

Climate commitment

Meeting the UK's 2010 CO₂ emissions target

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Executive summary

This report shows how the Government's manifesto commitment to reduce the UK's carbon dioxide (CO₂) emissions by 20 per cent from the 1990 level by 2010 can be met. Our starting point is the DTI's updated emissions projections published in November 2004, which suggested about a six per cent shortfall by 2010, corresponding to excess emissions of about 10 million tonnes carbon equivalent (10MtCe).

However, our proposals do not wholly depend on the accuracy of the emissions projections. If, as widely expected, revised projections suggest higher emissions in 2010 without new measures, then under our proposals the notional saving from the EU Emission Trading Scheme would also increase. Other measures would also need to be revised and enhanced.

The proposals are summarised in the table below with estimated emissions savings from each new measure, on the basis of the November 2004 projections. We have used published estimates where possible and made our own estimates in other cases. We have sought to avoid double counting, for example emissions from electricity generation. The proposals are neither exhaustive nor exclusive.

| Measure | Estimated annual CO ₂ emission saving by 2010 (MtCe) |
|---|---|
| EU Emissions Trading Scheme phases I and II | 5.0 ¹ |
| Climate Change Levy (reformed and increased) | 0.9 |
| Climate Change Agreements (enhanced and extended) | 0.3 |
| New Building Regulations (households) | 0.6 |
| New Building Regulations (commercial buildings) | 0.1 |
| Energy Efficiency Commitment phase III (additional to current plans) | 0.4 |
| Community Energy (extended, reformed and enhanced) | 0.4 |
| Renewable Transport Fuel Obligation | 0.9 |
| Vehicle Excise Duty (increase differentials between bands + compulsory labelling) | 0.6 |
| Company Car Tax (extend bands and ratchet up emissions standards) | 0.2 |
| Smarter Travel Choices programme | 0.6 |
| Total | 10.0 |

Meeting the 2010 target and putting the UK on a path to developing a truly low carbon economy requires action by every government department, not just Departments for Environment, Food and Rural Affairs (DEFRA), Trade and Industry (DTI) and Transport (DfT), which currently share responsibility for the Public Service Agreement (PSA) target to reduce CO₂ and other greenhouse gas emissions. Given the importance of PSA targets in defining priorities and the urgency of mitigating climate change, all government departments should share responsibility for delivering this PSA target, including the Office of the Deputy Prime Minister (ODPM) and HM Treasury (HMT).

There are strong reasons for the UK going beyond its international obligation under the Kyoto Protocol, which is to cut greenhouse gas emissions by 12.5 per cent from the 1990 level by 2008-12, by meeting its domestic CO₂ emissions target for 2010. Far deeper emissions cuts will be required in the long term. The UK will gain long term economic advantage by developing the low carbon industries that will provide jobs and prosperity in the future. Business needs certainty that Government will keep to its emissions targets and provide a strong long term policy framework to ensure their

¹ This figure would increase if the emissions projections increase

technology investments will have long term value. The UK Government also has an important global leadership role on climate change that is strengthened by keeping its domestic promises and would be weakened by breaking them. Delivering manifesto commitments is also a matter of keeping faith with the electorate.

EU Emissions Trading Scheme

The Government should cease legal proceedings against the European Commission over the UK's total emissions allocation in phase I (2005-7). Instead it should take advantage of the emissions savings that would accrue from meeting the Government's original allocation submission to the Commission.

The UK's phase II National Allocation Plan (2008-12) should be based on the scheme making at least a proportionate contribution to meeting the 2010 target. Hence we propose that the total number of allowances given to industry per year in phase II should be no more than 46 per cent of the total 2010 CO₂ emissions target. On this basis the maximum total number of allowances for the whole five year phase would be 1,113.2 million tonnes of CO₂ emissions, excluding any new sectors being added. If necessary to meet the 2010 target overall, the cap should be lower since the trading scheme is likely to be one of the most sure and cost-effective ways to deliver emission reductions.

Emissions projections should not be used to set the overall cap but to guide the allocation of allowances between sectors and installations, on the basis of benchmark standards. To guard against misinformation and pressure from industry groups, in future emissions projections should be carried out by an independent body such as National Statistics instead of the DTI. We also recommend that the Government uses its full discretion to auction ten per cent of allowances in phase II. The revenue should be earmarked for spending on climate change mitigation.

Government, industry and civil society organisations should join forces to press the European Commission to ensure that other member states' phase II National Allocation Plans are at least consistent with meeting their Kyoto Protocol commitments in accordance with the EU's burden sharing agreement.

Renewables Obligation

Additional support is likely to be necessary to meet the Government's target that ten per cent of electricity should be generated from renewable sources by 2010, in particular for emerging technologies like off-shore wind, wave and tidal power. The Government should consider revenue subsidies such as feed-in tariffs as well as capital grants for emerging technologies, to buttress the Renewables Obligation (RO). Feed-in tariffs would subsidise the cost of electricity sold to suppliers. We also propose that the windfall revenues earned from Renewables Obligations Certificates (ROCs) for Non Fossil Fuel Obligation (NFFO) schemes (which preceded the RO) should be earmarked for climate change mitigation measures, including renewables. The sum is estimated at £550 million to £1 billion to 2010.

Climate Change Levy and Agreements

The Climate Change Levy is a tax on energy used by businesses. It should be reformed so that it is based on CO₂ emissions from different fuels and the rates are increased towards the estimated social costs of greenhouse gas emissions of about £70/tCe. The increased revenue should be earmarked for climate change mitigation measures. Sectors covered by Climate Change Agreements should continue to receive an 80 per cent discount on the levy and agreements should be enhanced and extended.

Building regulations

It is a missed opportunity that the new building regulations concerned with improving insulation and energy efficiency standards in new buildings and major renovations are weaker than the draft regulations. Nevertheless, the new regulations in force from 2006 could reduce energy use in new buildings by 20 per cent compared to the existing standards. More resources should be directed at ensuring compliance, through inspection and enforcement. The Government should also consider tax

incentives such as stamp duty rebates for first buyers of newly built homes to encourage developers to go beyond the minimum standards, for example to meet the standards of the new Code for Sustainable Buildings.

Energy Efficiency Commitment

The Energy Efficiency Commitment (EEC) requires energy suppliers to implement energy saving measures in customers' homes, including such things as cavity wall and loft insulation. We propose that the EEC in phase three (2008-11) should be set at about three times the level of phase one. To promote efficiency and innovation, EEC should be reformed into a 'white certificate' trading mechanism, enabling a diversity of suppliers to earn and trade credits for installing household energy saving measures. Financial incentives such as Council Tax rebates should be used to encourage uptake of energy saving services. This should be combined with public information and marketing campaigns. White certificate trading could also be extended to the commercial sector and to innovative energy and emission saving measures such as microgeneration.

Warm Front

Rising energy prices are putting more households at risk of fuel poverty. The Government and devolved administrations should review and increase the level of spending on anti-fuel poverty programmes such as Warm Front to meet objectives to eliminate fuel poverty for vulnerable households in England by 2010 and for all households across the UK by 2016.

Community Energy

The Community Energy scheme provides grants for district heating schemes for residential developments using energy efficient technologies, principally Combined Heat and Power (CHP). We propose that the Community Energy scheme should be enhanced and extended and that a further £200 million is allocated to the scheme between 2006 and 2010. It should also encompass more biomass heat schemes and microgeneration.

Renewable Transport Fuel Obligation

The Government should introduce a Renewable Transport Fuel Obligation (RTFO) on road fuel suppliers to meet the EU Biofuels Directive indicative target that biofuels make up 5.75 per cent of total road fuel sales by energy content by 2010. We also recommend that a carbon certification scheme is developed in association with the RTFO to ensure real emissions savings and voluntary codes and standards are developed on issues such as protecting biodiversity and preventing child labour.

Vehicle Excise Duty

From 2006, the differentials between Vehicle Excise Duty (VED) bands for cars should be increased to at least £50 and a new band for gas guzzlers with CO₂ emissions above 210g/km should be introduced. This should be combined with making the voluntary new car labelling scheme compulsory to highlight differences in fuel costs as well as VED.

Company Car Tax

The amount of income tax paid by company car tax drivers varies according to the car's list price (effectively the recommended retail price) and its CO₂ emissions rating. At present, drivers pay income tax on between 15 and 35 per cent of the cars list price, with cars up to 140g/km attracting the lowest rate and cars above 235g/km attracting the highest rate. There are bands at 5g/km intervals and in one per cent steps between the top and bottom bands.

We propose extending the number of bands at the top and bottom so that from April 2006 tax is paid on only ten per cent of the list price for cars up to 110g/km (like the Toyota Prius) and on 40 per cent

of the list price for gas guzzlers over 255g/km. The emissions standards for each band should then be increased by 5g/km per year so that by 2010/11 the ten per cent rate applies to cars up to 90g/km and the 40 per cent rate for cars over 235g/km. These reforms would create a market for highly efficient vehicles towards meeting the Government's Powering Future Vehicles strategy target that one in ten new cars should have an emission rating of 100g/km or less by 2012. They would also deter the purchase of gas guzzling company cars.

Vans and lorries

The main growth in emissions of CO₂ from road transport has been from vans and lorries since 1990 yet no CO₂ emissions standards have been set for these vehicles. This situation needs urgently to be rectified at EU level combined with tax incentives at UK level to promote the purchase of more fuel efficient models. More efficient use of vans and lorries should also be promoted so they are not making unnecessary journeys or travelling empty.

Smarter Travel Choices

'Soft' measures such as workplace and school travel plans, travel information and marketing, car sharing and car clubs, teleworking, teleconferencing and home shopping have some of the greatest potential to reduce road traffic and emissions in the immediate term. We recommend an intensive programme of such 'smarter travel choices' measures. This will require more funding and more flexibility for local authorities to use Local Transport Plan funding for these purposes, which often require revenue support rather than capital expenditure.

Climate funding

We propose that revenues from ROCs from NFFO schemes, auctioning allowances under the EU Emissions Trading Scheme and increased rates of Climate Change Levy should all be earmarked for climate mitigation measures, including:

- Capital grants and revenue subsidies for renewable electricity schemes, including extra support for emerging technologies;
- Enforcement of building regulations and tax incentives to go beyond minimum standards in new buildings and major renovations;
- Council Tax rebates to promote uptake of energy saving measures by households;
- Anti-fuel poverty programmes such as Warm Front;
- Business energy saving programmes;
- CHP, biomass heat, and microgeneration schemes such as Community Energy;
- Smarter travel choices; and
- Public engagement programmes to change attitudes and behaviour to reduce household and transport emissions.

We estimate that these sources could raise £4 to £6 billion for measures to support meeting the 2010 target. Meeting the target will also mean exceeding the UK's commitment under the Kyoto Protocol and generating a surplus of emissions allowances (Assigned Amount Units). If the Government trades these surplus allowances with other governments to help them meet their Kyoto obligations, then the revenue raised should also be earmarked for climate change mitigation.

1. Introduction

"We remain committed to achieving a 20 per cent reduction in carbon dioxide emissions on 1990 levels by 2010, and our review of progress this summer will show us how to get back on track."

Labour Party manifesto 2005

Climate change is the most serious long-term environmental threat to human and ecological welfare. As the Labour Party's manifesto for the 2005 general election stated and Tony Blair has consistently argued, it is one of the most pressing challenges that the world faces. A handful of sceptics continue to demur but the overwhelming consensus of expert scientific opinion, led by the Intergovernmental Panel on Climate Change (IPCC), is that the accumulation of greenhouse gases in the atmosphere from human activities is causing global warming and dangerous interference in the climate system on which all life on Earth depends. The principal greenhouse gas is carbon dioxide (CO₂) and the main human activities in question are the combustion of fossil fuels (coal, oil and gas) and deforestation.

The IPCC's third assessment report published in 2001 suggested that the average global surface temperature could rise by between 1.4°C and 5.8°C during the 21st century, with potentially severe consequences of extreme weather and rising sea level for people and the planet (IPCC 2001). The average global surface temperature has already risen by about 0.8°C since pre-industrial times and some further warming is inevitable due to the inertia in the global climate and energy system.

No amount of global warming is safe. Heat waves, droughts, floods and storms are already happening around the world with greater frequency and intensity, as predicted. Sea level is rising. The insurance industry is warning of huge and escalating financial costs, let alone the human misery. Many of the worst impacts fall on the poorest people in the least developed countries (Simms et al. 2004) but no country is immune. For example, the heat wave across Europe in summer 2003 is estimated to have caused about 30,000 premature deaths. It has been linked to global warming with greater than 90 per cent probability (Stott et al. 2004).

Since the IPCC's third assessment report, the accumulation of new evidence suggests that the threat of climate change is even worse than previously thought. That was the conclusion of the international symposium on avoiding dangerous climate change held in Exeter earlier this year as one of the UK's G8 presidency events (Met Office 2005).

There is a growing consensus that to prevent the worst impacts of climate change, average global surface temperature rise should be limited to no more than 2°C above the pre-industrial level. This is long standing European Union (EU) policy and also the recommendation of the International Climate Change Taskforce (ICCT) co-founded by ippr with the Center for American Progress and The Australia Institute (ICCT 2005).

Above 2°C the climate impacts are likely to increase substantially (Retallack 2005), putting billions of people at greater risk of water scarcity, hundreds of millions at more risk of diseases like malaria and causing significant agricultural losses from major food exporting countries. Beyond this threshold, there could be disastrous consequences for biodiversity, including near extinction of coral reefs and irreversible decline of the Amazon rain forest.

The risk of abrupt or runaway climate change also increases above 2°C, with increased likelihood, for example, that forests and soils become a net source rather than a sink for CO₂, or that permafrost melts on a large scale releasing vast quantities of methane (a more powerful greenhouse gas than CO₂), or that the West Antarctic Ice Sheet collapses and the Greenland ice sheet melts irreversibly, ultimately causing the sea level to rise by many metres. Other risks include the shutting down of the Gulf Stream, perversely causing a mini ice age in northern Europe, and the release of huge quantities of methane from the sea bed due to ocean warming. These risks are not science fiction but the subject of serious scientific debate (Met Office 2005).

Limiting average global surface temperature rise to no more than 2°C above the pre-industrial level is likely to be extremely challenging. The exact relationship between atmospheric greenhouse gas

concentrations and temperature changes is uncertain but analysis commissioned by ippr suggests that to have a high probability of limiting global average surface temperature increase to 2°C requires stabilising greenhouse gas concentrations at the equivalent of no more than about 400 parts per million by volume (ppmv) CO₂ (Retallack 2005).

It is therefore alarming that this concentration has already been exceeded. CO₂ alone is at about 380 ppmv and currently rising by as much as 2 ppmv per year. Adding the other greenhouse gases, for example methane, the total is already well above the equivalent of 400 ppmv CO₂. This is currently masked by the counteracting effect of fine particulate emissions (aerosols), which have a cooling effect, for example sulphates from the combustion of fossil fuels. As particulate emissions from power stations, vehicles and other industrial activities are cleaned up to improve public health, it is likely that temperature increase will accelerate, if CO₂ emissions continue unabated.

The need to reduce net global greenhouse gas emissions is urgent. This year has seen important advances at international level, with the coming into force of the Kyoto Protocol and the advent of the EU Emissions Trading Scheme. The UK has played an important role in these and other initiatives and has a record of international leadership on climate change. Tony Blair is right to have made climate change a key issue for the UK's presidencies of the G8 group of countries and the EU in 2005.

Credibility abroad also requires action at home. The UK is one of only a few countries on course to meet and exceed its commitments under the Kyoto Protocol, to reduce its greenhouse gas emissions by 12½ per cent from the 1990 level by 2008-12 under the EU's burden sharing agreement. It has also set a more ambitious domestic target to cut CO₂ emissions by 20 per cent from the 1990 level by 2010 and a long-term goal to reduce CO₂ emissions by about 60 per cent by around 2050, with significant progress by 2020 (DTI 2003).

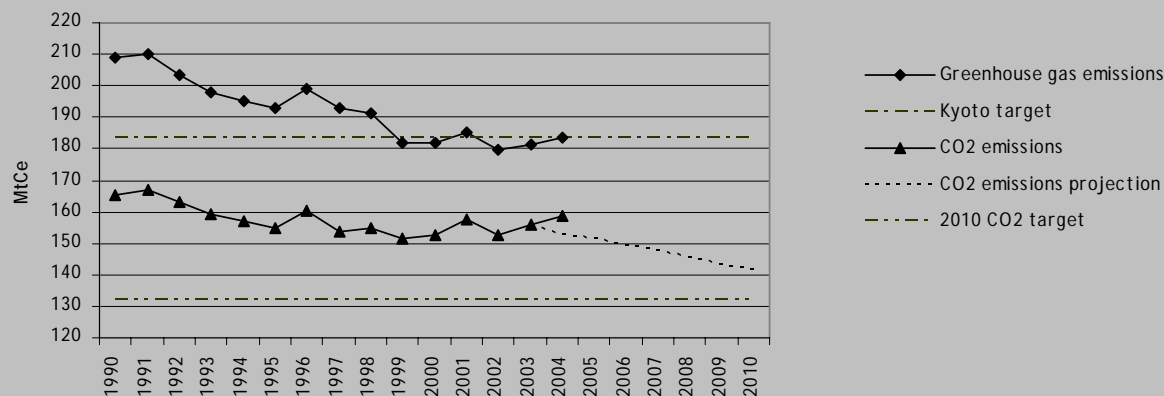
ippr's assessment is that even these long term targets are unlikely to be enough. For the UK to take its fair share of responsibility in global action on climate change, with a high probability of keeping within the 2°C threshold, it is likely to need to cut CO₂ emissions by nearer to 90 per cent by 2050 (Retallack 2005). We recommend an intermediate target of a 40 per cent cut in emissions by 2020 (*ibid.*). Emissions from international aviation and shipping should also be included, which are currently excluded from Kyoto and domestic targets. Therefore, meeting the 2010 target is not an optional extra but an essential step towards the deeper and broader emission cuts that will be needed in the decades ahead. Yet the UK is not on course to meet its 2010 target. The most recent official forecast published in November 2004 suggested that a reduction in CO₂ emissions of about 14 per cent on 1990 levels would be achieved by 2010 (DTI 2004, see figure 1). Emissions increased in 2004, for the second year running, and were just 4 per cent below 1990 levels (DTI 2005a). New action is required.

Some would argue that the UK should do no more than meet its legal obligations under the Kyoto Protocol and wait until there is international agreement to go further. After all, the UK is responsible for only about two per cent of global greenhouse gas emissions and cannot solve climate change on its own. We disagree with this line of argument. The UK has an important global leadership role on climate change that can only be fulfilled if we lead by example. It would set a terrible signal if the UK Government says one thing and does another.

Nothing would please the opponents of action on climate change more than if the UK Government, in the run up to the Montreal conference on climate change at the end of 2005, admitted defeat on its manifesto commitment to cut CO₂ emissions. It would weaken the hand of UK ministers who will negotiate on behalf of the EU at the conference, which is the first meeting of the parties to the Kyoto Protocol since it came into force and will start discussions about commitments beyond 2012.

Moreover, it is in the UK's long term economic interests to get ahead of the game. Future jobs and prosperity will be created in industries using low carbon technologies not the polluting technologies of the past. It is the countries whose governments fail to plan ahead that will lose out economically when they are subsequently obliged to act more abruptly to cut their emissions. For business to have the confidence to invest in new technology there is need for stable long-term policy frameworks (see text box overleaf). It would undermine that stability to chop and change with the 2010 target.

Figure1: Actual and projected UK greenhouse gas emissions



Source: DTI 2004 and 2005

ippr strongly endorses the Government's manifesto commitment to get back on track (reproduced at the head of this introduction). The review of the UK Climate Change Programme currently underway (HMG 2004) and now due to be completed by the end of 2005, is necessary and welcome. ippr made a substantial contribution to this review in an earlier report by Bridget Woodman and Catherine Mitchell. *The burning question: is the UK on course for a low carbon economy?* analysed the strengths and weaknesses of UK energy and climate change policy (Woodman and Mitchell 2004). It recommended a range of reforms to the energy system and new policy measures in broad terms.

The purpose of this report is more limited and should be read as a supplement to *The burning question*. It aims to show in quantitative terms that meeting the UK's 2010 target is well within our means and can be done in a way that helps to secure long term prosperity and build a fairer society. It argues that it is in the UK's interests to meet the 2010 target, laying the foundations for a low carbon economy.

The need for business certainty

Under the auspices of the Prince of Wales's Business and the Environment Programme, the heads of 13 major UK companies wrote to Tony Blair in May 2005:

"Our companies and many others have already made significant investments in low-carbon technologies, processes and products. But what we have done so far is not nearly sufficient given the size of the challenge facing us. We need to create a step-change in the development of low-carbon goods and services by rapidly scaling up our existing investments and starting to invest in new technologies.

"To achieve this we need a strong policy framework that creates long-term value for carbon emissions reductions and consistently supports and incentivises the development of new technologies. Without such policies, our companies are not able to justify to our boards or investors the necessary high up-front investment in low-carbon R&D, technologies and processes." (HRH The Prince of Wales's Business and the Environment Programme 2005)

These leaders of industry included the heads of HSBC, Johnson Matthey, F&C Asset Management, BAA, BP, AWG, Standard Chartered Bank, John Lewis Partnership, Cisco Systems, Scottish Power, ABN Amro, Shell and Sun Microsystems.

Similarly in July, through the UK Business Council for Sustainable Energy, leaders in the UK energy sector, including the chief executives of United Utilities, Scottish and Southern Energy, Scottish Power, British Gas, RWE npower, E.ON UK, EDF Energy and National Grid Company, wrote to the environment secretary Margaret Beckett MP in these terms:

"The Government's Climate Change Programme must set the foundations for a truly ambitious and practical framework for every sector, which sets the long-term direction across the economy towards a low carbon future. Such a framework is vital in order to provide certainty as to the scale of policy measures over the next four decades. A clear pathway to the 2050 emissions reduction target would enable a sustained shift across the economy that would enable the market to react accordingly." (BCSE UK 2005)

2. Summary of proposed new measures

A summary of proposed measures is set out in table 1. The estimated CO₂ emission savings in 2010 are expressed in millions of tonnes of carbon equivalent (MtCe²). We have aimed to avoid double counting. Hence, for example, new building regulations on their own could achieve larger emission savings than the amounts specified in the table. However, some of the emissions savings would be due to reduced electricity consumption and therefore included in the savings attributed to the EU Emissions Trading Scheme.

If the most recent emission projections are correct, then additional emission savings of about 10MtCe must be achieved to meet the 2010 target (DTI 2004). For the purposes of this report, they are the best publicly available. Hence we have sought to identify measures that would achieve about 10MtCe savings in total from industry, households and transport. However, the November 2004 emission projections did not anticipate the increase in CO₂ emissions in 2004 (see figure 1) and it is widely believed they underestimate the scale of the challenge. If the emissions projections are significantly wide of the mark, and they are currently being revised, then the measures would need to be adjusted accordingly. We return to this issue in the concluding section.

The measures set out in table 1 are in addition to those accounted for in the November 2004 emissions projections. In some cases, they are new, such as a Renewable Transport Fuel Obligation. In other cases they are building on existing measures, such as the Energy Efficiency Commitment. We have used published estimates of emission savings where possible and made our own estimates in other cases. We have sought to make the figures credible, though we do not have the analytical resources of Government. The proposals are neither exclusive nor exhaustive but designed to show that the Government's manifesto commitment to meet the 2010 target can and should be delivered. In the next sections, the proposals are described in more detail and the economic implications are discussed.

Table 1: Proposed new and enhanced measures for the UK Climate Change Programme³

| Measure | Estimated annual CO ₂ emission saving by 2010 (MtCe) |
|---|---|
| EU Emissions Trading Scheme phases I and II | 5.0 |
| Climate Change Levy (reformed and increased) | 0.9 |
| Climate Change Agreements (enhanced and extended) | 0.3 |
| New Building Regulations (households) | 0.6 |
| New Building Regulations (commercial buildings) | 0.1 |
| Energy Efficiency Commitment phase III (additional to current plans) | 0.4 |
| Community Energy (extended, reformed and enhanced) | 0.4 |
| Renewable Transport Fuel Obligation | 0.9 |
| Vehicle Excise Duty (increase differentials between bands + compulsory labelling) | 0.6 |
| Company Car Tax (extend bands and ratchet up emissions standards) | 0.2 |
| Smarter Travel Choices programme | 0.6 |
| Total | 10.0 |

² To convert to MtCe to MtCO₂, multiply by 44 and divide by 12, the respective atomic masses of CO₂ and carbon

³ Additional to measures included in the DTI updated emissions projections, November 2004

3. Power generation, industry and commerce

3.1 EU Emissions Trading Scheme

“The total quantity of allowances in Phase II should be consistent with the trading sector’s contribution to achieving the national climate change goal, that is reducing carbon dioxide emissions by 20% below 1990 levels by 2010.”

DEFRA et al. (2005a) UK Government approach to EU ETS Phase II, paragraph 21

Emissions savings under the EU Emissions Trading Scheme (ETS) are not a matter of conjecture but of choice. Governments decide the amount of emissions allowances allocated or ‘cap’ set. The scheme covers CO₂ emissions from power stations and energy-intensive industries such as cement, paper, steel, glass and oil refining, throughout the EU. The first phase of the scheme runs from 2005-7 (phase I) and the second from 2008-12 (phase II), coinciding with the first commitment period of the Kyoto Protocol. Subsequent phases will also have five year periods.

Under the scheme, each member state devises a National Allocation Plan (NAP) for each phase. The NAPs specify the total permitted emissions for the phase and how allowances are to be allocated to the installations included in the scheme. In phase I, governments have the discretion to auction up to five per cent of their allowances but the other 95 per cent must be allocated free of charge. Up to ten per cent can be auctioned in phase II.

Installations, such as factories or power stations, are allocated a quota of allowances. Each allowance permits the installation to emit one tonne of carbon dioxide (tCO₂). Allowances can be traded between installations (and intermediaries) across the EU. If an installation produces more emissions than its quota it must purchase additional allowances. Installations emitting less than their quota can sell their surplus allowances. The penalty for producing more emissions than allowances is €40 per allowance in the first phase and €100 per allowance in the second phase. The excess emissions must also be covered by allowances surrendered by the installation in the next phase so that the environmental integrity of the scheme is not compromised.

In phase II, allowances must be backed by equivalent greenhouse gas emission allowances under the Kyoto Protocol (Assigned Amount Units). It will be also possible for emissions credits to be acquired through Kyoto’s Clean Development Mechanism (CDM) and Joint Implementation (JI) whereby investments in emissions saving projects abroad, in developing countries and industrialised countries respectively, earn ‘emission reduction units’ equivalent to allowances.

The EU ETS is a sure way of capping and reducing total emissions from the installations covered by the scheme across the EU, or achieving equivalent emissions savings through the flexible mechanisms (CDM and JI). It is the single most important policy instrument in the EU and UK climate change programmes, covering around half the CO₂ emissions from the EU and UK (excluding international aviation and shipping). Trading of allowances should ensure that emissions savings are made in the most cost-effective way. Installations will either limit their emissions and sell surplus allowances or buy extra allowances, whichever is the most profitable or costs least.

The UK’s draft NAP for phase I published in April 2004 proposed a total allocation of 736 million allowances over the three years (DEFRA et al. 2004a). It was then estimated that this would deliver emissions reduction of 1.5MtCe per year by 2010 (*ibid.* paragraph 1.11). Revisions to the draft NAP were published in November 2004 increasing the total allocation to 756 million allowances on the basis of revised emissions projections (DEFRA et al. 2004b). This would achieve no reduction in emissions by 2010, in fact a small increase, though a saving of 5.2 per cent on projected emissions was claimed.

However, the European Commission insisted that the original total in the draft UK NAP should not be exceeded. The Government then decided to issue allowances on the basis of a provisional total of 736 million to enable the scheme to get underway but started legal proceedings against the Commission (DEFRA and DTI 2005). It also decided that if the UK must stick to the original total, then the

distribution of allowances to energy-intensive industry installations will be according to the revised plan, while the allowances given to the electricity generation sector will be reduced by 20 million from the original plan (DEFRA 2005a).

Though the Government's frustration on procedural grounds is understandable, we think it is a mistake to have entered legal proceedings. Winning the case would be a Pyrrhic victory, making the 2010 target manifesto commitment harder to achieve and damaging the Government's good reputation on climate change. It would be wrong to allocate an extra 20 million allowances to the electricity generation sector, which is set to profit from the EU ETS through the value of emission allowances they are allocated with charge (Carbon Trust 2004). Instead, the Government should drop the legal proceedings, take advantage of the emissions savings and focus on planning for phase II.

As the quotation at the start of this section exemplifies, the Government has stated time and again that the total quantity of allowances in phase II should be consistent with meeting the 2010 target (see also DEFRA et al. 2004a paragraph 1.16, DEFRA et al. 2004b paragraph 3.10 and DEFRA et al. 2005b subsection 2.3.1). A reasonable interpretation is that industries under the EU ETS, the trading sector, should make at least a proportionate contribution to the emissions savings required to meet the 2010 target and arguably more than this since it is likely to be one of the most cost effective ways of reducing emissions.

Since the trading sector covers around half the UK's CO₂ emissions, on the basis of the November 2004 emission projections, we propose that together phases I and II should achieve annual emissions savings of at least 5MtCe by 2010, shared between the electricity generating and energy intensive industry sectors. This excludes any new industry sectors that may be added to the scheme in phase II.

A different way of preparing the NAP in phase II is needed. Instead of basing the total allocation on savings from projected emissions it should be based on what is needed to meet the emission target for 2010, a top-down approach. This has two major advantages. The first is that it ensures that the ETS makes its proper contribution to meeting the target. The second is that it prevents gaming whereby industries claim that their future emissions will be higher than necessary in order to claim more free emission allowances. In fact, it is problematic that emissions projections are carried out by the Department for Trade and Industry which is subject to misinformation and pressure from its industry clients seeking a favourable deal. In future the emissions projections should be carried out by an independent body, such as National Statistics.

According to the draft phase I NAP, installations covered by the EU ETS were responsible for around 46 per cent of UK CO₂ emissions in 2002 and were then projected to account for a similar proportion in 2010 (DEFRA et al. 2004a, paragraph 1.19). The UK's target is to reduce CO₂ emissions to 132MtCe in 2010. Hence, we propose the average total annual allocation in the UK's phase II NAP (2008 to 2012) should be no more than 46 per cent of 132MtCe, which is about 60.7MtCe or 222.6MtCO₂ (9.2 per cent lower than in phase I). Hence the total five year cap should be no more than about 1,113.2 million allowances. If the emissions projections are optimistic, the cap may need to be less than this to compensate for growth in emissions from other sectors.

The distribution of allowances within the total could then be guided by emissions projections for different industries and benchmark standards for different types of installations, for example power stations or manufacturing plants. This would provide a spur to efficiency, rewarding low emission installations relative to high emission installations in the same category.

The Government is right to propose an increasing role for auctioning allowances under the EU ETS (DEFRA et al. 2005b). Firms are receiving allowances free of charge that are not free to society. The social costs of the climate change impacts of emissions have been estimated by the Government to be about £70/tCe and rising (DEFRA 2002). Using this figure, the total UK allocation in phase II could be worth more than £20 billion. On the polluter pays principle, the Government should use its full discretion to auction ten per cent of allowances in phase II. The revenue should be ear marked for climate change mitigation initiatives, discussed further in section 6.

A key political issue for the Government is the impact of this approach on the UK's economic competitiveness. The CBI may protest, as it has before, that the Government is "risking the sacrifice of UK jobs on the altar of green credentials" (CBI 2004). But the competitiveness impacts even on the most polluting industries are exaggerated. Analysis by the Carbon Trust suggested that only the aluminium industry in the EU may be significantly disadvantaged by the introduction of the EU ETS, while other sectors such as electricity, cement and paper may become more profitable (Carbon Trust 2004).

Even if ten per cent of allowances are auctioned, industries will continue to receive the great majority of the emission allowances they need free of charge. With the illustrative cap we propose, the overall rate of reduction in allowances between phases I and II would be a manageable 2.3 per cent per year, assuming a linear path. Growth and employment opportunities will be created for manufacturers and operators of low emission technologies, the industries of the future.

A valid concern is that there should be a reasonably level playing field across the EU, which requires that other countries' NAPs should also deliver real emission reductions in phase II. This also affects the degree to which UK installations use emissions trading. If the trading price is low and the UK has a relatively tight NAP, then the UK could be a net importer of allowances, which would not help to meet the domestic target.

It is a requirement of the Directive governing the EU ETS that the NAPs in phase II should be consistent with countries achieving their emission reduction targets according to the EU member states' burden sharing agreement under the Kyoto Protocol. The UK has met its Kyoto commitment and is on course to exceed it. For most other member states this is not the case (European Environment Agency 2005).

Consistent with the joint statement by Margaret Beckett and Digby Jones in advance of phase I (DEFRA 2004a), the CBI should join with Government to press the European Commission to ensure that all member states' NAPs in phase II are at least consistent with meeting their Kyoto commitments.

3.2 Renewables Obligation

The EU ETS is the overarching policy framework for driving down CO₂ emissions from the sectors covered by the scheme but does not stand on its own. It needs to be buttressed by other measures that promote renewable energy and energy efficiency. An important complementary measure is the Renewables Obligation (RO), which requires electricity suppliers in Britain to supply an increasing proportion of electricity from renewable sources, rising to 10.4 per cent in 2010 and 15.4 per cent in 2010 (excluding existing large-scale hydro power). The RO is the principal instrument for delivering the Government's target of 10 per cent renewable electricity by 2010 and aspiration for 20 per cent by 2020.

Under the RO, electricity suppliers earn Renewables Obligation Certificates (ROCs) and surrender certificates each year to show that they have supplied a sufficient proportion of renewable electricity or pay a buy out price of £30/mWh for the shortfall. ROCs can be traded and hence an alternative way of making up a shortfall is to buy surplus certificates from other suppliers. At the end of each year, the buy out fund is shared between suppliers in proportion to the ROCs they have surrendered. This rewards those suppliers that meet (or exceed) their targets at the expense of those that fall short.

Views differ as to whether the 2010 renewable electricity target can be met on current policies. A report by the National Audit Office suggested that the target could be achieved, based on updated analysis by Cambridge Econometrics (NAO 2005). Others have suggested the target will be missed without additional measures (Mitchell and Woodman 2004). Barriers to progress include planning permission for wind farms and cost for emerging technologies such as wave and tidal power.

The RO is currently under review, due to be completed in 2006 (DTI 2005b). It is a technology-neutral market mechanism that favours the most developed and least cost technologies, currently onshore

wind, landfill gas and biomass co-firing. There is a case for extra support to emerging technologies like off-shore wind, wave and tidal power, through, for example, 'feed-in tariffs' (Mitchell and Woodman 2004), as well as increased capital grants. Feed-in tariffs are a revenue subsidy, reducing the price paid by suppliers for the electricity they buy from generators.

A possible source of funding for increased support is the windfall that the Government will receive from the value of ROCs earned by Non-Fossil Fuel Obligation (NFFO) projects, the forerunner to the RO. The size of this windfall has been estimated in the range of £550 million to £1 billion up to 2010 (NAO 2005). At present, only £60 million of this has been ear-marked for renewable energy under the Sustainable Energy Act 2003. We propose that all the proceeds should be ear-marked for renewable energy and energy efficiency, including anti-fuel poverty programmes. This is further discussed in section 6.

3.3 Climate Change Levy and Agreements

Important measures to promote business energy efficiency in the UK include the Climate Change Levy (CCL) and associated Climate Change Agreements (CCAs). The CCL is an energy tax applied at different rates to gas, coal, liquefied petroleum gas (LPG) and electricity used by industry (table 2). The levy does not apply to households or transport. Renewable electricity and good quality combined heat and power (CHP) schemes are exempt.

Table 2: Rates of Climate Change Levy

| Fuel | Rate per mWh | Rate per tCe |
|-------------|--------------|------------------|
| Coal | £1.50 | £16 |
| Gas | £1.50 | £30 |
| LPG | £0.70 | £22 |
| Electricity | £4.30 | £31 ⁴ |

Source: Pearce (2005)

Energy intensive industry sectors – initially defined as those registered under the EU Integrated Pollution and Prevention Control (IPPC) Directive – are eligible to negotiate legally binding CCAs with the Government, whereby they agree to achieve emission reduction targets in return for an 80 per cent discount on the CCL. CCAs are ongoing with 42 sectors, such as aluminium, vehicle manufacture and paper, including 22 sectors also covered by the EU ETS. The majority of these have been granted an exemption during phase I, but must be included in phase II.

The CCL has come under fire for not being a true carbon tax and for excluding the domestic sector (Pearce 2005). On the basis of CO₂ emissions, the CCL rate for gas is higher than for LPG and nearly double that for coal (see table 2). It does not provide an incentive to switch to lower carbon fossil fuels, which is part of the reason that coal use increased after its introduction.

The introduction of CCL in 2001 was an environmental tax reform, designed to cut energy use and emissions rather than raise money. A small proportion of the revenue was earmarked for the business energy efficiency programmes run by the Carbon Trust, but most of the revenue was used to fund a 0.3 per cent cut in the rate of employers' National Insurance Contribution (NIC). In fact, industry got a tax cut overall: CCL currently yields about £0.8bn compared to the loss of about £1.6bn in NIC revenues, per year (Cambridge Econometrics 2005).

There is a strong case for restructuring and increasing the rates of CCL, which have not been changed since the levy was introduced, and therefore the rates have fallen in real terms (Mitchell and Woodman 2004). The first step is that the rates for coal and LPG should be increased to match the rate for gas on the basis of CO₂ emissions. This would provide an incentive to switch to lower carbon fuels.

⁴ Based on prevailing fuel mix for non-renewable electricity generation in 1999

In the case of electricity, the rate should vary according to the fuel mix of the supplier, based on CO₂ emissions. This would favour investment in new cleaner coal technologies that produce more electricity per tonne of coal burned, as well as renewable electricity and efficient gas powered stations.

The second step is that the rates should be further increased towards the estimated social costs of emissions at £70/tCe (DEFRA 2002). This would be consistent with the polluter pays principle. Together, these reforms would be likely to at least double the revenue from CCL. The extra revenue should be earmarked for publicly funded climate mitigation measures, including business energy efficiency programmes, discussed in section 6.

We do not recommend extending the CCL to the domestic sector at this stage. Analysis by the Policy Studies Institute suggests that a domestic energy tax would be likely to exacerbate fuel poverty, even with full recycling of the revenue to increase welfare benefits (Ekins and Dresner 2004). Alternative measures to reduce household emissions and tackle fuel poverty are discussed in section 4.

There is no double charging involved in our proposals for CCL for installations that are also included in the EU ETS. Even with auctioning of ten per cent of allowances, these installations would get the vast majority of their emission allowances free of charge. The CCL is a modest charge in comparison to the value of these free allowances. Moreover, those sectors that are part of Climate Change Agreements also receive an 80 per cent discount on CCL.

Cambridge Econometrics (2005) have modelled the initial effects of the CCL for HM Customs and Excise and estimated that it will reduce emissions by about 3.7MtCe per year by 2010, assuming that rates are increased from 2005 in line with price inflation (which has not happened in 2005). Sectors that are not directly covered by the EU ETS contribute most of the emissions reductions, for example 1.8MtCe per year from the public sector and commerce (*ibid.*). We postulate that the announcement and price effect of reforming and increasing the rates of CCL as we propose could double the emissions saving. Avoiding double counting those sectors covered by the EU ETS and the electricity used by sectors not under the EU ETS, a conservative estimate of the emissions savings on top of those covered by the EU ETS is about 0.9MtCe per year.

Most sectors covered by CCAs met or exceeded their interim emission targets for 2004 (Future Energy Solutions 2005). However, emissions from these sectors increased between 2002 and 2004 (*ibid.*) and the targets have been criticised as weak, requiring little or no more action than business as usual (Pearce 2005). The existing CCAs are currently under review and DEFRA also hopes to extend CCAs to new sectors. At the time of writing negotiations are apparently complete in relation to the 22 sectors also covered by the EU ETS, and nearing completion with the other sectors (ENDS 2005). Significant emissions reductions should be achieved, though falling short of DEFRA's original aim of an extra 0.9MtCe per year in 2010. We have attributed an extra 0.3MtCe per year in 2010 to enhanced and new CCAs, taking a cautious approach and aiming to avoid double counting emissions reductions under the EU ETS.

4. Homes and other buildings

Buildings are responsible for about half of the UK's carbon dioxide emissions (excluding international transport), around 30 per cent from households and 20 per cent from other buildings (ODPM 2004). CO₂ emissions derive from energy consumed for space heating, provision of hot water, air conditioning, lighting and cooking. Some of these utilize fuels directly, primarily gas, and others use electricity. The housing stock of Great Britain is expected to increase by around 7.6 per cent from 2002 to 2011 based on growing population and a trend of decreasing household size (DEFRA 2004b). With this in mind the improved energy efficiency of the existing stock and in new construction is fundamental in limiting CO₂ emissions.

Given the key role that buildings and the built environment have in limiting CO₂ emissions, it is extraordinary that the Office of the Deputy Prime Minister (ODPM) does not share with the Department of Environment, Food and Rural Affairs (DEFRA), Department for Transport (DfT) and Department for Trade and Industry (DTI) responsibility for their joint Public Service Agreement (PSA) target to: "Reduce greenhouse gas emissions to 12.5 per cent below 1990 levels in line with our Kyoto commitment and move towards a 20 per cent reduction in carbon dioxide emissions below 1990 levels by 2010, through measures including energy efficiency and renewables." This should be rectified as one of the outcomes of the review of the UK Climate Change Programme.

4.1 Building regulations

Standards of insulation and energy efficiency in new buildings and major renovations are set under Part L of the building regulations, consequently helping to limit CO₂ emissions. Energy efficiency remains the principle means to reduce the energy requirements of buildings, both in the building fabric and through the installation of products used within buildings. Developers and contractors must ensure new and retro-fitted construction work meets the required standards in both domestic and commercial buildings.

The building regulations were last updated in 2002 cutting energy demand for space heating in new buildings by 50 per cent from the 1990 standard (DTI 2003). The 2005 amendments should be implemented in January 2006 with energy efficiency expected to be on average 20 per cent higher than the 2002 regulations (ODPM 2005). Successive reviews are planned every 5 years from 2010.

The Government projects 1.4MtCe will be saved in 2010 by the 2005 building regulation revisions (DEFRA 2004c). Of this, 0.8MtCe is attributable to the domestic sector improvements and 0.6MtCe to business and public sector improvements. 0.4MtCe of the 0.6MtCe business and public sector savings was accrued from the 2002 revisions and therefore will not be additional to that included in the 2004 emission projections (ODPM 2004). As a result, about 1.0MtCe would be additional to the current regulations.

It is disappointing that the energy efficiency standards in the 2006 building regulations have been watered down to a 20 per cent improvement on the 2002 regulations instead of the 25 per cent improvement in the draft proposals. Energy efficiency improvements in significant alterations to buildings, such as extensions, will not now be realised. With almost 300,000 planning permissions granted each year an opportunity has been lost. As a result the energy efficiency standards fall yet even further behind the best standards in Europe (House of Lords 2005). Despite the missed opportunities the claimed emissions savings remain similar to those assigned in the 2004 consultation (ODPM 2004).

Whilst some of the improved standards relate to efficiency improvements that cut the consumption of fuel directly i.e. gas and oil, others correspond to reducing the amount of electricity used. Reductions in the use of electricity are already covered by the cap under the EU ETS. Hence only emissions savings that can be assigned to reducing direct fuel consumption can be attributed as additional in our package of proposals (summarised in table 1).

Without complex calculations using the finalised building regulations the carbon savings resulting from regulation changes by fuel type cannot be accurately estimated. We have assumed that emissions savings occur roughly in proportion to energy consumption for different purposes.

In 2001 62 per cent of energy consumption in households was attributed to space heating, 22 per cent to water heating, 13 per cent to lighting and appliances and 3 per cent to cooking (BRE 2003). Comparable figures are not available for commercial buildings. It is believed lighting and appliance consumption represents a larger, but not dominant, component of total energy consumption than in domestic buildings (House of Lords 2005). The non-electrical contribution that consists of the majority of space heating and hot water requirements has been assumed to be approximately 80 and 50 per cent of domestic and commercial buildings energy requirements respectively. It must be emphasised that this is a crude estimate due to the absence of knowing exactly which regulation and thus fuel source the CO₂ savings will be derived from.

Taking 80 per cent of the domestic sector's 0.8MtCe saving, and 50 per cent of the commercial sector's 0.2MtCe, to avoid double counting emissions regulated under the EU ETS, results in the estimated emissions savings of 0.6MtCe and 0.1MtCe attributed to new household and commercial building regulations respectively in 2010 in our proposals (table 1).

Recent research suggests a lack of enforcement in meeting standards under Part L of the regulations. On average, 32 per cent of dwellings surveyed failed to meet their air permeability target that indicates the thermal efficiency of the building despite simple and well known solutions (BRE 2004). Hence it is essential that compliance to these regulations is tightly enforced to ensure that the emissions savings are achieved. This requires resources for inspection and ensuring that remedial actions are taken.

While the building regulations require minimum standards, the 'Code for Sustainable Buildings' is a voluntary agreement that aims to promote higher standards in relation to environmental sustainability, including CO₂ emissions. The code is currently being drafted and is due to be implemented alongside the new building regulations in 2006. All new residential developments receiving Government funding will have to meet the code. The vast majority of house building in the UK is carried out by private developers and voluntary compliance is likely to be limited not least due to the extra costs involved.

Details of the code have yet to be published. The Building Research Establishment's EcoHomes and the Energy Saving Trust's Energy Efficiency Best Practice Standard provide some benchmark standards and it is hoped the code will set similar standards (House of Lords 2005). In light of the new building regulations the EST's new Best Practice standard would set a maximum increment of 25 per cent lower carbon emissions. It is unknown the exact numbers of buildings that will adopt the higher standards, but provisional estimates suggest between 80,000 and 140,000 homes will fall under the obligation, equating to around 0.04 to 0.07MtCe emissions per year.

EST's Best Practice standards would add some £5,000 to the typical £75,000 cost of constructing a new home. As a consequence fiscal incentives are likely to be required to encourage private developers to adopt the code, such as stamp duty rebates for first buyers (EST 2005). In addition, the European Directive on the Performance of Buildings (EPBD) requires all new buildings, those changing hands or being let to have an energy performance certificate displayed by 2007. Measures in effect under the EPBD hope to influence the purchase of more energy efficient buildings, but in isolation they are unlikely to secure significant additional emissions savings. Nonetheless, adoption of the EPBD is a welcome step to creating more demand for an energy efficient property market.

4.2 Energy Efficiency Commitment

One of the most successful and central components to the Government's Plan for Action (DEFRA 2004b) to reduce energy consumption in existing houses is the Energy Efficiency Commitment (EEC). EEC places an obligation on energy suppliers with more than 15,000 customers to cut energy consumption in households. Suppliers encourage customers to install energy efficient measures, such

as insulation or energy efficient appliances and lighting to meet energy reduction targets. Failure to comply can incur a fine of up to 10 per cent of a supplier's turnover. The cost of EEC is passed on to all customers via energy bills.

Of the assigned target, 50 per cent must be delivered to households receiving certain incoming related benefits or tax credits, the "priority group", thereby improving equity and helping to alleviate fuel poverty. These measures can be promoted and delivered with a range of project partners – charities, retailers and manufacturers and suppliers are not restricted in the way that savings are achieved.

Phase I concluded its three years in 2005, delivered the equivalent of about a 0.4MtCe emissions saving per year and exceeded its 62 TWh reduction target (Ofgem 2005a). Between 2002 and 2005 around 10 million households benefited, saving customers a total of around £350 million per year on their energy bills (Ofgem 2005b). The 35 per cent excess has been carried over to phase II contributing to the elevated 130 TWh target (0.7MtCe) running from 2005 to 2008 (DEFRA 2004c). Phase III will take effect from 2008 to 2011 and has been provisionally assigned a target at least equal to phase II. It is the only phase for which targets currently remain open to revision.

Suppliers adopt the most cost effective means of providing energy efficiency savings to households. This is primarily delivered by insulation (cavity wall and loft insulation), followed by lighting and lastly through providing efficient appliances and heating to homes (Ofgem, 2005). All measures are supplied at subsidised rates to all households and free of charge to those in the priority group.

Given the success of EEC I and the Government's commitment to reducing domestic carbon emissions and eliminating fuel poverty by 2016 (DEFRA 2004d) it makes sense to enhance and develop each additional phase. There must be capacity to do so alongside a policy framework that enables the delivery of elevated targets.

There are approximately 11 million homes with unfilled cavity walls (DEFRA 2004b), of which 4.5 million should be filled under the measures outlined in the Energy White Paper by 2010 (DTI 2003). The remaining 6.5 million unfilled cavities represent a further 1.7MtCe per year to be saved (EST 2005).

The issue is not one of running out of potential, but one of creating demand. With relatively low, although increasing, energy prices it is difficult to inspire householders to invest capital in insulation and efficiency measures. Concern over the loss of 'low hanging fruit' and the difficulty of stimulating consumer demand needs to be addressed if a higher EEC III target can be realised. Innovative marketing and approaches lie with the responsibility of suppliers, and though elevated costs that are borne by consumers maybe unpopular, they remain low in relation to the energy savings customers will then benefit from.

British Gas and Braintree District Council have trialled a co-funded Council Tax rebate incentive in Braintree, Essex offering households a one-off £100 rebate on their council tax bill if they took advantage of a £175 insulation package. The offer is not open to those in tenanted properties or those in the priority group. Applications exceeded the number of grants available and the scheme has been successful in stimulating demand. In its current form, the energy savings made through the scheme contribute to the British Gas energy reduction target under EEC. It represents an innovative way of stimulating customer demand for energy efficient measures.

Development of fiscal incentives such as Council Tax rebates are becoming widely advocated (EST 2005; Green Alliance 2005; House of Lords 2005). Whether or not these incentives are entirely Government funded initiatives remains to be decided. It is also possible that such incentives could be provided under the EEC umbrella, using EEC money. However, this could be politically difficult since it would raise energy bills that are already increasing and could exacerbate fuel poverty.

The Energy Savings Trust (2005) found that providing an incentive equating to 75 per cent of the cost of the insulation package could act as a trigger to stimulate consumer action on energy efficiency. Since discounts of about 60 per cent are already offered by suppliers through EEC, EST estimates that

a tax rebate in the region of £90 for homes with unfilled cavity walls and £50 for homes without cavity walls or filled cavity walls would be required to motivate uptake. EST estimate the cost to HM Treasury would be approximately £111 million to 2010 to deliver around 0.29MtCe emissions savings in 2010 (EST 2005).

Whereas Stamp Duty rebates for first buyers of newly built homes could induce property developers to meet the higher energy efficiency standards of the Code for Sustainable Building, Council Tax rebates would incentivise owners to improve the efficiency of their existing property. Hence the two incentives would be complementary. A new home meeting the Code for Sustainable Building Standard would be highly unlikely to qualify for measures delivered through the Energy Efficiency Commitment (EEC).

Financial inducements to encourage households to take up energy saving measures need to be combined with public campaigns to highlight the urgency of the issue of climate change and the need to cut household emissions, while the schemes available to help households cut their emissions and fuel bills need to be much more vigorously marketed.

Energy suppliers are obligated to meet targets but not well incentivised. We recommend the introduction of a market trading mechanism in accredited energy savings. Operating along similar lines to the Renewables Obligation on electricity suppliers, "white certificate" trading would involve the trading of certificates representing accredited energy savings on an open market between energy suppliers and other service providers, such as insulation companies. If a supplier exceeds its obligated energy savings target, it would be able to sell surplus certificates to other suppliers. Underachieving suppliers would be able to purchase certificates to make up the shortfall to reach their target. The introduction of a market mechanism into EEC is gaining increasing support as a means to promote innovation and cost effectiveness in the delivery of energy efficiency (e.g. Green Alliance 2005). White certificate trading could also be extended to novel emissions saving measures such as microgeneration and could also be extended to the commercial sector.

Currently, to avoid a fine, suppliers ensure measures are installed and as a result exercise strong control over the market. This may stifle innovation and prevents third parties entering the market, which would otherwise drive cost-effectiveness and reduce the risk of a capacity shortfall in the insulation industry (House of Lords 2005). Coupled with providing a long term target for energy use reduction, white certificate trading would provide suppliers the investment security and market based incentive to invest in innovative approaches.

Given the remaining potential of insulation measures in the domestic sector, there is no reason why EEC phase III should not be set a savings target of about 195 TWh, equivalent to 1.1MtCe. This would provide an additional 0.4MtCe saving to those outlined in the Government's plan for action (DEFRA 2004b). Consumer demand would need to be stimulated through the use of fiscal incentives, of which Council Tax rebates is probably the most viable. In order to help secure delivery of an elevated target, we recommend reform of EEC into a tradable mechanism to motivate suppliers.

4.3 Warm Front

Providing adequate and affordable heating is a key aim of UK energy policy (DTI 2003). Fuel poverty is defined as when a person needs to spend 10 per cent or more of their income to afford adequate warmth in their home. The Government is committed to, as far as reasonably practical, ending fuel poverty in vulnerable households in England by 2010, and totally eradicate it by 2016 across the UK (DEFRA 2004d). Elderly households and ones with children are considered vulnerable.

Warm Front is the Government's grant based scheme charged with improving energy efficiency in fuel poor households in England. From the scheme's introduction in 2000 to March 2005, around 200,000 households per year have received assistance, costing about £200 million per year. Whole house insulation measures aim to improve houses SAP⁵ rating to 65, with cavity wall insulation being

⁵ Standard Assessment Procedure (0-120): Represents the thermal efficiency of a building.

responsible for the largest proportion of savings. 75 per cent of the theoretical improved thermal efficiency is taken in terms of improved comfort, rather than reduced energy use (DEFRA 2004b). As a result Warm Front contributes a savings reduction of 0.2MtCe to the climate change programme.

The number of households in fuel poverty is affected by energy inefficient dwellings, low incomes, under occupancy and rising energy prices. Measures for tackling fuel poverty focus upon tackling the promotion of social inclusion through income improvement and improving energy efficiency (DEFRA and DTI 2005). As a result the fuel poverty strategy simultaneously contributes towards the Government's social inclusion and CO₂ emission reduction agendas.

In 2003 there were approximately 1.2 million fuel poor households in England of which 1.0 million were considered vulnerable (DEFRA 2004d). Despite the significant drop from around 3 million in 1996, the recent backdrop of rising energy prices highlights the importance of improved energy efficiency in reducing households' vulnerability to fuel poverty (SDC 2005).

For social justice and environmental reasons, the Government has a dual commitment to tackle fuel poverty and meet its target for CO₂ emission reductions. The Government should strengthen its efforts in this area through Warm Front and likewise the equivalent schemes in Scotland, Wales and Northern Ireland should be enhanced. Making firm assessments of the potential to extend Warm Front and the equivalent schemes is problematic due to lack of up to date data (especially in the devolved administrations) and their volatility to changing energy prices. As the numbers of those classified as fuel poor is likely to rise, it is probable that Warm Front spending should be increased. However, we have not been able to estimate the costs or emissions savings that might be achieved.

4.4 Community Energy

Combined Heat and Power (CHP) is highly fuel-efficient technology that puts heat produced as a by-product of the electricity generation process to use. District heating is the provision of heat from a central source to multiple buildings using a variety of possible heat sources, including geothermal and biomass. Community Energy is a funding programme for district heating schemes that utilises CHP technology in capturing heat in power generation and, to a lesser extent, heat derived from biomass and other fuel sources. Approximately 62 per cent of the projects and 74 per cent of the funding has been allocated to CHP schemes.

Community Energy contributes an estimated 0.1MtCe emission savings in the current climate change programme and in doing so helps up to 100,000 people on low incomes (DEFRA 2005b). Between 2002 and 2005 the programme offered up to £2 million of development grant support and £48 million in capital support, whilst aiming to draw in £200 million from other sources to 2005 (DEFRA 2004e). Leveraged funding from third parties failed to meet expectations and totalled £125m. Nonetheless a further £10.6 million of HMT funding was announced in June 2005 enabling the scheme to be extended to around 2007/08 (DEFRA 2005c).

Aiming to provide up to 130MW of good quality, new CHP capacity the Community Energy scheme has so far allocated grant support to about 50MW of CHP capacity (DEFRA 2004b). Mitchell and Woodman (2004) highlight how far this falls short of the cost effective potential of CHP identified by BRE (2003). A total cost effective community heating potential of about 2,289MW, equivalent to a 0.68MtCe emissions saving per year is estimated. Despite the viability of the technology, more needs to be done to encourage the uptake of Community Energy grants.

Biomass district heating has been adopted extensively in Finland, Sweden, Denmark and Austria with great success (EU Commission 2005). In such systems the biomass is fired in a central boiler and then the hot water is distributed to the houses in insulated underground pipes. Extending the remit of the Community Energy scheme to include more biomass district heating projects would further extend the potential of the technology. The Biomass Task Force (2005) recommended streamlined capital grant support for a range of biomass heating applications. They also reinforced the potential of district heating as a green development opportunity that needs to be flagged up to planners and developers.

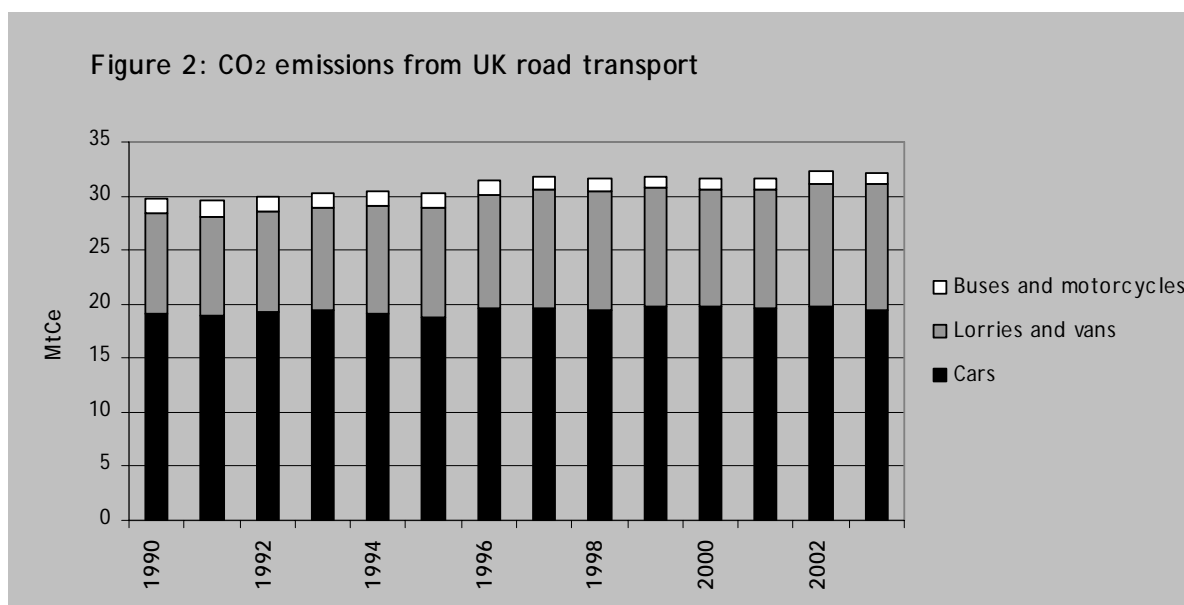
Allowing better access of biomass heat technologies to the community energy grants would both enable the scheme to deliver and offer the financial and marketing support the technology requires.

Microgeneration technologies such as micro-CHP also have much to contribute in future. Hence, enabling microgeneration to be incorporated under the Community Energy scheme would facilitate uptake and provide better support for a mass market by providing access to capital support.

We recommend reforming and extending the Community Energy scheme, allocating an additional £200 million to spending between 2005 and 2010, which we estimate would deliver a further 0.4MtCe emissions savings per year. In doing so, there should be strong focus on the development of biomass heating projects and the inclusion of microgeneration technologies where appropriate. Providing continual support to the CHP biomass heating and microgeneration industries is essential for them to become established and reach their cost effective potentials. The Government needs to show strong support, for what are highly viable and beneficial technologies on route to gaining more widespread use.

5. Transport

Transport accounted for just over one fifth of the UK's domestic CO₂ emissions in 2004, of which 95 per cent was road transport (DTI 2005a). Both the proportion and amount of emissions from transport are increasing. The majority of emissions from road transport are from cars but most of the growth since 1990 is from vans and lorries (see figure 2).



Source: AEA Technology

Emissions from international aviation and shipping are excluded from the domestic target and Kyoto commitments. The UK should arguably take responsibility for half the emissions from journeys to and from the UK (while the other half should be attributed to the countries at the other ends of the journeys). On this basis, the UK was responsible for about 3.4MtCe of CO₂ emissions from international aviation in 2000 adding, adding just over two per cent to total domestic CO₂ emissions that year, and forecast to increase about three fold to between 8.9MtCe and 10.1MtCe by 2030 (HMT and DfT 2003).

The climate change impact of aviation is compounded by other emissions from aircraft at high altitude with the result that the total estimated warming impact is two to four times the effect of CO₂ alone. Hence emissions from international aviation are significant and should be included in future domestic and international targets and commitments, as should emissions from international shipping that are unknown quantity. We support the efforts of the Government to include aviation in future phases of the EU ETS. However, further consideration of aviation and shipping is beyond the scope of this report.

Emissions from transport can be reduced by substituting high carbon fossil fuels, like petrol and diesel, with alternative fuels, like biofuels or by improving the fuel efficiency of vehicles or by reducing journey lengths and/or switching to lower emission or carbon-neutral modes such as public transport, walking and cycling. We propose measures on all of these fronts to promote low-carbon fuels, low-carbon vehicles and low carbon journeys.

5.1 Renewable Transport Fuel Obligation

Renewable transport fuels produced from crops (biofuels) have the potential to make a substantial contribution to reducing CO₂ emissions. Bioethanol is produced from sugar or starch crops such as sugar cane and sugar beet. Biodiesel is produced from oily crops such as oil palm and oil seed rape. Biofuels can also be produced from straw and may in future be produced from wood, such as coppiced trees. Sales of biofuels in the UK are currently running at about 0.25 per cent of total road

fuel sales (DfT 2005). They can be blended with conventional petrol and diesel *and* used in ordinary cars and lorries.

The Government is currently considering the introduction of a Renewable Transport Fuel Obligation (RTFO). The UK Energy Act 2004 made provision for this (TSO 2004). We support the introduction of a well designed RTFO combined with a carbon certification scheme, to ensure real emission savings, and safeguards for biodiversity and for social welfare in developing countries. An RTFO that met the EU Biofuels Directive indicative target of 5.75 per cent of total road fuel sales by energy content in the UK by 2010 (roughly 8 per cent by volume), could save up to 1MtCe emissions per year (EU 2003, DfT 2004). The Department for Transport's estimate is actually 0.76MtCe to 1.06MtCe, assuming emission savings of 40 per cent to 57 per cent compared to conventional fuels (including emissions during production, distribution and use). We have assumed an amount in the middle of this range, 0.9MtCe (see table 1).

An RTFO would operate in a similar manner to the Renewables Obligation for electricity (see section 3.2). Fuel suppliers would earn RTFO certificates (RTFOCs) for the biofuels they sell. At the end of each year they would be required to declare their total fuel sales and surrender their certificates to show whether they had met their obligation to sell a certain proportion of biofuels (e.g. 3 per cent by energy content in 2007 rising to 6 per cent in 2010). Certificates would be tradable, so that suppliers would alternatively be able to buy surplus certificates from other suppliers to make up their quotas. If they were unable to surrender sufficient certificates at the end of the year, they would pay a penalty in proportion to the shortfall. As with the RO, the penalty payments could be redistributed to all suppliers in proportion to the amount of certificates they surrendered. Hence, rather than raising revenue for the Government, suppliers who met or exceeded their obligations would be rewarded by those that fell short.

Different biofuels produced by different methods have very different carbon savings if CO₂ emissions across the entire lifecycle are included. For example, biofuels would produce low carbon savings if virgin rainforests were cleared for fuel crops, fertilisers were extensively used and biofuel processing plants were powered by coal. (Bulk transport has a relatively small impact on CO₂ emissions.) Bioethanol produced from wheat can have savings ranging from 7 to 77% (LowCVP 2004).

A carbon certification scheme is therefore necessary for a sustainable RTFO that would deliver significant CO₂ savings. Designing and implementing an effective scheme will be a difficult undertaking because biofuels are a globally traded commodity. Nevertheless, the RTFO should move towards a CO₂ certification scheme. Avoiding deforestation should be considered for inclusion in the scheme.

Giving over large swathes of land to biofuel production raises significant sustainability and social justice issues, particularly if fuels are imported from developing countries. It is possible that a significant proportion of UK biofuel demand will be met by imports. Firstly, it is unclear as to whether the UK has adequate land resources to meet domestic transport fuel demand. Certainly, the East of England Development Agency estimated that the 5.75 per cent target could be met by around 0.5Mha of sugar and starch crops, and 13 processing plants. The British Association for Biofuels claim Oil Seed Rape production could be raised to 0.6Mha, providing 2 per cent of diesel demand (NSCA et al. 2004). In the longer term, it has been suggested that the UK's entire road transport fuel demand in 2050 could be met by 4Mha of second-generation fuels from woody crops (EST 2002). However, another study using more pessimistic assumptions including lower yields and higher transport demand, suggested that two thirds to three quarters of biofuels would have to be imported (E4Tech 2003).

Secondly, imported biofuels might be more commercially viable than domestically grown crops: their resource costs are lower and CO₂ savings higher. Studies have estimated that bioethanol grown and processed in Brazil costs 16 pence per litre (p/l), bioethanol grown in Brazil and processed in the UK costs 48 p/l and bioethanol grown and processed in the UK costs 37 p/l (DfT 2003a). Also, Brazilian ethanol from sugar cane, produced in processing plants powered by crop wastes, has CO₂ savings of up to 80 per cent.

The possibility of large biofuels imports raises sensitive issues, including threats to biodiversity and negative social consequences such as increased child labour in agricultural work and decreased staple food production. Against this, developing countries could profit from increased agricultural exports (Renewable Energy Partnerships 2005).

Mandatory safeguards protecting against the potential negative consequences of biofuel trade could not be included in an RTFO. Clear, uncontested definitions of these objectives do not exist, and attempts to link World Trade Organisation (WTO) agreements to social issues and labour standards have met significant opposition. However, biodiversity and social issues, at home and abroad, could be addressed through voluntary codes and standards – especially if fuel companies believed such action was necessary to protect their brand reputation.

Beyond the EU's 2010 target, biofuels can contribute to even deeper CO₂ savings. At present, EU technical standards for 'normal' petrol limits biofuel blends up to 5 per cent by volume (which will need to be amended for the 2010 target to be met). However, an ethanol blend of 10 per cent can be used in normal car engines with only slight adjustments (NSCA et al 2004). With adapted car engines, even higher blends are possible. In Sweden, 12,000 Ford Focus Flexible Fuel Vehicles run on any mix of bioethanol and gasoline. E85 fuel (85 per cent bioethanol, 15 per cent gasoline) will be sold in 25 per cent of Swedish petrol stations by 2008 (Ford 2005).

5.2 Graduated Vehicle Excise Duty and company car tax

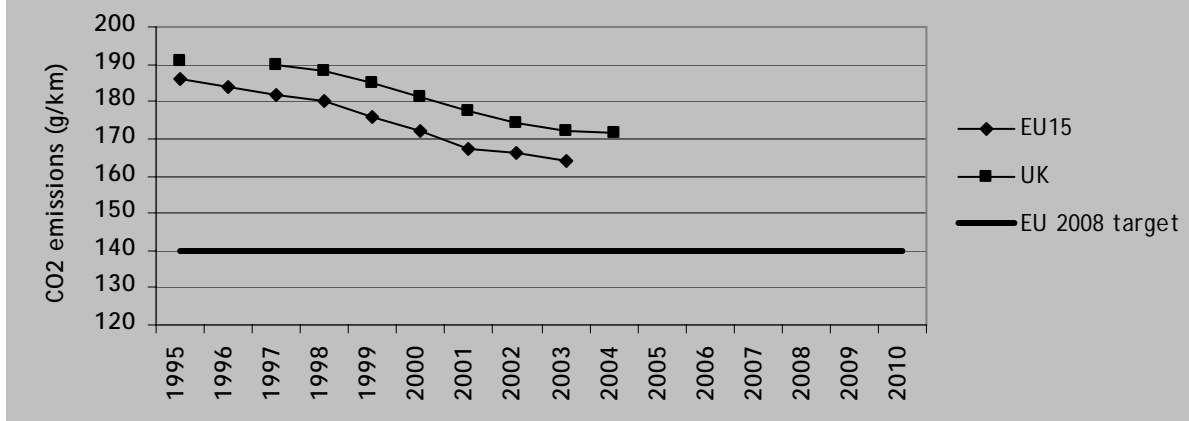
The UK is part of the agreement negotiated in 1998 between the European Commission and members of the Association des Constructeurs Européens d'Automobiles (ACEA) to reduce average new car CO₂ emissions across the EU (15 states) by about 25 per cent from 185g/km in 1995 to 140g/km by 2008. Similar agreements were signed with the members of the Japan Automobile Manufacturers Association (JAMA) and Korea Automobile Manufacturers Association (KAMA) in 1999. These agreements fall short of the EU's aim to reduce average CO₂ emissions from new cars to 120g/km by 2010 at the latest.

There is no technical difficulty in meeting these targets. A recent study for the European Commission concluded that the 140g/km target is relatively cheap to meet and would produce significant consumer benefits across the board, as well as environmental benefits (IEEP et al. 2005). While meeting the 120g/km would be significantly more costly, the costs would be manageable and there would be further benefits. The study estimated that to meet the 120g/km target manufacturing costs per car might increase by about £500 and the average new car price by about £800. Many consumers would benefit overall as a result of lower fuel costs.

As figure 3 shows, progress is being made in reducing average CO₂ emissions from new cars but has slowed in recent years and is not fast enough to meet the EU target in 2008. According to the most recent progress report by the European Commission (2005), ACEA is no longer confident that it can deliver the target. Meanwhile, the UK lags behind the EU average and the gap between the UK and EU averages increased from 5g/km in 1995 to 8g/km in 2003.

In addition to the negotiated agreements with car manufacturers at EU level, in its Powering Future Vehicles Strategy, the Government has set a target for passenger cars that by 2012 ten per cent of new cars sold in the UK would have CO₂ emissions of 100g/km or less at the tailpipe (DfT 2002). On present trends and policies, this is a forlorn hope: of more than 2.5 million new car registrations in 2004, fewer than 500 had emissions of 100g/km, less than 0.02 per cent (SMMT 2005).

Figure 3: Average new car CO₂ emissions ratings EU and UK



Source: European Commission and Society of Motor Manufacturers and Traders (SMMT)

New measures are needed to get on course to deliver the negotiated agreement at EU level and to make progress towards the UK's domestic target for new cars. In fiscal terms, the obvious candidates are company car tax and Vehicle Excise Duty (VED). On the first of these, the reform of company car tax by the Government has already delivered significant emissions savings. Company car taxation has been based on CO₂ emissions since April 2002. Drivers of company cars pay income tax on between 15 and 35 per cent of a vehicles list price according to the CO₂ emission rating. Currently, cars up to 140g/km pay tax on 15 per cent of the vehicles list price, the rate of tax increases by one per cent at 5g/km intervals and cars with emissions of 236g/km or more pay tax on 35 per cent of the list price (SMMT 2005).

A report for the Inland Revenue (2004) estimated that company car tax reform had already delivered emissions savings of 0.15 to 0.2MtCe in 2003, on course to deliver 0.5 to 1MtCe per year in the long term. We believe that further emissions savings are possible by extending the bands and progressively raising the emissions standards, to reward the most fuel efficient cars and penalise the gas guzzlers. At present, there is no tax advantage for company cars with emissions lower than 140g/km, such as the Toyota Prius rated at 104g/km or Honda Insight at 80g/km. Likewise, there is no tax penalty for gas guzzling company cars with emissions higher than 236g/km.

We propose that from 2006, the tax bands are extended at the bottom and top so that drivers of company cars up to 110g/km pay tax on only 10 per cent of the vehicles list price, with bands at 5g/km intervals up to cars over 255g/km, whose drivers would pay tax on 40 per cent of the cars list price. The emissions standard for each tax band should then be improved by 5g/km each year so that by 2010/11 the lowest tax band would be company cars up to 90g/km. These illustrative proposals are set out in detail in appendix A. We estimate the reforms would save at least an additional 0.2MtCe per year by 2010, on top of our complementary proposals for VED.

Since March 2001, VED for new cars has also been banded according to CO₂ emission rating. However, whereas graduated company car tax has provided a significant financial incentive, the differentials between VED bands are insufficient to have any significant influence on consumer behaviour. Currently, the difference between adjacent bands is as little as £10 per year and in no case more than £30 (see table 3). The difference in VED between the most gas guzzling diesel car in band F and the most efficient alternative fuel car in band A is only £110 per year. While average emissions from new company cars declined, albeit by just 1.6g/km, in 2004 the average emissions rating for new private cars actually increased by 0.6g/km and it was 5g/km higher than for company cars (SMMT 2005).

Consumer research suggests that the differentials between bands would need to be increased significantly if they are to influence consumers' purchasing decisions (DfT 2003b). For example, it is

suggested that a difference of £300 between each VED band might cause three quarters of new car buyers to swap bands. We do not think it would be politically feasible to increase the differentials to this extent in one leap. However, a significant increase in the differentials could be combined with the new car labelling scheme to highlight the savings in fuel costs as well as VED.

This year saw the introduction of a colour coded voluntary labelling scheme for new cars, which highlights the VED band and the estimated fuel cost for 12,000 miles. We recommend that this scheme should be made compulsory and that sales people are required to draw it to car buyers' attention. We also recommend that the differentials between adjacent VED bands should be increased to at least £50 from next year and concur with the Sustainable Development Commission (SDC) that a seventh band G, should be created for gas guzzlers (SDC 2005). Along with the Energy Saving Trust we propose that this should include all cars with emissions above 210 g/km.

Our illustrative proposals for VED rates in 2006/7 are set out in table 3 and are based around freezing the band B rates, reducing the rates for band A and increasing the rates for bands C and above. The difference between the top and bottom VED rates would be £320.

Table 3: Illustrative proposals for Vehicle Excise Duty rates

| Band | CO ₂ g/km | Annual VED | | | | | |
|-------|----------------------|----------------|-----------------|----------------|-----------------|-----------------------|-----------------|
| | | Petrol cars | | Diesel cars | | Alternative fuel cars | |
| | | Current 2005-6 | Proposed 2006-7 | Current 2005-6 | Proposed 2006-7 | Current 2005-6 | Proposed 2006-7 |
| A | Up to 100 | £65 | £25 | £75 | £35 | £55 | £15 |
| B | 101-120 | £75 | £75 | £85 | £85 | £65 | £65 |
| C | 121-150 | £105 | £125 | £115 | £135 | £95 | £115 |
| D | 151-165 | £125 | £175 | £135 | £185 | £115 | £165 |
| E | 166-185 | £145 | £225 | £155 | £235 | £135 | £215 |
| F | 186+ (186-210) | £160 | £275 | £165 | £285 | £155 | £265 |
| New G | 211+ | - | £325 | - | £335 | - | £315 |

Table 4 shows how combining increased VED differentials with compulsory labelling could highlight significant financial incentives for people to purchase more fuel efficient cars. It compares VED bands and fuel costs for the most efficient and typical models in each segment of the UK car market in 2004. For example, the new owner of a Toyota Prius would save £150 in annual VED compared to buying a Vauxhall Vectra plus £550 in fuel costs for 12,000 miles.

Analysis by the SDC suggests that if average emission savings of 12g/km for new car purchases are achieved, then the emissions savings would amount to between 0.4 and 0.8MtCe per year by 2010 rising to up to 1.5MtCe in 2015. We have ascribed a saving of 0.6MtCe in 2010 to our proposals (table 1). When the voluntary agreements with the car manufacturers are reviewed in 2006, the EU should consider mandatory measures to improve average new car CO₂ emission standards, for example through a certificate trading scheme (Kågeson 2005).

Table 4: Fuel costs for lowest and typical CO₂ emitting new cars in each UK market segment in 2004

| Market segment | Emission rating | Model | CO ₂ g/km (segment average) | VED band | Fuel | Miles per gallon | Fuel cost for 12,000 miles* | Difference in fuel cost |
|------------------------|-----------------|--------------------------------|--|----------|------------------------------|------------------|-----------------------------|-------------------------|
| Mini | Lowest | Smart Fortwo | 113 | B | Petrol | 60 | £860 | £200 |
| | Typical | Vauxhall Agila | 139 (av = 136) | C | Petrol | 49 | £1060 | |
| Super-mini | Lowest | Citroen C2 | 107 | B | Diesel | 69 | £770 | £230 |
| | Typical | Peugeot 206 | 144 (av = 147) | C | Diesel | 53 | £1000 | |
| Lower medium | Lowest | Honda Civic | 116 | B | Petrol/ electric | 58 | £900 | £350 |
| | Typical | Ford Focus | 163 (av = 162) | D | Petrol | 42 | £1250 | |
| Upper medium | Lowest | Toyota Prius | 104 | B | Petrol/ electric | 66 | £790 | £550 |
| | Typical | Vauxhall Vectra | 175 (av = 176) | E | Petrol | 39 | £1340 | |
| Executive | Lowest | Audi A6 | 169 | E | Diesel | 45 | £1190 | £300 |
| | Typical | Volvo V70/XC70 | 209 [av = 209] | F | Diesel | 36 | £1490 | |
| Luxury saloon | Lowest | Mercedes S320 | 204 | F | Diesel | 37 | £1450 | £360 |
| | Typical | Audi A8 | 265 (av = 286) | F** | Diesel | 29 | £1810 | |
| Sports | Lowest | Honda Insight (Vauxhall Tigra) | 80 (146) | A (C) | Petrol/ electric (petrol) | 83 (46) | £620 (£1150) | £1140 (£610) |
| | Typical | Audi TT | 230 (av = 232) | F** | Petrol | 29 | £1760 | |
| Dual purpose (4x4/SUV) | Lowest | Toyota Rav4 | 190 | F | Diesel | 40 | £1340 | £430 |
| | Typical | Land Rover Freelander | 248 (av = 244) | F** | Diesel | 30 | £1770 | |
| MPV | Lowest | Fiat Doblo | 147 | C | Diesel | 51 | £1030 | £330 |
| | Typical | Vauxhall Zafira | 194 (av = 192) | F | Diesel | 39 | £1360 | |

*Based on average prices for September 2005: petrol 94.8p/l: diesel 97.4p/l (AA Motoring Trust)

**Proposed new band G (over 220g/km)

Main sources: Vehicle Certification Agency and Society of Motor Manufacturers and Traders

At least there are some policy frameworks in place for cars. The same cannot be said for vans and lorries, which is a yawning gap given the main growth in road transport emissions is from these (see figure 2). Mandatory CO₂ emission ratings for vans and lorries should be introduced at EU level and targets for improving emission standards set, backed by fiscal incentives to promote fuel efficiency.

The government's ten year transport plan published in 2000 also envisaged implementing 'sustainable distribution' policies to promote more efficient use of lorries in making deliveries (DETR 2000). This agenda should be revisited as the potential fuel and emissions savings are significant.

5.3 Smarter travel choices

In the immediate term, 'soft' measures have some of the greatest potential to reduce road traffic, congestion and emissions. These include such things as workplace and school travel plans, personalised travel planning, travel awareness campaigns and public transport information and marketing, car clubs and car sharing schemes, teleworking, teleconferencing and home shopping. A major study commissioned by the Department for Transport estimated that a ten year intensive programme of soft measures could achieve a nationwide reduction in all traffic of about 11 per cent (Cairns et al. 2004). While not primarily dependent on regulation and tax incentives, these initiatives are often enhanced by such factors and the benefits are better locked in by hard policy measures like road pricing, the reallocation of road space to public transport, cyclists and pedestrians, and parking constraints.

Follow on work yet to be published has estimated the emissions savings that might be delivered (Jillian Anable, Centre for Transport Policy, Robert Gordon University, personal communication). A low intensity programme, effectively a continuation of existing policies, could deliver gross emissions savings from car traffic of up to 0.26MtCe per year by 2010 rising to 0.49MtCe in 2015. A high intensity programme is estimated to save up to 1.35MtCe per year by 2010 increasing to 2.5MtCe in 2015. The difference with the low intensity scenario is up to 1.09MtCe per year by 2010 rising to 2.01MtCe in 2015. The majority of the estimated emissions reductions come from initiatives related to the journey to work. Tele-initiatives also make a big contribution.

These figures are gross savings, for example they do not take into account increased emissions from public transport and other induced traffic. Hence we have cautiously attributed net emissions savings of 0.6MtCe per year by 2010 from a 'smarter travel choices programme' (table 1). Initial estimates suggest that such an intensive programme of soft factor interventions would require additional public and private spending steadily increasing to about £550 million in 2010 and £1.1 billion in 2015. Up to 40 per cent of this could be funded by the private sector, for example through cost savings from teleworking and teleconferencing. It is not simply a matter of increasing the amount of funding but increasing flexibility. Many soft measures require revenue spending but Local Transport Plan funding from the Department for Transport is generally for capital projects only.

Soft measures are very cost effective, not least because of their congestion benefits. For the high intensity scenario the benefit to cost ratio is estimated to be between 4: 1 and 10:1. The next section discusses possible new sources of public funding for climate change policies.

6. Climate funding

Both Tony Blair and Gordon Brown have identified climate change as one of the most important long term challenges we face. In his speech to the finance and environment ministers' roundtable during the UK's G8 presidency, Mr Brown acknowledged that "we now have sufficient evidence that human-made climate change is the most far-reaching – and almost certainly the most threatening – of all the environmental challenges facing us" (HMT 2005a). In announcing the second Comprehensive Spending Review, the Chief Secretary to the Treasury, Des Browne MP, also identified one of the new challenges to be addressed as "increasing pressures on our natural resources and global climate from rapid economic and population growth in the developing world and sustained demand for fossil fuels in advanced economies" (HMT 2005b). A high priority should be given to measures that reduce greenhouse gas emissions and fossil fuel dependence both at home and abroad.

Throughout this report we have identified a number of areas where increased public spending would reduce emissions, as well as helping to deliver other objectives like energy security and reducing fuel poverty, including:

- Capital grants and revenue subsidies for renewable electricity schemes, including extra support for emerging technologies;
- Enforcement of building regulations and tax incentives to go beyond minimum standards in new buildings and major renovations;
- Council Tax rebates to promote uptake of energy saving measures by households;
- Anti-fuel poverty programmes such as Warm Front;
- Business energy saving programmes;
- CHP, biomass heat, and microgeneration schemes such as Community Energy;
- Smarter travel choices; and
- Public engagement programmes to change attitudes and behaviour to reduce household and transport emissions.

We have also identified potential new sources of funding, including receipts from auctioning allowances in the EU Emissions Trading Scheme and from NFFO schemes, and increased revenues from the Climate Change Levy. We propose that these monies are dedicated to climate change mitigation. Table 5 illustrates the order of magnitude of money that might be generated for additional spending on emission reducing measures to help deliver the 2010 target, £4 to 6.5bn.

If the 2010 target is achieved, then the UK will also have exceeded its commitments under the Kyoto Protocol, generating a surplus of Assigned Amount Units (AAUs) that might be traded with other governments. There are differing views as to whether the Government should trade AAUs in these circumstances or bank them to raise trading price, thus helping to promote other countries to meet their Kyoto obligations by reducing emissions rather than buying AAUs. If the Government does choose to sell AAUs, then the money raised should also be earmarked for climate change mitigation.

Table 5: Proposed new sources of funding for climate change mitigation

| Source | Estimated revenue (£bn) |
|--|-------------------------|
| Renewable Obligation Certificates from NFFO schemes to 2010 ⁶ | 0.55 - 1.0 |
| Auction 10% of UK allowances in phase II of the EU Emissions Trading Scheme 2008-12 ⁷ | 1.5 - 2.3 |
| Increased revenue from Climate Change Levy 2006-10 | 2.0 - 3.2 |
| Total | 4.05 - 6.5 |

⁶ Source: NAO (2005)

⁷ Assumes trading price of 20-30 Euro/tCO₂ and exchange rate 1.5 Euro = £1

7. Conclusion

The aim of this report is to make a simple point, that the Government's manifesto commitment to cut UK CO₂ emissions by 20 per cent from the 1990 level by 2010 can and should be met. We have identified a limited number of quantifiable measures by which we believe this can be achieved. However, we also recognise the limitations of the exercise. Our proposals are neither exhaustive nor exclusive. We welcome alternative proposals. What we do not welcome is denial and defeat. Climate change is just too urgent an issue for that.

Meeting the 2010 target and going further to put the UK on course to a truly low-carbon economy requires action across every government department. We have already highlighted the oddity that one of the key departments, the ODPM, does not share responsibility for delivering the Public Service Agreement (PSA) target to cut greenhouse gas emissions (section 4.1). The Treasury is another key department that does not share responsibility for the PSA. Given its control of the purse strings and tax policy this is wrong.

Climate change is the most serious long term global environmental threat to human and ecological welfare. All parts of society and every department of government must be harnessed in mitigating climate change. Since PSA targets play a major role in defining departments' priorities, the seriousness of the issue requires that all government departments should share responsibility for the PSA target to cut emissions of CO₂ and other greenhouse gases.

A key issue affecting our analysis is whether the emissions projections published in November 2004 are accurate. If, as seems likely, they are optimistic, our proposals would need to be revisited. But our proposals on the EU Emissions Trading Scheme (covering about half the UK's emissions) are not dependent on projections but on the scheme making at least a proportionate contribution to meeting the 2010 target. Hence, the UK National Allocation plan in phase II should be based on the target not the projections. If the projections go up, then the notional emissions savings from the trading scheme also go up. The real emissions savings from the baseline are unchanged.

More problematic are the sectors outside the emissions trading scheme, namely light industry and commerce, households and transport. If the projections in these sectors are also revised upwards, then the range of measures we have proposed would need to be reviewed and enhanced. It may also be necessary to secure further savings from the emissions trading scheme to close the gap, since this is likely to be one of the most cost effective avenues.

This highlights the point that mandatory emissions cap and trade schemes also provide a certainty of environmental outcome (the total quantity of emissions) that other measures like tax incentives, minimum standards, obligations and voluntary agreements do not, where the environmental outcome depends on demand. In the longer term, we therefore advocate bringing emissions from all sectors within the ambit of mandatory cap and trade schemes.

The Carbon Trust has developed proposals for a UK embedded mandatory cap and trading scheme to cover business and industry sectors not included in the EU scheme, to replace the current voluntary UK Emissions Trading Scheme. An alternative route that we believe deserves serious consideration is including households, transport and other sectors in the EU scheme in future phases through the suppliers of road fuels, gas and oil for heating. It is already the case that electricity supplied to households is included in the EU scheme through the generators. Looking further ahead, the idea of tradable household emission allowances based on per capita entitlements (often known as domestic tradable quotas) is attractive in terms of fairness and consumer incentives.

What is also clear is that while mandatory emissions cap and trading provides the foundations for limiting emissions, it is no silver bullet. There will always be the need for complementary measures to promote innovation and investment in low-emission or emission reducing technologies, to provide incentives for individuals and organisations to make sustainable consumption choices, to ensure fairness for all and to reconcile climate objectives with other public goods. On this score, one of the

agendas that is stalled and needs revisiting by the Government is environmental tax reform. We have made a number of proposals in this report.

There are two key issues that also need to be addressed by Government. The first is the economics of climate change. Conservative sections of industry will persistently argue that taking a lead on climate change by reducing emissions initially faster than other countries will jeopardise the UK's relative economic competitiveness. This argument must be met head on.

Our view is that it is in the UK's long term economic interests to take early action in reducing CO₂ and other greenhouse gas emissions. It is those countries that fail to act and are required to act abruptly at a later stage that will suffer economically in the longer term. For all countries, the human, ecological and economic costs of failing to tackle climate change far outweigh the costs of action. The Treasury review of the economics of climate change initiated by Gordon Brown is a prime opportunity to address these questions (HMT 2005c).

Second, there is a crying need for better public engagement on climate change so that the urgency of the issue and scale of the threat is understood and people know what they can do to help and are motivated to act. Without popular support, it will be extremely difficult to implement the measures that are necessary to tackle the problem and entail changing behaviour. As part of ippr's ongoing low-carbon programme, we are engaged in a major project on how to frame messages to win hearts and minds and incentives to change consumer behaviour.

We are in the foothills of action on climate change. ippr's future work will look beyond 2010 to what needs to be done to secure deep emission reductions in the long term. In the short term, the outcome of the review of the UK Climate Change Programme is a key test of the Government's commitment.

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Appendix A: Illustrative proposals for company car tax bands

| % of cars price to be taxed* | CO ₂ emissions rating (g/km) | | | | | |
|------------------------------|---|-----------------|-----------------|-----------------|------------------|------------------|
| | Current 2005-6 | Proposed 2006-7 | Proposed 2007-8 | Proposed 2008-9 | Proposed 2009-10 | Proposed 2010-11 |
| 10% | | Up to 110 | Up to 105 | Up to 100 | Up to 95 | Up to 90 |
| 11% | | 115 | 110 | 105 | 100 | 95 |
| 12% | | 120 | 115 | 110 | 105 | 100 |
| 13% | | 125 | 120 | 115 | 110 | 105 |
| 14% | | 130 | 125 | 120 | 115 | 110 |
| 15% | Up to 140 | 135 | 130 | 125 | 120 | 115 |
| 16% | 145 | 140 | 135 | 130 | 125 | 120 |
| 17% | 150 | 145 | 140 | 135 | 130 | 125 |
| 18% | 155 | 150 | 145 | 140 | 135 | 130 |
| 19% | 160 | 155 | 150 | 145 | 140 | 135 |
| 20% | 165 | 160 | 155 | 150 | 145 | 140 |
| 21% | 170 | 165 | 160 | 155 | 150 | 145 |
| 22% | 175 | 170 | 165 | 160 | 155 | 150 |
| 23% | 180 | 175 | 170 | 165 | 160 | 155 |
| 24% | 185 | 180 | 175 | 170 | 165 | 160 |
| 25% | 190 | 185 | 180 | 175 | 170 | 165 |
| 26% | 195 | 190 | 185 | 180 | 175 | 170 |
| 27% | 200 | 195 | 190 | 185 | 180 | 175 |
| 28% | 205 | 200 | 195 | 190 | 185 | 180 |
| 29% | 210 | 205 | 200 | 195 | 190 | 185 |
| 30% | 215 | 210 | 205 | 200 | 195 | 190 |
| 31% | 220 | 215 | 210 | 205 | 200 | 195 |
| 32% | 225 | 220 | 215 | 210 | 205 | 200 |
| 33% | 230 | 225 | 220 | 215 | 210 | 205 |
| 34% | 235 | 230 | 225 | 220 | 215 | 210 |
| 35% | 236+ | 235 | 230 | 225 | 220 | 215 |
| 36% | | 240 | 235 | 230 | 225 | 220 |
| 37% | | 245 | 240 | 235 | 230 | 225 |
| 38% | | 250 | 245 | 240 | 235 | 230 |
| 39% | | 255 | 250 | 245 | 240 | 235 |
| 40% | | 256+ | 251+ | 246+ | 241+ | 236+ |

*There is a 3% supplement for diesel cars not approved to Euro IV emissions standards subject to a current ceiling of 35% for the proportion of car price taxed and proposed ceiling of 40%