

# 11. Environmental policy

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## Summary

- The government inherited targets to reduce emissions of greenhouse gases and increase the share of renewable energy. A number of initiatives have been proposed to help meet these objectives. Emissions fell markedly during the recession but it is not clear how much of the fall is permanent.
- The government is on track to meet its pledge to increase the share of green taxes in total receipts: green taxes are forecast to rise from 7.9% of receipts in 2009–10 to 8.3% in 2014–15. It is not certain that this is a good measure of a government's environmental credentials.
- Revenues from the Carbon Reduction Commitment will be kept by the Treasury rather than redistributed back to participating firms. This may be a more efficient way to raise revenue than increasing other taxes. Although the change may reduce incentives for firms to abate their emissions, this effect should be modest.
- Proposed reforms to the climate change levy would introduce an additional tax based on the carbon content of fuels. Taxing on the basis of carbon is desirable and may help improve certainty about the future carbon price. However, the proposal will add another layer of complexity to carbon pricing and, despite this change, the range of carbon prices for different users of different fuels is likely to widen rather than narrow in the years ahead.
- A new 'Green Deal' will offer households and businesses investment in energy efficiency measures at no up-front cost, paid for by higher energy bills over a number of years. It will better target energy-inefficient properties than the Warm Front scheme which it replaces, but will be of less benefit to poorer households.
- The government is likely to revisit the idea of a per-plane tax to replace air passenger duty, consulted on but rejected by the previous government. This would be desirable since the relevant externalities of aviation are not directly related to passenger numbers.
- There is continued debate about a 'fair fuel stabiliser' for fuel prices that would see duty rates cut when the pre-tax price rose and vice versa. This would help stabilise household finances, but official estimates suggest that it would make the public finances more uncertain. It would also be very difficult to implement in practice.

## 11.1 Introduction

The government inherited a number of environmental policies and targets from Labour, and it is clear that the environment will be a considerable area of future policy focus. The coalition agreement included a set of commitments on energy, climate change, the

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environment and transport.<sup>1</sup> This chapter considers the policy background facing the government and looks ahead to discuss a number of the more significant reforms that have been suggested or have begun to be implemented.

Economists have long advocated the need for a clear, consistent carbon price as one of the main weapons to reduce emissions, not least Lord Stern in his 2006 review.<sup>2</sup> In advance of the 2010 general election, IFS researchers<sup>3</sup> showed that policies aimed at reducing greenhouse gas (GHG) emissions in recent years have developed in many different directions, generating a range of complex abatement incentives for different sectors of the economy and a number of different carbon prices. This is perhaps somewhat inevitable given that policy operates at regional, national and supranational levels, the complicated nature of the underlying problem, the range of different targets in place (both national and international) and the number of different interest groups involved. However, the greater the complexity and the more noisy the different environmental signals given by different policies, the less likely it is that the desired outcomes will be reached at the lowest cost. A key challenge for the government will be to try to rationalise these policies into something more coherent.

Section 11.2 discusses progress towards environmental targets for greenhouse gas emissions and renewable energy. Section 11.3 looks at environmental fiscal policy, including overall green tax receipts and environmental spending, and asks whether the government is likely to meet its own commitment to increase the share of revenues accounted for by environmental taxes. Section 11.4 then considers a number of policies that have been implemented by the government, or that were suggested as part of the coalition agreement or the individual party manifestos. These are divided into two main areas: energy policy (reforms to the Carbon Reduction Commitment (CRC), the climate change levy (CCL), the electricity market and the introduction of the 'Green Deal') and transport policy (reforms to aviation taxes and a possible 'fair fuel stabiliser'). Section 11.5 assesses what may happen to implicit carbon tax rates applied to different fuels and consumers based on policy reforms announced so far. Section 11.6 concludes.

## 11.2 Environmental targets

### Emissions

The coalition government inherited two main emissions targets:

- a target under the Kyoto Protocol to reduce GHG emissions by 12.5% compared with 1990 levels over the period 2008–2012;
- a series of rolling 'carbon budgets' that are enshrined in law and set by the independent Committee on Climate Change (CCC), designed to take the UK to a long-term objective of an 80% emissions reduction in 2050 compared with 1990 levels.

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<sup>1</sup> See HM Government, *The Coalition: Our Programme for Government*, 2010 ([http://www.direct.gov.uk/prod\\_consum\\_dg/groups/dg\\_digitalassets/@dg/@en/documents/digitalasset/dg\\_187876.pdf](http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_187876.pdf)).

<sup>2</sup> See Stern Review on the Economics of Climate Change ([http://www.hm-treasury.gov.uk/sternreview\\_index.htm](http://www.hm-treasury.gov.uk/sternreview_index.htm)).

<sup>3</sup> P. Johnson, A. Leicester and P. Levell, *Environmental Policy since 1997*, IFS 2010 Election Briefing Note 7 (IFS Briefing Note 94), 2010 (<http://www.ifs.org.uk/bns/bn94.pdf>).

The first three carbon budgets commit to GHG reductions of 22% in 2008–12, 28% in 2013–17 and 34% in 2018–22 relative to 1990 levels.<sup>4</sup>

Analysis by IFS researchers ahead of the 2010 general election showed that the UK was ahead of its Kyoto target for 2008–12 and broadly on track to meet its 2018–22 carbon budget target.<sup>5</sup> This analysis was based on emissions data up to 2008. First estimates of emissions for 2009, the first full year following the financial crisis, have recently been published by the Department of Energy and Climate Change (DECC) and show a marked fall in emissions.<sup>6</sup> Total GHG emissions fell by 8.6% from 628.3 million tonnes of CO<sub>2</sub> equivalent (mtCO<sub>2</sub>e) to 574.6mtCO<sub>2</sub>e. CO<sub>2</sub> emissions alone fell even more sharply, down by 9.7% from 532.8 million tonnes to 480.9 million tonnes. The recession therefore had a substantial impact, particularly on emissions generated by power stations (which fell 13% between 2008 and 2009), business emissions (down 15%) and emissions from industry (down 19%). However, the fall in emissions also meant that UK organisations participating in the EU Emissions Trading Scheme (ETS) held surplus emissions permits, such that in 2009 the UK became, for the first time, a net seller of ETS permits rather than a net buyer. In 2009, the UK sold a net 13.7 million tonnes of CO<sub>2</sub> permits compared with purchasing a net 19.9 million tonnes in 2008. For purposes of emissions targets, this net sale of permits is treated as if UK emissions were 13.7 million tonnes higher (since they allow emissions elsewhere to rise). This offsets the decline somewhat: including net ETS sales, emissions fell by 3.3% between 2008 and 2009. Despite this, one side effect of the recession seems to be that emissions targets look more easily achievable: UK emissions in 2009 were around 14% below their Kyoto target level, and 4% below the trend levels consistent with meeting the medium-term carbon budget for 2018–22. Of course, neither the previous nor current government would have wished to meet emissions targets only as a result of a deep recession. And emissions could rebound as the economy recovers, though at least some of the fall is likely to be sustained to the extent that the impact of the recession on economic output is permanent rather than temporary (see Chapter 1) and that the fall reflects a longer-term downward trend in emissions.

The CCC also considered the impact of the recession on future carbon budgets. In December 2010, it published its advice for the fourth carbon budget period covering 2023–27.<sup>7</sup> The CCC suggested a target to reduce emissions in 2025 to 50% below 1990 levels and to 60% below by 2030, with the reductions coming entirely from domestic action (i.e. excluding net purchases of emissions trading permits). Partly as a result of lower emissions following the recession, it also suggested tightening the second and third budgets; in particular, that the 2018–22 target be tightened to an emissions reduction of 37% below 1990 levels compared with the initial 34%, with the additional reductions required of emissions not currently part of the EU ETS (the ‘non-traded’ sector). The government will decide in Spring 2011 whether to accept these recommendations and will propose legislation for future carbon budgets.

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<sup>4</sup> See <http://www.theccc.org.uk/carbon-budgets>. Note that the carbon budget target is based on a slightly different definition of GHG emissions than the Kyoto target (in particular, carbon budgets exclude emissions from UK Overseas Territories, which are included in the Kyoto totals) but in practice they are similar.

<sup>5</sup> P. Johnson, A. Leicester and P. Levell, *Environmental Policy since 1997*, IFS 2010 Election Briefing Note 7 (IFS Briefing Note 94), 2010 (<http://www.ifs.org.uk/bns/bn94.pdf>).

<sup>6</sup> Figures available from [http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/climate\\_change/1\\_20100325084230\\_e\\_@@\\_2009provisionaldataables.xls&filetype=4&minwidth=true](http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/climate_change/1_20100325084230_e_@@_2009provisionaldataables.xls&filetype=4&minwidth=true).

<sup>7</sup> See Committee on Climate Change, *The Fourth Carbon Budget: Reducing Emissions through the 2020s*, 2010 (<http://www.theccc.org.uk/reports/fourth-carbon-budget>).

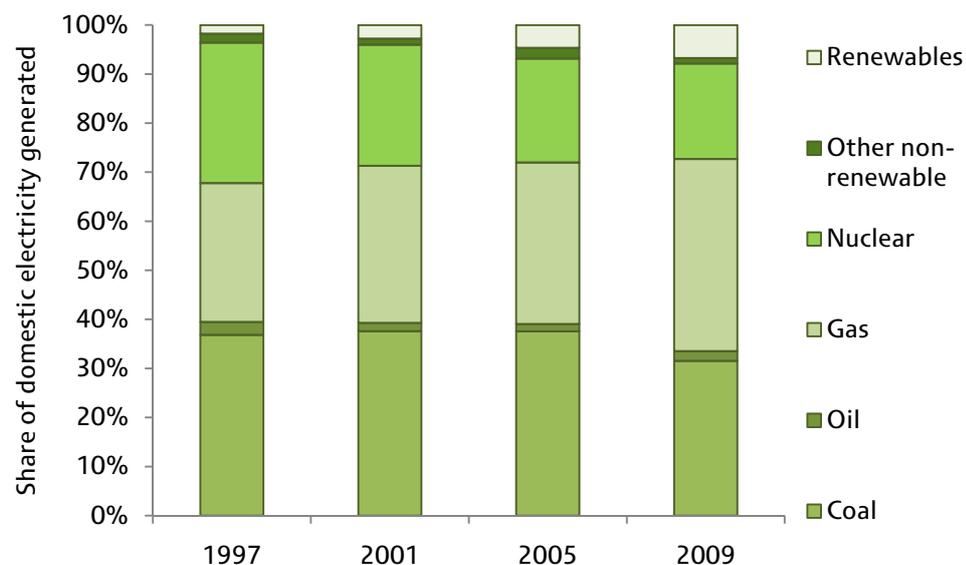
## Renewable energy

The government has also inherited European-level targets on renewable energy. Under the European Renewable Energy Directive 2009, member states were given legally-binding targets to increase the proportion of total energy (including transport fuels) supplied from renewable sources by 2020. The UK's target is 15%.<sup>8</sup> To deliver this, the previous government set itself a goal under the 2009 Renewable Energy Strategy to generate 30% of electricity from renewables by 2020 amongst other measures.<sup>9</sup>

As part of the coalition agreement, the government suggested it would seek to set the renewables target above 15%, and the Secretary of State at DECC, Chris Huhne, asked the CCC to consider the case for a change. In September 2010, the CCC suggested that the overall target should remain unchanged and that the 30% target for renewable electricity generation was also appropriate.<sup>10</sup> Thus it seems likely that the medium-term renewables targets will remain the same as those inherited from Labour.

Although the share of electricity generated from renewables has increased, there is still some way to go to meet the 30% objective (see Figure 11.1). In 1997, just 1.8% of domestic electricity was generated from renewable sources, increasing to 6.7% in 2009. Over the same period, there was a large decline in the share generated by nuclear, from 29% to 20%, and a smaller decline in the share generated by coal, from 37% to 32%. The share generated by gas rose markedly from 28% to 39%.

Figure 11.1. Share of domestic electricity generation by fuel source



Source: Calculated from table 5.4 of *Digest of UK Energy Statistics* ([http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/source/electricity/dukes5\\_4.xls&filetype=4&minwidth=true](http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/source/electricity/dukes5_4.xls&filetype=4&minwidth=true)).

<sup>8</sup> See [http://ec.europa.eu/energy/renewables/index\\_en.htm](http://ec.europa.eu/energy/renewables/index_en.htm).

<sup>9</sup> See [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/res/res.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx).

<sup>10</sup> See <http://www.theccc.org.uk/news/latest-news/747-committee-advises-government-to-focus-on-meeting-current-2020-renewable-energy-target-rather-than-raising-it-10-september-2010>.

The government's Renewable Energy Action Plan contained some details of measures inherited from Labour and planned future measures that would help the UK meet its renewables target.<sup>11</sup> New measures, not discussed in depth in this chapter, include a new Renewable Heat Incentive, announced as part of the October 2010 Spending Review but planned by the previous government. It will provide a total of around £860 million of support to the domestic and non-domestic sectors over the period from June 2011 to March 2015 for installation of renewable heat measures such as solar panels and biomass boilers.<sup>12</sup> The Spending Review also announced plans for a 'Green Investment Bank' (pledged in the coalition agreement), capitalised with an initial £1 billion of resources from public expenditure in 2013–14, to help support private investment in environmental technologies including renewable generation. Details of precisely how this will operate are as yet unclear.

## 11.3 Fiscal policy and the environment

### Environmental taxes

The coalition agreement contained a pledge to 'increase the proportion of tax revenue accounted for by environmental taxes'. This commitment resembles a 'statement of intent' made by Labour shortly after coming to power in 1997 to 'explore the scope for using the tax system to deliver environmental objectives' and to 'shift the burden of tax from "goods" to "bads"'. Interestingly, this statement remains live on the Treasury website, suggesting the principle is adhered to by the current government.<sup>13</sup> Despite this statement, the share of receipts from environmental taxes fell under Labour from 9.5% in 1997 to 7.9% in 2009 (and as low as 7.1% in 2008). This fall was not unique to the UK: amongst OECD countries, the (weighted) average share of receipts from green taxes fell from 5.8% to 5.2% between 1997 and 2007.<sup>14</sup>

An obvious question to ask is whether having a target to raise a minimum proportion of revenues from green taxes is desirable. In general, the answer is 'no': ideally, revenues should be raised as efficiently as possible, whether or not this means a greater reliance on environmental taxes (see Chapter 9). To the extent that environmental damage from carbon or congestion, say, is underpriced in the current tax system, there may well be scope to raise green taxes, but this would not suggest doing so in an indiscriminate manner just to meet an arbitrary revenue target. Optimal policy may well imply environmental tax rates that are different from those that would maximise revenues. Nor is it clear that the green tax share of receipts is a good signal of a government's environmental credentials, for the following reasons:

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<sup>11</sup> See <http://www.decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/energy%20mix/renewable%20energy/ored/25-nat-ren-energy-action-plan.pdf>.

<sup>12</sup> See [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/policy/renewable\\_hat/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/renewable_hat/incentive/incentive.aspx).

<sup>13</sup> [http://www.hm-treasury.gov.uk/tax\\_environment\\_statement\\_of\\_intent.htm](http://www.hm-treasury.gov.uk/tax_environment_statement_of_intent.htm).

<sup>14</sup> See <http://www2.oecd.org/ecoinst/queries/index.htm> for figures for all OECD countries. Note that the OECD uses a slightly different definition of environmental receipts from that used by the UK Office for National Statistics (ONS). On the OECD measure, UK receipts from green taxes fell from 8.5% to 6.8% of the total between 1997 and 2007.

- Environmental incentives in the tax system can be sharpened without raising revenues – tailoring vehicle excise duty payments to vehicle emissions, for example, or reforming the taxation of air travel to a per-plane rather than per-passenger basis.
- If green taxes do change behaviour and reduce the extent to which the taxed activity (emitting GHGs, burning vehicle fuel, and so on) is carried out, this reduces the size of the green tax base, and could, in some cases, lead to a fall in total receipts.
- The green tax share of receipts is sensitive to the size of non-environmental revenues: between 2008 and 2009, the share rose markedly because of a drop in other receipts, not because the tax system became suddenly more ‘environmental’.
- Governments may make use of non-tax instruments – for instance, direct regulation – to achieve environmental goals.

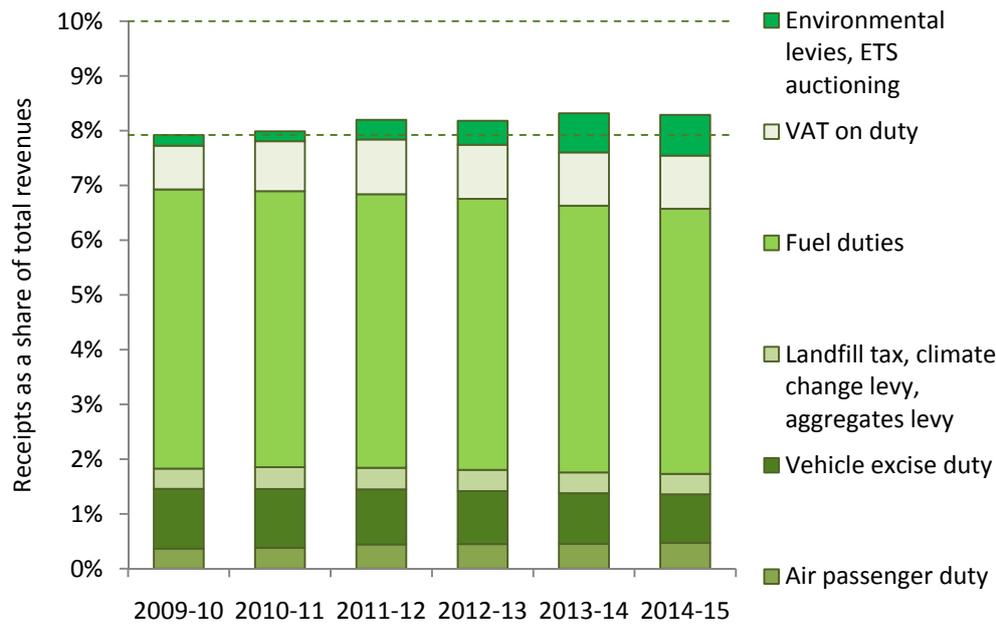
Thus it is important to consider a government’s environmental policy in a wider context than its use of green taxes and the proportion of revenue they account for. However, as the government has made this pledge, it is worth assessing whether it is likely to meet it. To answer this, we need first to define the set of environmental taxes. The ONS’s *Environmental Accounts* includes a particular set of taxes based on international agreements on the definition of environmental taxes, but it is not clear whether the policy will be judged against the same set of taxes – the current classification is subject to an ongoing review.<sup>15</sup> We choose to define environmental taxes as those in the ONS definition and also include a set of ‘environmental levies’ as defined in the latest Office for Budget Responsibility (OBR) forecasts for tax receipts. This includes the Renewables Obligation (RO), the Carbon Reduction Commitment (see Section 11.4), feed-in tariffs under the Clean Energy Cash Back Scheme,<sup>16</sup> and social tariffs for energy supply. We also include forecast receipts from the auctioning of EU ETS permits. To assess the government’s likelihood of meeting its objective, we need to define the target share for green tax receipts. A reasonable interpretation of the coalition agreement’s pledge is that the share in 2014–15 (the end of the current parliament if it runs for a full term) should be at least as high as it was in 2009–10 (the last full year of the previous parliament). On this basis, the pledge looks likely to be met, based on the most recent OBR forecasts for receipts. In 2009–10, total receipts were £513.8 billion, of which green taxes made up £40.7 billion or 7.9%. In 2014–15, total receipts are forecast to be £698.0 billion, of which green taxes are £57.9 billion or 8.3%. This would allow the government to meet its objective with around £2.6 billion to spare. Looking at green tax receipts as a share of national income rather than total receipts, the forecast is an increase from 2.9% in 2009–10 to 3.2% in 2014–15.

Figure 11.2 shows a breakdown of green tax receipts as a share of total receipts between 2009–10 and 2014–15. There is little change in the level or composition of receipts forecast over the current parliament. Indeed, it is clear that the share of green taxes rises only because of the new ‘environmental levies’ and emissions trading revenues – measures introduced by the previous government – that will start to come on stream in the near future. Together, revenues from these sources will rise from around £1.0 billion (0.2% of receipts) in 2009–10 to £5.2 billion (0.7%) in 2014–15. This increase offsets a forecast decline in the share of revenues from duties on fuel, by far the most important green taxes, and from vehicle excise duty.

<sup>15</sup> See <http://www.statistics.gov.uk/pdffdir/ea0610.pdf> for the latest figures.

<sup>16</sup> Not to be confused with proposals for a general system of feed-in tariffs (see Section 11.4).

Figure 11.2. Green tax receipts as a share of total revenues



Notes: Figures for 2009–10 are out-turns; those for other years are forecasts. VAT on duty calculated by assuming fuel duty receipts spread evenly within calendar years and applying appropriate VAT rates. Lower dashed line shows target level for 2014–15 to match 2009–10 out-turn. Upper dashed line shows target of 10% for 2014–15 as voted on at the Liberal Democrat 2010 conference.

Sources: Office for Budget Responsibility (<http://budgetresponsibility.independent.gov.uk/econ-fiscal-outlook.html>); authors' calculations.

It may be, of course, that some in the government would regard an increase in the green tax share from 7.9% to 8.3% as something of a disappointment. For example, the Liberal Democrats' 2010 party conference passed a motion calling for the share of receipts to reach 10%.<sup>17</sup> Raising the share of green tax receipts to 10% by 2014–15 (assuming that all additional green tax receipts are offset by cuts in other taxes, leaving total revenues unchanged) would require green tax revenues in 2014–15 to rise by £11.9 billion in cash terms, or by just over one-fifth above the £57.9 billion forecast receipts that year.

How could the government increase the share of green tax receipts to 10%? It would appear almost impossible to do so with the current green tax system. As fuel duty and associated VAT account for around three-quarters of all green tax receipts, raising significantly more revenue would, in practice, require higher fuel taxes. The government estimates that increasing fuel duties by 1% raises around £295 million,<sup>18</sup> so even a 10% increase in fuel duties would still leave a significant gap. The Liberal Democrats put forward plans in its manifesto to reform air passenger duty into a per-flight tax and introduce a supplementary tax on short domestic flights, expecting them to raise an additional £3.3 billion per year.<sup>19</sup> Even if introduced together with large fuel tax

<sup>17</sup> See <http://www.libdems.org.uk/siteFiles/resources/PDF/Conference%202010/CD%20mon.pdf>.

<sup>18</sup> Source: HMRC, *Tax Expenditures and Ready Reckoners*, December 2010 update ([http://www.hmrc.gov.uk/stats/tax\\_expenditures/table1-6.pdf](http://www.hmrc.gov.uk/stats/tax_expenditures/table1-6.pdf)). Revenue estimate based on 1% increase in duties on diesel, petrol and rebated oils.

<sup>19</sup> See *Liberal Democrat Manifesto 2010* ([http://network.libdems.org.uk/manifesto2010/libdem\\_manifesto\\_2010.pdf](http://network.libdems.org.uk/manifesto2010/libdem_manifesto_2010.pdf)). We discuss reforms to aviation taxation in Section 11.4.

increases, however, green tax receipts would still be some way short of 10% of total revenues.

It therefore seems likely that a more ambitious target could be hit only by introducing new green taxes, the likeliest being new taxes on road congestion and carbon emissions.

Motoring taxes at present are based on fuel consumption (fuel duties) and the type of vehicle chosen (vehicle excise duty, VED). In the long term, increases in these taxes, along with tighter regulation and changing vehicle manufacturing technology, are likely to see consumers choosing more fuel-efficient vehicles, which limits the potential growth in revenues from these taxes. Ultimately, there may be widespread adoption of electric vehicles, which, under the current system, would see receipts from fuel taxes and VED fall substantially. This, of course, would be desirable in the context of climate change policy. However, current rates of fuel duty can really only be justified in the light of the congestion costs of motoring, and these costs would remain even were all vehicles electric. This illustrates the fact that fuel taxes are particularly poor at targeting congestion costs. Thus there is a strong case for pricing congestion separately from the other environmental costs associated with motoring.<sup>20</sup> The coalition agreement included plans to 'work towards the introduction of a new system of HGV road user charging', though the previous government had also considered and abandoned plans for road pricing for lorries; there is no sign of any intention to introduce road pricing for private vehicles.

Additional taxes on carbon may therefore be the most likely source of substantial new green tax revenues. Analysis of the revenue potential of a broad-based carbon tax from last year's IFS Green Budget<sup>21</sup> suggests that full auctioning of all permits in the EU ETS with a simultaneous carbon tax applied on non-ETS emissions at the same price could raise £13.4 billion, before behavioural responses. This analysis was based on emissions as they were in 2007 and estimates of the likely carbon price in the traded sector at the time of the 2010 Green Budget. A new analysis of these figures suggests the yield of such a tax could be substantially lower than previously estimated for two (related) reasons:

1. The recession was partly responsible for a fall in GHG emissions from 636.2mtCO<sub>2</sub>e in 2007 to 627.6mtCO<sub>2</sub>e in 2008.<sup>22</sup>
2. The scale of the recession has seen emissions fall across Europe, meaning the caps placed on EU-wide emissions under the ETS now appear much less stringent than before. This, coupled with some methodological changes, has led to a fall in DECC's assessment of the likely price of permits going forward. Permits sold in 2010 would fetch on average £14.10 per tonne of CO<sub>2</sub> according to the most recent estimates,<sup>23</sup>

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<sup>20</sup> See section 5.6 of D. Fullerton, A. Leicester and S. Smith, 'Environmental taxes', in J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (eds), *Dimensions of Tax Design: The Mirrlees Review*, Oxford University Press for IFS, 2010 (<http://www.ifs.org.uk/mirrleesreview/dimensions/ch5.pdf>).

<sup>21</sup> See M. Brewer, J. Browne, A. Leicester and H. Miller, 'Options for fiscal tightening: tax increases and benefit cuts', in R. Chote, C. Emmerson and J. Shaw (eds), *The IFS Green Budget: February 2010*, IFS Commentary 112, 2010 (<http://www.ifs.org.uk/budgets/gb2010/10chap7.pdf>).

<sup>22</sup> Note that this is the estimate of emissions from the UK and Crown Dependencies. This is slightly different from the 628.3mtCO<sub>2</sub>e emissions figure for 2008 quoted in Section 11.2, which is based on the Kyoto Protocol emissions definition which also includes UK Overseas Territories.

<sup>23</sup> See [http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/carbon%20valuation/1\\_20100610131858\\_e\\_@\\_@\\_carbonvalues.pdf](http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/carbon%20valuation/1_20100610131858_e_@_@_carbonvalues.pdf).

lower than the £22 per tonne according to previous estimates (and the 2008 figure of £21 per tonne on which our previous assessment of the likely tax yield was based).<sup>24</sup>

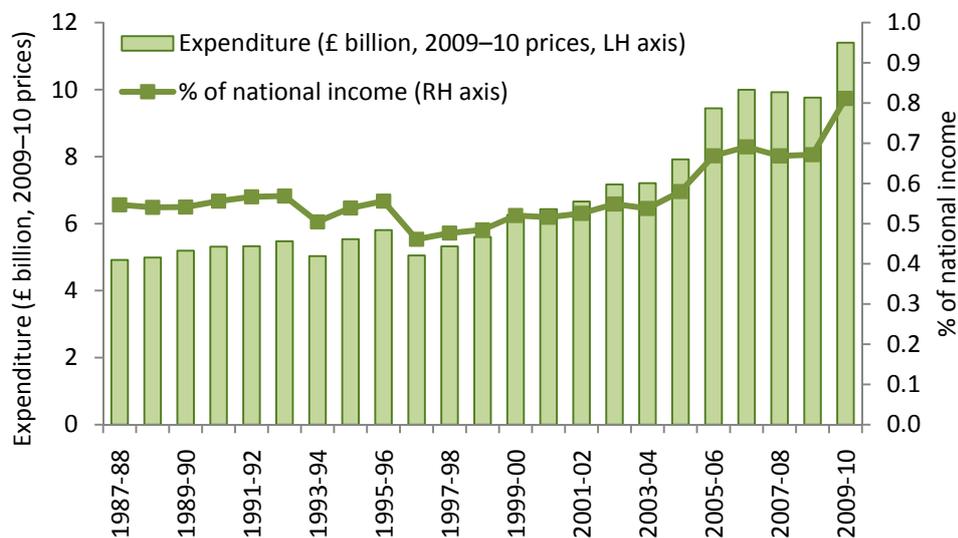
Taken together, our revised estimate is that a broad-based carbon tax introduced now at £14.10 per tonne (assuming that emissions as part of the ETS were covered by auctioned permits sold at this value) would raise £8.8 billion a year, falling to £6.5 billion a year once offsetting cuts were made to fuel duty (which would no longer play a de facto carbon tax role) and the CCL abolished (since emissions in energy use would be priced). These estimates are based on detailed emissions patterns in 2008, but as we noted in Section 11.3, total emissions also fell markedly in 2009. Applying a tax rate of £14.10 per tonne to estimated total 2009 emissions gives revenues of £8.1 billion, though as yet it is not possible to determine what receipts would be once particular sectors were exempted.

## Environmental expenditures

Having explored environmental taxes, it seems natural to consider the other side of the fiscal balance sheet and look at spending on the environment. In particular, how did the environment fare in the October 2010 Spending Review in the face of sharp reductions in planned real expenditures on public services?

This is a difficult question to answer since it is not clear how to measure public spending on the environment. We can look at past spending by function based on the UN Classification of the Functions of Government (COFOG) groups, one of which is 'environmental protection'.<sup>25</sup> This includes spending on waste management (street cleaning, refuse collection, landfill costs and so on), waste water management (including

Figure 11.3. Environmental protection expenditure



Note: Figures for 2009–10 are estimates.

Source: Tables 4.2 and 4.4 of HM Treasury, *Public Expenditure Statistical Analyses 2010* ([http://www.hm-treasury.gov.uk/pespub\\_pesa10.htm](http://www.hm-treasury.gov.uk/pespub_pesa10.htm)). Nominal expenditure figures are converted to 2009–10 prices using GDP deflators from HM Treasury ([http://www.hm-treasury.gov.uk/data\\_gdp\\_fig.htm](http://www.hm-treasury.gov.uk/data_gdp_fig.htm)).

<sup>24</sup> See Department of Energy and Climate Change, *Carbon Valuation in UK Policy Appraisal: A Revised Approach*, 2009

([http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/carbon%20valuation/1\\_20090715105804\\_e\\_@@\\_carbonvaluationinukpolicyappraisal.pdf](http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/carbon%20valuation/1_20090715105804_e_@@_carbonvaluationinukpolicyappraisal.pdf)).

<sup>25</sup> See [http://www.hm-treasury.gov.uk/d/cofog\\_definitions\\_coins250609.xls](http://www.hm-treasury.gov.uk/d/cofog_definitions_coins250609.xls).

sewer systems and water treatment), pollution abatement, biodiversity protection and R&D expenditures related to the environment. Using this measure, Figure 11.3 shows expenditures on environmental protection both in real terms (2009–10 prices) and as a share of national income since 1987–88. In the 1980s and 1990s, environmental protection spending was typically stable at around 0.5–0.6% of national income, but it began to rise in the 2000s to reach more than 0.8% in 2009–10.

Over the period shown, real expenditures more than doubled, from £4.9 billion to £11.4 billion. As a share of total public spending, spending on environmental protection rose from 1.3% to 1.7%. The increase in real spending in recent years has been driven mostly by capital expenditure. In 2004–05, real current environmental protection spending was £6.9 billion and capital spending £1.0 billion. By 2009–10, these figures were £8.4 billion and £3.0 billion respectively. Capital spending on environmental protection rose from around one pound in eight of the total to one pound in four.

It is hard to estimate how environmental protection spending is likely to change in the years ahead, since the Spending Review does not set out future planned expenditure by function. However, environmental protection expenditure is dominated by two departments. In 2008–09, around two-thirds of the total spent on environmental protection (£6.0 billion out of £9.3 billion) came from the Department for Environment, Food and Rural Affairs (DEFRA) – this represented some 57% of total DEFRA expenditures that year. Just under a fifth of environmental protection spending (£1.5 billion) came from DECC, amounting to 59% of total DECC expenditures. The rest of environment spending came largely from the devolved administrations (in total contributing 17% of environmental protection expenditure, but in all cases accounting for 3% or less of the total departmental budget) and the Department for Business, Innovation and Skills (BIS), which contributed 4% of environmental protection spending (£0.4 billion) which made up only 2% of the departmental total budget.<sup>26</sup>

Thus, future environmental protection spending is likely to be highly correlated with future spending by DEFRA and DECC. Table 11.1 summarises the settlements for these departments, as set out in the 2010 Spending Review and taking into account the most recent forecasts for inflation from the OBR, compared with the average across all departments. The most striking point is the large real increase of almost 44% in DECC's capital budget, compared with a 40% decline in the DEFRA capital budget and an average 30% real reduction in capital spending across departments. By 2014–15, capital

**Table 11.1. Real cumulative change in departmental budgets, 2010–11 to 2014–15**

Department	Current budget	Capital budget	Total
DECC	–24.6%	+43.7%	+15.5%
DEFRA	–27.6%	–39.7%	–31.3%
Total DECC and DEFRA	–26.6%	+22.0%	–7.0%
Average across total DELs	–8.1%	–29.5%	–11.7%

Source: Authors' calculations from HM Treasury, *Spending Review 2010*, Cm 7942, 2010 ([http://cdn.hm-treasury.gov.uk/sr2010\\_completereport.pdf](http://cdn.hm-treasury.gov.uk/sr2010_completereport.pdf)) and inflation forecasts from the OBR November update. Current budget includes depreciation. Capital budget is gross.

<sup>26</sup> Calculated from table 5.1 of HM Treasury, *Public Expenditure Statistical Analyses 2010* ([http://www.hm-treasury.gov.uk/d/pesa\\_2010\\_tables\\_chapter5.xls](http://www.hm-treasury.gov.uk/d/pesa_2010_tables_chapter5.xls)).

expenditure is planned to account for more than 70% of DECC's total departmental spending compared with less than 60% in 2010–11. Both departments face much-larger-than-average real cuts to current expenditures (which in large part arise from the decision to protect the NHS and schools budgets from deep real cuts in spending). However, the sharp increase in DECC capital expenditure means that there will be an increase in the two departments' combined capital budgets of 22%.

The large increase in DECC's capital budget appears to be driven mainly by investment of up to £1 billion in carbon capture and storage (CCS) demonstration plants, which featured as part of the coalition agreement. The idea behind CCS is to remove carbon emissions at source from fossil-fuel-fired power stations and to store the carbon for the long term so that it does not enter the atmosphere. The Spending Review document (paragraph 2.101) noted the possibility that further CCS investment could be funded through a levy on electricity supplies, though no decision has yet been made on this.

## 11.4 Environmental policy reforms: enacted, planned and potential

### Energy policy

During the previous government's period of office, a number of policies were enacted with the intention of reducing the emissions associated with energy use.<sup>27</sup> By and large, these policies focused on business and industrial energy generation and consumption rather than domestic energy use: for example, the CCL, the EU ETS, the RO and the CRC. Policy on domestic energy focused largely on encouraging energy efficiency improvements, either through direct subsidies (such as the Warm Front scheme) or through regulations on energy suppliers (such as the Carbon Emissions Reduction Target). Indeed, the most striking policy change affecting domestic energy prices directly during Labour's tenure was to reduce the VAT rate on domestic energy from 8% to 5%. This means that domestic fuel prices are now in effect subsidised by almost 15% through reduced VAT<sup>28</sup> and vastly offsets increases in domestic energy bills that are estimated to result from the various policies imposed on the non-domestic sector (for example, through energy suppliers passing on the costs of the ETS and RO to final bills).<sup>29</sup> Recent DECC estimates suggest that energy and climate change policies in 2010 increased combined household gas and electricity energy bills on average by around £42 per year, or 4% of the bill without the policies. The average bill was estimated at £1,103; had VAT been charged at 20% instead of 5%, the bill would have been £1,261, suggesting the implicit VAT subsidy on domestic energy bills is about £158 per household per year.

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<sup>27</sup> For a summary, see section 3 of P. Johnson, A. Leicester and P. Levell, *Environmental Policy since 1997*, IFS 2010 Election Briefing Note 7 (IFS Briefing Note 94), 2010 (<http://www.ifs.org.uk/bns/bn94.pdf>).

<sup>28</sup> For a discussion of why the extensive use of reduced- and zero-rating in VAT is undesirable and why distributional objectives may be better met through changes to income taxes, see chapters 7 to 9 of J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba, *Tax by Design: The Mirrlees Review*, Oxford University Press for IFS, 2011 (<http://www.ifs.org.uk/mirrleesReview/design>). Chapter 9 of this Green Budget contains a summary.

<sup>29</sup> Some of the incidence of business energy tax and regulation policies may also be felt by consumers in the form of higher prices for other, non-energy goods and services. For figures that follow, see Department of Energy and Climate Change, *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills*, 2010 ([http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/markets/impacts/impacts.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/markets/impacts/impacts.aspx)).

So far, the current government appears likely to continue the trend of focusing direct price policies on the non-domestic sector while encouraging energy efficiency improvements in the domestic sector. In this subsection, we discuss three main energy reforms that have been announced by the government:

- a change to the way revenues are distributed in the CRC, which was announced in the Spending Review;
- reforms to the supply of electricity, including a possible carbon tax on generation;
- the 'Green Deal' for domestic energy, which will enable energy efficiency measures to be installed at no up-front cost.

Common to each is the issue of how they interact with the EU ETS. If the reforms reduce the overall demand for energy, then power suppliers will be able to reduce their demand for emissions permits in the ETS. However, in the short term, this will simply allow other ETS participants to raise their emissions, since the overall emissions cap is set at a supranational level. Since emissions have the same impact regardless of where they are generated, domestic energy policy can only have an impact in a global sense if, in the long run (i.e. in future phases of the ETS), the emissions cap is reduced to take account of the reduction in UK emissions.

### *Reform of the Carbon Reduction Commitment*

The CRC is a carbon trading scheme which was announced by the previous government and began in April 2010.<sup>30</sup> It covers both private firms and public sector organisations (including hospitals and local authorities) that are relatively large consumers of energy but are not covered by the EU ETS.<sup>31</sup> Organisations covered by the CRC are required to report on their carbon emissions each year (imputed by their use of different fuels and energy consumption) and to buy enough permits to cover their total emissions. Initially, these permits will be sold at a fixed price (£12 per tonne of CO<sub>2</sub> for 2011–12), although it is expected the permits will be sold through an auction from 2014–15. Participants will buy these permits at the beginning of each year on the basis of their expected emissions, and then trade in a secondary market to ensure they have enough to cover their actual emissions at the end of the year. A league table that ranks each organisation's overall performance on various dimensions will also be published.

The 2010 Spending Review announced two major changes to the CRC:

- First, the sale of allowances for the first year (2011–12) is to be delayed to April 2012 rather than being held in April 2011 as originally envisaged. This means that firms will be able to purchase allowances for their actual emissions rather than for their expected emissions in 2011–12, and that there will be no need for trading in the secondary market in that year.
- Second, revenues from the sale of carbon allowances are to be kept by the government as part of general revenues rather than, as previously planned,

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<sup>30</sup> Further details of the CRC are available at <http://www.environment-agency.gov.uk/business/topics/pollution/98263.aspx>.

<sup>31</sup> Only certain sectors are covered by the ETS (see the UK's National Allocation Plan, [http://www.decc.gov.uk/assets/decc/what%20we%20do/global%20climate%20change%20and%20energy/tacling%20climate%20change/emissions%20trading/eu\\_ets/euets\\_phase\\_2/phase\\_2\\_nap/nap-phase2.pdf](http://www.decc.gov.uk/assets/decc/what%20we%20do/global%20climate%20change%20and%20energy/tacling%20climate%20change/emissions%20trading/eu_ets/euets_phase_2/phase_2_nap/nap-phase2.pdf)).

redistributed to firms taking part. This is expected to raise around £1 billion or so per year by 2014–15.<sup>32</sup>

Perhaps unsurprisingly, there was criticism of the latter change from business groups and other bodies representing those affected. The CBI argued that the change ‘effectively [turns the CRC] into a new green tax’ and ‘reduces the incentives for good behaviour’.<sup>33</sup> The Local Government Association also criticised the move, but suggested that ‘the changes would give a greater incentive to reduce energy consumption’.<sup>34</sup>

What can we say about the impact of the decision not to recycle revenues to participants? First, some of the revenues would have gone to public sector organisations covered by the scheme. Part of the change is therefore just a redistribution of revenues across branches of government, including from local to central government. Estimates from the CCC show that around 21% of the emissions covered by the scheme come from the public sector.<sup>35</sup> Local authorities may want to try to compensate for the lost revenue by raising additional income from council tax or local charges, but the effect of the change to the CRC is small compared with the size of the overall cuts in local government funding as part of the Spending Review (see Chapter 6).

Second, what about the impact on private firms covered by the scheme? Most obviously, these firms will now shoulder a greater share of the total costs of reducing emissions than before. However, a key point to make is that the CRC was *always* effectively a ‘new green tax’ that put an additional price on carbon. Whether or not revenues are redistributed, the CRC raises firms’ energy costs at the margin. The impact of the change on firms’ incentives to use energy depends on how it affects these marginal costs. Since the planned redistribution of revenues would have been based only partially on reductions in a firm’s energy consumption, the effect of not having this redistribution on firms’ marginal costs of energy is probably small.<sup>36</sup> Indeed, for this reason, the decision not to redistribute the revenues could be an efficient (in the sense of having little additional distorting effect on behaviour) way of reducing the deficit compared with raising other taxes.<sup>37</sup>

As the quotations above show, there is some confusion over whether the end of revenue recycling increases or diminishes firms’ incentives to reduce energy use. What can we say about this? Originally, the amount a firm could expect to receive back would have depended on its baseline emissions, adjusted by a bonus or penalty factor determined by its ranking in a league table of all CRC participants. This league table will still be published and will be based on three factors:

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<sup>32</sup> This change probably will not affect the government’s objective to raise the share of receipts accounted for by green taxes (see Section 11.3) since the revenues would likely have counted as green tax receipts in any case. However, with revenue recycling, the revenues would have been simultaneously scored in government expenditures, whereas this is no longer the case. Unless the government chooses to spend the additional revenue elsewhere, the net effect is therefore to reduce the size of the deficit.

<sup>33</sup> [http://www.cbi.org.uk/pdf/cbi\\_csr\\_20\\_analysis.pdf](http://www.cbi.org.uk/pdf/cbi_csr_20_analysis.pdf).

<sup>34</sup> <http://www.publicfinance.co.uk/news/2010/10/lga-slams-carbon-tax-plan/>.

<sup>35</sup> See Committee on Climate Change, *The CRC Energy Efficiency Scheme: Advice to Government on the Second Phase*, 2010 (<http://www.theccc.org.uk/reports/carbon-reduction-commitment>).

<sup>36</sup> To the extent that the end of revenue recycling will reduce firms’ incentives to cut their energy consumption, it in fact *decreases* firms’ marginal energy costs. However, there are reasons to believe this effect is modest (see below).

<sup>37</sup> The change may reduce the incentive for smaller firms to grow larger, as this may mean that they run the risk of becoming eligible to participate in the CRC in the future.

- early action taken by firms before the CRC began;
- the absolute amount of emissions reduction;
- the reduction in carbon intensity (emissions per pound of turnover).

Since baseline emissions and pre-scheme action are not affected by decisions taken as part of the scheme, at least part of the amount recycled would have been independent of any emissions reduction: scrapping this part of the revenue recycling therefore has no incentive effects on energy use. On the other hand, as part of the league ranking would have depended on how successful the firm was at reducing its emissions, ending revenue recycling may slightly weaken incentives to reduce emissions, but there are reasons to believe the effect could be modest:

- First, only part of the ranking depends on actual emissions reduction performance.
- Second, the ranking is partly determined by emissions intensity (largely so as not to penalise growing firms), meaning firms can still perform well in the league table even if their absolute emissions level rises.
- Third, at least part of the motivation for reducing emissions is about the reputation effects of a good league table ranking rather than about the financial incentives, and these effects will remain in place.
- Fourth, the reform increases the net cost of the CRC to firms, which could make it more visible in firms' decision-making and actually help reduce emissions.
- Fifth, the government still retains ultimate control over firms' incentives to abate: if there were concerns that firms' incentives to abate were diminished, the government could simply choose to increase the carbon price or tighten the emissions cap in future rounds of the scheme.

Overall, therefore, ending revenue recycling will probably only have a small effect on the environmental impact of the CRC, and could make a small but valuable contribution to reducing the fiscal deficit.

### *Reform of the climate change levy and wider reforms of electricity supply*

The climate change levy is a tax on business energy use, introduced in April 2001. The rates vary according to the type of fuel supplied, but not directly with the carbon content of different fuels. All non-renewable electricity, for example, is charged at 0.47p/kWh, heating gas at 0.164p/kWh and coal at 1.281p/kg. Although renewable energy is exempt, the very different carbon contents of different sorts of non-renewable electricity mean that the implicit carbon tax rates embodied in the CCL vary substantially. Nuclear electricity, for example, generates essentially no carbon emissions but is still subject to the same rate of CCL as coal-fired electricity, which is estimated to produce 915 tonnes of CO<sub>2</sub> per gigawatt-hour supplied, and as gas-fired electricity, which produces 405 tonnes.<sup>38</sup> The implicit 'carbon tax' on coal from the CCL is £5.14 per tonne of CO<sub>2</sub>, on gas is £11.60 per tonne and on nuclear is essentially infinite.

In opposition, the Conservative Party proposed reforming the CCL.<sup>39</sup> The original proposals for reform included the following:

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<sup>38</sup> See table 5A of <http://www.decc.gov.uk/assets/decc/Statistics/publications/dukes/311-dukes-2010-ch5.pdf>.

<sup>39</sup> <http://www.conservatives.com/~media/Files/Green%20Papers/Rebuilding-Security.ashx?dl=true>.

- levying the tax on power generators rather than on energy use, and, in so doing, allowing the tax rate to vary with the carbon content of different fuels supplied more straightforwardly;
- allowing generators to reduce their liability for the CCL by the value of emissions trading permits purchased or allocated. This would have introduced a 'floor price' for carbon: the generator would pay the higher of the ETS and CCL carbon prices.

This proposal had two key objectives: first, to target better the CCL on carbon emissions, giving generators an incentive to discriminate between different fossil fuels on the basis of their carbon contents (effectively promoting gas and nuclear over coal); and second, to give firms greater certainty over the returns to low-carbon sources of energy, which should make them more attractive to investors.

On 16 December 2010, the government launched a consultation on plans to reform the CCL.<sup>40</sup> These are similar in spirit to, but different in practice from, the proposals outlined by the Conservatives. Rather than replacing the CCL on energy use, the government has proposed supplementing it with an additional tax (or 'carbon price support rate') from April 2013, levied on the carbon content of fossil fuels supplied to electricity generators. The intention is to use the new tax to achieve a more predictable increase in the total carbon price (including the ETS price). The precise mechanism by which the new tax will stabilise carbon prices is subject to the consultation: the tax rate may be subject to some fixed annual escalator or be adjusted annually according to either projected future ETS prices or actual ETS prices over the preceding year.

The rates of the new levy are yet to be decided, but the government presented 'illustrative' scenarios where the levy varies between £1 and £3 per tonne of CO<sub>2</sub> in 2013, rising to a projected rate of between £3.70 per tonne and £23.70 per tonne in 2020 (based on the latest DECC assumption that the ETS price in 2020 will be £16.30 per tonne and a range of target prices between £20 and £40). Assuming UK emissions from energy generation are in line with those in the National Allocation Plan for the EU ETS (just under 190 million tonnes of CO<sub>2</sub> in 2012),<sup>41</sup> initial revenues are therefore likely to be small: around £190–570 million in 2013 depending on the rate and actual emissions that year. This, of course, may also help the government achieve its objective to raise the share of revenues generated from green taxes. By 2020, the CCC estimates that power sector emissions will need to be just over 100 million tonnes to be consistent with long-term targets,<sup>42</sup> so revenues then may be around £0.4–2.4 billion depending, again, on the actual rate and emissions in 2020.

The new levy on inputs will clearly make low-carbon forms of generation (renewables and nuclear) relatively more attractive to investors. It will also make gas relatively more attractive than coal for producing electricity. It does not look as if the new levy will apply to gas or oil used for heating, which will potentially create an unwelcome incentive for firms and households to switch from electricity to other fuels.

By introducing a new tax on carbon and not replacing the CCL outright, this reform will widen the range of different carbon prices that apply to different sectors of the economy,

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<sup>40</sup> [http://www.hm-treasury.gov.uk/consult\\_carbon\\_price\\_support.htm](http://www.hm-treasury.gov.uk/consult_carbon_price_support.htm).

<sup>41</sup> See [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/change\\_energy/tackling\\_clima/emissions/eu\\_ets/euets\\_phase\\_ii/phaseii\\_nap/phaseii\\_nap.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/change_energy/tackling_clima/emissions/eu_ets/euets_phase_ii/phaseii_nap/phaseii_nap.aspx).

<sup>42</sup> See [http://downloads.theccc.org.uk/s3.amazonaws.com/4th%20Budget/4th-Budget\\_Chapter6.pdf](http://downloads.theccc.org.uk/s3.amazonaws.com/4th%20Budget/4th-Budget_Chapter6.pdf).

adding complexity to an already complex system of different incentives. On the one hand, it represents the first direct pricing of carbon that will affect households as well as businesses, which is to be welcomed, but it does not appear to bring us closer to a consistent carbon price for all emissions, which would help reduce emissions in the most efficient way (see Section 11.5). If the government is able to achieve a more predictable carbon price through this new levy, then it may help encourage investment in renewables (though it could reduce the incentive for firms and households to invest in improvements in energy efficiency if one motive for this is to insure themselves against unpredictability in energy prices). However, it is not clear whether these proposals would generate more certainty than the ideas outlined by the Conservative Party before the election to introduce a direct floor price for carbon. A simple rate escalator for the new duty will increase the overall carbon price, but leave the same variation in the underlying ETS price, and attempting to adjust the levy on the basis of forecasts of future ETS prices may lead to more volatility if forecasts turn out to be wrong. In the face of unexpected shocks to wholesale electricity prices, there may also be political pressure not to implement any planned increases in the new tax rate, similar to the pressure not to raise rates of fuel duties in the face of high oil prices during most of the last decade (see the discussion of the ‘fair fuel stabiliser’ below). These pressures may undermine the extent to which additional certainty is generated. Given the inherent difficulties in forecasting wholesale energy pricing in the longer term, it would be desirable for the government to spell out conditions under which it would review the policy.

Alongside proposals to reform carbon pricing, the government is consulting on wider reforms to electricity supply. Most significant are proposals to replace the current Renewables Obligation with a so-called ‘feed-in tariff’ (FIT) for low-carbon sources of energy from 2013.<sup>43</sup> The FIT supports the price of low-carbon sources of energy by mandating that low-carbon generators receive a higher price than the going market rate for their electricity. This higher price is effectively paid for by consumers through a higher average price for electricity. The FIT can therefore be seen as a tax on electricity consumption that is used to subsidise low-carbon generators.

The government has yet to decide how the FIT will support the price of low-carbon sources of energy. The consultation laid out three possible options:

- ‘premium FIT’ – essentially a per-unit subsidy to low-carbon generators;
- ‘fixed FIT’ – a guaranteed fixed price for low-carbon energy;
- ‘contract for difference’ (CfD), which also pays a fixed price; however, if prices rise above the contracted level, the suppliers would return some of the additional revenue to consumers. This is the government’s preferred option.

Shifting from the RO to FITs as a means to achieve renewables targets is effectively a move from a ‘quantity-based’ to a ‘price-based’ economic instrument. Under the RO, energy suppliers are mandated to provide a given percentage of their energy from renewable sources, with the option to use ‘buyouts’ at a fixed price if they are unable to meet their obligation. Under FITs, the price of renewables will be subsidised directly.<sup>44</sup> In

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<sup>43</sup> <http://www.decc.gov.uk/en/content/cms/consultations/emr/emr.aspx>. Feed-in tariffs currently exist for microgeneration (<http://www.fitariffs.co.uk/FITs/>); the proposals here would extend these to all suppliers of renewable energy.

<sup>44</sup> Note that because buyout payments made under the RO are returned to firms according to the number of renewable certificates they supply, the RO also effectively subsidises renewable energy. The key difference is that the subsidy under FITs is either constant or adjusted so as to make the prices firms receive more stable,

general, quantity-based instruments provide greater certainty that a given target will be met whereas price-based instruments give firms more certainty over the profitability of their investments by making the price or subsidy they receive more predictable.

The proposed FITs differ from the RO in two further respects. First, FITs would apply to nuclear generators, unlike the existing RO which only covers renewable sources of energy. Second, the RO is currently 'banded': a MWh generated from certain renewable sources counts more towards firms' obligations than a MWh generated from others. This obviously steers firms toward adopting particular technologies. These incentives would disappear unless the FIT is similarly 'banded', potentially making the FIT a more market-based approach to promoting low-carbon forms of energy by allowing investors to choose the cheapest form of low-carbon generation themselves.

### *The 'Green Deal'*

The 2010 Spending Review announced the creation of the 'Green Deal', which had been promised in the coalition agreement. More details were published by DECC in December 2010.<sup>45</sup> Final details are subject to consultation, but the main features are expected to be as follows:

- Households and businesses will be able to install certain energy efficiency measures at no up-front cost. Instead, repayment will take place (with interest) through energy bills over a number of years. Before any Green Deal is agreed, properties will be visited by an adviser who will assess energy performance and advise on which efficiency measures to install. The initial costs of installation will be met by high-street lenders and other financial institutions that want to sign up as 'Green Deal providers'. Interest rates will not be subsidised, although repayment structures and interest rates will be regulated.
- Consumers will be able to repay Green Deal loans early if they wish. Consumers who default will be treated in the same way as those who default on energy bill payments (including, for example, receiving protection against disconnection during winter).
- The Green Deal will be available to businesses and domestic consumers. Owner-occupiers and renters will be included, though renters will not be able to agree a deal without their landlord's consent. If landlords appear reluctant to take up the Deal, some compulsion may be introduced (from 2015).
- Liability to repay the loan will fall on the property rather than the individual. Thus if someone moves out, the next owner or tenant will continue to pay for the measure; this makes sense, because they will be the beneficiaries of an earlier decision to install energy efficiency products.
- Only measures for which, on average, the estimated energy savings offset the expected total costs including interest are included. This is likely to mean that installation of microgeneration technologies (for example, solar panels and wind turbines) will not be covered. The precise list of which measures will be included has yet to be defined.

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whereas under the RO the effective subsidy declines as firms get closer to meeting their targets and the use of buyouts falls.

<sup>45</sup> See Department of Energy and Climate Change, *The Green Deal: A Summary of the Government's Proposals*, 2010 (<http://www.decc.gov.uk/assets/decc/legislation/energybill/1010-green-deal-summary-proposals.pdf>) for a summary.

- The Green Deal will replace the Warm Front scheme,<sup>46</sup> which currently provides grants for energy efficiency measures for low-income and vulnerable households. Government expenditures under Warm Front were £345 million in 2010–11, but were set to fall to £100 million in 2012–13.<sup>47</sup>

There is a clear rationale for a policy like the Green Deal. Considerable evidence has built up to suggest that what appear to be profitable installations of energy efficiency measures (in the sense that the energy savings would more than offset the cost of installation) are not taken up.<sup>48</sup> This could be for a number of reasons. Most obviously, consumers may be credit constrained and unable to finance up-front payments for some measures, and would therefore respond to a policy such as the Green Deal which allowed them to repay over a long period. Consumers may be unaware of the potential energy savings from different measures, and if information is provided as part of the policy (either directly by government, energy companies or Green Deal providers) coupled with an energy performance assessment, this may help increase overall take-up of energy efficiency measures (though this could also suggest a policy to raise awareness rather than setting up a credit structure). There is also considerable evidence that installation of energy efficiency products is particularly poor in the private rented sector. For example, the latest English Housing Survey, for 2008, found that 32% of private rented properties with cavity walls had them insulated, compared with more than 40% of owner-occupied properties and more than 50% of social housing. Similarly, only around a quarter of private tenants with lofts had more than 150mm of insulation, compared with a third of owner-occupiers and half of social properties.<sup>49</sup> This is almost certainly because landlords are currently responsible for making these investments, but do not obtain direct benefits from the lower fuel bills which are paid by tenants (the so-called ‘principal–agent problem’). In theory, more energy-efficient rental properties could charge higher rents as a way for landlords to appropriate these benefits, but this would probably require a straightforward way for prospective tenants to verify that measures have been installed. By reducing the up-front cost of improvements to zero, and making tenants pay for improvements in energy efficiency through energy bills rather than through their rent, the Green Deal could help correct this particular market failure.

Tying the liability to repay to the property rather than the individual means that people who are considering moving should not be disincentivised from taking up the Green Deal.<sup>50</sup> The intention is that prospective tenants or owners of a property should be made aware of any liabilities they face under the Green Deal before moving in. This will need to be made very transparent to avoid the situation where someone planning to sell their property had the incentive to take up the scheme and to capitalise the value of the energy

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<sup>46</sup> See <http://www.warmfront.co.uk> for details. A scheme called the Landlords’ Energy Saving Allowance, which allows landlords to offset up to £1,500 against their income tax liabilities for installing particular energy efficiency products, will be ended from April 2015; this had been pre-announced by the previous government and was not directly linked to the introduction of the Green Deal.

<sup>47</sup> See [http://www.decc.gov.uk/en/content/cms/news/csr\\_hmt\\_releas/csr\\_hmt\\_releas.aspx](http://www.decc.gov.uk/en/content/cms/news/csr_hmt_releas/csr_hmt_releas.aspx).

<sup>48</sup> See, for example, McKinsey’s ‘cost curves’ showing negative marginal abatement costs for domestic energy efficiency measures (<http://www.mckinsey.com/client-service/sustainability/costcurves.asp>).

<sup>49</sup> <http://www.communities.gov.uk/documents/statistics/pdf/1750754.pdf>. A study based on older data in England found that private renters were less likely to have loft insulation, wall insulation or double glazing even conditional on other dwelling and resident characteristics; see V. Brechling and S. Smith, *The Pattern of Energy Efficiency Measures amongst Domestic Households in the UK*, IFS Commentary 31, 1992 (<http://www.ifs.org.uk/comms/comm31.pdf>).

<sup>50</sup> Brechling and Smith (op. cit.) found that those who said they were planning to move were less likely, all else equal, to have certain energy efficiency measures, although the effects were not statistically significant.

efficiency products in the asking price without themselves paying much of the actual cost. Information on Green Deal liabilities could be included, for example, on the Energy Performance Certificate which should be provided to potential buyers or tenants by sellers or landlords.

The Green Deal scheme represents a clear shift from direct government provision of energy efficiency measures to a more market-focused approach. The role of government will be limited, and focused on helping to set up the infrastructure for, providing information about and regulating the scheme. The Warm Front scheme, which it will replace, provides energy efficiency products worth up to £6,000 to eligible low-income and vulnerable households as a way of trying to combat fuel poverty. Two reports from the National Audit Office on Warm Front had been somewhat critical of the scheme.<sup>51</sup> There were two main criticisms:

- First, because it was targeted on poor and vulnerable households, it was not necessarily targeted on those who lived in the least energy-efficient properties; many grants were, therefore, given to households already living in relatively energy-efficient homes. With a fixed budget for Warm Front, a greater impact on fuel poverty might have been possible if eligibility had been based on both income and the current energy efficiency of the property.
- Second, the size of grants available was not always enough to cover the cost of the work. In this case, households were required to make up any difference, which was not always possible.

The move to the Green Deal may help address both criticisms: presumably, those households that would stand to make the biggest gains in reduced energy use will be the most likely to take up the scheme (assuming that the main reason they do not invest in energy efficiency already is either constrained credit or a lack of information); and the Green Deal should involve zero up-front costs to households other than the time and inconvenience associated with installing the measures. Another potential benefit of the Green Deal compared with Warm Front is that there should in principle be no limit on the total value of energy efficiency measures that could be installed under the Green Deal, whereas under Warm Front there was an annual cap on the total value of grants, meaning that more households in total may benefit.

However, there may be some concerns about the change. Low-income households would have been eligible for a full grant under Warm Front to cover the cost of the work. All else equal, poorer households are less likely to take up the scheme than richer households, since they may be more concerned about repaying the loan over the long term through increased energy bills, though there may be additional help for poor households.<sup>52</sup>

Overall, although Warm Front benefited the poor (and thus was probably more progressive, in the sense of being worth more to the poor than the rich), the Green Deal appears to be a more efficient way to reduce energy use.

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<sup>51</sup> National Audit Office, *Warm Front: Helping to Combat Fuel Poverty*, 2003 ([http://www.nao.org.uk/publications/0203/warm\\_front\\_helping\\_to\\_combat.aspx](http://www.nao.org.uk/publications/0203/warm_front_helping_to_combat.aspx)); National Audit Office, *The Warm Front Scheme*, 2009 ([http://www.nao.org.uk/publications/0809/the\\_warm\\_front\\_scheme.aspx](http://www.nao.org.uk/publications/0809/the_warm_front_scheme.aspx)).

<sup>52</sup> From 2013, the government plans to replace existing obligations on energy companies to provide energy efficiency measures that partly (the Carbon Emissions Reductions Target) or wholly (the Community Energy Saving Programme) focus on the poor with a new Energy Company Obligation (ECO) which will be focused entirely on support for poor and 'hard to treat' households. Details of the new ECO are as yet unclear.

A final consideration for any policy designed to encourage energy efficiency is the so-called 'rebound effect', which suggests that the savings in terms of fuel bills and carbon emissions may be less than expected.<sup>53</sup> Greater energy efficiency effectively reduces the cost of heating the home, and households may respond to this by keeping their home warmer, rather than keeping their home at the same temperature as before but at a lower cost. A study from Sweden that modelled the hypothetical effect of a 20% improvement in energy efficiency in transport and heating found a 1.3% rise in CO<sub>2</sub> emissions as a result, compared with a 'no-rebound-effect' baseline fall in emissions of 6.2%.<sup>54</sup> The size of the rebound effect for domestic energy efficiency measures will be an important consideration for policymakers. At present, it is not empirically clear, although a robust evaluation of the Green Deal may well shed some light on this.

## Transport policy

### Aviation taxes

Air passenger duty (APD), a tax on passengers departing from UK airports, was first levied in 1994. Until April 2001, there were two rates: one for passengers flying to European Economic Area (EEA) countries and one for those flying outside, who paid twice as much. From April 2001 to November 2009, APD was reformed so that those flying non-economy class paid twice as much as those flying economy, and those flying outside the EEA paid four times as much as those flying inside. Real-terms rates of APD rose markedly under the previous government, by 57–542% depending on the destination and class of flight.<sup>55</sup>

The coalition agreement contained a pledge to 'replace Air Passenger Duty with a per-flight duty'.<sup>56</sup> This was followed in the June 2010 Budget with the announced intention to consult on 'changes to the aviation tax system, including switching from a per-passenger to a per-plane duty, which could encourage fuller planes'. However, as yet, no more detailed proposal to reform aviation taxes has been provided.

Such a reform would be desirable, as we discussed in analysis published in a previous Green Budget.<sup>57</sup> It would give airlines a clearer incentive to fly their aircraft fully loaded, and would more easily allow freight-only flights to be brought into the tax system. In 2007, the previous government launched a consultation on reforming APD into a per-plane tax, a measure which at the time had cross-party support. However, following the consultation, the government abandoned the plan.<sup>58</sup> Instead, it maintained a per-

<sup>53</sup> See, for example, S. Sorrell, 'Jevons' Paradox revisited: the evidence for backfire from improved energy efficiency', *Energy Policy*, 2009, 37, 1456–69.

<sup>54</sup> R. Brännlund, T. Ghalwash and J. Nordström, 'Increased energy efficiency and the rebound effect: effects on consumption and emissions', *Energy Economics*, 2007, 29, 1–17.

<sup>55</sup> See table 3.1 of P. Johnson, A. Leicester and P. Levell, *Environmental Policy since 1997*, IFS 2010 Election Briefing Note 7 (IFS Briefing Note 94), 2010 (<http://www.ifs.org.uk/bns/bn94.pdf>).

<sup>56</sup> The Liberal Democrat manifesto included a plan to introduce a per-plane tax coupled with a supplementary tax on short domestic flights (under 300 miles) which together were expected to raise an additional £3.3 billion. The Conservative manifesto included a commitment to 'reform Air Passenger Duty to encourage a switch to fuller and cleaner planes' but did not specify any more detail.

<sup>57</sup> A. Leicester and C. O'Dea, 'Aviation taxes', in R. Chote, C. Emmerson, D. Miles and J. Shaw (eds), *The IFS Green Budget: January 2008*, IFS Commentary 104, 2008 (<http://www.ifs.org.uk/budgets/gb2008/08chap9.pdf>).

<sup>58</sup> See [http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/media/E/2/consult\\_aviation310108.pdf](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/media/E/2/consult_aviation310108.pdf) for the initial consultation document and [http://webarchive.nationalarchives.gov.uk/20100407010852/http://www.hm-treasury.gov.uk/d/pbr08\\_aviationduty\\_395.pdf](http://webarchive.nationalarchives.gov.uk/20100407010852/http://www.hm-treasury.gov.uk/d/pbr08_aviationduty_395.pdf) for the response.

passenger charge but increased from two to four the number of different payment bands, which were based on the distance between London and different national capitals (though all flights to EEA countries still fall within the same band). Within each distance band, those flying non-economy continue to pay twice as much. Current rates range from £12 for an economy flight within Band A (countries with capitals within 2,000 miles of London) to £170 for a non-economy flight to Band D (more than 6,000 miles).<sup>59</sup>

The decision not to implement the per-plane tax appears to have been mainly based on two issues:

1. the lack of a clear tax base for flights that would correlate well with the emissions generated;
2. a concern that the tax would create an incentive for people flying long distances to take a short flight out of the UK, followed by a longer flight to their final destination, something that would probably increase the overall environmental costs of flying.

These issues clearly remain, but a move to a per-plane tax is nevertheless still a good idea. The previous government proposed basing a per-flight tax on a combination of distance flown and the maximum take-off weight (MTOW) of the aircraft, both of which were argued to be good proxies for emissions: heavier aircraft generally emit more carbon for a given distance flown, and aircraft that fly further emit more. However, MTOW is not perfectly correlated with emissions: some recent aircraft are heavier but less polluting than older models, meaning that a tax based on weight could discourage investment in more fuel-efficient aircraft. Further, airlines may be able to improve the efficiency of their existing fleet (i.e. the relationship between MTOW and emissions is not necessarily fixed) and the tax system should not discourage this. In its response to the consultation, the Civil Aviation Authority (CAA) suggested that the weight of the aircraft could be adjusted by an age factor such that newer planes were taxed more lightly for a given weight, recognising that more recently developed aircraft are generally more efficient. This is not always the case, however, and could in turn encourage premature fleet replacement, which could be environmentally costly. As an alternative, the CAA suggested a banded system of weights with lower tax rates for the most efficient aircraft within each band, though this creates the potential for difficult and opaque decisions about which aircraft to favour in this way.<sup>60</sup> A good tax base in principle would be the CO<sub>2</sub> emissions of different aircraft, but comprehensive data on these do not currently exist; it would, therefore, seem sensible to encourage such data to be collected and made available before any future reform to APD. Indeed, given the intention to include aviation in the EU ETS from 2012 (see below), it is hard to imagine that there will not be wide demand for such information.

The fact that aircraft weight and distance flown are not perfect proxies for the emissions of a flight is not in itself a good reason to have rejected the change. As a possible basis for a tax, weight and distance are almost certainly more closely correlated to emissions than passenger numbers and destination.

Transfer and transit passengers are exempt from APD. Under a per-plane tax, it would be hard to maintain these exemptions. This may encourage those who would at the moment

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<sup>59</sup> Details of which countries fall into each APD band can be found at [http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?\\_nfpb=true&\\_pageLabel=pageExcise\\_InfoGuides&propertyType=document&id=HMCE\\_CL\\_000505#P28\\_1885](http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_InfoGuides&propertyType=document&id=HMCE_CL_000505#P28_1885).

<sup>60</sup> <http://www.caa.co.uk/docs/5/20080424CAAResponseOnAviationDutyFinal.pdf>.

transfer at, say, Heathrow to transfer at airports on the near continent instead. A per-plane tax may also encourage passengers to take a short initial flight and then a longer connecting flight (though the tax could be levied according to the final destination). In each case, the incentives to change behaviour would depend on the size of the tax passengers would face relative to the costs of doing so (the costs of booking two flights rather than one, the inconvenience of making a transfer elsewhere and so on). If the differential between short- and long-haul flights were large, these behavioural responses would be more likely. One reason to limit this differential is that the external costs associated with a flight by a given type of aircraft include a relatively large fixed component: GHG emissions and noise associated with the take-off and landing cycle.<sup>61</sup>

The need to try to find some complex design for aviation taxes that at least reasonably approximates the emissions generated stems from the fact that taxes on aviation fuel are not permitted under Article 24 of the 1944 Chicago Convention (which established the International Civil Aviation Organisation). Were fuel taxes in place, there would obviously be greater incentives for airlines to use less fuel, and to earn as much profit from a given amount of fuel by flying fully loaded. It would seem desirable to try to find ways to tax aviation fuel by some sort of international agreement. Even without this, it would still be possible and sensible to tax aviation fuel used on domestic flights, and it would also be sensible for VAT to be levied on domestic aviation.

There are plans to include aviation in the EU ETS from 2012, with airlines being given a cap of 97% of their total average emissions between 2004 and 2006, falling to 95% in 2013. It is expected that 15% of permits will be auctioned in 2012.<sup>62</sup> Including aviation in the ETS substantially limits the rationale for domestic aviation taxes designed to deal with carbon emissions. Any reform of aviation taxes that was consulted on during 2011 would probably not come into force until 2012, so it would be crucial that the relationship between the ETS and domestic tax policy were a key focus of any such consultation. But even if aviation enters the ETS, there would remain scope for taxes on flights designed to tackle non-carbon externalities, such as noise and the pollutants other than GHGs (all of which are more closely related to the characteristics of the flight than the number of passengers), and to raise revenue to the extent that flights remain outside the VAT and fuel duty system.

### *A 'fair fuel stabiliser'*

In 2008, the Conservative Party put forward a proposal for what it called a 'fair fuel stabiliser' (FFS).<sup>63</sup> The idea of the policy would be to use fuel duty rates as a stabilising instrument to try to reduce the volatility of the pump price of vehicle fuel caused by fluctuations in oil prices: fuel duty rates would be cut when oil prices rose and increased when oil prices fell. The proposal was mentioned in the June 2010 Budget: the OBR was asked to assess the impact of oil price shocks on the public finances. In the light of this,

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<sup>61</sup> Noise and congestion costs may also differ from airport to airport (e.g. depending on local population density), which suggests tax rates should vary according to airport of origin as well. There have been reports this may be considered, e.g. <http://www.telegraph.co.uk/travel/travelnews/8232228/Air-passengers-face-higher-tax-to-fly-from-London.html>.

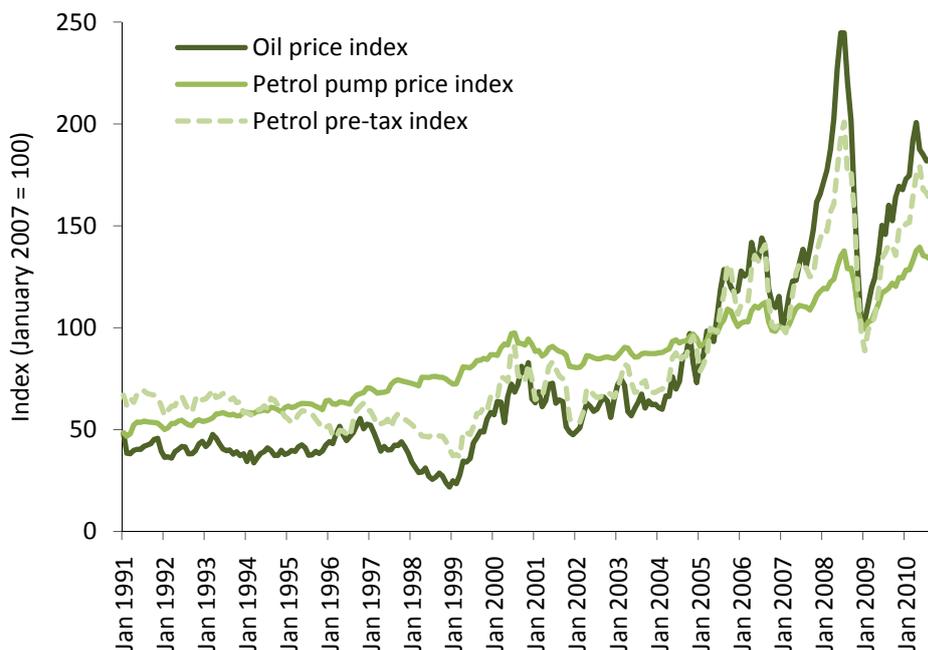
<sup>62</sup> See [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/change\\_energy/tackling\\_clima/emissions/eu\\_ets/aviation/aviation.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/change_energy/tackling_clima/emissions/eu_ets/aviation/aviation.aspx).

<sup>63</sup> See <http://www.conservatives.com/~media/Files/Downloadable%20Files/A%20Fair%20Fuel%20Stabiliser%20A%20consultation%20on%20the%20future%20of%20fuel%20taxation.ashx?dl=true>.

the government would then ‘examine options for the design of a fair fuel stabiliser’. More recent statements from David Cameron suggest the idea is still being considered.<sup>64</sup>

In fact, high fuel taxes in themselves help stabilise pump prices of fuel, at least compared with pre-tax costs which are driven mostly by oil prices. Figure 11.4 shows indices for the nominal price of oil acquired by refineries, pre-tax petrol prices and pump petrol prices since 1991. Oil and pre-tax petrol costs have shown huge recent volatility, both more than doubling between 2007 and 2008, then falling back just as quickly to their initial levels before rising rapidly once more. At the same time, volatility in pump prices was much smaller, though still far greater than the long-run trend, because the cost of oil acquired by refineries is such a small fraction of the final pump price.

Figure 11.4. Oil and petrol price indices



Source: Authors' calculations from DECC statistics on fuel prices

(<http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/source/prices/qep411.xls&filetype=4&minwidth=true>).

Indeed, the relative stability of the upward trend in petrol prices over most of the period represents a somewhat informal ‘stabiliser’ policy operated by both the previous Conservative and Labour governments. During the 1990s, when pre-tax prices were low, real-terms fuel taxes were increased annually as part of an escalator policy begun in the Spring 1993 Budget. When pre-tax prices began to rise after 1999, the escalator policy was abandoned and real-terms fuel taxes fell significantly, but pump prices continued to rise as the oil price rose further. The most recent rise in oil prices, since 2009, has been accompanied by small real-terms increases in duty following the announcement of a renewed escalator policy in the 2009 Budget, under which duty rates will rise by one penny over inflation each year to 2014–15. It will be interesting to see whether these planned increases go ahead: during the 2000s, planned increases in duty rates were often postponed or cancelled. Alistair Darling’s last Budget, in March 2010, announced that the

<sup>64</sup> For example, <http://www.bbc.co.uk/news/uk-12144966> and <http://www.bbc.co.uk/news/uk-politics-12123843>.

planned increase in April 2010 would be staggered in three parts, rather than implemented in full in one go. Should oil prices remain high, it is possible that George Osborne may decide not to implement, or to delay, planned duty increases.

In considering an FFS, the Conservatives suggested three major benefits of the policy:

1. greater stability in household finances from a more stable fuel price;
2. greater stability in the public finances;
3. greater certainty over the cost of carbon.

We consider each in turn, and then offer some thoughts on the practical difficulties in implementing an FFS policy.

An FFS would help stabilise household finances. Vehicle fuel is a significant and growing part of the overall household budget: the average household spent 4.9% of its total (non-housing) budget on fuel in 2009, compared with 4.4% in 1999 and 3.5% in 1989.<sup>65</sup> On average, vehicle fuel is a greater share of the budget for richer households than poorer ones. In 2009, households in the poorest expenditure decile spent, on average, 1.6% of their budget on fuel and those in the 2<sup>nd</sup> decile spent 3.8%. This compares with 5.7% to 5.9% for those in deciles 5 to 8, though the share was slightly lower for those at the very top of the spending distribution (5.1% in the 9<sup>th</sup> decile and 4.0% in the top decile). The policy could also help stabilise prices of other goods for which fuel costs are a significant part of overall production costs. However, if one reason for households to invest in fuel-efficient new cars is insurance against volatile future fuel prices, increasing the stability of fuel costs under the FFS could reduce the take-up of low-carbon vehicles, and thus raise transport emissions.

The other claims for the effects of the policy are harder to justify. An FFS could only stabilise the public finances if an increase in oil prices actually increased overall tax revenues.<sup>66</sup> Some studies have suggested that revenues rise following higher oil prices, but only after a lag.<sup>67</sup> Following the Budget, the OBR published its own estimates of the impact of oil prices on the public finances.<sup>68</sup> It concluded that a temporary \$10/barrel rise in the price of oil lasting one year would raise just £100 million in the year of the shock and see revenues fall by £700 million the following year, as the negative effects of reduced output outweigh increased revenues from oil and gas. For a permanent \$10/barrel increase, the impact on the public finances was estimated at between a £1.2 billion revenue gain and a £0.7 billion revenue loss in the first year, falling to a loss of between £1.5 billion and £3.5 billion in the fourth year. Based on the OBR estimates, therefore, there would not appear to be any clear revenue gain from either a permanent or a temporary shock to oil prices. An FFS would achieve less, not greater, stability in the public finances. David Cameron's recent statements on the FFS have tended to suggest the idea will be implemented only if there is expected to be a revenue gain to the Exchequer from higher oil prices.<sup>69</sup> It is possible the Treasury may disagree with the OBR's analysis

<sup>65</sup> Based on data from the UK Expenditure and Food Survey.

<sup>66</sup> In general, higher oil prices generate higher North Sea oil and gas revenues and higher VAT receipts from fuel purchases. However, these are offset both by lower receipts from other corporations and individuals (as economic activity in general is depressed by higher oil prices) and by lower VAT receipts from other spending if consumers substitute their purchasing patterns.

<sup>67</sup> See R. Barrell, A. Choy, S. Kirby, R. Metz and O. Pomerantz, 'Prospects for the UK economy', *National Institute Economic Review*, 2005, 193, 37–52.

<sup>68</sup> See [http://budgetresponsibility.independent.gov.uk/d/assessment\\_oilprice\\_publicfinances.pdf](http://budgetresponsibility.independent.gov.uk/d/assessment_oilprice_publicfinances.pdf).

<sup>69</sup> For example, 'Is there a way in which when the oil price goes up, if the Treasury is getting more revenue out of that oil, can we find a way of sharing that risk with the consumer' (<http://www.bbc.co.uk/news/uk-politics->

and argue there is a revenue windfall, but it would need to explain carefully why it disagrees if this is the case.

Nor is it clear that an FFS would generate greater certainty over the cost of carbon. The usual rationale for fuel taxes is the external costs associated with motoring, including carbon and other pollutants, noise, road damage and congestion. These costs, imposed on others, are not taken into account by motorists, which results in excess levels of motoring at the pre-tax fuel price. Fuel taxes are an instrument, albeit an imperfect one, through which these costs can be priced into the decisions made by motorists. The costs associated with emitting a tonne of carbon into the atmosphere are probably fairly constant and do not depend on the pre-tax price of fuel. Thus carbon costs do not give a convincing economic rationale to vary fuel taxes according to the pre-tax price.

However, carbon only represents a small part of the external cost of motoring. By far the largest externality is congestion. It seems reasonable to assume that the marginal congestion externality increases with higher traffic levels. Since higher pre-tax prices will reduce traffic volumes, it may well be that marginal congestion costs fall when oil prices rise. This may provide a better rationale for lower fuel taxes when pre-tax prices rise, though, as discussed earlier, fuel duty is a particularly poor instrument to target congestion externalities. A further rationale for the FFS (but not one given by the government) arises from the oligopolistic nature of oil supply: if higher oil prices result from a strengthening of market power by oil suppliers, then pre-tax fuel prices will be above marginal costs, and this might suggest a case for lower fuel taxes to improve economic efficiency.

However, the arguments in favour of an FFS have to be set against the practical difficulties of implementing it. If the oil price increased at a known, unchanging trend rate with random fluctuations around this trend, then it would be relatively straightforward to design a target path for pump prices where any variation in oil prices was offset by changes in duty rates, in a way that was essentially revenue neutral in the long run. The main difficulties in this case would be deciding how frequently taxes should be adjusted, whether any lags in implementing tax changes risked increasing rather than reducing volatility of final prices, and whether there was a 'ratchet' effect, whereby it was relatively easy and popular to cut taxes when prices rose but much more difficult to raise taxes when prices fell. However, as Figure 11.4 above makes clear, trends in oil prices can be hard to forecast accurately and are probably not stable over time. For example, the large spike in prices in 2008 appears to have been temporary, though it may not have been obviously so at the time. If the government gets the trend wrong, or fails to adjust to a new trend, fuel taxes could rise or fall significantly before the 'mistake' is realised. This might then require big sudden policy adjustments, which would undermine claims to greater stability.

So, in summary, an FFS would stabilise household finances, but official estimates suggest that it would make the public finances more uncertain. It would also be very difficult to implement in practice.

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[12123843](http://www.bbc.co.uk/news/uk-12144966)); 'But the concept that when the oil price rises – and it has risen – if that yields extra revenue to the Treasury is there a way of sharing the burden between the Treasury and the motorist?' (<http://www.bbc.co.uk/news/uk-12144966>).

## 11.5 Consistency of carbon prices

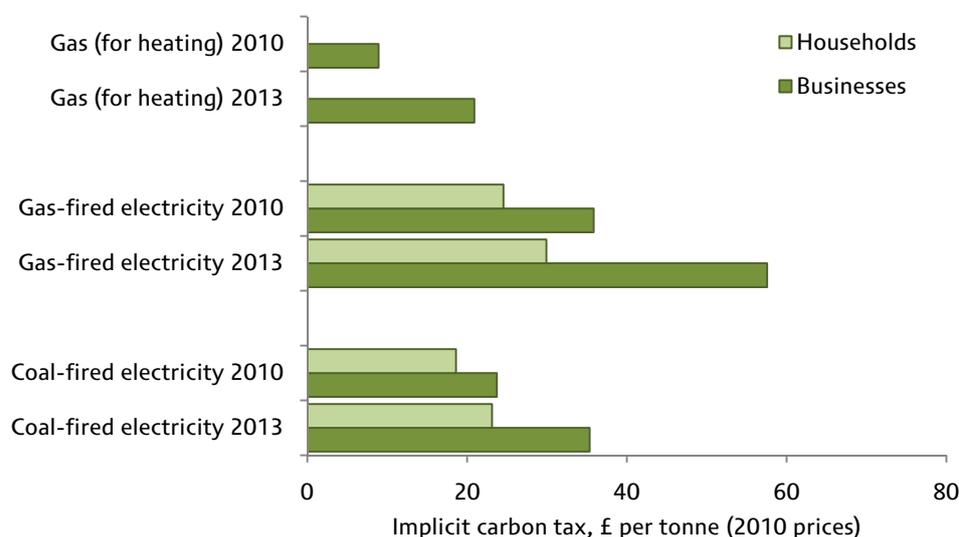
Previous analysis by IFS researchers has explored the extent to which different carbon prices operate within different parts of the economy.<sup>70</sup> Such differences are economically inefficient, since they do not provide the right incentives to reduce emissions at lowest overall cost. This section updates the analysis for 2010–11 and estimates the carbon prices that will prevail in 2013–14 given the environmental measures scheduled to come into force by then. The policies generating implicit and explicit carbon prices are:

- the EU Emissions Trading Scheme;
- the Climate Change Levy on business energy use;
- the Renewables Obligation;
- the Carbon Reduction Commitment;
- the carbon price support rates (CCL on upstream electricity generation).

We do not include the effects of the proposed feed-in tariffs (which will tend to make energy more expensive, while subsidising the generation of renewable and nuclear energy) since the details are currently unclear. Instead, we assume that firms will face the same implicit tax rates as they would have under an unchanged RO.

Figure 11.5 summarises the results for firms and consumers using gas for heating, coal-fired electricity and gas-fired electricity.<sup>71</sup> All prices are at 2010 levels. Note that nuclear power faces an implicit carbon tax rate of infinity (from the CCL and the RO) since it produces no carbon emissions, though the environmental costs associated with handling and storing nuclear waste may provide reasons to want to impose taxes on nuclear generation as well.

Figure 11.5. Implicit carbon taxes



Note: The rates for business assume the business participates in the CRC.

Source: Authors' calculations from DECC data. Details of calculation in Appendix B.

<sup>70</sup> See section 4 of P. Johnson, A. Leicester and P. Levell, *Environmental Policy since 1997*, IFS 2010 Election Briefing Note 7 (IFS Briefing Note 94), 2010 (<http://www.ifs.org.uk/bns/bn94.pdf>).

<sup>71</sup> Details of the calculation of these figures can be found in Appendix B.

The chart should be interpreted with care. Electricity consumers, for example, do not buy their power from a particular power station that generates electricity using a single fuel, but rather from a supplier that has a particular mix of fuels. For electricity, the interpretation should be: 'In a world where all electricity were produced from the same fuel source (coal, nuclear, gas, etc.), what impact would various policies have on the price and what implicit carbon tax does this give based on the CO<sub>2</sub> emissions from that source?'

At present, firms tend to be taxed at a higher rate per tonne of CO<sub>2</sub> than households for a given fuel (and, in the case of gas for heating or cooking, households are not taxed at all). Coal-fired electricity has a lower carbon tax than gas-fired, owing to the fact that the CCL and RO do not discriminate between non-renewable fuels on the basis of their carbon contents.<sup>72</sup> The reforms to the CCL work to reduce both these differences. The new levy will affect households as well as firms, and will serve to make coal more heavily taxed relative to gas, and coal and gas more heavily taxed than nuclear energy. However, at the low proposed initial rates, these reforms will not offset currently planned increases in the RO and the introduction of the CRC, which do not discriminate between non-renewables, such that the differences in the carbon prices of coal- and gas-fired electricity may well increase. The CRC is not a carbon tax, but is more akin to an energy tax, since the liability depends on energy use which is converted to an imputed carbon quantity using the average carbon emissions per kWh (meaning that it applies to nuclear and renewables as well as non-renewables). Indeed, the creation of the CRC generates an even more diverse set of implicit carbon tax rates than shown in Figure 11.5. Firms in the CRC face effectively three different sources of 'carbon tax' on their energy use: the CRC itself, a (potentially reformed) CCL and the increase in energy costs resulting from the EU ETS. Slightly smaller firms outside the CRC, and much larger firms that already participate in the ETS, will only face two of these. Thus the creation of the CRC imposes different effective carbon tax rates on firms of different sizes. As a result, despite the future introduction of an explicit electricity tax based on carbon content, it looks likely that there will be a wider, rather than narrower, range of implicit carbon prices in the future.

## 11.6 Conclusion

A number of announcements and consultations suggest environmental issues will be an active area of policymaking in the years ahead.

Ultimately, it would be desirable to move as far as possible towards a single, visible price of carbon for all sectors of the economy as a means to reducing emissions to levels consistent with future abatement targets in the most economically efficient way possible. Our analysis shows we are a long way from that point at the moment. This partly derives from using a range of instruments (taxes, trading and regulation), and from imposing emissions reduction targets that imply different sectors of the economy (notably those where emissions are and are not covered by the ETS) reducing emissions to different extents as well as facing different prices. But it also partly reflects deliberate decisions about which groups to favour: there remains a clear reluctance to price household energy directly in the same way that business energy has been priced, despite the introduction of

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<sup>72</sup> Note that the RO effectively subsidises renewables (both by reducing the number of buyouts firms need to purchase and by making firms eligible for larger payments from the buyout fund) as well as in effect 'taxing' non-renewables. This subsidy is not visible here since renewables are associated with zero carbon emissions.

several schemes that will serve to raise domestic energy prices in a much less transparent way than direct carbon pricing. The introduction of the 'carbon price support mechanism' offers a means by which this could change in the future, but the initial rates are very low, and it represents yet another layer of complexity to carbon pricing.

Some reforms suggested by the government, such as revisiting changes to aviation taxes and the 'Green Deal' for energy efficiency, do appear sensible and to be welcomed. Others, such as the 'fair fuel stabiliser', look less like good environmental policy. A commitment to raise the share of revenues from green taxes needs a clear statement from the government on which taxes are 'green' and what the target level is, but it is not at all clear that this measure is a good reflection of a government's environmental credentials.