



National Audit Office

THE CLIMATE CHANGE LEVY AND CLIMATE CHANGE AGREEMENTS

A REVIEW BY THE NATIONAL AUDIT OFFICE

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The Climate Change Levy and Climate Change Agreements

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1 The Climate Change Levy ('the Levy') was the first major climate change policy affecting the business sector to be announced by the Government. Alongside Climate Change Agreements ('the Agreements'), it is expected to make a significant contribution to the Government's target of cutting annual UK carbon emissions by 20 per cent from 1990 levels by 2010. Together the policies are forecast to achieve annual savings of 5.4 MtC (million tonnes carbon) towards the 36 MtC needed to meet the target.

2 The Levy and Agreements were designed in response to the 1998 Marshall Report. The Levy is a tax on energy use by business, its aim being to encourage businesses to use energy more efficiently and therefore to reduce greenhouse gas emissions from the levels that they otherwise would have been. The Agreements are a way for businesses to receive a tax discount in return for achieving target energy efficiencies or emissions reductions. If businesses do not achieve their targets, they lose their tax discount. Both policies were without precedent in the UK when introduced.

3 The aim of this briefing is to help the Committee understand and consider:

- new results from the Agreements, as reported in Summer 2007;
- the effectiveness of these two policies as a whole; and
- their future role in combating climate change.

To this end we reviewed the existing econometric, qualitative and reported evidence on the effectiveness of the Levy and Agreements, and in early 2007 conducted a new survey of 40 businesses and thirteen industrial sector associations.

The main points from our examination

4 The main findings from our review are as follows.

Key conclusions

Climate Change Levy

The announcement of the Levy contributed to a significant refocusing of attention on energy use in the years after 1999. This has driven energy efficiencies and emissions reductions relative to business as usual in both energy intensive and less intensive industries.

The extent to which the Levy has continued to drive further energy efficiencies in more recent years is harder to discern, especially as it has been joined by other policies and drivers since its introduction. Econometric analysis suggests the Levy has permanently raised managerial awareness. However, its impact on energy prices has been limited. Results of our survey, conducted in early 2007, suggest it is no longer seen as a major driver of new energy efficiencies.

The cumulative carbon savings achieved by the Levy across the economy cannot be measured; only estimated. The balance of qualitative evidence broadly supports the major assumption which underlies the most recent estimate of annual savings of 3.5 MtC in 2010.

Climate Change Agreements

Sectors subject to Agreements have made energy efficiencies and emissions reductions. The negotiation of Agreements and the development of monitoring regimes to measure progress against Agreement targets raised awareness of the potential for energy efficiencies. These efficiencies were then made.

Not all Agreement targets were stringent, but early overachievement against them was the result of genuinely significant improvements in efficiency as much as weak targets.

As with the Levy, the effect of the Agreements in terms of emissions savings can only be estimated. We have found no evidence which would undermine the most recent estimate of 1.9 MtC.

Climate Change Levy

- **The Levy was designed to promote energy efficiency rather than absolute reductions in carbon emissions.** The Levy is a tax on businesses' use of energy, designed to promote energy efficiency and thus generate reductions in carbon emissions relative to business activity. It was not designed to promote absolute carbon reductions by harming competitiveness or curtailing business activity. Nor was it supposed to act as an incentive to make primary energy generation less carbon intensive; it taxes energy consumers rather than suppliers.
- **Estimates of the impact of the Levy have increased.** As at Budget 2000, when the initial Levy rates were finalised, the Government estimated the Levy element alone would achieve annual carbon savings of at least two MtC in 2010 against business as usual projections. In 2005, an independent report concluded, using econometric modelling techniques, that the Levy would in fact achieve savings of 3.7 MtC in 2010 (since revised to 3.5 MtC).
- **The announcement of the Levy in 1999 resulted in businesses making improvements to energy efficiency.** A variety of evidence suggests that the announcement of the Levy focused the attention of businesses on achieving energy efficiencies. The result was a reduction in energy demand even before the Levy raised energy prices in 2001. It is likely that this 'announcement effect' has continued since 2001, but we did not find conclusive evidence regarding the permanence of this. It is also likely that the announcement had a greater effect amongst large businesses than small enterprises.
- **The price effect of the Levy has been limited, and declining, for non-energy intensive businesses.** The influence of energy costs as a driver of business decisions has been increasing over time, but within energy costs the Levy is relatively unimportant. Up to April 2007 it was a reducing element of energy costs. Therefore companies do not recognise the Levy as a major decision driver. There is little evidence of the Levy rates having had an effect in business sectors that are not energy-intensive because:
 - in these sectors energy costs are a small proportion of operating costs, and the Levy rates are too low to change this; and
 - energy demand is price inelastic.

- **Businesses are unconvinced that the Levy has driven emissions reductions.** This scepticism may reflect the following:
 - where the announcement of the Levy had an effect, it is now embedded and hidden within ongoing business decision-making. Furthermore, the Levy is now just one of several potential drivers promoting energy efficiency;
 - the price effect has been limited and declining for non-energy intensive businesses; and
 - businesses are simply reluctant to acknowledge the impact of the policy.

Climate Change Agreements

- **Most Agreements are designed to promote energy efficiency rather than absolute reductions in carbon emissions.** The design of the Agreements follows the same principles as that of the Levy: that energy efficiencies and carbon savings should be promoted without harming competitiveness. Industry opinion influenced both the design of the Agreements and the negotiation of targets. For most Agreements, targets are set relative to industrial output. In addition, targets have been flexed by various means which reduce the effectiveness of Agreements in terms of cutting absolute emissions, but recognise other pressures on UK industry and are only temporarily available. It is also the case that some businesses have benefited from the tax discount despite failing to meet their targets: they have done this by relying on the overachievement of others within their sector.
- **The Agreements are now forecast to achieve fewer additional savings than was originally planned.** As at Budget 2000, the first round of targets agreed was anticipated to yield annual savings of at least 2.5MtC in 2010 against business as usual projections. Based on the revised targets set in 2004 and the addition of new sectors from 2006, Agreements were then forecast to achieve 2.9MtC in 2010. The latest projections suggest that additional savings represented by the Agreements' 2010 targets will only be 1.9MtC. This is because rising energy prices mean that even in the absence of Agreements, businesses would have been driven to make energy efficiencies and carbon savings.

- **Results reported to end 2006 suggest Agreements are making progress towards their forecast 2010 impact.** Sector targets and results reported against them are based on all energy efficiencies compared to a baseline – they do not seek to differentiate between those caused by Agreements and those that would have happened anyway. Defra’s modelling estimates that if these sector targets are met, the additional efficiencies beyond business as usual, brought about by the Agreements will equate to 1.9 MtC. Efficiencies reported by participating companies to the end of 2006 met or exceeded targets in most cases, suggesting that the Agreements are progressing towards the original estimated 2010 impact.
- **Only a proportion of the reported results are actually additional savings achieved by Agreements.** Due to the way results are measured and collected, only some of the reported savings are actually the result of the policy itself. Of the 4.5 MtC¹ annual savings reported to December 2006, revised business as usual projections suggest that only 1.9 MtC can be considered additional savings achieved by the Agreements.
- **Not all targets have been as challenging as they could be.** By 2004 businesses had achieved annual emissions savings of 2.4 MtC in excess of their targets, resulting in a considerable surplus of emissions reductions which companies can use or sell in future periods. Limited information about the potential energy and emissions savings in industry sectors meant that some initial targets have turned out to be undemanding, and similar weaknesses have affected the revised targets set in 2004.
- **Agreements have enabled businesses to achieve efficiency improvements, though business opinion is divided over their effectiveness.** A variety of evidence suggests that Agreements helped raise the profile of energy efficiency within businesses. It is likely that early overachievement against targets was the result of a combination of genuinely significant investment in energy efficiency as well as targets that might have been more challenging. Nonetheless, business opinion is divided over the effectiveness of the Agreements.

Barriers to improving energy efficiency

- **Businesses told us that there are a number of barriers to improving their energy efficiency, which may limit the effectiveness of the Levy and Agreements.** These include:
 - long term uncertainty in government policy choices on energy and carbon;
 - complexities when dealing with several policies;
 - conflicts between policies and demand for energy efficient products; and
 - a lack of fit between policies and investment cycles.

Administrative burden and impact on competitiveness

- **The administrative burden of the Levy is estimated to be small, both for government and the companies affected.**
- Whilst there are higher compliance costs involved for those companies affected by Agreements, **in general the benefits of the Agreements outweigh the administrative costs.**
- The evidence for the impact on international competitiveness is inconclusive.

Issues for Committee scrutiny

5 On the basis of our findings, the Committee may wish to pursue the following lines of inquiry:

- Both the Levy and Agreements were designed to promote energy efficiency rather than absolute reductions in carbon emissions; this reflected government priorities following the 1998 Marshall report. In light of the Stern Review and draft Climate Change Bill, where do policies which focus on energy efficiency fit with those that target absolute carbon reductions directly?
- The Levy has been a greater driver of change in energy-intensive industries than in those which are less energy-intensive. What role is there for a climate change tax in less energy-intensive sectors and how will it work alongside the Carbon Reduction Commitment?²
- Businesses have reported difficulties in reconciling the Levy and Agreements with the EU Emissions Trading Scheme. Can the policy mix impacting on businesses be simplified whilst still providing the required incentives?
- From the perspective of the taxpayer and competitive rivals, is it right that some businesses can be given a tax discount despite failing to achieve their Agreement targets?
- The Government has the opportunity to revise Agreements targets in 2008. What, if anything, should be done to tighten the targets for participating companies and industry sectors? How can government overcome the limitations in the way targets have been negotiated so far?
- Should the Government conduct more analysis to assess the scale of any potential error in the total carbon savings figure generated from the results of the Agreements?
- Carbon trading is becoming a more important way for businesses to meet their targets under the Agreements. What will be the impact if businesses purchase carbon credits (if they continue to be traded at low prices) rather than push for greater energy efficiencies? Is the large surplus of carbon credits, which could be used in future target periods, a problem?
- Businesses see long term uncertainty in government policy as a barrier to improving energy efficiency. Does carbon budgeting, as proposed in the draft Climate Change Bill, represent an opportunity to reduce uncertainty regarding the long term future of particular policy packages? What will be the long-term future of the Levy and Agreements?
- Products which when in use promote energy efficiency (such as insulating glass for windows) can be energy intensive to manufacture. Policies such as the Levy, Agreements and Emissions Trading Schemes can penalise manufacturers for making these products. Does the Government need to give greater consideration to this apparent conflict?
- Does it matter that econometric estimates of policy impact can vary widely due to changes in business as usual projections, even if policies are working as expected? In the case of the Agreements, what are the implications of the fact that taxpayers are receiving less value for the tax foregone?

INTRODUCTION

This briefing responds to a request from the Environmental Audit Committee

1.1 In April 2006 the National Audit Office published a briefing for the Environmental Audit Committee on UK climate change policy.³ This work was produced to inform and assist the Committee's further work on climate change, and set out options for further Committee scrutiny. After discussion of the briefing in June and July 2006, the Committee signalled that one of the areas it wished to study in more detail was the effectiveness of the Climate Change Levy ('the Levy') and Climate Change Agreements ('the Agreements').

1.2 The Levy and Agreements have been key components of the Government's Climate Change Programme since they were implemented in April 2001.

- The Levy is a tax on energy use by business, its aim being to encourage businesses to use energy more efficiently and thereby to reduce greenhouse gas emissions from the levels that they otherwise would have been.
- The Agreements are a way for energy-intensive businesses⁴ to reduce the amount of Levy they pay. Businesses which sign Agreements with the Government receive a tax discount in return for achieving agreed energy efficiencies or emissions reductions.

Both policies were implemented in response to the 1998 Marshall Report.

The Marshall Report and the Climate Change Levy package

In March 1998 the Government appointed Lord Marshall (then President of the Confederation of British Industry) to investigate ways in which economic instruments could be used to make effective reductions in greenhouse gas emissions. Marshall reported in November 1998, and made several recommendations of policies which would reduce emissions without harming competitiveness.⁵ Out of these recommendations were born the UK Emissions Trading Scheme and the 'Levy package', which includes the Levy, Agreements and Enhanced Capital Allowances.

The Levy is charged to businesses via their fuel and electricity bills. Suppliers collect the Levy and pay it to Government in a similar way to VAT.

Energy-intensive industries are allowed to negotiate Agreements with the Government. Signatories to Agreements receive a tax discount equal to 80 per cent of the Levy. The discount is given prospectively on entering into an Agreement. Agreements set an overall efficiency target to be achieved by 2010, with performance against milestone targets reported every two years, beginning in 2002. If milestone targets are not achieved, the discount is discontinued. The Government has the right to renegotiate the targets in 2004 and again in 2008.

Enhanced Capital Allowances are designed to stimulate investment in low carbon technologies by bringing forward tax relief on qualifying capital expenditure.

1.3 There has been some controversy over the effectiveness of the Levy and Agreements. Energy use by business depends on product demand, energy prices, energy efficiency and the impact upon these of government policies. However, it is extremely difficult to split out the influence of each individual effect.

1.4 We set out to look at the evidence for the effectiveness of the policies by drawing on three main sources:

- **Econometric modelling.** Such modelling projects energy supply and demand based on a set of equations that are estimated from historical data. Models are run on computers based on data from across the economy and assumptions about the future. The results of econometric modelling are estimates and as such cannot be audited in a conventional way. Such modelling relies on assumptions being made: those assumptions, even if valid, may not be the only assumptions that could be validly made about the future. Previous NAO work for the Committee has highlighted that the results of such modelling is subject to a high level of uncertainty.⁶ This briefing cannot state whether the econometric forecasts are materially correct but can make useful comparisons between them and the results of qualitative research and, in the case of Agreements, reported results.
- **Qualitative research.** Surveys of business opinion can give crucial insights into the effect the policies are having. Several surveys have been conducted by, amongst others, the Green Alliance and business federations. Our briefing includes the results of a new survey of 40 UK businesses conducted by RPS on behalf of the NAO during February and March 2007.
- **Reported results.** Businesses subject to Agreements must collect and report data on energy use to measure progress against targets. From this, carbon savings achieved so far can be calculated. This briefing assesses what these results mean.

Our methodology is set out in **Figure 1**.

1 Our methodology

We interviewed key personnel at Defra (National Climate Change Policy Division), AEA Technology (consultants who operate the Agreements with Defra), HMRC, and certain sector associations subject to Agreements. We reviewed the available literature. We also analysed the working papers which underlay the results of the Agreements milestone period assessments.

We employed consultants from RPS to conduct a survey of 40 businesses – 33 of which have some or all facilities subject to Agreements; seven of which are only subject to the Levy (henceforth referred to as ‘Levy-only’). The survey comprised company interviews, quantitative data collection and a behavioural assessment. Interviews comprised open-ended questions to which participants could venture opinions as appropriate.

RPS also conducted a survey of industry sector associations subject to Agreements. Thirteen participated.

See Appendix 1 for the key survey findings and a list of companies and sector associations taking part.

Source: National Audit Office

1.5 In light of this briefing and the results of our survey, the Committee will be better able to consider the Agreements results due to be published in Summer 2007, the effectiveness of these policies as a whole, and their future role in combating climate change. The briefing is structured as follows:

- Part 2 focuses on the Levy;
- Part 3 covers the Agreements;
- Part 4 covers barriers to energy efficiency which limit the effectiveness of both policies; and
- Part 5 provides some additional information on the administrative burden of the policies and their impact on competitiveness.

The Levy and Agreements are key policies within the Government’s Climate Change Programme

1.6 Government expects the Levy and Agreements to make a significant contribution to its target of cutting annual UK carbon emissions by 20 per cent from 1990 levels by 2010. According to estimates published in the 2006 Climate Change Programme, only the EU Emissions Trading Scheme is expected to deliver greater savings (see Figure 2). The Levy was also the first major climate change policy affecting business to be announced (see Figure 3). Projections made at June 2006 estimated that total annual savings of approximately 36 MtC would be required to meet the 2010 target. Figure 4 shows in simple terms how the policies impacting businesses overlap.

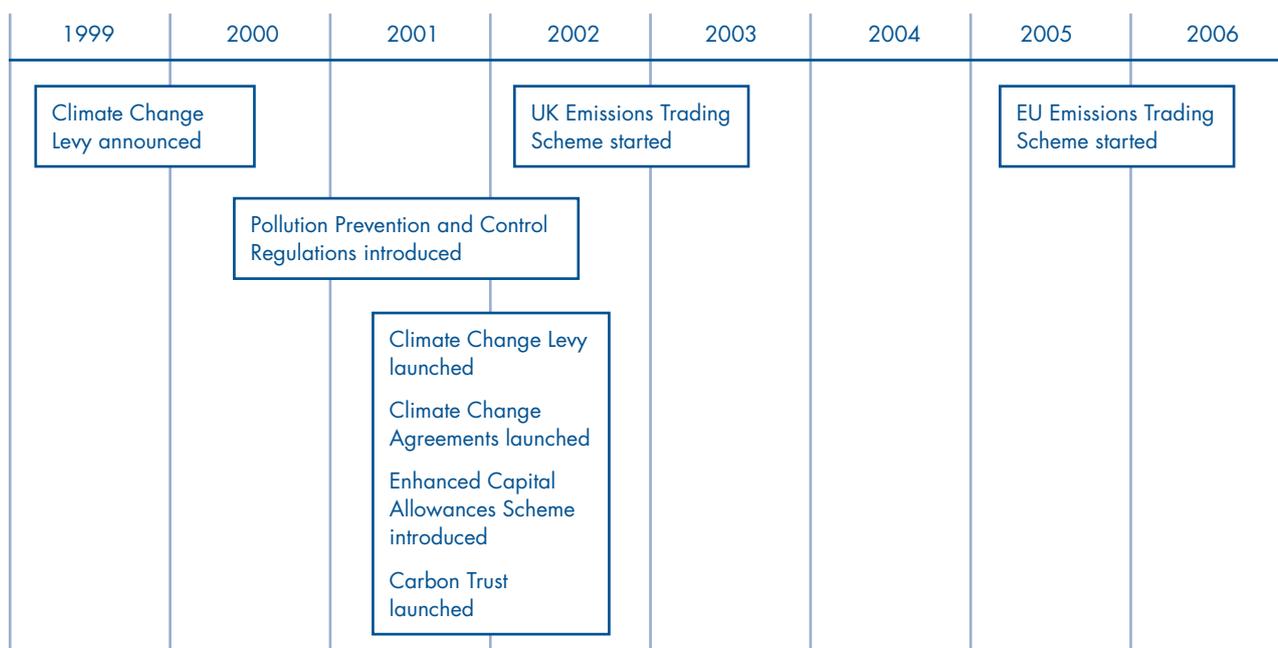
2 The five most significant policies in terms of expected carbon savings

Policy	Carbon saved in 2010 (MtC)
Second Phase of the EU Emissions Trading Scheme	8.0
Climate Change Levy	3.7 (since revised to 3.5)
Climate Change Agreements	2.9 (since revised to 1.9)
Renewables Obligation	2.5
Voluntary Agreements with car manufacturers package	2.3
Total	19.4

Source: HM Government (2006)

3 A timeline of climate change policy developments relating to the business sector

Only policies relating to business activities as a whole are included. Businesses will be impacted by building regulations, waste regulations and other policies, such as those relating to renewable energy and alternative fuels.

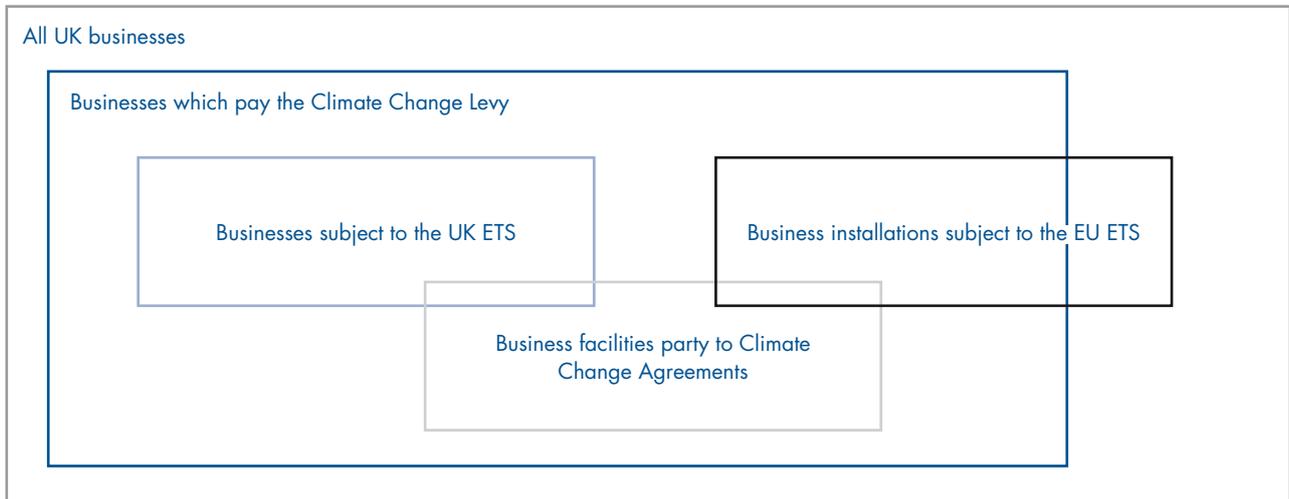


Source: National Audit Office¹

NOTE

¹ For a timeline of key developments in UK climate change policy across all sectors, see National Audit Office, *Climate Change Policy: Options for Scrutiny*, April 2006, Figure 1 – http://www.nao.org.uk/publications/nao_reports/05-06/Climate_change.pdf.

4 Key climate change policies impacting the business sector



The Carbon Trust

Offers energy saving and carbon management advice and other support to businesses across the UK. Enhanced Capital Allowances are available to any business with a qualifying asset.

Climate Change Levy

Is levied on all businesses except those small businesses whose energy bills are very low.

Climate Change Agreements

Are voluntary agreements, open to facilities within business sectors which meet certain criteria. The criteria are based upon processes emitting certain pollutants (the same criteria as for the **Pollution Prevention and Control** regulations) or requiring a certain level of energy intensity.

UK Emissions Trading Scheme (ended 2006)

Covered 33 organisations, which voluntarily took on emissions reductions targets.

The **Carbon Reduction Commitment** will be a similar cap and trade scheme, but will be mandatory and will cover more organisations not already covered by the EU ETS. Its precise coverage is yet to be determined

EU Emissions Trading Scheme

Is a mandatory cap and trade scheme covering over 1,000 UK installations which undertake certain specified activities. These include electricity generators (which do not pay the Levy), oil refineries, offshore platforms, and industrial plants in the minerals, iron, steel, cement, paper and chemicals sectors.

Source: National Audit Office

THE CLIMATE CHANGE LEVY

2.1 The Levy was announced in the March 1999 budget, and legislated for in the Finance Act 2000 as part of the UK Climate Change Programme.⁷ The Levy came into effect in April 2001. The aim of the Levy was to encourage businesses to use energy more efficiently and therefore to reduce greenhouse gas emissions from the levels they otherwise would have been.

2.2 The Levy was intended to be broadly revenue neutral to the Treasury, and so was matched with a 0.3 percentage point cut in employers' National Insurance Contributions.⁸ In fact, the Levy has consistently yielded less than the rebate on employer National Insurance Contributions (see Figure 5). Some of the revenue collected is reinvested in promoting energy efficiency in businesses via grants and loans from the Carbon Trust.

2.3 The Levy is charged on energy delivered to business users as follows (at May 2007):

- Electricity, at 0.441 penny/ kilowatt hour (kWh);
- Gas, at 0.154 penny/kWh;
- Coal and coke, at 1.201 pence/ kilogram (kg); and
- Liquefied Petroleum Gas, at 0.985 penny/kg.

Levy rates were frozen from the levy's introduction on 1 April 2001 until 1 April 2007, when they increased in line with inflation to the above rates. Budget 2007 announced that the rates would rise with inflation from April 2008.

2.4 Not all energy use is subject to the Levy: domestic and non-commercial use by charities are excluded. Very small quantities of fuel are also excluded – thus some small businesses do not pay. The overall scope is outlined in Figure 6.

5 Levy yield and National Insurance Contribution rebate

	Levy Yield (£m)	Approximate employer National Insurance Contribution rebate (£m)
2001–02	555	1,035
2002–03	829	1,125
2003–04	832	1,185
2004–05	764	1,215
2005–06	744	1,275

Source: HMRC

NOTES

Rebate figures are based on actual receipts and assume that employer National Insurance Contributions would always have been 0.3 percentage points higher in the absence of the Levy, on top of other changes in the rate of employer National Insurance Contributions.

The yield in 2001-02 is significantly lower than later years; this is because there is a lag between when tax liability arises and when payment is received by HMRC.

The Levy was designed to promote energy efficiency rather than absolute reductions in carbon emissions

2.5 The Levy was designed to generate reductions in carbon emissions relative to business activity. It was designed to promote absolute carbon reductions without harming competitiveness or curtailing business activity. As the Levy taxes energy consumers rather than suppliers, it is not explicitly designed to encourage primary energy generation to be less carbon intensive.⁹

6 Scope of the Climate Change Levy

The Levy applies to electricity, gas, coal and coke, and Liquefied Petroleum Gas, used as direct sources of energy by businesses.

Greenhouse gas emissions released as part of industrial processes are not covered by the Levy – it targets energy use only.

Non energy generation uses of fuels (for example gas used as a feedstock for chemicals) are therefore exempt.

Fuels used to generate electricity for third parties are not chargeable: **electricity suppliers** are generally exempt from the Levy. The energy is therefore taxed only once in the supply chain; on the business user rather than the generator.

To encourage the use of **alternative energy sources**, exemptions cover the following supplies:

- Electricity generated from renewable sources, with the exception of (large-scale) hydroelectric power plants with a declared net capacity of more than 10 megawatts;
- Electricity generated from coal mine methane;

- Energy used in good quality combined heat and power stations and electricity generated by combined heat and power;
- Fuel used in certain processes using recycled materials which compete with dual use processes; and
- Waste Liquefied Petroleum Gas, low value coal and solid fuels re-sold.

To protect UK competitiveness, supplies of **energy for export** are exempt. To protect a fledgling industry, a temporary exemption (until 31 March 2011) applies to **natural gas supplied** in Northern Ireland.

Fuel supplies for most forms of **transport** are also exempt (the main exception is transport used at places of entertainment such as theme parks).

Source: National Audit Office, adapted from HMRC

2.6 As the Levy is a policy designed to address energy efficiency, each commodity subject to it attracts a different rate commensurate with its energy content rather than its carbon content. Basing rates on energy content should mean that the Levy provides greatest incentive to conserve energy for fuels that require a high level of energy input for a given energy output. Electricity attracts the highest tax rate because a considerable proportion of the energy content of the fossil fuels used to generate the electricity is lost in combustion, transmission and distribution. Liquefied Petroleum Gas attracts a low rate because it is in direct competition with kerosene used for heating, which is exempt from hydrocarbon oil duty. **Figure 7** shows that these rates based on energy content do not equate to carbon content and therefore imply different prices for carbon.

2.7 This focus on energy rather than carbon is controversial.¹⁰ This briefing does not rehearse these arguments, many of which predate the introduction of the EU Emissions Trading Scheme in 2005; rather it seeks to evaluate the levy's effectiveness in achieving its objective of an improvement in the energy efficiency of business and a resultant reduction in carbon emissions relative to business activity.

7 Carbon price equivalents for the Climate Change Levy

Climate Change Levy (April 2001 – March 2007 rates)	£/tC
Carbon equivalent of Levy on electricity @ 0.43p/kWh	37
Carbon equivalent of Levy on natural gas @ 0.15 p/kWh	29
Carbon equivalent of Levy on coal @ 0.15 p/kWh	18

Source: HMRC

Estimates of the impact of the Levy have increased

2.8 The cumulative impact of the Levy across the economy cannot be measured as to do so would require taking measurements at every business across the country; thus its impact can only be estimated. Key estimates of the impact of the Levy (excluding the impact of the Agreements) on carbon emissions have been as follows:

- As at Budget 2000, when the initial Levy rates were finalised, the Government estimated the Levy itself would achieve annual savings of at least two MtC in 2010 against business as usual projections (for reference, the business sector as an end user was estimated to have emitted 60.3 MtC in 2000). This appraisal was solely based on estimates of changes in business energy consumption via an analysis of historic energy price elasticities.
- In 2005, a report conducted by Cambridge Econometrics and the Policy Studies Institute attempted to evaluate the impact of the Levy by comparing actual energy use with a model predicting what would have happened in its absence.¹¹ It used a model of the economy, populated with data on energy use and intensity across different sectors, to build this alternative scenario (for more detail, see **Figure 8**). It found that annual carbon emissions were reduced by 3.1 MtC in 2002 and will have reduced by 3.7 MtC in 2010. The report assumed the Levy would rise with inflation from 2005, rather than 2007 as has happened, so this estimate was slightly overstated, and the Government now uses a revised savings estimate of 3.5 MtC in 2010. It was from the Cambridge Econometrics work that HMRC generated a cost-effectiveness indicator for the Levy of £100 per tonne of carbon (see **Figure 9**).

8 The Cambridge Econometrics appraisal of the Climate Change Levy

Cambridge Econometrics used the MDM-E3 model, one of the most sophisticated macroeconomic models of the UK economy available. It includes a dedicated energy-environment-economy model. The work involved several runs of the model over two years, using up-to-date data as it became available. The work was reviewed by government economists and was quality assured by another academic.

Source: National Audit Office

9 Cost-effectiveness of the Climate Change Levy

The Government considers the Levy will bring a net benefit to the UK of £100 for every tonne of carbon the policy saves. This figure derives from an appraisal performed by HMRC.

The policy represents a benefit to the Exchequer in terms of Levy received, but because this is paid by businesses, the net effect to the UK is zero.

The main reason for an overall benefit is that businesses are expected to save more on reduced fuel expenditure than they spend in new investments. The value of the benefit of reduced fuel expenditure was derived from the Cambridge Econometrics work; the cost of new investments was estimated to be roughly equivalent to the total tax paid.

Our previous briefing to the Committee on *Cost-effectiveness analysis in the 2006 Climate Change Programme Review* provides more detail on the methodology and process of deriving cost-effectiveness indicators.

Source: National Audit Office

2.9 The main reason for the variation in estimates is that they have given different weights to two effects of the Levy:

- **An announcement effect.** This effect assumes that simply the announcement of the Levy in 1999 focused the attention of businesses on achieving energy efficiencies. The result was a reduction in energy demand even before the Levy raised energy prices in 2001.
- **A price effect.** This effect recognises that from 2001 the Levy made energy more expensive and should therefore have reduced demand. Higher prices affect decisions regarding output and investment.

The original appraisal in 2000 did not seek to quantify an announcement effect. The 2005 Cambridge Econometric appraisal found, on the basis of a literature review, that taxes like the Levy usually do produce an announcement effect; the appraisal went on to assess how great such an effect might have been. The results of their modelling attributed most of the impact of the Levy to the announcement effect rather than the price effect.¹² The remainder of Part 2 examines this finding in relation to other evidence.

The announcement of the Levy in 1999 resulted in businesses making improvements to energy efficiency

2.10 There is qualitative evidence which supports the notion of an announcement effect:

- A 2002 survey conducted by the Green Alliance found that in 16 of 24 businesses senior management had discussed the Levy after its announcement (although only eight of those had gone on to make changes to energy management).¹³
- Our survey found that four of the seven Levy-only businesses suggested that the imposition of the Levy had refocused attention on energy use; 23 of the 33 businesses party to Agreements agreed. For an example of one business that stated that they undertook an energy efficiency programme directly related to the announcement of the Levy, see **Case Study 1**.

CASE STUDY 1

Ineos chlor

In spring 1999, in response to the announcement of the Levy and the increasing profile of energy efficiency, Ineos Chlor, a chemicals producer, launched an Energy Efficiency Improvement Programme. This included an Energy Efficiency Steering Committee chaired by a senior production manager reporting to the Operations Director. The Committee included representatives from all site operating sections. An energy manager was appointed to the programme full-time. The long-term objective was to embed efficiency improvements into day-to-day site management.

Early on the company recognised the need to identify where energy was actually being consumed and to manage the consumption more effectively. A system of meters was set up to monitor consumption; these fed into a Process Information Management System.

By monitoring and understanding energy use, energy efficiency projects were identified that met the company's investment criteria. The Committee compiled a list of projects and assessed the potential for efficiency improvements in each operating section over the period to 2009-2010. Projects that promised the swiftest payback were given priority.

The programme resulted in a 3.4 per cent reduction in the site's total specific energy consumption during 2004 (equivalent to savings in the order of 43,000 tonnes CO₂). The company continues to implement further projects where they can compete with other projects requiring financing.

Managers at Ineos Chlor recognise that, amongst other factors, the Levy announcement helped to provide additional momentum to the process improvements they were completing. Since then, rising energy prices, other commercial factors, and a price for carbon driven by the EU Emissions Trading Scheme have lessened the influence of the Levy on investment decisions.

Source: National Audit Office/RPS

2.11 The results of the Cambridge Econometric modelling suggested that this announcement effect was permanent rather than transitory. It has also suggested that the announcement did not just bring forward impacts that the price effect would have caused later, but reduced energy demand to a greater extent than the price effect ever would.¹⁴

2.12 Our survey did not find conclusive evidence to support or contradict the permanence of the announcement effect. We found that businesses see investment decisions as dependent on analysis of costs and benefits rather than past announcements. However it may be that measures (such as new energy monitoring arrangements) taken in response to the announcement are now embedded to the extent of being hidden within decision-making processes. This is reflected in an increased awareness of energy efficiency issues but one not specifically attributed to the Levy.

2.13 It seems likely that an announcement effect will last at least as long as new energy monitoring arrangements and a higher level of management interest in energy efficiency are maintained. As illustrated by Case Study 1, the effect could be explained as follows:

- Some businesses reacted to the announcement of the Levy by making energy management a greater priority.
- Where energy management was prioritised, business put in place new energy monitoring regimes which highlighted opportunities for efficiency improvements.
- These improvements will last for at least as long as the equipment, systems or processes put in place. As long as the monitoring regimes are maintained, businesses will continue to benefit from a greater understanding of where energy is used and will be able to make informed investment decisions.

2.14 The saving brought about by the announcement effect is likely to have been concentrated amongst large rather than small businesses. This is because small businesses generally have fewer resources with which to monitor government policy so are less aware of new announcements. In early 2002, the Federation of Small Businesses found that 45 per cent of Small or Medium Enterprises (SMEs) were unaware as to whether they were paying the Levy. In June 2002 SGS Consulting published a survey of 100 manufacturing SMEs which also found a residue of ignorance about the Levy: 20 per cent of respondents were unaware that it was in force.¹⁵ If small businesses are less aware, it may be that they are less likely to adjust their priorities. According to npower, 61 per cent of Major Energy Users but only 18 per cent of Small and Medium Enterprises see reducing carbon emissions as a priority.¹⁶

The price effect of the Levy has been limited and declining for non-energy intensive businesses

2.15 Businesses see the primary drivers of investment decisions as being related to product demand and operational costs: a view expressed by six of seven of the companies in our survey subject only to the Levy and all of those party to Agreements. The Levy does not impact on product demand but it does impact on operating costs by increasing the price of energy.

2.16 The three key findings from our survey relating to the price effect were as follows:

- **The influence of energy costs as a decision driver has been increasing over time;** a trend generally anticipated to be continuing in the future. This is directly related to rising energy costs since 2003. Our findings are consistent with those of the most recent npower business energy index.¹⁷ According to npower, *'Rising energy costs continue to have a detrimental impact on profitability according to 72 per cent of companies. 47 per cent of companies have responded by raising their own output prices and a similar proportion complain about the loss of competitiveness'*.¹⁸ If energy prices are driving change then the element of the price formed of the Levy (discounted or not) should be part of the stimulus for change.

- **However, the cost of the Levy is a relatively unimportant element of energy costs, especially outside of energy intensive sectors.** Only two of the seven Levy-only (i.e. less energy intensive) businesses we surveyed recognised the Levy component as an element of the energy price whereas twenty of the 33 (energy intensive) businesses party to Agreements recognised the Levy as being a component of the energy price (note that these opinions reflect the situation before Levy rates began to rise again from April 2007).
- **Therefore companies do not recognise the Levy as a major decision driver.** All of the Levy-only organisations we surveyed indicated that the Levy currently has no discernable material effect on investment decisions. Those that had invested in energy efficiency were unable to quantify how much of an influence the Levy was in such decisions, if any.

2.17 These results suggest that the Levy was not set at significant rates initially, and has become less significant over time. When introduced, the Levy was estimated to have increased total energy prices by on average around 15 per cent.¹⁹ In general, this increase would only have been significant in energy intensive industries, where energy costs are a major component of operational costs.²⁰ This price component will have declined over time (see Figure 11) but not to the extent that energy intensive businesses have been tempted to withdraw from Climate Change Agreements: the value of the Levy discount is still high enough to make participation in the Agreements worthwhile.

2.18 Outside of energy-intensive sectors, there is little evidence of the price effect having led to a significant improvement in energy efficiency:

- Four of seven Levy-only businesses we surveyed stated that they consider the Levy a 'blanket' tax which cannot be reduced. Further evidence can be drawn from the difficulty in obtaining Levy participants for our survey: we approached over 20 Levy-only companies but a majority did not feel participating would be worthwhile because they had no views on the Levy.

- In 2004 a Green Alliance survey found that for Levy-only sectors the Levy was considered ineffective.²¹
- The Carbon Trust has found that the Levy package *'is not providing sufficient incentive for change across the less energy intensive segments'*.²²

The key reasons for this appear to be that:

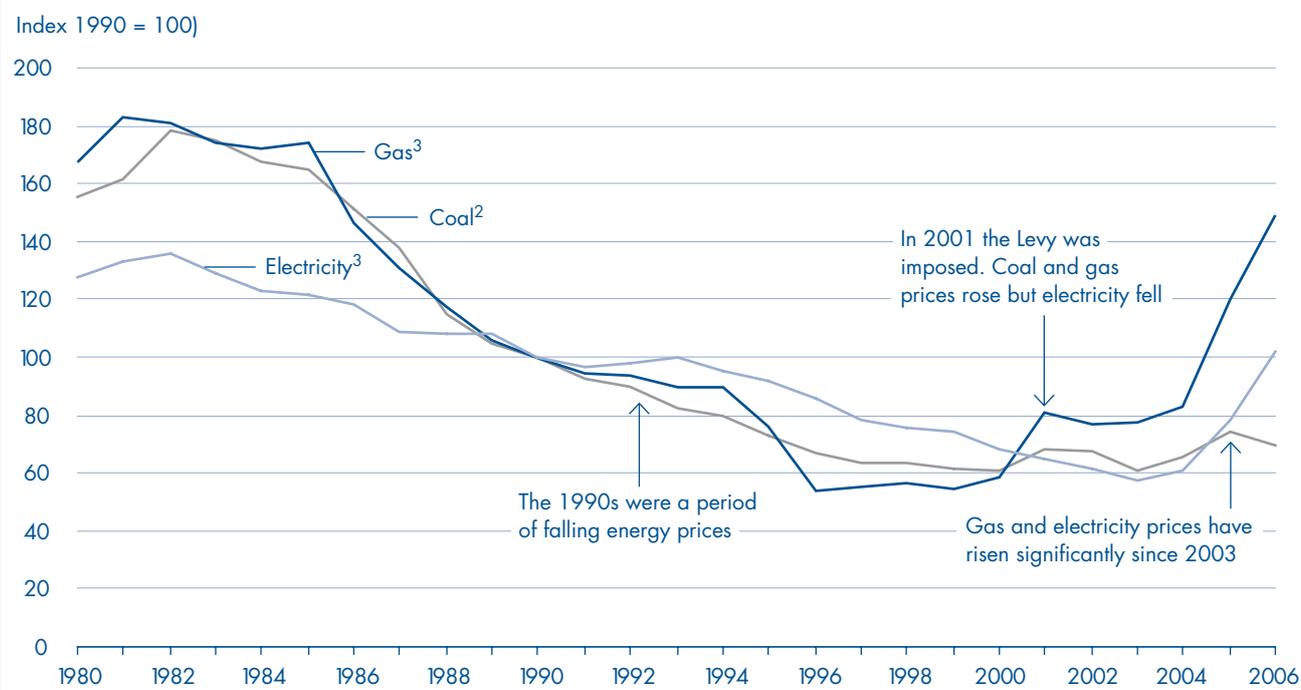
- in these sectors energy costs are a small proportion of operating costs, and the Levy rates are too low to change this; and
- the demand for energy is price inelastic (i.e. unresponsive to price changes).

2.19 These conclusions are supported by **Figure 10 overleaf and Figure 11 on page 19**. Figure 10 shows that:

- The impact of the Levy was not that great a change in the context of historic prices.
- The Levy was introduced at a time when gas prices were rising, coal prices were stable and electricity prices were falling.
- The Levy did not halt falling electricity prices when introduced. According to the Green Alliance survey *'the Levy had been undermined by other, competing policies, particularly falling electricity prices caused by the New Electricity Trading Arrangements.'*
- Energy price rises since 2003 (caused by falling North Sea gas supplies, rising oil import prices, and other factors) have been greater in impact than the price rise caused by the Levy.

Figure 11 on page 19 shows that as fuel prices have risen the Levy has become a relatively less significant component of total energy costs. This is because Levy rates remained static from 2001 to April 2007, since when they have begun to rise with inflation.

10 Fuel price indices for the industrial sector in real terms¹ including the Climate Change Levy



Source: DTI (2007)

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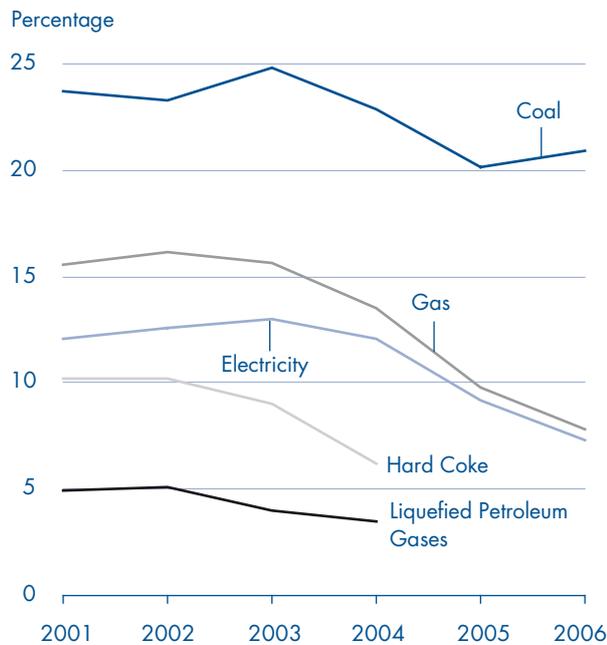
- 1 Deflated using the GDP implied deflator at market prices.
- 2 Indices based on a survey of the prices (excluding VAT) of fuels delivered to industrial consumers in Great Britain, with the inclusion of an estimation of the amount of Levy paid.
- 3 Indices based on the average unit value (excluding VAT) of sales to industrial consumers.

Businesses are unconvinced that the Levy has driven emissions reductions

2.20 Only one out of seven Levy-only businesses we surveyed felt the Levy had driven emissions reductions; four stated that it had not; two were unsure. In light of the other findings outlined above, this scepticism may reflect the following:

- Where the announcement of the Levy had an effect, it is now embedded and hidden within ongoing business decision-making. Thus businesses acknowledge that the policy refocused attention on energy use but cannot quantify this effect. Furthermore, other drivers of attention on energy use now exist, such as other policies, higher oil prices, increasing media coverage and greater political and consumer concern; the ongoing impact of the Levy in raising awareness is therefore harder to identify separately. Several of our survey respondents saw emissions trading as a stronger driver of energy efficiency.
- The price effect has been limited and declining for non-energy intensive businesses.
- Businesses are simply reluctant to acknowledge the impact of the policies.

11 Climate Change Levy as a percentage of fuel prices over time



Source: National Audit Office

NOTES

Percentages reflect the proportion of the energy price paid (in pence per kWh) represented by the Levy rates.

Prices paid (exclusive of VAT) reflect the results of a Department of Trade and Industry survey of some 1,200 manufacturing sites.

VAT is levied on energy after the Levy has been added.

Data for Hard Coke and Liquefied Petroleum Gases beyond 2004 has not been published.

Conclusion

2.21 From the evidence presented above, our conclusion on the Levy's effectiveness is as follows:

- The announcement of the Levy contributed to a significant refocusing of attention on energy use in the years after 1999. This has driven energy efficiencies and emissions reductions relative to business as usual in both energy intensive and less intensive industries.
- The extent to which the Levy has continued to drive further energy efficiencies in more recent years is harder to discern, especially as it has been joined by other policies and drivers since its introduction. Econometric analysis suggests the Levy has permanently raised managerial awareness. However, its impact on energy prices has been limited. Results of our survey, conducted in early 2007, suggest it is no longer seen as a major driver of new energy efficiencies.
- The cumulative carbon savings achieved by the Levy across the economy cannot be measured; only estimated. The balance of qualitative evidence broadly supports the major assumption which underlies the most recent estimate of annual savings of 3.5 MtC in 2010.

THE CLIMATE CHANGE AGREEMENTS

3.1 In order to make the Levy revenue neutral to the Government, employers' National Insurance Contributions were reduced by 0.3 percentage points when the Levy was introduced. Businesses do not benefit equally from this: energy intensive businesses often face a net tax increase because they incur a high Levy charge whereas businesses with large workforces (especially in the service sectors) may face a net tax decrease.

3.2 In recognition of this, a discount of 80 per cent of the Levy is available to energy intensive businesses which enter into Agreements with Defra. The discount, available since the Levy came into effect, is given in return for a commitment to meet targets to reduce energy use or carbon emissions.²³ Only businesses operating certain industrial processes are eligible (see Figure 12). In our survey 31 of the 33 businesses subject to Agreements noted that the primary reason they had sought to negotiate Agreements was in order to minimise the impact of the Levy on their energy and operational costs (the other two indicated that pressure from stakeholders to manage energy and emissions was the primary driving factor).

3.3 Agreements, setting out the energy saving targets to be reached, are negotiated by Defra with industry sector associations ('umbrella Agreements') and individual businesses within those sectors ('underlying Agreements') – (see Figure 13). Underlying Agreements apply to certain 'target units' within each business. Targets are measured against energy use or carbon emissions in agreed baseline years.

3.4 The Agreements are not contracts but have the force of public law agreements. Agreements follow one of three forms:

- 1 An agreement between the Secretary of State and the sector association, with performance across the sector measured and assessed collectively. No such agreements have yet been signed.
- 2 An umbrella agreement between the Secretary of State and the sector association, with underlying agreements between the Secretary of State and individual companies. Companies' performance against their individual targets is only assessed if the sector target is not met.
- 3 As option 2, but in this case the underlying agreements are made between sector associations and companies and are approved by the Secretary of State.

3.5 The 80 per cent Levy discount is given prospectively on entering into an Agreement. Performance against targets is reported at milestones every two years with an overall efficiency target to be achieved by 2010. The results of the third milestone, reflecting the position as at the end of 2006, were published in July 2007. If the targets set are not met at a given milestone then the discount is not renewed for the next two year period (though the Government does not claw back the discount already given). At the next milestone the discount will be renewed if the target unit is back on track (see Figure 14 on page 22). Technical support, advice and compilation of reported results against baseline are contracted out by Defra to AEA Technology.

12 Eligibility to enter a Climate Change Agreement

When Agreements were first established eligibility depended on whether a business was operating processes already covered by the EU Integrated Pollution, Prevention and Control (IPPC) Directive. The IPPC definition is based upon processes emitting certain pollutants rather than intensity of energy use.

From January 2006 (following state aid approval from the European Commission) the eligibility criteria were extended to include a definition based on energy intensity, as defined in the EU Energy Products Directive. A larger number of processes became eligible to be covered by an Agreement and subject to the Levy discount. As well as the existing IPPC definition which has remained in place, processes are also eligible to be covered by an Agreement if:

- Energy intensity exceeds 10 per cent, i.e. energy costs account for more than 10 per cent of production costs;

OR

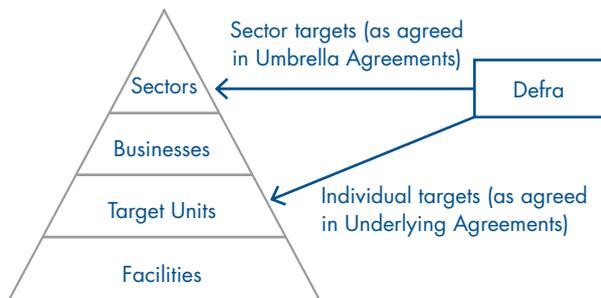
- Energy intensity is between 3 and 10 per cent; and
- The product has a 50 per cent import penetration ratio, as agreed between Defra and HMRC (i.e. where there is significant competition from foreign imports within the domestic UK market).

Note that the definition of energy intensity applies to processes rather than sites or companies.

As a result of this extended criteria, twelve more energy intensive sectors and around 300 facilities have so far joined Agreements. There were also a number of existing Agreements participants for whom the scope of the Agreement was extended.

Source: National Audit Office, adapted from Defra

13 Climate Change Agreements



A **facility** can be a piece of machinery, a process, a factory or an entire site depending on which operations meet the eligibility criteria. A **target unit** is a facility or cluster of facilities owned by one company which share a single target. They vary in size and output.

By the 2004 milestone there were 42 sectors party to Agreements. There are now 51 sectors party to them (comprising around 4,500 target units and 10,000 facilities). In addition, the Ceramics sector is divided into five sectors.

Source: National Audit Office

3.6 Analysis by Cambridge Econometrics has estimated the cost to the Exchequer, in terms of Levy yield forgone, at roughly £350 million in 2003-04 (data is not collected at source to verify this estimate).

Most Agreements are designed to promote energy efficiency rather than absolute reductions in carbon emissions

3.7 The design of the Agreements follows the same principles as that of the Levy: that energy efficiencies and carbon savings should be promoted without harming competitiveness. Targets were set as a result of negotiation between Defra and business sectors and in principle depended upon the scope for efficiency savings within each sector.

3.8 When first introduced, the Agreements had no precedent in the UK, though a similar scheme was in operation in the Netherlands. UK industry was therefore wary of the proposal. Industry opinion influenced both the design of the Agreements and the negotiation of targets.

For most sectors, targets are set relative to output

3.9 Businesses can elect to have either absolute or relative targets, which can be expressed either in units of energy use (e.g. kwh) or tonnes of carbon emitted. Absolute targets require energy use or carbon emissions to not exceed a set amount. Relative targets require energy use or carbon emissions to decrease relative to units of production. The nature of the sector target is determined by the nature of the majority of the underlying targets within that sector. The Agreements allow the participants to choose how to work toward the targets.

3.10 Where targets are relative, the Levy discount can be secured even if there is an absolute increase in energy use and Carbon emissions, providing efficiency has improved sufficiently. This could be the result of production output increasing at a faster rate than increases in energy use. Unsurprisingly, relative targets were the more popular amongst businesses: only four sectors have umbrella Agreements based on absolute targets (steel, aerospace, wallcoverings and supermarkets). See Appendix 2.

Targets are adjusted for entrants and exits to industry

3.11 Sector targets may be adjusted to take account of entrants and exits to the Agreement during the period: facilities may have withdrawn from or signed up to Agreements since they were first made. As a result, changes are made:

- to the sector target; and
- to the baseline energy use from which progress against the target is measured. This will reflect what energy the facilities currently within an Agreement used in the baseline year.

14 Climate Change Agreements milestone periods

2001	1 April: Climate Change Agreements launched
2002	31 December: first milestone period ends
2003	Results of the first milestone period are analysed and published. Target units that have failed lose their discount until April 2005
2004	31 December: second milestone period ends. During winter 2004-05 some targets for 2006, 2008 and 2010 are renegotiated
2005	Results of the second milestone period are analysed and published. Target units that have failed lose their discount until April 2007
2006	31 December: third milestone period ends¹
2007	Results of the third milestone period are analysed and published. Target units that have failed lose their discount until April 2009
2008	31 December: fourth milestone period ends. During 2008-09 some targets for 2010 are renegotiated
2009	Results of the fourth milestone period are analysed and published. Targets units that have failed lose their discount until April 2011.
2010	31 December: final target period ends
2011	Results of the final target period are analysed and published. Target units that have failed lose their discount
2012	
2013	31 March: Climate Change Agreements cease and all discounts are lost ²

Source: National Audit Office

NOTES

1 In Phase One of the EU Emissions Trading System, facilities that were already in equally stringent energy/carbon reduction agreements were allowed to opt out of EU ETS. To ensure equivalence, Defra required the reporting by opt outs to be comparable to the incumbents. This applied to 331 facilities subject to Agreements. These facilities are required to report every year during the opt out, ie 2005 and 2007 as well as 2006. These are referred to as Target Periods 2.5 and 3.5.

2 The statement that discounts will be lost in 2013 assumes that Agreements do not continue beyond this date or that follow-on policies are not implemented by the Government. There have been no announcements yet to this effect.

Targets have been flexed

3.12 In addition, there are four flexibility options, known as 'risk management tools', built into the Agreements that target units can call upon in order to make it easier to meet their targets. Three of these provisions reduce the effectiveness of Climate Change Agreements in terms of cutting absolute carbon emissions, but recognise other pressures on UK industry (though two apply only for the first three target periods). They are as follows:

■ Product mix/output algorithms

- Targets are based on the existing mix of products produced at a facility. Where a facility produces a range of products, and then increases its production of energy intensive products at the expense of less energy intensive products, it will find it harder to meet its agreed target. Adjustments to the target can be made to reflect this change.

- Similarly adjustments may be made for changes in the level of overall output (even where the targets are relative) which render a target impossible to meet. Typically facilities will have to use a minimum amount of energy in order to maintain plant and machinery. A large drop in production could lead to this minimum amount of energy being spread over a lower output, thus making a relative target impossible to meet. By flexing the target the Government is avoiding penalising businesses already suffering production problems or low demand.
- The methodology for recalculating targets needs to be agreed by the Government.

- **Tolerance bands.** Some Agreements include a level of leniency, such that the Levy discount will be given to a target unit if it does not meet its target but does achieve efficiency savings within a certain range of it. This is to allow for slippage in industrial plans. If a target unit wants to make use of its tolerance band, it must submit an energy management action plan for approval by the Government.
- **Relevant constraints.** There can be situations where through no fault of a facility, a constraint is imposed which prevent it achieving the agreed efficiency savings. For example, a new regulation might have been imposed which has required a facility to implement procedures that have caused energy usage to increase. Targets can be adjusted to accommodate this. Relevant constraints need to be approved by the Government, and energy management action plans need to be submitted with them.

The fourth option is to purchase carbon allowances via the UK or EU emissions trading schemes. If a unit is struggling to achieve its target, it can purchase carbon allowances. Its target will be adjusted (made easier) by the amount of allowances purchased. Unlike the other options, carbon trading should not impact on the total carbon saving achieved.

3.13 Any Agreement signatory can invoke a relevant constraint or purchase carbon allowances. However, they have access to only one of product mix/output algorithms or tolerance bands, as written in their Agreement. Each risk management tool has been used to a different extent (see Figure 15), with carbon trading by far the most popular, used by between a quarter and a third of target units to meet the 2004 and 2006 milestones.

3.14 Product mix/output algorithms and tolerance bands were developed as a concession to industry to encourage them to sign up to Agreements. They were only available up to the 2006 milestone assessment.²⁴ Defra made this decision in order to provide greater certainty over the absolute emissions savings being achieved in 2008–2012: the period for which the UK must prove it has met its commitment under the Kyoto Protocol. Consequently it will be harder for the 2008 milestone and 2010 targets to be met. Except where relevant constraints have been invoked, trading will be the only risk management tool to assist in the achievement of targets. From this point onward, the Agreements will in effect be a trading scheme based on baseline and credit (as opposed to cap and trade).

Some businesses benefit from the tax discount despite failing to meet their targets

3.15 Some underachieving businesses will continue to benefit from the Levy discount if other members of their sector have overachieved. Approximately 250 target units passed the 2004 milestone despite failing to meet their efficiency targets. This is because units that have failed to meet their individual targets may be recertified and continue to receive the 80 per cent discount if the sector level target in the Umbrella Agreement has been met. Defra initially look at sector performance at the target period assessment and only drill down to individual target unit level if the sector as a whole has failed to meet its target.²⁵

15 Use of risk management tools during the 2004 and 2006 milestone periods

Tool	Number of times used	
	In 2004 (out of 4,200 target units)	In 2006 (out of 4,500)
Product mix / output algorithms	around 100	113
Tolerance bands	1	1
Relevant constraints	3	3
Carbon trading	1,137	1,454

Source: National Audit Office

The Agreements are now forecast to achieve fewer additional savings than was originally planned

3.16 As at Budget 2000, the first round of targets agreed were anticipated to yield annual savings of at least 2.5MtC in 2010²⁶ against business as usual projections. Based on the more stringent targets set in 2004 and the entry of twelve more sectors, Agreements were at that point, based on then current business as usual assumptions, forecast to achieve additional annual savings of 2.9MtC in 2010. These forecasts were the results of appraisals by AEA Technology and Defra. They assume that Agreements sectors will cut energy use from business as usual projections according to their targets. The 2.9 MtC figure reflects the additional energy efficiencies caused by Agreements, over and above those that sectors might have made anyway. It was from this estimate that Defra generated a cost-effectiveness indicator for the Agreements of £90 per tonne of carbon (see Figure 16). However, as energy prices have risen in recent years (see Figure 10), the savings sectors might have made anyway in the absence of Agreements are now considered higher than once thought (because higher prices will encourage businesses to be more energy efficient). This means that the additional savings represented by the 2010 targets are now thought to be lower. As at July 2007, the additional annual savings yielded by Agreements targets were anticipated to be 1.9 MtC in 2010.

3.17 The reduction in forecast impact does not mean that businesses are failing to achieve their targets, but it does illustrate the volatility of forecasting. Estimates of impact can change significantly even though businesses party to Agreements are entirely on track to meeting their targets. This 'shifting of the goal posts' applies to any policy whose success is measured against business as usual.

3.18 The reduction in forecast impact does mean that the Agreements represent less value for money for the taxpayer. If forecasts of what businesses would have done in the absence of Agreements are taken as accurate, the income lost to the Exchequer through the Levy rebate is not achieving the additional carbon savings initially anticipated.

Results reported to December 2006 suggest Agreements are on track to making their forecast 2010 impact

3.19 Reported results from the first three milestones (see Figure 17) suggest the Agreements are progressing towards these forecasts. These results are drawn from data gathered at each milestone to assess whether targets have been met. Reported results take two forms: absolute and relative.

- Absolute savings include data from all Agreements sectors. Absolute figures reflect changes in total output as well as changes in energy efficiency. Thus the absolute saving in 2004 is less than that in 2002 because industrial output has increased since 2002.
- Absolute figures are also shown excluding the steel sector, which is the most significant sector, representing roughly a quarter of all emissions

16 Cost-effectiveness of the Climate Change Agreements

In 2006 the Government considered the Agreements would bring a net benefit to the UK of £90 for every tonne of carbon the policy saves (this value would now be different as forecast savings have been revised downwards). This figure derives from an appraisal performed by AEA Technology.

The policy comes at a cost to the Exchequer in terms of Levy foregone, but because this is received by businesses, the net effect to the UK is zero.

The main reason for an overall benefit is that businesses are expected to save more in energy bills than they spend making new investments. AEA Technology calculated the present value of lifetime savings in energy costs, net of investment expenditure, to be between £2.3 – 3.2 billion. There are some additional costs to businesses in terms of administration of the scheme, but these are estimated to be small by comparison.

Finally, the £90/tC indicator also reflects the benefit of improved air quality as a result of fewer emissions, valued at £0.5 billion over the lifetime of the policy.

Our previous briefing to the Committee on *Cost-effectiveness analysis in the 2006 Climate Change Programme Review* provides more detail on the methodology and process of deriving cost-effectiveness indicators.

Source: National Audit Office

from sectors subject to Agreements. The steel industry suffered significant operational difficulties soon after Agreements were signed. Steel output and energy use were significantly reduced: thus emissions for the first two milestone periods were well below target levels. The result was that at the first (2002) milestone assessment the steel sector accounted for 2.6 of the 4.5 MtC savings reported, and 2.0 of 3.9 MtC as at the second milestone. Some of the sector savings may have been efficiencies driven by the Agreements target, but the massive overachievement of the sector target was mostly due to the reduction in industrial output.²⁷ Excluding the steel sector therefore gives a better indication of absolute savings achieved by energy efficiencies.

- Relative savings include data from all Agreements sectors, except the four sectors with absolute targets, for whom relative data is not gathered (steel, aerospace, wallcoverings, and supermarkets). Relative figures reflect the reduction in emissions the sector would have achieved if output in the baseline year had been the same as that during the milestone year (i.e. impacts due to changing levels of output are ignored).

3.20 Neither the absolute nor relative reported savings in Figure 17 are directly comparable to the 1.9 MtC econometric estimate of impact in 2010, quoted in paragraph 3.16. This is because sector targets and results reported against them are based on all energy efficiencies compared to a baseline – they do not seek to differentiate between those caused by Agreements and those that would have happened anyway (for example, due to rising energy prices since 2003 or the work of the Carbon Trust). The 1.9 MtC 2010 figure, on the other hand, is an estimate of the impact solely caused by the Agreements. This is illustrated in **Figure 18 overleaf**.

3.21 Savings reported in absolute terms (though not relative terms) include the effect of changes in production as well as energy efficiencies. As noted above, declining production in the steel sector had a major impact on reported absolute results. A more accurate figure for absolute savings attributable to Agreements can be achieved by stripping out the steel sector (leaving savings of 2.5 MtC) but this then excludes any genuine efficiencies made within that sector. The other three sectors with absolute targets have undergone less significant changes in output.

17 Savings calculated from milestone data			
	Absolute annual carbon saving (MtC)	Absolute annual carbon saving excluding steel sector (MtC)	Relative annual carbon saving excluding steel, aerospace, wallcoverings and supermarkets sectors (MtC)
Milestone 1 (2002)	4.5	1.9 (steel 2.6)	3.0
Milestone 2 (2004)	3.9	1.9 (steel 2.0)	3.9
Milestone 3 (2006)	4.5	2.5 (steel 2.0)	4.3

Source: National Audit Office

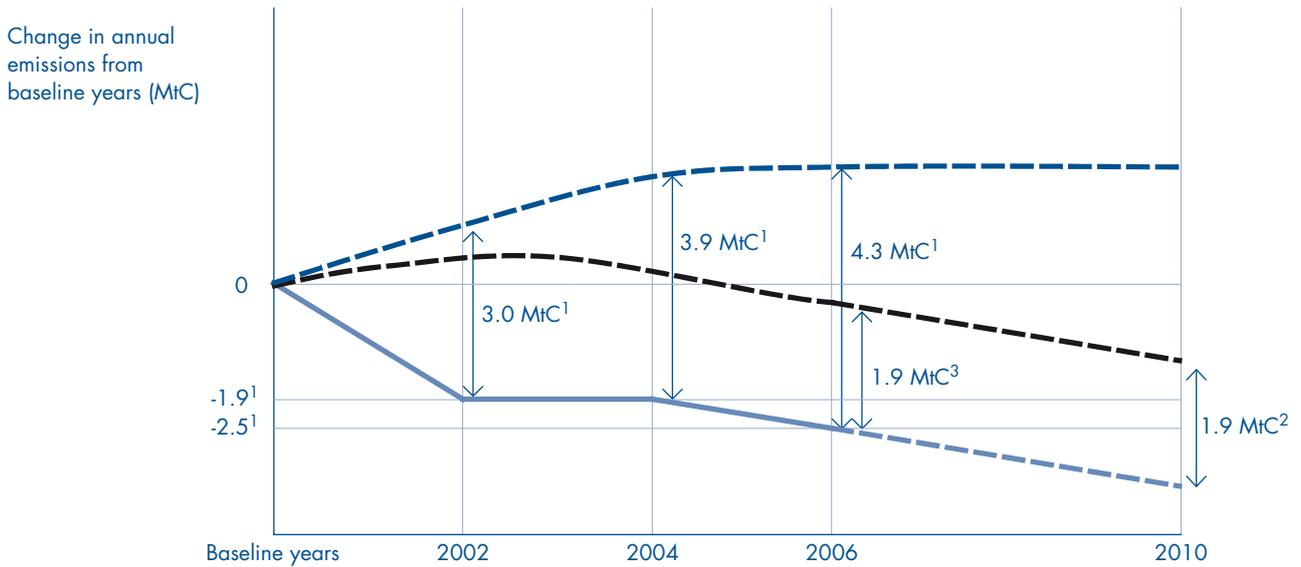
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Figures represent the difference between carbon emissions in the milestone year compared to baseline years. Figures are not cumulative. In absolute terms, emissions were 0.6MtC higher in 2004 than 2002, hence the savings figure is 0.6MtC lower.

Defra publish these figures in terms of MtCO₂. For example, the absolute annual savings as at milestone 3 are shown here as 4.5 MtC, which is equivalent to the 16.4 MtCO₂ announced by Defra in July 2007.

For a breakdown of the 2006 results by sector, see Appendix 2.

18 Reported and estimated savings due to Climate Change Agreements



- BAU(1): Projected emissions reflecting business as usual assuming that production increases but no efficiency improvements are made
- BAU(2): Projected emissions reflecting business as usual assuming that production increases and efficiency improvements are made (but only those that would have occurred in the absence of the Agreements, such as those driven by rising energy prices)
- Projected emissions reflecting BAU(2) plus efficiency improvements brought about by the Agreements
- Actual emissions reflecting reported savings

Source: National Audit Office

NOTES

1 See Figure 17. Reported absolute savings are reflected by annual emissions in 2002 and 2004 being 1.9 MtC below emissions in baseline years, and emissions in 2006 being 2.5 MtC below. Reported relative savings are reflected by annual emissions in 2002, 2004 and 2006 being 3.0, 3.9 and 4.3 MtC respectively below what they would otherwise have been with no efficiency improvements at all. These reflect all efficiency improvements, not just those attributable to the Agreements.

2 See paragraph 3.16. The latest econometric estimate of impact is that Agreements will achieve savings of 1.9 MtC in 2010, on top of any other efficiency improvements made.

3 See paragraph 3.24. Of annual savings of 4.3 MtC achieved by sectors in 2006, it is estimated that 1.9 MtC is the direct effect of the Agreements. In other words, 2.4 MtC would have been saved anyway.

Dashed lines are illustrative only and do not reflect future projections exactly. Curved lines reflect the fact that businesses party to Agreements have in general favoured making efficiencies earlier rather than later. The reported and estimated savings are only broadly comparable because reported absolute figures exclude the steel sector and reported relative savings exclude the steel, aerospace, wallcoverings and supermarket sectors. Estimated savings in 2010 include all sectors.

3.22 Defra's modelling estimates that if sector targets are met, the additional efficiencies brought about by the Agreements will equate to 1.9 MtC in 2010. The fact that efficiencies reported by participating companies to end 2006 (Figure 17) met or exceeded targets in most cases would suggest that the Agreements are progressing towards their estimated 2010 impact.

3.23 In addition to the lack of direct comparability there are further limitations with these reported results. These issues, all of which are accepted by Defra, are outlined in **Figure 19 overleaf**. **Figure 20 overleaf** summarises the Government's process for obtaining assurance over the reported results.

Only a proportion of the reported results are actually additional savings achieved by Agreements

3.24 When considering the results outlined in Figure 17 it is vital to distinguish between the total savings reported by the sectors and those savings attributable to the Agreements. Of the 4.5 MtC (16.4 MtCO₂) annual savings reported to December 2006, business as usual projections suggest that only 1.9 MtC (7.0 MtCO₂) can be considered additional savings achieved by the Agreements, with the remainder being driven by higher energy prices and other market changes. However, this figure has and will change as business as usual modelling is updated to reflect the latest energy prices. Previous NAO work for the Committee has highlighted that the results of such modelling is subject to a high level of uncertainty.²⁸

3.25 A further limitation with the 4.5 MtC 2006 figure is that it includes reductions in energy use and carbon emissions that were achieved prior to the announcement and negotiation of the Agreements. Sectors report on progress against targets against a range of baseline years, rather than since 2001 (the start of the Agreements); each sector was permitted to choose its baseline year. In allowing this Defra sought to allow credit to be given for early actions and to avoid penalising businesses that

were already making efficiencies of their own volition. The choice of baseline years was also determined by the quality of data available and consideration of significant events in the industries. **Figure 21 overleaf** shows the range of baseline years. 32 of 46 sectors opted for a baseline year of 1999 or earlier: at least two years before the Agreements began. This means that the total savings reported in Figure 17 are not a measurement of carbon reductions from a single point in time, and include savings achieved before the policy was implemented or even announced. In most cases there is no detailed information for the years between the baseline year and the first milestone year, 2002. The 1.9 MtC 2006 figure quoted in paragraph 3.23, although only an estimate, does have the advantage of stripping out any savings achieved before Agreements were announced.

3.26 Having discussed the meaning and limitations of the reported results, this briefing goes on to discuss other evidence on the effectiveness of the Agreements.

Not all targets have been as challenging as they could be

3.27 By 2004 businesses had achieved annual emissions savings of 2.4 MtC in excess of their targets, resulting in a considerable surplus of emissions reductions which companies can use or sell in future periods. In part, this reflects businesses opting to make the required investments earlier rather than later. However, it seems likely that some proportion of Agreements targets have not been as stringent as possible. This applies to both the initial targets set and the revised targets established in 2004. Evidence for this is as follows:

- The 2005 Cambridge Econometrics modelling suggested that most sectors in Agreements would have passed their targets without any efficiency improvements additional to what they would have done in its absence. '*A combination of technological change and relative decline in UK energy-intensive subsectors of manufacturing... implies that the energy (and therefore carbon) saving and energy-efficiency targets would have been met without the [Agreements]*'.²⁹ However, the authors recognised this modelling result was uncertain because of certain limitations of the modelling methodology.

19 Limitations of the reported results

It is difficult to make simple comparisons over time. Baselines are adjusted at each target period to reflect the estimated energy use in the baseline years of the participants currently within the Agreements: the baseline is not a constant figure because there may be entrants and exits to Agreements. Therefore sector level results reported from different milestone periods are not readily comparable as they are achieved against differing baseline figures for energy use or emissions. Between 2002 and 2004 baselines changed in 31 of 46 sectors – 13 of these by more than ten percent.

Moving baselines – an example

At the first milestone (December 2002) the Wallcoverings sector had achieved an annual absolute energy use of 627 million kWh, an improvement on its baseline of 784 million kWh.

At the second milestone (December 2004) the sector had achieved an annual absolute energy use of 396 million kWh, an improvement on its baseline of 453 million kWh. The baseline had decreased due to facilities exiting the Agreements.

Wherever there have been changes, it is meaningless to compare the original baseline set in 2001 with the current energy performance of a sector. The most appropriate comparison is between current energy use and energy use in the baseline year for those companies currently subject to the Agreement.

It is difficult to state which sectors are making the greatest effort.

It is difficult to state which sectors are making the greatest effort in prioritising efficiencies because simple comparisons across sectors are not possible. Firstly, different industries have varying opportunities for improvements. In addition, they are reporting against different baseline years and partly because sector targets can be expressed in different units against either absolute or relative targets. Even where sectors are assessed in the same way, there can be a variety of methods of calculation, based on the differing availability of data and the complexity of the sector (for example, more complex methods of calculation are used where sectors include a diverse number of product streams).

Where facilities have closed, the impact of Agreements may be underestimated. It is possible that the reported figures underestimate the impact of the policy. In certain sectors it has been common for companies to consolidate their production in the most efficient sites. This can be a valid and successful way to achieve greater energy efficiency: the less efficient sites will close and the Agreements pertaining to them will end. A new baseline will be constructed based on the more efficient sites but excluding the closed sites. Thus the baseline will not record the improvements in efficiency brought about by switching sites.

Source: National Audit Office

20 Processes to provide assurance over the reliability of the results

The Government is satisfied that the reported results are materially accurate. Sector associations and businesses subject to Agreements must collect data on energy use to measure progress against targets. They are required to collect the data from facilities and submit it to AEA Technology at the end of each milestone period. AEA Technology carry out a review of these submissions and report to Defra as to whether each sector has met its targets and is eligible for the Levy discount. It is from this data that AEA Technology calculate the results quoted in Figure 17. Defra obtains assurance over the reported results as follows:

When data is submitted, AEA Technology perform sense checks of the data and ensure that it is complete and coherent. In addition, AEA Technology carry out a year-round programme of audits at both target unit and sector association level. Audits are carried out to confirm eligibility for Agreements, currently and at application, check data gathered, review procedures and suggest recommendations for improvement. Data reviewed includes baseline year data, throughput and metering. Most target units to be audited are chosen randomly, with a smaller number specifically targeted because Defra consider their eligibility or results to be in question. Approximately 9 per cent of target units had been audited by April 2007. Between 10 and 20 per cent of audits have uncovered errors (AEA technology have not recorded the precise figure) but only in a very few cases do these errors impact on whether the target unit has passed or failed. From this it can be concluded that results as a whole are accurate in terms of pass or failure rates, though more analysis would need to be undertaken to estimate the potential error in total carbon savings.

In addition, some sector associations conduct extensive checking of their members' submissions before sending them on to AEA Technology.

Many businesses have volunteered data in order to correct errors in baselines that were made during the original negotiations. In some cases these corrections have made it harder for targets to be achieved; this has strengthened Defra's opinion that in general, businesses are reporting results accurately.

Source: National Audit Office

21 Baseline years

Baseline year	2001	2000	1999	1998	1997	1995	1990
Number of sectors adopting that year	2	10	21	3	1	6	3

For a detailed list of baseline years, see Appendix 2.

Source: National Audit Office

- Our survey found that 24 businesses subject to Agreements considered their 2010 targets to have been set at ‘achievable’ levels. Within that, ten were willing to indicate that their milestone targets had been relatively simple to achieve so far. 16 businesses thought that future targets would pose greater difficulty, though this may reflect the fact that most businesses have opted to make investments early on and now have fewer options.

Limited information may have compromised the initial targets set

3.28 The initial targets were negotiated between Defra, assisted by AEA Technology, and the sector associations. They were partially informed by an independent study by AEA Technology for the Global Atmosphere Division (GAD) within Defra based on a database of energy use and energy saving potential in the main industrial sectors. The study was used as an objective benchmark to measure whether challenging targets were offered.

3.29 The GAD assessment considered two projections to 2010:

- Business As Usual – what will happen if recent behaviour continued unchanged;
- All Cost Effective – energy savings that would be theoretically possible if each industry sector took all available cost-effective management and technical energy efficiency measures, assuming unlimited management time and capital.

The assessment suggested that compared to the Business As Usual scenario, 4MtC per year could be saved if all possible cost-effective measures were taken up by 2010. In theory, this analysis should have allowed Defra to negotiate targets that would take industry as close to the All Cost Effective projection as possible, given a reasonable amount of management time and capital.

3.30 Two factors combined to weaken Defra’s negotiating position, such that the final targets agreed amounted to a forecast saving of around 2.5 MtC per year by 2010, some 60 per cent of the theoretical maximum savings estimated by GAD. These factors were:

- **Limitations of the GAD assessment.** The GAD assessment was of limited use in informing the Agreements negotiations. The assessment had been commissioned for another purpose: to give the Government an overall indication of the potential emissions savings from industry as a whole rather than to give a detailed picture of potential from individual sectors. Only 13 industrial sectors were covered by GAD and those industries could not be mapped neatly onto the Agreements sectors (the composition of which were determined in most cases by existing trade associations). Where the sector was not covered similar sectors had to be used as a benchmark for available savings. Thus the GAD assessment could be used only as a broad indicator of potential savings. Furthermore, a number of assumptions used in the GAD assessment were subject to challenge by sector associations during the negotiations (such as the fact that GAD had not taken into account regulatory and planning constraints).
- **Reliance on data provided by the sectors.** Where the GAD assessment did not provide sufficiently detailed information, Defra had to rely on the information provided by the sectors themselves regarding baseline energy use and carbon dioxide emissions, and the potential for future savings. The quality of the data presented varied from sector to sector depending upon how established existing detailed monitoring of energy use was. To provide an independent check on the data, AEA Technology tested and reviewed some data submissions and consultants were engaged to carry out energy reviews for other sectors. However, this was not carried out for all sectors and in some cases industry was reluctant to share much data due to commercial sensitivities. Thus it was very difficult for Defra to ensure that each sector target was sufficiently stringent.

There are weaknesses in the way revised targets are set

3.31 Targets were revised in 2004, resulting in the tightening of sector targets for the remaining three milestones at 2006, 2008 and 2010 (see Figure 14). As with the original targets Defra made the revisions via a series of negotiations with the industry associations, and again there was a degree of dependence on the quality and extent of information made available by the sectors. Defra set out to a default tightening of targets in each sector of:

- five per cent, which had been the average overachievement across all sectors; or
- the percentage overachievement reported at the 2002 milestone for the sector in question, if greater.

3.32 The actual results of the review were short of Defra's default position, representing a tightening of targets of 3.2 per cent for 2006, 2.7 per cent for 2008 and 3.0 per cent for 2010. The revised targets may not have been as stringent as they could be, for the following reasons:

- Under the timescales set out in the Agreements the new targets had to be negotiated before the data from the prior milestone (2004) had been compiled, audited and analysed. When AEA Technology compiled this information they found that many sectors had easily achieved the milestone 2004 targets. Indeed, ten sectors had gone further and already exceeded their new revised targets for 2010 (see Figure 22). In other words, in 2004 these sectors had managed to negotiate revised targets for 2010 which they found they had already achieved.
- Defra were under pressure to complete the negotiations quickly. This was particularly the case with 25 sectors due to enter the EU Emissions Trading Scheme (ETS) in January 2005. For these sectors the 2004 milestone review had to be carried out in parallel with determining the EU ETS UK national allocation plan.
- The Agreements do not allow Defra to consider the extent of overachievement against early milestones that has been sold or 'ringfenced' for future sale as carbon credits. This was because businesses were concerned that early action on their part would be penalised if Defra were able to tighten later targets

in this way. As at the end of 2004, some 1.5 MtC was ringfenced and available to meet targets in future years.

Agreements have enabled businesses to achieve efficiency improvements, though business opinion is divided over their effectiveness

3.33 A lack of stringency in the targets may not have limited the effectiveness of the policy: the overachievement shown in Figure 22 may be due to better than expected efficiency improvements as much as weak targets. Discussions between AEA Technology and industry suggest that businesses have found more room for efficiency improvements than they initially expected. If so, this suggests that sectors negotiated targets based on assumptions of limited possible efficiency savings, but when it came to ensuring that they met the targets, they found more possibilities, and took them.

3.34 Econometric modelling performed by Ekins and Etheridge suggests that the targets encouraged firms to reduce energy use further than they would have done otherwise by bringing about a greater awareness of the scope for improvements. This effect is similar and related to the announcement effect of the Levy. *'Industrial managers were not generally aware of the extent of these opportunities before the process of negotiating the Agreements, but became aware of them during this process... industrial managers persuaded ... the UK Government... that cost-effective measures were limited, and then went on to prove themselves wrong'*.³⁰ In other words, although industry may have hit their Agreements targets in any case, they may not have reduced demand and emissions by quite so much without them.

3.35 There is quantitative evidence to support this. In 2004 a survey of eight industry representatives and other stakeholders found that the Agreements had helped raise the issue of energy use higher up the business agenda.³¹ Our survey found 23 of the 33 businesses subject to Agreements made reference to a 'refocusing of attention on energy use' following the announcement of the Levy and the negotiation of Agreements. A number of companies we surveyed noted that significant efforts were undertaken at the start of the scheme to negotiate targets and exemptions, gather data, install monitoring and reporting equipment, and develop procedures.

22 Sectors which had exceeded their revised 2010 targets in 2004

Sector	Unit of measurement	2010 revised target set in 2004 ¹	Actual performance as at milestone 2004 ¹
Aluminium	Ratio of current carbon emissions to baseline emissions	0.659	0.646
Chemicals	Ratio of current energy use against baseline use	0.810	0.805
Mineral Wools	Kwh per tonne	4511	4337
Lime	Kwh per tonne	957	935
Maltsters Association	Kwh per tonne	1197.84	1196.17
Motor manufacturers and traders	Kwh per vehicle	3225	2704
Rubber (New tyres)	Kwh per tonne	5644	5000
Spirits	Kwh per litre of pure alcohol	7.23	7.03
Steel	Peta-joules absolute energy	370	308
Textiles	Kwh per given level of throughput	2,667,631,254	2,435,380,254

Source: National Audit Office, adapted from AEA Technology

NOTE

¹ In all sectors, the lower the target, the tougher the target. So, for example, the Lime sector's revised target was to use 957 Kwh energy per tonne of output by 2010. But at the same time as this target was set, they were already using only 935 Kwh per tonne. Note that this does not mean they have already fulfilled their Agreement obligations: they must maintain these performance levels until 2010.

3.36 In general, businesses have opted to make investments early in the scheme, and have preferred to seek efficiency savings themselves rather than rely on trading. There has been significant oversupply of credits within the carbon trading market, and carbon prices have remained low. Total overachievement that has or could have been made available for purchase by Agreements participants equals approximately 6.1 MtC. However, Agreement participants have so far utilised only 1.1 MtC of this to achieve their targets (see figure 23 overleaf).

3.37 For the remainder of the policy lifetime, Agreements are forecast to maintain a steady annual level of additional carbon savings, but will not drive energy efficiency to the next level. As shown in in **Figure 18 on page 26**, the additional savings brought by Agreements are estimated to be 1.9 MtC in both 2006 and 2010. This is further evidence that businesses subject to Agreements have opted to make their energy efficiency improvements earlier rather than later.

3.38 Nevertheless, business opinion is divided over the effectiveness of the Agreements. According to npower's latest survey, 50 per cent of major energy users say compliance with Agreements has resulted in energy savings. The other 50 per cent say not.³² 23 of the 33 Agreements businesses we surveyed indicated that the policy package currently has no discernable effect on decision-making and is not a direct material consideration in investment decisions. In light of the apparent contradiction with the other findings above, the following reasons may apply:

- Where there has been an announcement or awareness effect, it is now embedded and hidden within business decision-making.
- The price effect (of the Levy discount) has been limited and declining (at least until new rates were imposed in April 2007).
- Businesses are reluctant to acknowledge the impact of the policies.
- In some cases the low price of carbon means it is cheaper to trade to meet Agreements targets than to invest: eight companies in our survey directly stated that this is the case.

Conclusion

3.39 From the evidence presented above, a conclusion on effectiveness could be drawn as follows:

- Sectors subject to Agreements have made energy efficiencies and emissions reductions. The negotiation of Agreements and monitoring regimes put in place to measure progress against targets raised awareness of the potential for energy efficiencies which were then undertaken.
- Not all targets were stringent, but early overachievement against them was the result of genuinely significant improvements in efficiency as much as weak targets.
- The effect of the Agreements in terms of emissions savings can only be estimated. We have found no evidence which would undermine the most recent estimate of 1.9 MtC.

23 Extent of use of carbon trading

	Carbon credits verified for sale (MtC)	Carbon credits ring-fenced for future use (MtC)	Total overachievement (MtC)	Number of target units buying carbon credits to meet targets (out of 4,500)	Carbon credits bought (MtC)
Milestone period 1	0.2	0.9	1.0	1,026	0.2
Milestone period 2	0.2	1.5	1.6	1,137	0.2
Milestone period 3	0.1	1.0	1.1	1,454	0.7
Total	0.4	3.3	3.7		
Overallocation of credits from the UK ETS (by April 2006)			2.4		
Total overachievement			6.1		
Total credit actually bought					1.1

Source: National Audit Office, adapted from AEA Technology

NOTE

Totals may not sum due to rounding

BARRIERS TO IMPROVING ENERGY EFFICIENCY

4.1 npower's most recent business energy index suggests that energy management is a highly significant issue for companies that use a lot of energy:³³

- 81 per cent of companies have taken steps to increase their energy efficiency;
- 93 per cent measure their energy efficiency levels;
- companies believe that, on average, further energy savings of 10.6 per cent are technically possible; but
- 44 per cent of companies said they lacked resources for investing in energy saving initiatives.

4.2 However, businesses told us that there are a variety of barriers to improving their energy efficiency which may limit the effectiveness of the Levy and Agreements. These include:

- long term uncertainty in government policy;
- complexities when dealing with several policies;
- conflicts between policies and demand for energy efficient products; and
- a lack of fit between policies and investment cycles.

It was not possible for us to assess what the extent of further efficiency improvements would be if these barriers were removed.

There is long term uncertainty in government policy

4.3 Future uncertainty in government policy (i.e. what will happen when current policies reach the end of their lifetime) leads to uncertainty for businesses trying to make investment decisions. Three of the thirteen sector associations noted that future uncertainty was currently of concern to businesses within their sectors. Two of these stated that uncertainty over climate change policy in general was a barrier to investment, including one association which claimed that investment projects have already been halted because of this.

4.4 Some companies were more concerned about future uncertainty surrounding the EU Emissions Trading Scheme (ETS), and to a lesser extent the proposed Carbon Reduction Commitment (see Figure 24), than the future of the Levy and Agreements. Companies subject to both Agreements and EU ETS whom we interviewed stated that the EU ETS posed more significant costs and risks for them than the Levy and Agreements.³⁴ They anticipated that as a driver for change the EU ETS will have greater influence.

4.5 Our survey found several companies for which future uncertainty in the Levy/Agreements policy package was not particularly high: seven of the 33 businesses party to Agreements and two of the seven Levy-only businesses stated that they had not really considered this to date. Two of the thirteen sector associations noted that investment horizons for their sectors were generally limited to five years and as such the expiry of the current Agreements at 31 March 2013 was too far away. Uncertainty surrounding the future of the package is therefore likely to become a more significant issue within the next few years.

4.6 Three of the Agreements companies were concerned that when the current Agreements expire they would lose the Levy reduction and be subject to full costs of the Levy – in all cases the companies stated that this would seriously affect their competitiveness.

24 The Carbon Reduction Commitment

In the 2006 Energy Review, the Government committed to consult on measures to reduce carbon emissions in large non-energy intensive organisations by 1.2 million tonnes of carbon per year by 2020. This consultation ran from November 2006 to January 2007 and identified a range of options for achieving these emissions savings. Amongst these was the Energy Performance Commitment proposal – a carbon cap and trade scheme that would be mandatory for large companies not already subject to the EU ETS. The 2007 Energy White Paper stated that this proposal would go ahead, under the name of the Carbon Reduction Commitment. A second consultation was published in June 2007.

Source: Defra

There are complexities when dealing with several policies

4.7 Sixteen of 40 companies and six of thirteen sector associations we surveyed had concerns over the interaction of the Levy and Agreements with the EU ETS. The companies reported difficulties in reconciling the differences between the schemes, the most significant of which were:

- **Double counting.** Ensuring compliance with both Agreements and EU ETS involves two different reporting timescales, different forms and complicated administration. For more information, see [Figure 25](#).
- **Double taxation.** The EU ETS puts upward pressure on electricity prices in addition to the Levy charges.
- **Determining optimal production levels.** The EU ETS imposes absolute caps but Agreements impose relative targets.

- **Differing coverage.** The scopes of the schemes are different such that different facilities within an industrial site may be covered by one policy or the other. This can result in complexities during reconciliation periods.

4.8 Six companies were of the opinion that government failed to understand the policy interactions fully when bringing in new policies. Many of these expressed concerns regarding the potential interaction of the proposed Energy Performance Commitment with the current climate policy structure in place.

4.9 Twelve companies and six sector associations stated that in their opinion the Government's climate change policy is becoming too complex and is increasingly difficult to manage. Their view is that the regulations should be simplified and made clearer. This is also supported by several references to guidance documents and government reports being lengthy and difficult to understand.

25 Complexities in complying with a Climate Change Agreement and the EU Emissions Trading Scheme

Double counting rules were introduced to avoid a double credit or penalty for compliance with both schemes. For example, if a business reduces emissions it may have a surplus of allowances for sale on the EU ETS. The same reduction in emissions may also lead to an over-performance against Agreements targets, which could also be converted into allowances for sale. In other words the operator could gain two sets of allowances to sell for the same emissions reduction. Alternatively, if emissions increase businesses would have to purchase allowances twice to meet the requirements of different schemes.

The current approach to double counting is to net off the EU ETS surplus from the Agreements performance so that the benefit or penalty will only occur once. The double counting is avoided via the correcting of the Agreements target (by deducting the overlap surplus) against which performance is compared. Though logical, there are several complexities in doing this which were highlighted in responses to our survey:

- **Different timescales.** Adjustments are made on the verified performance of the EU ETS data; such verification results in a lag between the schemes. This results in the verified data for 2005 being compared to the 2006 Agreements target period and will result in the verified 2007 data being compared with the 2008 Agreements target period.

- **Determining allocation and performance for areas of overlap.** The EU ETS allocation is based on tonnes of CO₂ for the entire installation for each year of the scheme (installation being defined by the scope of the EU ETS coverage and does not necessarily align to an entire site). There is no breakdown of the allocation for different parts of the site. The allocation for the overlap area is assumed to be the percentage of the emissions arising from this area.

- **Overlap adjustments.** Performance of the overlap area is required to determine a surplus or shortfall for each EU ETS reporting year and operators therefore have to record the emissions for the overlap area each year. Where the overlap areas have different boundaries this can introduce further complexity as the operator must separate out the emissions from the overlap area from other emissions and report them separately. The adjustment process can be further complicated if Agreements targets are adjusted via risk management tools. Such adjustment must occur prior to the overlap adjustment.

- **Reconciliation.** The process of reconciliation between the schemes can be complicated for some sites and result in significant efforts and resources being directed at resolving the differences. In some cases the process has resulted in some sites being in compliance with both schemes individually but after adjustment failing to meet the required performance and having to purchase additional allowances, at additional cost.

Source: National Audit Office/RPS

Some policies conflict with demand for energy efficient products

4.10 Pressure to save energy and reduce emissions is mounting. However, products which in use are energy efficient can be energy intensive to manufacture. Sectors further down the supply chain increasingly demand products that will allow them to make energy efficiency improvements; however, this can result in additional energy input in the sectors which manufacture such products.

4.11 For example, the construction sector is increasingly seeking to use materials which can improve the energy efficiency of new buildings. Energy Performance Certificates for housing will also be likely to expand demand for energy efficient products. One of the key products for improving efficiency of homes is energy efficient glass. Demand for such glass has increased since 2000. The production of such glass requires the input of more energy than previous requirements by the glass-making industry.

4.12 The automotive sector is also looking to improve the fuel efficiency of its products, not least because of Voluntary Agreements signed with the EU. A critical component in this is reducing the weight of the vehicle while maintaining the structural integrity and strength. This can be achieved by using thinner, lighter steel. Demand for such material has increased but its production requires the input of more energy by steel manufacturers.

4.13 It may be that on balance these products will result in an overall reduction in UK carbon emissions. However, the manufacture of such materials comes at a carbon cost to industries regulated by the Levy, Agreements and EU ETS. There is as yet no mechanism whereby these overall benefits can be taken into account within the schemes.

Policies may not fit investment cycles

4.14 Eleven companies of 33 subject to Agreements told us that they had completed all available cost-effective projects (defined by their company investment criteria) and that a plateau was now being reached where large efficiency gains could not be achieved without considerable investment. The cycle for more significant investments in processes tends to be longer: the investment criteria much tougher to meet.

4.15 Compliance with government schemes does not necessarily fit in with long-term investment cycles. Some companies in the glass sector noted that they had completed all the minor efficiency projects such that approximately 75 per cent of their energy was now consumed by the furnaces; these have a design life of approximately 10 years and are not yet up for renewal. Some businesses indicated that in future years they may have to use emissions trading in order to comply, possibly using some of the credits they have banked from overachievement to date (as was intended in the design of the Agreements).

ADMINISTRATIVE BURDEN AND IMPACT ON COMPETITIVENESS

5.1 The Levy and Agreements were designed to promote energy efficiency without harming business competitiveness. This briefing has focused on their effectiveness in promoting energy efficiency, but in the course of our review we also looked, in less detail, at the concomitant administrative burden and impact on competitiveness. We found that:

- the administrative burden of the Levy is estimated to be small;
- in general, the benefits of the Agreements outweigh the administrative costs; and
- the evidence for the impact on international competitiveness is inconclusive.

The administrative burden of the Levy is estimated to be small

5.2 The Levy is collected by energy suppliers at the point of sale in a similar way to VAT. The part of the total energy cost accounted for by the Levy is itemised on the energy bill to business customers. Other than that there is no difference from paying a normal bill so there is a minimal administrative burden on businesses subject to the Levy.

5.3 There is a greater amount of administration required where businesses are claiming relief or exemptions. There are exemptions from Levy for electricity generated from new renewables and from combined heat and power. Ofgem independently verifies whether a generator is producing renewable or combined heat and power electricity for Levy purposes and issues a Levy Exemption Certificate (LEC) for each megawatt hour of qualifying electricity generated for consumption within the UK.

5.4 It is the suppliers of energy who are required to register and to pay to HMRC the Levy that is due. Around 220 suppliers are registered to pay the Levy. KPMG has estimated the annual administrative burden across these suppliers to be a total of £13 million.³⁵ This is equivalent to 0.26 per cent of the total burden placed on business by HMRC, or 1.7 per cent of Levy receipts. The burden includes:

- the issuing of Climate Change Levy Accounting Documents (itemised energy bills) to business customers; and
- making quarterly Levy returns to HMRC.

5.5 HMRC estimates the Levy is a cheap tax for it to collect. The estimated cost of collection is 0.4 per cent of revenue, with around 30 staff currently deployed on the Levy in HMRC.

The benefits brought by Agreements tend to outweigh the administrative costs

5.6 Sector associations and businesses subject to Agreements must collect a wide range of information including energy use and production data and evidence to support use of the risk management tools. 25 of the 33 businesses subject to Agreements considered the administration to be simple; the others considered it a burden. The latter view tended to be expressed by companies which have a large number of facilities subject to Agreements and who are required to compile and report information on each site.

5.7 Thirty one of the 33 companies considered the benefit of the Levy rebate outweighs the costs; two stated it did not. Evidence gathered from our survey suggests that the value added by the Agreements does vary considerably from business to business: from £1 to £80 of benefit per pound spent on administration. Significant costs tended to be incurred at the outset in the form of capital equipment, time or consultancy fees; now in general only small costs associated with day-to-day management are incurred.

5.8 Businesses in general have appreciated the role given to sector associations within the Agreements. One benefit is that sector associations are perceived as being better able to interpret government guidance or regulation; they can relay this to businesses in simpler terms. Two businesses commented that having to deal directly with government is more difficult (as happens in the case of the EU ETS).

5.9 Benefits would not necessarily outweigh the cost for less energy-intensive businesses. Three of the Levy-only companies perceived that the administrative burden would be greater than the benefits of joining Agreements.

The evidence for the impact on international competitiveness is inconclusive

5.10 A recent paper³⁶ on the macroeconomic effects of the Agreements suggests that the energy efficiency improvements brought about by them have led to improvements in international competitiveness for sectors subject to Agreements. This finding is based on the same model as the Cambridge Econometric evaluation of the Levy.

5.11 No equivalent study has yet been performed on the Levy. In theory, if the energy efficiency improvements brought about outweigh the cost of the tax, there should be an improvement in competitiveness. However, given that all EU countries are required to impose energy taxes under the Energy Products Directive, the impact of those taxes would also have to be considered before a conclusion on competitiveness was reached.

5.12 Impacts on competitiveness will of course vary from business to business, depending on energy use and scope for efficiencies. Nine of the 33 businesses party to Agreements we surveyed felt the Levy and Agreements brought them a disadvantage with non-UK competitors.

SURVEY PARTICIPANTS AND KEY FINDINGS

The Key findings of our survey are set out in **Figure 26**. The businesses and sector associations that took part in our survey are set out in **Figure 27** and **Figure 28** respectively.

26 Key findings of our survey

Impact on emissions

Nine of 40 businesses thought the Levy and Agreements package had directly delivered absolute reductions in carbon emissions. Seven of these suggested the greatest reductions had been made in the early years of the package. 16 indicated that it might have had an indirect effect. 15 businesses denied that the package had achieved reductions, but many of these had invested in measures that would have led to reductions, casting doubt on their answer.

Impact of the announcement of the policies

27 of 40 businesses and six of the 13 sector associations made reference to a refocusing of attention on energy use brought about by the policies.

Price effect of the policies

All of the seven businesses subject to the Levy only indicated that it currently has no material effect on investment decisions. Four of those consider the Levy to be a 'blanket tax' which cannot be reduced and provides no real incentives.

23 of 33 businesses party to Agreements also indicated that the policies currently have no material effect on investment decisions.

Source: National Audit Office/RPS

Relationship with the EU Emissions Trading Scheme

Nine businesses that are party to both Levy and Agreements and the EU Emissions Trading Scheme (ETS) considered the EU ETS to pose greater risks and therefore hold more influence. 16 were concerned about the interaction of the Agreements with the EU ETS. Six sector associations expressed similar concerns.

Climate Change Policy

12 businesses gave the opinion that climate change policy as a whole is becoming too complicated to manage easily.

Administration

25 of 33 businesses party to Agreements considered the administration of the scheme to be simple. 31 thought the benefits outweighed the costs.

Competitiveness

9 businesses ventured the opinion that the Levy and Agreements put them at a disadvantage with foreign competitors.

27 Participating businesses

Sector	Companies	Agreements or full Levy
Brewers	Scottish and Newcastle	Agreements
	Youngs	Full Levy (formerly party to Agreements)
	Harveys	Full Levy
Building Products – covering cement, slag grinders and other building products.	Castle Cement	Agreements
	Civil & Marine	Agreements
Chemicals	Hanson building products	Agreements
	Terra Nitrogen	Agreements
	Ineos Chlor	Agreements
	AstraZeneca	Agreements

27 Participating businesses *continued*

Sector	Companies	Agreements or full Levy
Dairies	Kerrygold	Agreements
	Dairy Farmers of Britain	Agreements
Food and drink plus bakers	Thomas Bakers	Agreements
	Tate & Lyle	Agreements
	Matthew Walker	Agreements
Foundries, Aluminium and metal coaters	AETC	Agreements
	Wolstenholme International Ltd	Agreements
	Swan	Agreements
	Nottingham Zinc (Kirkby Plating)	Agreements
Glass	Allied Glass	Agreements
	Pilkington	Agreements
	Rockware Glass	Agreements
Horticulture	Hedon Salads	Agreements
	Humber Growers	Agreements
Paper	ANSL	Agreements
	Georgia Pacific	Agreements
Potash	Cleveland Potash Limited	Agreements (recently joined)
Primary & secondary steelmaking	Corus	Agreements and some sites full Levy
	Outokumpu	Agreements
	Thamesteel	Agreements
	CELSA	Agreements
Retail and Services	Sainsburys	Agreements and some sites full Levy
	Ikea	Full Levy
	Lloyds TSB	Full Levy
Textiles & Leather	Catensa	Agreements
	Miliken WSP	Agreements
	Abingdon Flooring	Agreements
	J&T Beaven	Agreements
Other full Levy companies	Sims Metals	Full Levy
	Bourne Technical Mouldings	Full Levy
	Nylacast	Full Levy

Source: National Audit Office/RPS

28 Participating Sector Associations

British Glass Manufacturers Confederation (BGMC)
Mineral Wool Energy Savings Company (MINESCO)
Society of British Aerospace Companies (SBAC)
Society of Motor Manufacturers and Traders (SMMT)
British Cement Association (BCA)
Chemical Industries Association (CIA)
Spirits Energy Efficiency Company (SEEC)
Cementitious Slag Makers Association (CSMA)
Wall Coverings Manufacturers Association (AWMO)
Dairy UK
UK Leather Federation (UKLF)
Maltsters' Association of Great Britain
Target 2010 (Foundries)

Source: National Audit Office/RPS

SECTORS PARTY TO CLIMATE CHANGE AGREEMENTS

29 Sectors party to Climate Change Agreements and reported results as at December 2006¹

	Baseline Year	Absolute Baseline ² (ktC)	Relative Baseline ³ (ktC)	2006 Emissions (ktC)	Absolute Change ² (ktC)	Relative Change ³ (ktC)
Sectors with absolute targets						
Aerospace	2001	104	N/A	85	(19)	N/A
Steel	1997	8,466	N/A	6,481	(1,985)	N/A
Supermarkets	2001	13	N/A	13	(0)	N/A
Wallcoverings	1999	17	N/A	15	(2)	N/A
Total		8,601		6,594	(2,007)	
Sectors with relative targets						
Agricultural Supply	1999	178	202	171	(7)	(31)
Aluminium	1990	1,970	2,258	1,337	(633)	(921)
Brewing	1999	185	178	145	(40)	(34)
British Meat Federation	1995	85	110	93	9	(17)
Cement	1990	1,725	1,538	1,114	(611)	(424)
Ceramics - non-fletton	2000	323	291	279	(44)	(12)
Ceramics - fletton	2000	13	13	18	5	5
Ceramics - refractories	2000	89	58	67	(22)	10
Ceramics - whitewares	2000	123	113	88	(35)	(25)
Ceramics - materials	2000	21	24	20	(1)	(4)
Chemicals	1998	3,777	4,035	3,223	(554)	(812)
Craft Baking	1990	54	82	63	9	(19)
Dairy Industry	1995	221	273	218	(3)	(55)
Egg Processing	1995	4	5	4	0	(1)
Eurisol (Mineral Wool)	1999	70	108	82	12	(26)
Food & Drink	1995	1,643	1,873	1,600	(43)	(273)
Foundries	2000	294	290	273	(21)	(17)
Glass	1999	537	600	539	2	(62)
Gypsum Products	2000	118	139	134	15	(6)
Leather	1999	8	7	6	(2)	(1)
Lime	1998	219	218	191	(28)	(27)
Malting	1999	94	100	89	(6)	(12)
Metal Forming	2000	119	130	109	(10)	(21)
Metal Packaging	1999	78	83	72	(7)	(11)
Motor Manufacturers	1995	261	366	214	(47)	(151)
Farmers - Eggs	1999	12	17	11	(1)	(6)
Farmers - Pigs	1999	15	16	12	(3)	(4)
Farmers - Poultry Meat	1999	31	40	26	(5)	(14)

30 Sectors party to Climate Change Agreements and reported results as at December 2006¹ *continued*

	Baseline Year	Absolute Baseline ² (ktC)	Relative Baseline ³ (ktC)	2006 Emissions (ktC)	Absolute Change ² (ktC)	Relative Change ³ (ktC)
Non-Ferrous Metals	1998	217	201	167	(50)	(34)
Paper	1990	1,338	1,912	1,181	(157)	(732)
Poultry Meat Processing/Feed	1999	84	104	94	10	(10)
Poultry Meat Rearing	1999	77	71	66	(11)	(5)
Printing	1999	156	178	169	13	(9)
Rendering	1999	95	113	111	16	(2)
Rubber	1999	126	105	69	(57)	(36)
Semiconductors	2000	142	413	110	(32)	(303)
Slag Grinders	1999	22	29	25	3	(4)
Spirits	1999	179	187	162	(17)	(25)
Surface Engineering	1999	198	203	173	(25)	(29)
Textiles	1999	117	106	89	(29)	(17)
Wood Panel Industries	1999	175	192	148	(27)	(44)
Total		15,196	16,980	12,761	(2,435)	(4,220)
New sectors joining Agreements for Milestone 3						
Contract Heat Treatment	2004	32	33	30	(1)	(2)
Industrial Gases	2004	145	141	142	(3)	0
Calcium Carbonate	2004	20	20	18	(2)	(1)
Kaolin and Ball Clay	2004	84	78	75	(9)	(4)
Packaging and Industrial Film	2004	9	9	9	0	0
Textiles - EI	2004	8	8	8	0	(1)
Energy Intensive Horticulture	2004	96	100	81	(15)	(18)
Geosynthetics	2004	6	6	6	(0)	(0)
Total		399	396	370	(29)	(26)
Grand Total		24,196		19,725	(4,471)	

Source: National Audit Office, adapted from AEA Technology

NOTES

1 All figures are expressed in thousand tonnes of carbon (ktC). Negative figures represent carbon savings and are shown in brackets.

2 Absolute baselines reflect the emissions of the current Agreement participants as they were in the baseline year. Absolute changes reflect the difference between this and reported emissions in 2006.

3 Relative baselines reflect the emissions of the current Agreement participants as they would have been with baseline year energy efficiency, but assuming 2006 levels of production. Relative changes reflect the difference between this and reported emissions in 2006 (ie. the difference caused by changes in energy efficiency rather than changing production levels).

- 1 Defra reports savings from the Agreements in terms of MtCO₂. Annual savings reported to December 2006 were 16.4 MtCO₂, with 7.0 MtCO₂ being considered additional savings.
- 2 The Carbon Reduction Commitment is a carbon cap and trade scheme that will be mandatory for large companies not already subject to the EU ETS.
- 3 National Audit Office, *Climate Change Policy: Options for Scrutiny*, April 2006 – http://www.nao.org.uk/publications/nao_reports/05-06/Climate_change.pdf
- 4 See Figure 12 in Part 3 for the definition of energy intensive.
- 5 *Economic Instruments and the business use of energy: A report by Lord Marshall*, November 1998 – <http://www.hm-treasury.gov.uk/media/E9E/5D/EconomicInstruments.pdf>
- 6 National Audit Office, *Emissions Projections in the 2006 Climate Change Programme Review*, December 2006 – http://www.nao.org.uk/publications/nao_reports/06-07/Climate_Change_Projections.pdf
- 7 The first *UK Climate Change Programme* was published in 2000. It was revised in 2006.
- 8 This aspect of the Levy reflected HM Treasury's 1997 Statement Of Intent on environmental taxation which stated that 'just as work should be encouraged through the tax system, environmental pollution should be discouraged'.
- 9 However, electricity generated from renewable sources (with the exception of large-scale hydroelectric power) is exempt from the Levy, meaning that the Levy should provide an additional incentive to invest in zero carbon generation.
- 10 See, for example, the arguments of Dieter Helm, 'climate changes, policies and the case for carbon tax', in *British Energy, Turning Point? An Independent Review of UK Energy Policy*, 2001 - http://www.british-energy.com/documents/Turning_Point_-_Climate_changes,_policies_and_a_case_for_carbon_tax.pdf
- 11 Cambridge Econometrics and Policy Studies Institute on behalf of HMRC, *Modelling the Initial Effects of the Climate Change Levy*, March 2005 – http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageImport_ShowContent&propertyType=document&columns=1&id=HMCE_PROD1_023971
- 12 This only applied to sectors outside of the Agreements. However, the modelling took the existence of the Agreements as a given. It could not, therefore, replicate any stimulus that the announcement of the Levy had in getting energy-intensive businesses to negotiate Agreements.
- 13 Green Alliance, *Next steps for energy taxation: a survey of business views*, November 2002 – http://www.green-alliance.org.uk/grea_p.aspx?id=376
- 14 Paulo Agnolucci, Terry Barker, Paul Ekins, *Hysteresis and energy demand: the Announcement Effects and the effects of the UK Climate Change Levy*, Tyndall Working Paper 51 - http://www.tyndall.ac.uk/publications/working_papers/wp51.pdf
- 15 Results of these surveys are quoted in ENDS Report 330, July 2002, pp 9-10.
- 16 *npower, Business Energy Index* – Winter 2006 – http://www.npower.com/energyindex/nBEI_winter2006.pdf. Based on a survey of 100 SMEs with significant energy usage and 100 major energy users.
- 17 *npower, Business Energy Index* – Winter 2006 – http://www.npower.com/energyindex/nBEI_winter2006.pdf: 'Companies are reporting a significant increase in energy costs as a proportion of total operating costs – up to 12.2 per cent compared with 9.6 per cent 6 months ago...The overall prediction for company energy is that they will rise by 9 per cent over the next 3 years.'
- 18 *npower, Business Energy Index* – Winter 2006 – http://www.npower.com/energyindex/nBEI_winter2006.pdf. Based on a survey of 100 SMEs with significant energy usage and 100 major energy users.
- 19 HMRC estimate.

- 20 Those industries were driven to negotiate Agreements with the Government. See Part 3.
- 21 Green Alliance, *Business Action on Climate Change: Where next after emissions trading?*, February 2005 – http://www.green-alliance.org.uk/grea_p.aspx?id=348
- 22 Carbon Trust, *The UK Climate Change Programme: Potential evolution for business and the public sector*, December 2005 – <http://www.carbontrust.co.uk/Publications/publicationdetail.htm?productid=CTC519&metaNoCache=1>
- 23 In two cases, Agreements have been signed which include non-CO2 emissions.
- 24 Or 2007 for the 331 facilities that have to report at milestone 3.5 (see Figure 14).
- 25 In taking this approach Sector Associations assumed some of the responsibility for managing and achieving the targets, and the industry adopted a collective approach to energy efficiency. The sector associations know the business of the sectors in greater depth. Some sectors have sub-sectors within them which are used to determine whether targets are met.
- 26 This estimate had been revised from an initial estimate of 2 MtC published in the pre-budget report of November 1999.
- 27 The fortunes of the steel industry have since been recovering; between 2002 to 2004 output rose by 18 per cent. However, energy use rose by only 9 per cent – demonstrating an improvement in energy efficiency.
- 28 National Audit Office, *Emissions Projections in the 2006 Climate Change Programme Review*, December 2006 - http://www.nao.org.uk/publications/nao_reports/06-07/Climate_Change_Projections.pdf
- 29 Cambridge Econometrics and Policy Studies Institute on behalf of HMRC, *Modelling the Initial Effects of the Climate Change Levy*, March 2005 - http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pagelImport_ShowContent&propertyType=document&columns=1&id=HMCE_PROD1_023971
- 30 Paul Ekins and Ben Etheridge, *The environmental and economic impacts of the UK climate change Agreements*, Energy Policy 34, March 2005.
- 31 Green Alliance, *Business Action on Climate Change: Where next after emissions trading?*, February 2005 – http://www.green-alliance.org.uk/grea_p.aspx?id=348
- 32 npower, *Business Energy Index – Winter 2006* – http://www.npower.com/energyindex/nBEI_winter2006.pdf. Based on a survey of 100 SMEs with significant energy usage and 100 major energy users.
- 33 npower, *Business Energy Index – Winter 2006* – http://www.npower.com/energyindex/nBEI_winter2006.pdf. Based on a survey of 100 SMEs with significant energy usage and 100 major energy users.
- 34 Particular concerns were noted about the future allocation rules for the period post-2012.
- 35 KPMG on behalf of HMRC, *Administrative Burdens – HMRC Measurement Project: Report by Tax Area*, March 2006 – <http://www.hmrc.gov.uk/better-regulation/part5.pdf>
- 36 Barker, Ekins and Foxon, *Macroeconomic effects of efficiency policies for energy-intensive industries: The case of the UK Climate Change Agreements, 2000–2010*, Energy Economics 29 (2007).

Greencoat is produced using 80% recycled fibre,
10% TCF virgin fibre and 10% ECF fibre

