sustainable development commission

SDC submission to the
DTI Energy Review

Meeting the challenge:
energy policy for the 21st Century

April 2006

Table of contents

1 INTRODUCTION

The Sustainable Development Commission (SDC) welcomes the Energy Review announced by the Department of Trade and Industry (DTI) in January 2006.

We see this as a good opportunity to take stock of progress since the 2003 Energy White Paper and further develop the UK's long-term strategy for delivering a low carbon economy whilst ensuring security of energy supply and progress on fuel poverty.

It is important to divide the measures resulting from the Energy Review into those that reduce carbon emissions up to 2020, and those that take effect from 2020-2050. To address the problem of climate change the measures up to 2020 are the most urgent and important, as these will determine our long-term path for stabilising concentrations of carbon dioxide in the atmosphere.

The SDC's main input into the Energy Review process will be as follows:

- Report on nuclear power: comprehensive position paper on the role of nuclear power in a low carbon economy, with supporting evidence base consisting of eight separate research papers - **SUBMITTED**
- Long-term framework: continuing work looking at the need for a long-term investment framework for climate change policy based on an expanded role for emissions trading, potentially down to the individual level - **ONGOING**
- Long-term electricity contracts: outcomes from work looking at alternative ways to stimulate demand for low carbon electricity generation – **ONGOING**

This submission presents the SDC's vision of a sustainable energy system, and summarises our recommendations for Government policy. Work ongoing will be fed into the Energy Review team as it is completed.

2 PROGRESS SO FAR

2.1 UK energy policy goals

The current Energy Review, "Our Energy Challenge", is based on the four goals outlined in the 2003 Energy White Paper[1]. These have been summarised as follows:

- To put ourselves on a path to cut the UK's carbon emissions by some 60% by about 2050, with real progress by 2020
- To maintain the reliability of energy supplies
- To promote competitive energy markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity
- To ensure that every home is adequately and affordably heated

2.2 Are these goals being met?

2.2.1 Carbon emissions

Latest projections show that UK carbon emissions have been rising steadily over the past three years, largely as a result of increased coal burn in power stations, but also due to rising demand for energy in the household, transport and commercial sectors[2].

On current projections, the UK will fall well short of its target to reduce emissions of carbon dioxide (CO_2) from 1990 levels by 20% by 2010, with additional savings of 15.1 million tonnes of carbon (MtC) needed to stay on course.

The recently published revision of the UK Climate Change Programme[2] addresses part of the short-term challenge, but leaves an emissions gap of between 3-8MtC against the 2010 target (2-5 percentage points short of 20%). As a result, the period 2010-2020 (when a further 20-40% cut is required) remains a critical concern.

This has obvious implications for our longer term aspirations: if meeting these initial targets proves too difficult, then even larger emissions cuts will be needed in future years. In the meantime, our total impact on climate change is increased due to larger annual emissions in the interim period.

It is also increasingly likely that 60% cuts in carbon emissions by 2050 will be insufficient if the UK is to play its part in limiting the rise in average global temperature to 2°C. This is the level beyond which the risks of 'dangerous climate change' become more pronounced[3]. The implications for UK climate change policy would be a requirement for even greater short-term cuts in emissions consistent with an 80-90% reduction by 2050.

To reverse current trends the UK needs a package of measures that will deliver substantial emissions reductions over the short (up to 2020) and the longer term (2020-2050).

The main reason why this is proving so difficult is the inability of departments – and the sectors of society that they represent – to agree on how to divide up the emissions reductions required. The result is a political calculation of which sectors are 'easiest' to target, omitting those, such as transport, which are seen as highly controversial. However, this is neither economically efficient, nor environmentally effective, and it is hard to see how this approach will cope with the even greater challenges that lie ahead. Where policies do exist, their ambition is often severely limited by a lack

[1] Defra/DTI (2003). *Our energy future – creating a low carbon economy.*
[2] Defra (2006). *Climate Change – The UK Programme 2006.*
[3] Defra (2006). *Avoiding Dangerous Climate Change.* Scientific symposium on stabilisation of greenhouse gases, 1-3rd February 2005.

of political urgency and hence the emissions savings achieved are modest at best.

2.2.2 Reliability of energy supplies

A sharper than expected decline in oil and gas output from the UK Continental Shelf has prompted a re-examination of UK energy security, particularly in relation to gas supplies.

Although the long-term situation is not expected to differ significantly from projections in the Energy White Paper, there is increasing popular concern over the UK's increased dependence on imported supplies of gas, which will become our dominant fuel on current projections.

While the security implications of importing fuel supplies are often exaggerated, over-reliance on one single source of energy does increase the risk of price volatility and of a major supply interruption, for example through political interference, a catastrophic incident, or a temporary imbalance in supply and demand.

This problem is exacerbated by the UK's inability to reduce overall demand for energy: consumption of electricity and transport and heating fuel has continued to rise. This is the result of economic growth and unsustainable consumption patterns, combined with the absence of any carbon constraint for most businesses and individuals. The growth in energy demand has outstripped the efforts of energy efficiency schemes and awareness-raising campaigns, and this trend shows no sign of abating.

2.2.3 Competitive markets

It is commonly claimed that Great Britain (GB)[4] has the most liberalised energy markets in Europe and that this leads to greater competition. While GB is certainly the most liberalised when compared to other EU countries, the level of real competition in GB's energy markets remains open to question.

In the supply market, there is strong competition between suppliers on both price and customer service levels, but little in the way of energy service offerings, particularly in the household sector. Energy services, along with smart metering and greater use of microgeneration, offer the potential for wider product choice through a combination of fuel/technology choice, energy efficiency upgrades, varying tariff structures, and by allowing for a different balance between price, contract length and up-front payments. The current situation is far removed from this ideal, which limits choice for the consumer and promotes a business model predicated on increasing supplies of primary energy. In the long-run, this will increase costs, because it does not allow for the full realisation of cost-effective energy savings and capital-intensive investments in low carbon technologies.

In the generation market, competition certainly exists in large-scale electricity generation but, largely due to the homogeneity of the supply market, there is very little incentive for diversification of product, which leads to an increasingly limited set of electricity generating technologies. In addition, the market design and structure severely limits the opportunities for new entrants, whilst acting against the needs of smaller generators or those with more variable output.

The outcome for the GB market seems to be an increasingly small number of very large supply companies, all of which are vertically integrated into the generation market[5]. The product offering in the supply market is extremely limited, and although price differences exist, a large percentage of customers do not take advantage of possible cost savings, due to a combination of lack of accessible information, high transaction

[4] Great Britain (GB) is used here to distinguish the single energy market operating in England, Scotland and Wales from Northern Ireland, where liberalisation is much less advanced.

[5] Although not all generating companies are suppliers.

costs (in terms of time), and because for many consumers energy is a small proportion of overall expenditure.

This situation is far from perfect competition. While liberalised markets have been successful in increasing efficiency and bringing down costs in the UK energy sector, there has been little progress in improving access to energy services and increasing product choice for consumers.

2.2.4 Fuel poverty

Action on fuel poverty has certainly been positive in recent years, but this has been significantly helped by large decreases in the cost of energy supplies in the late 1990s and early 2000s. The DTI estimates that levels of fuel poverty in the UK stood at around two million households in 2003, down four and a half million since 1996[6]. However, recent rises in the price of electricity and gas look set to reverse some of these gains[7]. The DTI estimates that up to a million households might be pushed into fuel poverty as a direct result of fuel price increases[8].

This illustrates the importance of focussing fuel poverty action on reducing energy demand, which in fuel poor households is primarily affected by the energy efficiency of the building stock. A strategy which does not do this leaves low income households extremely vulnerable to fluctuations in the price of energy, over which they have no control.

There are a number of policy measures that are delivering energy efficiency improvements for the fuel poor: the Energy Efficiency Commitment (EEC), Warm Front and its equivalents in the Devolved Administrations[9], and the Decent Homes programme. These schemes have been largely successful, and will have helped reduce the impact of recent price rises on levels of fuel poverty. However, these policy interventions have not been significant enough to eliminate the problem altogether.

2.3 Long-term outlook

It seems clear from the above analysis that despite a strategy which is heading in the right direction, progress in delivering this strategy has stalled or reversed in many areas.

Unfortunately, the longer term outlook is equally troubled. The potential of the EU Emissions Trading Scheme (EUETS) is fundamentally limited by a lack of emissions targets post 2012 and by its reliance on 'grandfathering' for emissions allocations. This means there is no long-term framework for investment in large-scale low carbon technologies.

For the large number of businesses outside the scope of EUETS there is much less incentive to consider reducing carbon emissions. Here action is reliant on the Climate Change Levy and use of fiscal instruments such as Enhanced Capital Allowances, and we would argue that this provides a weak framework for longer term considerations.

Measures to increase energy efficiency in households and businesses will not necessarily bring about an absolute reduction in energy demand due to their lack of ambition and the absence of any real constraint on energy use or carbon emissions by the end-user. The effect is continued upward pressure on carbon emissions and imported gas.

[6] DTI (2005). *The UK Fuel Poverty Strategy: 3rd Annual Report.*
[7] DTI (2005). *Fuel poverty update, November 2005.*
[8] DTI (2006). *Our Energy Challenge – power from the people.* DTI Microgeneration Strategy document.

[9] Warm Front operates in England only. Scotland operates the Warm Deal scheme and Wales has the Home Energy Efficiency Scheme.

3 OUR ENERGY VISION

The SDC's vision for meeting the UK's energy needs would help meet all four goals of energy policy simultaneously, and without the need for new nuclear power, which we believe is, on balance, incompatible with the Government's sustainable development principles.

This vision develops the one outlined in the 2003 Energy White Paper. It is based on a long-term framework for tackling climate change, with absolute year-on-year reductions in emissions achieved from all sectors of society. A credible cap would be applied consistent with limiting any temperature rise to 2°C and based on the scientific evidence of the International Panel on Climate Change.

We would like to see much greater effort on reducing energy demand combined with the more efficient use of fossil fuels, leading to an overall reduction in their use over time.

As highlighted in the 2003 Energy White Paper, there would be a shift towards decentralised energy supply, with less reliance on the wasteful system of centralised electricity generation. The national grid would still perform a valuable role, with capacity vacated by closing centralised plant replaced with large-scale renewables. But there would be a much greater emphasis on CHP, community heat networks, and microgeneration technologies.

Innovation policy would be radically reformed, and the aversion for 'picking winners' would be replaced with a more constructive policy that targets innovation funding at technology groups where there is UK competitive advantage, and where the long-term potential is greatest. Funding would be substantially increased.

All this would be combined with a major effort on transport, buildings and public sector procurement to ensure that every sector plays a part in delivering a low carbon economy, whilst reducing our dependence on imported fossil fuels.

As acknowledged in the Energy White Paper, the four goals of energy policy can be achieved together. In fact, they are actually complementary, for the following reasons:

- A modern energy economy with greater decentralised supply, combined with increased use of renewable energy would significantly reduce carbon emissions, and open up options for continuing reductions over time
- Similarly, reducing energy demand combined with decentralised energy supply would reduce the demand for imported fossil fuels whilst increasing diversity – this would improve energy security
- An increase in innovation activity, and opportunities for more diversity in energy supply and generation would bring more genuine competition to our energy markets
- Continued action to ramp up targeted energy efficiency measures, along with the development of heat networks and the deployment of microgeneration technologies, would make a lasting contribution to reducing fuel poverty

In summary, we believe our vision would deliver an energy policy that is modern, reliable, competitive and equitable, but most of all sustainable in the long-term.

4 OUR DETAILED RECOMMENDATIONS

In this section we outline our detailed recommendations to Government for the Energy Review, in answer to questions 1-4 of the consultation document.

4.1 A long-term framework

4.1.1 Capping carbon emissions

The need for a long-term policy framework for combating carbon emissions is clear. This would provide business certainty and create an environment for long-term investments in low carbon technologies and industries.

The first priority is a framework that mandates absolute, binding cuts in carbon emissions on a rolling basis.

The only way that this can be achieved with any certainty is through a 'cap and trade' scheme that extends to all the carbon emissions in the economy.

The cap must be based on scientifically credible evidence, and consistent with the aim of avoiding dangerous climate change. The current scientific consensus is that a 2°C temperature rise should be the upper limit.

4.1.2 Emissions trading

A cap and trade approach, otherwise known as emissions trading, is superior to carbon taxation, as it is guaranteed to deliver the required emissions reductions in the most economically efficient way possible. However, it would need to be economy-wide in order to ensure complete compliance – this also improves economic efficiency, as it spreads the burden to all sectors, rather than just a few.

The Government should state its intention to put emissions trading at the centre of climate change policy, and work towards developing a scheme that is economy-wide and allows for binding emissions reductions over a set period.

These need to be set as far ahead as possible, with targets used to set even longer term objectives.

Such a scheme would ideally be at the EU level, but this is likely to take too long to negotiate, and there is an opportunity for the UK to take a leading role in developing a predecessor scheme which could be incorporated into an EU scheme at a later date. Slow progress at the EU level should not deter the UK from seeking an early expansion of emissions trading, and a move away from 'grandfathering' to auction-based allocations. Unilateral action on this issue is preferable to no action at all, so long as forward compatibility is maintained.

The extension of emissions trading to cover the whole economy is essential for any real progress on reducing carbon emissions to occur. Without this, there is the potential for serious distortions as a result of action being focussed entirely on one or two sectors – such as the business sector, as is currently the case. This is not economically efficient, as abatement action may not take place in the sectors where it is most cost effective.

Within the category of emissions trading, there is a choice between upstream or downstream allocation – the EUETS could be regarded as mid-stream. The benefits of upstream are administrative simplicity, but a downstream scheme is more visible, and therefore goes beyond a simple price mechanism by providing greater carbon awareness among all of the participants in the market. This could increase economic efficiency, by levering carbon abatement action by individuals and businesses that would not otherwise have been identified.

4.1.3 Personal carbon trading

It is for this reason that the SDC is very interested in the idea of personal carbon

trading[10] as part of a wider emissions trading scheme. We believe that carbon trading at the individual level offers a number of potential benefits, such as fairness, transparency, and educational opportunities.

We would like to see a Government commitment to early assessment of personal carbon trading and the role it might play within a broader emissions trading framework. This should include an announcement in the Energy Review of trials to test different methodologies and their effectiveness over the next three years. The SDC is continuing its work in this area in cooperation with a number of other organisations.

4.1.4 Integrating current policy

The SDC believes that Government policy on climate change should be set in the context of this long-term framework. Current and future policies should therefore be judged on their compatibility with an emissions trading framework, and their ability to help bring this about.

The Carbon Trust has proposed a UK Consumption-based Emissions Trading Scheme (UKCETS), and we believe this is a good policy that could help deliver emissions reduction in the short-term, but is compatible with these aims in the longer term. It is for this reason that the SDC fully supports this policy, and we urge the Government to take it forward. A UK lead in this area would allow us to play a formative role in developing future stages of the EUETS as well as leading in carbon market trading expertise.

The SDC sees economy-wide emissions trading as fundamental to delivering action on climate change in a simple, effective and efficient way.

[10] Many terms are used to describe this broad concept, including: Domestic Tradable Quotas (DTQs), Personal Carbon Allowances (PCAs), and Personal Carbon Credits.

All our policy recommendations are made with this in mind, and are therefore designed to be consistent with this long-term framework. Our recommendations for the short to medium-term are put forward either as 'policy fixes' to deliver carbon reductions in the interim period, or as 'innovation mechanisms' to help deliver the technologies and policies we will need in the longer term.

In the absence of the unifying theme of economy-wide emissions trading or carbon taxes there is a continuing risk that complex interactions between macro- and micro-economic effects will negate the potential outcomes of specific measures such as energy efficiency[11].

4.2 Implications for energy policy

The energy sector, along with large energy users, needs a stable, long-term policy framework within which investment decisions, many of which are highly capital intensive, can be made. Our proposal above would go a long way towards achieving this, but there will remain a gap between long-term aspirations, and the current policy environment that investors face. We have made some recommendations below as to how this gap could be filled.

However, although we will need as many solutions as possible, it is also necessary to evaluate potential solutions for their compatibility with a modern energy system and with sustainable development principles. All investments, whether public or private, have an opportunity cost, as resources are limited and cannot be spent twice. While investment in one technology may not directly preclude investment in another[12], it could require a series of

[11] House of Lords Science and Technology Committee (2005), Second Report – Energy Efficiency, Chapter 3.

[12] Our evidence suggests private sector investment in nuclear plant would have little or no direct impact on investment in renewables, although public sector investment in the energy

supporting investments that indirectly impact on alternative technologies or divert time and attention away from them. For example, an investment in more gas-fired or nuclear electricity generation would require investments to be made in transmission assets, and this could divert funds away from investments in decentralised infrastructure.

We do not accept the argument that every option is required to tackle the climate change problem. Some solutions may directly conflict with others, or be unacceptable in their own right. Where this is the case, policy must be based on the available evidence taking into account the portfolio of measures and their effects at the macro-economic level and should seek a long-term perspective to avoid being constrained by the status quo.

4.3 SDC position on nuclear power

The SDC has spent a year analysing nuclear power against the UK's sustainable development principles[13].

Our position paper, '*The role of nuclear power in a low carbon economy*', was published in March 2006 and draws on eight separate evidence-based reports which we have made publicly available. These cover the following subjects:

Paper 1: *An introduction to nuclear power – science, technology and UK policy*
Paper 2: *Reducing CO_2 emissions: nuclear and the alternatives*
Paper 3: *Landscape, environment and community impacts*
Paper 4: *Economics of nuclear power*
Paper 5: *Waste management and decommissioning*
Paper 6: *Safety and security*
Paper 7: *Public perceptions and community issues*
Paper 8: *Uranium resource availability*

This work has been submitted separately to the Government and the Devolved Administrations and forms a major part of our contribution to the Energy Review. Our conclusions are summarised here.

It is clear that nuclear power could generate large quantities of electricity, contribute materially to stabilising carbon emissions and add to the diversity of the UK's energy supply. However, even if we were to double our existing nuclear capacity, this would bring an 8% cut in total carbon emissions from 1990 levels by 2035, and would contribute little before 2020. Nuclear cannot tackle climate change alone.

A key issue that the SDC explored through the evidence base was whether the UK could have a viable energy future without nuclear power. Or in other words, whether nuclear power is a choice, or whether is it an absolute necessity.

The conclusion from the analysis was that the UK could meet our CO_2 reduction targets and energy needs without nuclear power, using a combination of demand reduction, renewables, more efficient use of fossil fuels combined with carbon capture and storage technologies.

In this context, the Sustainable Development Commission assessed whether nuclear power has a role to play in future UK electricity supply. We have five serious concerns:

Intergenerational issues

The intergenerational impacts of a new nuclear programme is of great concern, particularly with regard to decommissioning and the disposal of nuclear waste. Even if a policy for long-term nuclear waste is developed and implemented, the timescales involved (many thousands of years) lead to

sector could be affected – see *Paper 4: The economics of nuclear power*.

[13] The UK's shared framework for sustainable development was agreed by the UK Government and the Devolved Administrations in 2005 and is outlined in "*One future – different paths*".

uncertainties over the level to which safety can be assured. We are also concerned that a new nuclear programme could impose unanticipated costs on future generations without commensurate benefits.

Cost
There is very little certainty over the economics of nuclear power. A new nuclear power programme could divert public funding away from more sustainable technologies that will be needed regardless, hampering other long-term efforts to move to a low carbon economy with diverse energy sources. Nuclear power is also prone to moral hazard, which could lead to forced public subsidy regardless of the Government's original intentions.

International safety and security
If the UK cannot meet its climate change commitments without nuclear power, then under the terms of the UN Framework Convention on Climate Change, we cannot deny others the same technology. The UK has been a world leader on climate change, and must take account of the implications of this legal issue. We are concerned that other countries that adopt nuclear power may have much lower safety standards than the UK, and this increases the risk of accidents (transboundary contamination) and radiation leaks from waste materials. Greater use of nuclear power also increases the risk of nuclear proliferation, which impacts on international security.

Technological lock-in
A new nuclear power programme could lock the UK into an inflexible, centralised electricity-generating system for the next 50 years, as investments to develop the electricity networks to cope with more decentralised, small-scale technologies will be suppressed just as their potential is growing.

Reducing energy demand
To meet our carbon reduction targets, we will need much greater action to reduce energy demand. We are concerned that a new nuclear programme would give out the wrong signal to consumers, encouraging the impression that the challenge of climate change can be tackled by a large-scale technology fix. Greater use of decentralised, small-scale energy generating technologies helps to increase awareness of energy consumption and foster more sustainable behaviour. We are concerned that a new nuclear programme could indirectly reduce political support for policies aimed at energy efficiency by competing for public funding.

Therefore the majority view of the Sustainable Development Commission is that in consideration of these issues, there is no justification for bringing forward plans for a new nuclear power programme at this time, and that any such proposal would be incompatible with the Government's own Sustainable Development Strategy. This is our advice to Ministers.

Nonetheless, the majority of the Commission also believes it is right for the Government to continue to assess the potential contribution of new nuclear technologies for the future, as well as pursuing answers to our nuclear waste problems as actively as possible. We believe a full and thorough national debate on sustainable energy options will be needed in the future, particularly if new nuclear power is to be pursued.

As stated in our position paper, a sustainable energy policy would combine an aggressive suite of policies for energy efficiency and renewables, with the development of carbon capture & storage (CCS) technologies, to effectively remove the carbon emissions that come from burning fossil fuels such as gas and coal. This alternative vision has been expanded on in this submission, along with clear recommendations on how it can be achieved.

4.4 A decentralised energy system

The 2003 Energy White Paper outlined a vision for the future which saw a much greater role for decentralised energy (DE) systems. The production of heat and electricity closer to the point of demand, using much greater efficiencies than possible through centralised power generation, offers the opportunity for lowering carbon emissions whilst increasing energy security.

The SDC fully endorsed this vision[14,15], and continues to believe that a more decentralised energy system would be the optimal choice for the future. A number of recent reports have confirmed this (see references below).

We recommend that the Government put the UK on a course to deliver a more decentralised energy system relying on greater use of CHP, renewables, and microgeneration.

It is worth noting that a decentralised energy supply does not exclude a role for large-scale electricity generation, nor does it remove the need for a national electricity grid. However, it would result in a change in emphasis, from historic investments in large, often remote, generating plant, to smaller, more localised plant. Accompanying this would be a shift in investment from transmission to distribution systems, although the former would continue to be important, particularly for large-scale renewables.

4.4.1 Benefits of decentralised energy

The implications of such a shift could be economically rewarding, in addition to the climate change and energy security benefits.

Recent modelling work by the World Alliance for Decentralised Energy (WADE) suggests that a high proportion of decentralised energy (DE) – based primarily on CHP in the shorter term but with more renewables in the longer term – would cut carbon emissions, reduce reliance on imported gas, and lead to lower overall costs [16].

Another report commissioned by the GLA and Greenpeace shows that by 2025, a low DE approach (covering 30% of London's heat demand) could deliver a 27.6% cut in carbon emissions from current levels despite the use of natural gas for CHP[17]. This is because primary energy demand would be reduced by 23.6%, primarily through the more efficient use of gas compared to centralised gas-fired plant.

A report by the International Energy Agency (IEA) highlights the potential for decentralised energy technologies (called Distributed Generation in the report) to achieve cost savings over conventional electricity generation, particularly in CHP mode[18]. It also claims that greater use of decentralised power generation can help improve the reliability of electricity supply whilst reducing the necessary capacity margin.

A more radical critique of the centralised electricity generating system is presented by the Rocky Mountain Institute (RMI)[19]. They find that 'properly' considering the economic benefits of decentralised energy supplies can raise their value by a large factor, often up to tenfold.

[14] SDC (2001). *Forging an energy policy for sustainable development.*
[15] SDC (2002). *Sustainable energy: response to the Government's 'Energy Policy: key issues for consultation'*

[16] Greenpeace (2006). *Decentralising UK Energy: cleaner, cheaper, more secure energy for the 21st century.* (Report prepared by WADE).
[17] GLA/Greenpeace (2006). *Powering London into the 21st Century.*
[18] IEA (2002). *Distributed Generation in Liberalised Electricity Markets.*
[19] RMI (2002). *Small is profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size.*

On microgeneration, a recent report by the Energy Saving Trust (EST) finds that by 2050, microgeneration could potentially provide 30-40% of the UK's total electricity needs and could help to reduce CO_2 emissions by up to 15%[20]. In energy terms, microgeneration could supply just over 300TWh of energy by 2050, most of this from micro CHP and fuel cells.

The benefits of a more decentralised energy system are well understood. They include:

- More efficient use of fossil fuels – this reduces carbon emissions and the demand for imported gas
- Reduced transmission losses – electricity is produced close to where it is needed
- More reliable – overall system reliability is increased through diversity of plant and reduction in transmission requirements
- More flexible – a more modular, decentralised energy system is better able to respond to technological change
- Lower costs – potential both for lower capital costs (new plant and infrastructural investment) and a decrease in the cost of electricity and heat – this has fuel poverty benefits
- Greater competition – a decentralised system could lead to more market participants, which would increase competition
- Better demand response – enhanced ability to contribute to demand response on the national grid through heat storage
- Raised energy awareness – the production of electricity and heat more locally helps raise awareness of energy production and consumption, and can help reduce demand

In short, a more decentralised energy system is a more modern energy system. It would be cleaner, would contribute to energy security, and allows for much greater flexibility in bringing forward the low carbon technologies of the future.

4.4.2 Barriers to deployment

The current energy system is predicated on a centralised model, and this in itself is a major barrier to greater decentralisation. The UK's liberalised energy markets were developed with this system in mind, and this has created a number of problems for decentralised generators. These, and others, are summarised below:

- Transmission and distribution is a regulated monopoly, and there are no incentives for the national grid operator or district network operators to connect decentralised generators – these are seen as an expense rather than an asset
- The market design favours large, vertically integrated energy companies with generation and supply operations – this creates barriers to market entry for smaller generators
- The regulations surrounding 'private wires networks' are a major barrier to their development by limiting the size of domestic networks, and restricting the ability of private wires operators to obtain competitive prices for exported power[21]
- Intermittent renewable generators are penalised by their inability to mimic conventional electricity generators – the result is a substantial discount in the wholesale price they can achieve
- There is no incentive structure to reward the carbon savings from cogeneration plant when compared to centralised plant – heat is therefore undervalued for its carbon-saving potential[22]

[20] EST (2005). *Potential for Microgeneration – study and analysis.*

[21] Greenpeace (2005). *Decentralising power: an energy revolution for the 21st century.*

[22] An economy-wide emissions trading scheme would solve this problem, but in its absence most cogeneration projects receive no carbon-

- The '28-day rule' is a disincentive to the greater use of long-term contracts, necessary to for many decentralised energy projects to be commercially viable – this rule is out of step with other sectors (telecoms, personal finance) and should be abolished
- The lack of smart metering infrastructure for most domestic and small business consumers does not allow them to obtain the full value of any exported electricity they generate
- The current market design does not require energy suppliers to offer a fair price for exported electricity (currently the price for electricity exported onto the grid is substantially lower than the price paid for using electricity off the grid)
- The current design of EUETS penalises CHP due to the system of permit allocation – new CHP plant is treated as an increase in on-site emissions, and therefore a cost[23]
- Planning constraints severely hamper efforts for greater deployment of renewables and CHP – large-scale electricity generation is handled centrally, whilst smaller schemes often endure lengthy and costly delays
- An anomaly in the business rates system means that businesses that install on-site renewables are being penalised through increases in their business rates levy which is a serious disincentive

4.4.3 Agenda for action

Action to bring about a more decentralised energy economy must take place at all levels – national, regional and local.

Nationally, we need a review of the current market structure – both the market design and the functions of regulators – to assess the extent to which it impacts on decentralised energy technologies.

The SDC is this year conducting an in-depth review of the role of Ofgem and other regulators in the energy system. This will report in the latter part of 2006.

The UK Government should also consider the role of a 'stricter consents' policy in helping to guide investment decisions towards a more decentralised energy system.

Between 1997 and 2000, the restriction on gas-fired generation over 10MW capacity to CHP plant is claimed to have resulted in 3GW of additional CHP capacity consented over that period[24].

In the long-run, there is very little sense in developing fossil-fuelled centralised plant to without carbon capture and storage, considering the long lifetimes of such investments.

The Government must send a signal to power plant developers that carbon capture and storage will be compulsory in the future, and should require immediately that all new plants are designed 'CCS-ready'.

Combined with an immediate stricter consents policy favouring CHP, this would send a strong signal to investors of the future direction of energy policy and allow for a shift in investment.

On community heating, the SDC was very disappointed at the absence of additional funding for the Community Energy scheme in the revised Climate Change Programme. Whilst projects on new-build sites are best incentivised through the planning system, retrofitting and improving existing projects ought to be a continual process. The Community Energy scheme provided capital funding, but even more importantly it

related benefit for their more efficient use of energy.

[23] We are hopeful that this will be addressed as part of the forthcoming National Allocation Plan for Phase II of the EUETS.

[24] CHPA (2004). *CHPA response to DTI consultation on draft guidance to power station developers.*

supported the costly process of coordinating between multiple stakeholders.

We are particularly worried that some local authorities and housing associations continue to take out community heating infrastructure and replace them with individual boiler units, a practice that should be unacceptable. Without financial support for community heating schemes the UK Government and Devolved Administrations should put in place safeguards to ensure that all existing schemes are maintained, and where possible, expanded. The GLA is actively investigating the potential for heat grids in London. Using heat mapping, they show how up to 50% of Greater London's heat demand could be met from decentralised energy generation[17].

At the regional and local level, planning and development bodies (such as RDAs and local authorities) have a huge role to play in promoting community heating schemes and developing wider heat grids (by expanding and joining together existing community heating schemes).

All new developments over a certain size should be required to have community heating, powered by CHP or a renewable energy source. To enable this, planning bodies should ensure that all new developments exceed a density of 50 dwellings per hectare, the level necessary to ensure viability[25].

Therefore, the SDC strongly recommends that this standard is incorporated into plans for the new growth areas, as well as the strategic plans of RDAs and local authorities.

Microgeneration also has a significant role to play in a decentralised energy economy and action is needed now to build up capacity in existing technologies and help bring forward the technologies of the future. This is covered in section 4.4.4 below, which draws on ongoing SDC work on microgeneration, which will result in a position paper with more detailed policy proposals in June 2006.

4.4.4 The role of microgeneration

The 2003 Energy White Paper was very clear in spelling out the key role that microgeneration would be expected to play in meeting future energy needs, as part of a shift towards greater decentralised energy supply.

The SDC believes that microgeneration technologies, particularly small-scale renewables, are highly compatible with sustainable development principles, and should make a major contribution to efforts to mitigate climate change. The benefits of microgeneration include:

- Reduction in carbon emissions
- Reduction in energy demand and promotion of sustainable behaviour
- Increased energy security
- Enhancing competitive markets and UK competitiveness
- Reduced price risk
- Reduced transmission losses
- Greater grid stability
- Job creation
- Reduction in fuel poverty
- Reduced environmental and health impacts

However, existing funding initiatives (totalling around £42m over the last four years excluding the Scottish Community and Householder Renewables Initiative) have not led to the creation of a mass-market microgeneration industry. In most cases microgeneration companies are small and operate in a niche market.

The UK is far behind most other European countries when it comes to microgeneration. For example, we have about 2% of Europe's solar thermal capacity, compared to

[25] For comparison, Victorian terraced housing has an approximate density of 70 units/ha. 50 units/ha is also the threshold for viable public transport provision (see section 4.12.4).

Germany's 47% share[26]. This pattern is repeated with all the other technologies, including solar photovoltaics and biomass.

Recent announcements indicate that the UK Government is getting serious about having a viable microgeneration sector for the future. This is essential if the UK is to create future options for making the deep cuts in carbon dioxide emissions that are required over the long-term. The DTI recently published its Microgeneration Strategy[8], to which the SDC submitted a response.

A major part of this strategy will be the Low Carbon Buildings Programme (LCBP), and the SDC welcomes the additional funding of £50m that was announced in Budget 2006[35], bringing the total to £80m over three years. This now equates to an increase in funding over the previous schemes, which we believe is essential to maintain momentum in this market. However, we also note that this will most likely represent a decrease in funding for the solar photovoltaics industry, which contradicts policy statements made in 2001[27] and 2003[28].

We also welcome the range of practical measures outlined in the strategy and hope that these will be actioned at the earliest opportunity. This should include a commitment to eliminate the anomaly identified in the business rates system, as described in section 4.4.2 above.

However, although the funding is welcome, the household retrofit market is not a priority area, and most of the funding will be aimed at large new-build projects and, most likely, schools. While this is sensible considering the funding available and the high visibility of schools and resulting educational potential, the importance of the household retrofit market cannot be ignored if mass-market scale is to be achieved and long-term carbon reductions delivered.

The SDC believes that the Government should develop a support mechanism for microgeneration that does not rely on grant funding. We have proposed a Microgeneration Commitment on energy suppliers to install microgeneration on domestic buildings. It should aim to have this in place by 2008, to allow for a smooth transition from LCBP funding and to run alongside EEC3. We present a summary of our proposals in section 4.7.3.

4.5 Energy efficiency

A sustainable energy policy must start and end with energy efficiency. Despite the challenges in ensuring that all opportunities for saving energy are realised, energy efficiency consistently comes out as the most cost-effective option for reducing carbon emissions and improving energy security. Work by Defra and the Carbon Trust shows that energy efficiency can often produce savings with a net cost benefit, particularly in the household sector[29,30]. In fact, the Defra report shows that the Climate Change Programme, prior to being revised in March 2006, is expected to deliver benefits (net of costs) of around £80 billion over its lifetime, of which around half is attributable to building regulations.

Despite this, the SDC is concerned that energy efficiency measures are not resulting in a reduction in energy demand. It is possible that energy efficiency measures lead to lower effective energy costs which in turn can stimulate consumer demand and economic growth, leading to further energy consumption[11]. This does not negate the importance of energy efficiency measures, which will improve the efficiency of the

[26] European Solar Thermal Industry Federation (2005), *Solar Thermal Markets in Europe 2004*.
[27] DTI (2001). *Opportunities for all in a World of Change*. White Paper.
[28] The 2003 Energy White Paper reaffirmed an earlier commitment to a solar PV demonstration programme in line with our international competitors; the Major PV Demonstration Programme, with £20m of funding over three years, was meant to be the "first stage of this process".

[29] Defra (2006). *Synthesis of Climate Change Policy Evaluations.*

building stock and manufacturing capacity for the long-term. But in order to lock in potential savings, energy efficiency must be part of a wider attempt to limit carbon emissions more generally – for example, cap and trade schemes or carbon taxes.

4.6 Reducing energy demand in the business sector

Action on reducing energy use and emissions in the business sector has been primarily through the Climate Change Levy and the EUETS. The latter targets only large energy users, and there is therefore significant potential for large energy savings from businesses outside the EUETS.

The Carbon Trust has published a comprehensive assessment of the remaining potential for energy and carbon savings in the business and public sectors[30]. This shows how implementing the most cost-effective range of measures could reduce carbon emissions by ~4.7-5.1MtC by 2010, and ~11.2-12.6MtC by 2020, using existing technologies. Over 90% of these savings can be achieved at net benefit to UK business at a 15% cost of capital.

The primary delivery mechanism for the additional emissions savings would be a UK Consumption-based Emissions Trading Scheme (UKCETS), which would cover businesses and public sector organisations over a certain size (initially excluding SMEs) but not covered by the EUETS. The proposed scheme would be auction-based to eliminate the problems of 'grandfathering', but could be made revenue-neutral. The scheme would not replace the CCL, but overlaps would be minimised.

The SDC fully supports the proposed UKCETS (see section 4.1.4) and we call on the Government to give further consideration to this proposal as a matter of urgency.

[30] Carbon Trust (2006). *The UK Climate Change Programme: potential evolution for business and the public sector.*

4.7 Reducing energy demand in the household sector

Reducing, or even constraining, energy use in households is proving to be a significant challenge. Despite the success of policy measures on household energy efficiency, energy use and carbon emissions have continued to rise.

However, this does not mean that opportunities for increasing household energy efficiency, or for reducing overall energy demand and carbon emissions, are exhausted. Far from it – current policy initiatives are modest when compared to the overall potential. The Energy Efficiency Innovation Review has shown that there is the potential to deliver an extra 9-19MtC of emissions savings by 2020[31]. It is essential that these savings are realised if we are to meet long-term carbon emission reduction targets.

The fuel poverty agenda is addressed in the most sustainable way by extending current initiatives on energy efficiency rather than relying on lower energy prices, as we highlight in section 2.2.4 above. This will need to be a continuous process: as carbon becomes more constrained, the average thermal efficiency standards of buildings will continue to rise. So a continuing programme to improve the improve the housing structure, thermal insulation, and efficient heating systems will bring progressive benefits for more low income households. Sub-standard housing leads to increased energy costs, which in future would translate into carbon costs if a personal carbon trading scheme is adopted as we propose[32].

We therefore recommend the long-term continuation of subsidised home insulation

[31] HM Treasury (2005). *Energy Efficiency Innovation Review: summary report.*

[32] Any scheme to limit carbon emissions leads to a carbon cost for consumers for their energy consumption. However, personal carbon trading would make this cost explicit.

schemes for low income households, such as the Warm Front scheme in England.

A broad range of technical measures for improving energy efficiency in homes are already well understood to be cost-effective and readily available on the market. These include:

- insulation (loft, walls, floors, tank and pipes, secondary & double glazing)
- draught proofing
- improved heating systems (complying with the new Building Regulations standards of 86% efficiency)
- wider use of heating controls
- efficient lighting and appliances

However, ensuring that these measures are applied, especially in existing homes, is a major challenge. Below we make a number of recommendations which we believe would stimulate uptake. Many of these are taken from a report the SDC has completed for the Office of the Depute Prime Minister which examined the potential for significantly improving resource efficiency in the existing housing stock[33].

4.7.1 Existing housing stock

Homes already built account for 99% of our total housing stock. Estimates vary of the proportion these will represent in 2020 and 2050, but even the most pessimistic estimate is that 75% of the current stock will still be in use in 2050 (depending on the rate of demolition of existing homes).

The SDC strongly favours programmes for improving the resource efficiency of existing homes, rather than seeing widespread new build as the more appropriate option. Building new homes instead of upgrading existing stock is carbon intensive and carries many wider environmental and social impacts. If the existing stock can be made more efficient at a more reasonable cost we can realise many environmental and social gains.

Buildings themselves require ongoing repair and reinvestment to improve their resource efficiency, and reduce carbon emissions. But there appears to be an uneven 'playing field' between refurbishment projects subject to VAT, and new-build projects which are VAT-free. This is regrettable and, we believe, needs to be tackled: as an example, equalising VAT on new build and refurbishments at 11-12% VAT would be revenue neutral.

The SDC recommendations for ODPM are founded on the behaviour change policy approach introduced in *Securing the Future*, the UK Government's Sustainable Development Strategy. With this approach, individual policies work better in a supportive policy framework. By proactive encouragement, enabling, exemplification and engagement, positive behaviour change can occur, as has been demonstrated in some other policy areas[33].

In addition, policy proposals need to be projected over the medium term to give industry some certainty that their investment will be well made. Industry capacity-building investments may take several years, and considerable financial resources, so industry must feel confident that the products they produce and install will meet policy needs. Evidence shows that policies that encourage innovation and good practice by industry, based on outcomes rather than prescriptive requirements, are more readily welcomed by industry.

In summary the Sustainable Development Commission, through the broad range of its work, has found that:

- consumers need clear and consistent signals about policy directions and priorities in order to change behaviour, and clear incentives to do so
- setting statutory standards, through regulation with proper enforcement, is

[33] SDC (2006). *Stock Take: delivering improvement in existing housing.* (To be published Mary 2006).

necessary to ensure that a minimum standard is being met - we cannot rely on voluntary standards alone

- regulations should set minimum standards that are achievable by all, proportional, and clearly deliver on policy objectives. Far from being a consistent burden on business, regulation can minimise the administrative burden on market players and the cost of compliance, as it provides a "level playing field" for those sectors.

Our recommendations for action on existing domestic buildings are:

- The Code for Sustainable Homes, currently being developed by ODPM to set a framework for the carbon emissions, water consumption and household waste reduction in new homes, is extended to existing buildings. **A Code for Sustainable Homes (Existing Housing)** could be integrated into existing and forthcoming policies, such as:
  - The Home Condition Report, to widen the householder advice to broader resource efficiency issues
  - The Decent Homes Standard, to improve the environmental impacts of this government/local authority funded programme
  - The Green Landlords Scheme, to raise awareness among tenants and encourage landlords to utilise the current incentives
  - The Housing Market Renewal and other publicly funded refurbishments, to ensure high standards.
  - Embedded in a cycle of reviews, signalling improvements to the Building Regulations every five years

- **Offset** any increase in carbon emissions in the new Growth Areas by matching this with a commensurate reduction in carbon emissions through implementing energy efficiency in existing homes in the same region.
- **Equalise VAT on refurbishment and new build** to overcome the current distortion that can encourage developers and home owners to demolish and replace homes instead of refurbishing existing buildings to high environmental standards. Our assessment is that 11-12% VAT on both repair and new build would be revenue neutral.
- Use the enabling powers of the **Sustainable and Secure Buildings Act 2004** to make sustainable development the driving force behind revised Building Regulations. This means Government will need to amend Regulation 8 to allow sustainability to be delivered across the Building Regulations approved guidance documents.
- Amend the **Building Regulations Part L** to implement the proposal to require consequential energy efficiency works in existing homes when carrying out building work.

4.7.2 Energy Efficiency Commitment

The Energy Efficiency Commitment (EEC) has been very successful in delivering low cost energy efficiency savings in the household sector. Suppliers over-achieved their targets in EEC1 by nearly 42%[34], and the Treasury has announced that an additional 250,000 installations will be carried out over the next two years above the EEC2 target to deliver early on EEC3[35]. An assessment of household energy efficiency policy for Defra showed that EEC is a cost effective method of delivering these savings because of its

[34] Eion Lees Energy (2006). *Evaluation of the Energy Efficiency Commitment 2002-05.* Report to Defra.
[35] HM Treasury (2006). *Budget 2006 – A strong and strengthening economy: investing in Britain's future.*

ability to harness the marketing power of energy suppliers[36].

It is for these reasons that the SDC recommended in 2005 that EEC3 should be increased by at least three times the level of EEC1, but in view of the apparent willingness of energy suppliers to deliver 200,000 extra installations in the EEC2 period, it is clearly possible to accelerate activity in EEC3.

We therefore now recommend that EEC3 should be four times the activity level of EEC1.

Therefore, although the Government intends to achieve between 0.9-1.2MtC savings through EEC3, the SDC recommends that more ambitious savings of 1.2-1.5MtC could be achieved. However, we must also recognise that the EEC will not necessarily result in overall decreases in carbon emissions from the household sector and it has no ability to limit consumers' appetite for energy-hungry appliances. It should therefore be seen as a short-term policy tool that will help bridge the gap to a more holistic approach to cutting carbon emissions, such as economy-wide carbon trading as described in section 4.1.

The SDC welcomes the UK Government's plans to increase flexibility and the range of measures covered in EEC3. However, we are unconvinced of the merits of extending EEC in its current form to cover microgeneration. As we explain in section 4.7.3 below, microgeneration and energy efficiency have very different characteristics, and it is not clear if and how EEC could help support a microgeneration industry on the scale needed post-2008.

Our recommendation is for consideration of a separate Microgeneration Commitment to run alongside EEC3, to deliver microgeneration through greater energy services provision.

[36] Oxera (2005). *Policies for energy efficiency in the UK household sector.*

If major modifications to EEC are made that would render microgeneration an obligatory part of achieving carbon savings then microgeneration may work as a part of EEC. But without a new obligation on suppliers to install microgeneration rather than the least cost-effective measures it is unlikely to stimulate uptake of microgeneration on a wide scale.

4.7.3 A Microgeneration Commitment

Our proposal for a Microgeneration Commitment would enable the Government to meet its objectives for microgeneration, without compromising the UK's liberalised energy markets, and with no requirement for significant public funding. The SDC has looked at a number of options for supporting microgeneration post-2008 and we believe that a commitment separate from the EEC would be the most effective.

A Microgeneration Commitment would be based on the EEC model, but with one important difference: energy suppliers would be required to reclaim all (or a large part) of their microgeneration investment costs from the benefiting customer rather than through a levy on all customers' bills, as happens through the EEC. This requirement eliminates the potentially large levies that would be required if microgeneration became a significant element of the EEC – microgeneration measures are many times more expensive than energy efficiency, so the cost per household would be high. It would also force suppliers to develop innovative incentive packages in order to stimulate demand and fulfil their microgeneration capacity targets.

The SDC therefore sees this proposal as one way in which Government could help bring about greater 'energy services' provision. Energy suppliers would most likely need to make use of five year supply contracts, and there is then scope for a whole range of imaginative and diverse product offerings that could help consumers obtain

microgeneration technologies without the high up-front costs.

Suppliers would have an incentive to install energy efficiency measures at the same time by fulfilling their Microgeneration Commitment and their EEC at the same time. We also see 'white certificates' as an ideal partner to this system, which could help encourage competition from outside the energy sector (e.g. from supermarkets, banks, and microgeneration installers themselves).

This scheme, as outlined above, would clearly target the 'able to pay' market, helping to raise the profile and desirability of microgeneration. However, there is also scope for a grant-funded stream within the Microgeneration Commitment aimed at fuel poor households, which could be funded by either the taxpayer or consumers.

The benefits of a separate Microgeneration Commitment are as follows:

- **Zero cost** to the Exchequer and zero (or minimal) levies on consumers' bills
- **Familiar**: modelled on the successful EEC scheme
- **Fair**: cost of installed microgeneration passes to the benefiting customer
- **Promotes energy services**: energy suppliers would need to offer incentive packages in order to stimulate demand
- **Increases competition**: would promote genuine competition based on product as well as price and could help bring new players into the energy sector
- **Lower capital costs**: the cost of microgeneration could be expected to fall due to bulk purchasing and greater uptake
- **Complements energy efficiency**: it is likely that energy suppliers would seek to install energy efficiency measures at the same time, helping to meet their EEC targets
- **Fuel poverty element**: the scheme could incorporate dedicated funding to help target the fuel poor
- **Changed perceptions**: would help change perceptions of microgeneration as a radical option, and increase its desirability

We do not believe that all of these benefits could be captured by a reformed EEC incorporating microgeneration. This option might also confuse consumers by giving conflicting messages about the need for low cost energy efficiency measures (the 'basics') versus higher cost 'innovation' measures[37]. We therefore recommend that the Government gives serious consideration to a separate Microgeneration Commitment, to run alongside an expanded EEC.

4.7.4 Post-EEC3

The SDC notes the recent interest in a supplier cap and trade scheme to replace EEC in 2012 – this has been suggested for both the domestic and the business sectors. The cap could be set to limit the amount of energy sold by energy supply companies, leaving them to decide how to stay within their allocations. Flexibility would be ensured through a trading regime.

The aim of this proposal would be to halt the year-on-year rises in household energy consumption by stimulating supplier-led energy efficiency measures, microgeneration and demand reduction (through tariff and pricing policy).

There is currently insufficient evidence to fully assess this proposal, but it does represent an alternative to continued reliance on supplier commitment mechanisms. It is unclear what impact this proposal would have for microgeneration and how it would fit within our suggested long-term framework for climate change

[37] Energy Efficiency Partnership for Homes (2006). *Future Approaches to Energy Efficiency in the Household Sector.* Proceedings from a seminar held on 21-22 March 2006.

policy, based on economy-wide emissions trading. However, the concept has a lot of merit and we recommend that the Government keep this option under review as a replacement for EEC in 2012.

4.7.5 Improved consumer information

On other fronts, we note the Government's intention to undertake a smart metering pilot and we hope they will act on the results this produces. We also believe our proposals for a Microgeneration Commitment could help stimulate interest in smart metering from energy suppliers, who would be given a strong incentive to take this agenda forward. This could be the precursor to mandatory action.

In the interim period there is significant potential for reducing energy demand through improved information on bills. We would like to see a requirement for energy suppliers to provide graphical indications of annual energy consumption against previous consumption patterns, and against a national average baseline[38]. A report for Ofgem by the Centre for Sustainable Energy concluded that providing consumers with historical comparisons on their bills would be the most effective way to influence energy consumption[39]. The report also found that smart meters were not required to introduce these measures, which could also link well with 'fuel mix disclosure' requirements.

4.7.6 New homes

New homes account for around 1% of the housing stock in any given year, and by 2050 around 30% of all homes will be built post-2006. This illustrates the fundamental importance of action on new homes – such action can also be a catalyst for bringing forward innovative technologies for the retrofit market and reducing costs.

The Code for Sustainable Homes is currently being developed by ODPM. We see the Code as an important tool in transforming the house-building market through its use as a public procurement standard, and providing a clear indication to the construction industry of the future direction of building regulations. We believe that action on the Code, followed by building regulations, needs to be ambitious.

Our recommendation is for building regulations to require zero heating standard by 2010, followed by a zero carbon buildings standard by 2015.

To help achieve this we recommend that the Code level 3, which will be used as a criteria for publicly-funded housing projects, should be set to require 'zero carbon heating' with immediate effect, rising to a 'zero carbon' standard by 2010. Building regulations should therefore follow, with zero carbon heating achieved in 2010, and zero carbon buildings in 2015.

The Government is committed to 'lead by example' in implementing sustainable development. Through using its purchasing power to procure sustainable housing, the public sector can bear much of the short-term risk of implementing higher standards, whilst benefiting from longer-term cost savings.

4.8 Public sector action

4.8.1 A carbon neutral public sector

The public sector should aim to set a strong example through its procurement policy. The SDC has consistently supported the aim of achieving a carbon neutral public sector ahead of action at the national level.

We therefore call on the UK Government and the leaders of the Devolved Administrations to commit to a carbon neutral public sector by 2015.

[38] This information could be improved by collecting information on household size and heating type; there could be allowance for basic and enhanced comparisons.

[39] CSE (2003). *Towards effective energy information – improving consumer feedback on energy consumption.* A report to Ofgem.

This would include all publicly-funded organisations, and crucially all schools and health bodies, which are responsible for a large percentage of public sector emissions.

A separate target should apply to the central Government estate to achieve carbon neutrality by 2012.

We envisage carbon neutrality being achieved through a combination of energy efficiency savings, investment in new buildings and plant, and finally through carbon offsetting. The use of carbon offsetting would generate an opportunity cost for saved carbon emissions, and would encourage carbon-consciousness in procurement policy.

Carbon offsets could be procured centrally, through the Office of Government Commerce (OGC), or by extending the Government Carbon Offsetting Fund currently used to offset UK Government air travel. There are a number of options for how carbon offset funds could be spent, including the purchase of Clean Development Mechanism (CDM) credits for projects in developing countries, dedicated overseas carbon/energy funds (such as the Renewable Energy & Energy Efficiency Partnership scheme set up by the Foreign & Commonwealth Office in 2002), or funding for UK community projects where true 'additionality' can be shown. This issue would need further investigation to ensure that the most sustainable options are brought forward.

4.8.2 Supporting the Code

As we explain in section 4.7.6 above, the public sector has an important role to play in improving the standard of new buildings through its support of the Code for Sustainable Homes.

Our recommendations would mean that all publicly-funded (whether in part or in full) housing projects would need to be zero carbon by 2010, and comply with a zero carbon heating standard with immediate effect. However, we would also like to see this commitment extended to all new public sector buildings through public procurement standards, as specified by OGC.

4.8.3 Schools

Funded by the Department for Education and Skills (DfES), the SDC has carried out a scoping study into the carbon 'footprint' of the UK schools estate, including both direct and indirect carbon emissions sources that are attributable to the operation of schools. This shows that schools contribute 15% of the wider public sector carbon emissions.

Schools are a key focus in driving behaviour change in pupils and the wider community through showcasing carbon efficient technologies and lifestyles to raise awareness and contribute to the curriculum. School building energy use contributes around 44% of the schools' footprint and significant savings may be made through cost effective energy efficiency and microgeneration installation.

Two major capital investment programmes will transform the schools estate in England over the next 20 years, and we recommend that these are designed to minimise all aspects of the carbon footprint. Procurement of new build and refurbishments should require high standards of energy efficiency in design, along with monitored operational carbon emissions targets (as for the health estate) and a focus on showcasing microgeneration.

We recommend on the basis of the scoping study that a fuller carbon analysis is undertaken of the schools estate, and that the UK Government commits to an emissions reduction goal in line with national targets, considering both direct and indirect emissions sources.

We welcome the £50m in additional funding for microgeneration (see section 4.4.4) and recommend that funding is provided both for investigation of low-carbon approaches as well as a ring-fenced fund for microgeneration on school buildings.

Grant funding for microgeneration in schools needs to consider maximising educational outcomes for pupils and the wider community, streamlining grant applications, ease of access to information and potential availability of match funding from other private sector bodies.

4.8.4 Health buildings

The health sector has a target to reduce the level of primary energy consumption by 15%, or 0.15MtC, between March 2000 and March 2010; a target of 35 – 55 GJ/100 m^3 per year for the healthcare estate for all new capital developments and major redevelopments or refurbishments; and a target of 55 – 65 GJ/100 m^3 per year for all existing healthcare facilities not subject to major redevelopment or refurbishment.

We welcome these targets: they are ambitious and will encourage energy efficiency in the NHS. However, we consider that all of these targets should be based on carbon rather than energy, in order to encourage the use of microgeneration and renewable energy.

Combined heat and power is a viable technology for hospitals due to their high stable heat loads, but it is often not included in new-build and refurbishment projects due to an undue focus on minimising short-term costs and risk. We recommend that building developers could be required to install connections for plant so that the building is 'future-proofed', even if the plant itself is not installed at the initial stage. Major CHP plant may be subject to site-based licences for emissions and carbon trading, therefore the Department of Health should examine how to assist developers with this centrally.

Similarly to schools (see above), we recommend that the additional £50m funding for microgeneration is provided both for investigation of low-carbon approaches as well as a ring-fenced fund for microgeneration on health buildings.

4.9 Electricity supply

We note that there is a strong emphasis in the Energy Review consultation document on electricity supply. While electricity is important - due to the high carbon emissions associated with centralised generation, transmission, distribution and energy inefficient products and buildings - action focussed on supply options alone will fail to deliver on the UK's four energy policy goals.

We have restated our position on nuclear power in section 4.3. This was based on evidence which showed that it is possible to achieve a low carbon electricity supply based on renewables and greater use of CHP[40]. We also see a potential role for carbon capture and storage in helping to bridge the gap to a renewables future.

4.9.1 Renewables

The UK Government has a target for a 10% contribution from renewables to UK electricity supply by 2010, with an 'aspiration' for a 20% contribution by 2020. The SDC places great importance on achieving these targets, and we call on the Government to restate its commitment to the 2010 target, and to commit to a firm target for 20% renewables by 2020.

In 2002 the Renewables Obligation (RO) came into force, placing a requirement on electricity suppliers to source an annually increasing percentage of their supply from renewable energy sources. The RO is, in effect, a levy on consumers to subsidise renewable sources of electricity, and it provides a premium payment (~4p/kWh) to renewable generators.

This system has been effective in bringing forward large increases in renewable electricity generation, which reached 3.6% of the supply mix in 2004. Most of this increase has been met through new onshore

[40] SDC (2006). The role of nuclear power in a low carbon economy - *Paper 2: Reducing CO_2 emissions: nuclear and the alternatives.*

wind power capacity, and an expansion of landfill gas and biomass.

For the longer term we will need to ensure that a broad range of renewables are developed – this increases reliability, and will allow us to aim for a much greater percentage of output from renewable generators. The SDC is therefore concerned that action is taken now to ensure that pre-commercial technologies, such as marine renewables (tidal and wave) and solar photovoltaics, are supported through innovation funding.

We are also concerned that in its current form, the RO may not provide the best framework for delivering high percentages of renewable electricity generation, from a diverse range of sources, at the lowest cost. The RO is a blunt tool, and in the longer term may over-subsidise some renewables (e.g. some onshore wind sites), whilst at the same time providing too little support for others. We therefore believe there needs to be consideration given to a system that would support low carbon forms of generating capacity over the long-term and in a cost effective way. This could be a modified RO, or some other support mechanism.

However, until 2015 at least, the RO is the primary support mechanism for achieving the target for 10% renewable electricity contribution by 2010 and the 20% 'aspiration' for 2020. Much of this is due to come from on- and offshore wind power[41], but there is evidence that the offshore wind sector will struggle to realise its full potential without additional support. This is of particular concern for the post-2010 period, when offshore wind is expected to make a substantial contribution to longer term targets.

The BWEA estimates that offshore wind has the potential for 8.2GW of installed capacity by 2015[42]. However, in the absence of additional support only 2GW is likely to be built. The reasons for this are many, but include recent changes in the cost of turbines, operational problems, and financial uncertainties.

The long-term case for offshore wind still seems to be sound[42,43]. Therefore, the Government needs to consider whether it can allow these problems to severely reduce the chances of offshore wind making a substantial contribution to UK electricity supply in the long-term. The SDC's opinion is that there is a strong case for limited additional support for this pre-commercial technology on innovation grounds. We recommend that the UK Government provides additional funding to help realise the full potential of offshore wind over the next 10 years.

4.9.2 Biomass

The SDC in Scotland produced a report in 2005 which looked at the potential for wood-fuelled heating in areas off the gas grid[44]. Combined with action to develop biomass supply chains, our proposed strategy could be used to displace rural electricity consumption, thus helping to reduce electricity demand. We proposed a capital grants scheme to help tackle the high up-front costs associated with conversion to a biomass energy supply – this is consistent with the recommendations of the Biomass Task Force[45].

We also note the Government's review of biomass co-firing, which is running alongside the Energy Review. We support the aims of this review, but urge the Government to consider the low efficiency of co-firing when compared to biomass-only

[41] The BWEA estimates that, without further deterioration in planning delays, onshore wind power could amount to over 6GW by 2010, contributing around 16TWh (nearly 5%) to UK electricity supply. See BWEA (2006). *Onshore wind: powering ahead.*

[42] BWEA (2006). *Offshore wind: at a crossroads.*
[43] DTI (2004). *Renewables Innovation Review.*
[44] SDC (2005). *Wood Fuel for Warmth.*
[45] Biomass Task Force (2005). *Biomass Task Force – report to Government.*

generation[46], and the impact that co-firing might have on planned biomass-only generating capacity[47]. These considerations need to be balanced against the desire to increase UK biomass production, and the support that co-firing can provide for energy crops.

4.9.3 Carbon capture and storage

The SDC is interested in the role that carbon capture and storage (CCS) technologies might be able to play in bridging the gap to a more sustainable energy future based on renewable sources of energy.

We recognise that there are a number of important issues that would require resolution, particularly the health and safety implications of continued reliance on fossil fuels, particularly coal, and also the intergenerational implications of long-term storage of carbon dioxide. We call on the UK Government to undertake an assessment of these issues.

Our support or otherwise for CCS technologies needs to be considered in an international context. Many developing countries, of which China and India are commonly-used examples, are planning a large expansion in the use of coal over the next few decades. The implications for global greenhouse gas emissions are obviously huge. As a result, there is a strong case for the development of CCS technologies to help limit the carbon implications of this expansion.

We recognise that full-scale commercial use of CCS technologies is unlikely before 2015. However, this depends on the rate of research and development in the forthcoming decade. The SDC would therefore like to see a strong commitment to further research, development and deployment of CCS technologies, in the UK and overseas. Seen in the context of our recommendations for a more decentralised energy economy, including a stricter consents policy for centralised plant, CCS deployment in the UK should aim to include heat capture so that efficiencies can be maximised. If further fossil-fuelled plant is to be allowed, this should be 'carbon capture ready' as an absolute minimum, bearing in mind the long lifetimes of conventional plant (see section 4.4.3).

The viability of CCS is likely to depend on the price of carbon resulting from credible cap-and-trade emissions scheme – particularly if CO_2 has to be transported long distances from its source to a secure reservoir. The long-term aim should be to allow CCS to compete freely with other forms of low carbon electricity generation, with full cost internalisation.

4.9.4 Other options for incentivising low carbon electricity supply

Recognising the limitations of the RO, and the fact that this does not provide support for non-renewable low carbon electricity generators (such as CHP and CCS technologies), the SDC recommends that the UK Government gives consideration to alternative proposals for facilitating investment in low carbon electricity generation.

As highlighted by Helm and Hepburn, the UK electricity sector faces an uncertain investment climate in the absence of a carbon market post-2012[48]. Due to the long lead times for many energy investments and the lack of any certainty on the scale of future carbon constraints (and therefore the impact on carbon prices), investment in low

[46] New biomass generating capacity can achieve very high efficiencies (often in CHP mode), and has great potential to contribute to a decentralised energy system. For example, the Avedore Multi-fuel Power Plant in Copenhagen, Denmark, achieves efficiencies of 95%; this compares to around 35% for a coal-fired plant.

[47] As co-firing makes use of existing generating capacity the capital costs are minimal, whereas new biomass-only capacity, although competitive, faces full new-build costs.

[48] Helm, D. and Hepburn, C. (2005). *Carbon contracts and energy policy: an outline proposal.* [Unpublished paper].

carbon technologies and long-term innovation is being hampered.

The effect of this is likely to be further investment in gas-fired, centralised CCGT plant, taking us in exactly the opposite direction to where we believe we should be heading. This is not only costly in carbon terms, but could be costly for consumers in the long-run, by locking the UK into high gas dependency that will increase the risk of price fluctuations and the financial impact of future carbon constraints.

These are the implications of an imperfect market, where carbon signals are non-existent in the long-term. Accordingly, there is a strong case for transferring this political risk to the Government, as the participant best placed to deal with it. This point is well covered by Helm and Hepburn, who suggest a system of carbon contracts to simulate low carbon energy supplies post-2015[48].

However, this approach would necessitate a complicated system of baselines in order to determine the potential contribution of each measure. An alternative approach, suggested by Professor Paul Ekins[49], would be for the Government to offer long-term contracts for low carbon electricity generation, awarded through a competitive bidding process. The Government would, in effect, offer a guaranteed floor price, at a level determined by each successful bid, for low carbon electricity output from 2016 onwards. The Government would then cover the difference if the price of wholesale electricity in the contract period was lower than the floor price; if it was higher, there would be no payout.

The benefits of this approach are that it would provide long-term certainty to investors to help bring about supplies of low carbon electricity. There is the potential to award the incentives according to need, with low cost options bidding in for a lower contract price whilst high cost options could obtain the necessary support. This should ensure that the cost of the system to the taxpayer and/or consumer is minimised, and could potentially result in zero cost for some or all of the contracted output – depending on wholesale electricity prices in the long-term.

The SDC is very interested in this proposal and would like to see further work done to flesh out the details.

4.9.5 Intermittency

The SDC feels that the Energy Review consultation document misunderstands the interplay between baseload capacity and intermittency, particularly in relation to renewables.

Firstly, it is important to realise that all electricity generating capacity is intermittent, in that no generator can provide guaranteed continuous output. The best fossil-fuel powered generators achieve load factors of ~90%, meaning there is a 1 in 10 chance they will not be available at any point in time.

This means we need to take a systems view of the electricity system, rather than considering each technology type in isolation. From this perspective, all generators, including intermittent and distributed generators, can contribute to providing firm capacity.

For example, the addition of 20% wind power to the UK electricity system is expected to displace around 5GW of conventional capacity[50]. Although this output will be variable, this needs to be considered in the context of a grid system which already has to balance large fluctuations in supply and demand.

A recent report by the UK Energy Research Centre represents the most comprehensive assessment of the intermittency issue in the

[49] Ekins, P. (2005). *An alternative to carbon contracts.* [Unpublished paper]

[50] SDC (2005). *Wind Power in the UK.*

UK to date[51]. This shows that achieving 20% of output from wind power would pose very few problems for the grid system, and would result in additional costs of between 0.1 to 0.15p/kWh. This is consistent with the findings of the SDC's comprehensive report on wind power, published last year[50].

It is important to stress that achieving 20% output from 'intermittent renewables', let alone wind power alone, is still a very long way off. It is also the case that the cost of intermittency will differ for each renewable technology, and that some technologies will be complementary. Therefore, the 20% figure above is relevant to wind power alone, and the deployment of significant amounts of other technologies (such as wave, tidal or solar power) onto the grid would not necessarily increase costs proportionately. In fact, a technologically and geographically diverse portfolio of renewable electricity supply would collectively reduce the problem of intermittency. In addition, many renewables (biomass, hydropower, heat pumps) are not 'intermittent' in this way, which should caution against treating renewables as a single category.

The SDC calls on the UK Government to counter the claims made by those who seek to dismiss the contribution of some renewables on the grounds of intermittency. Assessment of the contribution of intermittent renewables should be careful to avoid the presumption that intermittency is a problem for the electricity system.

4.9.6 Demand management

There is a strong case for increased use of demand management as part of a sustainable energy system. Demand management is a highly efficient way of meeting peak loads, helping to reduce the need for marginal, inefficient (and therefore more polluting) generating capacity.

The national grid operator already makes use of demand response – generally through paying large electricity users to reduce demand at short notice. However, there is considerable potential to expand such options to smaller business users, and even households. A more decentralised energy system combined with 'smart metering' could help achieve this, with consumers able to curtail demand in response to price incentives. The Government should also investigate ways of utilising 'dynamic demand' technologies[52], either through the market or, if necessary, through regulation.

4.10 Gas supply

The Energy Review consultation document highlights our increasing dependence on imported natural gas, which is projected to reach 90% of total demand by 2020[53].

Import dependency itself should not be viewed as a major concern, particularly if sound policies are put in place to promote diversity of supply sources and increase storage capacity. Indeed, many countries have been net importers of oil and gas for decades, and there is a strong incentive for producers to maintain stable supplies (and prices) for their consumers. The SDC supports the broad measures outlined by the Government for dealing with increasing import dependency, such as investment in supply and storage infrastructure, and the maximisation of remaining UK reserves.

However, the greatest impact on reducing import dependency would be to reduce overall demand for gas. Our recommendations on decentralised energy and energy efficiency would go a long way towards achieving this, whilst reducing

[51] UKERC (2006). *The costs and impacts of intermittency: an assessment of the evidence on the costs and impacts of intermittent generation on the British electricity network.*

[52] Dynamic Demand is the term used by a not-for-profit organisation of the same name, set up to promote technologies that allow for automatic demand response in household and commercial appliances. See www.dynamicdemand.co.uk.

[53] DTI (2006). *Our Energy Challenge – securing clean, affordable energy for the long term.*

carbon emissions and the scale of infrastructural investment required.

In the long-run, greater use of a diverse portfolio of renewable technologies is the most sustainable way of achieving low carbon energy supplies whilst reducing our dependence on imported gas.

4.11 Transport

The role of transport is significant in terms of climate change abatement. The transport sector is currently the second largest source of UK end user greenhouse gas emissions, and if international aviation were included it would be the largest. Furthermore, while emissions from all other sectors are set to decline, transport emissions are predicted to continue to increase.

The use of more efficient private vehicles and reductions in demand for road and air transport, through developing a less energy intensive economy, will also help achieve another aim of the energy review: maintaining the reliability of energy supplies.

4.12 Surface transport

Road transport is, currently, the principal source of greenhouse gas emissions from the transport sector and is responsible for around one quarter of the UK's total end user CO_2 emissions (DfT, 2004). To achieve significant emission reductions in this sector a mixture of technological *and behavioural change* is necessary[54,55]. The SDC was therefore disappointed with the emphasis in the revised Climate Change Programme on purely technological solutions.

Below we set out SDC recommendations on how the road transport sector should start to significantly reduce its carbons emissions before 2020:

1) Increasing the use of more efficient, lower carbon vehicles
2) Increasing the use of lower carbon fuels
3) Using existing vehicles more efficiently
4) Reducing the number and length of trips
5) Increasing the use of alternative modes of transport

4.12.1 The use of more efficient, lower carbon vehicles

Improvements in vehicle efficiency have, so far, been partly offset through consumers purchasing larger, less fuel efficient vehicles with 'additional' features, for example, air conditioning.

Graduated Vehicle Excise Duty (VED) bands were introduced by Government in 2001 to encourage take up of lower carbon vehicles. There were six bands (A to F) and a maximum differential of £30 between each band.

After Budget 2006 a new higher band, G, was introduced for vehicles which emit 225g or more of carbon dioxide emissions per vehicle kilometre[35]. VED for this band is £210 for petrol and £215 for diesel vehicles. The VED rate for the lowest band (A) is now zero and the maximum differential between each bands has increased from £30 to £60.

However, research by MORI suggests a much higher differential is necessary to impact on consumer purchasing decisions. In our response to the Climate Change Programme Review (CCPR)[56] the SDC recommended a differential of £300 between each band (plus a new higher band), leading to a top band VED of £1,800/year. We estimated

[54] Hickman R. and Banister D. (2005) *If, At First, the Idea is Not Absurd, Then There is No Hope For It: Towards 15 MtC in the UK Transport Sector.* Paper to the 45th European Congress of the Regional Science Association, Amsterdam 23rd to 27th August 2005.

[55] Tight, M. R., Bristow, A. L., Pridmore, A. and May, A. D., (2005) *What is a Sustainable Level of CO_2 Emissions from Transport Activity in the UK in 2050?* Transport Policy 12(3), pp 235-244.

[56] SDC (2005). *Climate Change Programme Review: full submission.*

that this could result in carbon savings per annum of between 0.4 to 0.8MtC. A widened differential would also help put the UK on a path to achieving its Powering Future Vehicles Strategy target and its contribution to the EU voluntary agreement on emissions for new vehicles.

The SDC recommends that the Energy Review considers how VED and other fiscal incentives can be used much more effectively to fully encourage people to purchase the lower carbon, more fuel efficient vehicles necessary to put the UK transport sector on a path to reducing its carbon emissions.

4.12.2 The use of lower carbon fuels

Biofuels (renewable transport fuels) can offer substantial carbon savings compared to conventional fuels. If biofuels contribute 5% of fuels in 2010 and offer a 50% carbon saving compared to conventional fuels then savings of around 1MtC could be achieved.

However, we are concerned about the sustainability impacts of the use of primary crops, especially if the RTFO target increases above 5%. It is essential that the fuels are fully carbon and sustainability accredited to encourage the uptake of lower carbon sustainable fuels and technologies, including the use of feedstocks based on agricultural and forest waste products. The RTFO should be carbon-based at the outset; a volume-based RTFO will be unable to incentivise lower carbon feedstocks.

4.12.3 Using existing vehicles more efficiently

In our submission to the CCPR we advocated that the Department for Transport (DfT) examine the role that changes in speed limits could make in reducing carbon emissions. Our assessment is that around 1.5MtC could be saved per year.

4.12.4 Reductions in the number and length of trips and the use of alternative modes

Improvements in vehicle efficiency have also been offset by an increase in vehicle kilometres travelled, leading to an overall increase in carbon emissions from transport.

To combat this we need measures which will facilitate behavioural change and reduce car vehicle kilometres travelled, such as green travel plans, school travel plans, car clubs and improved information on public transport options. If these measures were introduced under a high intensity scenario, an 11% reduction in national traffic levels could be achieved[57].

The SDC analysis for the CCPR suggests that savings of 0.5MtC per annum are possible. There would be numerous other benefits, including reductions in congestion, and health benefits through improvements in air quality and increased levels of physical activity. An increased emphasis on the importance of behavioural change measures would therefore have wider sustainable development benefits.

To facilitate the uptake of behavioural change measures a clear national strategy on the need for traffic reduction is necessary. The aims of the 1997 White Paper and the Road Traffic Reduction Act need to be revisited with urgency. There must be a move away from DfT's current position that uncontrolled traffic growth is tenable. Local Authorities must be given a clear message that reductions in traffic are necessary through DfT guidance on the local transport plans.

There is also the need to reduce the need to travel. Here housing density is an important issue and we are pleased that the Energy Review will consider the Barker Review on Land Use Planning. Current typical housing densities of 30-50 dwellings per hectare or

[57] Cairns S., Sloman L., Newsome C., Anable J., Kirkbride A., and Goodwin P. (2004). *Smarter Choices – Changing the way we travel.*

less will reinforce the dependence on travel by private car. Housing densities need to be at least 50 dwellings per hectare in order to justify the provision of comprehensive services[58] including good public transport links, improved walking and cycling facilities, and community heating infrastructure (see section 4.4.3).

The SDC will continue to look at the contribution of transport-related behavioural change measures over the forthcoming year.

The SDC recommends that the energy review reflects the findings of recent studies, and considers the importance of behavioural change in reducing transport's carbon emissions.

4.13 Aviation

In the UK, aviation (international and domestic) currently produces around 10MtC per annum. This is forecast to increase to around 18MtC in 2030 and then decrease slightly, due to expected improvements in technology, and stabilise at around 17MtC in 2050. Assuming that aviation emissions are 17MtC (and given the technological changes necessary this could be considered a low figure) aviation could account for 26% of emissions (assuming a 60% reduction) or 52% of emissions assuming an 80% reduction in 2050.

Furthermore, these figures underestimate the climate change impact of aviation, which is estimated to be 2-4 times greater than that of carbon alone, depending on the assumptions used with regard to radiative forcing.

The SDC calls on the UK Government to affirm that the 60% target includes emissions from domestic and international aviation together with their radiative forcing effects.

The SDC is concerned about the plausibility of the 60% or greater carbon reduction if aviation grows as forecast, particularly given that a 20% reduction in carbon emissions by 2010 looks unlikely to be achieved and this does not include international aviation[2].

There are a number of questions which need to be answered.

- How is aviation expected to contribute to emission reductions?
- If the emphasis is on trading, is this plausible on a 2050 timescale, when the contraction and convergence approach which is the basis for the 60% and 80% reduction, would result in all countries reducing their emissions by then?
- Is a significant breakthrough in aviation technology or fuels anticipated?
- If yes, what level of reduction is plausible?
- Would there be trade-offs between reductions in carbon emissions and increases in aviation's other radiative forcing effects such as vapour trails?
- Would the slow turn-over rates for aircraft fleets result in limited impact until 2030-2050 or later?
- Improvements in aviation operations have the potential to reduce emissions, but what measures are being taken to implement these improvements?

If the government is committed to reducing carbon emissions and the impact of climate change then it needs to start to take the issue of aviation emissions far more seriously than it has done to date. These issues must be addressed prior to the planned airport expansion. The 'predict and provide' approach has been discredited in practically every other sector, and will result in an increase in demand to fill the capacity provided.

[58] Power A, Richardson L, Seshimo K, Firth K and others (2004). *A framework for housing in the London Thames gateway.* LSE Housing and Enterprise LSE Cities.

5 SUMMARY OF KEY RECOMMENDATIONS

1. The UK Government should state its intention to put emissions trading at the centre of climate change policy, and work towards developing a scheme that is economy-wide and allows for binding annual emissions reductions.
2. The UK Government should commit to and early assessment of personal carbon trading and the role it might play within a broader emissions trading framework.
3. Current and future policies should be judged on their compatibility with an emissions trading framework, and their ability to help bring this about.
4. The SDC believes there is no justification for bringing forward plans for a new nuclear power programme at this time, and that any such proposal would be incompatible with the UK Government's own Sustainable Development Strategy. We recommend that the UK Government pursues a low carbon energy policy that excludes nuclear power.
5. The UK Government should continue to assess the potential contribution of new nuclear technologies for the future whilst continuing to pursue answers to our nuclear waste problems as actively as possible.
6. We recommend that the Government put the UK on a course to deliver a more decentralised energy system relying on greater use of CHP, renewables, and microgeneration.
7. We call for a review of the current energy market structure – both the market design and the functions of regulators – to assess the extent to which it impacts on decentralised energy technologies.
8. The UK Government should consider the role of a 'stricter consents' policy in helping to guide investment decisions towards a more decentralised energy system.
9. The Government must send a signal to power plant developers that carbon capture and storage will be compulsory in the future, and should require immediately that all new plants are designed 'CCS-ready'.
10. All new developments over a certain size should be required to have community heating, powered by CHP or a renewable energy source. To enable this, planning bodies should ensure that all new developments exceed a density of 50 dwellings per hectare, the level necessary to ensure viability, as well as improved public transport provision.
11. The SDC fully supports the proposed UK Consumption-based Emissions Trading Scheme and we call on the Government to give further consideration to this proposal as a matter of urgency.
12. We recommend the long-term continuation of subsidised home insulation schemes for low income households, such as the Warm Front scheme in England.
13. We recommend that A Code for Sustainable Homes (Existing Housing) could be integrated into existing and forthcoming policies, including the Home Condition Report, the Decent Homes Standard, the Green Landlords Scheme, and the Housing Market Renewal scheme.
14. We recommend that any increase in carbon emissions in the new Growth Areas is offset by matching this with a commensurate reduction in carbon

emissions through implementing energy efficiency in existing homes in the same region.

15. We recommend that the Government equalise VAT on refurbishment and new build
16. We recommend that the Government Use the enabling powers of the Sustainable and Secure Buildings Act 2004 to make sustainable development the driving force behind revised Building Regulations.
17. We recommend that the UK Government amend the Building Regulations Part L to implement the proposal to require consequential energy efficiency works in existing homes when carrying out building work.
18. We recommend that EEC3 should be four times the activity level of EEC1.
19. We recommend consideration of a separate Microgeneration Commitment to run alongside EEC3, to deliver microgeneration through greater energy services provision.
20. We recommend that building regulations require a zero heating standard by 2010, followed by a zero carbon buildings standard by 2015.
21. We call on the UK Government and the leaders of the Devolved Administrations to commit to a carbon neutral public sector by 2015.
22. A separate target should apply to the central Government estate to achieve carbon neutrality by 2012.
23. We recommend on the basis of the scoping study that a fuller carbon analysis is undertaken of the schools estate, and that the UK Government commits to an emissions reduction goal in line with national targets, considering both direct and indirect emissions sources.
24. We welcome the £50m in additional funding for microgeneration and recommend that funding is provided both for investigation of low-carbon approaches as well as a ring-fenced fund for microgeneration on school and health buildings.
25. We recommend that the UK Government gives consideration to alternative proposals for facilitating investment in low carbon electricity generation.
26. The SDC calls on the UK Government to counter the claims made by those who seek to dismiss the contribution of some renewables on the grounds of intermittency.
27. The SDC recommends that the Energy Review considers how VED and other fiscal incentives can be used much more effectively to fully encourage people to purchase the lower carbon, more fuel efficient vehicles necessary to put the UK transport sector on a path to reducing its carbon emissions.
28. The UK Government should ensure that biofuels used to fulfil the RTFO are fully carbon and sustainability accredited to encourage the uptake of lower carbon sustainable fuels and technologies, including the use of feedstocks based on agricultural and forest waste products.
29. We recommend that the Department for Transport (DfT) examine the role that changes in speed limits could make in reducing carbon emissions.
30. The SDC recommends that the energy review reflects the findings of recent studies, and considers the importance of behavioural change in reducing transport's carbon emissions.
31. We call on the UK Government to affirm that the 60% target includes emissions from domestic and international aviation together with their radiative forcing effects.