and gas in 2000.

After years of self-sufficiency, we are becoming ever more dependent on fossil fuel imports.
The depletion of our North Sea reserves means that this trend is set to continue. For instance, National Grid’s base case prediction is that imports will account for 70% of UK gas demand by 2018 – up from 1% in 2000, and 40% in 2008.\textsuperscript{20}

![Chart 6: Imported proportion of UK gas supplies](image)

Source: National Grid, Gas transportation ten year statement 2009

**The decline of our generating capacity**

Much of our fossil fuel and nuclear generating capacity is approaching the end of its working life. In the case of coal-fired and oil-fired power stations the process of retirement has been hastened by the pollution control standards required by the EU Large Combustion Plant Directive. By 2020, at least a third of our coal-fired capacity and two-thirds of our oil-fired capacity – along with nearly three-quarters of our nuclear capacity – is due to have closed down.\textsuperscript{21}

![Chart 7: 2008 generating capacity in 2020](image)

Source: BERR, 2007 Energy white paper
The Government itself admits that a total of 22.5 gigawatts of generating capacity will be gone by 2020. By 2025, there will be further coal plant closures and just one of our existing nuclear power stations will still be working. Independent forecasts emphasise just how much of our existing generating capacity will be in need of replacement in the years ahead.

The energy crunch does not end with the depletion of our fossil fuel reserves or the decrepitude of our power stations. Other key parts of our national energy infrastructure – including transmission networks and storage facilities – are also in urgent need of new investment.

Much of our national grid was conceived and constructed during the 1950s and 1960s. It was built at a time when consumers played a passive role, and electricity generation came from predictable, large-scale sources. It is, to a large extent, unsuited to a 21st century in which supplies come from a wider range of sources – from microgeneration to intermittent wind – and in which consumers need to be able to adjust their consumption much more flexibly.

Source: Parsons Brinckerhoff, Powering the future, 2009
The consequences of inaction

UK energy policy was designed for an age of abundant fossil fuel supplies and excess generating capacity. These benign conditions no longer apply – as has been clear for at least a decade.

Yet, despite the transformation of the basic assumptions underpinning British energy policy, the policy framework remains fundamentally unchanged. A policy designed for an age of plenty is still with us in an age of insecurity. Sometimes governments are overtaken by events, but in respect of energy policy, this is a Government that saw what was coming and did nothing about it.

If we continue in our failure to adapt to the new circumstances of the 21st century, then the consequences for Britain’s energy security will be dire.

Consequences for our fossil fuel supplies

Unless we diversify our energy mix, we will become ever more reliant on fossil fuel imports just as we enter a new era of global energy insecurity in which production becomes concentrated in unstable and sometimes hostile parts of the world, and struggles to meet growing demand driven by China and the other emerging industrial giants.

This would leave our economy increasingly exposed to volatile and rising fossil fuel prices, with consequences for inflation, jobs and inward investment.

This is before we take into account the risk of outright interruptions to vital energy supplies – as we have already seen in the case of gas supplies from Russia to other European countries.

We have also already seen the dramatic impact of higher fossil fuel prices on our energy bills which have doubled in the space of five years.
Consequences for electricity supplies

On the issue of our ageing power stations, doing nothing will mean losing our ability to supply enough electricity at times of peak demand, especially when other factors – like unusually cold weather – put the grid under additional strain. That is why we need a secure ‘capacity margin’ – which is the amount of power generation that can be called upon over and above the forecast level of peak demand. If we allow that capacity margin to be eaten away, then the result will be a higher level of what the Government calls ‘expected energy unserved’ and what the rest of us call power cuts. In July of last year the Government published a forecast showing that ‘expected energy unserved’ would rise from almost nothing today to almost three gigawatt hours by 2017. This is equivalent to a 15 minute power cut for every household in Greater Manchester, every winter night for a month. The Government responded to mounting alarm about this prospect by revising the shortfall down as a result of the recession. But as the Chief Executive of Ofgem said in February 2010:

“In 2017 we get to the really sweaty-palm moment in terms of possible shortages. It is the scale of collapse in energy supply from 2013 up until 2017 that is profound and worrying. Companies say that there are X-gigawatts of new power stations in the pipeline, but you can’t rely on this until the earth is cut.”

(Alistair Buchanan quoted in Daily Telegraph, ‘UK energy policy – has it run out of steam’, 4 February 2010).
To keep the lights on we must replace our disappearing generating capacity. However, Government inaction over the previous decade has narrowed our options for the coming decade:

- The earliest possible date by which new nuclear capacity, which will only replace closing capacity, can come on line is now 2018 – assuming everything goes to plan²⁸
- On carbon capture and storage (CCS), the competition for the demonstration programme has been delayed for so long that we can’t count on the widespread deployment of clean coal plant before 2020
- Renewable generation, even though ready for investment this decade, will not fill the capacity gap on its own

All of this means that we will need more gas-fired generation, further increasing our dependency on gas imports.

**Can we rely on gas?**

Gas is in many ways an attractive ‘bridge fuel’ to the future:

- Its combustion produces the lowest level of local pollutants and carbon emissions of any fossil fuel
- Gas-fired generating plant is not only less polluting than other fossil fuel plant, but also much less expensive to build and much more efficient in operation
- At present, gas is typically the most practical and affordable source of heat for homes, other buildings and industry

Furthermore, the growth of the liquefied natural gas (LNG) industry and breakthroughs in the extraction of previously inaccessible gas from shale formations mean that the global supply outlook is brighter than it was a few years ago.²⁹ Nevertheless, simply building new gas plant is not enough to guarantee our energy security. We need reliable energy supplies not just most of the time, but all of the time.

We must be able to cope with extreme events such as the freezing weather of January 2010 when unusually low temperatures coincided with disruption to pipeline supplies from Norway. This placed the UK supply system under strain, with the result that scores of major industrial users on interruptible contracts were cut off. By late February, the level of gas left in storage was equal to four days of average gas demand.³⁰ There was no danger of interruptions to residential customers, but, if it had not been for the impact of the recession on gas demand levels, or if the still unresolved Russia-Ukraine gas dispute had flared up again, then the supply situation this winter would have been much more dangerous.

For resilience in the face of such events – and to make the most of gas supply opportunities in normal circumstances – we need a level of storage capacity, long-term contracts and demand response that tracks our increasing reliance on imports.

The current Government insists that gas import levels will not rise at all in the coming decade.³¹ This flies in the face of expert evidence. For instance, National Grid, which operates the UK gas transmission system, is forecasting that, in the ten years from 2008, imports will rise from 40% of UK demand to 70%;³² and all four of Ofgem’s energy scenarios also show the level of imports increasing, to varying degrees, from current levels.³³

Britain currently has some of the lowest levels of gas storage and drawdown capacity in Europe.³⁴ The low drawdown capacity is especially important: even if we have gas in storage, we cannot extract it quickly enough to meet even half of our daily requirement. Therefore, on this – and many other – vital components of our energy security, we start from a weak position.
There is nothing inevitable about the decline of Britain’s energy security. Our energy crisis is real, but there are things we can do about it. The problem is that in thirteen years in power, the current government hasn’t done anything about it. On one crucial issue after another their record is one of inaction:

- **Generating capacity** – Sufficient generating capacity can be built to reliably meet peak demand if electricity markets provide the right incentives. In 2001, Labour removed the old long-term capacity incentives, but failed to put new ones in their place. It should have been obvious that this would lead to profits for those plants that get used, but little incentive to build rarely-used standby plants. And indeed, Government figures show the margin of capacity over demand falling away to just seven per cent by 2017 – which according to the Government’s own analysis is not enough to prevent a rising level of power cuts.

- **Gas** – By 2018, at least 70% of our gas needs will be imported (see above). Other countries that rely on imports make sure that they have enough storage capacity or long-term contracts to secure supplies. Yet the UK has, at best, just 16 days of gas storage capacity, compared with 99 in Germany and 122 in France. This has a negative effect on energy security. In late February 2010, the volume of gas in storage in the UK was equal to just four days of average gas demand.

- **Nuclear power** – Although our nuclear power stations are reaching the end of their working lives, they are doing so on a known schedule that gave us enough time to build replacement capacity. However, the Government repeatedly delayed the decision on nuclear new build until the 2007 Energy White Paper, when the go-ahead was finally given. It took another two years to propose vital revisions to the planning guidance – and then only in draft form for consultation. That means that with the exception of Sizewell B every single existing nuclear power station will have shut down, or be about to shut down, before their replacements can come online.

- **Renewables** – Britain has some of the best renewable energy resources in Europe, which could allow us to offset the depletion of our fossil fuel resources and diversify away from total dependency on gas-fired generation. But while countries like Germany have, since the mid-nineties, more than doubled the share of their energy that comes from renewables, the UK remains third from bottom of the table of EU renewable energy use, above only Luxembourg and Malta. Britain is bound by an EU commitment to source 15 per cent of our energy from renewable sources by 2020: currently we are at just 2.5 per cent.

- **Coal** – Carbon capture and storage (CCS) technology would allow us to keep coal as a vital part of a diverse and sustainable generating mix – and give Britain a stake in an important emerging global industry. But while other countries are moving ahead on this crucial technology, Britain is falling behind. Gordon Brown first announced plans to support CCS in his 2006 Budget speech. Four years later, the Government has still not authorised a single CCS plant under its competition.
• **Oil** – Our transport systems are almost wholly dependent on oil, but we can reduce our exposure through efficiency measures and by accelerating the development of electric vehicles and biofuels. Despite warnings from bodies such as the International Energy Agency and the UK Energy Research Centre that global oil production will peak within the next two decades,\(^{46}\) the Government still has no plans to prepare Britain for such an event\(^{47}\) – not even after the wake up call of 2008 when oil prices soared to $147 per barrel.

• **Energy efficiency** – Making our use of energy in homes and businesses more efficient is by far the cheapest way of reducing our dependency on imported fossil fuels, cutting our energy bills and abating our carbon emissions.\(^{48}\) Yet, instead of taking full advantage, Britain is lagging behind other countries again, with some of the least energy efficient homes in Europe.\(^{49}\) According to the Committee on Climate Change, the main Government policy on energy efficiency is ineffective and needs to be replaced.\(^{50}\)

• **Decentralised energy** – It’s the same story when it comes to local heat and power generation technologies like heat pumps and combined heat and power (CHP). It took the Government twelve years to agree to a tariff agreement that would allow householders, businesses and communities to sell energy back to the utilities – a system which still isn’t in place for biomass and heat producing technologies,\(^ {51}\) leaving this much needed new industry in limbo.

• **The smart grid** – Smart grid technology has the potential to cut energy bills, enable the electrification of transport and banish black-outs to the history books. Yet, once again, Britain is falling behind our competitors – many of which are already running large-scale demonstrations or have even begun nationwide deployment.\(^ {52}\) In Britain, the Government has announced plans to deploy smart meters by the end of 2020, a timescale of over a decade that is widely regarded as unambitious.\(^ {53}\)
Objectives and principles

Multiple threats to the security, sustainability and affordability of our energy supplies should leave no doubt that British energy policy is in crisis. The countless ducked decisions and wasted opportunities of the last thirteen years should leave equally little doubt as to the cause of this crisis. Rather than lurch from short-term fix to short-term fix, the time has come for fundamental change: a complete restructuring of British energy policy.

We believe that any successful process of reform needs to start with clear policy objectives and clear principles that are consistently applied to the achievement of those objectives.

Objectives

The objectives of Conservative energy policy are as follows:

- **Security** – Britain must be able to count on, today and in the future, reliable supplies of energy for electricity, heating and transport.
- **Sustainability** – Our wellbeing depends on a healthy environment. In extracting, generating and using energy we must safeguard the ecosystems we rely on.
- **Economy** – Energy is a necessity of daily life for consumers and business. We want it to be abundant and affordable.
- **Opportunity** – Historically, energy has been a sector of British industrial and commercial strength. We want to develop and deploy those strengths to create new wealth for the country.

Principles

Given the importance of the long-term investment decisions at stake, it is vital that a coherent set of principles is rigorously applied to all Government actions on energy. Conservative energy policy will therefore:

- **Be market-based** – The renewal of Britain’s infrastructure is a major investment challenge, one in which commercial investors will play the main role. We need an environment that is attractive to investors – both existing participants in the market and new entrants.

  Some might argue that the public policy goals that depend on the energy sector – including environmental objectives, security of supply and the protection of consumer interests – require an industry that is heavily directed by government. This would mean a regulated utility model in which investment plans are approved and rates of return specified by the state – a model that is practised in many parts of the world and which is broadly the drift of current Government policy.

  We believe that the need for risk-taking, innovation and investment in the years ahead make the energy industry one which can benefit from more, not less, enterprise. Our approach is therefore market-based rather than government-based.

- **Provide prudential oversight** – Public policy has an important role to play within a market-based approach. The strong national interest in the four objectives we set out above must be secured. It is accepted – not least after the events of recent years – that public exposure to the banking system requires prudential reserves to be maintained and systemic risk to be monitored and reduced. Similarly, in energy policy, a prudential approach to energy security, environmental impact and consumer protection is the foundation of – and not an alternative to – a functioning market.
• **Offer strategic clarity** – The energy policy vacuum over the past twelve years has been filled with multiple, disparate bodies promoting multiple, disparate policies. We believe that all UK energy policy should be set clearly and comprehensively by ministers accountable to Parliament and the electorate. Other bodies – minimal in number – should be clearly focused on executing, rather than making, public policy.

• **Favour diversity** – Sir Winston Churchill believed that energy security lay in “*diversity and diversity alone.*” A Conservative Government would secure our energy supplies by promoting diversity in the technologies that supply our heat, power and transportation needs; and in the sources and supply chains for the energy on which those technologies depend.

• **Seek value for money** – For businesses and for households, energy is a major component of their costs. Government should seek to minimise the costs of energy to consumers. Trading arrangements should expose, not distort, the full costs of each form of energy. And while subsidy will sometimes be required in the initial stages of immature technologies that can contribute to the objectives of energy policy, they will never be permanent: energy markets must be sustainable without public subvention.

• **Practise environmental stewardship** – We believe that each generation has an inalienable responsibility to bequeath a healthy natural environment to the next. Therefore, the environmental costs and benefits of energy use must be consistently and transparently priced into the decision-making of both the state and the market. Allowing sectional interests to force the costs of pollution on others is not only wrong and economically inefficient, it is also – given the scale of the energy industry – a threat to global security.

• **Take an internationalist approach** – A significant contribution to Britain’s energy security will come from stronger international relationships. Conservatives will take a much more active role in developing and deepening long-term agreements with important overseas suppliers; facilitate greater interconnection between the UK grid and neighbouring networks; recognise the importance of European and global co-operation in achieving shared objectives; and promote free trade in the financing, development and operation of energy projects.

• **Promote competition** – Ultimately, the objectives of energy policy are not achieved by government, but by the investors, innovators and entrepreneurs that have always driven technological progress. Government policy must therefore strive to tear down barriers to market entry – whether within the regulatory framework, incentive structures, access to physical infrastructure or our trading relationships with the rest of the world.
Actions to rebuild security

A Conservative Government intends to take twelve key actions to put our energy system back on its feet. We will:

1. Ensure that Britain has a clear, consistent and stable energy policy
2. Establish a capacity guarantee in the electricity market
3. Establish a security guarantee for gas supply
4. Reform the Climate Change Levy to provide a floor price for carbon
5. Operate a streamlined planning process for large infrastructure investments
6. Facilitate nuclear power
7. Accelerate the demonstration of carbon capture and storage
8. Promote renewable energy
9. Revolutionise supply and demand by building an energy internet
10. Reduce demand by offering every household a Green Deal on energy efficiency
11. Electrify transport to reduce dependence on oil
12. Create a Green Investment Bank

Action 1: Ensure that Britain has a clear, consistent and stable energy policy

Britain needs an energy policy that is clear, consistent and stable. Without one, investors will charge a premium to compensate for the risk of policy uncertainty. This increases the cost of capital and, in turn, the costs borne by consumers.

To have a clear, consistent and stable energy policy requires:

- Firstly, that ministers – not quangos, advisory bodies or regulators – should be unambiguously responsible for determining policy.
- Secondly, that policy decisions should be reliably and swiftly implemented. Public bodies beyond ministers and their departmental staff must have a clear and unwavering focus on the execution of policy. The number of such bodies should be reduced – eliminating duplication and cutting costs.

It is on this basis that we propose the following changes:

- The Department of Energy and Climate Change must be made clearly responsible for determining energy policy, working with the National Security Council, the Ministry of Defence and the Foreign Office in respect of international security issues; it will be streamlined to focus on supporting the decision-making role of ministers
- We intend to exchange the displacement activity of inconclusive reviews and consultations for an Annual Energy Statement to Parliament that sets a clear strategic direction for energy policy – and therefore energy investment – in the years ahead
- We will reform Ofgem to focus it on executing, not developing, policy. We propose to transfer Ofgem’s competition policy and consumer protection powers to the Office of Fair Trading, with Ofgem serving in the role of economic regulator and delivery agency for government policy. Most non-departmental public bodies would be incorporated within this principal delivery agency for government policy
- This will allow the abolition of other delivery bodies – with the quango count reduced still further by consolidating the myriad existing sources of public investment in energy within the Green Investment Bank (see action 12)
Action 2: Establish a capacity guarantee in the electricity market

We believe that developers should be incentivised to build enough generating capacity to provide a reliable electricity supply at times of peak demand.

The new electricity trading arrangements brought in by Labour in 2001 and 2005 abolished the old capacity payment system, focusing incentives on ‘just in time’ electricity supply. In theory, short-term incentives for supply should be enough to secure the necessary long-term investment in capacity. But, in practice, this approach can fall short – for three reasons in particular:

- Firstly, as in the banking system, individual operators’ attitude to risk (in this case, the risk of running short of power) may not be the same as that of consumers and the Government
- Secondly, revenues from occasional and unpredictable price spikes may prove too much of a lottery to finance new investment in back-up capacity or ‘peaking’ plant that is only in demand at times of tight supply
- Thirdly, the ongoing loss of old power stations and the increasing penetration of variable forms of generation, such as wind power, mean that price spikes could get even spikier – provoking public pressure for regulatory curbs on prices which could make back-up capacity uneconomic

We believe there is a better way to provide the necessary incentives. In financial markets, the central bank specifies the prudential reserves that other banks in the system have to maintain. In electricity markets, we believe the energy regulator should have a similar role – undertaking the following functions:

- Monitoring and assessing the adequacy of capacity margins
- Where capacity margins are inadequate, to have the power to secure the new capacity required – either directly, as a requirement on suppliers to have sufficient contracted capacity available, or by arranging auctions to fill any missing capacity
- Enabling open competition and transparent cost comparison between alternative ways of meeting capacity requirements – not only peaking plant, but also demand-side response measures, interconnection with neighbouring grids and storage technologies

In effect, the regulator would be able to make long-term commitments on behalf of consumers to provide certainty of payment for new capacity. This would allow investments to be planned in advance (thereby assuring security of supply) and at low risk (thereby cutting costs).

Action 3: Establish a security guarantee on gas supply

The prudential approach that we will apply to the security of electricity supplies will also be applied to the security of gas supplies. Indeed the two markets are linked given that gas is set to play an even more important role in the generation of electricity than it does now.

With North Sea production in decline we must maximise the diversity, reliability and affordability of the increased levels of imported gas we will need in the years ahead. In place of the pipeline politics that have dominated energy policy on the Continent, we believe that Britain must take full advantage of a worldwide market that has been transformed by the globalising impact of the LNG industry and the shale gas revolution. In this new market, Britain is well positioned to play an active role at the hub of a diverse, international trading network, instead of a passive role at the end of a long Eurasian supply chain.

Therefore, a Conservative government will:

- Work with UK importers to secure new and reliable long-term supply contracts with both LNG and pipeline gas producers in Europe and around the world
- Maintain and deepen our existing trading relationships with other North Sea producers, especially Norway
- Press for the liberalisation of gas and other energy markets within the European Union and around the world
While diversity represents one half of the security equation, the other half is all about resilience. A global market that provides ample supplies in normal circumstances is not immune from extreme events such as unusually cold winters, pipeline failures and political conflicts.

That is why a Conservative Government will ensure that, like France and Germany, we have enough gas storage or other equivalent security measures to guarantee supplies throughout the year. This would take the form of an obligation on gas suppliers which could be fulfilled through alternative means – including storage facilities, contracted demand-side response and proven long-term supply contracts – so long as they provide confidence that the UK gas system can withstand a sustained disruption of external supplies during the winter period of peak consumption.

**Action 4: Reform the Climate Change Levy to provide a floor price for carbon**

A credible and sustainable price for carbon is vital if we are to see adequate and timely investment in new electricity generation. Whatever the carbon content of electricity generated, operators considering new investments in plant with a life of several decades need to know where they stand. This is especially true for investments such as renewables and new nuclear power stations where the bulk of the lifetime costs are sunk in advance of generating any electricity at all.

The EU Emissions Trading Scheme (ETS) was designed to be the primary mechanism by which the market could determine the cost of carbon. Yet the experience of the ETS has been of such price volatility and market uncertainty that it has had the opposite of its intended effect: it has made long-term investments more risky and therefore more costly, and so less likely to be made.

In Britain, the Climate Change Levy (CCL) is another measure that promised to provide incentives for investment in low carbon energy. However, the CCL is misleadingly named because it is a tax, not on the carbon content of energy, but on the amount of energy supplied.

Therefore we are left in a situation in which two of the most important of our energy and climate change policies are badly flawed.

A dependable carbon price over the long-term is a crucial basis for investments made on timescales that extend beyond the life of particular governments. It is appropriate to find common ground between UK parties for establishing a price for carbon that is reliable in the long-term.

We propose to fulfill our commitment to reform the CCL in a way which is revenue-neutral, by turning it into a rebateable carbon levy that would act as a floor price for carbon in the energy sector:

- The CCL would be removed from the ‘downstream’ supply of electricity to consumers and would instead be payable ‘upstream’ on the carbon content of electricity when it is generated
- The levy would be set at a rate determined by the Treasury, but power generators would be able to offset the costs of purchasing ETS allowances against their liability for the reformed Climate Change Levy
- If the ETS price is at or above the level of the rebateable levy, no net charge would be payable; if the ETS is below this level, then the difference would be paid through the levy to the Treasury

We intend that this reform should provide incentives primarily for future generating capacity, rather than penalise existing capacity. Accordingly:

- The rebateable levy would begin at a low rate, to be determined with the industry, and then increase at a defined predictable pace until it reaches an optimal floor price in the future
- The levy would be in place for at least 25 years, matching much of the life of all but the longest investments in capacity
- The exemptions that currently apply to domestic consumers, small businesses and charities under the CCL would be carried over to the new system
- The current system by which some groups of industrial users can secure rebates in return for improving their energy efficiency would also continue
- The reform would be revenue-neutral, first replacing the CCL on electricity and in time rebating the proceeds to energy consumers
Ultimately the cost of achieving a diverse and resilient energy system has to be paid for by consumers. Reducing that cost depends on incentivising the necessary investment in the most economically efficient way – which is what this reform will deliver.

**Action 5: Operate a streamlined planning process for large infrastructure investments**

Modern energy provision is impossible without an effective system for the planning of land use and development. With so much investment needed in new generating capacity and network infrastructure over the next decade, we cannot afford to be without a planning system that reflects the needs of large infrastructure developments.

The alternative is one of crippling delays, massive overspends and barriers to market entry that restrict competition and innovation – all of which would jeopardise much needed investment, drive up costs for consumers and compromise Britain’s energy security.

That is why we accept, and will retain, the provisions made in the 2008 Planning Act for a streamlined, fast-track planning process for major infrastructure projects. In particular, we will maintain a dedicated unit to deal with such projects, with decisions subject to strict time limits. Individual planning decisions must be governed by clear statements of national energy policy so that major infrastructure planning inquiries deal with local impact issues and do not waste time considering the merits of national policy. Therefore we also support the use of National Planning Statements, which embody the principle that strategic decisions on matters of national importance should be made by ministers democratically accountable to Parliament.

However, it is in respect of the principle of democratic legitimacy that the approach set out in the Planning Act contains flaws that must be corrected:

- In particular, the Infrastructure Planning Commission (IPC) should not have been created as yet another democratically unaccountable quango. We would retain the expertise and relevant powers of the IPC, but as separate unit within the existing Planning Inspectorate – a body that reports directly to ministers.
- Both as a matter of principle, and because without it there is a significant risk of judicial review, the National Planning Statements should be ratified by Parliament thereby providing a clear democratic mandate.
- The final planning decisions on major infrastructure developments should be taken not by an unaccountable official, but by the relevant Secretary of State, accountable to Parliament. However, the Secretary of State’s decisions will still be subject to the same statutory time limits that currently govern the Chair of the Infrastructure Planning Commission and will be made on the basis of the same assessment and advice.

Streamlining the planning system at the expense of democratic accountability is a counterproductive shortcut, vulnerable to popular and judicial reaction. Our reforms combine the virtues of efficiency and democracy, and thus provide the best guarantee of stability for this vital part of the energy policy framework.
Action 6: Facilitate nuclear power

Nuclear power has long been Britain’s most significant source of low carbon energy. In 1979 nuclear provided 12% of our electricity, and by 1997 that proportion had more than doubled to 26%. That, however, was the high point. From 1997 to the present day, the nuclear share of the generating mix halved to 13% – and will continue to fall as all but one of our nuclear power stations retire by 2023.

Nuclear power is proven technology, but its long development times mean that replacements for older plant have to be planned years ahead. The Government’s long-standing refusal to make a decision on nuclear power has meant that new nuclear capacity will not be ready until towards the end of the decade.

Our framework reforms to energy policy will ensure that this failure to anticipate and prepare for the future can never happen again.

- We support the long overdue National Planning Statements on energy infrastructure, which are of critical importance to nuclear power – and will submit them to a vote of Parliament to protect against Judicial Review and the further delays that would cause.
- A carbon floor price will provide a reliable signal for investment in all forms of low carbon energy including nuclear power (see action 4).
- Consistent with our view that all energy supplies must be sustainable without permanent public subsidy, we agree with the nuclear industry that taxpayer and consumer subsidies should not and will not be provided – in particular there must be no public underwriting of construction cost overruns.
- We will work closely with the industry to identify a long-term repository for nuclear waste and establish a fair allocation of costs for the use new nuclear power stations will make of the facility.
- We would retain the Office of Nuclear Development, which is widely recognised as an effective body.
**Action 7: Accelerate the demonstration of carbon capture and storage**

During the freezing weather of January 2010, coal-fired power stations supplied over 40% of our electricity\(^58\) – relieving the intense pressure on our gas supplies. However, in the coming decade at least a third of our coal-fired capacity will close – and most of the rest will disappear in the decade after that.

Keeping coal in the energy mix will be an enormous challenge:

- Coal is highly polluting – in terms of local pollution like sulphur dioxide as well as greenhouse gases (in 2008 each gigawatt hour of coal-fired power produced 910 tonnes of carbon dioxide, as opposed to just 393 tonnes for gas-fired power)\(^59\)
- The economics of coal are also a major obstacle – the capital costs of coal plant are two to three times those for gas plant\(^60\) and no major new coal-fired power station has been built in Britain since 1974\(^61\)
- As for security of fuel supply, UK coal production has halved since 1997\(^62\) and almost 60% of the ‘steam’ coal we import for use in power stations is Russian\(^63\) (greatly in excess of the proportion of gas we are ever likely to import from Russia)

However, carbon capture and storage (CCS) technology provides an attractive way forward for coal:

- As the name suggests, CCS provides a means of abating the carbon emissions from coal-fired generation
- CCS creates a stream of pure carbon dioxide that can be used to enhance the recovery of oil from depleted fields
- Pre-combustion CCS technology also provides a means of producing hydrogen in large quantities – initially for use in CCGT power stations (that would otherwise be fuelled by natural gas), but, in the longer-term, as the basis for the development of an advanced hydrogen economy

Several countries are already engaged in a race to demonstrate CCS technology on a commercial scale and stake a claim in an emerging global industry. Given Britain’s rich natural endowment of geological storage sites for captured carbon – and our traditional strengths in the relevant marine engineering and process industry sectors, we have all the competitive advantages we need.

Unfortunately, Labour’s reluctance to commit to CCS as the future for coal, and its mismanagement of the demonstration programme has held Britain back, allowing our competitors to take the lead.

A Conservative Government will put UK CCS back on track:

- We will bring the current CCS competition to a rapid conclusion, allowing the winner to move to the next stages of demonstration
- Avoiding the pointless delays seen so far, we will expand the demonstration programme to at least four facilities (including the current competition) and include both pre-combustion and post-combustion technologies
- We will ensure that CCS pipelines are planned and located where the greatest capacity for growth can be provided at the lowest costs – enabling efficient, shared access to transportation and storage infrastructure
- All new coal-fired power stations would have to incorporate CCS technology from the outset and an Emissions Performance Standard would be used to underpin progress on the level of carbon capture and efficiency of each plant – guaranteeing consistency with UK carbon budgets
- Our preference would be to fund the CCS demonstration programme from EU Emissions Trading System receipts, but we would adopt the funding mechanism proposed in the current Energy Bill if that is required to avoid further delays
Action 8: Promote renewable energy

Renewable energy has a vital part to play in the security and sustainability of Britain’s energy systems.

British wind, wave and tidal energy resources have world-beating potential. It is an inexhaustible resource that provides us with important advantages in the development of a global clean energy industry. Offshore wind, in particular, has the potential to become Britain’s largest natural energy resource – and its development will play a significant part in meeting the UK commitment to source 15% of our energy from renewables by 2020.

- We will put in place an offshore grid to reduce the uncertainty over grid connections that impacts on investment in offshore wind and marine renewables
- Marine park facilities will be developed alongside the offshore grid to accelerate the development and demonstration of wave and tidal power systems
- We will help take the poison out of many of the planning battles surrounding onshore wind by promoting community ownership of appropriately sited wind farms, allowing host communities to retain the additional business rates and providing electricity to local residents at discounted tariffs

The main system of financial incentives for investment in renewable capacity is the Renewables Obligation (RO) which – in comparison to the feed-in tariff system used in other countries – is expensive, bureaucratic and produces an unpredictable revenue stream. We will reduce costs to consumers and risks to investors by allowing feed-in tariffs to be used for future investments such as round three of the offshore wind development programme and wherever this would offer better value for money to the public and reduce the cost of capital for investors.

Decentralised energy – which includes CHP, waste heat capture, biomass, biogas, geothermal and microgeneration technologies – has the potential to make a contribution Britain’s production of both electricity and heat.

- We are committed to the introduction of feed-in tariffs to promote small-scale renewables and the capture of waste heat
- We will give local councils the power to identify areas that would be suitable for district energy schemes – such as those adjacent to heat-generating industrial facilities – and allow them to use the planning framework to promote integrated district heating schemes for those areas
- In promoting biomass, biogas and the capture of waste heat we will support the use of sustainably-sourced fuels and waste products, rather than feedstocks whose production damages the environment

Action 9: Revolutionise supply and demand by building an energy internet

Actions 1 to 8 (above) are focused on ensuring that Britain has a more robust, more diverse, less polluting and lower cost supply of energy. However, power cuts, fuel shortages and soaring bills aren’t just a matter of supply alone, but result from imbalances between supply and demand.

We cannot continue with a one-sided energy policy that focuses only on supply. The assumption that the level of demand at any particular time is either fixed or can only be managed by the top-down control of consumers is wrong. New developments are challenging the old, centralised, unresponsive energy model. In actions 9, 10 and 11 we set out a programme of reform for activating the full potential of demand-side energy technologies – potential not just for the security and sustainability of our energy, but also the empowerment of energy consumers.

The most revolutionary of these technologies is the smart grid, which we believe will do for our use of energy what the internet did for our use of information. Currently our energy networks are stuck in the post-war era of centralised command and control. Metaphorically – and sometimes literally – we have an analogue energy system with little scope for interactivity between producer and consumer, and little opportunity for personalised control or responsibility. The smart grid can change all of that.

This is a rapidly developing technology. Politicians today can no more plan the evolution of the energy internet than their predecessors could have planned the information internet. However, with so much of our energy infrastructure in need of replacement, we have a golden opportunity to put the building blocks of the smart grid in place and make Britain a leading centre for smart grid innovation and enterprise.
In particular, consumers stand to gain from the deployment of smart meters, which would provide user-friendly real-time information on household energy use; help identify options for saving energy; and improve accuracy of billing. Above all, smart meters would make it much easier for consumers to take advantage of off-peak energy prices. Nationally, this can help even-out demand levels and revenue streams, thereby reducing the need for new capacity and cutting the cost of capital for the new capacity that is needed. This will be particularly important in helping to integrate intermittent or inflexible sources of generation like wind or nuclear, respectively.

In place of the current policy of delay, a Conservative Government will act to secure consumer interests:

- We will accelerate the roll-out of smart meters, setting a deadline of the end of 2016 for most homes and businesses to have a smart meter
- We will enshrine the principle that smart meter data belongs to the consumer, not the utility – legislating, if necessary, to protect rights to privacy, access and transfer
- We will work with the industry to agree common standards that enable smart meter support for microgeneration, electric vehicles and consumer-controlled automation of appliances and heating systems

The indispensable parts of our energy infrastructure – such as the electricity transmission system – are designated as regulated assets. Investment in these lynchpin components receives a modest but guaranteed rate of return and Government is able to require a fair access regime for network users. We will use these arrangements to promote smart grid investment across our energy networks and in particular:

- Set ‘smartness’ criteria for the renewal and replacement of our existing transmission and distribution infrastructure – in particular ensuring full support for smart meters
- Require the interoperability of different smart grid systems so that UK energy markets are open to products and services from the widest possible range of providers
- Co-operate with neighbouring countries to interconnect national smart grids and enable cross-border trading of supply-side and demand-side response

**Action 10: Reduce demand by offering every household a Green Deal on energy efficiency**

The most secure, and the most affordable, kind of energy is the energy we don’t have to use. Reducing the amount of energy we consume, through improving our energy efficiency, saves money, cuts carbon and – because it reduces the demand that needs to be supplied – enhances our energy security.

Two-thirds of the gas Britain uses – and imports – is used for heating. Yet, much of it is wasted because so much of our housing stock, commercial property and public sector estate is poorly insulated. As a nation we will be living and working in these buildings for decades to come, so, as well improving standards for new construction, we need to address the main challenge, which is to retrofit the homes and workplaces we already have.

The good news is that much investment in energy efficiency can pay for itself through the savings it generates in energy consumption. Given the cost of supplying wasted energy is almost always higher, it simply makes no sense not to be investing more in efficiency. Current Government schemes are grossly inadequate in their ambition, fail to attract private sector finance and are operated as closed shops under the control of the big energy suppliers – whose commercial interest is in getting us to consume more, not less, of their product.

A Conservative Government will sweep away these limitations by offering every household in Britain a Green Deal of up to £6,500 worth of energy efficiency improvements at no upfront cost, with a higher limit for hard-to-treat homes:

- Householders would be entitled to an independent assessment that would identify the best opportunities for efficiency improvements to their homes
- These improvements would then be carried out immediately by a kite-marked installer
- The cost of the work would be repaid over the long-term from the resulting energy savings and through the energy bills payable at the property where the work is done
The widest possible range of private, public and voluntary sector organisations would be able to participate in financing, marketing and delivering efficiency improvements under the Green Deal – banks, investment funds, high street retailers, local authorities, housing associations, charities, social enterprises and community groups in addition to the established energy suppliers.

The Green Deal, as well as extending choice and opportunity to individual householders, would also provide a framework for systematically improving the efficiency of entire streets and estates – which could provide new and effective options for the deployment of public funds to combat fuel poverty.

The aggregation of energy efficiency improvements on an even larger scale would offer an alternative and more cost-effective way of meeting the need for new generating and storage capacity (see actions 2 and 3). We would ensure that our energy market reforms allowed demand-side measures to compete fairly and openly with supply-side measures. And, in this context, we would seek suitable opportunities to expand the Green Deal from the housing sector to cover efficiency investments in the commercial, industrial and public sectors.

**Action 11: Electrify transport to reduce dependence on oil**

Oil accounts for 97% of the energy used for transport in Britain. Without oil, our transport systems – and much of our economy – would grind to a halt.

The last two years have seen extraordinary volatility in the global price of oil. Prices have swung from $147 a barrel in July 2008 to $32 a barrel in December of the same year, and by the end of 2009 prices were back up to between $70 and $80 a barrel – despite the impact of the recession. With most economies now in recovery there are fears of further pressure on prices. As the Industry Taskforce on Peak Oil and Energy Security (consisting of leading companies from the power, engineering and transport sectors) warned this year:

“The era of cheap oil is behind us. We must plan for a world in which oil prices are likely to be both higher and more volatile.”

The prudent approach to energy security, economic stability and carbon is to reduce Britain’s exposure to the risk of extreme and erratic oil prices. With mainstream voices like the International Energy Agency predicting that global production of crude oil will hit an upper limit within twenty years – and some experts predicting an even earlier crunch in supply – we need to start preparing now.

Firstly, we need to make the most of our remaining UK oil (and gas) reserves. Wherever we can profitably produce oil and consume it in place of imports we should do so. We will therefore reform the taxation and licensing of exploration and development – together with arrangements for access to North Sea infrastructure.

However, the long-term solution to the economic, environmental and security consequences of our dependency on oil is to progressively reduce that dependency. To prepare for this transition, a Conservative Government will:

- Accelerate progress towards building the type of high-speed electric railway system that has been available across Europe for decades – and which provides an attractive alternative to unsustainable developments such as a third runway at Heathrow
- Work on a national and international basis to strengthen fuel efficiency standards for road vehicles, aviation and shipping
- Ensure that the Renewable Transport Fuel Obligation only provides incentives for the production of biofuels that meet an acceptable sustainability standard – ending the perverse situation in which a supposedly green policy causes environmental damage and attracts investment away from genuinely promising biofuel technologies

Above all, we will position Britain to prosper from what may be the most important energy transformation of all – the electrification of road transport:

- The widespread adoption of electric vehicles depends on a national network of recharging points; we will designate these as a regulated asset – enabling Distribution Network Operators to invest ahead of need
- We will work with the transport and energy sector to agree the common standards that would enable maximum flexibility in the development and deployment of vehicle and network technologies
We will ensure that the smart grid is developed not only to manage the new demands that would result from electrification, but also to realise the opportunities that would be created by the combined power storage capacity of millions of electric vehicles.

**Action 12: Create a Green Investment Bank**

With so much of our generating capacity and energy infrastructure in need of replacement – and the global race to develop new energy technologies so important to our future prosperity – it is vital that we secure the finance to create an energy system fit for the 21st century.

A Conservative Government will act to help mobilise investment in our green energy future. This includes establishing, in conjunction with the Treasury, Green ISAs and creating new Green Bonds designed to leverage private sector finance and allow retail and institutional investors to participate more easily in the major task of building clean energy systems.

We will also create a **Green Investment Bank** with two main functions:

- To consolidate within a single institution the existing disparate sources of public investment in the low carbon economy, such as the Carbon Trust and the Marine Renewables Deployment Fund. This will provide a clearer focus for prospective investors as to where to go for investment help, will leverage in external investment and will ensure that public funds deployed are focused and efficiently managed.
- To act as an intermediary to help attract and package investment opportunities in forms acceptable to investors.

We have established a high-profile working group to advise on the key technical issues involved in the creation of the Bank including funding mechanisms, investment criteria and management. It is due to report after the election and before the end of 2010.
Cutting the cost of security

A key objective of Conservative policy is that our energy should be abundant and affordable.

Already, average domestic gas and electricity bills are over £1,200 a year67 – almost as much as the average band D council tax.68 And energy prices are just as important to British industry as they are to British families: affordable energy is vital for our competitiveness. The energy regulator Ofgem has forecast real terms price increases between now and 2020 of between 14% and 23%.69 Some analysts believe that this is a substantial underestimate of the costs to consumers of present policy.70

Our policy aims to reduce the rise in consumer prices compared with what would happen if Labour’s policies were to continue.

Current pressures for higher prices

There are three principal reasons why, under Labour’s policies, fuel bills are set to rise during the next decade:

Replacing capacity

We have no alternative but to replace the significant proportion of Britain’s generating capacity that will reach the end of its life by 2020. Similarly, our energy infrastructure needs to be upgraded to cope with the new demands that will be made on it. Ultimately, the costs of this essential work can only be paid for by energy consumers. The replacement of ageing assets should have been carried out in a planned, orderly way – with provision made when energy prices were comparatively low. However, as on so many other issues, the Government failed to mend the roof when the sun was shining. It is always more costly to get work done when deadlines are pressing.

Fossil fuel prices

If we do nothing, Britain’s dependence on imported fossil fuels will grow. High and volatile fossil fuel prices have already caused most of the increases to our energy bills over the last five years. Many industry experts believe that further price shocks are on their way. Oil prices have increased by over 80% from their credit crunch low point. If demand rises as the world economy recovers from recession, and developing nations like China resume their rapid growth, then British consumers will be exposed to a significant risk of escalating energy prices – as will a British economy that will have less protection than it once had from the cushioning effect of North Sea oil revenues.

The upfront cost of diversity

Diversifying Britain’s energy mix will reduce our exposure to fossil fuel price rises in the future and to disruptions to the supply of particular energy sources. It is also necessary if we still want Britain to be a significant energy producer. However, in terms of the cost of building new capacity there is no doubt that gas-fired plant is currently the cheapest option. Therefore, while a diverse energy system is the best means of guaranteeing our long-term energy security, the upfront capital costs will be higher than for a gas-only future.

In the coming decade, the biggest challenge in this regard will be in achieving Britain’s targets under the EU Renewable Energy Directive. In 2007, the Government made a legally binding commitment to source 15% of our energy from renewables by 2020. This is one of the lowest targets of any EU member state, but because Britain starts from such a low base (just 2.5% of our energy came from renewables in 2008), we face a bigger challenge than any other member state – as even the Government admits.71 Because so little progress has been made on renewables under Labour, the drive to reach our committed level now has to be made over an inappropriately compressed timetable, with all that implies in terms of cost.
Reducing price rises

Recognising the enormous burdens imposed on consumers by Labour’s legacy of inaction, we will reform energy policy with aim of reducing and offsetting the cost of the investment required.

It is not possible to say that the cost of electricity in the uncertain future will be less than the cost in the past, when fossil fuels were cheap plentiful and secure. Our aim has, therefore, to be different: it is to ensure that the cost of energy will be lower than it would have been had Labour’s policies continued.

There are three main parts to our cost reduction strategy:

Cutting the cost of capital

The first part of our strategy is to minimise the cost of capital for energy investments. Ofgem estimate that between £100 billion and £200 billion of investment is needed by 2020.\(^2\) On the assumption that this will be passed on to consumers, even a modest 0.5% reduction in the cost of capital would cut energy bills by between £500 million and £1 billion a year.

There is plenty of risk in new energy investments – including construction overruns, technology risks and uncertainty in forecasting future energy prices. Public policy should be a haven from these risks, but thirteen years of indecision in energy policy has amplified risk, thereby increasing the cost of capital.

The proposals in this paper would create a more stable and predictable policy environment within which investments can be made:

- **A carbon floor price** – A floor price mechanism will be introduced as a revenue neutral reform to the Climate Change Levy, so that there will be no net increase in the cost of energy for consumers. At the same time it provides a level of certainty over future carbon prices, making investment more certain and predictable.

- **Security guarantees** – Because it is inconceivable that energy should be routinely rationed by black-outs, we must have adequate peaking capacity and certainty of gas supplies. It is better to spread the cost of that capacity smoothly over time, rather than perpetuate a system in which increasingly extreme price spikes provide the sole incentive for investment. Relying on inherently unstable and unpredictable revenue streams will either mean that investments are financed at a premium or that they or not financed at all, which would expose consumers – and Britain’s international reputation – to the consequences of a substandard electricity supply system.

- **Feed-in tariffs** – The Renewables Obligation (RO) is another risk-laden and expensive incentive mechanism for investment. Wherever feasible, we will replace the RO with feed-in tariffs, providing a more stable, certain and straightforward revenue stream for new energy developments – thereby reducing investor risk and lowering the cost of capital. Because unpredictable changes to regulations add to costs and uncertainty, any facilities already operating under the RO would be allowed to continue unaffected or, if they preferred, to transfer to a feed-in tariff.

- **A reformed planning system** – The planning system is a major cause of uncertainty and unnecessary cost. A fast-track, streamlined approach, proofed against Judicial Review, would remove a major source of risk.

- **Open networks** – Access to vital network connections is a further source of risk for new energy developments. Typically, it is more economical to provide such connections as a shared resource rather than through multiple proprietary networks. Where appropriate, we will step in to put in place a regulatory framework for fair and open access. This will reduce the risk for individual developments and lower barriers to market entry. In particular, we will establish an offshore grid to make Britain a priority destination for investment in offshore wind and marine renewables.

The cost-effectiveness of the open networks approach is illustrated by National Grid’s proposal for a shared offshore transmission network that would not only provide the most efficient way of connecting offshore renewable resources, but also of strengthening interconnections with neighbouring power grids (see next page).
Unlocking the cost-cutting power of energy efficiency

Not all measures to increase our energy security have a cost. Indeed some actually save money. The most important is energy efficiency, which, by cutting waste, cuts our dependency on imports, our carbon emissions and our fuel bills.

Furthermore, by cutting overall demand, less in the way of new generation and infrastructure is required, further cutting the costs of energy security. In particular, it will be easier and cheaper to meet Britain’s renewables target – which is set as a proportion of overall energy use rather than an absolute level.

Given the upward pressures on the cost of producing energy it is absurd not to be investing more in saving energy – especially when such investments have a proven track record of paying for themselves. Our Green Deal on home energy efficiency would remove the obstacles to making that investment on the scale required. Efficiency improvements would be paid for over a period of 25 years out of the much larger resulting energy savings, thereby removing the upfront capital cost from householders and allowing them to enjoy the net financial savings from the outset.

The deployment of smart grid technology will provide new ways of using energy more efficiently. For instance, smart meters will give consumers the information and monitoring tools to identify and act on energy saving opportunities. As well as cutting overall energy use, smart meters would make it easier for consumers to benefit from off-peak tariffs, thereby helping to smooth-out consumption patterns which would reduce the cost of peak supply across the network and generate additional savings.

Reducing subsidies

In the context of energy policy, subsidies are ultimately paid for by consumers – whether as additions to their energy bills or through taxation.

We believe that energy markets must be sustained without permanent subsidy to any form of generation. Under Labour, a plethora of subsidy mechanisms have emerged piecemeal and without much thought for the long-term consequences. This has created a requirement for review and modification which adds to the complexity and instability of the policy framework.

The first step to sorting out this mess is to be absolutely transparent about the costs to consumers of existing and future subsidies, so that the public has a clear view of the extra burdens mandated by policymakers. Under a Conservative Government all consumer-paid subsidies will be disclosed on energy bills so that bill payers can be informed about the level of contribution they are making.

The next step is to clarify that no energy subsidy should be permanent. Where subsidies are required it is with the restricted and time-limited purpose of overcoming the initially higher costs of the research, development and deployment of emerging technologies. When this phase is over and the technology is at parity with mature technologies – or it has become clear that it is unlikely to be so within a reasonable timeframe – then the subsidy should cease for future investment.
One thing subsidies should certainly not be used for is to compensate for the investment risks caused by deficiencies in the energy policy framework. Therefore, the third step is to resolve those deficiencies so that the level of subsidy need be no higher than that justified by the inherent requirements (and advantages) of the technology in question. This needs to start with the way that the subsidy mechanisms themselves work. In particular, mechanisms (like the Renewables Obligation) that have a destabilising impact on revenue streams should, wherever possible, be replaced with mechanisms (like feed-in tariffs) that produce a predictable stream of revenues appropriate for low carbon technologies whose economics are determined by upfront capital costs rather than variable fuel costs.

Maximising additional benefits

The one policy area in this paper that does not offer the prospect of lower increases in bills than under current policy framework is our policy on Carbon Capture and Storage (CCS). Although we will not exceed the Government’s proposed contribution for the development of this technology, we have not proposed a reduction in planned spending in this area. The reason for this is primarily industrial: if CCS is successfully demonstrated, Britain is particularly well-placed to benefit from an international market in CCS equipment and know-how. Our skills and industrial capabilities in marine engineering and the process industries, our world-class research institutes, and our natural endowment of suitable offshore storage sites, make this an attractive strategic investment for our industrial future. Making the most of this potential won’t have a direct impact on energy bills, but the country as a whole will benefit from the contribution to jobs and growth.

CCS is by no means the only new energy technology in which we see a major industrial opportunity for Britain. Though the primary purpose of this investment is to ensure the security and sustainability of our energy supplies, we believe that we should take every available chance to maximise the contribution of such investment to jobs and growth in the UK. This is best achieved, not through protectionist measures, but by making Britain the best place in the world to invest in the low carbon economy.

Achieving this aim will, like the full range of much-needed and long-overdue changes detailed in this paper, require a degree of reform to the content and delivery of UK energy policy, which is only possible with a change in Government.
2. Streamlined government

2.1 The energy policy vacuum

During the last thirteen years Britain has lacked a clear energy policy. In that time there have been eleven ministers with lead responsibility for energy, reporting to eight Secretaries of State in three Whitehall departments. (This is without counting the various other ministers with energy-related responsibilities or the various other departments that were responsible for climate change prior to the creation of the Department of Energy and Climate Change.) For an area of policy that is intensely technical and highly complex, it is perhaps not surprising that this dizzying succession of ministers and departments has failed to get a grip.

In thirteen years there have been countless reviews and consultations, a number of white papers and the occasional energy bill, but nothing that amounts to the comprehensive programme of reform required by the security and sustainability challenges of the 21st century.

This picture is further complicated by a proliferation of publicly funded quangos, agencies and advisory bodies. Many of these have done what they can, within their remits, to fill the policy-making vacuum left behind by ministers. Reports such as Ofgem’s Project Discovery are the closest the machinery of government has come to producing a reassessment of the energy policy framework.

So what does DECC do?

The Department of Energy and Climate Change (DECC) was formed in October 2008 from the energy-related components of the much renamed Department for Trade and Industry and the climate change components of the Department for Environment, Food and Rural Affairs (Defra).

Despite what appears to have been a difficult birth, we believe the creation of the new department was a step in the right direction – especially in providing a basis for the full integration of energy efficiency into the mainstream of energy policy. However, since its formation eighteen months ago, DECC has expanded from an initial complement of 800 civil servants to 1,070. This is small by Whitehall standards, but nevertheless significant for what is essentially a policy-making, not operational, department – especially one whose policy-making role has been eclipsed by the efforts of non-departmental public bodies.

Having created a new department, the time has come to go further and to provide the institutional base for a clear UK energy policy.

2.2 The right direction

Clear policy begins with clear objectives – security, sustainability, economy and opportunity – which we set out in chapter 1.

Responsibility for achieving these objectives is ultimately that of government. Although we believe that the best approach to achieving all four is one that is market-based, it is nevertheless vital for ministers to satisfy themselves that these policy objectives are being met and, where necessary, intervene to ensure that they are.

The foundations of good energy policy

Beyond clear objectives and a competent government, good energy policy rests on three foundations:

- The first foundation is absolute clarity that it is the role of the elected government – not quangos, advisory committees, or regulators – to formulate, decide and promulgate Britain’s energy policy. While ministers can (and should) take advice from various bodies – such as that of the Committee on Climate Change in respect of carbon budgets – the distinction between advice and information on the one hand, and decision-making on the other must be understood. There must be no more ambiguity that policy determination sits securely with ministers – supported by their department and accountable to Parliament.
The second foundation follows on from the first. Clarity on the role of energy ministers and the energy department, must be mirrored by clarity on the role of non-departmental agencies, which (apart from purely advisory bodies like the Committee on Climate Change) is – solely and exclusively – the execution of government policy. This requires a properly joined-up, streamlined apparatus for delivery. At present, energy policy involves too many public bodies, too many funding streams and too many separate agendas. Rationalisation is required to eliminate overlaps, cut costs and simplify delivery.

The third foundation is that the policy framework, once established, should be clear, stable and predictable. If Britain is to attract the investment we need in our energy systems, then we must have an energy policy that minimises the risks that investors face: the availability and cost of capital; technology risks; the availability of enabling infrastructure; supply chain constraints; the predictability of energy prices; and the impact of taxation, planning and regulatory regimes. Currently, the opacity and instability of UK policy has amplified these uncertainties instead of providing a refuge from risk.

2.3 A Better Way

Putting these foundations in place has implications for the Department of Energy and Climate Change, for Ofgem and for the various non-departmental public bodies and agencies.

**DECC**

Under a Conservative Government, the Department of Energy and Climate Change will be tightly focused on supporting strategic-level decision-making by ministers. We will call a halt to the inconclusive reviews and consultations that have had such a paralysing effect on the development of policy within government and investment planning within industry.

In place of an irregular and erratic stream of policy initiatives, we will establish a long-term energy policy framework. The Secretary of State for Energy and Climate Change will make an Annual Energy Statement to Parliament that draws together the analysis contained within key policy parameters, such as the National Grid’s seven year statements and the carbon budgets, and sets out a clear strategic direction for energy policy – and therefore energy investment – for the years ahead. We are examining the extent to which the Department’s current structure and skill set is suited to these tasks, and would welcome contributions from those who have dealt with DECC so far.

**Ofgem**

We believe that there is a strong case for giving a single body overall responsibility for the execution of Government energy policy, bringing together the various existing public bodies charged with implementing policy, and preventing the proliferation of new quangos in the future.

In preparing this green paper, we have received representations advising that an entirely new public body should be set up for this purpose – free from the legacy that existing bodies like Ofgem bring with them. However, the creation of an entirely new body carries with it the risk of delay when the task of renewing UK energy policy is so urgent. For that reason we propose to reform, rather than abolish, Ofgem, and give it a clear role as the main sectoral delivery body. It would be responsible for implementing government policy across the range of energy policy issues – for example actively monitoring compliance with the gas supplier security obligations we set out in chapter 9; executing the forward capacity market arrangements described in chapter 4 and the feed-in tariff system for renewable energy set out in chapter 13.

Currently, Ofgem serves as the competition authority for the energy sector. This is a role which we think is anomalous – competition law is an essentially judicial activity, requiring consistency of approach across sectors rather than being *sui generis* to the energy sector.

It is on this issue that public trust in Ofgem has come under the greatest strain in recent years – with consumer groups questioning whether Ofgem has taken a sufficiently detached view of the industry. We therefore propose to transfer Ofgem’s power as a competition authority to the Office of Fair Trading. This would have the benefits of allowing market regulation to take place at arm’s length from industry and consumer pressures and enabling Ofgem to have a clearer focus on its role as a delivery body for energy policy as opposed to competition policy.
Other government bodies

Having established a clear division of responsibility between DECC and Ofgem in respect to energy policy, we will rationalise the machinery of government – ensuring that its size, cost and complexity is no greater than what is strictly required to deliver the objectives of that policy.

Aside from investment-orientated bodies like the Carbon Trust, which we deal with in chapter 5, and the Committee on Climate Change, which has a statutory basis for its scrutiny of carbon budgets, we expect that most non-departmental public bodies will be incorporated within Ofgem as the principal delivery agency for Government policy.
3. A reliable price for carbon

3.1 The importance of pricing carbon

We are committed to decarbonising the UK energy sector to meet our climate change obligations, and do not underestimate the scale of this enormous challenge. However, we believe that national action to decarbonise our economy and rebuild our energy security is best led by innovators and entrepreneurs, not bureaucrats and politicians. This means we need the simple, straightforward and reliable incentive of a carbon price to support long-term investment decisions.

The price of carbon is crucial at every level – it ensures that scarce resources are best directed to technologies that save most carbon for each unit of investment, it minimises the social costs of energy generation, and it maximises the emissions reductions that can be achieved.

A carbon price is in many ways the opposite of a state subsidy. If it functions correctly it exposes and brings into play an underlying component of the social cost of the activity: making tangible something that is already present.

And that is not all: by rewarding producers and customers who find new ways to reduce emissions, a well-functioning carbon price can drive research, innovation and progress in the deployment of new technologies; something which Britain in particular has much to gain from, given our skills and industrial capabilities in this field.

Conversely, because it provides automatic disincentives to the over-use of the most highly carbon-polluting technologies, the carbon price can be a much more sensitive way of reducing emissions than the blunt, and therefore often crude, imposition of state regulation and enforcement.

This sensitivity is important for energy security: it may well be desirable for existing high emission plant to be maintained for occasional use in times of critical need (when demand is high or other sources of energy have proved inadequate). Government regulation may squeeze such plant out of the system, whereas an effective carbon price can ensure that they are used exceptionally, rather than constantly, without any need for clumsy interventions.

Finally, an effective carbon price reduces the need for subsidy – which is always second-best given the reliance it produces on bureaucratic allocation mechanisms, the establishment of client-dependence on the state and the complex (and therefore costly) distributional problems associated with taxing one set of people and transferring the revenues to another.

The wider policy context

In an ideal world, a well-functioning carbon price may be the only policy tool needed to result in an optimal set of investment decisions. However, for reasons that we summarise below, current arrangements have not made it possible to rely exclusively on the current proxies for a carbon price.

It is also true that a public policy objective of energy security may require policies to be deployed that are in addition to establishing a price for carbon. If diversity of supply is considered to be an important contribution to security, for example, the carbon price, while making an important contribution to the investment case for a variety of technologies, may not be enough on its own to prevent over-reliance (from the point of view of security) on a source of energy which happens to be the most economically efficient at a given level of the combined carbon and energy price.

As Professor Dieter Helm puts it:

“Since the market failures in respect of carbon emissions are numerous, it is unlikely that one instrument will be sufficient to meet the demanding targets. There will need to be many. However, any coherent carbon policy needs a carbon price at its core, so that customers pay the cost of the carbon emissions. Once this is in place, the other market failures, notably in respect of R&D, can then be addressed”75
3.2 The inadequacies of existing policy

A credible and sustainable price for carbon is vital if Britain is to see adequate and timely investment in electricity generation that is part of a transition to a low carbon economy. Currently, two primary mechanisms are used to provide incentives for energy suppliers and consumers to move towards low carbon energy sources; the EU Emissions Trading System (ETS) and the Climate Change Levy (CCL).

Neither has been effective at delivering this desired outcome.

**EU Emissions Trading System**

The ETS was introduced in 2005 as the primary mechanism to internalise the carbon costs of the power generation and heavy industry sectors in EU member states. The ETS covers over 10,000 installations across the EU (about 42% of EU emissions), including some 900 UK installations. Certain sectors of the economy – such as transport, agriculture and non-energy intensive industry – are not included.

Phase One of the ETS, which ran from 2005-2007, was essentially a trial run, with 99.9% of the permits handed out for free. The ETS has proved vulnerable to political interference, with member states governments handing out more pollution permits than were necessary to protect domestic industry, resulting in the price collapsing to €0.01 per tonne by the end of Phase One.

While the market design and implementation has improved in Phase Two (2008-2012), problems still remain: only around 8% of UK permits are being auctioned and, with demand destruction due to the recession, the ETS is experiencing ongoing volatility. The carbon price has fluctuated from a high of over €30 in April 2006 to a low of €0.01 in December 2007, and is currently floating at around €13 per tonne.

Phase Three of the ETS begins in 2013 and runs until 2020. It is not yet clear what percentage of pollution permits will be auctioned, nor what sectoral exemptions will be given for certain industries.

It is clear that the current level of price volatility and policy uncertainty provides disincentives for businesses to invest; increasing the level of risk they face. Given the capital intensity of the energy sector, with lengthy payback periods, we believe that a longer term, more stable regulatory environment in which to make investments is crucial.

**The Climate Change Levy**

The Climate Change Levy (CCL) is a tax on the supply of energy to business. It is a ‘downstream’ tax paid by the consumers of energy rather than generators, with the rate varying according to fuel and energy content. Electricity generated from renewables, waste solids and Combined Heat and Power (CHP) systems is exempt from the levy.

This energy tax is supplemented by a system of Climate Change Agreements (CCAs) that provide energy intensive sectors with the opportunity to reduce their CCL tax bills by 80% (reducing to 65% from 2011) in exchange for entering into agreements to meet energy efficiency targets.

The Climate Change Levy is in need of reform. The key problem is that the rates paid by businesses on their energy use do not reflect the carbon emissions from that energy. This does not provide the right incentives for businesses to switch to low carbon sources of energy. This is the reason the Royal Commission on Environmental Pollution wrote to the then Chancellor, Gordon Brown, stating that CCL was “misleadingly” titled and would “not be effective in achieving its stated aim.”

**The case for reform**

Investors in electricity generation must justify their investments on the basis of guesses about the future behaviour of politicians and regulators. And this comes on top of the considerable risks to which they are already exposed on technology outcomes, input prices, the cost of capital and future revenue streams.

There is an increasingly strongly held view – within industry, academia and environmental groups – that the time has come to reform these policy instruments in order to achieve the following objectives:

- To establish the conditions for a more dependable price for carbon upon which medium and long-term investment decisions are made
To better align all the policies that impact on investment decisions in this area, in particular by reducing the complexity and overlapping nature of different policy instruments

To more accurately bring to the surface the costs of the externalities associated with carbon and, therefore, better inform investment and policy decisions

### 3.3 A better way

The Conservative Party has a long-standing policy commitment to reform the Climate Change Levy – a generalised energy tax which does not distinguish between high and low carbon technologies – so that it is more closely related to the carbon content of energy, and indeed, to the objectives of climate change policy.

A dependable carbon price over the long-term is a crucial basis for investments made on timescales that extend beyond the life of particular governments. It is appropriate to find common ground between UK parties for establishing a price for carbon that is reliable in the long-term.

We therefore seek respondents’ views on a proposal to provide investor certainty by reforming the Climate Change Levy, as it applies to the generation of electricity, to provide a floor price for carbon.

This would be achieved by replacing the Climate Change Levy on the downstream consumption of electricity and converting it into a rebateable levy payable on the upstream generation of electricity at a rate determined by the carbon content of the electricity generated.

The reform would be introduced to be revenue neutral.

**The floor price mechanism**

Power generators would be able to offset the costs of purchasing allowances under the EU ETS against their liability under the reformed Climate Change Levy.

If the ETS price were at or above the price of the rebateable levy, no set charge would be payable. If the price of ETS allowances were below the value of the rebateable levy, then this would result in a net payment per tonne of the difference between the levy and the market price of allowances.

This would, in effect, set a floor for the carbon price in the UK power sector.

We envisage that the rebateable levy would be in place for 25 years and would begin at a level to be determined and then built up over time with a defined rate of escalation. This would minimise disruption to existing arrangements in the short-term but would offer a very clear signal to investors over the medium and long term, while still allowing the ETS to set an overall cap on emissions. Consistent with a revenue-neutral approach, any net revenues would be rebated to energy consumers.

**Consumer rebates**

Energy-intensive trade exposed industry would be able to negotiate agreements to help manage their exposure to the reformed Climate Change Levy just as they do today through Climate Change Agreements. For an upstream levy the relevant mechanism would be rebates rather than reductions in liability.

Currently, domestic consumers of electricity are exempt from paying the Climate Change Levy. We would continue that exemption under our reforms – together with those that currently apply to other consumers such as charities and small businesses. That part of exempted consumers’ electricity bill attributable to any net rebateable Climate Change Levy payment would be explicitly credited to consumers’ bills.

By reforming the Climate Change Levy in this way we believe we could provide a much-needed clear and stable framework for investors, incentivising low carbon electricity, maintaining the current exemptions for domestic consumers from the levy and extending current arrangements to safeguard the concession for energy intensive users.
4. A guarantee on capacity

4.1 A new era in energy policy

British energy policy dates from a ‘time of plenty’ when security of supply was not the concern it is today. North Sea oil and gas was one source of security, but also important was the excess generating capacity that once characterised Britain’s power sector.

This surplus was the legacy of an even earlier age of energy policy, when the Central Electricity Generating Board was in charge of deciding how many power stations Britain would need in the decades ahead. In 1970, the planners – failing to take efficiency improvements into account – predicted that Britain would need 100 gigawatts of generating capacity by 1995. The actual requirement was much less than that.

Energy policy reforms from the 1980s onwards were designed to make the best use of the excess capacity – in particular, by establishing electricity markets that prioritised supply from the least-cost sources of generation. With the need for substantial investment in new power stations still decades away, incentives for building new capacity were of secondary importance.

The threat to capacity margins

With so much spare capacity available, the generators have, since that time, always been able to supply enough electricity to meet even the highest levels of demand from consumers.

The level of available generating capacity over and above the level of peak demand is known as the capacity margin. To allow for unexpected events such as technical problems at particular power stations or exceptionally high levels of demand, a capacity margin of around 20% has generally been regarded as providing adequate security. Due to the legacy of excess capacity, the actual capacity margin has often been much higher.

However, that is set to change dramatically. In July 2009, the Department of Energy and Climate Change published an official forecast showing the capacity margin falling away to just 7% in seven years time and to even lower levels in the 2020s. According to the Government’s own analysis, a capacity margin of around 7% would result in the annual level of ‘energy unserved’ – i.e. black-outs – increasing from virtually zero today to almost 3 gigawatt hours in 2017. The Government responded to mounting alarm over this prospect by using the impact of the recession as a rationale for revising the shortfall downwards.

But as the chief executive of Ofgem said in February 2010:

“...In 2017 we get to the really sweaty-palm moment in terms of possible shortages. It is the scale of collapse in energy supply from 2013 up until 2017 that is profound and worrying. Companies say that there are X-gigawatts of new power stations in the pipeline, but you can’t rely on this until the earth is cut.”

Causes of the crisis

The immediate cause of this decline is that much of Britain’s generating capacity – including at least a third of our coal-fired capacity, two-thirds of our oil-fired capacity and nearly three-quarters of our nuclear capacity – is set to close down by 2020. This is for two main reasons:

• Firstly, age – with the major exception of CCGT gas plant and renewables, Britain’s power stations were mostly built in a period from the 1960s to the 1980s – and are now reaching the end of their working lives

• Secondly, tougher controls on airborne pollutants that damage human health and the natural environment have accelerated the retirement of fossil fuel power stations – in particular, the EU Large Combustion Plant Directive (LCPD) sets a deadline of 2016 that will bring forward the closure of the dirtiest oil-fired and coal-fired plant. In the longer term, it is expected that Britain will lose almost all its remaining coal-fired plants by 2023, as a result of the Industrial Emissions Directive

Both these factors, however, were entirely foreseeable. The working lifetimes of power stations, while not an exact science, are sufficiently well understood to allow the scheduling of replacement capacity. Likewise, the implications of the need to control pollutants like sulphur dioxide have also been long understood – indeed successive UK Governments were in the forefront of
efforts to agree tougher national and international standards. The LCPD was issued in 2001 and is based on a series of earlier international agreements stretching back to the 1979 Geneva Convention on Long-Range Transport of Air Pollution.

**Unblocking investment**

Government, therefore, has had every opportunity to secure the investment needed in new capacity – and to do so on a schedule that does not call the security of our energy supplies into question.

Unfortunately, the current Government has stood in the way of new investment:

- For entirely political reasons, Labour imposed a moratorium on new gas-fired plants which ran until 2000\(^\text{95}\)
- Ministers also operated an effective moratorium on new nuclear power from 1997 until the energy white paper in 2007 – a decade-long delay that means that most of Britain’s nuclear reactors will have shut down before they can be replaced
- Active obstruction on some technologies was matched by the ineffectiveness of policies to encourage investment in alternative options like CCS and renewables

In this paper we propose a number of reforms aimed at unblocking investment in new capacity:

- The renewal and stabilisation of the energy policy framework (chapter 2)
- A predictable floor price for carbon (chapter 3)
- A streamlined planning process for large infrastructure investment (chapter 6)
- Technology-specific policies on CCS (chapter 7), renewables (chapters 12 and 13) and nuclear power (chapter 10)

However, because involuntary power cuts are not an acceptable means of balancing supply and demand in a mature economy, we believe that that a sufficient capacity margin must be maintained not just in most circumstances, but in all circumstances. Therefore, in this chapter we make the case for a specific capacity guarantee in the electricity market.

### 4.2 The need for a capacity guarantee

Even in the context of a more functional energy policy than has existed for the last decade, there would still be cause for concern over the ability of electricity markets to guarantee investment in sufficient capacity – especially the capacity required at times of peak demand.

The electricity trading arrangements designed for the era of excess capacity are unsuited to contemporary challenges. Despite early warnings of the threat to the capacity margin, the Government, far from making a course correction, has actually acted to remove those capacity incentives that remained. In 2001, they introduced the New Electricity Trading Arrangements (NETA), which they extended to Scotland in 2005 to create the British Electricity Trading and Transmission Arrangements (BETTA). In both cases, the old system of payments for the provision of capacity was abolished, leaving incentives focused on the price at which electricity can be delivered every half-hour.\(^\text{96}\)

### A commodity and an insurance

To understand why this might not be enough, one has to first understand that there are essentially two things that consumers (and the governments that represent them) want from electricity suppliers:

- The power they actually consume
- Confidence that this power will be available on demand, in all circumstances

In effect, two products are bundled into one relationship – a commodity and an insurance. In order to ensure that both are supplied, both must be paid for.

The first should be easy to secure: the commodity price ensures that, whenever it is available, electricity is sold efficiently to the consumers who demand it. In anticipation of these sales, investment in generating capacity will be aligned to the
level of expected demand. However, the second product – the insurance premium that guarantees that demand will always be met – is more problematic.

**Incentivising new capacity**

Meeting higher than normal levels of demand requires generating capacity that isn’t normally needed. This ‘peaking’ or ‘back-up’ capacity can be provided in a number of ways – for instance, from purpose-designed peaking plant or from older, less efficient power stations that are only occasionally used. As long as the wholesale price of electricity exceeds the marginal cost of generation, then the owners of such plant have an incentive to switch it on as and when the demand arises.

The problem comes when there isn’t enough *existing* plant to maintain an acceptable capacity margin into the future – thereby requiring the construction of new plant. The question, therefore, is whether a system designed to incentivise suppliers to switch on generating capacity they already own will be sufficient to persuade developers to pay the upfront costs of building new capacity.

There are three main reasons why the answer may be ‘no’:

- Firstly, the generators’ view of the consequences of insufficient capacity may not be the same as that of consumers and the government. The consequences for a generator of being unable to supply enough power at a time of exceptional peak demand is the opportunity cost of the revenue it could have reaped at very high prices – regrettable, but not catastrophic. For consumers and governments, the reality, or even just the risk, of power cuts, would be much more serious.

- Secondly, even if the ‘peak rate’ price of electricity is high, the frequency, duration and intensity of these peaks is unpredictable – and so, therefore, is the resulting revenue stream. Capital markets may be unwilling to finance long-term investments with such uncertain returns.

- Thirdly, in order to provide enough of an incentive offset the disincentive of unpredictability, peak rate prices may have to be so steep that they provoke political pressure for Government intervention. Therefore, even if investors were willing to gamble on the prospect of occasional, but exotically high, peak rate prices, they might still be dissuaded by the risk of a regulatory clampdown. It would be like buying a lottery ticket only to find the prizes had been withdrawn.

**Further challenges**

The case for a reformed system of incentives, while already strong, will become even stronger as a result of new developments in the power sector.

For instance, higher penetrations of variable forms of renewal energy, especially wind power, will increase the amount of back-up capacity needed. Relying on short-term electricity prices alone to incentivise the necessary investment is likely to make existing price spikes even spikier.97

Whatever the cause, volatility in electricity prices isn’t just a problem for investment in back-up plant. Because the economics of other forms of generation – such as renewables, nuclear power and CCS – are also dominated by fixed, upfront capital costs rather than fuel costs, the lack of a predictable revenue stream is an obstacle to investment in the broad range of technologies required for a diverse energy system. It is a concern expressed by the Government’s own advisors:

“Current power market arrangements were designed to achieve efficient dispatch of fossil fuel-fired plant, and not to secure large investments in capital-intensive low-carbon technologies such as nuclear power and CCS generation. Under current arrangements, private investors face multiple risks around fossil fuel prices, electricity prices, carbon prices, and technology costs.”98

**4.3 A better way**

A Conservative government would take steps to ensure that Britain will always have adequate generating capacity to meet demand. Our immediate aim is to rebuild the capacity margin to avoid the power cuts that the Government previously said that it expected by 2017.

There is a parallel here between the regulation of energy markets and the regulation of financial markets. In both cases,
Government has a duty to ensure the stability of the whole system. In the financial sector, the central bank specifies key safeguards such as the level of prudential reserves that other banks in the system have to maintain. In electricity markets, we believe the energy regulator should have a similar role – undertaking the following functions:

- Monitoring and assessing the adequacy of capacity margins
- Where capacity margins are inadequate, to have the power to secure the new capacity required – either directly, as a requirement on suppliers to have sufficient contracted capacity available, or by arranging auctions to fill any missing capacity
- Enabling open competition and transparent cost comparison between alternative ways of meeting these capacity requirements – including energy efficiency improvements that reduce demand

In effect, the regulator would be able to make long-term commitments on behalf of consumers to provide certainty of payment for new capacity. This would allow investments to be planned in advance (thereby assuring security of supply), at low risk (thereby cutting costs) and without relying exclusively on short-term price signals (thereby reducing volatility). There are a variety of possible models for the capacity guarantee. One of them was provided in the shape of the electricity trading system that existed before the introduction of the present NETA/BETTA arrangements. However, it is widely accepted that the previous system was ‘gamed’ by the generators, and we recognise that the approach was not a perfect one and that a different system is needed.

This will require careful construction and we will work closely with the industry, with consumer groups and independent experts on the best way forward.

**Further measures**

Building new generating capacity is not the only means of maintaining an adequate capacity margin. A number of established and emerging technologies provide complementary ways of balancing supply and demand:

- **The smart grid** – By accelerating the deployment of smart grid technologies, including smart meters in homes and businesses, we will substantially increase the ability of consumers to take advantage of off-peak energy prices. This will help smooth-out peaks and troughs in demand, thereby reducing the amount of back-up generating capacity needed to ensure adequate supplies.

- **Interconnectors** – Interconnection between neighbouring electricity grids increases their overall robustness by allowing the trading of surpluses across borders and by diversifying the range of energy sources and technologies that can be called upon. This will be especially important as the amount of renewable generation increases, because the greater the geographical area involved, the less the overall variability in output. We will use the development of an offshore grid to build new interconnectors to neighbouring countries.

- **Electricity storage** – Progress on a number of storage technologies provides new opportunities for managing supply and demand across the grid. In particular, the electrification of transport could make huge quantities of storage capacity available through the use of vehicle-to-grid systems. We will ensure that infrastructure renewal programmes and market reforms enable the deployment of viable storage solutions.

- **Energy efficiency** – By definition, the capacity margin can be strengthened by reducing demand as well increasing supply. The best way to reduce demand is to use energy more efficiently. One of the aims of our energy efficiency agenda is to enable the aggregation of efficiency improvements – so that investment in saving energy can make a contribution to the maintenance of capacity margins that is as reliable, quantifiable and scalable as investment in generating energy.

Given these opportunities, it is important that the policy framework – including the capacity guarantee – enables the application of all available technology options, encompasses demand-side as well as supply-side measures, promotes free and open competition, allows the discovery of the most cost-effective solutions, and incentivises investment accordingly.
5. A Green Investment Bank

5.1 Private sector investment

Energy experts are agreed that the era of sweating Britain’s energy assets is at an end and a new investment phase must begin.

Given the state of Britain’s public finances, there is no question that the overwhelming bulk of the necessary finance can only come from the private sector. As a number of energy investment specialists have noted, the consequences of the credit crunch have made financing the scale of investment required even more challenging.

That said, long-term energy infrastructure developments in a country like Britain should provide an attractive proposition for the world’s risk-averse, post-credit crunch money markets. By establishing a long-term energy policy, within the wider context of a responsible economic policy, a Conservative Government will make Britain an attractive destination for investment.

5.2 The problems: fragmented public investment

The importance of the private sector does not mean that public sector is unimportant. Quite the contrary. The provision of strategic government support has a vital role to play in encouraging private sector investment by tackling areas of technological and regulatory risk.

Much of this paper is devoted to establishing a framework in which private investments can voluntarily be made. There are, however, circumstances, in which government has a further role to play. These include assistance with the research and development of new technologies and the mobilisation of additional private investment. Currently, a bewildering array of agencies and programmes are involved in the provision of public support for energy technologies. The product of occasional, unconnected, government initiatives taken over many years, the apparatus of delivery is fragmented, uncoordinated, and – even in aggregate – lacking in capacity equal to the task ahead.

The 2009 announcement of £4 billion in funds from the European Investment Bank has thrown a temporary lifeline to low carbon projects in the UK. However, as a number of think tanks and voices from within the investment community have argued, Britain – if it is to compete with other leading industrial countries over the long-term – needs to upgrade the strategic focus and the way it disperses public money, especially in the green energy industry; as well as being better able to leverage in the substantial private capital that is necessary and available.

5.3 A better way

As the Shadow Chancellor said last year, we believe that the time has come to establish new financial mechanisms to build Britain’s green energy future. These include establishing, in conjunction with the Treasury, Green ISAs and green bonds designed to allow retail and institutional investors more easily to participate in the major task of building a low carbon economy.

We would also establish a Green Investment Bank, which would have two functions:

- It would consolidate, and streamline, in a single institution, the existing disparate sources of public investment in the low carbon economy, such as the Carbon Trust and the Marine Renewables Deployment Fund
- It would act as an intermediary to help attract and package investment opportunities in green energy

The operating costs of the Green Investment Bank will be covered by combining the existing bodies responsible for dispersing public funds in the low carbon economy. In doing so, we intend both to rationalise running costs and also to allow a greater strategic focus in its investments so that the Bank can be a useful tool for implementing the policy priorities set out by ministers.

We have established a high-profile working group to advise on the key technical issues involved in the creation of the Bank including funding mechanisms, investment criteria and management. It is due to report after the election and before the end of 2010.
Box 1: Open networks

Missing links

Political debate on energy policy tends to focus on its most visible aspects – from the mighty machines that produce our energy to everyday domestic realities like gas bills and boilers. This overlooks the often invisible networks that connect generation to supply, the hidden infrastructure of pipes and wires that make it all happen.

This issue needs to come to the forefront of energy policy for two very important reasons: firstly, a great deal of our decades-old network infrastructure – such as the electricity transmission and distribution networks – is in need of new investment; and, secondly, the deployment of many low carbon energy technologies depends on the provision of entirely new network infrastructure:

- The large-scale development of wind, wave and tidal energy depends on an offshore transmission grid
- Advanced energy efficiency improvements, dynamic demand applications and the electrification of transport depend on the roll-out of smart grid technology
- The capture of waste heat from power stations and the growth of combined heat and power (CHP) systems depend on the availability of community heating networks
- Cleaning up coal-fired power generation using CCS technology depends on the pipelines to transport captured carbon to offshore storage sites.

Progress on developing these and other networks is either slow or non-existent and is delaying the deployment of low carbon energy technologies by undermining investor confidence and pushing up costs.

The case for open networks

As with other examples of public infrastructure such as roads and sewers, there are obvious economic efficiencies in providing connections in the form of shared, open networks rather than as separate, closed networks.

The debate over how to provide an offshore grid is a case in point. Offshore renewables can either be linked efficiently with shared, inter-operable networks, or a series of separate connections will be required for individual developments.

The default position of a Conservative Government is to favour the open networks model in which strategic infrastructure is provided as a shared resource. The electricity transmission network or ‘national grid’ provides a precedent for this approach. Though privately owned and maintained, the grid is a regulated asset, underpinned by government guarantees and mandates on financing, charging and fair access.

It will be the responsibility of a reformed Ofgem to work with the energy industry to identify new investments in enabling infrastructure that can be most efficiently designed, regulated and funded in this way. This will be driven by a competitive tendering process for the development, ownership and operation of such assets. And, where it would reliably reduce costs, the Regulated Asset Base system will be used to provide a modest, but guaranteed, return on capital.
6. A better planning system

6.1 The importance of efficient planning

Modern energy provision is impossible without an effective planning system. Large-scale power plants (gas-fired, coal-fired, nuclear and renewable) will generate the majority of the UK’s electricity for the foreseeable future; the electricity they generate needs to be carried by transmission and distribution network to our homes and workplaces; and our heating systems cannot function without gas storage and pipelines. All of these structures must be approved through a rigorous planning system, which facilitates appropriate and necessary developments, while stopping inappropriate ones, and does so in a way which is both fair and seen to be fair.

The planning system for major energy projects in the UK has failed this test of effectiveness. It has contributed to the crisis in our energy provision by failing to facilitate the construction of vital pieces of infrastructure. At the same time, it has frightened and frustrated local communities who feel that their voices are not heard in the planning decisions that affect their areas.

To ensure that Britain builds the energy infrastructure we need, we need to change a centralised, bureaucratic planning system which gives local communities little option but to rebel against Whitehall and regional diktats and, all too often, against the notion of development itself. We need to end the delays and uncertainty in the building of everything from wind farms to nuclear power plants, which have compromised our ability to generate the electricity we need to keep the lights on.

Planning must facilitate development, but only where the development is appropriate. Therefore, the planning system must also protect our environment and improve our quality of life. It must respect the history and character of a given location, and also uphold national priorities – carbon reduction, biodiversity, landscape, heritage.

Planning must also facilitate participation and social engagement. Communities need to be able to formulate a positive vision of their future development, and democratic accountability must be upheld.

6.2 The inadequacies of existing policy

Labour’s approach to the delivery of major infrastructure projects, such as energy and transport, has been glacially slow and resolutely bureaucratic. In the last decade there have been a number of extremely lengthy, extremely expensive planning inquiries on key national infrastructure projects, culminating in Heathrow Terminal 5, the inquiry into which sat for 525 days and cost £80m. Unfortunately, these inquiries have frequently not focused on answering the key question of ‘whether proposed development is in accordance with national planning law’, but, rather, have become protracted examinations of conflicting views on national policy.

The Government’s response has been to create a new quango – the Infrastructure Planning Commission (IPC) – and introduce new National Policy Statements for specific types of development such as nuclear power stations. But these new arrangements are fatally undermined by Ministers’ determination to wash their hands of any responsibility for making major infrastructure planning decisions. Under Labour’s proposals, the Commission will have widespread powers, despite having no democratic accountability. And there will be no proper Parliamentary ratification of the National Policy Statements.

6.3 A better way

The task in designing a planning policy for energy projects is to combine the expertise and streamlined approach of the IPC with greater democratic accountability.
**Major infrastructure**

We have already indicated that we would abolish the Infrastructure Planning Commission while retaining its expertise and powers. Major energy infrastructure projects will be decided by short and focused planning inquiries carried out by the new Major Infrastructure Unit, with the same powers as the IPC, and governed by our new national priorities framework. Such inquiries would be run by senior planning inspectors who would have much of the freedom enjoyed by judges in the courts to provide the direction of a case by way of pre-trial hearings. This would allow for the lines of evidence required to be clearer and for inquiries to be more focused.

At the conclusion of the inquiries, these planning inspectors will make recommendations to the Secretary of State, who will make the ultimate decision. We are very mindful of concerns that the Secretary of State might then sit on decisions, as has happened in the past, and we would therefore place a requirement on the Secretary of State to make a decision within a given timescale – similar to that proposed for the IPC.

Our plans are not only more democratic, they are also likely to be more efficient. The National Policy Statements proposed by the Government will be preserved and would be ratified by Parliament, to give them a greater legitimacy and so reduce the scope for judicial reviews. By contrast, Labour’s system will see the IPC bogged down in legal challenges – from judicial reviews in the High Court to challenges in the European Court of Justice (ECJ), thanks to its lack of democratic oversight. Our judicial system and the ECJ will attach greater weight to a document explicitly endorsed by Parliament.

While we are committed to abolishing the Infrastructure Planning Commission, we do not want to see any applications that have begun to be considered by the Commission start the planning process all over again. We will, therefore, introduce transitional arrangements to ensure that any such projects do not have to return to square one.

**Local developments**

We actively support getting more of our energy from renewable sources, including both onshore and offshore wind. As we will discuss throughout this document, this will help tackle climate change, create thousands of jobs, and improve our energy security. Britain has some of the best renewable resources in the world – not just on land, but in the wind, wave and tidal power available off one of the longest coastlines in Europe. We should make the most of those resources.

The developments needed to take advantage of these resources, such as marine energy parks, wind farms, may not, individually, qualify as large infrastructure projects. It is therefore right that decisions on their development should be made by local communities who understand the needs of their area. Therefore, to be successful in harnessing our national resources, it is vital that we develop broad public support for the development of local renewal energy schemes. This means allowing communities to be active participants in, as well as beneficiaries of, onshore wind development.

That is why it is Conservative policy to allow communities that choose to host wind farms to keep the business rates they generate for six years. We are also examining how community ownership of wind turbines can be introduced, as on the continent, and how discounted electricity can be available to communities in the vicinity of wind farms.
7. Coal

7.1 Coal in the 21st century

Coal was the foundation stone of the industrial revolution. Until well into the 20th century coal was Britain’s dominant source of energy – whether for transport, heating or power. However, the story of energy over the last hundred years is one in which advanced economies have made the transition away from coal in one application after another. First, oil took the place of coal in our transport systems; then natural gas supplanted coal as the main fuel for heating and cooking; finally a variety of energy sources have reduced the part played by coal in the generation of electricity.

Coal still provides a large proportion of our electricity – 31% in 2008. This accounted for 83% of UK coal use – with most of the rest used in the iron and steel industry. However, we are now at a critical point for the future of coal use in the UK. Most of Britain’s coal plant was built in the 1960s and early 1970s – and as the Government acknowledges most of it is due to retire over the next fifteen years:

“We will lose around a third of the UK’s current coal generation capacity by 2016, reducing our coal generation capacity from 29GW to 21GW. Most of the remaining existing coal generation capacity is likely to close by 2025.”

The serious drawbacks of coal use – in particular its environmental impacts – have led some to question whether coal has any future in our energy mix. However, the disadvantages are accompanied by some key advantages – as demonstrated during the cold weather of January 2010, in which coal-fired generation provided over 40% of our electricity, helping relieve the exceptional demand on gas supplies.

Therefore, finding a sustainable way of retaining coal as an energy source is an important objective, with huge potential benefits that would extend far beyond our shores.

Security of supply

Though Britain’s dependence on coal has diminished, the proportion we import has increased. Since 1997 domestic coal production has more than halved. Over 70% of the coal we use is now imported. By way of comparison, our next largest supplier is Colombia, which supplies 12% of our coal.

Source: DECC, Digest of UK energy statistics 2009
An important distinction needs to be made between ‘steam coal’ which is used in power and ‘coking coal’ which is used in iron and steel industry, because the two categories have very different supply profiles. While 95% of our coking coal imports come from Australia, the United States and Canada, 57% of our steam coal imports come from Russia, with a further 14% from Colombia and 11% from South Africa.\(^{118}\)

![Chart 14: 2008 UK steam coal imports by country of origin](image)

Source: DECC, Digest of UK energy statistics 2009

Nevertheless, coal does have a role to play in maintaining the diversity of Britain’s energy mix: As a solid, coal can be more easily stockpiled than oil and gas; Britain still has significant coal reserves of its own; and, globally, coal is conventionally reckoned to be the most abundant of the fossil fuels – though recent re-evaluations in a number of countries have drastically reduced estimates of economically recoverable reserves.\(^{119}\)

**The economics of coal**

The cost structure of coal-fired power is determined by three main factors:

- The cost of the fuel
- The capital cost of the plant
- The cost of carbon – i.e. the degree to which greenhouse gas emissions from coal plant are internalised

Coal was not immune to the 2008 spike in commodity prices. The North West Europe marker price for coal rose from an average of $43 per tonne in 2003 to $150 per tonne in 2008,\(^{120}\) spiking at times to well over $200 per tonne\(^{121}\) – a level of price volatility even greater than that for oil. Of perhaps even greater importance is the price of coal relative to gas. When coal is comparatively expensive, liberalised electricity markets tend to switch to gas-fired power. This can be seen in the current UK market with gas plant running at full capacity in order to take advantage of comparatively cheap shipments of liquefied natural gas. There is, of course, no guarantee that this price relationship will persist. But market expectations of a long-lasting shift in the economics of coal *vis-à-vis* gas are contributing to the postponement and cancellation of coal projects in Europe and North America.\(^{122}\)

Coal is the dirtiest of the major fossil fuels – not only in terms of its carbon emissions, but also in terms of its local pollution which includes sulphur dioxide, nitrogen oxides, particulates and other toxic substances. A recent US study by the National Research Council of just some of the pollution impacts from coal-fired power station put their annual cost at $62 billion in America alone.\(^{123}\) Technologies such as flue gas desulphurisation (FGD) can drastically reduce coal-fired pollution and their incorporation has been mandated by law across the developed world – and increasingly in emerging economies too. Building or retrofitting plant to minimum acceptable standards is obviously more expensive to the owners than passing on the cost of pollution to others. This has driven up the capital cost of coal plant – as has the need to increase thermal efficiency in order to reduce fuel consumption. A Massachusetts Institute of Technology survey of recent cost studies found that the capital cost of new coal plant was estimated at between two and three times the cost of new gas plant.\(^{124}\)
Therefore, even before one gets to the price of carbon, it is clear that the economics increasingly favour gas over coal—and that, without government intervention, gas-fired plant would be built in preference to coal-fired plant. This is especially true of the UK market, which is the most liberal of any major country. British markets are also particularly exposed to the difference in the capital costs of gas and coal plant, because so much old plant is due to retire over the next decade.

### 7.2 Carbon capture and storage

After capital cost and fuels, the third major element in the cost structure of coal-fired generation is the carbon price. In 2008, each gigawatt hour of coal-fired power produced 910 tonnes of carbon dioxide as opposed to 393 tonnes for each gigawatt hour of gas-fired power. Therefore, any price placed on emissions will further advantage gas over coal.

### The future for coal

As with the local pollution impact of coal plant, technology provides a solution in the form of carbon capture and storage (CCS). All the technologies needed to capture, transport and permanently sequester carbon dioxide already exist—and are in operation in various contexts around the world. However, they have yet to be demonstrated as a fully integrated system for the generation of low carbon electricity at a commercial scale. Given current market incentives it is unlikely that any private company would take the risk of attempting to do so.

Almost all new sources of energy have required a period of government support to become established in the market place. As the only means of producing low carbon energy from fossil fuels, there is a strategic rationale for government intervention to support the commercialisation of CCS—which would also provide a regulatory environment for retaining coal as an important part of Britain’s energy mix.

### Additional benefits of CCS

A Conservative Government would always aim to maximise the additional benefits of its climate change policies. CCS should be no exception, because, as well reducing greenhouse gas emissions, the technology has several other potential benefits for those nations that take a lead in its commercialisation:

- **Economic potential** – Given Britain’s traditional strengths in process industries and marine engineering, we should be well placed as a country to take a leading role in the development in this emerging global industry attracting investment and creating much needed new jobs.

- **Storage potential** – There is no doubt that Britain has a rich natural endowment of potential storage sites for captured carbon dioxide. Selling rights to that storage could be a major industry on its own, according to experts in the field:
  
  “Our group has made a comprehensive first evaluation of offshore UK storage, showing that 100 years of not just UK, but also European CO₂ could be stored profitably. If this business charged pore space fees, that could be a revenue of £5 billion a year just from storage.”

- **Enhanced Oil Recovery** – In oil producing regions like Texas, carbon dioxide is already being injected underground to recover oil from depleted wells. Given the long-term trend in global oil prices (see chapter 8) applying this technology to North Sea production may become commercially attractive, providing an additional market for UK-based carbon capture plant and pipelines.

A further set of additional benefits apply specifically to pre-combustion CCS technology:

- **Integrated Gasification Combined Cycle (IGCC) plant** – IGCC is an advanced power station technology, in which coal is gasified before being used to fuel turbines similar to those used in gas-fired power stations. Already the focus of major investments around the world, IGCC has the potential to be more efficient and less polluting than conventional coal plant—as well as allowing carbon dioxide to be captured before combustion.

- **Fuel flexibility** – IGCC plant can be fuelled with either coal or natural gas, providing more options for affordably funding the development of CCS demonstration plant—and enabling a flexible response to future security of supply issues. Progress on gasification technologies also opens up new low carbon options for the use of waste biomass as a fuel and for the extraction of presently non-recoverable coal deposits.
• **The hydrogen economy** – When carbon is captured from gasified coal what remains is a stream of hydrogen. The development of pre-combustion CCS plant would therefore provide the basis for the long-heralded hydrogen economy. Companies like Mitsubishi are already planning for this future, by funding the development of stationary fuel cell technology which would run on hydrogen from CCS coal to produce zero-emission electricity at much higher efficiencies than can be achieved with either IGCC or conventional coal plant.\(^{132}\)

**Slow progress**

Little of this potential will be achieved if Britain falls behind other countries in the development of CCS. So far, the omens are not good.

The Government’s demonstration programme got off to a poor start in 2007, when it announced “funding for one post-combustion CCS demonstration plant, due to be operational around 2014.”\(^{133}\) The Government was heavily criticised for its lack of ambition, for excluding pre-combustion CCS altogether and for leaving the door open to new unabated coal plant.

In 2009, there was the appearance of a U-turn: funding for between one and three additional demonstration plants was promised in the Budget; the expanded demonstration programme was opened up to pre-combustion CCS; and assurances were given that all new coal plant would have to be developed with CCS.

However, the original competition, though launched over two years ago, has yet to produce a final result – indeed it is not expected until 2011 at the earliest.\(^{134}\) As for the expanded competition, Ministers have yet to produce any details as to how it will work and the launch date is only the end of this year, with no finish date. In this time, the European Commission has managed to launch, run and conclude its own CCS competition, covering several EU countries and all the main CCS technologies. Not known for the rapid pace of its decision-making, the Commission has nevertheless outpaced the UK Government – a telling indictment of Labour’s foot-dragging bureaucracy.

There are growing fears that Britain is losing the race to develop CCS – as expressed in a recent report from Institute of Civil Engineers:

> “The UK was quick on the uptake in the global race to deploy CCS but now we have fallen behind other nations. If we want to keep a competitive lead and take advantage of the export opportunity it presents, progress needs to be greatly accelerated. We have the skills and the expertise to deliver global solutions - all we’re waiting on is Government to take the lead and provide the steps to get us there.”\(^{135}\)

A similar warning has been issued by the Scottish Centre for Carbon Storage:

> “The UK government programme to create and develop this CCS option commercially will not produce the demonstration power plants before 2020. Our compilations of rival projects worldwide suggests that this will be too late for the UK to gain advantage in a new global industry particularly as the USA is now progressing very rapidly, and China intends to have two demonstrations operating several years before the UK.”\(^{136}\)

Which concluded that:

> “At present, the UK will be beaten by the USA, Australia, Canada and China.”\(^{137}\)

### 7.3 A better way

Had a Conservative government been in office during the current Parliament, we would have adopted a more urgent, purposeful approach: rather than running a chaotic competition for a single CCS demonstration plant, we would have committed some of the proceeds of the EU Emissions Trading System to demonstrate a number of different CCS technologies – both pre- and post-combustion.

We are conscious, however, that by the time the next general election has taken place, the CCS competition should have advanced to the stage that it is likely to be the most rapid way to secure the first UK demonstration plant. It would therefore be counterproductive to interrupt progress and begin again with our preferred approach.
In recent months, Government policy has shifted to adopt more closely long-standing Conservative policy, specifically to:

- Favour four CCS demonstration plants
- Include both pre- and post-combustion technologies
- Require all new coal plant to demonstrate CCS

In parallel, the Government has suggested, though still inconclusively, that one or more CCS ‘clusters’ should be established – areas of the country in which investment in the infrastructure for CCS can serve a number of different CO₂-emitting plants, and provide common access to storage sites.

**Moving forward**

These are welcome developments, although we believe that in order to meet the Committee on Climate Change’s recommendation to substantially decarbonise the generation of electricity by 2030, CCS requires, as well as initial financial support, a commitment to a complementary regulatory approach.

A Conservative Government will therefore:

- Bring the current CCS competition to a rapid conclusion, proceeding quickly with the design and development studies which are the next stage. We will explore whether it would be possible to give the go-ahead to both projects remaining in the competition. Such an approach would bring forward the end of the competition by a year and give a clear signal of great urgency. They are sufficiently different – one new build and one retro-fit – that there would be significant lessons to learn from each of them.
- Support the demonstration of CCS in at least four facilities (including the current competition), to include demonstration of pre- and post-combustion technologies
- For the demonstration projects beyond those in the existing competition, favour negotiating public participation through a joint-venture approach with our proposed Green Investment Bank
- Locate demonstration facilities in areas amenable to CCS clusters, requiring the associated infrastructure (such as new pipelines) to be accessible to emitters other than the initial demonstration plant
- Require any new coal-fired power station, in order to be consented, to incorporate demonstration of CCS, covering all parts of the value chain (capture of CO₂, transportation, and storage)

The Government has set up the Office of Carbon Capture and Storage, but it is a pale imitation of the Office of Nuclear Development. The office must be much more energetic in driving forward the development of CCS in the UK, starting with the development of a roadmap so we can see how ambitious targets can be met. Labour’s approach to energy has too often been to have ambitious targets without the necessary roadmaps for achieving them.

**An emissions performance standard**

Although the price of carbon should be the prime driver towards ever-reducing emissions, an emissions performance standard would give additional regulatory assurance that new generations of fossil fuel plant would be required to make as much use of CCS as is possible.

In line with our amendment to the Energy Bill, which received broad support, we would set an emissions performance standard to restrict the amount of carbon dioxide that new plant can emit. The level would be published for consultation within six months of the election of a new Government and would be set to take account of the need to meet climate change targets, to safeguard energy security and to ensure affordable energy prices for consumers.
Funding

Clearly, before it reaches the point of commercial viability – which the Committee on Climate Change estimates to be in the early 2020s – demonstrating CCS will require initial support from public funds. Because of the prospective contribution coal can make to our energy security, and because of the industrial advantages Britain has in what is likely to be a worldwide industry, we believe that such temporary funding is appropriate.

The first source of funds should be Britain’s share of the receipts from the EU Emissions Trading System. This is a particularly appropriate source of funds since the revenues are derived from the price put by the market on CO₂ emissions from generators and other large emitters. However, the Government claims that it has already spent the ETS receipts, which will not be substantially received until 2013, even though ministers cannot say what the level of those receipts are assumed to be or where they have been spent.

Spending money that hasn’t been received yet would be consistent with the Government’s record of fiscal irresponsibility. If that proves true in this case, we would make use of the powers proposed in the Energy Bill to introduce a levy on electricity suppliers to contribute to the costs of the demonstrations. We believe that it is appropriate that the incidence of the levy should depend on the carbon emissions of the energy supplied so that ‘clean’ technologies are not obliged to fund the abatement of carbon-intensive technologies.

Although we do not intend to abort the current competition, we prefer an approach for the remaining demonstration plants in which taxpayers received an ongoing interest in the intellectual property and financial performance of the investments they have helped finance. We will favour a joint-venture approach in which our proposed Green Investment Bank participates in CCS demonstration plants by taking an ongoing equity stake in the venture in return for the funds committed. Such a joint venture approach would also allow other prospective users of the CCS infrastructure – such as other large CO₂ emitters in a cluster area – to participate in each project.
8. Oil

8.1 Oil in the 21st century

Without oil, the great advances in economic prosperity and personal freedom that have characterised the 20th century would not have been possible. And yet it comes at a price – one with environmental, financial and political components.

The environmental price of oil is not as high as coal, but significantly higher than gas. For instance, while the carbon content of coal is approximately twice that of gas, that for oil is about one-and-half-times greater. The combustion of oil is also a major local pollutant. The US National Research Council report that put the annual cost of local pollution from coal at $62 billion, (see chapter 7) found that the figure for oil was $56 billion. The comparable figure for gas was $2.1 billion.

Aside from its environmental impacts, the financial price of oil is that it costs much more per unit of energy than either coal or gas. Its political price is that, in most parts of the world, control of oil production has become concentrated in fewer and fewer hands, distorting power relationships both within and between countries.

These costs have effectively priced oil out of the market for power generation – and also for heating fuel in most areas. Today, transport accounts for 77% of the oil we use in Britain and oil accounts for 97% of the all energy sources used for transport. Just 1% of our electricity comes from oil-fired power stations, a contribution that is set to diminish to near-zero levels.

Security of supply

It is perhaps because oil plays such a small role in electricity production that it is overlooked in terms of the debate over energy security. But though we don’t need oil to keep the lights on, we do need it to keep the headlamps on – without it, our transportation systems would grind to halt. Thus any threat to our oil supplies must be taken as seriously as any threat to our coal or gas supplies.

The availability of North Sea oil is another reason why oil has been overlooked as an energy security issue for Britain. However, UK oil production peaked in 1999 and in 2005 we became a net oil importer for the first time since 1992. In the absence of any decrease in demand, the ongoing depletion of our domestic oil reserves can only increase our import dependency.

The oil trade is a globalised market – and it is on a global basis that the security of oil supplies should be judged. In terms of net oil exports, roughly half come from the Middle East, with most of the rest divided between Russia and Africa. As oil resources in other parts of the world continue to decline, we in the West will become increasingly dependent on these net exporters.

This raises legitimate concerns over the increasing concentration of oil reserves in potentially unstable or hostile parts of the world. However, beyond any threat to supplies from specific sources, there is an even more important question, which is whether future oil supplies will be sufficient to meet the world’s rising demand for oil.

The end of easy oil

It is a question that we’re already facing. In 2003, following a long period of stability, the oil price began to rise steadily, exceeding $60 a barrel by 2006; in 2007, the rise became a spike hitting $147 a barrel in July 2008. Despite the surge in prices there was very little increase in oil production which from 2005 stayed within a tight band of around 84 to 86 million barrels a day.
In the end it wasn’t increased production that brought prices back down, but the collapse in demand caused by the deepest recession since the 1930s. Despite continuing weakness in demand, oil prices were, by late 2009, back up to a range of between $75 and $85 a barrel.

In its 2007 World Energy Outlook, the International Energy Agency made the following statement:

“World oil resources are judged to be sufficient to meet the projected growth in demand to 2030, with output becoming more concentrated in OPEC countries – on the assumption that the necessary investment is forthcoming.”

However, in the 2008 edition of World Energy Outlook, there was a significant shift in the IEA’s position:

“Although global oil production in total is not expected to peak before 2030, production of conventional crude oil and natural gas liquids (NGLs) is projected to level off towards the end of the projection period.”

In Britain, an in-depth academic assessment of the global supply situation was published by the United Kingdom Energy Research Centre (UKERC) in October 2009, which concluded that:

“…approximately 3 million barrels per day of new capacity must be added each year, simply to maintain production at current levels – equivalent to a new Saudi Arabia coming on stream every three years.”

It must be stressed that finding this new capacity will be much more difficult and expensive than the capacity it replaces. As the UKERC report states, “there is a growing consensus that the age of cheap oil is coming to an end.” Indeed, a growing number of senior figures in the energy world – from oil industry chief executives to OPEC oil ministers – are saying that the age of easy oil is already over.

8.2 Adapting to constrained oil supplies

The end of the age of easy oil means that we can no longer assume with certainty that global production will be able to keep up with demand as reliably as it has in the past. Assuming that demand continues to rise – driven by such factors as the spread of car ownership in the developing world – there is, at the very least, the risk of high and volatile oil prices in years ahead.

Of course, oil shocks are nothing new, but those we experienced in the 1970s and early 1980s were driven by specific geopolitical events like the Arab oil embargo in 1973 or the Iranian revolution in 1979. The 2008 price spike, however, was the first time that limits to production appeared to be the main cause.
The next oil shock

A number of authorities are already warning of a second supply crunch in the coming decade. A report by the McKinsey Global Institute sets out the argument:

“It would be all too easy to respond with complacency to a short-term easing back of energy-demand growth. Once the global economy begins to recover, energy demand will bounce back too, imposing costs on consumers and businesses and on the climate in the form of CO₂ emissions. There is even potential for oil market demand to grow more quickly than supply, risking another market shock.”

It should be stressed that this is a mainstream view echoed by the International Energy Agency and senior oil industry figures like the Chief Executive of Total:

“What we’re saying is that come around 2012 the impact of this big recession on oil investment and capacity, if current trends continue, could be severe with much higher oil prices.

“We are running the risk of another oil crisis when demand outstrips supply around 2014 or 2015”

It is essential that as an oil-dependent economy we prepare for these new realities. In the short-to-medium term we need to minimise Britain’s exposure to high oil prices and in the longer-term we must be less dependent on oil prices that could be higher than at present.

8.3 A better way

There are two important aspects to Government policy towards oil to address energy security, economic competitiveness and reducing greenhouse gas emissions. The first is how Britain can ensure that our remaining oil reserves in the North Sea can be extracted to the fullest possible extent, and the second is how, during the decades ahead we can progressively reduce our reliance on oil products which will increasingly need to be imported and which, in any case, are major contributors to carbon emissions.
Box 2: UK Continental Shelf exploration

For so long as the UK is a major consumer of oil (and gas), we must ensure that we exploit our own natural resources to the fullest extent. The regime for taxation, licensing and infrastructure around North Sea oil was designed when output and rewards were high. Its priorities were, rightly, to maximise the tax take and to ensure that companies who were awarded licences had the expertise to manage large finds of oil. As North Sea oil has declined, government policy has not kept pace with the changing world.

We need policies designed for hunting, not farming. The most important challenge in the North Sea was once working out the best way to exploit the existing resources: how best to “farm” the oil and gas. Today, the challenge is to find viable resources at all: a new license awarded today is often just a license to “hunt”. We need policies that offer the right incentives to explore for and extract the remaining reserves of oil and gas, and to keep existing fields open as long as possible.

With this in mind, the next Conservative government will reform exploration of the UK Continental Shelf (not just the North Sea) in three key areas:

Taxation

We will implement a tax regime that offers sufficient incentive to keep existing fields open as long as possible, and which also makes new exploration on the UK Continental Shelf attractive. An important component of this will be giving the industry greater clarity on future tax rates. In addition, we will improve the incentives for exploring and developing marginal fields through the Field Allowance, opening up new areas of exploration, including in the seas west of the Shetlands.

Licensing

Like taxation, licensing of exploration needs to be adapted to today’s circumstances. We will streamline government, introducing prequalification and offering standard contracts to the winning bidders. We will offer exploration companies a simpler, clearer and more transparent licensing process. We will also explore awarding licenses on a stratigraphic basis, thus ensuring that we get the widest range of relevant expertise in exploration.

Infrastructure

We will open the networks for getting North Sea oil and gas onshore. At present, much of this infrastructure is owned by companies who developed it for large wells which are now running dry. We will seek to ensure that owners of small nearby fields can access this infrastructure, at a fair price, so as to provide a gateway to market for small fields. Reducing our dependence on oil.

As a source of energy, oil is used in Britain today overwhelmingly to power transport. We have seen in recent years the impact of high and volatile oil prices on motorists and industry. In circumstances when there is, at the very least, a significant risk that oil prices will be higher than they are today, a strategy for energy security should seek to reduce our overwhelming dependence on oil for transport.

In any case, meeting the required 80% cut in greenhouse gas emissions by 2050 will require Britain – along with other countries – to make a switch to powering transport through non-fossil fuel sources. It would clearly be pointless to power transport by electricity if that electricity were itself generated using insecure and carbon-intensive sources of energy. For that reason, a strategy to reduce dependence on oil for transport must be part of a joined-up approach designed to radically reduce the carbon emitted in the generation of electricity.
High speed rail

The UK currently has only 68 miles of high speed line\(^{169}\), opened in 2007 as part of a Conservative plan to link the Channel Tunnel with London. Without any further action, by 2020 we will be left with 0.7 per cent of the high speed network in Europe\(^{166}\), behind countries including Poland, Italy, Portugal and Sweden. The Conservative Party transformed the debate on high speed rail in 2008 when we committed to building a high speed rail line connecting London and Heathrow with Birmingham, Manchester and Leeds, with construction to begin in 2015. This is the first step towards achieving our vision of a national high speed rail network to join up major cities across England, Scotland and Wales. High speed rail can provide a more attractive, lower carbon alternative to long distance car journeys. And with a direct link to Heathrow, the UK’s most important airport, our high speed network will also provide a viable alternative to domestic and short-haul European flights.

Electric vehicles

Among the most important and exciting technological developments in the transition to a low carbon economy is the move towards electric vehicles as the norm, rather than the exception. Most of the world’s major motor manufacturers are already planning for electric vehicles – beginning with plug-in hybrid electric vehicles – to form a significant proportion of their sales by 2020.

However, widespread adoption of electric vehicles depends on key policy decisions. First, unless and until there is a national network of recharging points enabling drivers to be confident that they can easily find a place to recharge, take-up will be limited. To incentivise the deployment of public charging points we propose to designate them as regulated assets, enabling Distribution Network Operators to invest ahead of need and cover the installation costs. We will require standardisation of charging points so that all types of plug-in hybrids and full electric vehicles can make use of the network.

If take-up of plug-in hybrid electric vehicles is substantial, it will significantly increase the demand for electricity. This reinforces the need for urgent investment in generating capacity that is central to this green paper. It also underlines the need for a smart grid (see chapter 14). Without new interactivity being built into the grid, the demand for electricity from electric vehicles is most likely to occur at peak times – during the business day when people arrive at work, and in the early evening, when people return home from work. It is essential that smart capability is built into the grid and the vehicles so that most charging is carried out when other demand for electricity is low relative to supply – such as the early hours of the morning. Such dynamic demand management can be important in addressing the intermittent nature of some renewable technologies.

Biofuels

Road transport – accounting for over half of the UK final consumption of petroleum products\(^{161}\) and contributing 22 per cent of carbon emissions in the UK\(^{162}\) – can move beyond dependence on oil through advanced vehicle technologies such as electric and plug-in hybrid vehicle technology. Greener fuels can also make a significant contribution to reducing net emissions from transport, and can reduce our dependence on petrol and diesel fuels.

But in developing greener fuels, we must avoid adding to the land use changes which are destroying high carbon stock land and accelerating deforestation.

The need to meet these wider objectives is now beginning to be understood at an EU level. The Renewable Energy Directive (RED), agreed at the end of 2008, represented a positive move on renewable fuels, setting a clear mandated target for 10% of transport energy to come from renewable sources by 2020.\(^{163}\) The RED set a minimum greenhouse gas saving for any biofuel used – initially set at 35% and rising to 60% for all new plant by 2017-2018.\(^{164}\) Starting to differentiate between good and bad biofuels in this way is a step in the right direction. However, other important dimensions to sustainability, including safeguards against possible indirect land use effects from biofuels expansion, have yet to be fully implemented.

In the UK, when the Renewable Transport Fuel Obligation (RTFO) was introduced\(^{165}\), it did not sufficiently discriminate between good and bad biofuels\(^{166}\). That is why we voted against this measure. Still, today, there are no mandated sustainability standards under the RTFO\(^{167}\). The present Government’s plan is that the UK regime will align over time with the EU regime. Sustainability standards within the Renewable Energy Directive will be incorporated into the UK RTFO by the end of this year\(^{168}\) but may not be fully implemented for some period after that.\(^{169}\) In the meantime, concerns over the impact of biofuels on the rainforests remain.
A Conservative Government would take steps to discriminate more effectively and quickly between good and bad biofuels while also shoring up investor confidence in an important sector for the UK economy. In the first instance a Conservative government would commit to maintaining the current, lowered trajectory of UK biofuels targets. But to ensure only ‘good’ biofuels which meet exacting sustainability standards are used in the UK, we plan to develop a new Sustainable Biofuels Scheme, which will reform the RTFO to take account of these important factors. Under this new Scheme accreditation would only be given to products which produce significant savings in greenhouse gas emissions and which do not add to pressures on high carbon stock land, including the rainforests, through the total lifecycle, taking into account all the products and production processes used. Once this reliable framework on sustainability is in place we would accelerate the uptake of biofuels by establishing more ambitious targets than those in the RTFO.

We are encouraged that there is every prospect that the biofuels coming on stream in the UK would meet these high sustainability standards and avoid negative effects on the rainforests. We are also encouraged by the investment in next generation technology. We will frame the new Sustainable Biofuels Scheme to support the UK developing a leading capability in this area.

The new Scheme would place the UK in the vanguard in developing measures to draw on the full potential of biofuels, creating a long term stable investment framework. In parallel we would encourage the more rapid development of the EU regime in this direction.
9. Gas

9.1 Gas in the 21st century

For most of the modern era, gas was the fossil fuel nobody wanted. For miners in the 18th and 19th centuries it was known as ‘firedamp’ – a deadly hazard that claimed countless lives in colliery explosions. Gas was discovered in much larger quantities by the oil industry, which, until recent decades, routinely flared it into the atmosphere as an inconvenient and untransportable by-product. But then everything changed with the deployment of pipeline infrastructure, turning gas into a valuable commodity.

Compared to the other fossil fuels, gas is clean burning – causing very few of the local pollution problems associated with coal and oil. Its carbon content is also much lower – approximately half that of coal. Because gas-fired power stations are more efficient than other thermal plant, the difference in emissions per unit of generation is even greater than per unit of fuel. A further advantage is that new gas plant has much lower capital costs than coal plant – and can be used more flexibly in response to changes in demand.

The combination of these advantages with the ready availability of gas from the North Sea created the conditions for the ‘dash for gas’ – in which the share of UK electricity generated from gas surged from almost nothing in 1990 to almost a third by 2000.\textsuperscript{170} In 2008, 46% of UK generation was gas-fired. However, it should be noted that most of the gas we use in this country is for other purposes like heating, cooking and various industrial processes; only 34% is used in power stations.\textsuperscript{171} Overall, gas is now the largest component of UK energy demand.\textsuperscript{172}

Security of supply

The culmination of the dash for gas coincided with the peaking of North Sea production. With our domestic supplies now on their post-peak downward slope, we are becoming increasingly dependent on overseas supplies – having become a net importer in 2004.\textsuperscript{173} In this respect, we became more typical of our European neighbours who have, in most cases, been long dependent on gas imports.

Russia is by far the biggest exporter of gas to Europe, most of it via pipelines crossing Ukrainian territory. A long-running dispute between the two former Soviet republics has resulted in Russia cutting off supplies to Ukraine – causing shortages in several other European countries. These events, in combination with tensions elsewhere, have raised serious concerns over the security of our gas supplies.
In 2008, 72% of our gas imports come from Norway and a further 23% from the Netherlands. However, as UK production continues to decline, we will not be able to rely on our fellow North Sea producers to make up the shortfall. That leaves two alternative sources of gas:

- The network of pipelines that connect gas fields in Russia and other former Soviet republics (principally Azerbaijan and Turkmenistan) to consumers across Europe
- Liquefied natural gas shipments (LNG) from gas fields around the world

In both cases, there is evidence to show that the adequacy and security of supply is improving – and in the case of LNG, improving dramatically (see box 3, below). However, energy security isn’t just about supply sources. Other factors, such as importation infrastructure, storage capacity and trading relationships, form additional and indispensable links in supply. Even if, as we expect, global production of natural gas remains abundant for decades to come, we can only rely on this abundance if every link in the chain is secure.

![Chart 16: Projected UK natural gas supplies](source: National Grid, Gas transportation ten year statement 2009)
Box 3: The gas supply revolution

With most of Britain’s coal-fired and nuclear power stations due to retire over the next fifteen years, security of supply has been used as an argument against building gas-fired plant as a replacement, despite its low capital cost. However, the standard narrative on the security of gas supplies has been challenged by three game-changing developments in the global gas industry:

- Firstly, the building of major new pipelines – for instance, ‘Nord Stream’ which will cross the Baltic Sea to connect Russia directly to Germany, thus bypassing Ukraine and its still unresolved dispute with Russia; and ‘Nabucco’, which bypasses both Ukraine and Russia, connecting the EU to gas fields in western and central Asia via Turkey.

- A second, and yet more important, development is the ongoing world-wide deployment of LNG vessels and infrastructure. This has enabled the creation of a globalised market for gas, rivalling the old order of regionalised markets constrained by access to pipelines. As well as multiplying options for importers, LNG has allowed countries that were previously held back by their distance from pipeline networks to become major exporters. The Gulf state of Qatar is the best-known example, but other countries are catching up, in particular, Australia – set to become the world’s second largest LNG exporter by 2020.175

- The third, and potentially most important, development is the remarkable growth of the shale gas industry in the United States.176 It has long been known that certain shale formations contain huge quantities of gas trapped in tight layers of rock. These formations can be found around the world, but the American gas sector is unique in having a significant number of innovative, independent companies, which have developed and commercialised new techniques for extracting shale gas at reasonable cost. With recoverable reserves estimated at over 600 trillion cubic feet, shale gas resulted in an unprecedented boost to US natural gas reserves.177 US LNG import facilities built in anticipation of growing import dependency are operating at less than 10% capacity.178

Positive changes on this scale are rare in any industry, especially the energy industry. They help explain why gas prices have not just fallen – as might be expected in recessionary times – but fallen relative to oil prices, breaking the old link. This shift in the economics of energy has been matched by a shift in power within the energy sector. Shale gas in particular is a victory for free enterprise over the essentially state-led business of pipeline projects and national energy companies.

The oil multinationals, shut out of traditional fossil fuel markets by state policy, are now putting their vast resources behind the new, globalised gas industry. For instance, Shell has announced plans to build floating LNG plant capable of not only transporting gas like existing LNG vessels, but also extracting it directly from fields that are too remote to supply onshore LNG export facilities – thereby rescuing previously ‘stranded’ resources.179 The multinationals are also moving into the shale gas market, as exemplified by Exxon’s $41 billion dollar purchase of XTO, a company specialising in shale gas.180 This heralds the globalisation of the industry, with the know-how developed by the US independent applied to countries with as yet untapped reserves, including strategically important locations like Poland181 and China.182

9.2 Securing our gas supplies

Britain is the second largest gas consumer in the Europe Union – consuming only a little less than Germany.183 Securing our gas supplies is therefore an immediate priority.

The policy debate over this issue has often focused on the extent to which new gas-fired power stations should be allowed replace the generating capacity due to retire over the next two decades. Throughout this paper we make the case for diversity, following Winston Churchill’s principle that energy security “lies in diversity and diversity alone.”184
However, we also need to face the fact that decisions taken on electricity will not transform the situation in regard to gas. For instance, even if we were to build a massive 20 gigawatts of new CCGT (combined cycle gas turbine) plant – i.e. enough to double our existing capacity – overall UK gas consumption would only increase by a fifth.185 This is for the simple reason that most gas is used for other purposes (see section 9.1, above).

Ultimately, the question is not whether we should rely on gas for our heat and power – because we already do – rather the question is how we can ensure the security of our supplies.

**End of the line or first port of call?**

At a European level the focus is still on the ‘pipeline politics’ of securing gas supplies from the former Soviet Union. Britain, of course, has a strong interest in the energy security of Europe as a whole; and a Conservative Government would be in favour pipelines that improve the reliability of Russian supplies to the continent as well as those that provide links to alternative suppliers.

However, in terms of the active role we take in Europe’s energy politics, it must be remembered that Britain is literally at the end of a very long line. The priority for a Conservative Government would be to play to Britain’s historical and geographical strengths as a maritime nation. Beyond strengthening our already close trading relationship with Norway, the best way that we can actively ensure the security of our gas supplies is to make Britain a priority destination for LNG shipments from around the world, with the vital back-up of adequate storage capacity and long-term supply contracts.

**Import capacity**

Britain is already well positioned in terms of gas importation infrastructure.

Responding to Britain’s growing import requirements, 24 companies from eleven countries have invested £10 billion186 in LNG import terminals and a second pipeline to Norway – further proof that where genuine markets are able to operate in the energy sector, they deliver.

Total UK import capacity now stands at 127.5 billion cubic metres per annum. This is well in excess of projected import levels in the next twenty years – and of overall consumption levels too (currently a little under 100 billion cubic metres per annum).187

The UK is already attracting record levels of LNG shipments – exceeding 1 million tonnes a month – including those displaced from North American markets by shale gas production. By the end of 2009, this was enough to drive the UK NBP forward prices for gas down to 40 pence a therm.188

**Storage – the weakest link**

Unfortunately, while Britain is capable of importing large quantities of cheap natural gas, it is unable to store much of it. At the start of December 2009 Britain’s biggest storage site, the offshore Rough facility, was 99% full.189 However, by January 2010, when freezing weather set in and technical faults disrupted imports from Norway, our limited gas storage and draw-down was unable to compensate, placing supplies under such strain that National Grid was forced to issue a string of gas balancing alerts.190 By late February, the level of gas left was equivalent to just four days’ worth of average consumption.191

This isn’t the first time that supplies have come under strain in this way. In January 2009, the Russia-Ukraine gas dispute flared-up again, leading to the interruption of pipeline gas supplies from Russia via Ukraine to the European Union. Shortages caused by the interruption meant that the normal winter flow of gas from the Continent to Britain via the Bacton-Zeebrugge interconnector was reversed – accelerating the depletion of UK storage facilities.

Historically, our gas storage has been the North Sea. In times of especially high demand, extra gas could be extracted. Depletion has not only reduced the size of our remaining reserves, but also flexibility with which the rate of production can be increased to meet temporary surges in demand – a situation that is causing growing concern among energy experts:

“The UK is lagging behind in terms of overall storage capacity, historically because of the UK’s own indigenous supply from the North Sea. This is one part of the nation’s gas infrastructure that really needs looking at urgently.”

Today Britain has approximately sixteen days of gas storage,\textsuperscript{192} compared to around 100 days in Germany and 122 in France.\textsuperscript{193} But perhaps the most telling comparison is with the Netherlands – which shares Britain’s history as a major gas producer. Despite its much smaller population, the Netherlands has more storage space than the UK – and approximately three times as much relative to consumption levels.\textsuperscript{194}

While the Dutch Government prepared their country for the depletion of North Sea reserves, ours did not. It took ministers until 2009 to put in place the basic regulatory framework for the expansion of UK storage capacity. They continue to base their policy on statistics for future capacity that indicate proposed projects, rather than those actually in operation or under construction. According to National Grid’s Ten year statement just 0.53 billion cubic metres of additional capacity will have been built by the end of 2012, equivalent to two days of average demand.\textsuperscript{195}

**Trading relationships**

As well as much higher levels of storage, our European neighbours have underpinned the security of their gas supplies through long-term contractual relationships with exporters. Globally, most of the LNG market consists of long-term supply contracts. Just 10\% of LNG is sold on spot markets\textsuperscript{196} – where excess supply is a recent and, as yet, uncertain development, and on which Britain is currently entirely dependent for its LNG imports.

With North Sea production now in decline, contracted supplies could and should play a bigger role in guaranteeing our energy security. We believe that UK security objectives would be best served by an energy policy that provides a mix of market-based incentives for trading in storage capacity, spot markets and long-term supply contracts in which prices are based on the fundamentals of an increasingly diverse and productive global gas industry.

**9.3 A better way**

We believe that gas will have an increasingly important role to play in providing Britain with an energy mix that offers security of supply to consumers at a competitive price. As the proportion of intermittent renewable energy increases in Britain’s energy mix – and if nuclear power supplies a substantial proportion of baseload demand – the flexibility of gas-generated electricity is an important qualitative contribution which makes it an indispensable fuel.

A new generation of gas-fired power stations will, unlike during the last two decades, require most of the gas they use to be imported as North Sea production declines. This import dependence raises questions of energy security that other import-dependent countries have resolved through requiring suppliers to guarantee access to sufficient quantities of gas to be proof against external interruptions to supply. We believe that Britain should do the same.

**Internationally-comparable levels of gas storage**

Accordingly, a Conservative government will place an obligation on suppliers to have arrangements in place to guarantee continued access to gas supplies for a period long enough to withstand a sustained interruption of external supply during the winter period of peak consumption.

This supply obligation could be discharged in a number of ways: suppliers of gas to domestic and industrial customers could maintain enough gas in storage themselves to meet the obligation directly; they could contract with other owners of storage capacity to satisfy the requirement; they could demonstrate that they had long-term contracts in place with external suppliers to be able to dependably access the required level of supply during the specified period; or, suppliers could demonstrate that contracts they held with industrial users provided for sufficient demand-side response to be able to meet the supply obligation to remaining industrial and residential consumers.

The regulator would be responsible for monitoring adherence to this obligation as part of the licence conditions of gas suppliers to UK customers. This flexible approach to demonstrating security of supply gives operators a choice of means to guarantee supply. We expect that more storage capacity will need to be built, and that more gas will be held in reserve – as is the case in other gas-importing nations. The exact volume of storage and gas in storage will depend on the balance between physical storage, long-term supply agreements and contracted demand-side flexibility that operators choose.

**Long-term supply contracts**

While the North Sea delivered abundant gas supplies there was little need to invest in gas storage capacity, but neither was there an imperative to enter into long term supply contracts with other gas suppliers, which is the other principal way in which gas-importing nations can secure their supplies.
Britain’s energy policy overseas was to seek to persuade our European partners that gas markets should be liberalised and unbundled to conform to a spot-marked model more typical of oil markets. In itself, that is an appropriate ambition. However, in the meantime, European importers of gas lost no time in establishing long-term supply contracts with exporting countries like Russia and Norway. This has left Britain playing catch up in gas contracting. We are literally at the end of the line – able to take gas from other countries only once long-term supply contracts have first been discharged: a situation that leaves us especially vulnerable during periods of tight supply.

While continuing to favour overall market liberalisation in Europe, Britain needs to act in a way that defends the interests of our own consumers and businesses. As the governments of other European countries have done, a Conservative government would play an active role internationally in supporting the establishment of long-term supply contracts with overseas gas suppliers. It is clear that we should have multiple sources of gas supply: our long-standing connections with gas exporters in the Gulf have too often been neglected, and even within Europe our short-termist approach has left us short of strategic partners.

Security of gas supply can also benefit from as wide and diverse a set of interconnections with other countries as is possible. Clearly, new interconnectors will need to be promoted on a commercial basis, but a Conservative government would work with industry and other governments to facilitate the quickest possible response to opportunities to extend and reinforce our pipeline – and electricity grid – connections.

**Carbon capture and storage**

In its Low Carbon Transition Plan, published in July 2009, the Government revealed that it envisaged power cuts from 2017 rather than an increase in the contribution of gas to electricity generation. The Plan envisaged no increased imports of gas, and instead was based on 3 GWh of expected energy unserved by UK generators in 2017. We believe that this is a reckless assessment and that it is a duty of government to seek to avoid blackouts, rather than to assume their likelihood. This requires facing up to an increase in the use of gas for electricity generation at least during the next 10 years. Although much less CO₂-emitting than coal-fired generation – especially in CCGT plant – burning gas nevertheless contributes greenhouse gas emissions. To be consistent with our aim to substantially decarbonise the generation of electricity by 2030, gas generation also requires the rapid development of Carbon Capture and Storage. The policy of a Conservative Government for CCS has been described in chapter 7. The combination of a firm and predictable carbon price, pump priming investment in demonstrating CCS and the regulatory requirement of an emissions performance standard are the three policy instruments which we believe can accelerate the commercial deployment of CCS in Britain – something as relevant to gas as it is to coal in the long-term.

**The long-term view**

In this chapter we have presented a purposeful, but balanced, policy agenda on the role of gas in Britain’s energy mix. The risks of the current situation – particularly those surrounding our storage infrastructure – are significant, but so are the opportunities presented by gas supply revolution (see box 3). If – but only if – we address those weaknesses, we can be confident in seeking to make the most of the opportunities.

But what of the long-term? While the global supply situation in respect to gas may well prove to be more positive than that for oil (see chapter 8) – this might in itself present new challenges. If global production remains buoyant and gas prices remain low relative to other fossils fuels then this could create the conditions for major new sources of gas demand. For instance, we could see more fuel switching in the global power sector from coal and oil to gas. We could also see gas displacing oil in the transport sector – through the greater use of Compressed Natural Gas (CNG) vehicles, electric vehicles power by gas-fired electricity and gas-to-liquids fuel production as exemplified by the Pearl GTL project in Qatar.

If these developments happen at all it will be over the next couple of decades, not the next couple of years. Nevertheless, these very real possibilities underline the fact that we cannot rely on an everlasting excess of supply over demand. Rather, our long-term strategy should be that as and when gas displaces other fossil fuels, we deploy low-carbon energy technologies to displace natural gas. This will be facilitated by the fact that, as a flexible and low capital cost generating technology, gas-fired plant enables higher penetrations of renewable power over time; and also because the roll-out of efficiency improvements to buildings will do more to reduce demand for gas – as the main heating fuel – than any other form of energy.

In the end, its very displacability may prove to be gas’s greatest advantage.
10. Nuclear power

10.1 Nuclear power in the 21st century

Britain was the pioneer of nuclear power generation, with the world’s first industrial scale nuclear plant opening at Calder Hall in Cumbria in 1956. The last British nuclear plant, Sizewell B was opened in 1995. At its peak, nuclear power was generating 26% of the UK’s electricity demand in 1997, although plant closures and growing demand have now reduced that figure to 13%.198

By 2023 every existing nuclear plant apart from Sizewell B will have reached the end of its planned life,199 depriving Britain of an important low carbon source of baseload power. The current ongoing decline, in combination with the depletion of Britain’s fossil fuel reserves, has resulted in an unprecedented decline in UK-based energy production (see section 13.1) – compromising our energy security. However, unlike our fossil fuel production, the decline in nuclear generation can be reversed.
To understand why such a revival, though possible, has yet to be achieved we need to understand the history of nuclear power in Britain.

**Early setbacks**

Being an early developer, although a notable engineering achievement, brought its own difficulties. First, plant was built without an adequate decommissioning plan – which has left Britain facing a decommissioning bill estimated at £44 billion. Second, it is not possible to disentangle the costs of the civil nuclear programme from the military nuclear programme. And third, Britain did not adopt a single reactor design, so lessons from constructing a facility could not be learned for future facilities. As a result, it was not possible to achieve economies of scale and the programme was beset by delays and cost overruns.

There has also been a failure to tackle the problems of the disposal of the spent nuclear fuel and nuclear waste. Previous attempts ended in abject failure with massive public opposition to the proposed potential sites, resulting in the issue being put on the back-burner for another two decades.

Germany has recently taken the decision to extend the life of some of its nuclear power stations. This is an option for some British nuclear power stations too – if that is they can meet the safety assessments required by the Nuclear Installations Inspectorate. However, the scope for life extensions for the Magnox fleet is severely restricted by the availability of suitable fuel. For this and other reasons, the continuation of nuclear as a major part of our energy mix depends on new nuclear build.

**Continued delays**

The Government’s 2003 Energy White Paper effectively ruled out nuclear new build as being: “an unattractive option for new, carbon-free generating capacity”. This moratorium continued until the Energy White Paper in 2007, in which the Government stated that it would be “in the public interest to give the private sector the option of investing in new nuclear power stations”.

With Britain facing an energy crunch in 2017 (as predicted in the Government’s Low Carbon Transition Plan) and new plant taking many years to build, a new build programme starting in 2003 rather than 2011 would have done much to address the energy security challenges Britain faces.

**10.2 Enabling nuclear new build**

Our view is that new nuclear can make an important contribution to low-carbon energy security in the UK and should have a role to play, as long as it is economically viable. That means that the operators will be liable for the construction, operating and decommissioning costs and for their full share of the waste disposal costs and our discussions with them suggest that they are willing to invest on this basis.

To reassure potential investors, we have actively worked to take nuclear policy out of politics, recognising that investors need long-term policy stability if they are to be convinced about the opportunities for nuclear in the UK.

**Nuclear waste**

It is essential that a comprehensive disposal/storage approach for spent fuel and nuclear waste is found.

Government has a responsibility to deal with the ‘legacy waste’ produced historically in Britain’s civil and military nuclear programmes. Britain has the largest stockpile of plutonium in the world – around 100 tonnes – and the Government should take the lead in addressing how this should be dealt with.

It is likely however that for some decades, spent fuel will be stored on site at the facilities where it has been generated. It makes sense that it should be stored in a format that enables it to be transferred at an appropriate time to the deep-disposal facility rather than requiring repackaging at a cost of some additional billions.

**Reprocessing**

The Government needs both to take forward the process of finding a site for a potential deep-disposal facility and also explore other ways in which the used fuels which can be recycled, to provide fuels which could be used in the new generation of Pressurised Water Reactors being planned. Recycling can reduce the volume of plutonium by over 95%. Britain has already developed considerable expertise in these technologies and it is potentially a source of income for the Government that could be used to defray the cost of decommissioning and the disposal of legacy waste.
Market incentives

The most significant hurdle to new investment seems to be absence of a price for carbon or another mechanism to ensure a stable price for electricity generated.

The companies looking at new-build nuclear in the UK will constantly be assessing the comparative advantage of different opportunities around the world. They need to be sure of an adequate return on their investments if they are to go ahead.

The cost of carbon is clearly central to this, but there is a wider issue that relates to the structure of the UK energy purchasing market. Nuclear works most appropriately as base load, to generate the returns necessary to justify both the multi-billion construction and decommissioning costs.

As we discuss in chapter 3, it already looks possible that the EU ETS, even in its third phase from 2013, will lack the robustness and predictability to provide the certainty in the carbon price that would drive the development of nuclear, renewables and CCS and investment in these low-carbon technologies will be at severe risk if there is not predictability on the future price of carbon.

Maximising the industrial opportunity

Although the companies building new reactors and the designs may be foreign-owned, the Government should be active in securing the best possible opportunities for UK suppliers. The Government should have an effective programme for ensuring that local companies are aware of such opportunities and have the chance to pitch for them.

Equally, we need to ensure that local people have the necessary skills to take on local employment opportunities. The extent to which British universities are developing nuclear engineering courses is encouraging, but there needs to be a constant focus on providing the appropriate skills base at all levels.

The approach to nuclear new build in the UK is unique in the world. The opportunities for Britain in securing this investment are of great potential value, not just in providing low-carbon secure electricity (which will become of even greater importance as the ground transport system becomes electrified) but in providing a British model which can be followed around the world.
10.3 A better way

New build

We will improve the planning system to provide greater certainty to investors. We regret the Government’s decision to reject our proposals that the National Planning Statements should be subject to a substantive vote in Parliament, as this would reduce the risk of judicial review and prevent considerable delay. If the National Planning Statements have not been approved before an election, an incoming Conservative Government would require an early debate and substantive vote to enhance their legitimacy.

We would reform the Climate Change Levy to create a floor-price for carbon. Starting initially at a low level but building up over time, this would help provide the price predictability that investment in low carbon technologies would require. Reforms to the structure of electricity markets will be enacted to produce more predictable revenue streams appropriate to capital intensive forms of generation like nuclear and renewables.

We would require the development of relevant skills to be included in the Office of Nuclear Development’s roadmap, to ensure that people have the necessary skills and qualifications to take up the many employment opportunities that a nuclear new-build programme would create.

Decommissioning

Within eighteen months of coming to Government, we would require guidelines to be provided for the method of packaging spent fuel and nuclear waste, to avoid huge additional costs when it is eventually moved to long-term store.

We will give the Nuclear Decommissioning Authority a specific responsibility for realising the potential value of its assets. We will undertake a comprehensive assessment of the potential for recycling spent nuclear fuel, so that the costs, benefits and any environmental consequences of this approach of dealing with Britain’s plutonium stockpiles can be understood.

Simultaneously, we will take forward the process of finding a potential host community for a deep-repository. Our proposals for allowing business rates to be kept locally for the first six years will bring significant financial benefits to any such locality.

The expressions of interest have so far all been from Cumbria – from Cumbria County Council and from Copeland and Allerdale Borough Councils. To ensure that we maintain the best relations with these communities and taking these discussions forward in a sensitive manner, we would strengthen the Ministerial Forum on West Cumbria, for example by involving the trades unions, to ensure full representation of the local workforce.
11. Energy efficiency

11.1 Energy efficiency in the 21st century

Energy efficiency has long had Cinderella status in the world of energy policy. Until 2008, it didn’t even come under the remit of the government department responsible for energy.

Unlike coal, oil, gas, nuclear or renewables, it is not an energy source in its own right and so doesn’t appear as an item in the official balance sheet of UK energy supply and demand.206 And yet, there is a statistic that does illustrate the paramount importance of efficiency to our security and prosperity.

Periodically, the government publishes figures for the energy ratio – which shows how much energy is consumed per unit of gross domestic product. Using 1970 as the base year, the energy ratio has declined by an average annual rate of 2%; meaning that in 2008 it took just 43% of the energy that it took in 1970 to produce each unit of GDP.207

Some might object that this simply reflects a move away from heavy industry as a mainstay of the British economy. But, in fact, the energy ratio has declined in the domestic, service and transport sectors as well as the industry sector.208 Furthermore, the energy ratio has also declined in export-orientated manufacturing economies like Germany and Japan.209

The ability to produce more wealth with less energy is one of the surest signs of economic progress. To look at it another way, the more primitive a technology, the less energy efficient it is likely to be.

Cost advantages

We believe that in the 21st century, energy efficiency will be more important than ever. As fossil fuel supplies become less certain and more expensive, energy efficiency stands out as the most affordable way of reducing our exposure to a growing economic and environmental burden.

This can be seen in a remarkable piece of research carried out by McKinsey & Co.210 It is summarised in a bar chart in which the height of each bar represents the cost of different low carbon energy technologies, while the width shows the scale on which each option could be deployed. By assembling those bars in height order, a cost curve is created. On the lefthand side of the chart, the bars are inverted, reflecting the fact that the costs are less than zero. In other words, they actually save money, providing a speedy payback on the upfront investment. As one moves up the cost curve, the costs are still negative, but the payback times are longer – requiring more patient investment. It is only on the right-hand side of the curve that the costs become positive, exceeding the price of fossil fuel energy to various degrees – though, of course, to a lesser degree as fossil fuel prices increase.

Unsurprising the left-hand of the cost curve is dominated by various energy efficiency technologies that save money by saving energy – in particular the thermal insulation of buildings and greater efficiency in lighting, boilers, appliances and vehicles.

Even the most expensive energy efficiency measures are still cheaper than most low carbon energy generation options. For example, the revised cost estimates by the Committee on Climate Change for solid wall insulation puts its cost at £17 per tonne of carbon saved.211

Fighting fuel poverty

Taken as a whole, the McKinsey curve shows why – thanks to the cost advantages of energy efficiency – most economists believe that the overall costs of fighting climate change are affordable. However, energy efficiency also has a crucial role to play to the fight against fuel poverty, which – thanks to fossil fuel price increases – is a growing problem.

We have been very disappointed by Labour’s complete failure to tackle the problems of fuel poverty, which have deteriorated greatly, in spite of promises to eradicate it. Whilst this paper is predominantly about energy security, we are acutely aware that the actions called for are extremely expensive and we have therefore made an unparalleled commitment to energy efficiency to help reduce the number of units people use. It is also clear that without the actions proposed in this paper, Britain’s energy security will worsen further, with catastrophic consequences for consumers’ bills.

Figures published by the Government last October show that there were 4 million fuel poor households in the UK in 2007. Government projections for more recent years are available for England, but not for the UK. The Government projects that, in England, fuel poverty rose from 2.8 million fuel poor households in 2007 to 4.6 million households in 2009; an increase of 64 per cent.212
As well as being the least cost option for cutting carbon emissions, energy efficiency is also the least cost option for cutting energy bills. For instance, an evaluation commissioned by the Government of the ‘EEC2’ energy efficiency programme, found that measures installed under the programme saved electricity at a levelised cost of 2.1 pence per kilowatt hour – less than a quarter of the (then) average price to consumers. Substantial savings were also in regard gas consumption, which was reduced at a cost of just 0.6 pence per kilowatt hour.

**Security advantages**

If the most affordable kind of energy is the energy you don’t have to buy, then the most secure kind of energy is the energy you don’t have to import. Energy efficiency is a completely indigenous resource and the degree to which we, as a nation, avail ourselves of its full potential is entirely our own choice.

Unlike power stations or pipelines, most energy efficiency improvements are completely reliable – they rarely break down, they can’t be sabotaged and they don’t need vulnerable networks to bring their benefits to the consumer.

While debate rages over the relative merits of coal-fired, nuclear or renewable alternatives to our increasing dependency on gas-fired power stations, the reality is that two-thirds of the gas we use is for heating, not electricity. As we describe in the next chapter, alternative heating options are limited. Energy efficiency, however, allows us to reduce demand for heating – and therefore provides by far the cheapest and most scalable means of limiting our gas import requirements. The same can said for our dependency on oil within the transport sector.

Of course, we can’t rely on efficiency alone – we still need to find ways of diversifying the generation of heat and power. However, efficiency will make this more affordable in two ways: firstly, by producing savings that will help consumers to offset the costs of developing a diverse generation mix; and, secondly, by reducing overall energy demand and therefore the level of new generating capacity required.

### 11.2 Achieving an energy efficiency breakthrough

In terms of the cost of tackling climate change, fighting fuel poverty and ensuring security of supply, the benefits of energy efficiency are clear. However, the advantages do not stop there: As a low cost, but labour-intensive, energy technology, investment in energy efficiency is also a good way of creating jobs.

But if the case for energy efficiency is so overwhelming then why aren’t we doing more about it?

**The scale of what needs to be done**

In its recent report to Parliament, the Committee on Climate Change set out the scale of energy efficiency improvements required to enable Britain to meet its carbon targets:
“In this report, we present detailed trajectories for implementation of required measures: 10 million lofts and 7.5 million cavity walls are insulated by 2015, supported by a high level energy audit of all homes in the UK; 2.3 million solid walls are insulated by 2022; all (i.e. 12 million) old inefficient non-condensing boilers are replaced by 2022; stock penetration of A+ rated washing machines and dishwashers is increased to around 80% by 2022 and A++ rated fridges to 45% by 2022”.

A range of energy efficiency programmes are already in operation, the biggest of which is Carbon Emission Reduction Target (CERT) which has a three year budget (2008-11) of £3.2 billion. CERT is an obligation on energy suppliers, but its costs are ultimately passed on to energy consumers.

Unfortunately, comparison between energy efficiency benchmarks (as set out above) and what is actually being achieved, indicates that insufficient is progress is being made.716 The Committee on Climate Change has expressed its concerns:

“Our analysis suggests, however, that emissions reductions will not ensue to the extent required under the current framework (i.e. CERT, led by energy suppliers, which has been most successful at providing free energy efficient lightbulbs).”717

The Committee on Climate Change, notes that progress appears to be especially slow on the more difficult energy efficiency improvements such as solid wall insulation:

“This is borne out by the data from CERT’s first year of operation when only 8,600 solid wall insulation measures were delivered. Initially, the government suggested that the scheme might deliver 150,000 solid wall measures between 2008 and 2011.”7218

**Obstacles to progress**

There are a variety of reasons why opportunities to improve energy efficiency – even when they offer immediate financial benefits – aren’t taken up. These include inadequate access to low-cost capital, poor understanding of the benefits, the ‘hassle factor’ of employing contractors and a lack of trusted organisations to undertake the work.

These factors are well documented and are familiar to policy makers. All energy technologies face barriers to their deployment, which is why we need a national energy policy to clear the way. So the real issue is not the obstacles that apply to energy efficiency, but why don’t have government policies capable of dealing with them.

Again, the point is made by the Government’s own advisory body, the Committee on Climate Change:

“The current policy is not well designed to address the range of barriers to energy efficiency improvement (lack of information, hassle factor, lack of willingness to implement measures, etc.). A new policy is therefore required.”7219

We believe that the current inadequacy of government policy stems from three basic flaws:

Firstly, current government policy is largely restricted to incumbents. For instance, CERT and related schemes are implemented exclusively by the big energy suppliers. Those enterprises – commercial and social – that could transform the situation, for instance big-name retailers or housing associations – are excluded. Barriers to market entry are a problem across the energy spectrum, but particularly inappropriate in this case. In obvious contrast to large-scale energy projects like power stations, energy efficiency improvements in the domestic and commercial spheres should be a mass consumer product. Shutting out the diversity and competition that drives innovation and growth in other mass consumer markets is therefore a fundamental mistake that must be reversed if progress is to be made.

The second basic flaw in current government policy is its failure to recognise and reward the value that energy efficiency has in aggregate. While the purchase of, say, an energy efficient appliance can reduce the energy bills of the household that buys it, millions of such appliances reduce the cost of achieving energy security for the country as whole – by mitigating the need for new generating capacity and additional fuel imports. UK energy trading arrangements fail to provide a market for the roll-out of demand-side measures like energy efficiency – even though this may well be less expensive than supply-side measures like the construction of new power stations. Therefore, what could be an important driver of efficiency in the domestic, service and industry sectors is wasted.

The third basic flaw in current government policy is its poverty of ambition. While the combined budget for all the energy efficiency policies presently in operation amounts to £2.7 billion per annum,720 this is evidently not enough to achieve the
level of efficiency improvements required. Given that supply-side alternatives to demand reduction are almost invariably more expensive, it simply makes no sense not to be investing more money in energy efficiency. With our public finances in their current state it is clear that there will no step-change in progress without attracting finance from the private sector, which is something that the current approach is not designed for and hasn’t achieved – despite the fundamentally sound investment case for energy efficiency.

11.3 A better way

The Green Deal

Conservatives believe that the energy efficiency services market should be opened up by offering every household in Britain a Green Deal of up to £6,500 worth of energy efficiency improvements – with a higher limit for hard-to-treat homes – at no up front cost. Existing government schemes are failing their potential by restricting the number of homes eligible for energy efficiency schemes, or limiting the provision of these services to the big energy suppliers.

Under our plans, trusted private contractors such as high street retailers, local authorities, local businesses and social enterprises, as well as the traditional energy suppliers, would be entitled to provide these energy efficiency improvements to people’s homes. Rather than incurring a large bill up front, the costs of the work will instead be met over the long term through the energy savings resulting from the work:

- Householders can have an independent assessment of what energy efficiency improvements could be made to their home to lead to savings in their heating bills
- These improvements can then be carried out immediately by a kite-marked installer, at no upfront cost to the household
- The costs of the work will be repaid over 25 years through the household’s electricity bill

Any measures that improve the energy efficiency of the home and can demonstrate a positive payback over a 20 year period will be eligible for funding under the scheme.

The Green Deal will be privately financed by banks and investment funds and will be co-ordinated by existing non-departmental public bodies, so there will be no additional cost to the taxpayer.

Top-up funding for energy efficiency measures – such as CERT and WarmFront – will be combined with the scheme where available to reduce the cost to households even further.

We estimate that a typical house could expect to see savings of £360 a year on their heating bills after £1,500 worth of efficiency improvements. After repaying £120 a year through their electricity bill towards the cost of the improvements, a typical household will still be £240 a year better off.

There will also be significant economic and environmental benefits, with the Green Deal estimated to create over 70,000 skilled jobs and save 9.4 million tonnes of CO₂ a year, the equivalent to the current annual emissions of all the houses in Manchester, Birmingham, Liverpool, Bristol, Belfast, Cardiff, Edinburgh, and Glasgow put together.

Extending the Green Deal

Our plans for a Green Deal on home energy efficiency were first unveiled at the beginning of 2009. We have subsequently consulted on the details with a wide range of interested parties and developed complementary policies like the Green Investment Bank. The reaction has been overwhelmingly positive – other than from one source: the Government.

Missing the point that the Green Deal is about saving money, Ministers claimed that it would be unaffordable. That changed at the beginning of March, when the Government announced its own version of the Green Deal as part of the Household Energy Management Strategy. We very much welcome this change of heart – and, where these proposals contain useful additions to our own, a Conservative Government would incorporate and implement them.
However, we do regret that ministers have waited until the end of a thirteen year period in office to begin to get serious about energy efficiency. In Government we would be determined not to repeat this error. The security, sustainability and economic benefits of energy efficiency are too valuable to waste.

Therefore, alongside the implementation of the Green Deal on home energy efficiency, we will actively look for opportunities to extend the principles – and the scale of ambition – of the Green Deal to other sectors.

For instance, it is estimated that non-domestic buildings account for almost a fifth of UK carbon emissions. Improving the efficiency of these buildings – to a minimum Energy Performance Certificate standard of C – would, according to industry reports, generate annual energy cost savings of over £5 billion a year, with a typical payback period of less than five years.224

**Energy efficiency as a strategic energy resource**

A Conservative Government will regard the untapped potential of energy efficiency in all sectors as a strategic energy resource. As we show in section 11.1, efficiency improvements have always played a vital role in achieving our energy needs. However, because these improvements are spread over millions of buildings, vehicles and appliances – their collective contribution has been hard to factor into energy policy decisions.

This represents a missed opportunity, because quantifiable blocks of efficiency upgrades could provide a valid alternative to the construction of additional generating or storage capacity. In overseas energy markets such as the NEPOOL system in New England,225 efficiency projects are already able to compete with generating projects in providing a guarantee that there will be enough supply to meet demand in the electricity market.

Wherever feasible, we will ensure that energy market reforms allow demand-side measures, such as energy efficiency, to compete fairly and openly with supply-side measures.
12. Decentralised energy

12.1 Decentralised energy in the 21st century

The Green Deal will empower the public to save energy, but what about enabling families, communities and businesses to generate their own energy?

In our previous publications, *Power to the People* and *The Low Carbon Economy*, we made the case for local or decentralised energy – which includes combined heat and power (CHP) systems, solar panels, heat pumps and biomass boilers. Decentralised energy technologies can be deployed at a variety of scales – from individual dwellings to community buildings, commercial property and entire neighbourhoods. They represent an alternative to the established model of centralised energy generation and distribution controlled by big business and big government.

Though government has always intervened in energy markets to achieve social, environmental, economic and security objectives, state support has typically been directed towards the major players. That has to change, so that support is also accessible to individuals, community groups and local enterprises seeking to take control of their own energy needs. That is why we have campaigned successfully for measures that will enable members of the public to generate energy – even from their own homes – and be paid for it. The aim is to create a virtuous circle in which the market for local energy grows, driving the development of better and cheaper energy technologies, increasing consumer uptake and further growing the market. A consumer-driven energy market would of course present a challenge to the centralised energy model. It is a prospect that might frighten some governments, but we will actively encourage it.

**The importance of heat**

However, there is another reason why we believe local energy needs to be part of a diverse energy mix – and that is because the most important form of energy used in Britain today can only be generated locally: heat.

Generating heat is the single biggest use of the ‘raw’ energy Britain consumes – more than is used for generating electricity or fuelling transport. Moreover, around a third of the electricity used by consumers is used to power electrical heating systems. Thus around half of the energy we use in this country is for heat – whether in the form of space heating, hot water or various industrial processes.

Given the depletion of North Sea oil and gas, the implications for energy security are profound. Around two-thirds of the gas we use in this country is for heat. A significant share of the oil we use for non-transport purposes is for heat – in refineries, other industrial uses and as a heating fuel in ‘off-gas’ areas of the country.

Because coal is too polluting and impractical to be used as a substitute in any significant quantity; and because nuclear power and large-scale renewables are electricity-only technologies; local energy is the only alternative to gas and oil in the non-electrical generation of heat.
Box 4: How heat got left behind

In 1949, over three-quarters of our electricity was generated in power stations of less than 300 megawatts in size. In many urban areas, the heat output from these stations was also delivered to consumers through district heating networks. But with nationalisation and the national grid, came centralisation. Today, over three-quarters of our electricity is produced in stations of more than 300 megawatts capacity and two-thirds from stations of more than 1,000 megawatts capacity.\textsuperscript{233}

Heat production, however, has remained small-scale and local. Indeed, almost all of it now takes place in our homes and places of work – most of the old district heating networks having been abandoned decades ago. Unlike power, heat cannot be transported over long distances. So with most electricity generated tens or hundreds of miles from where it is consumed, the heat produced by power stations is typically vented into the atmosphere.

In 2008, 48\% of the energy produced by gas-fired power stations, 64\% of the energy produced from coal-fired power stations and 62\% of the energy produced from nuclear power stations was lost in this way.\textsuperscript{234} Total thermal losses from all power stations for that year came to 500,000 gigawatt hours\textsuperscript{235} – equivalent to all the energy used in a year by domestic consumers or more than the energy content of our annual gas imports.

With concerns growing over energy security, climate change and fuel poverty, the energy and carbon saving potential of this wasted resource can no longer be ignored.

Decentralised energy options

Some local energy technologies generate electricity without producing significant quantities of heat – these include solar photovoltaic panels, small-scale wind turbines and run-of-river hydro systems (referred to collectively in this document as micropower technologies).

Most local energy technologies, however, generate heat as a product, a by-product or a co-product. The main technologies can be placed into the following categories according to the energy source they use and the means by which their heat output is delivered to the consumer:

a). Heat capture systems that draw waste heat from conventional power plant and other industrial sources and deliver it to consumers through a district heating network

b). Combined heat and power (CHP) systems that capture the heat from their own power generation processes; heat is either delivered on-site or fed into a district heating network

c). Boilers or CHP systems that burn fuels derived from biomass crops or organic wastes; heat is either delivered on-site or fed into a district heating network

d). Systems that produce biogas derived from biomass crops or organic wastes, and purifies it for injection into natural gas distribution networks

e). Systems that capture and concentrate heat from the natural environment – e.g. solar thermal water heaters, heat pumps and geothermal systems; heat is usually delivered onsite – except for geothermal systems that usually feed into a district heating network

Untapped potential

Unless conventional boilers are included in the definition, very little decentralised energy is currently used in the UK. Because there is no official definition, overall figures are hard to come by. However, the following facts and figures illustrate the point:

- Just 0.7\% of the energy consumed by end users in the UK was in the form of heat supplied under contract\textsuperscript{236}
- CHP plant produces 7\% of electricity generated in the UK,\textsuperscript{237} 90\% of it by industrial users,\textsuperscript{238} mostly for their own consumption\textsuperscript{239}
• There has been no significant increase in CHP capacity since 2004\(^{240}\) and only 4% of fuel inputs are renewable\(^{241}\)
• Less than 1% of all heat is currently produced from renewable sources\(^{242}\) and almost half of this is accounted for by wood combustion in the domestic sector\(^{243}\)
• Renewables now account for 5.5% of electricity generation\(^{244}\) – but mostly from large-scale rather than local renewables
• UK production from micropower technologies like solar PV and microwind is negligible,\(^{245}\) as is UK production from microheat technologies like solar thermal and heat pumps\(^{246}\)

International comparisons show that much greater use can be made of local energy technologies. For instance, in Scandinavia, a third of heat demand is supplied by renewables and district heating.\(^{247}\) A 2003 survey of the level of district heating in 31 European countries put the UK in 23\(^{rd}\) place – ahead only of Belgium, Ireland and the Mediterranean countries.\(^{248}\)

### 12.2 Achieving a local energy breakthrough

Government has been slow to recognise the potential of decentralised energy.

Despite the importance of heat as a component of UK energy demand, the Government has a long history of resisting calls to provide a support regime for low carbon heat alternatives to oil and gas. While the Renewables Obligation (RO) was introduced for the power sector and the Renewable Transport Fuel Obligation (RTFO) was introduced for the transport sector, there was nothing for the heat sector

Micropower and other decentralised energy technologies that generate electricity instead of (or as well as) heat, can in theory qualify for support under the RO, but in practice it has been very difficult for small-scale generators to access the scheme.

#### 2020 renewables target

It is against this background that the government agreed, at an EU level, to a renewable energy target requiring that, by 2020, 15% of final energy consumption in the UK comes from renewable sources.

It should be noted that Britain’s target is lower than any other EU-15 country apart from the Netherlands, Belgium and Luxembourg. Nevertheless, a decade of neglect has left us starting from such a low base that both the heat and the transport sectors will need to make a significant contribution towards achieving the target if the power sector is not to be overburdened.

The Government’s renewable energy strategy, published in July, provides an indication of how the overall target might be divided between the three sectors – this allocates 30% of the effort to the heat sector.\(^{249}\) This would require 12% of all heat to come from renewable sources by 2020 – up from less than 1% today.\(^{250}\)

#### Lack of strategic clarity

The Committee on Climate Change recently stated that “the appropriate path for decarbonisation of heat through the 2020s and beyond is currently unclear.”\(^{251}\)

We believe the same could also be said of government policies on low carbon heat before 2020. The Government itself admits that achieving the target revolves around a single policy – the Renewable Heat Incentive (RHI):

“\[The RHI will be the driver behind a massive increase in renewable heat from current levels below 1% up to around 12% by 2020.\]”\(^{252}\)

Powers to introduce a Renewable Heat Incentive were included in the 2008 Energy Act, as a result of a cross-party pressure on the Government to end its neglect of the heat sector. However, ministers don’t plan to actually implement the RHI until 2011 at the earliest and, to date, they have been unclear as to the form it will take.

There is also an issue of scale. By setting a size limit of 5 megawatts for qualifying projects, many worthwhile community-scale projects, which can be more cost-effective than smaller installation, may be excluded.
Finally, it is unclear as to how government policy on decentralised energy relates to government policy on energy efficiency. Because efficiency improvements and decentralised energy installations take place within much the same context, i.e. at the level of the household, the workplace and the community, they compete with one another for resources. It is therefore vital that government policies are properly aligned so that investment decisions are not distorted by perverse incentives.

**Cost issues**

One of the consequences of Government neglect on this and other energy issues is that efforts to achieve secure and sustainable energy supplies will cost more than if action had been taken earlier.

The Committee on Climate Change is already concerned about the costs of the Government’s renewable heat policy:

“…we note that such a stretching target would be very expensive at the margin (e.g. costing hundreds of pounds per tonne of carbon saved).”  

Because the cost of schemes like micropower FITs and the RHI are ultimately spread among energy consumers, it is vital that value for money should be an overriding consideration.

**Infrastructure**

In 2008, the Government published an analysis showing which low carbon heat technologies could make the biggest difference at the least cost. This identified two groups of technologies, which could be deployed at scale and at low cost: Firstly, biomass as a replacement for electric and oil heating; and, secondly, large-scale CHP and waste heat capture.

In both of these cases, but especially the second, infrastructure in the form of district heating is a vital consideration. Without it, the generating systems will either be deployed sub-optimally or not at all – meaning that the diversification of heat supplies could only be achieved with non-network dependent, but more expensive, technologies.

Other countries, such as Denmark, have shown that it is possible to develop community and industrial heat networks as a cost effective option, as have modern city centre schemes in this country – such as those in Birmingham, Southampton and Woking. However, in each case this has required careful planning and regulation, in which central or local government is willing to take a co-ordinating role.

There are vital infrastructure considerations for other decentralised energy technologies too. For instance, the use of the existing gas distribution and transmission networks to maximise the potential of biogas production; and the roll-out of smart meters to optimise the deployment of micro-power.

In the continuing absence of a nationwide strategic approach in the UK, the danger is that we will make the same mistake with decentralised energy as we did with large-scale renewables – which was to provide a financial support mechanism while neglecting other essential elements, above all the availability of enabling infrastructure.

**12.3 A better way**

**FITs and RHI**

The first phase of the feed-in tariff scheme for micropower technologies should already be underway by the time the next government takes office and is due to be reviewed in 2013. Together with the RHI scheme, which is still in development, it is important that the next government uses this initial period to learn from the experience of implementation, so that necessary changes can be made as soon as possible. The Renewables Obligation, the CERT scheme for energy efficiency and the EU Emissions Trading System all provide examples of what happens when flaws aren’t ironed out at an early stage. A Conservative Government will not make that mistake in regard to decentralised energy.

As with most new technologies, uptake is relatively slow in the first few years of availability and then accelerates. These early stages are therefore the right time to correct mistakes before the cost implications become significant.
Though the default position of Conservative energy policy is to maximise the diversity of our energy systems, that does not mean that every energy technology is owed a living – especially as energy consumers ultimately pick up the bill. Social justice considerations demand that value for money be achieved – as do the legitimate commercial interests of companies providing better products. Therefore, the following review criteria will be applied:

- Value for money criteria – including cost per unit of energy provided and cost per tonne of carbon saved
- Technology criteria – including real world performance, scalability and prospects for future capital and operating cost reductions
- Broader criteria – including contribution to objectives on energy security, job creation potential and the fight against fuel poverty

There are two immediate changes that we will introduce at the earliest opportunity: Firstly, in order to maximise the opportunity for community-scale projects we will raise the capacity threshold for qualifying schemes from 5 megawatts to 10 megawatts. Secondly, within fair and appropriate conditions, we will allow capacity that was installed without public subsidy before the start of the feed-in tariff scheme to qualify for the tariffs.

**Alignment with the Green Deal**

A Conservative Government would be committed to a coherent energy policy framework in which policies on decentralised energy are properly aligned with those on energy efficiency, especially the Green Deal (see chapter 11). We will ensure that public resources are not used to mis-sell decentralised energy products when energy efficiency improvements provide better value.

However, where decentralised energy technologies do demonstrate long-term cost-saving potential, we will work with stakeholders to include these within an extended Green Deal. We will pay particular attention to the contribution that can be made by decentralised energy technologies within large-scale Green Deal programmes for fuel-poor households. For instance, whole-street or whole-estate projects could provide an ideal opportunity to incorporate community-scale generation of heat and power or the bulk purchase of decentralised energy products.

Though we have highlighted the possibility of conflict between energy efficiency and decentralised energy objectives, we are also mindful of the possible synergies. For instance, decentralised energy technologies, such as heat pumps, work best within buildings that have been insulated to the highest standards. Because it is designed to provide whole-building assessments of what work can best be carried out – and to encourage innovative approaches to this task – the Green Deal provides the best long-term context for the promotion of both energy efficiency and decentralised energy.

**An infrastructure strategy**

Conservative policy on decentralised energy will be underpinned by an infrastructure strategy. The starting point will be to clarify the regulatory regime for all forms of decentralised energy and the networks they depend on. This will be the responsibility of a reformed Ofgem.

In chapter 14, we set out our policy on the development of the smart grid – which is key to progress on micropower and microheat technologies. In our *Low Carbon Economy* green paper we make proposals for the development of biogas – including the principle of equivalence between biogas and natural gas, an open access regime in regard to gas transmission and distribution networks and a regulated biogas feed-in tariff. A Conservative Government would take these proposals forward in partnership with the industry.

District heat networks – which are key to progress on decentralised energy technologies like CHP, biomass and stationary fuel cells – are, by their very nature, more local than gas and electricity networks. That said, national standards are required to attract investment. Therefore, through Ofgem, we will put heat on an equivalent regulatory footing to gas and electricity. We will empower and equip local councils to identify areas that would be suitable for district energy schemes – such as those adjacent to heat-generating industrial facilities – and allow them to use the planning framework to promote integrated district heating schemes for those areas. We will ensure that the rules governing electricity and heat markets allow suppliers and consumers to enter into long-term contracts appropriate to the development of heat networks.
13. Large-scale renewables

13.1 Renewables in the 21st century

Generating large amounts of electricity from renewable sources is nothing new. In fact, Britain’s oldest serving power stations are all hydroelectric – some dating back to the 1920s and 1930s. However, Britain’s hydroelectric resources have always been comparatively limited and, historically, it was our fossil fuel reserves that underpinned our status as major energy producing nation.

That status is now under threat. UK energy production hit a peak of 298 million tonnes oil equivalent (Mtoe) in 1999, but the 21st century has seen a rapid decline – down 40% by 2008 to 177 Mtoe. There are four main reasons for this decline:

- The long decline in coal production, which peaked in 1952 at a little under 140 Mtoe, falling continuously over the intervening decades to just 11 Mtoe by 2008
- The decline of UK oil production, which peaked in 1999 at 150 Mtoe, falling to 79 Mtoe by 2008
- The decline in UK gas production, which peaked in 2000 at 108 Mtoe, falling to 70 Mtoe by 2008
- The decline in the UK production of primary electricity (i.e. electricity produced by means other than the combustion of hydrocarbons), which peaked at 24 Mtoe in 1998, falling to 13 Mtoe by 2008 largely due to the retirement of Britain’s ageing nuclear reactors

Some might argue that this is not a problem. After all, a country like Japan has been able to build and maintain an advanced economy despite being dependent on imports for more than four-fifths of its energy needs. However, even if concerns over security of supply are discounted, energy imports still need to be paid for. With Britain already mired in record levels of debt, the sustainability of funding an ever-growing energy deficit has to be questioned.

Clearly, energy efficiency (see chapter 11) has a pivotal role to play in reducing that deficit, but with the ongoing depletion of our fossil fuel reserves we also need to develop new sources of energy production.

A sea of energy

In chapter 10 we looked at the contribution that can be made by a revival of nuclear power and in the previous chapter we looked at the overlapping categories of low carbon heat, biomass energy and microgeneration. This chapter focuses on the large-scale generation of electricity from renewable sources.
Despite the depletion of North Sea oil and gas, Britain is still surrounded by a sea of energy – thanks to our world-class wind, wave and tidal resources. The UK is Europe’s windiest country, with at least one third of the entire European Union wind resource. Most of this is offshore – with 29 gigawatts of capacity available to be deployed in the first three ‘rounds’ of the UK’s offshore wind development programme. This is a vast resource, but it would fit within an area equal to just 0.5% of the total UK sea floor; suggesting that, in the long-term, there is even greater potential.

Britain also has the largest marine energy resources in Europe, including large amounts of tidal stream and tidal range energy, and both near-shore and offshore wave power. Wave and tidal power are emerging technologies, but a global race is already under way to commercialise them.

Also in the emerging technology category is geothermal power. This is well-established in the United States, but largely undeveloped in Europe. There is significant scope for development in some parts of Britain, particularly Cornwall. A Conservative Government would encourage the development of this potential resource.

**Further advantages**

As well as the size of the resource available, renewable energy has a number of other advantages:

- It is the only undepletable and completely indigenous energy source that we have. Even nuclear power ultimately depends on the availability of uranium imports
- It is a low carbon energy source that does not produce harmful waste products or emissions
- While Government dithering means that multiple new nuclear power stations are unlikely to be ready before 2020, new wind capacity can be brought online over the next decade, thereby reducing the amount of gas we will need to import
- In the case of offshore wind – and, post-2020, wave and tidal power – it is a scalable resource, allowing for long-term growth according to need
- Unlike many forms of conventional generation, most renewable capacity is made up of modular, factory-built units – facilitating the application of engineering experience to ongoing cost reduction and efficiency improvements
- While capital cost should fall over time, there is a guarantee that the fuel costs for wind, wave, tidal and geothermal power will stay at their current level – which is zero

Offshore wind and other marine renewables also provide Britain with a major industrial opportunity:

- Because of the size of the available resource, its location in shallow water and its proximity to centres of demand, the UK is projected to be the world’s biggest market for offshore wind in 2020
- Britain has further advantages as a prime location for the offshore wind industry including the availability of deep water ports along the North Sea coast, our strengths in marine engineering, the City’s expertise in project finance and proximity to potential export markets elsewhere in Europe
- A number of major companies are seeking to invest in Britain as a centre for offshore wind manufacturing
- According to research undertaken by the Carbon Trust, the development offshore wind would create between 40,000 and 70,000 jobs by 2020
- In regard to the emerging wave and tidal sector, Britain has established an early lead – energy policy decisions taken over the next ten years will determine whether we build on that lead or lose it

**The impact of variable generation**

For all of its advantages, renewable power has the disadvantage of its variable output.

The Government’s renewable energy strategy envisages an increase in the renewable share of electricity from 5.5% today to 30% by 2020. As this increase will be driven mainly by an expansion of onshore and offshore wind power, there are concerns that the grid would be destabilised as a result.
So, even though wind power is a home-produced energy source that typically displaces gas-fired power, would it compromise our energy security in other ways?

The feasibility of integrating wind at higher penetrations has been extensively studied by a number of expert organisations and individuals, whose conclusions are, on the whole, reassuring. For instance, National Grid, who are responsible for balancing electricity supply and demand on a minute by minute basis came to the following verdict:

“…based on recent analysis of the incidence and variation of wind speed we have found that the expected intermittency of wind does not pose such a major problem for stability and we are confident this can be adequately managed…”

Drawing on research from several countries, the International Energy Agency concurred:

“Initially, it was believed that only a small amount of intermittent capacity was permissible on the grid without compromising system stability. However, with practical experience gathering, for example in the Western Danish region where over 20% of the yearly electricity load is covered with wind energy, this view has been refuted.”

According to evidence given by National Grid UK to the House of Lords European Union select committee, the cost of integrating a 40% contribution from renewables would be 0.14 pence to 0.28 pence per kilowatt hour, adding between £6 and £12 per bill per year. This is not insignificant, but reasonable given the level of indigenous, low-carbon generation thus secured.

That said, the energy consultants, Poyry, have identified an important unresolved issue. While concurring with other experts that “reserve and response do not appear to be critical issues for the British market,” they believe that UK electricity trading rules are structured in such a way as to disincentivise the provision of the additional back-up capacity needed to accommodate wind.

13.2 Obstacles to a renewable future

Despite the enormous potential for renewable energy in Britain, actual progress has been disappointing. Apart from Luxembourg and Malta, no EU country produces less of its energy from renewable sources than we do.

Our ability to catch up by 2020 is now under threat from the increasing capital costs of developing large-scale renewable capacity – especially offshore wind. Learning rates should mean that costs come down over time, but this has been undermined by a policy context that many believe has multiplied investor uncertainties at every turn.

Planning conflicts

Onshore wind development has been held back by a series of bitter planning disputes. Some of the blame can be placed on an over-complicated planning system that delays democratic decision making. However, the Government’s main approach has been to demonise local objectors, irrespective of the merits of each case. In March 2009, the Secretary of State for Energy and Climate Change, Ed Miliband, said that to be against wind turbines “in your area” was as “socially unacceptable” as “driving past a zebra crossing.”

This approach is both wrong and counter-productive, and threatens to poison public opinion against all renewable developments no matter how appropriately sited. What the government should be doing is finding common ground rather than polarising public opinion. For instance, many applications are bogged down because there is no direct benefit to local communities in hosting them. This is in contrast to other countries such as Denmark, where, by 2001, 86% of wind farms involved some form of community ownership, with over 100,000 families sharing in the benefits.

Rather than pursue this positive path forward, ministers have used the issue as a political distraction tactic – as if the consequences of a comprehensively inadequate energy policy can be blamed on planning decisions made in the ‘Tory shires.’ The facts of the situation are that of the 14 gigawatts of onshore wind that the Government envisages by 2020, 3 gigawatts have already been built, 1 gigawatt is in construction and a further 3 gigawatts have been consented and are awaiting construction; of the 7 gigawatts currently in the planning system awaiting consent, 4 gigawatts are in Scotland, with just 1 gigawatt a piece in Northern Ireland, Wales and England.

There are, therefore, some more significant problems with the policy framework, to which we now turn.
**The Renewables Obligation**

The Renewables Obligation (RO) is the single most important policy for the support of large-scale renewables in the UK. When the RO was introduced in 2001, the Government had two main options for the provision of an incentive system for renewable generation:

- The feed in tariff (FIT) – which sets a predictable price at which renewable power is sold into the grid
- The tradable green certificate (TGC) – a complicated system (of which the RO is an example) in which each unit of renewable generation attracts a premium whose value depends on the overall level of renewable generation in any particular period

Faced with a choice between straightforward-and-predictable on the one hand, and complex-and-unpredictable on the other, ministers opted for the latter.

Given that developing large-scale renewable capacity requires large amounts of capital investment, and that investors require large amounts of certainty, the drawbacks of the RO should have been apparent from the outset. Certainly, they have now been confirmed by comparative studies showing that countries that use FITs have attracted more investment than those that don’t – including the UK. The International Energy Agency came to the following verdict:

> “The group of countries with the highest effectiveness (Germany, Spain, Denmark and, more recently, Portugal) used feed-in tariffs (FITs) to encourage wind power deployment. Their success in deploying onshore wind stems from high investment stability guaranteed by the long term FITs.”

London Research International, which produced an exhaustive comparison of policies across the European Union, concluded that:

> “On the whole, the UK’s renewable energy development programme seems to lack the coherence evident in other large EU member states.”

Despite being less effective than FITs, the RO and other TGC systems are more expensive. The IEA report remarked that:

> “Beyond some minimum threshold level, higher remuneration levels do not necessarily lead to greater levels of policy effectiveness. The highest levels of remuneration on a per-unit generated basis for wind among the countries studied are seen in Italy, Belgium, and the United Kingdom, which have all implemented quota obligation systems with TGCs. Yet none of these countries scored high levels of deployment effectiveness.”

The contrast between the Britain and Germany is especially instructive. A recent study undertaken by ClimateChangeMatters found that the German system delivered four times as much renewable energy as in Britain for less than half the unit price. This is all the more remarkable given Germany’s lower wind speeds.

Various modifications have been made to the RO to compensate for some of its flaws. However, this further complicates the mechanism and generates new risks and uncertainties for investors.
**Power price volatility**

The investment risks generated by the RO are compounded by those generated by the main electricity trading system, BETTA. As the Committee on Climate Change notes, the volatility this produces in revenue streams is wholly unsuited to investment in capital intensive energy sources like renewables and nuclear:

> “Given the importance of moving to a low-carbon electricity system at affordable cost, the Committee believes that we should not accept the significant risks and costs associated with the current market arrangements.”

In a situation where future revenue streams are fundamentally unpredictable, the default option for investment in new generating capacity will be the technology with the lowest upfront capital costs – i.e. gas-fired generation. The irony is that, in the long-term, this would further increase our exposure to volatile fossil fuel prices – not just because of the higher contribution of gas to the energy mix, but because of the knock-on effects on the cost of all forms of generation.

**Investment and infrastructure**

Good energy policy is not just about providing the right incentives for new generating capacity, but also providing an attractive environment for investment in supporting infrastructure and R&D.

According to evidence given by National Grid UK to Parliament, there were 16 gigawatts of renewable generation awaiting grid connection in 2008. Delays in connection represent a further source of uncertainty and therefore cost. These problems apply much less in Germany – Britain’s main competitor in the development of offshore wind. The Germans have also provided state-of-the-art port facilities for its offshore wind industry at Bremerhaven, which not only provide space for fabrication, component storage and deployment vessels – but also a focus for investment in R&D and testing facilities.

Offshore wind, wave and tidal power are all new technologies – at various stages of being deployed at scale for the first time. Strategic investments in locations, supply chains and technology improvements can therefore make an enormous difference to cost. A plethora of public bodies are involved in providing such investment, but it is badly co-ordinated – the proof being Britain’s failure to develop a centre for a world-beating, UK-based low carbon energy industry. As the manufacturers’ organisation, EEF, recently warned:

> “we cannot ignore the fact the UK is behind the curve and playing catch up in this area… to position the country as a premier location for the low carbon industrial revolution we urgently need more strategic and joined up thinking from government.”

Ultimately Britain as a whole will benefit from a policy to concentrate public resources where they can make the biggest difference, rather than spreading them out for no better reason than short-term political convenience.

### 13.3 A better way

We believe that renewable generation has an increasingly important part to play in achieving a diverse energy mix – indeed, it is key to Britain’s future as an energy producing nation. That does not blind us to the challenges involved – not least those of achieving the necessary reduction in capital costs.

This green paper set out reforms to the energy policy framework designed to attract the major investments required in Britain’s energy systems – and to reduce the cost of that investment. These framework reforms include a floor price for carbon (chapter 3), which will encourage investment in all forms of low-carbon generation including renewables; and a capacity guarantee in the electricity market (chapter 4), which will encourage investment in the back-up plant needed to manage the variable output of renewable energy sources like wind.
Planning

The planning system has been a major source of delay and risk for renewable developments – driving up costs and repelling investment.

We support a fast-track, streamlined planning system for major infrastructure projects (chapter 6). Planning-related issues of national significance, such as the energy policy framework, should be decided in Parliament. Furthermore these issues should be embodied within National Planning Statements so that they are not reopened every time there is a planning inquiry into the specifics of a particular local development.

However, a rational planning policy does not have to be an undemocratic one. We will ensure that final decisions on major infrastructure projects – while made on a strict timetable and on the basis of an objective technical assessment – are taken by ministers accountable to Parliament, not by unelected quangos.

Many renewable developments – especially onshore wind – fall below the threshold for national decision making. Unlike the current Government, we believe in taking the poison out of local planning battles by giving communities not only a say, but also a stake, in appropriately-sited developments. That means finding ways to allow communities who participate in renewable energy projects to share in the rewards.

A Conservative government will allow communities to keep all of the business rates from any new wind development for the first six years. To put this into context, a 10 megawatt wind farm – about five large turbines – could pay around £72,000 a year in rates back into the local community.\(^{297}\) We will also work with the industry on other ways in which communities can benefit. These include discounted electricity rates for local residents for the duration of the wind farm’s life. Perhaps the greatest potential lies in enabling community ownership of renewable developments. A Conservative government will introduce a user-friendly feed-in tariff system in place of the complex Renewables Obligation for community-owned renewables (see below), and we propose to use the Green Investment Bank to make project finance available for such schemes.

After years of inaction on the planning system, Labour’s solution is to take away the rights of local communities and demonise those who object. We believe this is a shortcut to bad outcomes on all sides. Ours is a real way forward, empowering people so that everyone can benefit from renewable energy.

Paying for renewable generation

Financial incentives for large-scale renewable developments are based on a combination of the revenues from the Renewables Obligation and the wholesale price of electricity. Both revenue streams are unstable, creating risks for investors and driving up the cost of capital. Consumers lose out too, because the current system of incentives is more expensive than alternative models used in many other countries and because it negates what should be a key advantage of renewable generation – insurance against future rises in fossil fuel prices.

We are therefore attracted to the feed-in tariff systems in operation in countries that have made more progress on large-scale renewables than Britain has. Though we have always taken a cautious approach to reform of the Renewables Obligation, we believe that the case for change is now strong – especially given the scale of the investment required if Britain is to keep-up with the world’s leading industrial nations.

We remain acutely conscious of the impact that any change in incentive structures might have on pending investment decisions. A Conservative Government would therefore begin by introducing feed-in tariffs in those areas of renewable development where the bulk of the investment required will take place in the medium-to-long-term:

- Round three of the offshore wind development programme
- Those renewable energy technologies still at an early stage of commercialisation, such as wave and tidal power
- Community-owned onshore wind developments where the simplicity and reliability of the feed-in tariff system may be more attractive than the current system
In government, we would, of course, work closely with the industry, consumer groups and independent experts on the detailed design of the system – such as the use of auctions to discover the optimal tariff for successive tranches of development. We would approach in a fair way the continuing use of ROCs by existing developments, taking account of investor expectations and based on a grandfathering approach. The combined effect of the reforms would be to achieve at least as much deployment of new capacity as under the Renewables Obligation – but at lower cost for both investors and consumers.

**Infrastructure and investment**

The comparative expense of the current system of incentives for renewable generation isn’t just a result of its inherent flaws, there is also an element of compensation for the risks created by other components of the policy framework.

One of these is the planning system (see above), another is the provision of enabling infrastructure for renewable developments. This is a particular problem for offshore renewables, where uncertainty over grid connections can deter investment and raise the cost of capital. We intend to reduce investment risks, lower barriers to market entry and cut costs by building an offshore grid to link-up wind, wave and tidal capacity in the most efficient way possible.

The shared architecture of the offshore grid will also provide a basis for stronger interconnection with neighbouring countries around the North Sea and provide an alternative to onshore transmission lines.

This open networks model will be applied to other forms of shared infrastructure required by the renewables sector. For instance, marine energy park facilities will developed alongside the offshore grid to accelerate the development of wave and tidal projects. The designation of these coastal zones would provide pre-consenting for new generating capacity, transport links and portside facilities. Sources of public investment in renewable energy will be consolidated in and directed by the Green Investment Bank, so that they can be deployed strategically to deal with supply chain bottlenecks, technology constraints and other obstacles to private sector investment.
14. The smart grid

14.1 The potential of the smart grid

The smart grid is a term that is used for a range of information technologies that bring interactivity, data sharing and automated control to energy networks – especially power grids – and to the appliances attached to those networks. In other words, the purpose of smart grid technology is to give energy networks the functionality we take for granted in modern communication networks such as the internet.

Currently, energy networks more closely resemble communication networks as they were decades ago – for the very good reason that they were largely designed and built decades ago. Thus, beyond the off switch, consumers have very little information on, and control over, the way that energy is provided to them. From the network operators’ point of view options are also limited and many basic functions, such as meter reading, have to be performed manually – equivalent to the rows of telephonists that were once required to connect each telephone call.

Ten key benefits of the smart grid

The smart grid will have as dramatic an effect on the way we use and produce energy, as the internet had on the way we use and produce information. There are at least ten key benefits that smart grid technology would provide:

• **Consumer empowerment** – Smart meters are the most important building blocks of the smart grid, providing consumers with user-friendly, up-to-date information on their energy use, helping to identify options to improve efficiency and cut costs, allowing meter reading to take place automatically, and improving the accuracy and usefulness of energy billing.

• **Real time pricing** – The smart grid will allow more flexible pricing of energy, for instance, making it easier for consumers to benefit from cheaper tariffs at times of low demand. This will improve the efficiency of energy markets, reduce peaks and troughs in demand and cut the cost of integrating variable or inflexible generating capacity like wind or nuclear.

• **Advanced demand-side response** – Smart grid technology could also give consumers the option of programming appliances to automatically vary their energy consumption in response to real-time market signals. This would allow fine-tuning of demand levels, providing a more cost-effective alternative to supply-side measures such as rarely used back-up generating capacity.

• **Operational efficiency** – Enabling, and rewarding, millions of consumers to participate in the balancing of supply and demand across entire networks is the most commonly publicised benefit of the smart grid, but the benefits do not end there. Smart technologies can be applied across all parts of the grid, not just in the home, and will improve the efficiency with which networks assets are deployed and operated, for instance, by reducing congestion in transmission and distribution networks.

• **Reduced line losses** – Every year, huge quantities of electricity and gas are wasted in the form of transmission losses and leaks. A smart grid would significantly reduce the problem, by constantly monitoring energy flows and rapidly identifying the location of technical faults and incidents of theft.

• **Automated recovery** – As well as mitigating routine transmission losses, the smart grid would strengthen the resilience of networks to disruptive events – whether accidental or deliberate. The integration of automated systems would speed-up detection, safety-testing and recovery – as well as triggering the demand response capabilities of the smart grid. This would reduce the frequency and duration of power cuts, and the resulting multi-billion pound costs to consumers and suppliers.

• **Improved power quality** – Though only occasionally noticed by domestic consumers, variations in the power supply can cause real problems for commercial users, such as those in the IT industry. The fine tuning that is possible with a smart grid will produce improvements in power quality.

• **Building control services** – Automated control systems are not only of relevance to network operators and major consumers, they can also make a difference in the home. For instance, smart thermostats will make it easier for householders to efficiently control heating and air conditioning systems.
• **Enabling microgeneration** – As well as saving energy, the smart grid can help consumers to generate their own energy. Two-way smart meters that measure electricity exported to the grid as well as taken from the grid would allow individuals, enterprises and communities to sell any electricity that they generate themselves through CHP units, wind turbines and other small-scale generation technologies. Other aspects of the smart grid would help manage the integration of decentralised energy.

• **Enabling electric vehicles** – Perhaps the biggest impact that the smart grid will have on our lives is by enabling the electrification of transport. The spread of plug-in hybrid electric and all electric vehicles will pose major challenges for the management of supply and demand. However, by automating the recharging of electric vehicles at times of low demand (e.g. overnight) or excess supply (e.g. when wind speeds are driving high levels of renewable generation) the best use can be made of available capacity. Automation would also allow the use of some of the storage capacity of car batteries as a form of back-up power. As electric vehicles become more common this could revolutionise the electricity sector, smoothing demand, stabilising revenue streams, reducing investment risks and enabling the integration of high levels of low carbon generation.

### 14.2 Obstacles to the smart grid

Smart grid technology can make a massive contribution to the security, sustainability and affordability of our energy supplies. With so much of our ageing energy network infrastructure due for renewal over the coming years, now is our opportunity to move forward into the smart era.

The alternative is to be left behind by other countries, which are already moving ahead of us.

**Smart meters**

Smart meters provide a glaringly obvious example of the way that Britain is moving too slowly on even the most readily implemented aspects of smart grid technology.

While utilities in other countries are already deploying smart meters – such as Enel in Italy and PG&E in California – the current UK rollout plan wouldn’t be complete until the end of 2020. The Government’s uninspiring smart grid vision has been met with widespread disappointment. For instance, the CBI has commented that:

“The Government is planning a smart meter roll out for the UK, but its timescale of a full rollout by 2020 is not ambitious enough and an earlier deadline should be set.”

While this slow pace of progress does not preclude the implementation of other smart grid improvements, particularly those that reduce the cost of operating energy networks, most of the consumer benefits, much of the demand response and energy efficiency potential of the smart grid depends on smart meters.

According to ABI research, 76 million smart meters have already been installed worldwide, a number projected to grow to 155 million by 2013. 30 million have been installed in Italy alone at cost of €2.1 billion, an investment that is now generating savings reported at €500 million a year.

**Consumer issues**

Another potential obstacle to the development of the smart grid is the uncertainty that surrounds the ownership and security of information generated by smart meters and other smart devices.

If this is under the exclusive control of the utilities or even the Government then there is a very real risk of consumer resistance. As well as understandable concerns over privacy, consumers may also have good reason to fear that smart grid technology will be used to the exclusive advantage of suppliers. With the relationship between wholesale and retail energy prices already less than transparent, a more technologically advanced version of the same situation will be regarded with even greater suspicion.

We recognise the progress made so far by Government and the industry in agreeing a shared approach on these matters. However, these are still early days and slow progress on actually building the smart grid means that potential impacts on consumers have yet to crystallise. There is, therefore, no room for complacency. There must be no repeat of the mistakes made in Government policies for the promotion of energy efficiency, where consumers have been denied choice and market entry has been restricted (see chapter 11).
The open smart grid and its enemies

It must be stressed that the smart grid is not a monolith, but a wide range of options, which could shift the balance of power between consumers and suppliers either way.

However, for this to happen to the advantage of consumers, three things need to happen first:

- There needs to be a critical mass of enabling infrastructure – especially smart meters – to create a market for smart grid services
- Technical standards and legal frameworks need to be finalised to allow the interoperability of different smart grid systems and the sharing of smart grid data
- Energy policy as a whole has to support energy markets that are open to products and services from the widest possible range of providers

This is major concern for those energy companies actively seeking to deliver the smart grid. For instance, David Mohler, chief technology officer of Duke Energy, a US utility, has spoken of the need to “(open) up the end of the wire to products and new services and letting other players get into interacting around energy with our customers” and getting “beyond building silos and proprietary products.”

This echoed in a recent report for the World Economic Forum:

“There is an urgent need to refresh utility regulatory regimes that oversee the governance and economics of the power industry” … failure to do so was “acting as a break on investment” in the smart grid.

Here in Britain, the Energy Networks Association has warned of:

“Lack of consistency across the UK in network planning guidance and standards resulting in poor sharing of knowledge, limited collaboration and inefficient relationships with manufacturers.”

There is, of course, a danger that in creating a policy framework fit for the smart era, Government could go too far – over specifying standards, inhibiting technological innovation and smothering markets. After all, politicians today are no more capable of planning the future development of the smart grid than politicians twenty years ago were capable of planning the future development of the internet.

However, there is an equal danger of not going far enough – of failing to require the roll-out of enabling infrastructure, failing to stop anti-competitive actions by dominant suppliers, failing to remove barriers to market entry for smart grid products and services.

14.3 A better way

If we want to make progress on the smart grid, then we must fill the policy vacuum that applies to this and so many other energy issues.

Accelerate the roll-out of smart meters

The first step that a Conservative Government would take is to accelerate the deployment of smart meters to households, setting a deadline of 2016 for most homes and businesses to have a smart meter.

Smart meters would need to conform to minimum technical specifications, delivering the following functions:

- Give real time information on energy consumption
- Interact with other means of displaying and analysing smart meter generated information – such as website and mobile phone services
- Transmit data to, and receive data from, competitive energy services suppliers
- Enable control of devices in the home to minimise bills
- Enable feed-in tariffs for microgeneration
Common technical standards would be agreed with suppliers, in order to provide an open platform for the development of other smart grid products such as smart thermostats and appliances.

We would also require investments in transmission and distribution infrastructure to support smart meter functions, in particular their interactive capabilities.

Our priority will be to reach early agreement on the key requirements of smart metering so less time is taken in discussions and consultations and the roll-out can actually start. The sooner these requirements are agreed the sooner we can stop installing thousands of dumb meters every day which will need to be replaced within a very few years.

**Act in the consumer interest**

Conservative smart grid policy will be developed around the principle that data generated by smart meters and equivalent smart devices belongs to the consumer. That means that consumers must have an unimpeded right to access and transfer their data, and that any service provider to which the gathering, processing and storage of such data is entrusted has a responsibility to safeguard privacy at all times. Furthermore, wherever the smart grid enables the automation of metering, appliances and other end user systems this should always be under the ultimate control of consumers, not any other party. If necessary, a Conservative Government would legislate to enshrine these principles in law.

In chapter 2 we propose reforms to the general regulation of the energy sector, including the transfer of responsibility for the functioning of energy markets to the Office of Fair Trading. As the technology develops, there will be a growing focus on ensuring that the new possibilities offered by the smart grid are developed to enhance consumer value, choice and power.

**Open networks, open standards, open markets**

The surest guarantee of the consumer interest is a fully competitive energy sector in which new and established providers succeed or fail on their ability to provide the best goods and services to their customers. In this respect, we believe that the innovation and interaction that the smart grid will make possible is what will finally transform the energy sector from an industry focused on relationships with policymakers and regulators to one where the customer is king.

A Conservative Government would seek to speed this transition by facilitating new market entry and new sources of investment. This will be achieved in three main ways:

- **Open networks** – In making decisions on the renewal of transmission and distribution network infrastructure, our priority – as in the case of smart meter roll-out – will be to establish a flexible open platform for ongoing technological and business development.

- **Open standards** – In establishing common technical and non-technical standards for the industry, our default position will be to play a supporting rather than a directing role. There may, however, be occasions on which direct involvement is necessary. For instance, where governments are involved in agreeing international standards; or if established industry players attempt to use proprietary standards to restrict competition and consumer choice.

- **Open markets** – Wherever Government influences the shape of markets for smart grid technology and services, we will make sure they are open the widest range of providers. This means that the measures we enact to rebuild Britain’s energy security – such as the capacity guarantee in the electricity market (see chapter 4) or the Green Deal on energy efficiency (see chapter 11) – will be structured to enable smart grid based solutions to compete on equal terms with other options.

**Smart grids need smart policy**

In chapter 2 we argue that the reform of energy policy must start from the top – by streamlining the machinery of government. The Department of Energy and Climate Change must focus on supporting ministers in their duty to provide a clear strategic direction; the tangled web of agencies through which public investment in clean energy technology is made available will be joined-up into a Green Investment Bank; and the proliferating quangos currently responsible for the execution of energy policy will be rationalised.
This will create an opportunity to equip the machinery of government with the expertise necessary to contribute usefully to the transition from dumb grid to smart grid. This is not because we expect government to make the detailed technical and business decisions that will shape the future of energy in the 21st century, but because we need a government capable of understanding and responding to the needs of the innovators, entrepreneurs and investors who will be making those decisions.

That means learning all the lessons from government’s role in the development of other hi-tech infrastructure sectors, above all, our information and communication networks. Whether as a Whitehall department, a facilitator of investment or a policy implementation body, the smart energy enterprises of the 21st century need to have faith in government as a arms-length, objective and, above all, informed source of support.

**The energy internet**

The technology writer, George Gilder observed that “in every industrial revolution some key factor of production is drastically reduced in cost… relative to the previous cost to achieve that function, the new factor is virtually free.” In the 21st century, that factor of production is the processing power and communications bandwidth provided by information technology – where costs per unit are falling at an exponential rate.

In this context, the significance of the smart grid is twofold:

- Firstly, it allows us to apply an increasingly abundant resource (IT) to improving the productivity with which we use an increasingly constrained resource (energy).
- Secondly, it represents a breakthrough for our use of IT networks – from the virtual world in which only data was networked to the intelligent networking of physical commodities like energy.

This won’t just encompass power grids, but also other utilities such as water and even transportation systems. Bringing intelligence to infrastructure will have game-changing implications – even for those things, which due to their unconnected components, we don’t even regard as infrastructure. For instance, the intelligent networking of cars is already underway thanks to the spread of satnav systems, which cut fuel costs by reducing navigational errors and could save their owners even more by incorporating live traffic information and automatically computing routes to avoid congestion.

Consumers, however, are entitled to ask “where will this all end?” and “who gets the benefit?” The answer depends on the choice we make as a nation between two very different models:

- The hyper-bureaucratic model in which IT is used to reinforce top-down power structures, enhancing and extending the control that politicians and their corporate clients have over our lives
- Or the post-bureaucratic model, in which on the basis of intelligently shared information, not top-down control, millions of independent actors freely work together in an endless variety of ways to the benefit of all

With its enthusiasm for ID cards and centralised databases, the current Government has revealed its preference. However, the Conservative vision is very different, one which we will strive to make real in the development of a smart grid that can truly be called an energy internet.
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