

GREEN LIGHT?

A review of regulatory
barriers to small businesses'
resource and energy
efficiency

FEBRUARY 2010

Table of contents

Executive Summary	5
Introduction	10
Resource and energy efficiency can save businesses money	10
A wide range of low-cost / no cost measures is available	11
Research has identified a number of barriers	15
This review therefore sought to assess the impact of existing regulation	16
<i>... by understanding how regulation can impose barriers</i>	16
<i>... and by focusing our research on key business activities</i>	17
Existing regulation is not the key barrier	19
Small businesses' energy demand is not particularly price-sensitive	19
Hidden costs have a stronger impact than regulation on SMEs' investment decisions	20
<i>Cost-effective measures may already have been adopted</i>	20
<i>Calculations underestimate the true costs of capital for SMEs</i>	20
<i>Calculations do not reflect the way small businesses operate and take decisions</i>	22
Time, access to information and access to capital are the key barriers	23
Regulation does have an impact on resource efficiency and waste minimisation	26
Business can adopt a number of measures to minimise their waste	28
Regulation plays a key role in encouraging business resource efficiency	28
There is scope for Government intervention to encourage businesses to adopt energy efficiency measures	35
In buildings	35
<i>Buildings and their use are the largest source of carbon emissions from businesses</i>	35
<i>A number of measures could target these emissions at low or negative costs</i>	36
<i>Regulation is not the key barrier</i>	37
<i>However, regulation is imposing some unnecessary costs</i>	39

In transport	41
<i>Transport is a large source of carbon emissions</i>	41
<i>Low-cost / no cost abatement opportunities are limited</i>	42
<i>Regulation is not a key barrier</i>	43
In industrial processes	43
<i>Industrial processes are highly carbon-intensive</i>	43
<i>Most low-cost / no cost carbon abatement opportunities have already been realised</i>	44
List of stakeholders	49
Glossary, definitions, abbreviations	51

Executive Summary

Introduction and background to the review

Between July and November 2009 the Better Regulation Executive (BRE) carried out a review of the impact of key regulations on the adoption of resource and energy efficiency practices and technologies by businesses, in particular small businesses. This report summarises the findings of the review.

The review was part of a package announced by the *UK Low Carbon Industrial Strategy* in July 2009 and aimed at helping Small and Medium Enterprises (SMEs) better understand and respond to the opportunities and risks posed by the move to a low carbon economy.

The aim of the review was to identify potential regulatory barriers to SMEs making the transition to a low carbon economy with a view to removing or reducing them. This hoped to save costs for businesses and maximise carbon emissions reduction from SMEs. During the course of this review, we were also told about key non-regulatory issues. We describe the main issues in this report, but have not made recommendations to address them.

The review team consulted a large number of official documents and research articles and interviewed around 40 stakeholders, from public and private sectors (see [Annex 1](#)) as well as putting a call for issues out through the major business organisations. We would like to thank the organisations and individuals that contributed to the review.

The feedback received from businesses by the review does not constitute a comprehensive survey of issues faced by businesses. However, they do illustrate the main areas of interest for businesses with regard to greater resource and energy efficiency.

Research shows resource and energy efficiency can deliver savings for SMEs

This review started by assessing the size of potential carbon and costs savings for SMEs in order to quantify the benefits of greater resource and energy efficiency.

There are no comprehensive statistics on the resource and energy efficiency of small businesses. Nonetheless, existing research¹ estimates that SMEs account for 20 per cent of the 192.5 MtCO₂ emitted by the commercial and public sectors. This represents 38.5 MtCO₂, or 7% of total UK carbon emissions. Out of this, NERA² estimates the cost-effective³ carbon abatement potential from organisations not covered by existing binding

¹ Carbon Trust (2005), *The UK Climate Change Programme: potential evolution for business and the public sector*, and NERA (2006), *Policy options to Encourage Energy Efficiency in the SME and Public Sectors*.

² NERA (2006), p.5

³ Cost-effective abatement potential includes all measures with a positive Net Present Value at 15 percent discount rate.

policies – essentially SMEs - at 15% of emissions. This represents 5.7 MtCO₂, making up 1% of total UK carbon emissions.

Research also suggests that there is scope for small businesses to save themselves money while cutting their carbon emissions. A research report for Defra⁴ estimates the low cost / no cost business benefits of greater efficiency in the use of waste, water and energy at £6.4bn on average per annum.

Some research claims that, even though the aggregate carbon abatement potential is quite small, there are low cost measures that could save small businesses money immediately or at least within two years.

Most of these savings relate to improving the energy efficiency of buildings: carbon emissions from buildings represent 70 per cent of emissions from SMEs and cost-effective measures could improve the energy efficiency of the buildings themselves⁵ (the fabric) and the way the building is used (lighting, heating).

Existing regulations are not the key barriers; hidden costs have a significant impact on SMEs' investment decisions

Given the existence of cost-effective carbon abatement opportunities for SMEs, it is important to understand what drives or impedes the adoption of resource and energy efficiency practices and technologies.

Very little data are available on how many of these measures have already been adopted by SMEs. However, existing research shows that there are a number of barriers that may be preventing businesses from taking advantage of them:

- financial barriers;
- hidden costs;
- market failures, including incomplete information, asymmetric information, transaction costs, and split incentives; and
- behavioural / motivation barriers.

Existing research does not identify regulation as a barrier. Business consultation carried out for this review confirms this finding. The review found that, overall, existing regulation is not the predominant barrier to greater resource and energy efficiency and that hidden costs have a significant impact on small businesses' investment decisions:

- The models that identify cost-effective measures do not necessarily capture the true costs of implementing energy efficiency measures, and underestimate the transaction

⁴ Defra (2007), *Quantification of the business benefits of resource efficiency*, a research report completed for Defra by Oakdene Hollins and Grant Thornton.

⁵ Committee on Climate Change (2008), *Building a low carbon economy: the UK's contribution to tackling climate change*, Carbon Trust (2009), *Building the future today: transforming the economic and carbon performance of the buildings we work in*, and Carbon Trust (2005).

costs. They use a 15% discount rate and identify as cost-effective measures that are in fact unviable for small businesses because they take too long to pay back.

- The models underestimate the fact that many small businesses do not have the time, especially the management time, to research low carbon measures and then to implement them.
- Many small businesses are not able to afford the upfront costs of certain technologies and have limited access to credit.

We also considered how regulation – particularly product standards – could be indirectly raising costs on the supply side. However, businesses did not tell us about any major hidden costs from regulation of this type. Further research in this area could be beneficial.

Regulation did appear to an impact on waste minimisation and resource efficiency

The review received a large volume of feedback from businesses indicating that waste regulations play a key role in encouraging businesses to adopt resource efficiency measures and may be imposing costs on businesses wanting to manage their waste better.

Businesses would particularly appreciate clearer definitions and guidance on waste and end-of-waste. Current definitions are widely said to be vague. Businesses feel vulnerable to inconsistent interpretations. Vague definitions may also hinder the growth of a market in recovered materials.

The Government has recently published a consultation document on the legal definition of waste and its application⁶, which will be published in July 2010. The consultation also includes a draft four-page practical guide for businesses.

Recommendation 1

Defra and the Environment Agency should work to maximise the certainty they can offer business around waste and end of waste definitions through the current consultation on the definition of waste. In particular, they should seek to ensure this advice and guidance meets business needs and follows the Code of practice on guidance on regulation⁷.

Some businesses expressed concerns that waste regulations and obligations were not being enforced consistently across local areas and regions. This may be due to the number of regulators involved in the enforcement of various waste regulations, as well as a lack of opportunity to share information. The Better Regulation Executive will explore the scope for more consistent enforcement of waste regulations at local level in more detail

⁶ Defra, *Consultation on draft guidance on the legal definition of waste and its application*, January 2010, <http://www.defra.gov.uk/corporate/consult/waste-definition/index.htm>

⁷ BIS, *Code of Practice on Guidance on Regulation*, October 2009 <http://www.berr.gov.uk/whatwedo/bre/code/page46954.html>

with the Local Authorities Coordinators of Regulatory Services (LACORS) and the Chartered Institute of Environmental Health.

Businesses also indicated that they see a number of regulations as confusing and potentially imposing overlapping regulatory burdens: the Waste Electronic and Electrical Equipment Directive, the Restriction of Hazardous Substances Directive, the Packaging Directive and the Batteries Directive. The review was told that it is difficult for firms to understand which regulatory regime they come under and that they sometimes have to comply with similar obligations under different regulations.

Recommendation 2

As part of the next phase of simplification targets to 2015 (within the theme of "Natural Environment") the Government should engage with relevant businesses to identify and remove overlapping requirements on businesses from legislation impacting on waste and waste materials where possible.

There is also scope in other areas for Government intervention to encourage the adoption of energy efficiency measures

The review identified a number of other areas where, although regulation is not a key barrier, Government could make it easier for businesses, in particular small businesses, to reduce their energy and resource consumption.

Building / Construction

Many existing Government policies do not focus on the stock of commercial buildings, which would be key to capturing emissions from SMEs. Instead, they tend to focus on new build and domestic buildings, and they do not fully take account of the landlord/tenant split.

Trade associations representing the construction industry see the complexity of the Building Regulations – Part L (on energy efficiency) as imposing disproportionate burdens on small firms, primarily builders and related trades, which are less able to absorb, keep up to date with and comply with complex regulations.

The Government is already looking into ways to assist small businesses improve their awareness and understanding of changes to Building Regulations: in particular, compliance assessments are being joined up and project-based guidance is being developed with industry.

Recommendation 3

CLG should continue to improve the quality of the guidance related to Building Regulations - Part L, particularly working with industry to ensure guidance is business-friendly.

Planning

Although there is ongoing Government work to simplify the planning regime, businesses still see the planning application process for small developments as disproportionately complex, long and costly, which has an impact on their decision to invest in resource and energy efficiency related developments..

Recommendation 4

CLG, working with other departments, should continue to simplify the planning system to encourage the delivery of non-domestic small scale renewable and low carbon energy technologies, giving particular consideration to the introduction of permitted development rights for these technologies.

Introduction

Resource and energy efficiency can save businesses money

0.1 The UK has set itself an ambitious climate change target - reducing greenhouse gas emissions by 80% of 1990 levels by 2050 (see **Figure 1**). In 2007, before this target was set, emissions from greenhouse gases covered by the Kyoto Protocol were 21.7 per cent lower than in the base year, 1990⁸. In order to meet this legally binding target⁹, each unit of economic output in Britain will need to be produced emitting one tenth of the CO₂ emitted today¹⁰.

0.2 As a result, the UK Budget 2009 set the world's first carbon budgets, equivalent to a 34% reduction in carbon emissions with respect to 1990 levels by 2020. The Climate Change Act allows the Government to meet its carbon budgets through the purchase of carbon credits, but the Government also aims to meet the first three carbon budgets by changing the way we use resources and energy and encouraging the development of low carbon technologies – as laid out in the recent UK *Low Carbon Industrial Strategy*.

0.3 The UK *Low Carbon Transition Plan* sets out in more detail how the Government will deliver these emission cuts. The Government will:

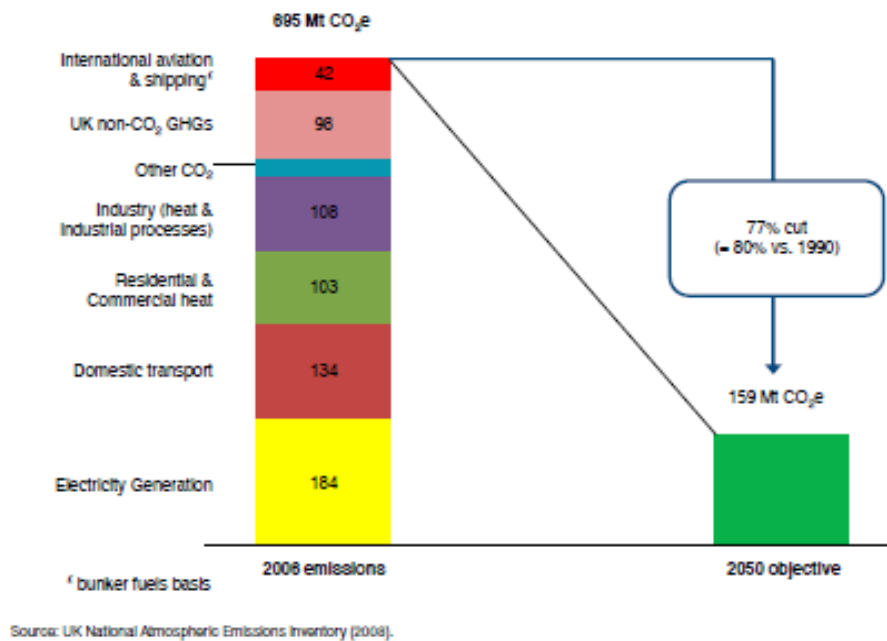
- drive decarbonisation;
- secure energy supplies;
- help UK low carbon and energy business to grow;
- protect consumers, in particular the most vulnerable;
- help businesses manage the costs of tacking climate change and help everyone adapt to climate impacts; and
- protect the environment.

⁸DECC, *UK Climate Change Sustainable Development Indicator: 2007 Greenhouse gas emissions, Final figures*

http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/climate_change/1_20091008144824_e_@@_ghgns200090203.pdf&filetype=4

⁹ As adopted by the Government in the Climate Change Act 2008.

¹⁰ On the assumption of continued economic growth at historic rates.

Figure 1: The size of the challenge

0.4 Research reviewed for this report shows that resource and energy efficiency practices and technologies can help the UK meet this target. They can deliver not only significant resource, energy and carbon emissions savings to the UK economy, but also costs savings to businesses. Indeed, greater resource and energy efficiency can:

- reduce energy bills by reducing the amount of energy consumed;
- reduce the use of scarce raw material by reducing the amount of resources needed and encouraging the use of more sustainable material; and
- reduce production costs, by reducing the amount of energy and resources used and by making production processes more efficient.

A wide range of low-cost / no cost measures is available

0.5 Existing research, in particular Marginal Abatement Cost Curves (MACC) developed by McKinsey for the CBI¹¹ and by the Buildings Research Establishment and AEA Technology for the Committee on Climate Change¹², identifies a wide range of measures that could help reach these targets by reducing carbon emissions.

0.6 Most importantly, many of these measures – such as switching off lights or installing insulation – are calculated to save, at current energy prices, more than they cost. Implementing such measures therefore not only reduces carbon emissions and

¹¹ CBI (2007), *Climate Change: everyone's business*

¹² Committee on Climate Change (2008), *Building a low carbon economy: the UK's contribution to tackling climate change*

resource consumption but also enables energy consumers to save money according to the research mentioned above.

- 0.7** Yet several studies indicate that there remains untapped potential for private, third-sector and public sector organisations and households to implement measures that would reduce their energy bills and operating costs. The fact that they are not taking these opportunities would seem to indicate that there are barriers to the adoption of low-cost / no cost carbon reduction measures.
- 0.8** The Government has implemented a number of policies specifically designed to encourage businesses to reduce carbon emissions (see **Box 2**). However, the key policies principally cover the large carbon emitters and large users of energy. A large number of usually smaller businesses are not directly affected by these binding policy levers although they may be affected as suppliers to larger firms.
- 0.9** As NERA (2006) put it: “SMEs and non-energy intensive sectors have CO₂ intensities that are an order of magnitude below that of the largest energy-intensive sectors. This helps to explain why policies to date have tended not to focus on SMEs”.
- 0.10** As a result, the review team was faced with a limited number of data sources on the use of energy and resources by small firms within particular industries or sectors, or across the economy as whole.¹³

¹³ In line with recommendations made by the Committee on Climate Change, DECC has launched a project to review the evidence base to increase the take up of energy efficiency measures by SMEs and to propose new policy interventions if supported by the evidence. They will develop evidence for the size of the sector's emissions and the potential for cost-effective savings; work with stakeholders to assess the barriers and drivers which influence motivations for implementing energy efficiency measures; and analyse the strengths of relevant existing policies to drive the development of effective policy.

Box 2: Existing climate change policies targeting businesses, including SMEs¹⁴

Climate Change Agreements and Climate Change Levy: A tax on electricity, gas and fuel oil use by business. Significantly reduced levy rates are paid by businesses who deliver reductions in energy use in line with their sector's Climate Change Agreements. CCAs cover a large number of SMEs in manufacturing and farming. Overall they have achieved emission reductions of over 20MtCO₂ a year compared to baselines. Small enterprises in particular may experience greater difficulty in meeting the reporting requirements for CCA, but only low numbers have withdrawn from the scheme since it started in 2001.

Carbon Reduction Commitment Energy Efficiency Scheme: Due to start in April 2010, it is a mandatory requirement for businesses consuming 6000 MWh p.a. of gas and electricity (about £0.5 million) to monitor their emissions and purchase allowances, initially sold by Government, for each tonne of CO₂ they produce. This mainly covers large firms but will include some SMEs in manufacturing and also has implications for tenants whose landlords have commitments of their own. One of its specific aims is to tackle the problem of split incentives between landlords and tenants affecting many SMEs in the commercial sector.

Building Regulations Part L 2006: One of the main drivers for the 2006 revision of the Building Regulations was the implementation of the Energy Performance of Buildings Directive (EPBD – see below). This involved the adoption of a methodology to calculate the energy performance of buildings, establishes that minimum building energy performance standards should be set using this methodology, and that new buildings should meet these minimum performance standards. Additionally, when work is carried out to an existing building with a floor area greater than 1000m², “consequential improvements” should be made to the whole building. As part of the EPBD Recast, the European Commission is proposing to remove the >1000m² cut-off, which if adopted will mean all major renovations irrespective of floor area will have to install cost-effective energy efficiency measures retrospectively where this is economically feasible.

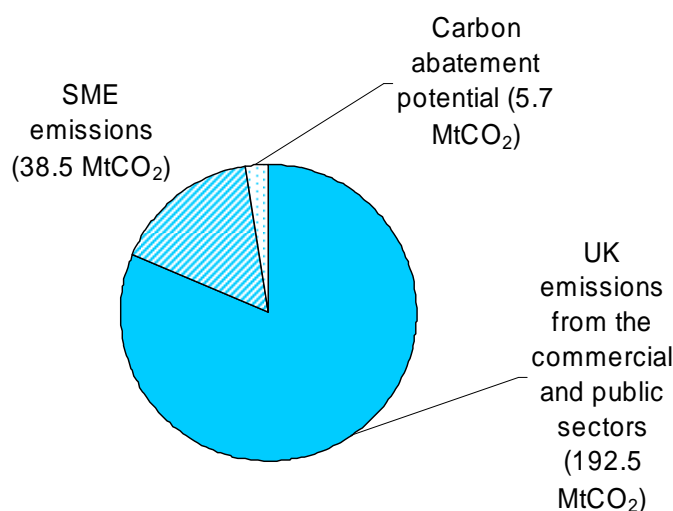
EU Directive on Energy Performance of Buildings: This requires all buildings being built, sold or rented out to obtain Energy Performance Certificates (EPCs) with information on the building's energy usage, and for all public buildings with a floor area over 1000m² (such as hospitals) to display them. These are called Display Energy Certificates (DECs). The directive also requires regular inspections of boilers and air conditioning units. Requirements have been implemented via the revision of the Building Regulations and the introduction of Energy Performance Certificates (EPC). A recast of the EPBD was recently agreed and will be implemented in 2012.

EU Emissions Trading Scheme: A compulsory cap-and-trade scheme that all plants which operate boilers of 10 MWh and above have to participate in. This mainly applies to the largest emitters in energy-intensive sectors, including cement, glass, pulp and paper and oil refineries. Most SMEs do not fall within the scheme, but are indirectly affected via changes in the price of carbon affecting electricity prices.

¹⁴ See also Middlesex University (2009), *Final report for BERR ED: SMEs in a Low Carbon Economy*, p.17.

- 0.11** A report commissioned from NERA by Defra in 2006¹⁵ estimates that energy use by organisations not covered by existing policies – essentially SMEs - amounts to around 20% of total UK emissions from the industrial, commercial and public sectors, that is 10.5 MtC (or 38.5 MtCO₂), or 7% of total UK carbon emissions.
- 0.12** NERA (2006) then estimates the cost-effective carbon abatement potential from organisations in the policy gap at 15% of emissions, or 1.4 MtC (5.7 MtCO₂), or 1% of total UK carbon emissions.

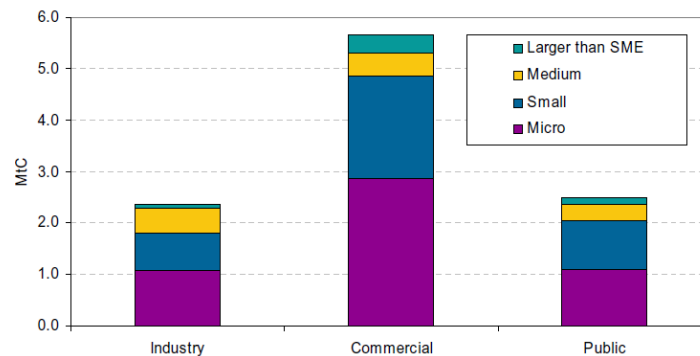
Figure 3: SME emissions and cost-effective abatement potential



- 0.13** Micro businesses (under 10 employees) and small businesses (under 50 employees), in particular, represent more than three quarters of emissions in the policy gap (see **Figure 4**). As 99.3 per cent of the 4.7 million private sector enterprises in Britain are small businesses (with fewer than 50 employees), the energy and resource savings, and therefore the costs savings, per business are quite small. The average cost saving is important because businesses will compare potential cost savings with the transaction costs involved.
- 0.14** In practice, however, the cost of, and therefore the savings associated with, these measures is likely to vary significantly across and within sectors (see **Figure 5**), and between regions.

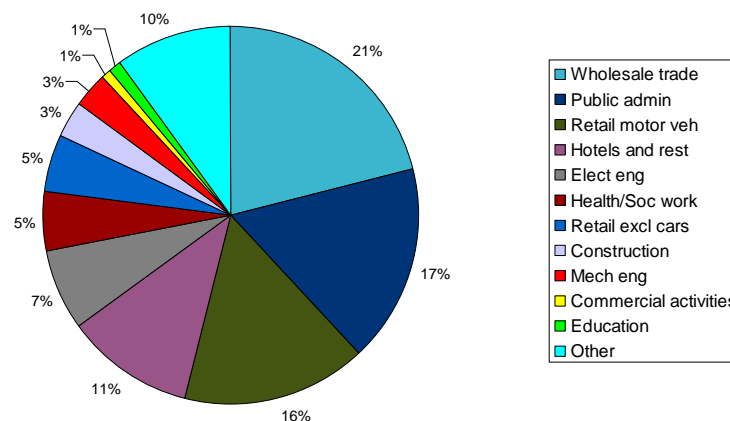
¹⁵ NERA (2006), *Policy options to Encourage Energy Efficiency in the SME and Public Sectors*, p.5.

Figure 4: Organisations not covered by existing policies, by organisation size



Source: NERA (2006)

Figure 5: Emissions from organisations not covered by existing policies, by sector



Source: NERA (2006)

Research has identified a number of barriers

0.15 The question is therefore why are businesses not exploiting all the opportunities to reduce their energy bills, especially where these opportunities often come at no or very little cost? A number of barriers to energy and resource efficiency have been identified by research. Building on a list developed by the Carbon Trust (2005), NERA¹⁶ developed the following list of barriers:

- financial barriers
- hidden costs

¹⁶ NERA (2006). This list is not in order of importance.

- market failures, including incomplete information, asymmetric information, transaction costs, and split incentives
- behavioural and motivation barriers

This review therefore sought to assess the impact of existing regulation

0.16 In light of these studies, and as part of the Government's package¹⁷ to help SMEs seize the opportunities offered by the transition to a low carbon economy, the Better Regulation Executive conducted a review to assess the extent to which regulation acts as a barrier to the adoption of low carbon technologies and practices by businesses.

0.17 During the course of this review, we were also told about key non-regulatory issues. We have included them in this report, but did not make recommendations.

... by understanding how regulation can impose barriers

0.18 We particularly sought to understand how regulation can act as a barrier. In general:

0.19 Regulation can act as a direct barrier by imposing monetary costs and delays, such as:

- administrative costs (or red tape) which include familiarisation with administrative record keeping and reporting
- policy / compliance costs, both initial and ongoing, representing the cost of complying with regulatory requirements
- hidden costs, such as the requirements of product standards
- enforcement costs, in particular with regulations that involve an approval process, thereby delaying investment decisions or that rely on the interpretations of inspectors, thereby creating the risk of arbitrariness and inconsistency

0.20 Regulation may also act as an indirect barrier by shaping perceptions about costs and delays:

- businesses may be tempted to hold off investment decisions because regulations are not yet clear or are subject to too much change
- they may also decide not to act because regulations are too complex and require third party intervention to be clarified

¹⁷ As set out in the *UK Low Carbon Industrial Strategy*, p. 73.

... and by focusing our research on key business activities

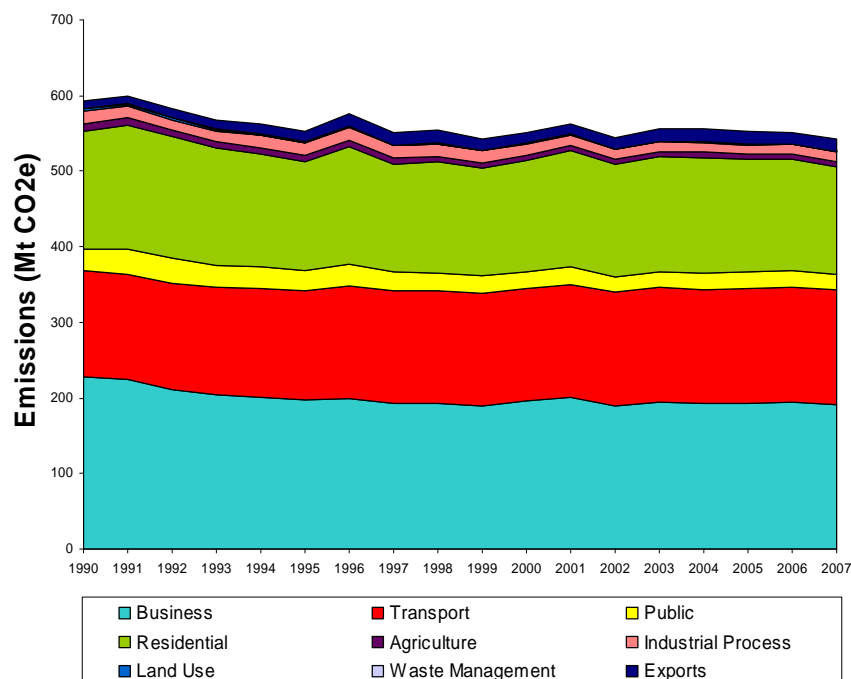
0.21 In order to identify regulatory barriers, we needed to narrow down our research and we therefore focused our research on four key areas:

- buildings
- transport
- industrial processes; and
- waste minimisation.

0.22 We chose this approach for three main reasons:

- the first three areas are the three main sources of carbon emissions from businesses by end-user (see **Figure 6**);
- waste is an important element of resource efficiency, and a heavily regulated area; and
- they are the key areas where businesses have direct control over costs (contrary to services they buy in).

Figure 6: Carbon emissions by end-user, 1999-2007



Source: DECC

0.23 Our research has included a review of existing literature on barriers to resource and energy efficiency and meeting with trade associations and individual businesses across a range of business sectors, regulators and Government officials. Between July and September 2009 we spoke to around 100 individuals, including around 40

face-to-face meetings and participation at three business stakeholder events, which gathered around 20 businesses each time. We also sent emails via trade associations to seek direct feedback from small businesses on the impact of regulation.

0.24 This report therefore brings together the leading research on energy and resource efficiency and cost abatement models with a considerable call for evidence and series of discussions with stakeholders. Our discussions with small businesses do not constitute a comprehensive survey of issues faced by small businesses, but we would expect them to highlight issues of first order importance to them.

Section 1

Existing regulation is not the key barrier

- 1.1** Research and business feedback obtained for this review shows that regulation is not the predominant barrier to the adoption of energy efficiency measures by businesses. Other barriers dominate the costs imposed by existing regulation and are therefore more important in businesses' decision to invest in low carbon practices and technologies.
- 1.2** In this section, we start by exploring the constraints on small businesses' energy use and investment decisions, before reviewing the key barriers to greater business resource and energy efficiency. We do this with a view to explaining the assumed non take-up of substantial low-cost / no cost carbon abatement opportunities from small businesses. The barriers highlighted in this section of the report are intended to inform the review of options for regulatory simplification and clarification in the next section.

Small businesses' energy demand is not particularly price-sensitive

- 1.3** NERA (2006) reviewed a number of studies looking at the elasticity of energy demand by sector. Although these estimates differ, they concur that the responsiveness of small businesses' energy demand to changes in price is low.¹⁸
- 1.4** This may be because there are no, or very few, substitutes for energy, and that it is difficult for small businesses to do without energy and to reduce energy consumption. It may also be simply due to the fact that energy costs represent a small proportion of overall costs for small businesses (see paragraph 1.29). Low energy costs do not offer small businesses a signal or an incentive strong enough to reduce these costs.
- 1.5** Nonetheless, there exist substantial opportunities for energy reduction at apparently low levels of investment in a range of key areas of business activities – as set out in section 3.
- 1.6** The key question is why the take-up of energy savings by SMEs appears to be so low when research claims it is so attractive. More fundamentally, it is important to understand what drives or impedes the adoption of energy efficiency practices and technologies by businesses.

¹⁸ For example, a Cambridge Econometrics study (2005) estimated the short-run elasticity to be -0.02 and long-run elasticity at -0.12.

Hidden costs have a stronger impact than regulation on SMEs' investment decisions

1.7 There have been a number of studies into barriers to take-up¹⁹, and research and business feedback obtained during the course of this review concur with that research:

- Cost-effective measures may already have been adopted.
- Calculations underestimated the true costs of capital for SMEs.
- Calculations do not reflect the way small businesses operate and take decisions.

Cost-effective measures may already have been adopted

1.8 A recent study commissioned by BIS from PwC²⁰ of a sample of businesses in the chemical and retail sectors found that most businesses had already identified and adopted most of the measures that were cost-effective.

1.9 This suggests that existing studies of resource and energy efficiency measures, such as McKinsey's MACC or DECC's ENUSIM model, may be overestimating the carbon emissions that can be achieved at low or negative costs or are based on out-of-date data.²¹

1.10 This is an area which could benefit from further research.

Calculations underestimate the true costs of capital for SMEs

1.11 The BRE review found that the models that identify cost-effective measures do not necessarily capture the true cost of capital for implementing energy efficiency measures.

1.12 Firstly, it is likely that businesses use implied discount rates which are higher than those used by the models. Most evaluations of carbon abatement opportunities use a discount rate of 15% to determine whether a measure is cost-effective, which corresponds to a payback period of seven years. This discount rate is arguably inappropriate for the investment decisions of small businesses, which typically seek investments with payback periods of 2 to 4 years (a 50% to 25% discount rate).

1.13 It is likely that small businesses implicitly use higher discount rates because (a) they are subject to credit constraints and (b), at least for new firms, mortality rates are high.

¹⁹ Carbon Trust (2005) and NERA (2006, 2007).

²⁰ PwC (2009), *Determining cost-effective action for business to reduce emissions*.

²¹ See Dieter Helm, "Climate change policy: why has so little been achieved?" *Oxford Review on Economic Policy*, 24:2, pp. 211-238.

1.14 During the course of this review, businesses repeatedly told us that the cashflow impact of energy efficiency measures was problematic, especially in times when many are struggling to survive.

- Statistics show that only half of all new businesses survive after four years (see **Figure 7**). Survival rates are likely to be lower in recession (see **Figure 8**).

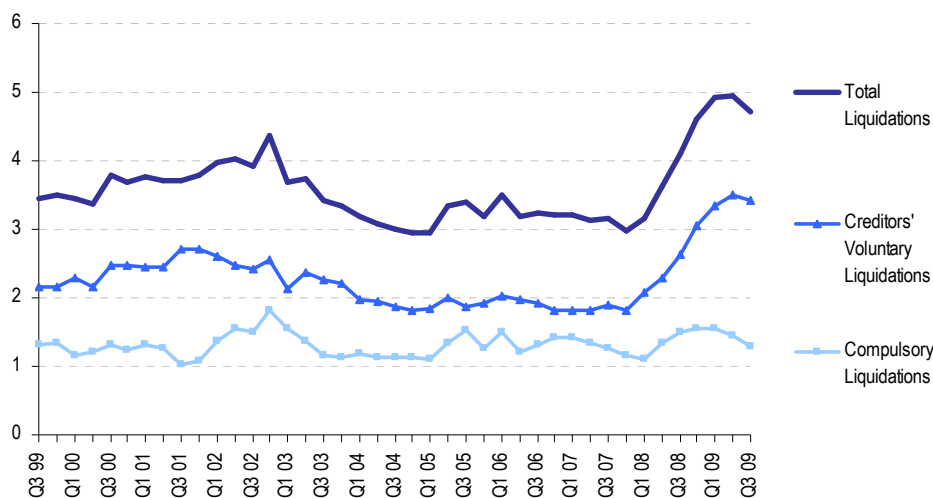
Figure 7: New businesses survival rate

	Rate (per cent)				
	Births 2002	Births 2003	Births 2004	Births 2005	Births 2006
One Year Survival	92.9	92.6	94.2	94.3	96.5
Two Year Survival	79.3	78.0	78.7	79.8	..
Three Year Survival	62.9	63.6	65.3
Four Year Survival	51.9	54.3
Five Year Survival	44.9

.. Data not available

Source: ONS

Figure 8: Corporate insolvencies 1999-2009



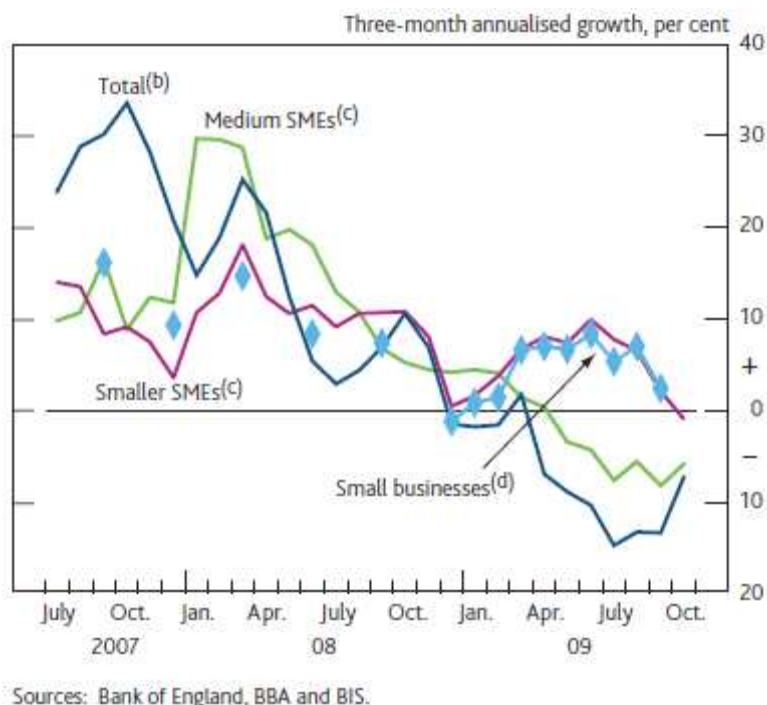
Source: Insolvency service statistics

1.15 A limited time horizon for small businesses would help explain why a rational SME decides not to invest in energy efficiency measures with a long payback period.

1.16 Secondly, the cost of credit can be a major issue for small businesses. Unlike large firms, SMEs are often unable to borrow or issue debt against future earnings because they cannot credibly signal their earnings prospects. Because of these information failures, credit is often not available to them at any price, or banks seek collateral, and the only collateral that most small firms are able to offer is the owner's equity in property, which in the current economic climate is likely to be declining in value.

1.17 Recent statistics from the Bank of England about lending rates²² show that growth in lending to small businesses has slowed in recent months:

Figure 9: Lending to businesses by size



Calculations do not reflect the way small businesses operate and take decisions

1.18 A third explanation is that the analysis of cost-effective measures does not reflect the way small businesses operate and take decisions. As a result, models are omitting certain costs.

1.19 This is referred to in literature as ‘hidden costs’. These include: management time; investment appraisal processes; information gathering and analysis; negotiation and procurement; documentation, auditing and regulatory compliance costs; disruption of business activity (requiring relocation, closing down of a section etc.); equipment incompatibility; staff training and replacement.

1.20 In all cases, literature recognises that existing models of abatement opportunities do not properly account for them – which is particularly problematic when evaluating the impact of costs on small businesses. A recent report by Ecofys²³ quantified these ‘hidden costs’ for the energy efficiency savings of households, which could be transposed to SMEs.

1.21 In addition, in many of these instances, there are trade-offs between energy efficiency benefits and other aspects of energy consumption. There are also issues around uncertainty about the level of costs - or a perception of high level of costs –

²² Bank of England (2009), *Trends in lending*.

²³ Ecofys (2009), *The hidden costs and benefits of domestic energy efficiency and carbon saving measures*.

which may cause SMEs to demand a risk premium in the appraisal of energy efficiency investments.

1.22 Finally, some research also argues that classic economic theory is insufficient to explain the lack of uptake of energy efficiency measures and that more attention needs to be paid to behavioural barriers, including the cost perception gap, lack of knowledge or awareness, inertia and loss aversion.

Time, access to information and access to capital are the key barriers

1.23 These findings were largely corroborated by our discussions with businesses. We found that the largest barriers for SMEs are, in order of priority:

- lack of management time;
- lack of information; and
- access to capital.

1.24 The PwC study commissioned by BIS found that the priority given to identifying and implementing measures to reduce carbon emissions was closely related to the significance of energy costs within total costs of a business. This represents a rational allocation of finite management time.

1.25 Business feedback for the purpose of this review confirms this. Businesses indicated that having the time to research and implement resource and energy efficiency measures and being able to afford the upfront costs of certain technologies dominate any effect from regulatory barriers by creating significant transaction costs.

1.26 We explore these barriers in further detail in sections 2 and 3.

Time

1.27 Businesses reported that time – especially management time – is extremely scarce. Energy-saving measures usually take time: not only time to identify available measures, pick one, identify the specific technology, find and contract with a supplier, but also time to explore taxes, grants and credits, to install and maintain.

1.28 NERA²⁴ estimates energy usage by small firms as follows, which explains why policies to date have tended not to focus on SMEs:

Type of firm	Emissions, tC/year
Average 'micro' firm in commercial sector	5
Average micro firm in industrial sector	25
Average small firm	25-50
Average small firm in industry	200

²⁴ NERA (2006), p.11 and table 2.2 p.13.

1.29 This leads to the following estimates of energy bills:

Organisation size	Micro<10	Small <50	Medium <250
Total category emissions (ktC)	5,578	4,198	1,188
Emissions (tC/firm)	5	40	250
Energy costs (£/firm)	600 ²⁵	4,800	30,000
Energy savings at 15% (£/firm)	90	720	4,500
Equivalent person-days	0.2	1.4	9.0

1.30 This table shows that, practically speaking, if it takes longer than two hours of management time to find out how to save £90 on annual energy bills and to implement the measures, energy efficiency measures impose net costs on the organisation. At that point, energy efficiency represents an investment, which will be weighed against other investments to assess the opportunity cost (i.e. the best alternative use these resources could be put to). So it is possible that the business will not adopt such measures, even if they come at no price.

Access to information

1.31 Our discussions with businesses indicated that access to information could also act as a significant barrier to the adoption of resource and energy efficient measures.

1.32 In particular, some businesses expressed confusion at the multiplicity of organisations which could offer advice: Environment Agency, Groundwork UK, Envirowise, WRAP, BusinessLink, Chambers of Commerce etc. While such diversity could mean that information is more targeted to respective businesses, this did not appear to be the case. Businesses remarked unanimously on the usefulness of NetRegs, the only UK-wide guidance service to date on environmental regulation.

1.33 Businesses also indicated that they particularly appreciated individual site visits and energy audits, through which they would get tailored advice, which they felt was more relevant and reliable than generic information made available through portals. They often expressed disappointment that the Carbon Trust only offers tailored advice to firms with energy bills above £50,000 a year. For firms below that level, the Carbon Trust currently offers expert advice online and via webinars, and they are working to lower this threshold and offer advice with energy bills between £30,000 and £50,000.

1.34 Finally, it also appears that there are regional disparities in availability of free energy audits and funding. For example, in the Northwest, Enworks, funded by the Northwest Regional Development Agency, has partnered with Groundwork²⁶ to offer resource

²⁵ This low figure may be explained by the fact that almost half of businesses are home-based and may therefore only claim part of their energy bill. See <http://www.enterprisenation.com/downloadfile.aspx?ID=83>

²⁶ The NWDA commissioned an evaluation of ENWORKS Waste Minimisation Project in 2008 to review the delivery period of 2003-2008. The evaluation found that the project supported 1,200 businesses in minimising their waste, delivering businesses £15.8m net cost savings (total cost savings minus capital costs), and saving 40,000tCO₂. See

efficiency services regardless of the size of the business. In the South East, the Environment Agency has launched two projects – Pathway to Zero Waste and European Pathway to Zero Waste – in partnership with the South East England Development Agency (SEEDA), the Waste Resources Action Programme (WRAP) and Defra. These include supporting SMEs in their resource efficiency efforts through model business plans and brokerage schemes with potential funding bodies.

Access to capital

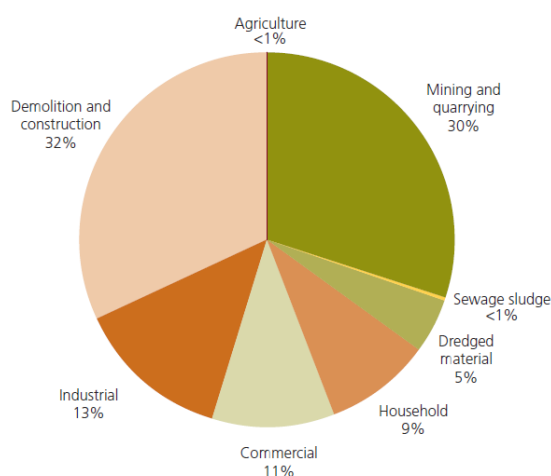
- 1.35** Many businesses, in particular small businesses, highlighted the fact that credit and capital constraints prevented them from investing in more ambitious and more costly technologies.
- 1.36** In summary, regulation is not acting as a key barrier to greater energy efficiency: hidden costs such as management time, information gathering, and capital and credit constraints are far more important barriers for businesses.
- 1.37** We nevertheless found evidence that regulation plays a key role in encouraging businesses to adopt energy and resource efficiency measures in particular sources of carbon emissions. These are explored in the following sections.

Section 2

Regulation does have an impact on resource efficiency and waste minimisation

2.1 Each year, England generates around 272 million tonnes of waste from households, commerce and industry²⁷ (see **Figure 10**). The economic cost of this waste extends well beyond the cost of paying for waste treatment or disposal. Most waste ends up in landfill, where biodegradable elements generate 22.8 MtCO₂e methane and nitrous oxide (greenhouse gases) per annum, while we continue extracting and processing new raw materials – thereby using valuable energy and contributing to carbon emissions.

Figure 10: Sources of waste generated in England, 2006



Source: Defra, *England Waste Strategy 2007*

2.2 A number of market failures make Government intervention necessary to incentivise producers and consumers to be more resource efficient and help develop the UK's waste infrastructure. In particular, prices for virgin raw materials do not reflect the full economic costs to the environment, and similarly the markets for recyclates (materials collected for recycling) do not reflect benefits relative to extracting and processing virgin materials. As such, there are insufficient price signals to industry to invest in re-processing, collection, sorting and maximising the value of waste.²⁸

²⁷ Defra (2007), *England Waste Strategy*.

²⁸ BIS (2009), *Towards a Low Carbon economy: economic analysis and evidence for a low carbon industrial strategy*, p. 106

2.3 The Government has put in place a number of economic and regulatory incentives, including:

- **The Landfill Tax**, which internalises the carbon costs of waste. Overall quantities of waste recorded at landfill sites registered for the tax have fallen by around 25% between 1997-98 and 2005-6.
- **The Landfill Allowance Trading System (LATS)**, which helps waste authorities meet their obligations to reduce biodegradable waste going to landfill in the most cost-effective way. Local authorities have landfilled less than their limits in each year of the scheme to date.
- **Producer responsibility**, in the shape of voluntary agreements and statutory obligations (under certain waste regulations).
- **Business support**, through the Waste and Resources Action Programme (WRAP).
- **Waste PFI schemes.**

2.4 A study commissioned by Defra from Oakdene Hollins in 2007 to quantify the business benefits of resource efficiency estimated the annual savings from the reduction or the management of waste through low cost / no-cost²⁹ intervention at £2.7bn via measures such as improved segregation and recycling of wastes currently sent to landfill as general mixed waste. However, data on resource efficiency are far less comprehensive than data on carbon emissions, including for waste arisings from SMEs, and these figures are therefore only partially indicative of potential savings. The Environment Agency estimates that SMEs generate around 60 per cent of all commercial waste produced in England and Wales.³⁰

2.5 Waste minimisation, re-use and recycling, as well as energy generation from waste, can:

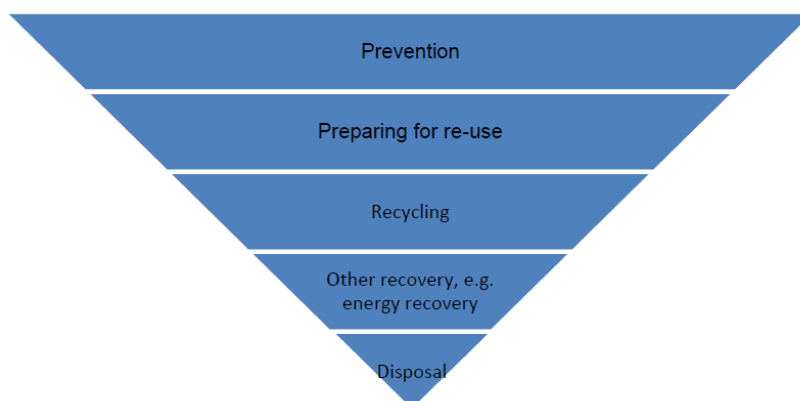
- reduce greenhouse gases emissions (by reducing carbon emissions from the extraction and processing of raw materials, by reducing the need to generate energy from fossil fuels, and by reducing methane emissions from landfill);
- reduce business operating costs: although the majority of small firms have relatively low disposal costs, there are significant savings opportunities from greater resource efficiency, including recycling or re-use of unused materials, energy and water, and from more efficient use of waste facilities and services; and
- provide business opportunities (by creating markets for recycled and recovered products and waste management opportunities).

²⁹ Defined here as payback in two years.

³⁰ Environment Agency (2006), *Putting the brakes on climate change*, p.11, <http://publications.environment-agency.gov.uk/pdf/GEHO0707BMMX-e-e.pdf>. The Environment Agency already has a resource efficiency tool aimed at large business activities, which it aims to roll out to SMEs as resources allow.

- 2.6** The UK is already involved in the range of initiatives to prevent certain materials from going to landfill and improve the way waste is collected, sorted and processed. However, there is scope for businesses to adopt more resource efficient practices and the ‘waste hierarchy’ provides a useful framework.
- 2.7** The Waste Framework Directive 2008 requires the following waste hierarchy (see **Figure 11**) to be applied “as a priority order in waste prevention and management legislation and policy” (article 4).

Figure 11: Waste hierarchy



Business can adopt a number of measures to minimise their waste

- 2.8** The actions businesses may take will depend on their specific circumstances, but they can be categorised as:
- **Waste minimisation:** reducing waste within processes by improving design and equipment and reducing packaging;
 - **Increasing reuse;**
 - **Increasing recycling and reprocessing:** recycling offers significant opportunities to reduce disposal costs and receive income for unwanted materials. Sorting of material and treatment to ensure they will not damage the environment are crucial to ensure the quality of recycling; and
 - **Generating energy from waste:** it could play an important role as a renewable source of electricity and heat, even if the infrastructure is not yet in place.

Regulation plays a key role in encouraging business resource efficiency

- 2.9** During the course of our review, we received a lot of feedback from firms indicating that waste regulations play a key role in encouraging them to adopt resource-efficiency measures and may be imposing costs on businesses wanting to or needing to dispose of, re-use or recycle their waste.

Key regulatory issues

Businesses would welcome greater clarity on the definition of 'waste', 'by-products' and former waste

- 2.10** Waste and by-products may be used as raw materials instead of being sent to landfill. But anyone who possesses, stores or transfers waste is subject to obligations which have costs. Those who breach the obligations may be subject to fines or even custody. This means that, other things being equal, buying material that is waste is much less attractive than buying other materials.
- 2.11** Businesses told this review that they would like to have greater clarity as to what practically constitutes waste, when waste ceases to be waste, and what by-products are.
- 2.12** The definition of waste comes from European legislation and states that waste means any "substance or object that the holder discards or intends or is required to discard"³¹.
- 2.13** However, neither existing Directives nor subsequent European Court of Justice (ECJ) judgements give certainty as to the circumstances under which waste ceases to be waste ('end of waste'). The revised Waste Framework Directive (WFD) 2008 leaves the definition of 'waste' unchanged but contains new text on 'by products', intended to summarise the existing case law, and a provision on 'end of waste', to enable the European Commission to adopt 'end of waste' criteria for specified wastes which may change the case law (Article 6).
- 2.14** At the time when the review team consulted businesses there was still little practical guidance on the meaning of 'waste' and 'end of waste', stating that it must be determined on the facts of the case and that the interpretation of the law is a matter for the courts.
- 2.15** For businesses, this means that there is a possibility that a material might turn out to be "waste" as defined by EU legislation and case law. Some businesses see this as a potential barrier to the growth of the market in recovered raw materials. Issues have been raised in relation to 'timber', 'straw', 'compost', 'steel slag', and 'pulverised fuel ash'³².
- 2.16** However, the Government has now published a consultation document on the legal definition of waste and its application³³, which should give businesses and other organisations greater clarity on what is waste and what is not when it is published in July 2010. The Environment Agency and Defra have also produced a four-page practical guide for businesses included in this consultation, which will also be published in July 2010.

³¹ Article 1(a) of the Waste Framework Directive 2006).

³² Steel slag and pulverised fuel ash are currently being considered by the Waste Quality Protocols project.

³³ <http://www.defra.gov.uk/corporate/consult/waste-definition/index.htm>

2.17 Furthermore, Defra, the Welsh Assembly Government and the Environment Agency have completed a review of Exemptions from environmental permitting. Revised regulations increase the provision of exemptions for low-risk activities. The aim is to lighten the regulatory burden, while removing the exemptions or restricting them, and regulating higher risk activities through standard permits. These changes will come into effect on 6 April 2010³⁴.

Businesses welcome work to give them more certainty on end of waste

2.18 The Environment Agency and the Waste and Resources Action Programme (WRAP) are running a programme to produce clear standards to determine when specified wastes can be considered to have been fully recovered, and hence are no longer waste. This is the Waste Quality Protocols project³⁵.

2.19 Businesses are strong advocates of the programme³⁶ and are keen for more materials to be covered.³⁷ The review was told that, recently, the programme has progressed more slowly than expected, for two reasons:

- Firstly, because of a Court of Appeal judgement which has laid down authoritative principles for end of waste products for the first time in English law, and has meant that the Environment Agency had to ensure that the Quality Protocols were consistent with those principles. However, these judgements have been helpful in laying down clear legal principles in the UK.
- Secondly, because the Environment Agency requires a lot of research to be carried out in order to ensure the recovered waste poses no greater risk to human health or to the environment than similar virgin materials. However, businesses are also aware that a clear understanding and quantification of the environmental risks are necessary conditions to develop effective markets in recovered materials.

2.20 A further issue for businesses is whether Quality Protocols will continue to offer safe harbours under the revised Waste Framework Directive. The question is open because the revised Directive contains a specific definition of end of waste for 'specified materials', which means that the Commission's criteria for any particular waste stream will take precedence over any national protocol for the same waste stream. However, the Commission's work so far has not focused on any waste stream already covered by a Quality Protocol in the UK. Moreover, the Government has always taken a proactive approach to the end of waste protocol process, and made sure industry experts were able to feed in views into technical discussions.

³⁴ www.environment-agency.gov.uk/business/topics/permitting/32158.aspx

³⁵ <http://www.environment-agency.gov.uk/business/topics/waste/32154.aspx>. This project is leading the sharing of best practice across Europe and was recently awarded the Better Regulation National Business Award.

³⁶ It is also welcomed by the Better Regulation Executive. In November 2009 the Environment Agency and WRAP were awarded the Better Regulation prize at the National Business Awards.

³⁷ For a full list, see: <http://www.environment-agency.gov.uk/business/topics/waste/114460.aspx>

Recommendation 1

Defra and the Environment Agency should work to maximise the certainty they can offer business around waste and end of waste definitions through the current consultation on the definition of waste. In particular, they should seek to ensure this advice and guidance meets business needs and follows the Code of practice on guidance on regulation³⁸.

Businesses are concerned regulations are not enforced consistently

2.21 Businesses expressed concerns that waste regulations and obligations were not being enforced consistently across local areas and regions. This may be due to the number of regulators involved in the enforcement of various waste regulations, as well as to the degree of discretion afforded to inspectors.

2.22 Inconsistencies in the enforcement of waste regulations may be due to:

- the absence of clear guidance on waste definitions (which should be resolved by the forthcoming guidance); or
- a lack of opportunity to share information, knowledge and expertise between regulators, to ensure consistent enforcement across sectors and areas. The Better Regulation Executive will explore the scope for more consistent enforcement of waste regulations at local level in more detail with the Local Authorities Coordinators of Regulatory Services (LACORS) and the Chartered Institute of Environmental Health.

Businesses are concerned by potentially overlapping regulations

2.23 Businesses also indicated that they see a number of regulations, in particular regulations derived from European legislation, as confusing and potentially imposing overlapping regulatory burdens, especially on manufacturers of electrical products. Products may fall under three layers of legislation:

- product-specific legislation, imposing registration, substance restriction, and collection, treatment and recovery requirements on specific wastes, such as the Waste Electrical and Electronic Equipment (WEEE) Directive, the Batteries Directive, the End-of-Life Vehicles Directive, and the Packaging Directive;
- horizontal legislation, imposing registration, substance restriction and monitoring requirements on the use of certain substances or the way specific waste materials are disposed of, such as the Restriction of the Use of Certain Hazardous Substances (RoHS) Directive, and the Waste Framework Directive; and
- legislation affecting the lifecycle of products – the Eco-Design of Energy-Using Products (EuP) Directive.

³⁸ <http://www.berr.gov.uk/whatwedo/bre/code/page46954.html>

2.24 The review was told that it is difficult for firms to understand which regulatory regime they come under, that they sometimes have to comply with similar obligations under different regulations, and that the cumulative burden is higher than it would be if packing and product design were tackled strategically.

2.25 The Government systematically consults on the transposition of European legislation, and Defra and BIS also hold regular joint stakeholder meetings to discuss the post-implementation operation of the transposing regulations. These events are organised to help keep stakeholders informed and to hear directly from obligated parties how the legislation is working on the ground.

Recommendation 2

As part of the next phase of simplification targets to 2015 (within the theme of "Natural Environment") the Government should engage with relevant businesses to identify and remove overlapping requirements on businesses from legislation impacting on waste and waste materials where possible.

Specific regulatory issue

Businesses would welcome greater incentives for producer responsibility over the life of a product

2.26 The Producer Responsibility Obligations (Packaging Waste) Regulations 2008 (as amended) are intended to encourage the minimisation of packaging and packaging waste, incentivise re-use and increase the recovery and recycling of packaging waste. They place obligations on certain businesses who satisfy two threshold tests (more than 50t a year, and a turnover of more than £2m p.a.) to recover and recycle specified tonnages of packaging waste each year.

2.27 One issue raised is that the system does not reward firms who develop products that are more easily recyclable as products are mixed on collection and everyone is paying a share of the overall costs of recycling. This means that producer responsibility legislation, by being focused on end of life recovery, gives only limited incentives for eco-design and energy use over the lifecycle of the product.

Additional non-regulatory issues

There are not enough treatment facilities for commercial waste in England

2.28 The latest statistics (2002-2003) showed that recycling capacity in the UK was low, and business systematically reported to the review that there are not enough waste collection points for commercial and industrial waste:

- Defra statistics from 2002-3 indicated that 42 % of commercial and industrial waste was being reused or recycled, while 41% was being sent to landfill. However, statistics available for households show that recycling has considerably increased thanks to the landfill tax escalator and other policies. It is therefore likely that this is also the case for commercial and industrial waste, although statistics will only be published later this year.

- Defra also estimates that 80 new industrial and commercial waste facilities will be needed by 2020 and 180 by 2020 if the UK is to divert more waste from landfill.³⁹ Without these, SMEs will continue to send waste to landfill instead of selling it or generating energy from it; or they will be subject to disproportionate cost where they have to deal with waste under the WEEE Directive.

2.29 It is a necessary condition for the growth in the market for used materials that the infrastructure should exist. As businesses divert more waste from landfill, more capacity will be needed. There are economies of scale in waste treatment, so large firms can do it themselves and SMEs cannot: they need access to commercial-scale facilities.

2.30 The Government recognises the importance of an adequate waste management infrastructure for dealing with all waste arisings in its planning policy. Planning Policy Statement 10 “Planning for Sustainable Waste Management” makes it clear that waste planning authorities should prepare and deliver planning strategies which enable the sufficient and timely provision of waste management facilities to meet the needs of their communities.

There is a lack of awareness among small businesses of their regulatory duties

2.31 Section 34 Environmental Protection Act 1990 imposes certain duties on any person who imports, produces, carries, keeps, treats or disposes of controlled waste or, as a broker, has control of such waste (with the exception of householders). This is known as the environmental duty of care. A recent SME survey carried out by NetRegs in 2009 (see **Figure 12**) found that awareness of environmental legislation, including the duty of care, is still low.

Figure 12: Business awareness of environmental legislation in England

Legislation	England SMEs
Duty of Care Regulations	31%
End of Life Vehicles Regulations	17%
Environmental Permitting	16%
Hazardous Waste Regulations	41%
Packaging Waste Regulations	22%
REACH Regulations	10%
Site Waste Management Plans	28%
Waste Electrical and Electronic Equipment Regulations (WEEE Regulations)	19%

Note: N= 9619 responses; Base = all business surveyed in England

Source: NetRegs SME Survey 2009 - England Report

³⁹ Defra (2007), Regulatory Impact Assessment for the Waste Strategy 2007.

2.32 Business feedback obtained for the purpose of this review confirmed the findings of this survey. Business and trade association expressed concerns that many firms are unaware of the duty of care and of two other widespread obligations:

- the obligation on those who transport waste “on a professional basis or with a view to profit” to register with the Environment Agency; and
- the obligation to set down in Landfill legislation to treat all non-hazardous waste prior to it being sent to landfill.⁴⁰ Landfills cannot generally accept untreated waste, so all producers of waste must ensure that their waste is treated either at the place where it is produced or elsewhere.

2.33 This widespread ignorance is worrying for several reasons:

- The duties are imposed to protect human health and environment. Ignorance and consequent widespread breach of the duties means that those objectives are threatened.
- The UK is obliged not merely to transpose, but to enforce directives and is in breach if it does not do so. If there is a lack of awareness of the duties and they are consequently not complied with, enforcement is not effective.
- Compliance is costly, and the non-compliant have a competitive advantage.
- If ignorance is widespread, then the law is not accessible or certain. Yet breach is punishable by fines, and, in some cases, with imprisonment.

2.34 The Government is aware of this issue and BIS, Defra, the Environment Agency are working together, alongside business, to:

- develop the reach of NetRegs as a guidance service on environmental and waste regulation for businesses; and
- introduce electronic duty of care systems that will improve the accuracy and value of Duty of Care Transfer Notes to SMEs.

⁴⁰ The obligation comes from the Landfill Directive and came into force in October 2007.

Section 3

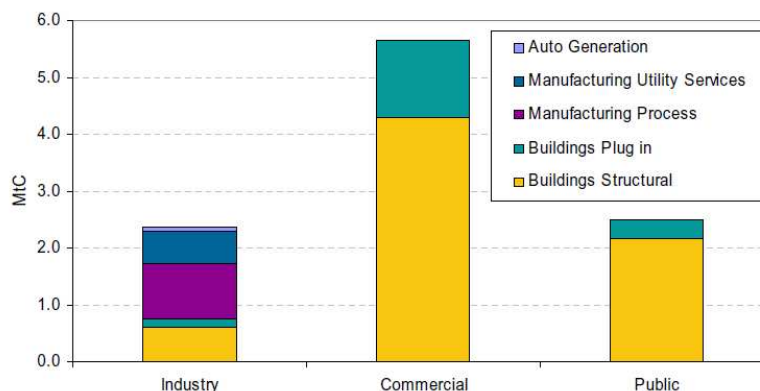
There is scope for Government intervention to encourage businesses to adopt energy efficiency measures

In buildings

Buildings and their use are the largest source of carbon emissions from businesses

- 3.1** Buildings account for about 50% of UK greenhouse gas emissions. The Committee on Climate Change (2008) estimates carbon emissions from energy use in commercial buildings at 56 MtCO₂ in 2006⁴¹. Of this, 80% is due to indirect emissions (electricity) and 20% to direct emissions (fossil fuel combustion).
- 3.2** NERA⁴² estimates that building use accounts for 70% of emissions coming from SMEs (see **Figure 13**). This means that carbon emissions from buildings are central to reducing carbon emissions from SMEs.

Figure 13: Organisations not covered by existing policies, by energy end use



Source: NERA (2006)

⁴¹ CCC report 2008, chapter 6, p. 214.

⁴² NERA (2006)

3.3 Research shows that there is a large economic prize available from improving the energy efficiency of non-domestic buildings, including commercial buildings, because carbon reductions and energy efficiency are achievable at a lower cost than in any other sector of the economy. This means improving the energy efficiency of the buildings themselves (the fabric) and the way the building is used (lighting, heating). Because emissions from electricity use are already subject to the EU Emissions Trading System (EU ETS), the remaining economic and carbon abatement potential lies in reducing the amount of energy needed to heat buildings through improved insulation and more efficient ways and less carbon-intensive ways to generate heat.

A number of measures could target these emissions at low or negative costs⁴³

3.4 Research done by the Buildings Research Establishment and AEA for the Committee on Climate Change (see **Figure 14**) suggests that ca. 25 MtCO₂ of the overall 56 MtCO₂ could be saved via a range of measures at low or negative costs across the whole economy (large and small businesses) by, for instance:

- replacing existing boilers (potential abatement of 2 MtCO₂ at -£45/tCO₂)⁴⁴
- insulating cavity walls (potential abatement of 2 MtCO₂ at -£35/tCO₂)
- solid wall insulation (potential abatement of 13 MtCO₂ at £5/tCO₂)

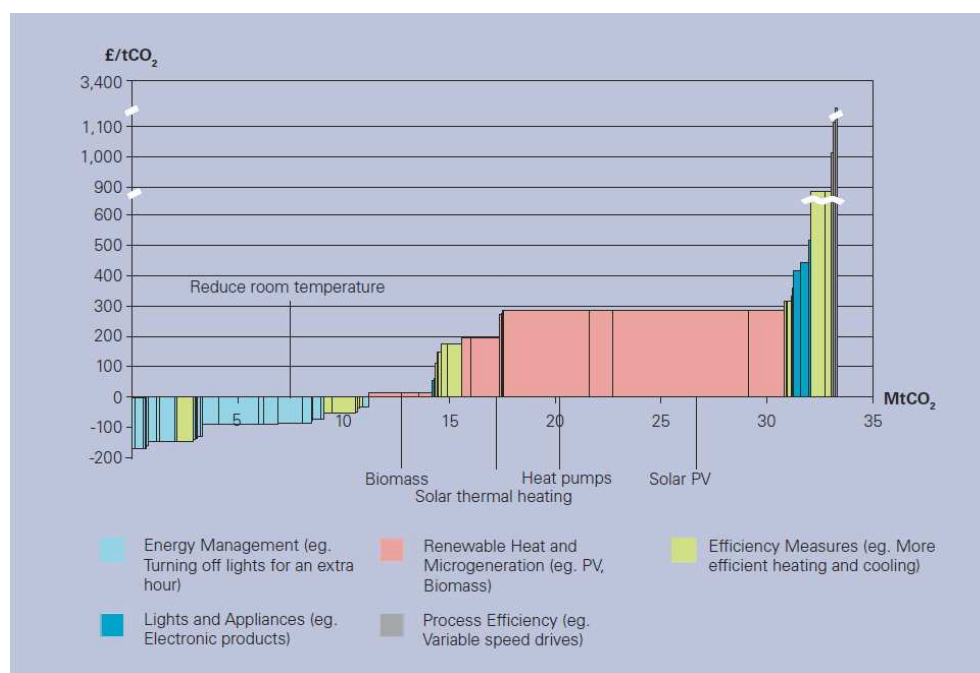
3.5 More expensive measures could also deliver significant carbon savings, in particular micro generation technologies, which could reduce emissions from buildings by up to 18 MtCO₂:

- biomass boilers – 3 MtCO₂ at £60/tCO₂
- solar PV – over 8 MtCO₂ at £hundreds/tCO₂

⁴³ Defined here, and until section 4, as using a discount rate of 15%.

⁴⁴ i.e. saving £45 per tonne of carbon immediately.

Figure 14: Non-domestic buildings MACC – technical potential in 2020



3.6 Although no research indicates which of these carbon abatement measures would be specifically available at low or no costs to SMEs, the overall carbon abatement potential identified by recent research⁴⁵ in buildings suggest that small businesses are not fully exploiting opportunities to save money by implementing low cost / no cost measures. This issue was explored in section 1.

3.7 The review therefore sought to assess the impact of regulation on the adoption of resource and energy efficient practices and technologies in buildings.

Regulation is not the key barrier

3.8 The direct impact of regulation on building usage for SMEs is fairly limited, because regulation tends to focus on sites occupied by energy-intensive businesses or on domestic buildings, and less on non-domestic buildings occupied by SMEs. This leaves carbon emissions from existing commercial buildings occupied by SMEs free of direct regulatory constraints.

Other barriers are far more important

3.9 As outlined in section 2, there is a large literature available on barriers to energy efficiency. Our discussions with businesses found that some are particularly relevant to building use by SMEs.

⁴⁵ See Buildings Research Establishment (2009), *Potential for energy efficiency savings in small and medium sized organisations - preliminary assessment*, and Carbon Trust (2009).

Split incentives

- 3.10** We found that a major barrier to the reduction in carbon emissions from building use is the fact that many businesses rent the buildings that they occupy. Although there are very little data available at present⁴⁶, it is commonly assumed that many SMEs are tenants⁴⁷, rather than owners of the building they occupy.
- 3.11** The issue is that most energy-saving measures are either completely under the control of the landlord, or require the landlord's consent. The Carbon Trust estimates that between 52% and 88% of carbon abatement opportunity in buildings requires the involvement of the landlord.⁴⁸ Over half of the abatement potential is estimated to be the landlord's decision alone. So, in general, landlords choose the technology; but the benefits accrue most directly to those who pay the energy bills, usually tenants. Furthermore, building owners may be unwilling to invest in building designs or appliances that reduce energy use unless they can recoup the cost through increased rentals. However, in many cases the energy savings involved would not warrant the costs of renegotiating rental contracts.
- 3.12** Even for those measures fully within the control of tenants, tenants do not have an incentive to invest in fixed equipment with payback periods longer than the expected tenancy. This renders many apparently worthwhile investments uneconomic for practical purposes, and significantly reduces the practically available carbon abatement potential – as is the case, for instance, with the installation of lighting controls.
- 3.13** The Carbon Reduction Commitment Energy Efficiency Scheme (CRC) is aimed directly at tackling the issues of split incentives between landlords and tenants. Unless the tenant has a direct supply with an energy supplier, the landlord will be responsible under CRC for the energy use in the premises, including those of tenants. This aims to incentivise innovative partnerships between landlords and tenants to secure the benefits of energy savings for both parties.

Indirect regulatory barriers

- 3.14** There may be hidden regulatory barriers behind this lack of cost-effectiveness and associated lack of adoption: product standards and accreditation required to check that standards compliance can increase production costs and make them more expensive for end-users. The point was made to the review team that accreditation methodologies of technologies are not always consistent and can impose significant one-off and on-going costs. For instance, SAP Appendix Q and the Microgeneration Certification Scheme impose different accreditation standards (and therefore different costs) for the same technology.

⁴⁶ Research conducted for DECC by the Buildings Research Establishment on the Potential for Energy Savings in Small Organisations (2009) notes the importance of the landlord/tenant split incentive. The Carbon Trust is also due to publish research in this area shortly.

⁴⁷ Research by Scrase (2001) for the Association for the Conservation of Energy, quoted by NERA (2006) estimates that as many as 90 per cent of SMEs operate from rented offices.

⁴⁸ Carbon Trust (2009).

Existing vs. new buildings

3.15 The Government now requires all new buildings to be built according to increasingly stringent energy efficiency standards and for dwellings also according to water efficiency standards. However, most buildings in the UK are old: around three quarters of the existing building stock was built before minimum energy performance levels were introduced into Building Regulations⁴⁹.

3.16 In Budget 2008, the Government announced its ambition that all new non-domestic buildings should be zero carbon from 2019 (with earlier targets for schools and other public buildings) and launched a consultation on policy options and their estimated costs and benefits⁵⁰.

However, regulation is imposing some unnecessary costs

Building Regulations (Part L) compliance requirements are complex

3.17 Amongst other things, the 2006 revision of Part L of the Building Regulations implemented the Energy Performance of Buildings Directive, which sets target emissions rates for domestic and non-domestic buildings (for the purpose of this review we are interested in Part L2A – new build non-domestic buildings and Part L2B – existing non-domestic buildings).

3.18 Several stakeholders commented that, since the majority of organisations in the construction sector are small firms or sole traders, the capacity of the sector to absorb and comply with complex regulations is low. They expressed the fear that many firms, faced with significant cost of accessing, understanding and complying with Building Regulations, do not bother.

3.19 The Government is already looking at ways to assist businesses in understanding compliance requirements:

- Part L compliance and Energy Performance Certificate assessor frameworks were recently joined up to encourage builders to use an energy assessor to do the compliance calculations.
- The Government recently consulted on options to help improve awareness and understanding of changes to the regulation⁵¹.
- The Government is also working with industry to develop project-based guidance.

⁴⁹ Building Regulations do not impose retrospective requirements generally; however, all building work must comply with current requirements and, for non-domestic buildings with a floor area over 1000m² where relevant building work is carried out, energy performance standards for the whole building must be met where practical and cost-effective.

⁵⁰ CLG, *Zero Carbon for New Non-domestic Buildings: Consultation on Policy Options, November 2009* <http://www.communities.gov.uk/publications/planningandbuilding/newnondomesticconsult>

⁵¹ CLG, *Proposed Changes to Part L and Part F of the Building Regulations: A Consultation Paper*, September 2009, <http://www.communities.gov.uk/publications/planningandbuilding/partlf2010consultation>

Recommendation 3

CLG should continue to improve the quality of the guidance related to Building Regulations, particularly working with industry to ensure guidance is business-friendly.

3.20 Businesses also expressed concerns that Building Regulations – Part L requirements are being interpreted inconsistently⁵² by local authorities building control departments and there were some doubts that standards were actually being met. This inconsistency could be linked to the complexity of Building Regulations – Part L, as outlined above, and to their interaction with other parts of the Building Regulations. This could also be due to a lack of enforcement of Building Regulations – Part L.

3.21 However, the Local Authority Building Control (LABC) carried out a survey in March 2009⁵³ that disproved accusations that building control officers do not enforce Part L of the building regulations properly.

Businesses are concerned by the cumulative burden of Building Regulations

3.22 Feedback from trade associations representing the construction industry indicates that the current piecemeal approach to updating and reviewing the Building Regulations and its supporting guidance is imposing a growing burden on developers. Contractors find it difficult to keep pace with revisions of regulations and to plan forward. This reduces the commercial viability of new projects at the margin and reduces the supply of new buildings. Since new buildings are more energy efficient than old – and would be even without Building Regulations – this hampers carbon reduction in buildings.

3.23 As part of the review of the *Future of Building Control*, CLG considered ways to make the Building Regulations easier to understand and comply with and to make the Building Control system more efficient and effective:

- CLG has now introduced the Periodic Review, a fixed three-yearly cycle of reviews of the technical parts of the Regulations, which should enable industry to plan for changes more easily.⁵⁴
- A project to map how building control processes fit with other regimes – such as fire regulations and the Code for Sustainable Homes – for a range of individual building scenarios has also been started, which will feed into a consultation on proposed changes to the Building Control System in late 2010.
- CLG is also looking at other ways to aid compliance with Building Regulations through improving the guidance available, particularly for small builders, introducing alternative compliance methods (through Competent Person self-

⁵² It should be noted that, due to their functional nature, some variation in the interpretation of Building Regulations is to be expected.

⁵³ http://www.labc.uk.com/site/scripts/news_article.php?newsID=14

⁵⁴ Those regulations being reviewed for implementation in 2010 include Parts L, F and J. In 2010, CLG will begin the evaluation of changes for implementation in 2013, which will include further changes to Part L.

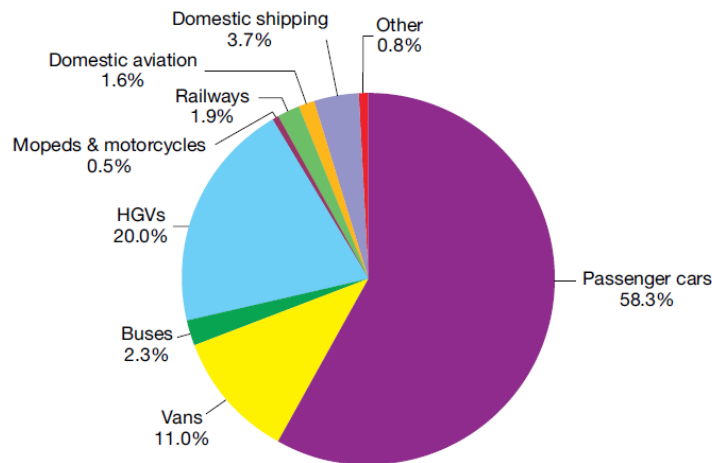
certification schemes or accredited construction details), introducing a risk-based service plan approach to inspections and streamlining the dispute resolution procedures.

In transport

Transport is a large source of carbon emissions

3.24 Transport is the second largest source of carbon emissions in the UK by end use⁵⁵, and represented 134 MtCO₂ in 2006.⁵⁶ Within this, the vast majority of emissions (92%) come from road transport (see **Figure 15**).

Figure 15: GHG emissions from domestic transport



Source: National Atmospheric Emissions Inventory (IPCC categories) 2007

3.25 It will be necessary for the UK to reduce these carbon emissions if it is to hit its carbon targets.

3.26 It is difficult, however, to assess how much of these carbon emissions are down to SMEs as research focuses on types of vehicles, distinguishing between cars, vans, heavy-goods vehicles, buses and domestic shipping, and on length of journey. By compiling numbers from the Committee on Climate Change report (2008), it is possible to estimate that emissions from all commercial road transport amount to ca. 52 MtCO₂, with:

- Just under 7 MtCO₂ emissions being down to commercial and public sector use of cars
- Around 25 MtCO₂ emissions coming from Heavy Goods Vehicles (we can assume these are used mostly by businesses)

⁵⁵ The numbers exclude emissions from international air travel.

⁵⁶ Committee on Climate Change (2008)

- Around 20 MtCO₂ coming from vans.

Low-cost / no cost abatement opportunities are limited

3.27 Transport technologies and fuels are well established, and vehicle performance and efficiency is steadily improving, in particular in cars. The EU's New Car CO₂ Regulation 2008 requires that the fuel efficiency of new cars sold must on average be 130gCO₂/km in 2012 and 95gCO₂/km in 2020.

3.28 The Committee on Climate Change identifies a number of ways businesses can reduce emissions and improve resource energy efficiency in transport, and we list these below. As yet these options have not undergone a full cost benefit analysis.

Switching to new, more energy-efficient vehicles and transport modes

- Switching to vehicles relying on other fuel sources such as hydrogen vehicles or electric vehicles (using decarbonised electricity)
- Switching transport mode, for instance for electrified rail (using decarbonised electricity)

3.29 The Committee on Climate Change estimates that the cost-effective abatement potential (i.e. below £40t/CO₂) on the supply side (i.e. by improving the carbon efficiency of road transport without changing the total level of transport demand or the balance between different modes) by 2020 lies between 4 and 14 MtCO₂⁵⁷. But the CCC estimates that these emissions reductions could be achieved thanks to hybrid and electric vehicles, which are still expensive technologies at the moment. Estimating potential from changes in transport mode is too complex.

3.30 Moreover, this reduction would only be achieved via the purchase of new cars, an investment decision that needs to be taken against other possible investments and their rates of return. As explained in section 1, small businesses typically seek investments with pay back periods of between two and four years. The manufacture and servicing of these new cars is also likely to be resource and energy intensive.

Adopting energy-efficiency measures without changing transport mode

- Improvements without a change in energy use, i.e. more efficient vehicles, through advanced engine technologies and improvements in tyres, aerodynamics, lights and appliances, which can all increase petrol and diesel efficiencies.
- Better logistic management.
- Using biofuels.

⁵⁷ This potential varies, depending on the discount rate that is used and whether the fuel duty saved is counted as a benefit. The lower figure uses a discount rate of 3.5% (as in the Green Book) and counts fuel duties saved as transfers rather than benefits. The larger figure uses a real discount rate of 7% and counts fuel duty saved as a benefit.

- Eco-driving, which can have an influence on fuel efficiency by adopting a smoother style of driving, paying greater attention to tyre pressure, intelligent use of heating and air-conditioning systems. Trials by the UK's Driving Standards Agency in 2004 showed average fuel savings of 8.5%. The CCC estimates that this could save around 0.3 MtCO₂ by 2020.
- The CCC also estimates that speed limit enforcement could also produce annual emissions reductions of over 3 MtCO₂ in 2020, with an additional 2MtCO₂ if the speed limit were reduced to 60 mph on motorways.
- Using public transport.
- Home working.

Regulation is not a key barrier

3.31 None of our discussions with businesses indicated that regulations were a barrier to them adopting more fuel efficient or low carbon vehicles.

3.32 For some industries and business, particularly those for whom transport represents a significant percentage of their operating costs, there are clear incentives to increasing fuel efficiency. However research indicates that low-cost / no cost measures are likely to already have been adopted⁵⁸ and the Government is providing funding for the Safe and Fuel Efficient Driving programme for Van and Heavy Goods Vehicles drivers, as well as a £1 million demonstration programme to encourage these practices to be embedded in the bus and coach industry.

3.33 The main issue is actually the costs of switching to new technologies and the Government has announced a number of measures in Budget 2009 and in the Department for Transport's carbon reduction strategy for transport *Low Carbon Transport: A Greener Future*, published in July 2009.

In industrial processes

Industrial processes are highly carbon-intensive

3.34 The Committee on Climate Change (2008) estimates 2006 carbon emissions from industry (i.e. heat and industrial processes) at 155 MtCO₂.

3.35 Heat is an essential input to industrial processes such as iron and steel production, extraction and processing of raw material, transport and disposal. Heat created by the combustion of fossil fuels in these processes accounts for 95 MtCO₂ of direct carbon emissions from industrial processes, and electricity use for 60 MtCO₂ of indirect carbon emissions.

⁵⁸ PwC (2009), *Determining cost-effective action for business to reduce emissions* – Final report for BERR.

Most low-cost / no cost carbon abatement opportunities have already been realised

3.36 Research commissioned by the Committee on Climate Change from AEA using DECC's ENUSIM model to determine the level of industrial abatement potential shows that the potential to reduce emissions at low-cost / no cost is small relative to size of the sector:

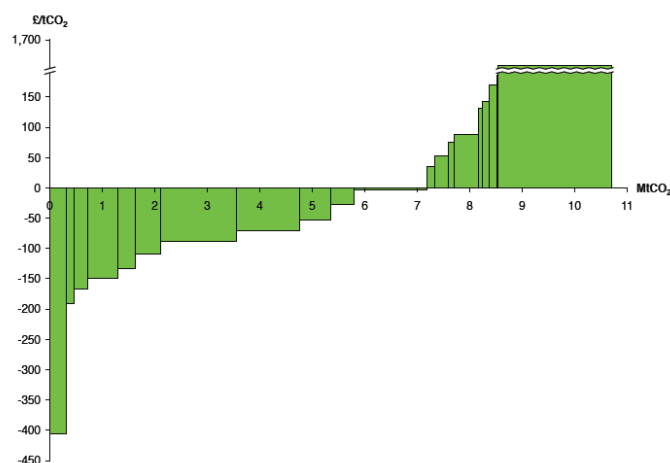
- at a negative cost, it represents 7 MtCO₂ across the whole economy (large and small businesses)
- at a cost below £40t/CO₂, it represents less than 4 additional MtCO₂

3.37 Since manufacturing and industrial companies use a lot of energy, their energy bills are a significant part of overall costs. Manufacturing companies therefore devote greater resources to energy management. Many of these companies are subject to binding policy levers such as EU ETS. This may explain why the remaining opportunity for carbon abatement is smaller than in the services sector.

3.38 Furthermore, the Committee on Climate Change notes that it is not possible to identify on the Marginal Abatement Cost Curves (see **Figure 16**) major blocks of opportunity resulting from specific technologies. The opportunities in industry lie in multiple relatively small process improvements: the MACC below includes more than 1,000 measures⁵⁹. These improvements encompass:

- improvements in efficiency in the use of electricity through multiple enhancements to electrical machinery; and
- improvements in efficiency in heat generation, insulation and heat recovery, which can be achieved either within existing plants via incremental improvements or as part of investment in new plants.

Figure 16: Industry MACC



Source: CCC 2008

⁵⁹ Owing to the number of technologies, it is not possible to show individual bars for each measure on the MACC. These improvements encompass improvements in efficiency in the use of electricity and in efficiency of heat generation, insulation and heat recovery.

3.39 Decarbonisation of off-site energy supply (i.e. energy generation on a large scale) did not fall within the scope of our review. However, we assessed the impact of regulations on on-site energy supply, i.e. on the generation of renewable energy using existing technologies.

There is scope for the planning regime to further support the adoption of energy efficiency measures

3.40 Business feedback has consistently espoused the view that the planning regime for small-scale renewables and low carbon energy technologies could be simplified to save them time and money, as it has been for household developments.

The planning application process for small developments is felt to be disproportionately complex, long and costly

3.41 Businesses have expressed strong dissatisfaction with the complexity, the time taken by and the costs of obtaining the planning permission required for small-scale renewables and low carbon energy technologies developments, costs which are no longer faced by households⁶⁰:

- As pointed out by the Killian Pretty Review, the legislative and policy framework and secondary legislation for the processing of planning applications is particularly complex. In our discussions, businesses indicated that it often required them to commission feasibility studies and hire consultants to help them navigate the planning application process, which necessarily add to the costs of planning applications.
- Businesses also expressed concerns at the costs of planning applications: at present, the fee for a minor non-domestic planning application is £335 where the floorspace of the building would be increased by more than 40m², and £170 where the floorspace would not be increased by more than 40m². Adding to this, the PwC administrative burdens measurement project estimates the administrative cost of preparing a planning application to be £1,450 for a minor development. However, this does not measure the delay costs, both standby and holding costs, of setting budget aside for a project that may not be granted approval. In practice, this would have disproportionate impact on small firms, which would have less opportunity to redeploy resources in response to unexpected delay.
- Overall, a small business will probably be ready to face all these costs if the benefits of the technologies are large enough, or if they form only a small part of the overall costs of the project – which is not the case for a small-scale project. As explained in section 1, if the costs of adopting low carbon technologies are high, this investment decision will be weighed against other investment decisions.

⁶⁰ In April 2008, some small-scale renewables and low carbon energy technology installations in domestic settings (such as solar panels) were granted permitted development rights. These rights allow householders to install such technologies at their properties without the need to apply for specific planning permission from the local planning authority.

There are no data on how many applications do not get submitted because the costs are not commensurate to the benefits.

- Finally, during the course of the business stakeholder events the review team attended, a dozen individual businesses commented that planning applications for small-scale, low-carbon developments took longer than the 8-week target adopted by the Government. Government statistics on the number of planning applications for small-scale developments show that 76% of applications are granted within the 8-week target. We did not find hard evidence that applications for renewables or low carbon technologies disproportionately fell into the 24% that do not.

3.42 The Government is on track in terms of implementing the recommendations of the Killian Pretty Review to simplify the planning regime, and recently published an update on progress⁶¹. The Government has launched a consultation on the introduction of permitted development rights (PDRs) for small-scale renewable and low-carbon technologies⁶², which includes proposals for the installation of a broad range of technologies on non-domestic premises.

3.43 The Department for Communities and Local Government (CLG) have estimated that permitted development rights to certain types of renewable and low carbon energy technologies for non-domestic premises would result in somewhere between £910,000 and £1,270,000 in annual savings to firms by not having to pay fees and undertake administration associated with submitting planning applications⁶³. These savings may indeed be more substantial if the uptake of these technologies is even greater than anticipated. The deregulation of the planning system in this regard could make a significant contribution to encouraging the uptake of small-scale microgeneration, which is needed if the UK is to meet its Renewable Energy targets.

3.44 More broadly, easing planning will make the adoption of low carbon technologies easier, thereby generating energy efficiency savings in buildings and industrial processes and attracting further investment in the development of new technologies to generate renewable energy.

Recommendation 4

CLG, working with other departments, should continue to simplify the planning system to encourage the delivery of non-domestic small scale renewable and low carbon energy technologies, giving particular consideration to the introduction of permitted development rights for these technologies.

⁶¹ CLG, *Taking forward the Government's response to the Killian Pretty Review*, Second progress report, December 2009 <http://www.communities.gov.uk/documents/planningandbuilding/pdf/1419562.pdf>

⁶² CLG, *Permitted development rights for small scale renewable and low carbon energy technologies, and electric vehicle charging infrastructure: Consultation*, November 2009 <http://www.communities.gov.uk/publications/planningandbuilding/microgenelectriccars>

⁶³ Ibid.

... and local planning decisions do not accord sufficient weight to the national low carbon agenda

3.45 Business feedback also indicates that planning officers are often largely unaware of the national low carbon agenda and its implications for planning approval. Investments in improving the energy efficiency of buildings or in renewable energy projects are often scuppered because local authorities or statutory consultees give undue weight to noise and insufficient (or no) weight to national renewable energy policy. Problems are also caused by variations between authorities in interpreting existing guidance consistently and by local opposition to certain low carbon technologies (biomass boilers and wind farms).

3.46 CLG is currently renewing the relevant Planning Policy Statements (PPS 1 supplement on climate change and PPS 22 on renewable energy) and accompanying guidance note, which should be published for consultation shortly⁶⁴. The Government will provide support to planners and local authority staff in England engaged in climate change activities to help increase their skills and knowledge.

⁶⁴CLG, *Programme for Replacement of Planning Policy Guidance Notes and Planning Policy Statements (as at 22 December 2009)*
<http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/programmereplacement/>

Summary of recommendations

1. Defra and the Environment Agency should work to maximise the certainty they can offer business around waste and end of waste definitions through the current consultation on the definition of waste. In particular, they should seek to ensure this advice and guidance meets business needs and follows the Code of practice on guidance on regulation.
2. As part of the next phase of simplification targets to 2015 (within the theme of "Natural Environment") the Government should engage with relevant businesses to identify and remove overlapping requirements on businesses from legislation impacting on waste and waste materials where possible.
3. CLG should continue to improve the quality of the guidance related to Building Regulations, particularly working with industry to ensure guidance is business-friendly.
4. CLG, working with other departments, should continue to simplify the planning system to encourage the delivery of non-domestic small scale renewable and low carbon energy technologies, giving particular consideration to the introduction of permitted development rights for these technologies.

Annex 1

List of stakeholders

Government departments, agencies and other public bodies

Department for Business, Innovation Skills
Department of Energy and Climate Change
Department for Communities and Local Government
Department for Environment, Food and Rural Affairs
Department for Transport
Committee on Climate Change
Environment Agency
Health and Safety Executive
Ofwat
Financial Services Authority
Carbon Trust
Sustainable Development Commission
British Standards Institute
Enworks
Envirowise
Vehicle and Operator Services Agency

Industry Organisations (and their members)

Aldersgate Group
BEAMA
British Chamber of Commerce
British Retail Consortium
Building Research Establishment
Confederation of British Industry
EEF
Federation of Small Businesses
Homebuilder Federation
Institute of Directors
Master Builders Federation
National Farmers Union
UK Contractors Group
Water UK

Individual discussions with companies

Adnams
Belvoir Associates
Corus Group
eMansys

Greenled Light Ltd.
Marks & Spencer
Origo Industries
Tesco

Annex 2

Glossary, definitions, abbreviations

Term	Definition
Energy efficiency measures	For this report, energy efficiency measures mean measures that: <ul style="list-style-type: none"> • reduce the amount of energy consumed per unit of output, or that • reduce the amount of carbon emitted per unit of energy consumed.
Resource efficiency	For this report, resource efficiency measures mean measures that will reduce the amount of raw materials, energy and water needed to produce a good or a service, thereby minimising waste and reducing costs.
Discount rate	The annual percentage rate at which the present value of a future pound, or other unit of account, is assumed to fall away through time. (Definition taken from HM Treasury, <i>The Green Book: Appraisal and Evaluation in Central Government</i>)
REACH Regulation	REACH is a European Union Regulation concerning the Registration, Evaluation, Authorisation and restriction of Chemicals. It came into force on 1st June 2007 and replaces a number of European Directives and Regulations with a single system. It applies to substances manufactured or imported into the EU in quantities of 1 tonne per year or more. Some substances are specifically excluded, including waste and the transport of substances. The Regulation is enforced by the Health and Safety Executive.
RoHS Directive	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2008 (the “RoHS Regulations”) implement EU Directive 2002/95 which bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. The Directive is enforced by the National Measurement Office.
WEEE Directive	The Waste Electrical and Electronic Equipment Directive (WEEE Directive) came into force in January 2007. It aims to both reduce the amount of electrical and electronic equipment being produced and to encourage everyone to reuse, recycle and recover it. The Regulation is enforced by the Vehicle Certification Authority.
Packaging Directive	The Packaging (Essential Requirements) Regulations aim to minimise the amount of waste packaging generated at source and ensure that packaging can be reused, recovered or recycled. These Regulations are enforced by the Trading Standards departments of local councils.
Batteries Directive	The Waste Batteries and Accumulators Regulations 2009 came into force on 5 May 2009 and set out new rules for the collection, treatment and recycling of all types of batteries and accumulators (rechargeable batteries). They are enforced by the Environment Agency.

