

Climate Change Programme Review  
the submission of the  
Sustainable Development Commission  
to HM Government

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**Sustainable**  
Development Commission

## Contents

### Executive Summary

1. Introduction.....	7
2. Targets.....	7
3. Cross-cutting Policies and Measures.....	8
3.1. EU Emissions Trading Scheme.....	9
3.2. Domestic Tradable Quotas.....	9
3.3. Capacity Building and Micro Generation.....	11
3.4. Planning Policy.....	12
3.5. A Carbon Neutral Thames Gateway.....	13
4. Energy Supply Options.....	13
4.1. Renewables - Wind.....	14
4.2. Renewables - Biomass.....	14
4.3. Coal in the electricity mix.....	15
4.4. CHP / Trigeneration.....	15
4.5. Hydrogen.....	16
4.6. Nuclear power.....	16
5. Achieving further savings from households.....	16
5.1. Changing Behaviour.....	17
5.1.1. Citizen Information.....	18
5.1.2. Energy Services.....	18
5.2. Regulation and Legislation.....	18
5.2.1. Building Regulations.....	18
5.2.2. The Code for Sustainable Buildings.....	19
5.2.3. Decent Homes.....	20
5.3. Fiscal Incentives.....	20
5.4. Market Transformation.....	21
5.5. Achieving radical energy savings from homes by 2050.....	22
6. Transport.....	23
6.1. Road transport - the importance of behavioural change measures.....	23
6.2. Road Pricing.....	25
6.3. Carbon cost analysis - inclusion of transport's other externalities.....	25
6.4. Achieving lower carbon vehicles.....	26
6.4.1. Changes in VED.....	26
6.4.2. Role for biofuels.....	28
6.5. Technology options.....	28
6.5.1. Hybrid cars.....	28
6.5.2. Contribution of buses.....	29
6.6. Aviation.....	29
6.6.1. Operational efficiency.....	29
7. Saving Carbon from Business.....	30
8. Saving Carbon from the Public Sector.....	31
9. Saving Carbon from Agriculture.....	33

## Executive Summary

The SDC strongly supports the UK government commitment to the 20% reduction in carbon emissions by 2010, and calls on government to re-commit to achieving this goal, as part of its efforts to reach a 60% cut in CO<sub>2</sub> emissions by 2050. Such a re-commitment also needs to be accompanied by commitment to deliver the reductions from carbon saving activity within the UK, as part of an overall move towards a low carbon economy.

The Climate Change Programme Review consultation document revealed the shortfall in anticipated carbon emissions savings to be 10 MtC per year by 2010. The SDC has undertaken some work to review the range of options for how the UK can fill this shortfall.

While targets are only part of the story, and recognising that it is the policies that will achieve the CO<sub>2</sub> savings, we believe appropriate targets are a strong motivator for developing policies to deliver the required savings. We therefore recommend that 3 new sectoral targets are developed to focus activity in these areas:

- a goal of achieving a 60% cut in carbon emissions from buildings (over 1990 levels) by 2050
- a goal of achieving a 50% cut in carbon emissions from road transport by 2025 (over 1990 levels) through a combination of technological and behavioural change
- a goal of achieving a carbon neutral public sector by 2020.

We have examined how the major sectors could contribute to reaching these targets, as part of the overall goal of carbon emission reduction to 2010 and beyond. Our assessment is that the following measures will need to be brought into effect, and that this will cover the 10MtC shortfall:

### Energy Generation and Industry

- Phase I of the EUETS will need to be maintained at its current level, and the government should not pursue its current action against the European Commission, aimed at reducing the savings to be achieved in Phase I. Our judgement is that this would achieve an additional 1MtC/yr;
- Phase II of the EUETS should be set at a level commensurate with the percentage contribution of this sector to the achievement of the target– i.e. 46%. We would recommend taking a top-down approach at this stage and setting the allocations in line with an aim to achieve the shortfall – perhaps an additional 3MtC/yr.
- While coal continues to be the cheapest fuel for energy generation, it continues to be used, despite the EUETS, and it is likely to remain in the electricity mix until the implementation of the Large Combustion Plants Directive in 2012. This is regrettable, as its carbon intensity means coal continues to contribute to UK carbon emissions despite the objective to move towards a low carbon economy. Successful development of carbon capture and storage is needed if coal is to remain in the mix. Some assessment is that it could save as much as 2.5MtC/yr (as part of the EUETS). Management of coal mine methane is also crucial for reducing overall UK greenhouse gas emissions.
- Continued support for renewables is essential, and the additional revenue from the NFFO banked savings (estimated to amount to some £880M by 2010) should be used to fund carbon saving projects across all sectors. Likewise we believe 10% of the EUETS allowances should be auctioned and the funds raised be invested in the same fund. Such a fund (perhaps a Climate Change Challenge Fund) could be used to support projects that

will save carbon emissions, but are not receiving support (e.g. under EEC or Carbon Trust) because they are too expensive for market-based instruments.

- Every effort should be made to achieve the 10GW CHP target, which will save an additional 1.4MtC/yr. This could be achieved through a Renewable Heat Obligation, and/or CHP exemption from the Renewables Obligation, plus continued support under the Community Energy Programme for district CHP schemes.
- The Climate Change Levy must be raised, initially in line with inflation, but rising progressively for the sectors not covered by the EUETS. Our assessment is that this could save an additional 1MtC/yr.
- The Climate Change Agreements could be widened and tightened to cover other businesses, perhaps achieving a further 0.5MtC.

## Households

A significantly enhanced programme of engagement with citizens is needed to motivate action to reduce household carbon emissions. We believe the combination of measures listed here will achieve savings of an additional 0.8MtC:

- EEC3 (saving 0.3MtC/yr) at triple the level of EEC1, with significant effort to incentivise citizens to take up the offers, such as through Council Tax rebate schemes co-ordinated with energy suppliers, the energy efficiency industry and other energy service providers to help over-achieve on this expected saving;
- Enhanced advice services and engagement activity to help encourage citizens to reduce their energy use
- The growth areas, such as Thames Gateway, Cambridge and Milton Keynes should be carbon neutral, so any growth is matched by commensurate savings in existing homes in the South East, East of England and East Midlands regions.

The SDC is this year evaluating the proposals in the Sustainable Communities Plan, and will be making recommendations for alternative approaches to the Sustainable Communities Plan objectives. We are, however concerned that there remain perverse fiscal barriers for large-scale refurbishment projects in regeneration programmes. Refurbishments pay 17.5% VAT, whereas new build is VAT free. This is distorting the economics of developments in favour of demolition and replacement rather than refurbishment. This is causing unnecessary destruction of communities, and destruction of older buildings which could be refurbished to immensely higher standards of efficiency.

Over the long term the SDC believes Domestic Tradable Quotas (DTQs) are likely to offer the most equitable, market based mechanism for giving citizens individual control over their use of their emission quotas. We explain the concept, and how it could work in this paper, and we believe more research, supported by governments, should be carried out over the next couple of years, along with pilot projects.

## Transport

We have identified carbon savings that could be achieved from a range of measures, but care should be taken that there may be some double counting, as some of the measures will lead to other cuts in emissions. It is a point worth noting that economic growth is widely expected to mean continued increase in road transport, but we challenge this expectation and believe policies must be developed with the intention of decoupling economic growth from increased road transport.

To achieve significant emission reductions the following will be needed:

- A clear national strategy on traffic reduction must be developed. This should concentrate on facilitating take up of demand management and behavioural change measures, and should lock in the savings that could be achieved, which we estimated could be around 0.5MtC/yr if a programme starts in 2007. Demand management measures include:
  - stronger guidance in Local Transport Plans to prioritise behavioural change measures;
  - good public transport facilities, cycling/walking infrastructure;
  - services at points close to this infrastructure;
  - removal of financial barriers: such as benefits in kind, and higher mileage rates for larger, more polluting vehicles;
  - all public sector bodies to have modal shift targets.
- However any carbon savings made through these measures will need to be locked in with complementary measures such as:
  - co-ordinated parking restraints between local councils,
  - congestion charging to discourage driving,
  - space provision for infrastructure improvements.
- We have modelled the carbon savings that could be achieved through new VED rates. Our proposal is that a new top band of VED is introduced, and that there is a £300 gap between each band. So the top band of VED would rise dramatically to £1800/yr for vehicles emitting 221gCO<sub>2</sub> or greater, and below this the bands would be at £1500, £1200, £900, £600, £300, and £0 for vehicles with emissions below 100gCo<sub>2</sub>/km. We propose that this policy should be announced in 2005, but brought into effect in 2008. We estimate that this would achieve carbon savings of around 0.4-0.8MtC/yr. We believe this policy would dramatically improve the market demand for highly fuel efficient vehicles such as hybrid cars.
- Increasing the contribution of biofuels to 5% of all road transport fuels would achieve savings of around 0.6-1MtC/yr, and a strategy for achieving this perhaps through the proposed Road Transport Fuel Obligation, would be needed.
- Adjusting road speed limits can also improve carbon emissions, and we recommend that a full assessment is made of this potential across all road types. Our estimate is that this could achieve around 1.5MtC savings.

We believe road user charging is necessary in the medium/long term, but that a combination of distance and congestion charging will be necessary to tackle both congestion and carbon emissions.

- We are concerned that the Aviation White Paper highlights a path of unsustainable air traffic growth, and we believe government should tackle this with urgency, to limit the damage anticipated over the next decade. We recommend that government leads among European countries by imposing an emissions charge initially on all internal air travel, followed by aircraft leaving the UK, to overcome the distorted price structures that leave rail travel as the least favoured option on some internal routes.
- We also recommend that in anticipation of progress in designing an emissions trading scheme that will include aviation (EUETS or other), further work is undertaken on the efficiency savings that can be made through improved landing and take off patterns

## Public Sector

The CCP review provides government with a real opportunity to lead by example. By adopting the target of a carbon neutral public sector by 2020 government will drive improvement in sustainable procurement of products, services and buildings. The SDC is this year working with the health sector to push NHS organisations to embrace sustainable development, through their

corporate activities, by helping to assess and promote sustainable public sector management behaviour, covering management of facilities, procurement of products, services and buildings, employment practices and sustainable transport options. This work will contribute to effort in the public sector to lead by example. Leadership being demonstrated domestically is an important part of the government's climate change agenda, and while we recognise international leadership on this issue, we believe citizens are not convinced by government's commitment to delivering the solutions. Delivering the practicalities of low carbon technology and behavioural change in the public sector will really show how government and the wider public sector can lead by example.

We believe that improving the sustainability of schools should be a high priority and recommend an acceleration of the Building Schools for the Future programme, to double the public investment in the refurbishment projects that will maximise efficiency improvements. We also believe public sector buildings should become demonstration centres for renewable energy technologies, with a focus on schools so they are funded to install renewables such as a wind turbine, solar hot water heaters, ground source heat pumps, and solar photovoltaics. The renewable technologies should then become sources of learning and engagement with both pupils and the wider community.

## **Agriculture**

The SDC is aware that there is little new data in government about the potential benefits for carbon emission savings from this sector, other than in energy crops and the role of forestry as a carbon sink. We recommend that further work is done on the potential for emissions savings from shallow soil tilling methods, management of upland peat and composted materials, the importance of ruminant diet for minimising methane, stock density rates and the need to manage the application and type of nitrogen fertilisers. We also recommend further work is done to improve the supply chain for energy crops to enable this carbon neutral fuel to develop into a viable fuel alternative. Development of technologies that make productive use of crop residues for biofuels, such as lygno cellulose will also be necessary.

## 1. Introduction

The Climate Change Programme Review comes at an interesting time. The UK government has earlier this year launched *Securing the Future*, the UK Sustainable Development Strategy. The UK's shared framework for sustainable development *One Future, Different Paths* has also been launched with the governments of Scotland, Wales and Northern Ireland. The SD Strategy has five new principles for sustainable development which now form the basis for policy in the UK:

*"we want to achieve our goals of living within environmental limits and a just society, and we will do it by means of a sustainable economy, good governance, and sound science."*

The new Climate Change Programme should apply these five principles. This will mean clearly identifying and working within our environmental limits in relation to carbon emissions and energy production and use. It also means tackling the climate change problem in such a way that we meet the economic and social needs of society both now and in the future.

The new SD Strategy also provides the context against which any new policies need to be appraised, so a narrow cost/benefit analysis will not be sufficient to give a consistent and comprehensive view of how policies might contribute to the sustainable development principles.

This submission by the SDC offers a range of options for achieving the 10MtC gap in the goal of achieving a 20% cut in our emissions by 2010. Where possible we have identified actual carbon savings that could be achieved, but our information is not comprehensive and there are areas where government appraisal data is needed to firm up the options.

## 2. Targets

The SDC strongly supports the UK government commitment to the 20% reduction in carbon emissions by 2010, and calls on government to re-commit to achieving this goal, as part of its efforts to reach a 60% cut in CO<sub>2</sub> emissions by 2050. We note that the EU has agreed to aim for a 60-80% cut in emissions over 1990 levels by 2050, and recommend that the UK may need at some point to reconsider its carbon emissions goal, in the light of improved scientific evidence on climate change.

A recommitment by Government to achieve the overarching goals will also need to be accompanied by commitment to deliver the carbon savings through activity in the UK. If the UK is to continue down the path towards a low carbon economy it will be crucial that there is consistent effort to achieve the carbon savings across the UK economy itself.

While targets are only part of the story, and recognising that it is the policies that will achieve the CO<sub>2</sub> savings, we believe appropriate targets are a strong motivator for developing policies to deliver the required savings. We therefore recommend that 3 new sectoral targets are developed to focus activity in these areas:

- a goal of achieving a 60% cut in carbon emissions from buildings (over 1990 levels) by 2050;
- a goal of achieving a 50% cut in carbon emissions from road transport by 2025 (over 1990 levels) through a combination of technological and behavioural change;
- a goal of achieving a carbon neutral public sector by 2020.

In addition to these sectoral target we believe government should make a highly symbolic commitment for the carbon impact of the proposed growth areas: the Thames Gateway, Cambridge and Milton Keynes developments should be carbon neutral, by matching energy and water saving activities in existing homes across the South East, East of England and East Midlands with any proposed new build.

Below we outline some shorter term policy measures which will contribute to achieving the 2010 20% target, and others which will need further development, but which could move the UK more effectively and securely on a path to achieving the 60% 2050 target.

### 3. Cross-cutting Policies and Measures

The recently published figures for carbon emissions from the UK in 2004 confirm that the emission reduction path towards the 2010 target is not on track. Overall, the pressure points in 2003 were:

- Increased use of coal in the electricity sector which raises overall carbon intensity,
- increased demand, particularly for electricity from all sectors but especially households,
- increased demand for transport fuels.

The EU Emissions Trading Scheme is creating a market for carbon trading, but while the price of gas remains high, and is unlikely to fall again much over the medium term, it is still cheaper for electricity generators to use coal as part of their generation mix. The price of carbon in the trading market is insufficient to change this behaviour. However the introduction of the Large Combustion Plants Directive will dramatically reduce the use of coal in electricity generation, but this is not expected to come into force until at least 2012. If coal is to remain in the mix then accelerated research into carbon sequestration is needed.

The increase in demand is worrying, but predictable. Government has made a good start with the range of policies introduced following the Energy White Paper, but it is just that: a start. Many of the policies have now been operating for a few years and lessons have been learnt. This should give government sufficient confidence to strengthen, widen and deepen the application of the successful policies for energy efficiency, and a range of recommendations are made later in this document. Over the medium term we believe it will be necessary to move towards a system of personal understanding and responsibility for individual carbon emissions, with the development of Domestic Tradable Quotas. DTQs are a market based mechanism which allow individuals to buy and sell more or less of their carbon allocations, and as such are a very progressive mechanism. This proposal is discussed further below, and is explored in comparison to carbon taxation.

Transport fuel demand is rising and is expected to continue on that trend. Serious action needs to be taken to curb unsustainable patterns of road and air transport use, and we make a number of recommendations later in this document. Again, we believe that a DTQ system covering energy use for heating, electricity and road transport would facilitate citizen action to cut carbon emissions.

### 3.1. EU Emissions Trading Scheme

The EUETS, as a market instrument, is likely to be an effective mechanism for encouraging industry to reduce its carbon emissions. When a value is placed on carbon, and if the National Allocation Plans are ambitious, business will be encouraged to participate in the emissions trading system. However if the National Allocation Plan is too generous, and allows business too much flexibility, then the value of carbon will remain low. If the market works imperfectly then the EUETS may not be as successful as government now hopes.

It will therefore be important that the development of the second phase of the EUETS is not marred by the same unseemly wrangling between departments as was evident in the first phase, and that the environmental imperative should take precedent. The SDC believes that the operation of the EUETS will demonstrate the incentives for business and will therefore prove to be advantageous to industry, as appears to be the case already with the electricity generators. This should help government handle better some of the resistance from trade representatives.

The level at which the cap is set for Phase II of the EUETS will be crucial for providing sufficient incentive for deeper carbon emission savings. Phase II of the EUETS should be set at a level commensurate with the percentage contribution of this sector to the achievement of the target – ie 46%. We would recommend taking a top-down approach at this stage and setting the allocations in line with an aim to achieve the shortfall – perhaps an additional 3MtC/yr.

We are pleased that consideration is being given to the practical feasibility of introducing surface transport in the EUETS. However we suggest that care is taken to ensure that it does not deflect from implementing measures that are already established, and can be brought into effect in much shorter time frames. These measures are discussed further in the section on transport.

We are also pleased that government is keen to pursue inclusion of aviation emissions into the ETS. However we believe this will be a complicated option that will need considerable development over the next few years, and we believe this may mean that rising emissions will continue unabated in the meantime. In the light of this the SDC believes measures should be brought in urgently to curb the uncontrolled demand for unsustainably low-cost air flights. The SDC would like to see an emissions charge imposed on all flights within the UK, and leaving UK airports. We believe such a charge will help citizens understand the impact of their travel behaviour on carbon emissions. Carbon literacy among citizens is an important part of the process of engendering firstly knowledge of the major issue of climate change, and secondly engaging citizen's willingness to understand the impacts of their behaviour.

### 3.2. Domestic Tradable Quotas

Domestic Tradable Quotas (DTQs) are a relatively recent concept, and have so far received only a small amount of attention. Put simply, DTQs are a form of carbon rationing, and like emissions trading they put an absolute cap on carbon emissions, with reductions in this cap over time. The difference from the EUETS is that a DTQ scheme would include individuals, thus bringing the need for carbon reductions directly into peoples' everyday lives, stimulating action at every level of society. DTQs would be guaranteed to achieve the Government's carbon dioxide reduction targets, but at less cost, and in a way that is both equitable and flexible.

### **How DTQs work**

The SDC has produced a briefing paper on DTQs which provides more detail than that given below (available from the SDC).

DTQs work by setting a national cap on emissions, and then reducing that cap over time. Current thinking suggests that the cap could be set by an independent committee of experts, similar to how the Monetary Policy Committee sets interest rates. Their aim would be to meet the Government's long-term carbon reduction targets by setting yearly reduction targets, taking into account any relevant factors. The national target would then be allocated to individuals. Over the longer term this might also be applied to business, but we believe a focus on individuals would be most productive as other trading arrangements already apply to business.

The carbon allocation for individuals would then be divided by the number of individuals qualifying, on a per capita basis, and the carbon allocations would be distributed at regular intervals, probably monthly or weekly. All participants would then be free to trade emissions permits on an open market using electronic accounts. Those with a surplus to their requirements would be able to sell permits at the market price. Those individuals not interested in actively participating could opt to automatically sell their allocation via a financial intermediary (and receive cash), and then pay higher prices for their energy (carbon) consumption.

### **DTQs vs carbon taxes**

The SDC believes that DTQs may offer a number of advantages to carbon/energy taxes. Some of these include:

- A more progressive approach: it seems that DTQs would be more progressive than carbon taxes, which like VAT will tend to disproportionately affect people on lower incomes. As DTQs are awarded on a per capita basis, those with low levels of energy consumption will be better off, although there will still be a role for Government to assist with energy efficiency measures targeted at the fuel poor.
- Independence from political control: as carbon taxes would be set by Government, they are highly prone to protest and change of leadership, and are therefore less effective as a long-term measure. The market price of DTQs is set by society's effectiveness in reducing carbon emissions. As the quotas will be set by an independent committee, Government will be removed from regular and technical decisions.
- Guaranteed outcome: DTQs are virtually guaranteed to achieve their reduction target (overachievement in the short-term is likely), as consumption will be dictated by the number of permits available. With a carbon tax, the outcome is far from certain, as people may not react as expected, and consumption may prove to be highly inelastic. There may also be pressure on the Government to lower taxes (as in the year 2000 fuel protests), which in turn reduces the chance of behavioural change.

### **Research and Pilots**

So far there has been very little research conducted on DTQs. The Tyndall Centre North is leading efforts on this, but the resources committed are very small. If, as we recommend, the Government sees DTQs as a prospective medium-term option, there will need to be a rapid increase in resources to build up the expertise necessary for this option to be seriously considered. Pilot projects could be a very effective way of building up knowledge of the pitfalls and benefits of the DTQ system.

Some of the areas that will need substantial research include:

- Economic/social modelling: the effect of DTQs on the wider economy and on public behaviour;
- Income impact assessment: how DTQs would impact on different income groups, in comparison to other measures;
- EUETS compatibility: how DTQs could be made to work with or alongside EUETS;
- Technological: the practical introduction of DTQs, including an assessment of the information technology requirements, and market structure;
- Allocation: the method of individual and business allocation;
- Fuel poverty: the likely impact on fuel poverty, the need for the continuation of existing energy efficiency measures and their likely level;
- Role of Government and existing policies: an assessment of the policies that could be removed (eg. Climate Change Levy, fiscal incentives), and the role of Government in assisting society in reducing emissions.
- Pilot projects: a series of pilot projects could be run to look at various aspects of the scheme in practice, whilst helping to raise public awareness.

### **Implementation**

The SDC believes that DTQs offer an interesting option for future action on climate change. It seems to us that current and planned measures will struggle to achieve the transition to a low carbon economy that the Government desires and that a different approach will be required to achieve the deep cuts in emissions that are necessary. DTQs manage to unite many of the Government's objectives (individual action, progressive, fair, market-based), but at least cost to society in general.

On the evidence so far, we believe that the Government should make a commitment to formally consider DTQs in 2007, by which point further research can be completed.

### **3.3. Capacity Building and Micro Generation**

The Energy White Paper presented a future with significantly increased levels of distributed energy generation across the UK, through both renewables and gas fired micro-CHP units in the home. We endorse this approach, and welcome policies that will facilitate this move to energy generation in the home and business.

The capacity to deliver the policies for achieving low carbon solutions is a serious issue. In practice much of the energy efficiency improvement that is needed will require skilled plumbers, electricians, installers for small scale renewables who are skilled in both plumbing and electricity, insulation contractors, greater numbers of building energy auditors, planners and Building Control Officers with improved awareness of low carbon building design and technical knowledge. None of this is ground breaking, but improvements to the capacity of these trades and professionals are not happening at a speed that will stimulate a really proactive movement towards lower carbon technologies.

There is also a related issue with micro generation where there is a shortage of industry capacity to install and repair the micro-CHP and other micro generation technologies. Micro generation also suffers from adverse planning decisions, which are inhibiting take up of small-scale renewable energy technologies. Government has an important role in overcoming these barriers, and we look forward to the production of the Micro Generation Strategy later this year.

The SDC believes this needs to become an urgent priority, for government to take forward with the appropriate bodies (such as the Sector Skills Councils, the Sector Skills Development Agency, the industries, and through the professional training agencies).

### 3.4. Planning Policy

In England *Planning Policy Statement 1* and *Planning Policy Guidance 22* give guidance to local planning authorities on sustainable development and renewable energy issues, as does *Planning Policy Wales* with accompanying Topic Advice Notes and Scotland's *National Planning Policy Guidance 6: Renewable Energy* and the *Northern Ireland Strategic Energy Framework*. However despite this guidance, experience on the ground implies that planning authorities are not able, or willing, to take risks and be more proactive in encouraging or requiring higher standards of sustainability in development plans.

Despite the large designs of the Sustainable Communities Plan, most planning applications are relatively small scale, and on average planning officers spend around 4 hours considering and deciding on an application. Pressure from government is designed to speed up the planning system, not to improve the sustainability elements of the planning approvals. In practice a myriad of unsustainable developments are being allowed, and even though each one may not appear to be a problem, the cumulative effect of these developments, particularly in overcrowded parts of the country will lead to increasing unsustainability, with growing stress on services, infrastructure, the environment and social cohesion.

The SDC is pleased to see the London Mayor's Supplementary Planning Guidance which requires building standards at a level above Building Regulations. It is clear that other planning authorities across the UK are not willing to make this sort of move (and are largely ignorant of L B Merton's requirement for 10% of buildings to have renewable energy sources), and we believe government should actively encourage such an approach. Individuals around the UK have difficulty in gaining planning approval for installing micro wind turbines and photovoltaics, and this is delaying even the market leaders from progressing on this path.

Given the Government's stress on speed through the planning system we believe there must be an active programme of training for planners in sustainability issues to enable them to assess applications through the sustainable development lens. Without such intervention we believe it is unlikely that there will be much progress in improving the quality of developments and encouraging CHP, higher standards of energy efficiency and building integrated renewables, in advance of the 2010 Building Regulations review .

New homes and mixed use developments delivered through the Sustainable Communities Plan in England must be designed at density standards of around 50units/hectare as this density level will be sufficient to make a community heating scheme cost effective, and will be sufficient for a bus service to operate, especially if there are minimal car parking facilities, carpools, and good facilities for cycling and walking.

### 3.5. Carbon Neutral Growth Areas

The Sustainable Communities Plan announced 200,000 new homes will be built in the Thames Gateway region. With this level of increase in homes there will, of course, be a big increase in carbon emission from them over the following decades.

The SDC is this year evaluating the proposals in the Sustainable Communities Plan, and will be making recommendations for alternative approaches to the Sustainable Communities Plan objectives. We are, however concerned that there remain perverse fiscal barriers for large refurbishment projects. Refurbishment projects pay 17.5% VAT, whereas new build has zero VAT. This is distorting the economics of developments in favour of demolition and replacement rather than major refurbishment of existing homes. This is causing unnecessary destruction of communities, and of older buildings, which could be improved to immensely higher standards of efficiency. In some specific cases (e.g. Langbury) the developers were compelled to change their plans for refurbishment to a demolition and construction programme (merely preserving the building facades) because of the additional cost of the VAT on the refurbishment proposal.

The SDC is now proposing to government that the Thames Gateway, Cambridge and Milton Keynes growth areas should be developed on the basis of achieving carbon neutrality of the development in relation to the whole South East, East of England and East Midlands regions' estimated carbon emissions.

In practice we believe this could function through partnerships between developers, energy suppliers (who have Energy Efficiency Commitment (EEC) targets), the energy efficiency industry, local authorities, and community groups in the regions. By requiring the growth areas to become carbon neutral, new developments could only be built if the carbon emissions they are projected to be emitted over the next two decades, will be off-set by carbon savings in homes in other parts of the regions. Such a collaborative arrangement would help suppliers deliver their EEC targets more rapidly, help LA s deliver their obligations under the Home Energy Conservation Act, and help government progressively increase the level of the EEC Obligation, as delivery would have been facilitated in these regions.

New homes and mixed use developments delivered through the Sustainable Communities plan must be designed at density standards that will support low carbon lifestyles, including allowing the integration of CHP and sustainable transport (around 50 units/ha). Planning guidance may be provided regionally to deliver sustainable communities with CHP, integrated renewables, minimal car parking, and facilities for cycling/buses/walking and carpools.

## 4. Energy Supply Options

The 2003 Energy White Paper (EWP) presented a scenario of how the energy system could look in 2020. It painted a picture of a diverse energy supply system, with a range of energy sources, and in particular much greater micro-generation (small scale renewables, micro-CHP units in homes). It also presented a picture of much greater demand management flexibility, with an emphasis on energy saving and energy efficiency in buildings. This is a scenario the SDC fully supports, and we believe it can be achieved if the right policies are put into place. The recommendations we make in this document are designed to support the achievement of the EWP 2020 scenario, as well as the 2010 20% UK carbon emissions reduction scenario.

Around half of the emissions savings expected through to 2020 will be from greater energy efficiency in households and the business sector, and additional policies for ensuring this is achieved are outlined below. Furthermore, development of renewable energy technologies is a necessary part of the overall change to our energy system. The SDC is also supportive of the research into carbon capture and storage, and welcomes the UK participation in the International Carbon Capture and Storage Leadership Forum.

#### 4.1. Renewables - Wind

The SDC has published a report *Wind Energy in the UK* (2005) which explores the commonly held myths about wind power – including the costs, and the issues around intermittency – as well as giving guidance to communities about ways of ensuring their needs are met when a development is proposed.

There are no technical barriers to wind energy providing a greater proportion of our electricity mix than envisaged in the renewables targets (10% by 2010 and 20% by 2020); the main barrier is likely to be cost. Equally there is no problem for the electricity system to handle intermittency, because the system deals with large variations in demand and supply every day.

Proactive engagement with local communities at an early stage in the planning process always helps for working through any issues that require sensitive handling. We do recognise that there will be sites which for other sustainability reasons (e.g. negative environmental impacts) would not be appropriate for development. Rigorous application of the Environmental Impact Assessment is needed to expose any potentially negative environmental impacts. It is worth noting that sites that had been initially opposed by communities, have subsequently been developed after positive resolution of the issues.

#### 4.2. Renewables – Biomass

The Renewables Obligation is a mechanism which gives most support to market available technologies such as wind power. In addition to wind energy, the SDC believes the potential for increasing exploitation of biomass sources must be given additional attention and co-ordination by government. Biomass (wood products) has the potential to provide a much greater energy source for community heating schemes (CHP), and more widespread use in rural communities in wood burning heating systems. Bioenergy (liquid fuel made from crops such as sugar beet) also has the potential to reduce the total carbon emissions from transport, either as a blend with petroleum, or as ethanol. In the UK the blend is currently only 5%, although in the US this level is 15%, and we believe vehicle manufacturers will have to rethink their approach to biofuels.

Both forms of bio-energy (for heat or for transport fuel) offer an alternative crop for farmers. With the reform of the Common Agricultural Policy in the process of implementation, and the move to single farm payments encouraging farmers to diversify their land use, the SDC believes there needs to be a more proactive effort to encourage both farmers and the bioenergy industry to work together to develop this potential. We look forward to the conclusions of the Biomass Task Force on how this can be better facilitated.

The SDC has recently carried out a study of the biomass industry, *Biomass in Scotland* in the rural regions of Scotland, to assess the potential for these regions to use locally sourced

biomass in homes, and to assess the strength of the industry base to provide the fuel if the demand was created. Our assessment is that there is considerable potential for encouraging householders and community heating schemes to use biomass fuelled heating systems in areas off the gas grid. We estimate that it could save between 7% and 23% of carbon emissions from heating demands in Scotland, equalling around 0.16MtC and 0.4MtC per year.

Our conclusion from this study is that:

- For the householder, the capital costs of installing a biomass heating system are discouraging, especially when compared with existing oil fired systems, or with electric wall heaters (even though the ongoing fuel bills are higher from these fuels). Capital grant schemes (such as SCHRI<sup>1</sup>, Clear Skies) should be simplified to provide sufficient encouragement, and should be structured to provide development assistance for the supply chain as well as longer term support than is now envisaged (currently through to 2010).
- Information to householders should be improved, and demonstration schemes should be developed in rural communities to encourage replication.
- Accreditation of appliances is outdated and has not kept in line with EU standards. The accreditation system is also expensive.
- Certification of installers needs to be established across the renewables industry, to common standards, to provide householders with security.
- More installers need to be trained.
- The fuel supply chain is inadequate, so rural locations with a wealth of fuel resource are unable to access that fuel at a reasonable price. Intervention is needed to support the industrial development of the wood pellet industry. The Arbre experience has undermined industry confidence.

### 4.3. Coal in the electricity mix

The use of coal in electricity generation is an important contributor to UK carbon emissions and in 2003 generators' demand for coal was 11% up on 2002. While coal continues to be the cheapest fuel then generators will continue to use it. It appears that the price of carbon in the EUETS is not yet sufficiently attractive to encourage generators to abandon their use of coal, and this is unlikely to change in the short term. This is very regrettable as its carbon intensity means coal use should be minimised for maximum emission savings.

The implementation of the Large Combustion Plants Directive in 2012 will change the outlook for coal, however. In the SDC's view coal use should be aggressively reduced until the successful development of carbon capture and storage reduces carbon emissions. Assessing the potential carbon savings for these technologies is difficult but some believe it could be as much as 2MtC/yr.

In addition, management of coalmine methane is crucial for reducing overall UK greenhouse gas emissions. We look forward to seeing the competitive grant scheme that is being developed to incentivise management of these emissions.

### 4.4. CHP / Trigenation

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<sup>1</sup> Scottish Community and Household Renewable Initiative, administered by the Energy Saving Trust; Clear Skies small scale renewable grant scheme administered by the Building Research Establishment

Combined heat and power is a highly energy efficient system, and encouraging wider investment in community heating schemes and industrial applications must be an integral part of the new Climate Change Programme.

Government has so far resisted the introduction of either a CHP Obligation, a Renewable Heat Obligation or an exemption from the Renewables Obligation. It would appear that government policy is not enthusiastically developed to support CHP, and we would question the basis for this. The Energy White Paper confirmed that energy efficiency will contribute half the carbon savings through to 2020, and CHP as an energy efficient technology should receive further support from government policy. We believe each of the Obligation proposals should be seriously reconsidered in this review.

The Community Energy grant scheme for encouraging and funding large and small scale community heating schemes has been very successful, and the SDC would like to see continued expansion of this scheme.

The Community Energy grant programme allows for funding to support feasibility studies and facilitates the development of community heating schemes between public and private investors. This is a key element of its success, and we believe continued public funds should be available through to 2012 to ensure support for schemes which are still in their infancy.

Trigeneration is combined heating and cooling, and is being encouraged strongly through the London Energy Plan. This is a tried and tested technology, which we believe, should be routinely installed into new and refurbished commercial buildings.

## 4.5. Hydrogen

It is widely expected that the future low carbon energy source will be hydrogen fuel cell technology. There is a considerable amount of expertise in the UK in hydrogen technology – from the fuel cell manufacturer Johnson Matthey to the hydrogen network in the North East. This expertise should be specifically encouraged, particularly with demonstration support, as it is the gap between R&D and market transformation that is the most difficult for individual companies to fill.

Hydrogen is unlikely to make a significant contribution to reducing overall UK CO<sub>2</sub> emissions before around 2030.

## 4.6. Nuclear power

The SDC published its position on nuclear power in 2002, and this position still stands. However, in view of the renewed expressions of interest in developing new nuclear capacity the SDC is re-examining its opinion and will publish a position paper in due course.

## 5. Achieving further savings from households

Households account for 27% of total UK carbon emissions and 82% of household energy is used for space and hot water heating<sup>2</sup>. Household carbon emissions are expected to rise as demographic changes occur over the next decade, as population increases from the current 55M to an expected level of 59M by 2020. Increasing numbers of smaller household size, and increasing numbers of electricity consuming appliances will all exacerbate the trend of rising emissions, and it is expected that 31.8M dwellings will be needed for 66.8M people by 2050<sup>2</sup>. The housing stock in 2050 will still be largely made up (around 70%) of existing homes.

The SDC recommends that government adopts a challenging target for achieving an overall 60% cut in emissions from buildings both households and commercial/industrial - by 2050.

## 5.1. Changing Behaviour

As the Government's new Sustainable Development Strategy has recognised, influencing citizen attitudes and behaviour in relation to resource use is an essential part of the process for reducing overall UK carbon emissions. Technological progress will achieve a lot, but its impact could be speeded up, and innovation encouraged, if citizens are also increasingly willing to adopt newer, cleaner technologies. Experience to date with the EEC - the major policy for reducing UK household carbon emissions - confirms this.

The EEC regulation on energy suppliers requires them to offer energy saving measures to their customers; suppliers are set carbon targets over 3 years and they are given flexibility in the way they achieve these. It has been operating successfully since April 2002, and the EEC2 will last to 2011 but no target has been set for the 2008-11 period.

The SDC believes that the success of EEC1, and the need to achieve additional carbon savings to achieve the 2010 target, are sufficient drivers for announcing an expanded EEC3 2008-11 to at least triple the energy efficiency installation activity levels of EEC1. On the basis of achieved savings from EEC1, and estimates for EEC2<sup>3</sup>, EEC3 at this level could achieve 1.1MtC/yr by 2011, or around 0.3MtC additional. Furthermore there is a clear need for the insulation industry (the one most affected by EEC, and the measure most needed in homes) to have longer term policy security for expanding their manufacturing and labour capacity over the longer timeframe. With 11M homes remaining with unfilled cavities the potential is huge. Over the longer term these homes (and the 7m solid wall homes) may need to incorporate solid wall insulation onto the structure as well.

However, an expanded EEC will not work without a comprehensive engagement strategy with citizens, because householders have to be motivated to accept the insulation offers from the suppliers (which is proving difficult). Price cuts are not sufficient.

Engagement with the public is a very important element of sustainable development, and is especially important for involving citizens in decisions about their own activity, and their contribution to meeting the UK carbon emission reduction goals. The SDC welcomes the government's £12M 2005-8 funding of local communications initiatives, as part of the Climate Change Communications Campaign. We believe community influencers, at whatever level are important communicators for sustainable development, and will be actively participating in deliberative fora later in 2005/6.

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<sup>2</sup> *Energy Efficiency The Government's Plan for Action TSO 2004*

<sup>3</sup> *Energy Efficiency - The Government's Plan for Action 2004*

SDC's recommendation is that government develops a programme of deliberative fora around delivering our climate change targets, with a particular focus on achieving the necessary household energy efficiency improvements by 2010 and through the following decade.

### **5.1.1. Citizen Information**

As mentioned elsewhere the Home Condition Report will be a powerful tool for informing the 3M home movers per year (1.3M buyer/sellers and 1.7M renters) about the energy efficiency of the home. But information on energy bills would be a start, for highlighting the relationship between the Government's Climate Change Programme and the energy efficiency offers from the suppliers. Citizens often find it counter-intuitive that the supplier that sells them energy also offers energy saving measures, and they are often suspicious of the motivation. The SDC therefore believe there should be better, citizen friendly information on the bill, linked to offers for cutting the bill as part of the overall energy efficiency policy goals.

There is also a considerable amount of improvement to be made into smart metering, especially for homes with embedded renewables or a micro CHP unit. There are significant barriers for citizens to get a fair price for electricity exports, and this needs to be tackled across the industry. Telemetric metering will improve metering accuracy and will enable innovations such as digital meter read-outs within the home to raise awareness.

### **5.1.2. Energy Services**

The SDC welcomes the announcement in the Budget 2005 of an energy services summit this year. Energy services provide a key opportunity to realise the financial potential of energy savings. Rather than simply selling electricity and gas, energy services focus on the outcome the customer wants - such as warm rooms and hot water - and offer the most cost-efficient way of achieving it. Under an energy services contract a supplier might, for example, install insulation or a more efficient boiler in a customer's home, and recoup the investment through the energy bill over several years.

However the success of energy services depends on two things:

- the trust of the citizen in the deal being offered by the energy provider, and
- sufficient competition between energy providers (whether energy suppliers or not) to ensure the customer feels they are getting a good deal.

This implies that opening up the energy provision market to businesses other than energy suppliers will need to be explored. Theoretically non-energy companies can participate in EEC, but the Obligation is only on energy suppliers so there is no incentive for non-energy suppliers to participate as they will not be able to trade their carbon savings. Further exploration of this issue, and proactive work with other businesses (perhaps a supermarket) is needed, led by government and Ofgem.

## **5.2. Regulation and Legislation**

### **5.2.1. Building Regulations**

The Building Regulations are increasingly important for energy saving in existing homes. The inclusion of boilers into the regulations has allowed for significant emissions savings, and the SDC is working on recommendations of how government could use the Sustainable and Secure Buildings Act to widen the scope of the Building Regulations to cover more elements of

household energy consumption in existing buildings. The findings from this work will be available in late 2005.

The requirements of the 2005/6 Building Regulations are not yet released, but the SDC would encourage government not to lose the opportunity to be ambitious in these new standards. While we recognise that the building industry can resist change, we believe the imperative of the need for significant carbon emission reductions over the next few years should strengthen government's resolve. It is also clear that industry is most concerned to be operating in a "level playing field", and that the Building Regulations provide just that context. Moreover it is eminently clear that once the Regulations are in place the additional initial costs of installing higher standard equipment rapidly falls (as with double glazed windows in new build).

Nevertheless the SDC is concerned at the low levels of compliance with Building Regulations exposed by the recent EST and BRE studies, and we believe post-completion pressure testing is an essential process for tackling leaky buildings and ensuring they are made airtight. We also believe government needs to ensure that any industry self-certification schemes for existing buildings (such as for condensing boilers) must be robust and enforced. The SDC believes that government should review, as soon as possible, Building Regulations compliance and enforcement mechanisms, including the new self-certification schemes.

Over the medium term the SDC believes the 2010 Building Regulations should be requiring developers to build to improved standards of energy efficiency as well as requiring building integrated renewables in order to minimise demand for energy from the centralised energy system. At the 2015 Regulations new build should have zero heating requirements, and the home should be generating sufficient energy from integrated renewables to meet most of its electricity needs.

The SDC is concerned that projected growth in domestic air conditioning could wipe out many of the gains made in energy efficiency measures over the next few years. We strongly urge government to address issues of domestic solar overheating through the 2005/6 Building Regulations, as a matter of urgency. External shading (trees, external blinds/shutters) and the thermal mass in the building structure need to be addressed as the possible solutions for ensuring that homes do not become overheated in summer months, particularly as climate change is likely to mean more frequent weather events like the heat in July /August 2003.

### **5.2.2. The Code for Sustainable Buildings**

Following publication of the Sustainable Buildings Task Group (SBTG) report in early 2004, government committed to developing the Code for Sustainable Buildings, with industry. The Government's response to the SBTG report acknowledged that the Code will set standards for the sustainable design and construction of new homes, at a level above the new Building Regulations, pre-viewing the 2010 Regulations requirements. The Code should be revised in 2010 to pre-view the 2015 Regulations, and the Code should therefore be energy neutral by 2010.

The Government has committed that all new publicly funded homes will be constructed to the standard of the Code. As-built compliance to these standards must be assured through post completion tests. It is difficult to quantify the level of carbon savings from this initiative, as the scale of uptake is unclear at this stage, but the implication of government announcements is that around 8,000 homes will be built to this standard per year. Depending on the standard that is agreed for the Code this could provide a significant market pull for improved technologies, as well as providing demonstration for householders.

### 5.2.3. Decent Homes

The Decent Homes standard in England currently includes energy efficiency criteria, but is not consistent with the Building Regulations. The Government has committed to ensuring that all social housing will meet the Decent Homes standard by 2010. This is a major commitment to assessing and intervening in social housing which could have been used to deliver a step change in energy efficiency. When a local authority is surveying a home for reaching the required standard of decency the loft insulation need only be 100mm deep to be left alone, whereas new homes need to be 300mm deep, and energy suppliers offer EEC savings for top-up loft insulation to the 300mm depth. It appears that the Decent Homes programme was not devised with energy efficiency and carbon saving in mind, which is a lost opportunity, and it is currently only projected to deliver 0.1MTC by 2010. The SDC would recommend that the Decent Home Standard is raised in line with the Building Regulations, as it can be achieved at minimal extra cost – perhaps an additional £70 per house in top-up left insulation when work to improve the decency of the home is being undertaken.

## 5.3. Fiscal Incentives

The Home Condition Report required by the Housing Act (and to comply with the EU Energy Performance of Buildings Directive) will include an energy rating and advice on how to improve the efficiency of the home. This will give occupants the information to choose between properties on the basis of energy efficiency, and ongoing running costs (fuel bills). This is likely to be particularly influential in the private rented sector where home movers often have a range of options. In the buyer/seller area it is likely to have least impact in areas of high demand (where location and price are the key concerns), but a fiscal incentive would almost certainly influence uptake of the advice in the Home Condition Report, if such an incentive was available.

It is disappointing that the Treasury, after consulting in both 2002 and 2003 on fiscal measures for domestic energy efficiency, was unable to include in Budgets 2004 and 2005 a more significant package of measures that will significantly contribute to carbon savings. The SDC believes **stamp duty rebates** for energy efficiency measures would be effective in engaging citizens, and incentivising them to improve the efficiency of their homes. We are aware, however, that the simplicity of collecting stamp duty is important for HMT, and this is unlikely to be changed.

**Council tax rebates** could also be developed more widely, and this has already been successfully started in Brentford in Essex. In this case an energy supplier has worked with a council to create an incentive, and it is particularly equitable as all homeowners pay council tax and not all move house. The SDC believes the Brentford pilot should be replicated, aided by government facilitation, perhaps in the way the Central and Local Partnership Ministerial group helped identify issues and solutions for common problems with delivering sustainable development principles. A partnership between local government, energy suppliers, the energy efficiency industry and government (Defra and ODPM) could facilitate council tax rebates across England for energy efficiency in the home.

The Landlords Energy Saving Allowance (LESA) is not currently expected to have a major impact on carbon savings as only enlightened landlords will make those improvements. The SDC is supportive of the proposed **Green Landlord Scheme** which appears to support holistic whole-house solutions in promoting energy and carbon efficiency, but we are concerned at the slow development of this scheme and low levels of awareness of both this and the LESA schemes among landlords.

The SDC would support a review of the VAT regime for refurbishment works (17.5%), while new build is zero rated. We understand that this is a complex subject and that the UK has limited discretion to vary the VAT regime. Nevertheless the SDC would support the creation of a level playing field so refurbishment is not discouraged. This has become particularly acute for major renovation programmes in the Housing Market Renewal areas where some developers are demolishing and rebuilding because the economics are favourable, when it would be more energy efficient and would conserve community cohesion, to refurbish the existing properties to higher energy efficiency standards.

The SDC also supports the introduction of reduced rate (5%) VAT to be applied to a wider range of energy-saving products including low energy lighting and DIY energy efficient materials and we support the UK Government in its efforts to secure EU agreement to implement these changes.

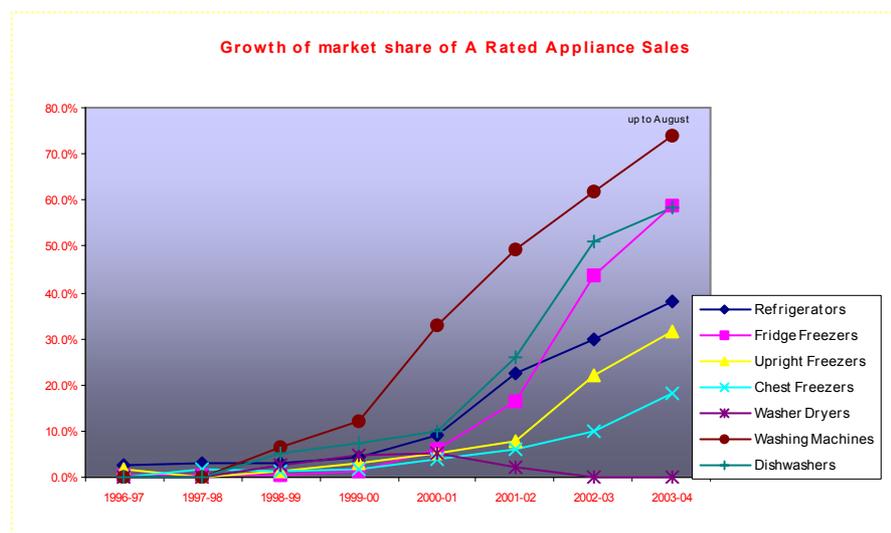
### Winter Fuel Payments

SDC are interested in the scope to link Winter Fuel Payments to energy efficiency to help the recipients make their homes warmer. As WFPs are administered by the Department of Work and Pensions, we understand that primary legislation would be required to allow DWP to administer a voucher or rebate scheme for installing energy efficiency measures in their homes (with an incentive of an additional WFP settlement for that year). But we believe this is an initiative worth pursuing.

## 5.4. Market Transformation

Electricity use in households accounts for around 18% of UK carbon emissions and use of appliances is growing rapidly, and is projected to grow over the next decade. Over 7 million kitchen goods are sold each year, and 14.4M cooking appliances. Demand for entertainment and home/office technology is growing rapidly. Market transformation is urgently needed to stimulate improved efficiency of products, and innovation is needed to accelerate radical technological improvements such as LED lighting at the appropriate quality for widespread household and commercial use.

The market transformation of some kitchen goods has been successful in the first phase (2002-5) of EEC, because government awarded suppliers with a further 60% additional carbon credits to offer appliance cut price deals. Energy suppliers worked mostly through major appliance retailers, and successfully transformed the market for goods they subsidised (see graph below). The



appliance schemes in EEC showed that it is relatively easy to influence citizen purchasing choices if the right incentives are in place at the point of purchase (as opposed to choices made in the home – as with insulation). All these appliances have been energy labelled since [1993], but it was the price incentive which caused the market transformation. However labelling is an essential information tool to support policy change.

Other consumer electronics have no overt energy labelling, and do not even advise the purchaser of the energy wasted on standby mode. As TVs, DVD and computers are increasingly left permanently on standby it is regrettable that there is no energy labelling of the standby power at the very least – especially as the standby consumption of a digital TV receiver box can range from 5Watts to 30W, and the goal of a 1W standby receiver seems remote. In addition proactive policies to achieve standards are necessary so the worst performing appliances are removed. The SDC believes a voluntary agreement with the electronics industry should be brought into effect as soon as possible for labelling standby power, in advance of any EU regulatory agreement.

### Intelligent Technology

We are also supportive of innovative ways to achieve carbon savings from households. One area of interest is novel demand-side solutions including frequency responsive dynamic demand management. These technologies would enable aggregate household demand to be reduced at peak periods by instantaneously controlling non-essential demands without the need for system signals. Dynamic demand controls could be incorporated in white goods such as fridges and freezers. Such technologies would deliver carbon savings (by reducing the need for more polluting reserve plant) whilst promoting efficient grid operations. One recent report<sup>4</sup> has estimated the savings as high as around 0.6 MtC/year, but this would need to be further explored.

## 5.5. Achieving radical energy savings from homes by 2050

As outlined above, the SDC believes government should have a target of a 60% reduction in carbon emissions from buildings (homes and commercial) by 2050. This will require :

- commitment and effort by government in setting the right policy frameworks;
- commitment by individuals, but probably stimulated by a new system of domestic tradable quotas as an incentive structure; and
- a range of technological breakthroughs.

The University of Oxford’s Environmental Change Institute recently completed a study examining the feasibility of achieving a 60% cut in CO2 emissions from homes by 2050<sup>5</sup>.

#### Proposals of the ECI study:

- That 2/3 of the dwellings standing in 2050, exist today and these will need to receive the following measures:
  - 100% cavity wall fill; 15% solid wall insulation; 100% loft insulation at 300mm; 100% high performance windows.
  - The average SAP rating will have risen to SAP80, compared to average of SAP 51 today
- 3.2M homes (14% of the current housing stock) will need to be demolished at a rate of 80,000/year by 2016
- 10M new homes will need to be built (a 33% increase) by 2050, at a rate of 220,000/year
- 72% of homes will have low and zero carbon technologies (renewables, micro CHP) providing the main heating and hot water energy supply in homes; 20% have gas boilers or electric heaters. To achieve this level of installation the installation of low carbon technologies will need to grow at 30%/year.
- All homes have more warmth, hot water and access to appliances; the use of air conditioning in homes is not modelled.

<sup>4</sup> www.c  
<sup>5</sup> 40% h

There are some assumptions in this study that the SDC would contend are pessimistic, and that lead to the overall conclusion that 14% of the current housing stock needs to be demolished:

1. The presumption that only 15% of solid wall homes (ie. 105,000 in total) would be insulated is very pessimistic, and we contend that this should be a focus for innovation policy. Solid wall insulation is at the moment either internal insulation, which reduces the size of rooms and is very disruptive, or is applied externally which is often inappropriate visually, especially for older brick properties. A technological breakthrough leading to a product that is widely useable and affordable, would dramatically improve the prospects for uplifting the energy efficiency standards of both solid wall homes, and indeed cavity filled homes (as a secondary insulant).
2. The assumption that air conditioning will not be in widespread use in homes may, in our view, be optimistic. In view of the projections for climate change, and the impact this will have in southern England particularly, where hotter summers and extreme weather events will become more prevalent, we think this is overly optimistic unless policies are put in place to provide alternative means of home cooling – such as improved external shading like shutters, blinds and tree planting.

## 6. Transport

The transport sector needs a clearer and stronger role in of the overall effort to cut carbon emissions. An explicit sectoral suite of policies for reducing emissions is urgently needed. We recommend that an overall target of a 50% cut in carbon emissions from the road transport sector would concentrate effort in this area, and should be achieved through a combination of technological and behavioural change. As we said in 2004, the government's Aviation White Paper outlines a path of unsustainable growth in aviation, and if this policy is pursued it will become increasingly difficult to meet the 2020 and 2050 targets.

We believe the following three policy areas can achieve carbon reductions additional to those already in the CCP baseline:

- increased policy effort in behavioural change measures
- specific measures to ensure take up of lower carbon vehicles: we have concentrated on the impact of increased VED levels, and on industrial policy for encouraging manufacture of hybrid vehicles in the UK;
- emissions trading in the aviation sector, and improved efficiency in landing and take off patterns

### 6.1. Road transport - the importance of behavioural change measures

DfT are already acting on certain measures that help facilitate transport behaviour change, but much further action is necessary, in particular to ensure that benefits are 'locked in'. We are

however, concerned that the additional benefits of behavioural change schemes will not be fully recognised in the current government policy appraisal process, as it does not currently value social inclusion or health benefits in quantitative terms.

A clear national strategy on traffic reduction is urgently needed, as it would facilitate take up of demand management and behavioural change measures.

## Behavioural change and carbon emission reduction

Recent research<sup>i</sup> suggests that a high intensity application of measures that help facilitate behavioural change<sup>6</sup> could reduce car traffic by 11% over a decade. We would recommend intensifying the application of demand management measures to aim to achieve this level of saving over a 5 year period. As car traffic currently produces around 21.5 Mt of carbon dioxide per year, an 11% reduction in traffic levels would result in a comparable reduction in carbon emissions i.e. in the region of 0.5MtC per year.

There are several DfT funded programmes now in place to encourage take up of behavioural change measures, these include the Travelling to Schools Initiative and recent good practice guidance, *Making Smarter Choices Work*<sup>ii</sup>. However if traffic reduction on the scale of 11% is to be achieved then further measures are necessary. The SDC has identified several areas where action is essential:

- Stronger guidance is necessary e.g. behavioural change measures should be specified more clearly within the Local Transport Plan process;
- The Government needs to lead by example, and travel plans introduced by the public sector should have modal shift targets;
- Financial barriers need to be removed, particularly in relation to benefits in kind<sup>7</sup>, for example mileage rates in the NHS are higher the more powerful the engine - which is rewarding more higher emissions;
- Good public transport and cycling/walking infrastructure and services need to be in place so there are viable alternative. Local authorities and passenger transport executives perceive their lack of directive powers as a hindrance to providing high quality alternative transport systems<sup>iii</sup>.

These issues need to be tackled to enable individuals' travel behaviour to change.

## Demand management measures

A further key point from the research is that 'hard' measures e.g. road space reallocation, parking charges and congestion charging measures are also necessary to:

- 'Lock in' the benefits of behavioural change measures – so they are not eroded by induced traffic;
- Encourage the take up of softer measures, for example parking restraint and congestion charging may motivate organisations to become involved in travel planning; and
- Provide the space and facilities for the key aspects that will ensure the success of smarter choices, for example the space necessary for high quality public transport, and walking and cycling provision.

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<sup>6</sup> These include School, Green and Personalised Travel Plans, Telecommuting and Videoconferencing.

<sup>7</sup> For example travel plans that utilise collected payment from all employees and then redistribute the funds so that non-car users are financially better off is treated as a BIK for tax purposes.

## Speed control

Reducing the speed limit from 70mph to 65mph can make a significant difference to vehicle emissions, and while there may be some loss of time this is likely to be balanced out by less congestion, fewer accidents and therefore less public spend. France enforced strict speed limits on main motorways in 2003 and succeeded in reducing accidents by 30%, and carbon emissions by 19%. It is worth exploring how this success could be replicated in the UK as a policy option for emissions saving. Our assessment is that around 1.5MtC could be saved per year through speed control measures.

## 6.2. Road Pricing

In the medium/longer term a move to a national road pricing scheme is seen as one key measure in ensuring this 'lock in' of the benefits of behavioural change.<sup>iv</sup> It is also recognised that local congestion charging schemes are a necessary first step along this path. However, at present, many local authorities (other than London) are nervous of taking a risk with congestion charging, and residents are often opposed. Indeed the London experience proves the benefit of courage and leadership, while the Edinburgh example reveals the risks in consulting voters in advance. Practical help is needed for local authorities that want to start congestion charging schemes and public transport services, and we welcome the new Transport Innovation Fund<sup>v</sup>.

Research indicates that a revenue neutral scheme, through making rural transport cheaper, could result in an increase in traffic levels and associated carbon emissions<sup>vi</sup>. Therefore any road pricing scheme must be designed to avoid any increase in emissions.

The importance of other demand management measures including road space reallocation and parking restraint also needs to be recognised. We recommend that DfT should issue good practice guidance (similar to the 'Smarter Choices' good practice guidance) on successful implementation of demand management measures. Existing barriers also need to be removed, such as inconsistent parking standards between neighbouring local authorities, which can influence business location decisions.

## 6.3. Carbon cost analysis – inclusion of transport's other externalities

Behavioural change measures also help reduce transport's other externalities. These externalities include social exclusion, congestion, air quality pollutants, and impacts on health. There is a cost of introduction of these measures, but research indicates that the benefits outweigh the costs.

The SDC<sup>vii</sup> have undertaken analysis of :

- 1) The cost of implementation of measures
- 2) The impact in terms of loss of revenue from fuel duty revenue and VAT and
- 3) The financial benefits in terms of reduction in carbon emissions, congestion, noise and air pollution.

The analysis indicates that for every pound spent on soft measures overall benefits in the range of £1.10 to £2 are produced (details of the analysis are provided in a separate SDC document available on website). These benefits are conservative estimates. Under congested conditions and with higher carbon values increased benefits would be achieved.

This illustrates that there is a clear need for a wider cost-benefit analysis approach to carbon emission reduction than is currently utilised. At present, when carbon emission savings are costed limited attention is given to additional benefits. In this case the congestion reduction, health and

social inclusion benefits of behavioural change measures would not have been considered. This may result in these measures being dismissed as being too expensive. In terms of true sustainability, carbon emission reductions need to be considered in a far wider context than is undertaken at present.

## 6.4. Achieving lower carbon vehicles

Car ownership, vehicle kilometres driven and therefore CO<sub>2</sub> emissions are projected to increase. The impact of existing and increased traffic levels will be reduced if people purchase more fuel efficient, lower carbon vehicles.

At present there are two targets relating to lower carbon cars that affect the UK. These are:

- DfT's Powering Future Vehicles Strategy target that 10% of new vehicle sales will be cars emitting 100gCO<sub>2</sub>/ vehicle km or lower by 2012, and
- The EU wide voluntary agreement that by 2008 average carbon emissions for new vehicles will be 140 g carbon dioxide per vehicle kilometre.

It would appear that neither of these targets is stimulating sufficient progress in either technological improvement in new vehicles, or citizen demand for low carbon vehicles. Figures published in 2004 reveal the ACEA average CO<sub>2</sub> emissions per new car in 2005 was in fact 172gCO<sub>2</sub>/km instead of the target 160g as intended. Similarly purchases of cars with less than 100gCO<sub>2</sub>/km represent only 0.03% of the market, and there are only 7 years to go before we reach the 2012 target date for 10% of new vehicles to reach this emission level.

Although there are several mechanisms currently in place to encourage people to purchase more fuel efficient, lower carbon vehicles, these are not stringent enough to ensure achievement of the targets.

We agree with the EST that it is important to set post 2008 targets now in order to influence future technologies, despite the fact that we are currently not on target to meet it. We also agree that the 120g CO<sub>2</sub>/km target should be extended from 2010 to 2015 rather than a weaker target set for 2010.

### 6.4.1. Changes in VED

The SDC<sup>viii</sup> has undertaken research to assess the impact that significant changes to vehicle excise duty would have on these targets (details of the analysis are provided in a separate SDC document available on website). The analysis is based on a spreadsheet model and includes assumptions for an increase in fuel efficiency of vehicles, future growth in new car ownership, and the existing trend for the purchase of both smaller and larger vehicles.

One important scenario tested involved:

1. Increasing the differential between each Vehicle Excise Duty band to £300, at present the differential between bands ranges from £10 to £25; and
2. Introducing a further VED band for cars emitting between 186 and 220 grams of CO<sub>2</sub> per vehicle kilometre. At present the highest band is for vehicles over 186 grams.

It was assumed that changes on this scale would come into force in 2008 (allowing for a 3 year warning period which in itself could have an announcement effect) and would impact on both the private and the company car market. MORI research for the DfT<sup>ix</sup> on VED was used as a base for assessing the impact of possible changes. Two scenarios here modelled:

1. Scenario 1 assumed that all car purchase decisions could potentially be impacted by changes in VED differential while
2. Scenario 2 assumed that only cars at the lower and higher end of each band would be impacted by the changes.

The two scenarios were set against two base cases, which included differing assumptions for vehicle efficiency improvements and existing trends in purchasing patterns.

The research findings suggested that changes in VED could play a significant role in helping the UK achieve its Powering Future Vehicle and the EU Voluntary Agreement targets.

*Table 1* Percentage of Vehicles which are 100g CO<sub>2</sub>/km or lower in 2012

	Base Case 1 (high efficiency improvements)	Base Case 2 (lower efficiency improvements)
No change in VED	0.73	0.09
Scenario 1 – VED changes affect purchasing decisions across bands	6.69	2.87
Scenario 2 – VED changes affect purchasing decisions at 'edge' of bands	3.47	0.93
Powering Future vehicles target – 10% of new vehicle sales will be cars which offer 100g of carbon dioxide or lower by 2012		

With the changes to VED we are advocating this could help - at 6.7% - move the UK towards achieving the 10% low carbon vehicle target.

*Table 2* Average carbon emission of new vehicle registrations in 2008

	Base Case 1 (high efficiency improvements)	Base Case 2 (lower efficiency improvements)
No change in VED	158.1	166.34
Scenario 1 – VED changes affect purchasing decisions across bands	146.04	154.51
Scenario 2 – VED changes affect purchasing decisions at 'edge' of bands	155.83	164.57
EU wide voluntary agreement – by 2008 average carbon emissions for new vehicles will be 140 g carbon dioxide per vehicle kilometre		

Under the two scenarios above average vehicle emissions could reach 146gCO<sub>2</sub>/km, which is well on the way to achieving the 140g target, or alternatively in a pessimistic scenario we could remain at a level of 166gCO<sub>2</sub>/km.

Our results suggest that average carbon reductions in the range 2 grams to 12 grams per vehicle km may be possible. In summary (detail in separate SDC document), if average carbon reductions of 12g/vehicle are achieved we will save between 0.4 and 0.8MtC per year by 2010, with much greater savings in future (up to 1.5MtC in 2015) as purchase patterns diffuse through the fleet.

We note that the widening of VED bands and the introduction of a new higher band has been advocated by several organisations including Transport 2000 and the EST. We also share EST's disappointment with regard to company car taxation and the freeze on the level of emissions qualifying for the minimum charge in 2006-2007 to 140 grams per kilometre. As the EST<sup>x</sup> highlights this means that even if the bands were reduced by 5 g CO<sub>2</sub>/km each year from

2007/8, the lowest band will reach only 115g CO<sub>2</sub>/km by the year 2011/12. We agree with the EST recommendation that Company Car Taxation bands should be progressively lowered in order to incentivise low-carbon cars and to continue to build on the success of the CCT reform.

#### **6.4.2. Role for biofuels**

We believe there is a role for biofuels in reducing road transport carbon emissions. However a sustainability index of all transport fuels is needed including the carbon accreditation of fuels, as well as taking into account wider social, economic and environmental issues.

The biodiesel fuel duty derogation will be in force for 3 years, however this is a remarkably short time for industry to have sufficient confidence that the policy will provide sufficient support. Industry investment times need to be taken into account if this policy is going to be effective, as the risk that this policy will be reversed will discourage investment. The industry also believes the 20p duty differential is insufficient incentive, so this should be re-examined to see if indeed it is too low.

Our understanding is that if the biofuels contribution to overall transport fuel use increases to 5% of the total market by 2010, then this could achieve additional carbon savings of up to 1MTC/yr. With this potentially significant contribution in mind, government should re-examine the existing incentive structure to see if it is actually achieving its goal so far.

### **6.5. Technology options**

Technological and behavioural change in transport use will need to go hand in hand for the deep cuts in carbon emissions to be achieved from this sector. There are a number of technological advances already on our roads, albeit in very small numbers, and we are particularly interested in government policy for encouraging more widespread take up of hybrid vehicles. We believe government has a role in influencing vehicle manufacturers, and persuading existing industry to invest in the technology in this country, particularly where they already have a manufacturing base, such as Toyota or Ford. It is also worth noting that recent experience in the US implies that the market for the largest, most fuel consuming vehicles is weakening (with GM profits falling dramatically) and the market for more fuel efficient vehicles, such as the Toyota Prius is growing exponentially.

#### **6.5.1. Hybrid cars**

There are a number of hybrid cars on the road – the Toyota Prius and the Honda IMA being perhaps the most well known. However both manufacturers are concentrating their market penetration efforts on Japan and the US. Indeed the Toyota Prius was the most highly sought car in the US in 2004. Take up in the UK is slow, however, relative to other vehicles, largely because it is not so available, and because of delays in purchasing.

Hybrid cars have the potential to halve CO<sub>2</sub> emissions, and double fuel efficiency as they develop. The Toyota Prius – a 5 seater family car – has emissions of 105gCO<sub>2</sub>/km, which is significantly less than similar sized and powered vehicles with emissions of around 160g and upwards. Over time diesel hybrids could be developed which will improve efficiency even further, but this is unlikely before adequate returns on investment have been made by the manufacturers.

Market demand for hybrid cars could be significantly boosted if our recommendations above on radically widening the VED bands are carried through. Citizens would benefit from the improved

efficiency of the vehicle, lower running costs, while achieving a family sized vehicle. In addition uptake of hybrid cars could be improved if UK industrial policy with vehicle manufacturers is redirected to encourage UK based manufacturers (such as Toyota and Ford) to invest in the assembly lines needed to produce hybrid cars.

### 6.5.2. Contribution of buses

Diesel electric hybrid buses can achieve carbon reductions of 33% per vehicle kilometre<sup>xi</sup>. We are aware that the additional cost of the buses can deter operators from investing. We are also aware that the funding mechanism initially proposed to overcome this barrier and facilitate the take up of these and other low carbon buses has been setback because the mechanism is not compliant with EU state aid legislation. We suggest that other measures could be used to help encourage take up including section 106 agreements through the planning route, and a commitment by the public sector to purchase these low carbon, public transport technologies.

## 6.6. Aviation

As we stated in our earlier documents<sup>xii</sup>, the forecast growth in aviation and the policies to tackle this growth as detailed in the Air Transport White Paper are unsustainable.

We are using this opportunity to again:

1. Express our concerns that the cost-benefit estimates for the additional airport capacity are misleadingly optimistic, and we ask the DfT to publish a new, fully documented appraisal, which takes into account the overall forecasted increase in air traffic; and
2. Call on the Government to affirm that the 60% carbon reduction target (given in the Energy White Paper) includes the radiative forcing from emissions from domestic and international aviation.

Overall we welcome the decision by government to press for the inclusion of aviation emissions into the EUETS. We recognise that the EUETS is likely to provide both the most effective and the fairest mechanism for ensuring that aviation is required to internalise the full costs of its contribution to the problem of climate change.

However we are also aware that there is still a significant amount of work to be done on both the design and the implementation of the EUETS and there is uncertainty as to how the EU scheme could be adapted for aviation emissions. There are also difficulties in including the non carbon impacts of aviation within the EUETS. We are therefore pleased that the recent UK Sustainable Development Strategy recognises that the EUETS may not be the total solution and that work is being progressed on the use of other economic instruments. We, again, strongly recommend that pending the inclusion of aviation into the emissions trading scheme, an emissions charge should be levied on all internal and flights out of the UK.

We also recommend that the inclusion of aviation in the EUETS is secured before the DfT sanctions any airport expansion, not least so that it can be assessed whether such expansion is really necessary and feasible.

### 6.6.1. Operational efficiency

Aircraft operational efficiency can have a significant impact on its carbon emissions. Implementation of Communication, Navigation, Surveillance and Air Traffic Management

(CNS/ATM) is estimated to provide the largest potential source of fuel and emission savings over time<sup>xiii</sup>. International Civil Aviation Organisation modelling of CNS/ATM implementation in Europe and the United States points to a potential 5% reduction in global carbon dioxide (CO<sub>2</sub>) emissions by 2015. IATA research also suggests that faster implementation of CNS/ATM could lead to a 9% improvement of CO<sub>2</sub> emissions worldwide.

The SDC recommends that the UK should take a lead role in ensuring that CNS/ATM measures are implemented as soon as possible in order to ensure that the maximum amount of carbon emission reductions are achieved. We are aware that Eurocontrol's (the European Organisation for the Safety of Air navigation) current main goal is the creation, and implementation of a Pan-European Air Traffic management system, and that this is directly related to the EU's Single European Sky initiative. However we are concerned that the emphasis within this system is on reducing costs and improving capacity rather than minimising carbon emissions. While we recognise that decisions are made at the European level, we feel that the UK government through the DfT should use its influence to ensure that changes in air traffic management systems properly address the importance of carbon emission reductions. We suggest as a matter of urgency that the DfT takes forward an assessment of the role that changes in air traffic management systems could play in reducing carbon emissions at the UK and EU level.

The majority of take-off and landing slots at congested airports are awarded on the basis of historic use – so called 'grandfather rights', and not in ways that reflect their environmental impact or economic value. We are pleased that the DfT recognises that the current system contains fundamental weaknesses and suggest that work is undertaken on how different options for slot allocation could impact on the different carbon emissions of flights.

## 7. Saving Carbon from Business

On average businesses in the UK waste 30% of the energy they buy<sup>8</sup>. For many businesses, a 20% cut in energy costs represents the same bottom-line benefit as a 5% increase in sales, but they do not perceive energy saving measures in this way. The barriers to energy efficiency are often complex and difficult to overcome. they range from:

- Organisational (lack of senior commitment), to
- Financial where the payback is perceived to be too long (although is often under 2 years), to
- Existing technologies not easily accommodating more efficient updates, to
- Caution about policy interventions from government, and
- Risk aversion to new technologies.

Many of these barriers actually fall within the "changing behaviour" category.

We welcome the announcement in the 2004 Spending Review of the £284M BREW programme of resource efficiency for business, and we expect this to build upon the successes of the Carbon Trust programmes. Experience has also shown the Climate Change Agreements (CCAs) have been particularly effective in concentrating minds in the company board room, thus enabling the Carbon Trust targeted advice to receive the high level backing needed to ensure it is accepted and implemented. In view of this we believe widening the scope of CCAs and tightening the allowances is likely to be effective in achieving further savings from the business sector by 2010.

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<sup>8</sup> Carbon Trust

For businesses outside the scope of the CCAs we believe the Climate Change Levy should not continue to be held at its current level, and it should be raised in line with inflation.

The SDC looks forward to the second phase of the EUETS widening to more businesses, and over time expanding to SMEs, who are largely untouched by targeted incentives for reducing their carbon emissions.

Inefficient and poorly managed commercial buildings are responsible for a large percentage of emissions from the business sector. The SDC recommends that government implements the EU Energy Performance of Buildings Directive with a wider interpretation than is currently envisaged. The EUEPBD requires public buildings to display an energy performance label from 2007, and we believe this requirement should be extended to all buildings when they change leasehold or ownership. This would enable prospective tenants or buyers to compare the efficiency and running costs of the buildings and make their choices accordingly. We believe this could be a very significant stimulant for landlords and building owners to improve the efficiency of their buildings, relatively rapidly. It is likely that if this was introduced in 2007 that additional carbon savings would be achieved from buildings by 2010.

Electricity and gas metering in business appears to be chaotic. Many businesses have estimated metering, and most are unable to be really sure what energy they actually use, unless they have an energy saving programme in place. This situation is untenable, and government, Ofgem and Ofreg need to work together with the energy industry to invest in improving the metering and billing system across the UK. This is no insignificant task, but is essential for really measurable progress to be made through to 2050.

## 8. Saving Carbon from the Public Sector

The whole public sector estate, including the Devolved Administrations, is responsible for around 5% of total UK carbon emissions, with central Government responsible for one tenth of this total. Three quarters of this is from space heating and lighting, with IT, hot water and catering responsible for most of the remaining emissions. However, the public sector also contributes to carbon emissions in other ways: how it procures - the wider public sector spends £125bn on goods and services a year - impacts, for example, on the levels of road and other transport and could pump prime innovative sustainable product design; how it delivers its services and its employment practices (the NHS alone is the UK's biggest employer), impacts on people's need to travel (The NHS alone creates around 25 billion passenger km a year, equivalent to about 4% of all passenger km travelled in the UK); and its current building programme (NHS £12bn by 2010) offers an opportunity to build sustainably and decrease emissions in the future. In these and other ways, the public sector can contribute significantly to the delivery of all three of the targets we recommend.

### Leadership

The government's new Sustainable Development Strategy emphasises the need for government and the public sector to lead by example. We believe this is a core role of the public sector, to demonstrate what action is being taken and give confidence to other sectors that their efforts are not alone. Over time (by 2020), the SDC would like the whole of the public sector to become carbon neutral, with an initial focus between now and 2010 on the major energy users - buildings and transport - as these are likely to be the quickest wins.

Since the Climate Change Programme was published in 2000 the public sector has committed to a number of carbon reduction initiatives, with varying degrees of success. We welcome these initiatives, but not the half-heartedness with which the Carbon Trust carbon management programme was actually put into effect in the few government departments who signed up to it. The Carbon Trust has previously proposed that the public sector should commit to leasing only buildings in the top quartile of energy efficiency, as this will pull the standards up across the market, but this has never been agreed.

We welcome the commitment by Defra and agreement by HM Treasury to participate in a full carbon management pilot, especially as this is likely to reveal the difficulties that public sector bodies have in recycling revenue savings into further capital investments for energy efficiency. We believe these constraints need to be explored, and mechanisms for overcoming them developed. Following this, an active programme for requiring public sector bodies to participate in such “invest to save” schemes for their energy use would need to be put into practice. Progress on this issue could enable significant improvement in delivering energy and carbon savings from the public sector.

Public sector commitment to installing renewable energy technologies as part of this process would provide a significant boost to public awareness of the technologies, and acceptability. Government should improve on its existing CHP target for the government estate (which it is not yet achieving) and commit to installing renewable energy technologies such as wind turbines, solar hot water and photovoltaics. It is interesting to note that government’s own PV Major Demonstration Programme has funded over 330 private and commercial installations but only 88 public sector installations in Great Britain. Beyond the government’s own estate, progress is slower. There are for example no CHP targets for the NHS. We recognise that progress continues to be made with some public sector building standards, such as for hospitals, other NHS buildings and the new Breeam standard for new and refurbished schools, and we welcome this. Nevertheless there is still much progress to be made in ensuring that these commitments are actually delivered on the ground, particularly in PFI and PPP contracts where sustainability elements are often omitted when the agreement goes ahead.

Capacity building across the public sector is needed to improve understanding and commitment to delivering the goals of sustainability, and for achieving the emission savings already committed to. Sustainability needs to be championed as a priority in the public sector, to guarantee delivery. The SDC is working with the NHS to promote Good Corporate Citizenship - a term that resonates well in the NHS, as it describes how organisations can embrace sustainable development through their corporate activities. Part of this work has been developing a self-assessment exercise to help NHS organisations measure their sustainable development performance. This means looking closely at how they contribute to strong local economies, community cohesion and a healthy environment. It focuses on sustainability in operational delivery, and includes sustainable procurement of buildings, goods and services, facilities management, employment practices, waste management and sustainable transport options. All of which will impact on carbon emissions.

Transport is also a very visible opportunity to demonstrate commitment to low carbon technologies, and the SDC welcomes commitments in the UK Sustainable Development Strategy that UK Government departments will ensure that 10% of their fleet are low carbon vehicles by 2012. We believe this target should be replicated cross the wider public sector, to include education (schools, universities, colleges etc) and the NHS, the police and prison services, Local Authorities, benefits offices etc.

We also welcome the establishment of the Sustainable Procurement Task Force and look forward to improved application of the existing guidance on procuring sustainable and energy saving products and indeed buildings. Nevertheless the barriers to uptake often relate to buyers' confusion about the standards they should be looking for, and a dedicated customer focussed service for public procurers may be needed to overcome these difficulties. Sustainable procurement relates equally to local sourcing of products and services, and the carbon benefit of such practice is clear: reduced transport emissions, while encouraging local economic activity.

## 9. Saving Carbon from Agriculture

This review of the Climate Change Programme gives government the opportunity to carry out in-depth research into the contribution that agriculture can make to reducing UK carbon emissions. With CAP reform moving the subsidy support structure to environmental stewardship, the opportunity for examining the implications for reducing carbon emissions from the land is timely.

The SDC is aware that there is little data in government about the potential benefits for carbon emission savings from this sector. There is good understanding of the role of energy crops, such as fast growing willow coppice or elephant grass, as a fuel source for electricity generation (see 3.2 above for comment on this) but much less understanding about the potential for emissions savings from shallow soil tilling methods, management of upland peat and composted materials, the importance of ruminant diet for minimising methane, stock density rates and the need to manage the application and type of nitrogen fertilisers. The use of anaerobic digesters linked to CHP for livestock farmers should also be considered.

Research has been carried out at the University of Bangor on some of these issues, and the Canadian experience with shallow tilling would also be informative. The SDC sees sustainable land use and management as a key element of sustainable development and is interested in being involved in the research of these potential sources of carbon emission reduction. We will work with government in 2005 to take this forward.

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