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Fiscal costs of climate mitigation programmes in the UK: a challenge for social policy?

Discussion paper [or working paper, etc.]

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Contents

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Editorial Note and Acknowledgements

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Abstract

This paper asks whether the policies and programmes enacted to reduce greenhouse gas emissions in the UK will compete with other goals of public policy, in particular social policy goals. The Climate Change Act 2008 has set the UK some of the most demanding targets in the world: to reduce GHG emissions (compared with 1990) by at least 80% by 2050 and by at least 34% by 2020 – just nine years away. A wide array of climate change mitigation policies (CCMPs) have been put in place to bring this about. Will these compete fiscally with the large public expenditures on the welfare state? We address this question by surveying and costing all UK government policies that have a climate change mitigation objective and which are expressed through taxation, government expenditures and government-mandated expenditures by energy suppliers and other businesses and which are directed toward the household sector. Our conclusion is that expenditures on CCMPs are tiny – around one quarter of one per cent of GDP - and will not rise significantly. Within this the share of direct spending by government will fall and that obligated on utility companies will rise. Green taxes are also planned to fall as a share of GDP. There is no evidence here of fiscal competition between the welfare state and the environmental state. However, the use of mandated electricity and gas markets will impose rising costs on the household sector, which will bear more heavily on lower income households and will increase 'fuel poverty'. Thus demands on traditional social policies are likely to rise. More radical policy reforms will be needed to integrate climate change and social policy goals.

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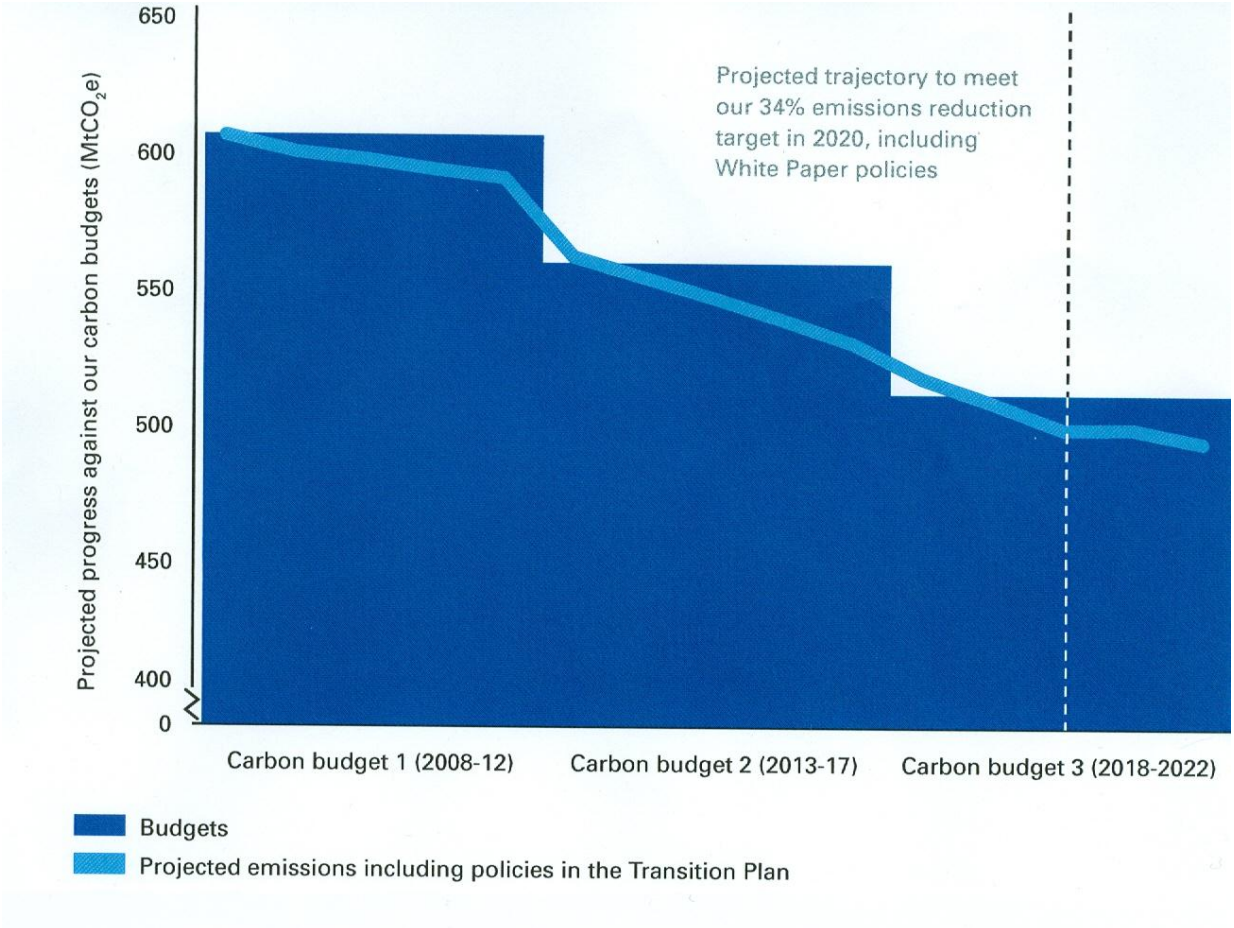
1. Introduction

The UK government is said to have adopted the world's most demanding and legally binding targets to reduce CO2 and other greenhouse gases. The UK Climate Change Act 2008 requires the UK to reduce GHG emissions by at least 80% by 2050 and by at least 34% by 2020, compared with the base year of 1990. Furthermore it has set three intermediate Carbon Budgets, as shown in Chart 1. As well as statutory targets the Act established the Climate Change Committee (CCC) as an independent body to advise the government on setting and meeting carbon budgets. At the same time the new Department of Energy and Climate Change, headed then by Ed Miliband, published the *UK Low Carbon Transition Plan* which set out detailed targets and programmes to achieve these goals. This, and the subsequent very detailed reports of the CCC, analyse plans and achievements in reducing emissions under five main headings: power and heavy industry (which accounts for about one half of all emissions), transport, homes and communities, workplaces and jobs, and farming, land and waste.

Chart 1: The UK's carbon budgets are equivalemt to a 34% cut in greenhouse gas emissions in 2020



Source: DECC (2009a), p.35, Chart 2.

The goal of this paper is to ask whether the policies and programmes enacted to achieve these ambitious goals competes, or will compete in the future, with other goals of public policy, in particular social policy goals.

Over the course of the twentieth century the welfare state emerged as one of the most conspicuous features of developed societies. Social policy is characterised by provision of central social services, including education and health services, and by extensive income transfers via social protection programmes and tax credits. Total spending on these programmes in the OECD countries amounts to around 28% of GDP. In the UK total social spending in 2007 was 25.3% of GDP, but by 2009-10 it accounted for 29.7%, mainly due to the drop in the GDP denominator during the post-financial crisis recession. The Coalition government plans a rapid reduction in real social spending and a slow decline in its share of GDP during the coming Parliament.

Climate change will pose challenges to all institutions of modern developed societies, not least the welfare state. We ask here whether the necessary climate change mitigation policies (CCMPs) induce severe fiscal competition with the social programmes of the welfare state as some have suggested (Gough and Meadowcroft 2011). At first sight this appears improbable since total environmental expenditure, according to government data amounts to only 0.8% of GDP in 2009-10 (PESA 2010). Yet, the Coalition government's Comprehensive Spending Review of October 2010 plans a 41% real growth in the capital budget of the Department for Energy and Climate Change (DECC) plus one billion pound funding for a Green Investment Bank, alongside unprecedented restraint on the welfare budget, which may presage a change of direction. Others ask, on the contrary, whether new carbon taxes could actually provide extra funds for social programmes (Büchs et al 2009). We also investigate conflicts and compatibilities between the growing raft of carbon mitigation programmes and allied social policies, such as the Fuel Poverty programmes. Will carbon mitigation and the 'eco-state' gradually replace the welfare state as the dominant mission of governments in the 21st century? These are big questions, but we restrict ourselves here to the more modest one of fiscal costs and fiscal competition.

Discussion of the costs of climate change mitigation raises big conceptual issues. Basically, three sets of costs can be distinguished:

- Macroeconomic costs, such as impact on GDP growth, as for example modelled in the Stern Report (2007)
- Costs to specific industries and to industrial competitiveness
- Costs bearing on households, and the distribution of these between income groups and other household characteristics.

We discuss only the third here. Our focus is mainly on policies to cut *household* emissions, as this is the area of greatest overlap with social policies. We address this question by summarising all UK government's policies that have a climate change mitigation objective and which are expressed through taxation, government expenditures and government-mandated expenditures by energy suppliers and other

businesses (for an earlier study of policy developments in 2006-07, see Snell 2008). We assess the costs of these programmes to government, with some estimates where necessary of the onward costs borne by business and households. We also consider briefly the distributive consequences of these programmes and some tentative estimates of the benefits in carbon saved. The period covered is 2005-06 to the present with forecasts to 2014-15, taking into account the new plans in the October 2010 Spending Review.

We should make clear what policies this report does *not* cover. First, it excludes the EU's Emissions Trading Scheme (ETS) in which the UK participates. The ETS is an 'upstream' cap-and-trade system applied to large industrial concerns including power generation across Europe. It sets an overall cap and requires companies to submit allowances to cover their verified emissions. Companies can trade their allowances and also use credits from economies achieved in developing countries. We are now approaching phase 3 of the ETS which will run from 2013-20. The ETS is the largest carbon trading system in the world and represents an historic institutional achievement but it has encountered numerous problems in the first two phases (NAO 2009). One result is that 'no medium or long-term forward price for allowances has been established' (NAO 2009: 11). The best guess of the impact of the first two phases up to 2012 on UK emissions is zero (DECC 2009a: p.56, Chart 3; NAO 2009). It is for this reason that we exclude it here, though Phase 3 will embody many modifications and by 2020 the majority of permits are expected to be auctioned, raising an additional £8bn in revenues.

Second, we exclude a wide range of non-traded policies aimed at industry, including investment in renewable energy, nuclear, and carbon capture and storage in coal-fired power stations, policies to reduce carbon emissions in transport and in industries outside the ETS and policies to reduce non-CO2 greenhouse gas emissions in agriculture. We focus mainly on programmes to cut household energy emissions.

Third, we do not investigate the impact of direct government regulations on domestic and commercial products, building efficiency and the EU vehicle efficiency regulations. These may impose substantial costs although these costs will be mitigated through lower energy use. Nor do we consider education and information programmes intended to directly influence behaviour and lifestyle.

The data presented in this report is subject to other important caveats:

i. We have taken an inclusive approach to what ought to be included. Where DECC have claimed an environmental objective for a programme in the Low Carbon Transition Plan, or a programme is featured in the Committee for Climate Change's reports, the programmes have been included. This means that some programmes may have been included when their contribution to abatement efforts are small.
ii. Most local projects that aim to reduce carbon emissions will have been missed in our audit; this includes, for example, most initiatives to encourage more cycling.

iii. Spending figures are provided for the total cost of programmes. No effort has been made to impute the portion that goes towards climate change mitigation. To the extent that programmes have other goals, spending on climate change mitigation is lower than reported. This also means that one cannot directly judge the relative importance of programmes in government efforts to combat climate change from the relative spending.
iv. Future programmes for which an ambition has been announced but the specifics have not been worked up are not generally included.
v. Scope has been limited to domestic programmes only. Programmes and expenditures that directly help other countries reduce their greenhouse gas emissions, such as British contributions of around £1.5bn between 2010 and 2011 to the "Fast Start Finance" programme, are excluded[1].
vi. All figures are in nominal terms.
vii. Generally, figures in italics are assumed, interpolated or forecasted extremely crudely while other figures have an official source.

The report is structured as follows. Section 2 describes 'green' taxes with an identified climate change mitigation goal. Section 3 summarises and costs CCM programmes that involve direct expenditures by the government. Section 4 outlines government programmes that mandate spending by the private sector; it also provides estimates of the cost of these programmes to consumers. Section 5 briefly considers some distributional consequences including impacts on 'fuel poverty', and compares CCMPs with compensatory social transfers such as the Winter Fuel Allowance. Section 6 presents initial calculations of the carbon savings to be achieved by these programmes. The conclusion summarises our findings and presents brief recommendations.

2. Environmental Taxation

We begin with environmental taxation, since this has by far the largest fiscal impact. Table 1 below shows the revenues from the major taxes that could be considered to have at least a partial objective of climate change mitigation.

1 http://www.dfid.gov.uk/Media-Room/News-Stories/2010/UK-confirms-action-on-climate-and-forests/

Table 1: 'Green' taxation revenues

£m		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
2.1	Fuel duties	23,440	23,590	24,910	24,620	26,200	27,300	28,900	30,300	31,800	33,400
2.2	Air Passenger Duty	910	970	1,990	1,860	1,860	2,300	2,900	3,000	3,300	3,500
2.3	Landfill Tax	730	800	880	950	840	1,100	*1,170*	*1,220*	*1,250*	*1,310*
2.4	Climate Change Levy	740	710	690	720	700	700	*740*	*780*	*800*	*830*
2.5	Vehicle Excise Duty	5,000	5,100	5,400	5,600	5,600	5,900	6,000	6,100	6,200	6,300
2.6	London Congestion Charge (Gross)	260	250	330	330	*330*	*330*	*330*	*330*	*330*	*330*
2.7	Company Car Tax	1,920	1,860	1,830	2,300	*2,300*	*2,300*	*2,300*	*2,300*	*2,300*	*2,300*
2.8	Carbon Reduction Commitment	0	0	0	0	0	0	715	730	995	1,020
	Total Environmental Taxes	**33,000**	**33,280**	**36,030**	**36,380**	**37,830**	**39,930**	**43,055**	**44,760**	**46,975**	**48,990**
	- as A percentage of GDP	2.59%	2.47%	2.53%	2.54%	2.70%	2.71%	2.80%	2.76%	2.75%	2.73%

Sources:
2.1, 2.2: 2005-10 HMRC Receipts (June 2010), 2010-2015 HMT Budget (June 2010)
2.3, 2.4: 2005-10 HMRC Receipts (June 2010), 2010-11 HMT Budget (April 2010), 2011-15 grown in line with 'Other HMRC Receipts' HMT Budget Forecast (June 2010) as forecasts no longer provided separately. Given the landfill tax escalator, this almost certainly underestimates the increase in its receipts. Budget 2009 indicates that CCL will raise around £700m per year in revenues in 2010-11, with receipts being roughly flat since 2005-06. Forecasts of CCL receipts are no longer provided separately so, as with Landfill Tax, receipts from 2011-12 onwards are assumed to have increased in line with 'other HMRC Receipts'.
2.5: HMT Budget (2006-10)
2.6: 2005-08 TFL Annual Reports, 2008-15 assumed constant.
2.7: 2005-08 HMRC, 2008-09 HMT Carbon Budget, 2009-15 assumed constant.
2.8: 2011-15 HMT Spending Review 2010
% GDP Figures calculated using HMT June Budget forecast 2010
All figures are rounded to the nearest £10m except for VED receipts which are rounded to the nearest £100m
From June Budget 2010, forecasts of landfill tax revenues (as well as those for the Climate Change Levy and the Aggregates Levy), are no longer provided separately, but are rolled into 'other HMRC receipts'.

There has been no significant switch to green taxation, nor is one planned. Revenues from environmental taxes have risen from around £33bn in 2005-6 to £38bn in 2009-10 and by the end of this parliament will be around £49bn, but as a share of GDP they will remain roughly constant at 2.7% of GDP. Throughout the period about two thirds of environmental tax revenues come from fuel duties, with vehicle excise duty making up the next largest share.

2.1 Fuel Duties

Fuel duties are levied on hydrocarbon oils and their substitutes. The bulk of receipts come from duty on petrol and diesel, set at £0.54p per litre in 2009-10. Duty is also levied on heating oil, fuel oil, and others. Reduced rates are charged on bio-ethanol and bio-diesel.

2.2 Air Passenger Duty

Air passenger duty is a per passenger tax on flights originating in the UK. The level of duty depends on the length of the flight and the class of seat, with premium economy, business and first class passengers paying double the economy rate. Rates are scheduled to increase in November 2010, and have increased rapidly since the introduction of APD in 1994.

2.3 Landfill Tax

The Landfill Tax is a tax on waste disposed at landfill sites, to reduce the amount of waste sent to landfill by encouraging alternative options such as incineration or recycling. The June Budget 2010, introduced a 'landfill tax escalator' until at least 2014. Revenues are planned to rise to an expected £1.1bn in 2010-11.

2.4 Climate Change Levy

The Climate Change Levy (CCL) is an indirect tax on notional units of energy supplied to non-domestic consumers. It was introduced in 2001, replacing the Fossil Fuels Levy. The current rates are 0.43 pence per kWh for electricity, 0.15 pence per kWh for gas and 0.96 pence per kWh for petroleum. The revenues shown here are net of the exemption for renewables i.e. they are receipts actually received. There is no Levy on energy supplied to domestic consumers.

2.5 Vehicle Excise Duty

Since June 1999, Vehicle Excise Duty (VED) has had an explicit dual revenue raising and environmental purpose, and since 2005-06, cars registered since 1 March 2001 have been taxed directly according to the level of CO2 emissions per kilometre. VED raised approximately £5bn in 2005-06 rising to a forecast £6bn in 2011-12.

2.6 London Congestion Charge

The London Congestion Charge is a daily levy on vehicles entering the Congestion Charging Zone between 7am and 6pm Monday to Friday. The charge was introduced in 2003 at a standard rate of £5 per vehicle and was increased in 2005 to £8 per vehicle. Transport for London describes the congestion charge as a toll not a tax.

2.7 Company Car Tax and fuel benefit
Company Car Tax is an addition to taxable income based on the imputed value of a company car and fuel provided as a benefit in kind. The list prices rise steeply according to carbon emissions per km.

2.8 Carbon Reduction Commitment
The Carbon Reduction Commitment is a mandatory scheme for large users of electricity not covered by Climate Change Agreements or the EU Emissions Trading Scheme. The details of the policy are currently under revision following Spending Review 2010. In its previous incarnation, after establishing an energy use baseline, energy users would be required to purchase enough permits for the year ahead at the start of each year (initially at a price of £12 per tonne, later auctioned). In the event of a firm facing a shortfall, additional permits must be obtained either from another energy user or from the government (thus imposing a price ceiling). Prior to Spending Review 2010, the revenues were to be recycled to energy users who were more successful in reducing or controlling their emissions. However, the Review announced that revenues from sales will now flow the exchequer, generating £0.7bn in 2011-12 rising to over £1bn by 2014-15. This why we place the CRC as a tax.

3. Government direct programmes to reduce household carbon emissions

This section briefly outlines direct government expenditures with climate change mitigation as one of their stated objectives and which impact on households. Table 2 gives nominal direct spending by programme rounded to at least the nearest £5m. For details on these, and data sources, see the programme-by-programme descriptions that follow.

Table 2: Direct Spending by programme

£m		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
3.1	Decent Homes	*670*	*670*	670	650	670	670	670	*670*	*670*	*670*
3.2	Warm Front	150	300	350	360	300	300	*200*	*100*	0	0
3.3	Devolved Energy Efficiency Programmes	*95*	*95*	*100*	*100*	*100*	*115*	*115*	*115*	*115*	*115*
3.4a	RHI (non domestic)	*0*	*0*	*0*	*0*	*0*	*0*	*25*	*50*	*100*	*150*
3.4b	RHI (Renewable Heat Premium Payments)	*0*	*0*	*0*	*0*	*0*	*0*	*15*			
3.4c	RHI (domestic)								?	?	?
3.5	Ultra Low Carbon Vehicle Incentive	0	0	0	0	0	0	85	85	85	85
3.6	Green Bus Fund	0	0	0	0	30	15	*15*	*15*	*15*	*15*
	Total	915	1065	1120	1110	1100	1100	1125	1035	985	1035

Sources:

3.1: 2005-09, Carbon Trust Annual Reports, 2009-15 authors estimates (see text). http://www.communities.gov.uk/documents/statistics/pdf/1186234.pdf see also Business Plan Statistical Appendix. We assume spending on the thermal element of decent homes will be flat subsequently. Given the 70% reduction in DCLG's capital budget announced in spending review 2010 this is almost certainly optimistic.

3.2: 2007-09 DCLG Local Authority Business Plan Statistical Appendix, 2009-11 Committee for Climate Change (2009) Meeting Carbon Budgets: The need for a step change. p.73, 2013-15 HMT Spending Review 2010, 2011-15 assumed. According to UK Fuel Poverty Strategy Annual Reports, between 2005-06 and 2007-08, £800m was spent on Warm Front. Over the 2008-11 spending round, spending is expected to be £959m, with £359m spent in 2008-09. We assume that the remaining spending is split evenly (£300m each year) between 2009-10 and 2010-11. We assume spending from 2012-14 onwards will be nil and spending in 2011-12 and 2012-13 have been interpolated on a straight line basis.

3.3: 2008-11 http://www.greenerlivingfund.org.uk/about/ and http://www.infoscotland.com/gogreener/912.html, 2011-15 assumed. HEES Annual Reports 2006-07 to 2008-09. In 2004/05 and 2005/06 the devolved administration paid the levy on behalf of customers.

Review of Energy Efficiency Levy Program (2006) http://www.uregni.gov.uk/uploads/publications/The_Energy_Efficiency_Levy_Programme_-Review.doc

3.4. DECC (2011) "Renewable Heat Incentive" & DECC (2011) "Renewable Heat Incentive: Impact Assessment", 3.4a figures suggestive.

3.5: Assumption based on BERR (2009) "Ultra-Low Carbon Vehicles in the UK"

3.6: Various, see text. The Green Bus Fund scheme initially received £30m of first round funding in 2009. In July of this year £15m of second round funding was announced for 2010. WE assume that the government continues to provide funding worth £15m per year going forward

3.22: 2009-11 http://www.dft.gov.uk/pgr/regional/buses/greenbusfund/, 2011-15 assumed. The incentive was expected to provide £250m from 2011. It is not made clear in the policy document, or Budget 2009, over how many years the spending is expected to be spread over; we assume over what would have been the three year spending round at the time of publication. We assume the spending continues at the same level subsequently.

Often, expenditure figures are only available over the three year spending review periods, 2005-06 to 2007-08 and 2008-09 to 2010-11. When this is the case, we assume that expenditure in each of the three years is one third of the total (unless other information is available). Given that spending tends to grow, this will tend to overstate spending at the start of the spending periods.

Direct spending on programmes targeting households increased from £0.9bn in 2005-06 to £1.1bn in 2010-11. Spending is expected to be roughly flat in the short term as Warm Front is phased out and replaced with the 'Green Deal' (primarily financed by energy providers) and Renewable Heat Incentive payments begin. The remainder of this section describes each of the programmes listed in the table.

3.1 Decent Homes (Thermal Element)

Decent Homes is a set of standards for social housing, including having a reasonable degree of thermal comfort, which requires that the dwelling must meet certain standards of insulation. The Committee on Climate Change estimates that over the period 2008-11 around £670m will be spent each year on meeting the targets embodied by the thermal element of Decent Homes. A breakdown by type[2] shows that this is mostly due to spending of £391m on central heating, £27m on insulation and £229m on windows (totalling £647m). In 2008-09, total capital spending on installation, replacement and major repairs for social housing in England was planned to be £2.8bn, suggesting approximately one quarter of capital spending is to increase energy efficiency. Note future spending figures assume, perhaps unrealistically given the cuts in DCLG's capital budget announced in Spending review 2010, that spending on the thermal element of Decent Homes remains constant. As this constitutes two thirds of direct spending by 2015-16 any reduction in this spending will also substantially reduce total spending.

3.2 Warm Front

Warm Front provides grants of up to £4000 for upgrades to eligible households' insulation and heating systems, including new boilers, loft and cavity wall insulation (£6000 if installing oil or renewable energy based systems). Eligible households are defined as those receiving benefits or tax credits. Spending Review 2010 announced the winding down of the Warm Front scheme and phase-out from 2013-14.

3.3 Devolved Administrations Energy Efficiency Programmes

Wales has the Home Energy Efficiency Scheme which is similar to Warm Front. Scotland has the Energy Assistance Package (EEP) and the Home Insulation Scheme (HIS), both of which target energy saving upgrades for mainly low income houses. The 'Northern Ireland Sustainable Energy Programme' is different. Funded by a per customer levy on electricity suppliers, it provides funding for energy efficiency upgrades, mainly targeted at low income households. For years since 2006-7 we assume no direct government expenditure but there is obviously an indirect cost to energy users. It also has the 'Warm Homes' scheme which is broadly equivalent to Warm Front.

3.4 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is intended to encourage businesses and households to generate heat using a range of renewables including biomass, solar thermal and ground and water source heat pumps. Following the review of RHI announced at Comprehensive Spending Review 2010, RHI is now being introduced in two phases. The first phases is targeted at the non-domestic sector and will be funded from general taxation. The subsidy is expected to cost £5.4bn in the years to 2020 and

2 Local Authority Housing Statistics (2009) – Table 7
http://www.communities.gov.uk/documents/statistics/pdf/1186234.pdf

cost £1.4bn per annum in 2020, given this information the figures in the table are a plausible guess at the profile of the spending. Non-domestic RHI provides a payment per kwH of heat produced depending on the size of the installation. The domestic RHI is intended to begin alongside 'Green Deal' in 2012, however details of the policy and its expected costs have not yet been release and given past changes in the policy it is not even certain who will end up paying the bill. Currently 1% of the UK's heat is from renewable sources and the Renewable Heat Incentive is intended to support an increase to 11%.

3.5 Ultra-low carbon vehicles incentive

The ultra-low carbon vehicle incentive was announced in January 2009 and is scheduled to start at the beginning of the next spending round (from 2011-12). The incentive comes in two parts. The bulk of the money is reserved for subsidising 25% of the purchase price (up to £5000) of new electric or plug-in hybrid personal vehicles. There is also £20m to support the roll-out of charging stations.

3.6 Other transport measures

The Green Bus Fund is a Department of Transport initiative, providing grants to local authorities to cover part of the cost of investment in low carbon buses that emit around 1/3 less carbon than a standard bus.

3.7 Departmental Carbon Budgets

Money spent to hit departmental carbon budgets (in excess of the support provided by the Carbon Trust etc.) has not been included (DECC 2009a: 215). Departments are obligated to reduce their emissions from buildings by 30%, from a 1999-2000 baseline, and from transport by 30%, from a 2005-06 baseline.

4. Mandated Spending

This section summarises, and attempts to attach costs to, government programmes that mandate spending by the private sector, mainly energy companies, and have a significant climate change mitigation objective. 'Costs' here refer to the extra costs imposed on energy suppliers as a result of CCMPs; however, it is expected that these will largely be passed on to end users. Section 4.1 outlines the expected mandated costs of programmes already announced, and mentions, but does not attempt to cost, some programmes that are expected in the future. Section 4.2 summarises DECC's most recent estimates of the impact of these programmes on consumers and businesses utility bills.

4.1 Costs of mandated programmes.

Table 3 shows mandated spending by programme for the years 2005-6 to 2015-16. Sources and the methodology behind the figures are included in the brief programme summaries that follow. All the figures in this section should be taken merely as indicative, while those in italics are guesstimates. Mandated spending has nearly trebled in five years from around £0.9bn in 2005-06 to £2.5bn in 2010-11 and is expected to continue to increase to £3.7bn by 2015-16. Thus it will increase in real terms and as a proportion of GDP.

Table 3: Estimated costs of mandated spending programmes

£m		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
4.1	Carbon Emissions Reduction Target	300	300	300	1,070	1,070	1,070	1,400	700	0	0
4.2	Community Energy Saving Program	0	0	0	0	100	100	100	50	0	0
4.3	Green Deal	0	0	0	0	0	0	0	*750*	*1,500*	*1,500*
4.4	Feed in Tariffs	0	0	0	0	0	50	100	150	200	300
4.5	Smart Meters	0	0	0	0	0	0	0	0	50	100
4.6	Renewable Obligation	590	710	870	1,030	1,100	1,310	1,350	1,500	1,650	1,830
	Total Mandated Spending	**890**	**1010**	**1170**	**2100**	**2270**	**2530**	**2950**	**3150**	**3400**	**3730**

Source:
4.1: Based on DECC Impact Assessments. Source: Eoin Lees Energy evaluation of EEC2 for DEFRA. Presentation here:
http://www.ofgem.gov.uk/Sustainability/Environment/Policy/EnvAdvGrp/Documents1/Eoin%20Lees%20EEC2%20evaluation%20presentation.pdf
4.2: Based on DECC Impact Asessments
4.3: Assumed
4.4: Assumption Based on DECC Feed in Tariff Impact Asessment. FiT Impact Assesment -
http://www.decc.gov.uk/en/content/cms/consultations/elec_financial/elec_financial.aspx
The figures in the table are highly speculative, based on our crude assumption that the amount of energy generated initially is likely to be low and increasing over time, as well as reflecting an estimated cost of £0.6bn p/a in 2020 in the original impact assessments and an estimated cost of £360m p/a in 2015 in the 2011 Review.
4.5: Assumed. Source: DECC (2009) "Impact assessment of a GB-wide smart meter roll out for the domestic sector".
4.6. The information supplied in the RO annual report allows us to infer the additional cost to the consumer in a straightforward manner for each year to 2008-09. This is done by applying the cost of buyouts to the certificates that suppliers did obtain. The underlying principle here is that the price of renewables is set by the marginal producer. For years after 2008-09, we have assumed that the total amount of electricity supplied remains constant , so the number of certificates required increases in proportion with the obligation. We then calculate the cost by multiplying this figure by the buyout price for this year. The price of obligations has not been set for 2011-12 so we increase the price in line with forecast RPI in June Budget 2010 Table C5 (4.2% for 2010-11). The same exercise is completed for Scotland and Northern Ireland; the figures above are the sum of all three schemes.

4.1 Carbon Emissions Reduction Target (CERT)

The Carbon Emissions Reduction Target (CERT), is an obligation made on energy suppliers and producers to improve domestic energy efficiency in the UK. The way these efficiency savings are delivered is left to providers, with government allocating an amount of CO2 to a menu of energy efficient upgrades such as cavity wall insulation or loft insulation. Providers are allowed to split the cost of upgrades with those receiving them, but 40% of the CO2 savings must accrue to elderly households or to those on benefits. Industry as a whole is obligated to save 293MtCO2 through 2008-12, an increase from the original target of 154MtCO2. The cost of this to energy providers is an estimated £1.1bn per year 2008-11 and £1.4bn per year over the extension period of April 2011-December2012. From 2005-08 (under the Energy Efficiency Commitment 2) suppliers had to produce energy savings of 130 TWh's at an estimated cost of £300m per year.

4.2 Community Energy Savings Programme (CESP)

The Community Energy Savings Programme (CESP) began in 2009-10 and is another obligation made on energy suppliers and producers to improve domestic energy efficiency in the UK. CESP requires that energy suppliers and generators provide upgrades to the heating systems and insulation in low income neighbourhoods, targeting only households in the bottom income decile. CESP is being used to pilot a 'whole house' approach to energy efficiency in England and Wales, where all cost-effective upgrades are applied en-masse to selected dwellings. The programme imposes costs on suppliers expected to be around £100m per annum. We assume that CESP continues to be funded at this level until it's phased out in favour of Green Deal, see below.

4.3 Green Deal

After December 2012 CERT is to be replaced by the 'Green Deal'. This will allow households to obtain energy efficiency upgrades at no upfront cost with payment coming though part of the saving in energy bills. Energy companies will be required, under the new Energy Company Obligation (ECO), to help poorer customers and those in hard to treat homes, and to provide basic heating and insulation to the poorest and most vulnerable households. ECO will replace CERT and CESP. In the absence of additional evidence we assume the mandated cost of Green Deal will be the same as the extension of CERT and CESP combined.

4.4 Feed in Tariffs

Feed in tariffs are intended to encourage micro-generation of renewable energy by guaranteeing an above market price for the first 20 years (25 for photovoltaic) of energy produced. The higher prices are set by government at a level sufficient to make micro generation economically attractive. UK Feed in Tariffs came into force on April 1 2010. As well as paying an above market rate for electricity provided to the grid, micro-generators also receive a payment for the electricity they generate and use. The payments are made by the electricity providers, who presumably pass on the cost to their customers, so the direct cost to government of feed in tariffs is negligible but consumers as a whole pay via higher energy prices. The expected resource cost is £0.6bn per year by 2020 and £8.6bn cumulative to 2030. A review of Feed in Tariffs was announced in Spending Review 2010, in which payments to large photovoltaic installations were reduced following falls in the cost of photovoltaic equipment and higher than expected take-up.

4.5 Smart Meters

By 2020 government wants every household to be equipped with smart meters. The roll-out will begin once the regulatory framework surrounding smart metering has been established around autumn 2013. The cost of the roll-out is expected to be around £800m and will be paid by energy suppliers and passed on to consumers via higher energy bills. We have assumed a cost of £100m per annum from Autumn 2013. Relative to a 'no climate change mitigation policy' baseline, energy prices are expected to be 1-2% higher in 2020 due to smart metering.

4.6 Renewables Obligation

The Renewables Obligation (RO) mandates that electricity suppliers obtain Renewables Obligation Certificates (RoCs) of a quantity proportional to the amount of electricity supplied RoCs are issued to certified renewable power generators who can sell them on to suppliers. If suppliers cannot obtain sufficient RoCs they have the option of paying the buy-out price for the shortfall. The buy-out price in 2008-09 was set at £35.76 per mWh and the price increases each year in line with the previous years RPI. The proceeds of any buyouts are distributed to holders of RoCs according to their share of the total number of renewables certificates. Therefore, the value of a RoC is the buyout-out price, plus the share of buyout revenues; in 2008-09 this was a total of £54.37. This is the implicit subsidy per mWh for renewable energy. As well as the cost of renewables buyouts increasing, the number of renewable certificates required as a portion of energy supplied also increases – from 3% of supply in 2002-03 to 15.4% of supply in 2015.

4.2 Who pays? DECC forecast impact of programmes on utility bills.

DECC (2010b) estimates the impact of these mandated policies on energy prices and consumer and medium size commercial energy bills in 2010, 2015 and 2020. This is compared to a counterfactual of no climate change policies. Note that, in addition to the policies mentioned in the preceding section, the costs here include the impact of the EU ETS, an as yet undefined replacement (or continuation) for CERT beyond 2012 known as the 'Future Supplier Obligation' and some EU efficiency and labelling standards. Table 5 shows DECC's estimated impacts of climate change mitigation policies on energy prices and bills for the 'central' fossil fuel price scenario in which the price of oil is assumed to be $80 per barrel by 2020 (at 2009 prices). DECC assume that transmission, metering and distribution costs rise in line with historical trends. This scenario implies a real increase in electricity wholesale prices of 14% over the next decade and in gas prices of 15%.

Table 5: Forecast increase in energy prices and energy bills

'central' fossil fuel prices

	2010	2015	2020
Domestic Users			
Increase in Gas Prices	4%	9%	12%
Increase in Electricity Prices	15%	29%	40%
Total Increase in Energy Bills	4%	-1%%	-6%%
Commercial Users			
Increase in Gas Prices	6%	9%	18%
Increase in Electricity Prices	20%	28%	43%
Total Increase in Energy Bills	14%	9%	20%

Source: DECC (2010b) p. 6 & p. 10 with cost of RHI netted off.

For domestic users policies are estimated to have increased gas prices by 4% today, rising to 12% by 2020. Electricity prices are thought to be 15% higher than otherwise today and are expected to be 40% higher by 2020. The average impact on actual energy bills will depend on the uptake of energy efficiency measures and renewables incentives. The DECC estimates assume great success in this respect, with average domestic bills expected to be only 4% higher than otherwise today and just 1% higher in 2020. These assumptions may be over-optimistic, not to say complacent. Note also that the costs and benefits of the policies will not be distributed evenly, as those who are able to benefit from the measures will see their bills fall while those who do not will see their bills rise.

5. Distributional impacts: Fuel poverty, social compensation and climate mitigation spending

One major goal of social policy, by no means the only one, is to compensate for market-generated inequalities that are considered inequitable or unjust. Thus we ask what are the distributional impacts of the programmes surveyed above, though we restrict ourselves solely to income differences between households (see Gough et al 2011 for a more detailed analysis of the distributional aspects of carbon emissions and CCMPs).

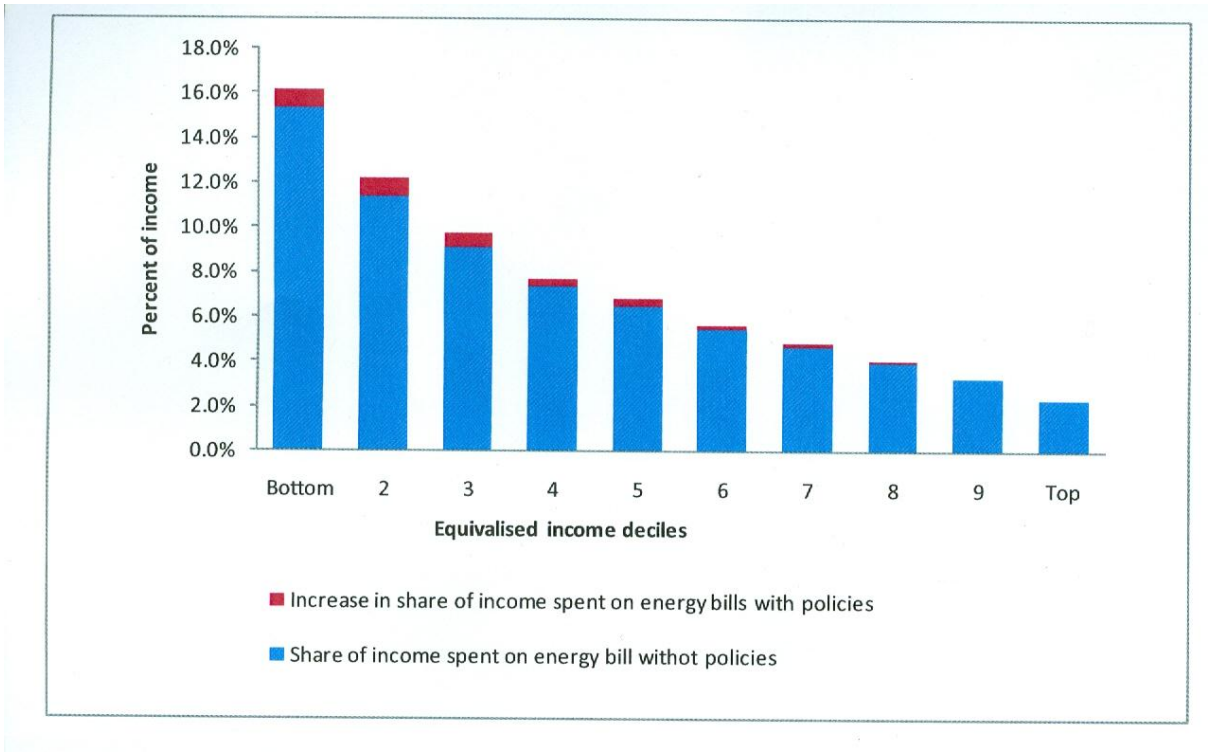
Green taxation: The major item here is fuel duty and, according to a study in 2002-03, a rise in petrol duty impacts more strongly on the upper half of the income distribution (Leicester 2005). Thus fuel duty is slightly progressive in its incidence; however, since there has been little change in the share of this and other green taxes in GDP, the distributional change is neutral. In any case there are principled objections to

estimating the distributional effect of any single tax measure. The overall impact of all taxes is roughly proportionate.

Direct expenditure on CCMPs: The majority of these are targeted on households receiving benefits and tax credits and are thus likely to be progressive in their impact. According to the CCC (2008: 418), the Supplier Obligations could be seen thus far as subsidising energy efficiency improvements for fuel poor households. However, as we have seen, they attract tiny levels of expenditure (less than 0.01% of GDP) and are set to decline.

Mandated expenditure on CCMPs: These programmes are more significant and are planned to grow. We have also noted that they will drive up household energy costs, and are intended to. The DECC estimates discussed above predict that energy bills will rise by over 5% up to 2020 (a very low estimate according to some), the major part of which will be from the ETS and domestic supplier obligations. These burdens will fall more heavily on lower income households – see Chart 2. Thus the overall impact of the current pattern of carbon mitigation programmes in the UK will be regressive.

Chart 2: Increase in energy bills in 2020 for different income deciles



Source: DECC 2010b, p.15, Chart 7

Fuel poverty

'Fuel poverty' is defined in the UK as a situation where a household needs to spend more than 10% of its income on total fuel in order to heat its home to an adequate standard – 21°C in the main living room and 18°C in other occupied rooms during

daytime hours, with lower temperatures at night. This figure is a form of 'capability' measure, which models the number of households who would be spending more than 10% of their income if they chose to maintain these temperatures. Fuel Poverty is driven by four main factors:

- Low income
- High fuel prices, including the use of relatively expensive fuel sources
- Poor energy efficiency of a home
- Under-occupancy of dwellings

Recent figures from DECC's *Annual Report on Fuel Poverty Statistics 20*10 (2010a) shows the proportion of UK households modelled as being in fuel poverty more than doubled in four years, from 2.0m in 2004 to 4.5m in 2008 - or 18% of all households. The main driver was a sharp rise in fuel bills of 18%pa, offset slightly by rising incomes (in the bottom three deciles where over 95% of the fuel poor are located) of 4%pa and improvements in energy efficiency of 2%pa. However, the latter is an average which lumps together a small minority who have gained and a majority who have not. The rise was also driven by a sharp rise of 45% in the number of 'under-occupied' households. A comparison of actual fuel spending with these models suggests that average temperatures have been allowed to fall in response to these higher energy bills.

The CCC estimates that the electricity and gas price impacts of the UK carbon budgets could increase the number of fuel poor households by 1.7m by 2022 (CCC 2008: 395). The costs of taking the extra fuel poor households back out of fuel poverty and mitigating the impact of higher electricity and gas prices on those already in poverty would be of the order of £500m annually. This illustrates the likely future regressive impact of 'mandated market policies' which are intended to be financed from higher consumer bills.

Social compensation versus carbon mitigation

Several of the programmes in sections 3 and 4 have social as well as climate change mitigation objectives, partly directed to those suffering 'fuel poverty'. On the direct expenditure side we have Decent Homes, Warm Front and the Devolved Administrations' Energy Efficiency Programmes. Indirectly, the Carbon Emissions Reduction Target mandates some improvements in energy efficiency for low income households, while the Community Energy Savings programme (and the future Green Deal) is targeted directly at low income households. These programmes constitute direct spending of around £1.1bn and mandated spending of approximately £1.2bn in 2009-10, although not all the mandated spending will flow to low income households.

However, these sums are outweighed by compensation payments (Table 5). In the past, the government's main direct weapons against fuel poverty have been compensatory: Winter Fuel Payments, a flat rate payment of £250 to households with pensioners (£400 if the oldest resident is at least 80) and Cold Weather Payments, which provide additional payments of £25 to pensioners and low income households

for each seven day period where temperatures average below 0˚C. The cost of these was around £2.7bn in 2009-10[3]. To these should now be added the new Warm Home Discount: a mandatory scheme which will automatically award pensioners on Pension Credit annual rebates of at least £120 off their electricity bills, with some support available for other groups too. The Warm Home Discount replaces the previous voluntary agreement with energy suppliers which ended in March 2011. Over the four years of the scheme to 2015, the Warm Home Discount will be worth up to £1.1 billion and is projected to help around 2 million households per year. The scheme is projected to help around two million households per year, with the majority of the rebates delivered by energy suppliers in the winter months.

Thus spending on compensatory fuel poverty programmes has exceeded energy-saving programmes. Professor John Hills has now (early 2011) been appointed by Energy and Climate Change Secretary Chris Huhne to lead an independent Review of the fuel poverty concept, definition and target.

3 http://www.dwp.gov.uk/previous-administration-news/press-releases/2010/march-2010/dwp044-10-120310.shtml

Table 5: Spending on energy efficiency programmes versus compensatory transfers

£m	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Warm Front	150	300	350	360	300	300	200	100	0	0
Devolved Energy Efficiency Programs	95	95	100	100	100	115	115	115	115	115
Decent Homes	670	670	670	650	670	670	670	670	670	670
Carbon Emmisions Reduction Target	300	300	300	1070	1070	1070	1400	700	0	0
Community Energy Saving Program	0	0	0	0	100	100	100	50	0	0
Green Deal (very speculative)							0	750	1500	1500
Social Spending + Environment (Fuel Poverty)	1215	1365	1420	2180	2240	2255	2485	2385	2285	2285
Winter Fuel Payments	1982	2015	2071	2701	2735	2734	2094	2031	1963	1897

Source:
Winter Fuel Payments Source: DWP Expenditure Tables, Table 2

6. Carbon Abatement by Programme

How effective are these programmes in mitigating carbon emissions? It is not easy to monitor past or forecast carbon savings. Table 6 below summarises the information from DECC's *Low Carbon Transition Plan* on how much carbon may be saved by some of the programmes mentioned in this report. The final column then divides this by our estimates of programme costs to estimate the CO2 savings per pound spent. Information was not available for all programmes so our coverage is incomplete. The methodology employed to derive forecasts of CO2 savings appears to vary from programme to programme, and in any case, estimates of future carbon savings must be highly speculative.

The programmes we survey are predicted to save two-thirds of a billion tonnes of CO2 over the period the three Carbon Budget periods from 2008-22. The major contributors are industrial level obligations - the Renewables Obligations and Supplier Obligations which account for about one half billion tonnes. Of the remainder, the most important are CERT, Decent Homes and Warm Front and their successors which between them should save about 100 MtCO2.

Further difficulties are encountered in estimating CO2 saved per pound spent. The costs for CERT are the (forecast) costs incurred due to interventions from 2008-11, divided by forecast CO2 savings attributable to these costs between 2008-22. This is straightforward; however, some of the interventions allowable under CERT, such as insulation, may continue to accrue carbon savings after this period, and some, such as energy efficiency light bulbs, may not. Conversely, the estimate of cost per tonne saved for enhanced capital allowances are (forecast) carbon savings over the lifetime of the intervention.

With these provisos in mind, the implicit CO2 cost in all the programmes exceeds the current ETS carbon price of €15 (c£13) per tonne, or the estimated 'level playing field price' of €40 per tonne (Larsson and Lonnroth, 2010). We also find great variation in the carbon reduction 'efficiency' of different programmes. For example Feed-In Tariffs to subsidise home production of electricity appear to cost almost ten times as much per tonne of carbon saved as does the Renewable Heat Incentive to encourage renewable home heating. The Community Energy Saving Programme which will provide whole house retrofitting for low income households in poorer areas appears to cost over four times as much per tonne saved than does the less ambitious CERT programme to improve domestic energy efficiency partly targeted at households receiving pensions or benefits.

Table :6 Estimated CO2 Savings by Programme

		Spending Period	Cost over Relevant Period £m	MtCO2 Saved in…				Cost of CO2 saving (and unit)	
				2008-12	2013-17	2018-22	**2008-22**		
5.1	Carbon Emissions Reduction Target								
	predecessor policies	*2002-08*		*16.9*	*14.9*	*8.9*	*40.7*		
	current policies	*2008-11*	*3210*	*15.3*	*23.1*	*22.0*	*60.4*	*53*	*£/tonne saved between 2008-22*
	all supplier obligations	*2002-??*		*32.2*	*38.0*	*30.9*	*101.1*		
5.2	Community Energy Saving Programme	2009-12	300	0.5	0.4	0.4	1.3	231	£/tonne saved between 2008-22
5.3	Renewable Obligation (Total)	?	?	52.6	120.5	221.3	394.4		
5.4	Carbon Trust (& SALIX)	?	?	3.9	5.7	5.7	15.3		
5.5	Climate Change Agreements	?	?	20.0	20.5	20.5	61.0		
5.6	Decent Homes + Warm Front + Devolved Administration Programmes	?	?	11.7	12.9	12.9	37.5		
5.7	Green Bus Fund	?	?		0.2	0.9	1.1		
5.8	Carbon Capture and Storage Demonstrations	?	?		5.4	20.9	26.3		
5.9	Feed in Tariffs	2009-20	3100	7	MtCO2 saved to 2020			443	£/tonne saved by 2020
5.10	Renewables Exemption From CCL	?	?	1	MtCO2 saved per year by 2010				
5.11	Enhanced Capital Allowances for Energy Saving Technologies	2010	150	3.2	lifetime MtCO2 for one years induced improvements			47	£/tonne saved
5.12	Landlord Energy Saving Allowance								

Source: All CO2 Savings from DECC (2009) UK Low Carbon Transition Plan

Notes on Table 6:
Forecasts of CO2 savings for 5.1 to 5.7 come from DECC's Low Carbon Transition Plan (2009a)

5.1 Carbon Emissions Reduction Target (CERT)
Mandated spending on previous editions of CERT (from 2002-2008) indicate savings of 40.7MtCO2 between 2008-22. Carbon savings tail off fairly rapidly towards the end of DECC's forecast period, possibly reflecting the heavy reliance on the free distribution of energy saving light bulbs in previous periods. Mandated spending in 2008-11 is estimated to save 60.4MtCO2 with savings holding up well in the final budget period, indicating that the total savings attributable to these interventions is likely to be higher. Estimated spending of £3.2bn by energy companies indicates a cost per tonne of CO2 of £53 across the forecast period although the cost over the lifetime of the interventions is surely lower. Note that the cost of the savings here does not include savings on energy bills by customers in receiving the interventions (although many of these will make co-payments) so the overall cost to society is lower. The cost of savings made by the successor programme to CERT may be higher to the extent that the low hanging fruit is picked first, although this may be somewhat offset by improvements in energy saving technology.

5.2 Community Energy Saving Programme (CESP)
Mandated spending on CESP (2009-12) is forecast to save 1.3MtCO2 from 2008-22, at a cost of £231 per tonne. As with CERT, there are surely further CO2 savings after 2022. The higher cost of savings is not surprising as co-payments under CESP are minimal so the cost is the full cost of installing upgrades, and the whole house approach of CESP means that energy saving upgrades that might not take place under CERT will be implemented. Again, as with CERT but especially applicable to CESP due to the lack of co-payments, the costs do not take into account the reductions in energy bills enjoyed by beneficiaries of the programmes so the costs to society are lower.

5.3 Renewables obligation
The renewables obligation is forecast to save 394.4MtCO2 from 2008-22. This includes savings from future renewables obligation for which the costs are unavailable so the cost per tonne is not available

5.5 Climate Change Agreements
Climate change agreements are forecast to save 61.0MtCO2 from 2008-22. As with Carbon Trust and SALIX, it is not clear which period of spending on these programmes the savings relate to but presumably future activity under these or successor programmes is not included. Note, this represents an increase in the saving expected at the time of the introduction of the climate change levy from around 2.5MtCO2 per year to 4.1MtCO2 per year, highlighting the difficulty in forecasting carbon savings (HMRC 2000 Regulatory Impact Assessment – Climate Change Levy).

5.6 Decent Homes and Warm Front
Warm Front and the devolved administration programmes are forecast to save 37.5MtCO2 from 2008-22. As with Carbon Trust and SALIX, it is not clear which period of spending on these programmes the savings relate to but presumably future activity under these or successor programmes is not included.

5.7 Green bus fund
Green buses, interpreted here as the green bus fund programme but possibly including upgrades to the bus fleet made without central government support, are forecast to

save 1.1MtCO2 from 2008-22. It is not clear precisely what spending these saving relate to.

Forecasts of CO2 savings for 5.9 to 5.13 come from the programmes relevant impact assessments. Any further adjustments are mentioned below.

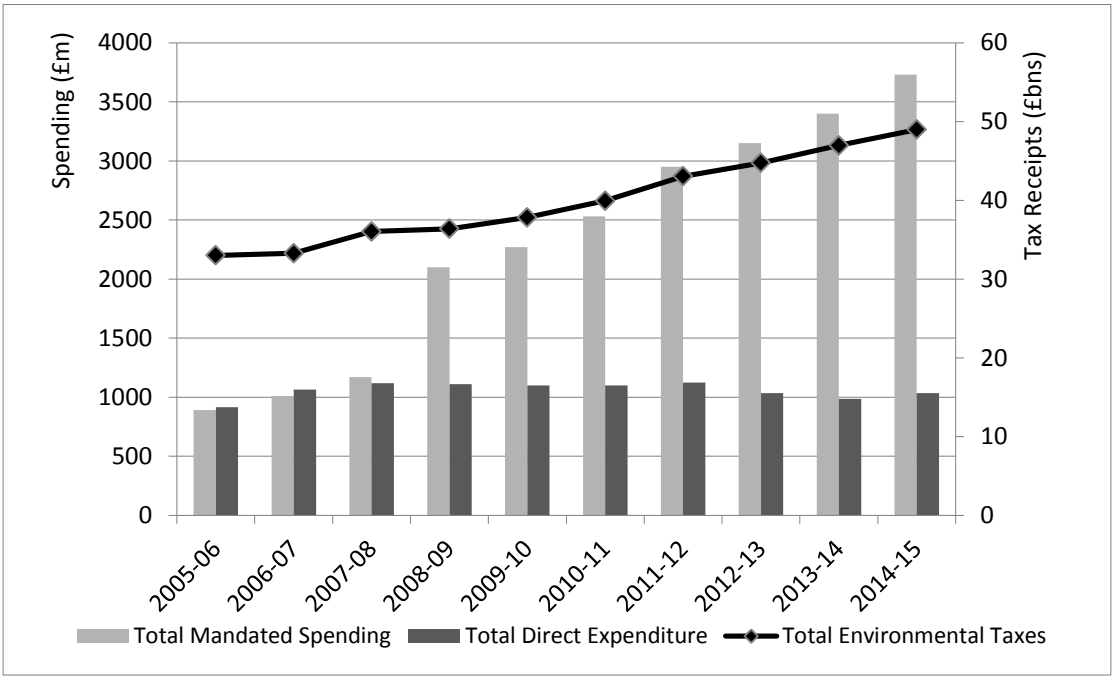
5.9 Feed in tariffs

Feed in tariffs are forecast to save 7MtCO2 by 2020 at a cost to consumers of £3.1bn, or £443 per tonne. It is not clear whether there will be further savings after this period but the resource cost of the carbon saved to 2030 is forecast to be around twenty times the cost of the same quantity of carbon permits.

7. Summary and Conclusions

Chart 3 brings together our expenditure estimates, and Table 7 calculates these in real terms after inflation.[4] We summarise our findings on fiscal costs and then the other issues addressed in this report.

Chart 3: Spending on household climate mitigation and environmental tax receipts



4 We should note here that our figures are much lower than official totals for all *environmental* expenditure. According to the 2010 Treasury Public Expenditure Statistical Analysis (PESA), this totalled £9.6bn in 2008-09, of which £5.7bn (59%) was classified as waste management, the major part of which was local waste collection and disposal and nuclear decommissioning. Yet the spending tagged 'Provision for Nuclear Decommissioning' in the 2008-09 COINS data implies higher expenditure of £5.7bn and an alternative approach, looking at net transfers to the Nuclear Decommissioning Authority, yields a yet greater cost to government of £8.4bn. The Eurostat figure on total environmental spending in the UK in 2008 is higher still at £10.9b. When the expenditure data is gathered on a different basis (albeit with the same system of classification) the results can look quite different!

Table 7: Nominal vs. Real Expenditures

£m	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Nominal Taxes	33,000	33,280	36,030	36,380	37,830	39,930	43,055	44,760	46,975	48,990
Nominal Mandated Spending	890	1,010	1,170	2,100	2,270	2,530	2,950	3,150	3,400	3,730
Nominal Direct Spending	915	1,065	1,120	1,110	1,100	1,100	1,125	1,035	985	1,035
*HMT GDP Deflator (June Budget 2010)**	90	93	96	98	100	103	105	107	110	113
Real Environmental Taxes	36,650	35,760	37,640	36,990	37,830	38,800	41,060	41,730	42,680	43,220
Real Mandated Spending	990	1,100	1,230	2,150	2,280	2,470	2,820	2,950	3,100	3,260
Real Direct Expenditure	1,100	1,240	1,270	1,230	1,220	1,180	1,130	1,020	900	870
*Assumed to increase by 3% in 2014-15										
Nominal GDP (Bns)	**1,274**	**1,348**	**1,424**	**1,432**	**1,403**	**1,474**	**1,539**	**1,620**	**1,710**	**1,796**

Fiscal priorities
The ambitious carbon targets of the 2008 Climate Change Act are not reflected in the UK government programmes and budgets. Direct government spending on all CCM policies is very small – c£1.bn this year and will most likely fall or remain flat through to 2014. Over the same period, mandated spending by the utility companies will rise from £2.5bn to £3.3bn. Yet the two combined amount to a mere 0.24% of GDP now and will rise to 0.27% by 2014. These are tiny sums of money given the scale of government ambitions.

Environmental tax revenues are an order of magnitude greater amounting to some £40bn at present and by the end of this parliament will be around £49bn. But as a share of GDP they are also predicted to fall, from 2.6% to 2.4%. There has been no significant switch to green taxation, nor is one planned.

The consumer will pay
The UK's growing reliance on emissions trading and the 'mandated markets' approach, means that the burden of CMPs falls on energy consumers, and ultimately on households – and this is intended. Rising fuel prices together with some impact from these measures have boosted average fuel bills by 70% from £694 in 2003 to £1200 in 2008 (DECC 2010a). DECC estimates that domestic gas prices will be 12% higher and electricity prices 40% higher by 2020. Yet it also assumes the uptake of energy efficiency measures and renewables incentives will be such that average domestic bills will rise by only 1% by 2020. These assumptions sound complacent; and it is also likely that the better off will gain more from energy efficiency measures.

Fuel poverty and the distributional consequences
The escalation in fuel bills in the early years of this century more than doubled the proportion of UK households modelled as being in fuel poverty. The CCC estimates that the electricity and gas price impacts of the UK carbon budgets could increase the number of fuel poor households by 1.7m by 2022 (CCC 2008: 395). This illustrates the likely future regressive impact of 'mandated market policies' which are intended to be financed from higher consumer bills.

Compensation trumps eco-social investment
At present spending on Winter Fuel Payments alone exceeds the total spent on all carbon efficiency programmes directed to low income households – and to this has now been added the Warm Homes Discount In other words, these (extremely inefficient) compensation payments exceed what have been called 'eco-social investment' programmes which are designed to achieve both social distribution and carbon reduction goals. If compensation remains a major aspect of fuel poverty policy this cost will escalate in the future.

Carbon savings are small and costly
The 'heavy lifting' in carbon savings is expected to be done by the ETS and domestic obligations on energy suppliers. The implicit CO2 cost in all the

programmes we could estimate exceeds the current ETS carbon price of €15 (c£13) per tonne, or the estimated 'level playing field price' of €40 per tonne. There is also great variation: Feed-In and the Community Energy Saving Programme are notably ineffective in terms of savings per pound spent.

Our conclusions are that present central government programmes to reduce direct GHG household emissions are small and patchy. They are increasingly delivered through mandated energy markets which are indirectly financed through average household energy bills. This impacts much more adversely on lower income groups. It is also likely that higher income groups will avail themselves of energy and carbon saving investments and thus see their bills falling or not rising so fast. Those programmes directed to low income households are tiny and stagnant and are outweighed by social programmes designed to compensate fuel poverty but which do nothing to reduce its underlying causes. The ambitious aims of the Climate Change Act are very distant when we dissect current programmes for climate change mitigation at the household level. Moreover, they pose growing dilemmas over fairness which social programmes are ill-designed to meet, and which are in any case being cut back. To reconcile carbon abatement and social equity will entail a more radical synthesis of environmental and social policies which cannot be discussed here (see Gough et al 2011).

Recommendations

The major impact of CCMPs on social policy is likely to be distributional, not fiscal: new ways will need to be found to counteract the regressivity of increasing electricity and fuel prices which any carbon reduction strategy must entail. This is much discussed and we do not have the space to treat this debate here (see eg. CCC 2008 ch.12, Nef 2008, King Badouin Foundation 2010, Preston and White 2010). The major alternatives are a) improved compensation payments for fuel-poor households, b) publicly and separately financed energy efficiency improvements for low income and fuel-poor households, and c) 'social' electricity and fuel tariffs.

Numerous studies have demonstrated that compensating low income losing households is very difficult to do due to the great heterogeneity of such households (variation by housing stock, rural-urban, occupation levels etc) – this is discussed further in Gough et al (2011). The emphasis must remain on the second: much more robust low carbon housing policies, with special help for low income households, for which there is a strong economic as well as social case. The Climate Change Committee has on several occasions called for a 'step change' in household carbon-saving policies and for more upfront government subsidies, but has so far met little government response. The Coalition government is cutting all public spending sharply and is moving further in the opposite direction towards mandated private policies such as Green Deal.

But even if implemented on a radical scale, this would still leave millions of households vulnerable to fuel poverty in the – very long – meantime. The third alternative could then be considered in addition: to adjust the current charging policies of utility companies by lowering the marginal costs of initial units of electricity or gas consumed, and raising the marginal costs of successive units. This would recognise the 'basic need' component of the first block of household energy and the progressive choice element in successive units, and thus would be intrinsically progressive. It would also tackle fuel poverty directly since fuel poor households consume below average amounts of electricity and gas (CCC 2008: 409). This would not incentivise higher emissions, merely redistribute the costs from lower to higher emitters. Though this solution has been raised by the Climate Change Committee it would require a radical shift in the pricing policies and regulation of private utility companies – a reversal of the liberalisation and deregulation agenda of the past three decades.

A combination of a large increase in eco-social investment and the introduction of social pricing of energy would entail a radical change of direction that is nowhere yet in sight.

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