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Small and Medium-sized Enterprises (SMEs): Understanding and Promoting Pro-Environmental Behaviour Change

Science Report – SC080017

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Steve Killeen

Head of Science

Executive Summary

Small and medium-sized enterprises (SMEs), defined by the UK Department for Business, Enterprise and Regulatory Reform (BERR) as registered businesses with up to 249 employees, are the economic lifeblood of the United Kingdom. In 2006, they represented £1.4 trillion (49 per cent) of turnover and employed 14 million people (48 per cent) (SBS BERR, 2006). The UK Government has supported this positive economic performance by reducing burdens of regulation, but SMEs are also responsible for a large proportion of environmental pressures. In 2006, SMEs generated 60 per cent of commercial waste produced in England and Wales, and caused 43 per cent of serious industrial pollution incidents (Environment Agency, 2006). 120 of 158 (76 per cent) of companies fined £5,000 or more for environmental incidents were SMEs (Environment Agency, 2006). There is little transparency in these organisations, and checks are likely to decrease under the current regulatory regime of decreasing burdens on business. The Environment Agency is investigating behaviour change techniques to influence the environmental performance of SMEs. The purpose of this short review is to help the Environment Agency understand pro-environmental behaviour change in SMEs and provide case studies of interventions as a source of learning and good practice.

The project was carried out by a student at the University of Leeds, as part fulfilment of an MSc Sustainability (Environmental Consultancy and Project Management) qualification. The research was carried out in two phases: a scan of secondary research, followed by primary qualitative research involving semi-structured interviews of three case studies. Three interventions were used as case studies: firstly, a scheme to enable sustainable procurement in the construction sector (Bioregional Development Group, One Planet Products); secondly, the creation of recycling networks in geographically isolated areas (Cumbria Action for Sustainability, Collaborative Waste Project); thirdly, tailored environmental advice and support for SMEs (Global Action Plan, Smartworks). Defra's Environmental Action Fund funded the first two projects; London Development Agency funded the third.

The recommendations from this report include:

- Define pro-environmental behaviour change targets for each project over the short, medium and long term.
- Use tangible, peer-to-peer, pragmatic solutions to help SMEs modify their negative environmental behaviours.
- Promote pro-environmental behaviours as core to SME business operations.
- Explore and implement methods to increase the effectiveness of NetRegs as a determinant of behaviour, in addition to being a promoter.
- Consistently advise SMEs to use the NetRegs site.
- Reduce the amount of information an SME initially receives when using NetRegs, via a more thorough search engine and/or limits on the amount of data viewed.
- Consider the creation of simple auditable environmental action plans to allow businesses to engage in pro-environmental behaviour change internally.
- Develop case studies of SMEs engaging in pro-environmental behaviour change for use by other SMEs and Government.
- Find out from SMEs what business models would best help them on pro-environmental behaviour change.
- Explore social marketing techniques to determine whether this model is more effective than using behaviour change indicators.
- Conduct further research into the cultural capital framework to determine if it is possible to engage SMEs as a population.
- Develop a better model for identifying and comparing pro-environmental behaviour change techniques.

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1 Project summary

1.1 Background and need

Reducing the environmental impacts of small and medium-sized enterprises (SMEs) is a challenge for the Environment Agency, as the organisation does not necessarily have regulatory jurisdiction over this group. This problem may increase as the regulatory requirements on this group are lessened. This project aims to understand how pro-environmental behaviour change techniques may be used to improve environmental behaviours of SMEs without direct regulation, or as part of a better regulation agenda.

There are continuing pressures on the Environment Agency to be a better regulator, with government targets to reduce administrative burdens by 25 per cent by 2010, as well as exempting or simplifying regulatory processes for SMEs.

Pro-environmental behaviour change (PEBC) is difficult to define, with the term used somewhat differently on a case-by-case basis. PEBC can mean a tangible behaviour such as increasing the proportion of rubbish recycled, or an intangible behaviour such as consuming more sustainably. For the purpose of this report, PEBC is defined as change in behaviour that results in incrementally positive environmental outcomes over the short, medium and long term. These goals will need to be identified with metrics for each project accordingly.

1.2 Aims and objectives

The aims and objectives for this project are:

- Identify behaviour change learning from case studies relevant to SMEs.
- Identify research needed to support policy analysis.
- Identify different behaviour change interventions that target SMEs and, where possible, evaluate their success.
- Compare interventions to current Environment Agency activities such as NetRegs, and make recommendations to improve Environment Agency approaches.
- Identify the applicability of web-based tools for the SME sector.

1.3 Research approach and limitations

This project is based on the use of qualitative methods to gain insight into PEBC in SMEs. The project was carried out in two phases. Firstly, a scan of secondary research was carried out. Secondly, a primary research phase was conducted. Five potential case studies were identified and contacted for data gathering and interviews. Analysis of each case study was undertaken, and three were selected as the most useful. The interviews were based on a semi-structured format designed to gain practical knowledge from those who had experience in achieving PEBC within this target group.

This standalone project was carried out by a student at University of Leeds, as part of an MSc Sustainability (Environmental Consultancy and Project Management) qualification.

Many limitations were identified in the project. Firstly, the Environment Agency is a complex and decentralised organisation. Regional teams can provide excellent support in their local area, but there is limited consistency of SME experience nationally. With this in mind, the project was structured to provide best practices that could be circulated to different regions as a basis for discussion and learning. The second area of limitation was the case study organisations. As little was publicly available on the work of these organisations, it was necessary to rely solely on the information they provided.

2 Where are we now?

2.1 Government and its agencies

The United Kingdom (UK) has a strong history of environmental protection policy. This agenda has been housed in the language of environment, sustainable development (SD) and climate change. In 1994, the UK published the first SD strategy in the EU, setting the written standard for Europe. However, the UK has inconsistently defined SD and wavered in its political and funding support over time (Russel, 2007). Overall, *“the policy of the UK Government is to maintain economic growth without causing excessive environmental deterioration or social injustice”* (ESRC, 2005a).

Concepts of pro-environmental behaviour (PEB) and change (PEBC) have been present in academic literature for nearly three decades. However, these concepts made a much more recent jump into political dialogue in the UK. In 2006, the then Secretary of State for Environment, Food and Rural Affairs, David Miliband, outlined the Department for Environment, Food and Rural Affairs (Defra)’s plan to maximise PEBC while minimising economic burdens on businesses (Figure 2.1):

Figure 2.1: Excerpt from Secretary of State’s (David Miliband) Statement in Defra Simplification Plan: Maximising Outcomes, Minimising Burdens (Defra 2006c)

“... we need both to get the balance right between costs and benefits, and to ensure that what we do helps stimulate real behaviour change and innovation rather than mindless compliance (or even more mindless non-compliance) and the automatic selection of end of pipe solutions. Reducing non-productive administrative burdens, using market based instruments, targeting inspections on high-risk operations, improving comprehension, joining-up customer interfaces are not anti-environmental, they are our license to operate. In a competitive world, they allow us to maximise outcomes, while minimising burdens.”

Defra also produced ten reports in a series entitled *Behaviour change: A series of practical guides for policy-makers and practitioners*, highlighting where behaviour change policies and applications fit within the UK. At the same time, the Stern Review reported on barriers to behaviour change related to climate change: *“barriers to behavioural change... include a lack of reliable information, transaction costs, and behavioural and organisational inertia... Regulatory measures can play a powerful role in cutting through these complexities, and providing clarity and certainty”* (Stern, 2006).

Recent Government recommendations have centred on providing individual mentoring and advice for SMEs (Hampton, 2005; Defra, 2006b). However, this type of engagement is relatively resource intensive, as can be seen in Figure 2.2.

Figure 2.2: Intensity of different forms of government engagement (Knott et al., 2008)



2.1.1 Department for Environment, Food and Rural Affairs (Defra)

Defra is the government department responsible for the natural environment, food sector and rural communities. Its overarching mandate is to tackle climate change and secure a healthy, resilient, productive and diverse natural environment (Defra, 2008d).

Defra has an active programme of research on PEBC. Its research aims and model of delivery lends to strengths, weaknesses, opportunities and threats as outlined in Figure 2.3. This SWOT provides succinct insight into Defra’s reputation, challenges and external interactions.

Figure 2.3: SWOT analysis of Defra’s current approach to promoting environmental behaviours (Defra 2006a)

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Evidence base • Understanding of behaviour • Setting strategic goals • Devolved delivery • Partnership working • Community based action 	<ul style="list-style-type: none"> • Dissemination/ feedback • Evaluation & monitoring • Lack clear simple messages • Lack of influence cross- Government • Lack systems approach • Lack of scaling up of good programmes
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Environment high on agenda • Political space to act & lead • Widen Defra’s sphere of influence – less established partners 	<ul style="list-style-type: none"> • Lack of sufficient funding and consistency of funding • Inconsistent policies • Number & range of confusing messages • Other environmental issues losing out to climate change

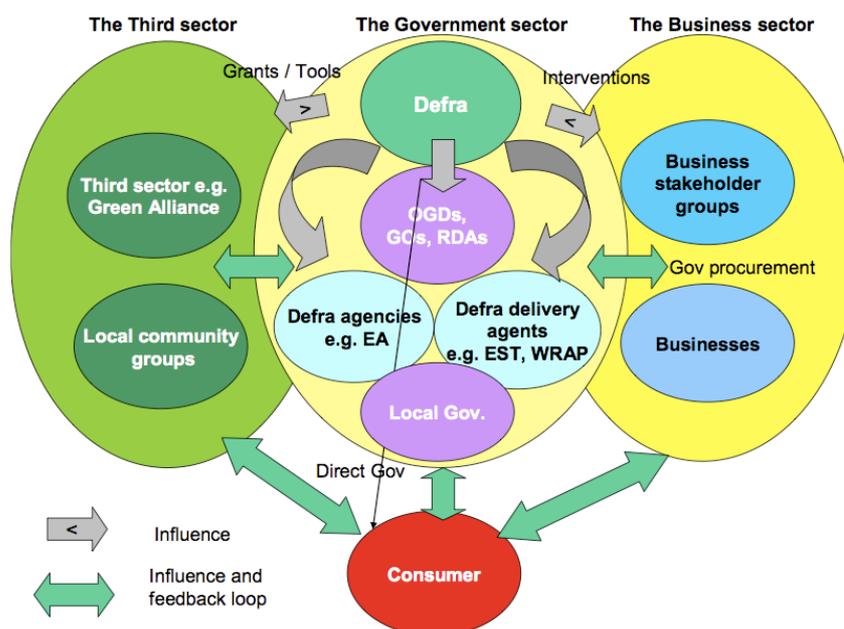
Defra has conducted research which reveals many challenges faced by SMEs: *“Engagement of SMEs in environmental management issues is, however, inherently complex. Research on European and UK SMEs concludes that a range of barriers currently prevent SMEs from effective management of environmental and social issues. These include: inappropriate language; lack of time and resources; short-term business-planning horizons; lack of appropriate information; and fear of doing things incorrectly”* (Defra, 2006b). Furthermore, Defra has identified many factors that improve the likelihood of successful engagement with SMEs (Figure 2.4).

Figure 2.4: Crucial factors for more successful engagement with SMEs (Defra 2006a)

- (1) Using established links and forming partnerships
- (2) Building capacity on environment and sustainability
- (3) Making the issues and support accessible
- (4) Enabling the enablers
- (5) Encouraging business networks and leadership
- (6) Promoting partnership across government, delivery agents and local authorities

Defra’s strategy for addressing SMEs is reliant on its delivery agents. Defra claims that SMEs will receive *“help and support...from the Carbon Trust, the Envirowise programme and the Environment Agency...The introduction of NetRegs by the Environment Agency is also designed to help UK business, especially small businesses, to understand environmental regulations”* (Defra, 2005b). This strategy is integrated with Defra’s overall delivery, which incorporates direct provision, online provision and provision by delivery agents as shown in Figure 2.5.

Figure 2.5: Defra Delivery Strategy (Defra 2006a)



2.1.2 Environment Agency

The Environment Agency has an important role to play with SMEs. It regulates and issues licenses to a portion of these businesses. It has a general responsibility to encourage businesses to take on environmental responsibilities; to help businesses use resources more efficiently; to protect the environment and human health; and to concentrate these efforts on higher risk businesses (Environment Agency, 2008a). A difficulty with SMEs is that only a limited number are covered by traditional regulation, such as permitting or licensing. The challenge for the Environment Agency is to encourage environmentally responsible behaviour without regulatory jurisdiction.

NetRegs is an online tool designed to support SMEs. The site aims to describe in plain English what SMEs need to do comply with environmental regulations (Murnaghan, 2008d), and the Environment Agency part-funds NetRegs with the Scottish Environment Protection Agency and the Northern Ireland Environment Agency (NIEA): “[The Environment Agency] know[s] small and medium-sized businesses struggle to keep on top of environmental regulations – and access to free, plain English guidance on compliance can help understanding as well as make a business more economical [Martin Brocklehurst]” (eGov Monitor, 2008).

The primary challenge for the Environment Agency in communicating with SMEs is low levels of environmental awareness. This means that SMEs are not looking for the information that NetRegs provides (Murnaghan, 2008d). A second point of note is that NetRegs is difficult to locate. For example, on the Business and Industry section of the Environment Agency’s webpage, there is a single toolbar link to NetRegs with no description of what the tool is. A survey of SMEs in 2007 showed that only 20 per cent of SMEs heard about NetRegs through the Environment Agency’s website, although this was the largest single source of reference, with 25 per cent quoting ‘other’ sources, and 14 per cent who didn’t know where they had heard of NetRegs (NetRegs 2007b).

NetRegs is a useful tool for SMEs who are aware and aim to be more environmentally responsible. The challenge is reaching the remaining SMEs who are unaware or unconcerned with their environmental activity.

2.1.3 Department for Business, Enterprise and Regulatory Reform (BERR)

BERR is the government department responsible for promoting the creation and growth of business; achieving simple and proportionate regulation; safeguarding employee and consumer interests; managing the UK's energy liabilities; and acting as an intelligent shareholder (BERR, 2008b). BERR's focus with regard to SMEs is to reduce the regulatory burden.

Regulatory change has been a priority in the UK since the 2005 budget, in which the Government called for the Hampton Review, to outline changes to the regulatory framework in the UK. The overarching principles of the Hampton review were to reduce the administrative burden on those using government services. Recommendations related to SMEs included sector-specific business advice provided via websites and newsletters (online and paper) and tailored advice provided via on-site visits to businesses. The effectiveness of this advice would then be judged by monitoring business awareness and understanding of regulations. Sector business reference groups would also be set up to reduce the burden of paperwork and form filling, with assessments of the time taken to comprehend, fill out and return forms. The review also recommended implementation of cost-benefit analyses for each set of data requested. It stated that coordination would limit duplications of information provision by businesses to government bodies (Hampton, 2006).

These recommendations resulted in the creation of the Department for Business, Enterprise and Regulatory Reform (BERR). In 2008, this department committed to a 25 per cent reduction in net administrative burdens by 2010, and the exemption or simplification of regulatory processes for SMEs (BERR, 2008a).

2.2 Small and medium-sized enterprises

SMEs represent a diverse target group. They are defined by BERR as registered businesses with up to 249 employees, varying in size, structure, sector and skill sets, but considered a collective group in this report to simplify analysis. The economic and social importance of SMEs is described below, followed by an exploration of their environmental performance, and a brief introduction to the type of pro-environmental behaviours this group are already adopting and potential reasons for this.

SMEs are the economic lifeblood of the UK. In 2006, businesses with up to 249 employees represented £1.4 trillion (49 per cent) of turnover and employed 14 million people (SBS BERR, 2006). The most economically significant industries were wholesale and retail trade, repairs; real estate, renting and business activities; manufacturing; construction; and transport, storage and communication as shown in Figure 2.6.

Figure 2.6: Top five most economically significant sectors for SMEs in UK (BERR 2006)

Sector	Turnover (£ million, excluding VAT)
Wholesale and retail trade; repairs	481,187
Real estate, renting and business activities	272,804
Manufacturing	173,013
Construction	147,867
Transport, storage and communication	84,782

A similar list of sectors can be found in terms of SME contribution to employment. The largest sectors of employment by SMEs were wholesale and retail trade, repairs; real estate, renting and business activities; manufacturing; construction; and transport, storage and communication as shown in Figure 2.7.

Figure 2.7: Top five most important sectors for employment by SMEs in UK (BERR 2006)

Sector	Employment
Wholesale and retail trade; repairs	4,836,000
Real estate, renting and business activities	4,241,000
Manufacturing	3,345,000
Construction	2,010,000
Transport, storage and communication	1,734,000

On the other hand, SMEs are responsible for a large proportion of environmental deterioration. In 2006, SMEs generated 60 per cent of commercial waste produced in England and Wales, and caused 43 per cent of serious industrial pollution incidents. In addition, 120 of 158 (76 per cent) of companies fined £5,000 or more for environmental incidents were SMEs (Environment Agency, 2006). This may be because SMEs mostly operate outside of environmental legislation due to their generally low individual environmental risk. SMEs may also fall between target groups for environmental awareness campaigns or interventions. These campaigns tend to be targeted at two groups: high-risk large businesses and individuals. Approaches based on behaviour change have therefore been suggested as a more effective way of helping this group.

Government is working to reduce the regulatory burden on SMEs, which will result in even less scrutiny of their environmental performance. Many of the worst offending sectors have been identified as those that are the most economically important, with worst offending sectors in 2006 being construction, waste, and water; followed closely by energy, food and drink, and chemicals. For example, the construction sector produced and transferred off site 91 million tonnes of waste in 2006, and the waste sector experienced 769 serious regulatory breaches (Environment Agency, 2006).

Combining the findings on economic contributors and environmental performance provides insights on priority industries. On the economic side, wholesale and retail trade, repairs, real estate, renting and business activities, manufacturing, construction and transport, storage and communication are the largest contributors. On the environmental side, industries with the worst track records are construction, waste, and water followed by energy, food and drink, and chemicals. Thus, focusing on construction and manufacturing (water, energy, food and drink, and chemicals) offers an opportunity to improve macro-SME environmental behaviours.

It is also important to understand factors such as awareness, available support, motivations and resources that influence SMEs pro-environmental activities. The general level of awareness of legislation in SMEs varies by sector and by country.

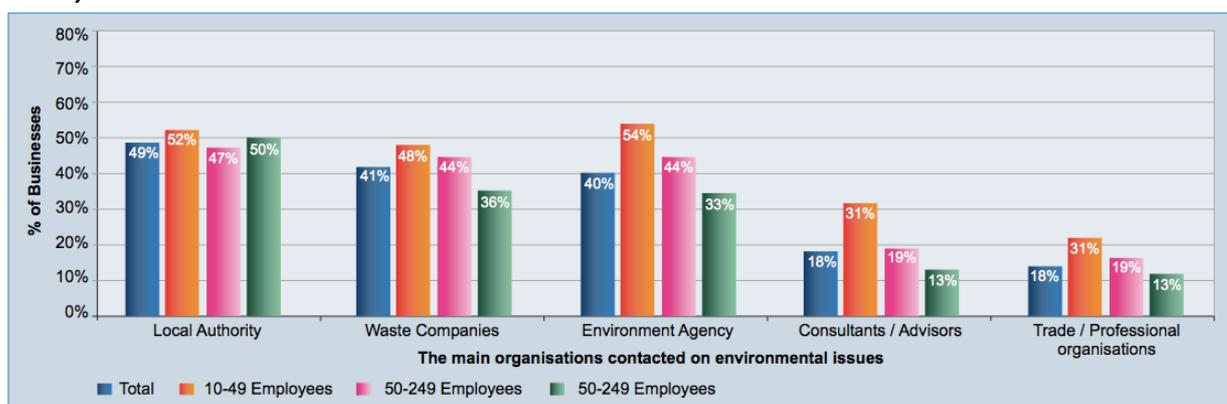
The levels of awareness for some regulations is low. For example, the highest awareness of regulation was for the Hazardous Waste Regulations. The figures indicate that 69 per cent of respondents in England, and 76 per cent of respondents in Wales had heard of these regulations. Awareness worsened with bodies of regulation such as the Pollution Prevention and Control Regulations where awareness in England was 44 per cent and 48 per cent in Wales (NetRegs, 2007a, 2007b and 2007c). A sectoral summary of the UK can be found in Figure 2.8. Furthermore, 11 per cent of SMEs cited environmental regulations as being an obstacle to business success (BERR, 2007).

Figure 2. 8: UK SMEs level of awareness of legislation by sector (NetRegs, 2007b)

Legislation	Most Aware	Least Aware
Packaging Waste Regulations	Food and Drink Manufacture (54%)	Recycling (22%)
Duty of Care Regulations	Recycling (70%)	Textiles and Clothing (43%)
Waste Management Licensing Regulations	Sewage, Waste and Cleansing (80%)	Textiles and Clothing (47%)
Water Resources Act 1991/The Water (Northern Ireland) Order 1999	Mining and Quarrying (46%)	Recycling (11%)
Pollution Prevention and Control Regulations	Sewage, Waste and Cleansing (65%)	Hotels and Restaurants (25%)
End of Life Vehicles Regulations 2003	Transport by Land (37%)	Hotels and Restaurants (11%)
Environmental Liability Directive 2004	Sewage, Waste and Cleansing (34%)	Printing, Publishing and Reproduction of Recorded Media (11%)
Waste Electrical and Electronic Equipment Directive (WEEE Directive)	Electrical Equipment and Machinery Manufacture (59%)	Hotels and Restaurants (20%)

SMEs use various sources of support for environmental issues. Some interesting trends emerge when analysing who businesses contact and their size, such as the high contact rates for local authorities by larger businesses (figure 2.9).

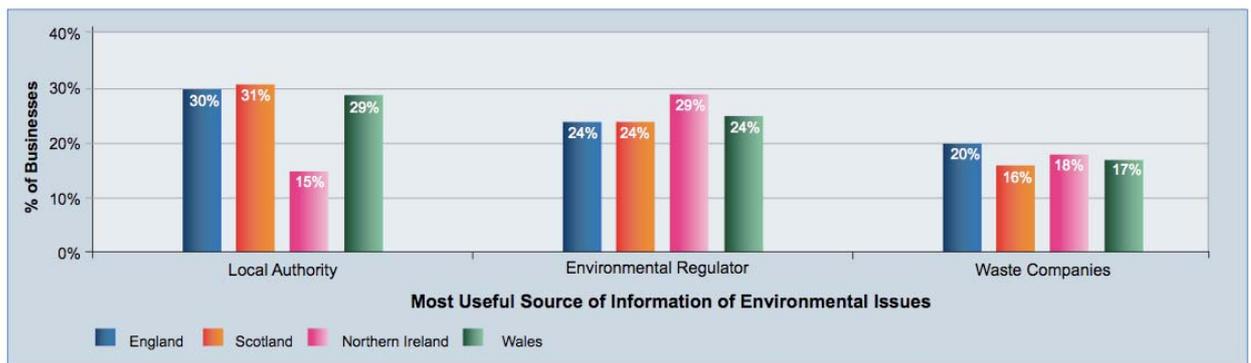
Figure 2. 9: UK organisations that SMEs contact about environmental issues (NetRegs, 2007b)



N=2,445. Base: Respondents who named an organisation that they contact about environmental issues (Multiple responses allowed)

Local authorities were rated as the most useful source of information by SMEs – apart from in Northern Ireland – which could make them a potential delivery sources for PEBC programmes to SMEs (figure 2.10).

Figure 2.10: UK SMEs opinions of most useful sources of information on environmental issues (NetRegs, 2007b)

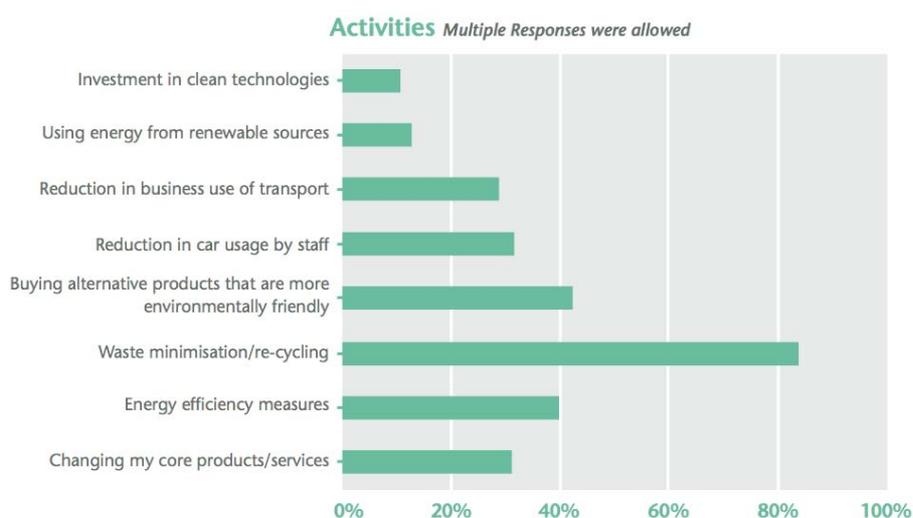


N=2,101. Base: Those respondents who stated the most useful source of information on environmental issues

Research shows that SMEs often adopt behaviours that are potentially harmful to the environment without recognising them as such, for example a survey of SMEs in 2007 found that 45% stored chemicals, fuels, or oils; 44% produced or imported packaging; 31% stored waste; 21% emitted smoke or fumes to the air; and 15% conducted an activity under the heading “anything that could create a local nuisance” (NetRegs, 2007b). If activities are not recognised as being potentially harmful, it can present a difficulty to the Environment Agency in helping business become environmentally responsible.

However, SMEs are adopting practical, incrementally positive environmental behaviours. A survey of SMEs by sector found that 68 per cent of SMEs in the mining and quarrying sector and 65 per cent of SMEs in the printing and publishing sector were engaging in at least one practical environmental performance improvement measure (NetRegs, 2007b). Across all sectors, when prompted over 80 per cent of SMEs reported engaging in waste minimisation or recycling activities (figure 2.11). These pro-environmental activities are a positive sign that SMEs will engage in pro-environmental behaviour change without being obliged to by legislation.

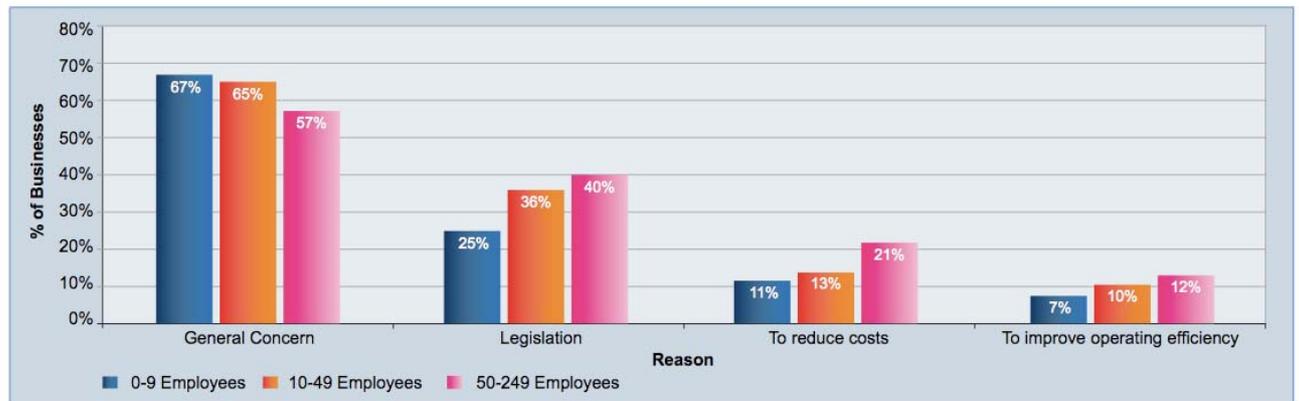
Figure 2.11: SMEs engagement in pro-environmental activities (prompted) (FSB, 2007)



SMEs often adopt positive and negative environmental behaviours at the same time. Many of the behaviours deemed to be negative are often small individually, but have a large cumulative effect. Another level of complexity is that there are many

underlying motivations for SMEs to engage in PEB. These internal and external drivers will be explored later in this report. Figure 2.12 outlines some of the motivators that have been identified.

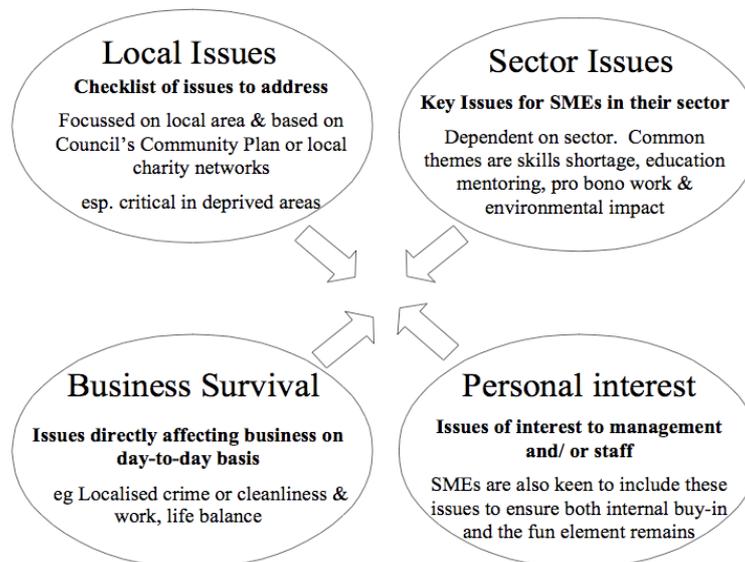
Figure 2.12: UK SMEs reasons for addressing environmental issues (NetRegs, 2007b)



N=2,745. Base: Businesses who have introduced measures to address environmental harm (Multiple responses allowed)

Some external triggers also cause SMEs to become involved in pro-environmental behaviours. These are represented in Figure 2.13.

Figure 2.13: Triggers of SME engagement (BiTC et al., 2002)

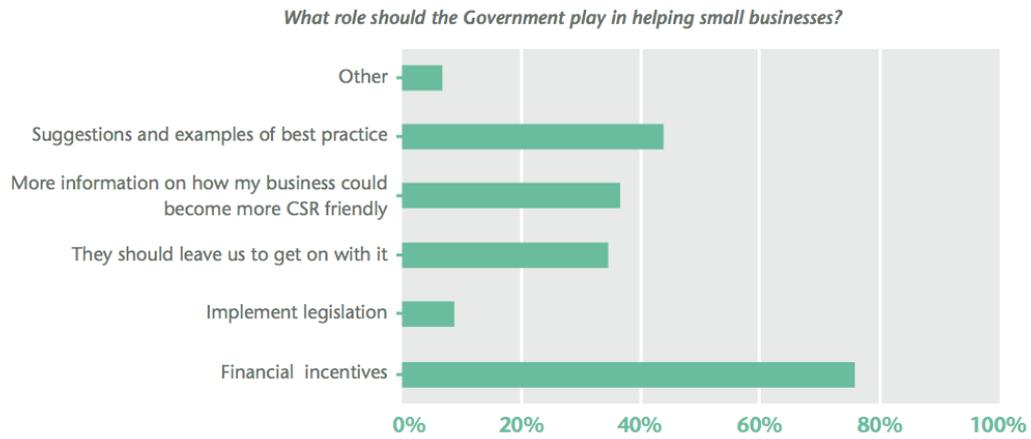


2.3 Current situation

Overall, SMEs are economically important to the UK. It is possible for their individual environmental performance to go unnoticed, due to their small size and limited public visibility, as only the cumulative effects are noticeable and negative. Impending regulatory reform may result in decreased transparency with regard to SMEs environmental performance. In this context, behaviour change techniques may result in more positive environmental impacts than other techniques, such as direct regulation.

Research shows that the roles SMEs would like the government to play in terms of promoting PEBC include providing financial incentives, providing best practices and providing information on how to become more CSR friendly (FSB, 2007). The full findings are listed in Figure 2.14.

Figure 2.14: Roles SMEs would like the government to play (FSB, 2007)



3 Research evidence base

3.1 Predicting behaviour change

Behaviour is difficult to predict. There are countless variables that affect individual behaviour at home (household), at work (organisation) and as a member of society (population). A large body of research exists into predicting PEBC at the household level, and many models of behaviour and behavioural change exist. Figure 3.1 lists some of the indicators used to predict pro-environmental behaviours at this level. These indicators are difficult to measure, and combinations of these variables are even more difficult to measure. Overall, this method is likely to be too complex to apply to SMEs.

Figure 3.1: Summary of selected indicators used in various studies to predict likelihood of engagement in pro-environmental behaviour change at the individual level

Indicator	Studies
Attitudes	(Abrahamse <i>at al.</i> , 2005), (Bamberg <i>at al.</i> , 2007), (Berenguer <i>at al.</i> , 2005), (Corbett, 2005), (ESRC, 2007a), (Leiserowitz <i>at al.</i> , 2006), (Owen <i>at al.</i> , 2006)
Awareness	(Abrahamse <i>at al.</i> , 2005), (Bamberg <i>at al.</i> , 2007)
Efficacy (both self and collective)	(ESRC, 2007a), (Harland <i>at al.</i> , 2007), (Homburg <i>at al.</i> , 2006)
Environmental concern	(Arnocky <i>at al.</i> , 2007), (Clark <i>at al.</i> , 2003), (Takacs-Santa, 2007)
Feedback (consequence strategy)	(Abrahamse <i>at al.</i> , 2005), (Abrahamse <i>at al.</i> , 2007), (Staats <i>at al.</i> , 2004)
Goal setting (antecedent strategy)	(Abrahamse <i>at al.</i> , 2005), (Abrahamse <i>at al.</i> , 2007)
Information (antecedent strategy)	(Abrahamse <i>at al.</i> , 2005), (Abrahamse <i>at al.</i> , 2007), (Staats <i>at al.</i> , 2004)
Norms	(Bamberg <i>at al.</i> , 2007), (Corbett, 2005), (ESRC, 2007a), (Harland <i>at al.</i> , 2007)
Pre-existing behaviour	(Arnocky <i>at al.</i> , 2007), (Bamberg <i>at al.</i> , 2007), (Berenguer <i>at al.</i> , 2005), (Biel <i>at al.</i> , 2005), (Leiserowitz <i>at al.</i> , 2006), (Owen <i>at al.</i> , 2006)
Values	(Berenguer <i>at al.</i> , 2005), (Biel <i>at al.</i> , 2005), (Leiserowitz <i>at al.</i> , 2006)

This list is limited in scope, and is for the purpose of illustration only.

A second level of complexity in SME behaviour results from whether the behaviour is internally and/or externally driven. Internal drive tends to originate from employee-shared environmental values; and the value systems of individuals who work within the organisation (Tilley, 2000). In addition, external drivers can influence and motivate SME behaviours. For example, firms can be pressured by their supply chain partners to engage in PEBC (BioRegional Development Group, 2008b).

Most individuals can be considered in three overlapping spheres in terms of behaviour: household, organisation and population. Influencing behaviour in one of these spheres may also change behaviour in another, for example one study found: “*there was a strong link in the sustainable waste management practices of the employees between the home and workplace. Base[d] on the results of the model, this link in behaviour was largely determined by the environmental attitudes and beliefs of staff. Employees who held pro-environmental attitudes and beliefs were more likely to perform sustainable waste management across the two locational settings*” (Tudor *at al.*, 2007). Further research

into this area would allow government organisations to understand how behaviour change achieved in one subpopulation can affect behaviour within a different setting.

3.2 Social marketing

Social marketing is a specific approach to creating behavioural change. This set of principles is based on marketing concepts combined with psychology. Social marketing has identified target audiences who are more likely to engage in behaviour change. Traits of this target audience are outlined in Figure 3.2.

Figure 3.2: Traits of target audience most likely to engage in behaviour change (Weinreich, 1999)

To achieve behaviour change, a target audience must possess the following traits:

- Believe that it is at risk for the problem and that the consequences are severe
- Believe that the proposed behaviour will lower its risk or prevent the problem
- Believe that the advantages of performing the behaviour (benefits) outweigh the disadvantages (costs)
- Intend to perform the behaviour
- Possess the skills to perform the behaviour
- Believe that it can perform the behaviour (self-efficacy)
- Believe that the performance of the behaviour is consistent with its self-image
- Perceive greater social pressure to perform the behaviour than not to perform it (social norms)
- Experience fewer barriers to perform a behaviour than not to perform it

Although these traits will not precisely predict behaviour, they can help design methods for shifting the target audience to a position where they are more likely to engage in behaviour change. For example, in order to change an SME's trait to 'possess the skills to perform the behaviour', the change agent can provide skills-based training.

3.3 Cultural capital framework

A study was undertaken for the Cabinet Office to identify cultural capital, and how it can be used to achieve population-level behaviour change:

"The relationship between cultural capital – attitudes, values, aspiration, sense of self-efficacy – and behaviour is an ecological one. First, our cultural capital is constantly evolving: through our interaction with the immediate environment around us (our parents, peers, role models and mentors, neighbours, schooling, workplace) along with the influence of broader society-wide forces (including economic and technological forces; the political and legal structure; the media; and the process by which ideas and innovation are formed and disseminated). Second, cultural capital has an influence on our behaviour which, along with our response to the incentives, barriers and level of information and engagement we face in any given situation, determine our actual behaviour itself. Third, over time our behaviour can 'normalise' into underlying attitudes, values and aspirations" (Knott, 2008).

Although this policy framework is in its infancy, it has the potential to act as a model for the Environment Agency to engage with SMEs as a population, and Figures 3.3 and 3.4 provide a brief overview of this framework.

Figure 3.3: Relation between policy stages in developing cultural change strategies and the cultural capital framework (Knott *at al.*, 2008)

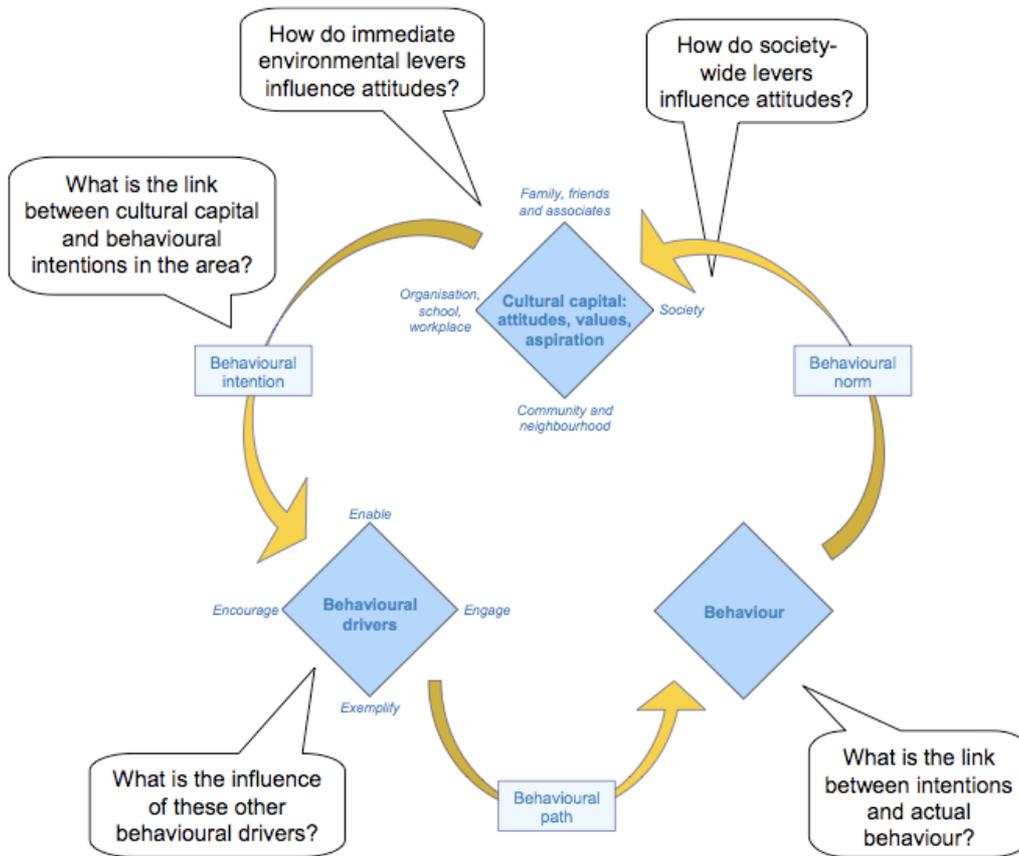
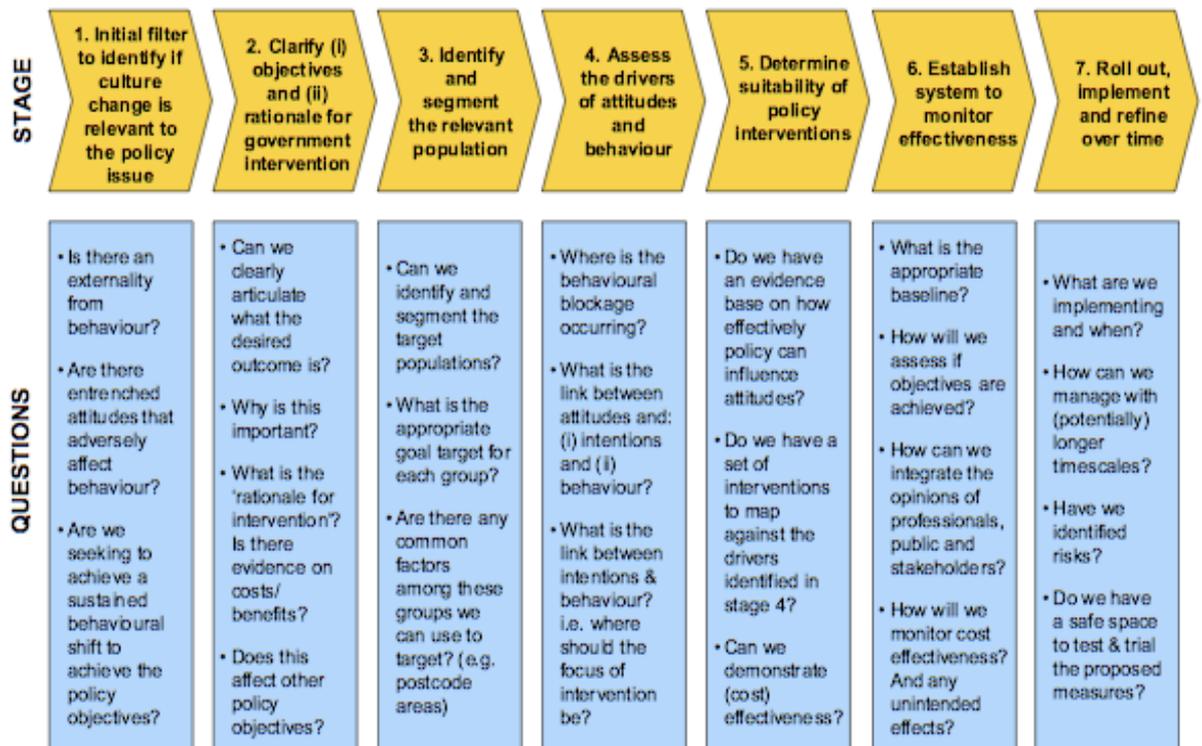


Figure 3.4: Policy stages in developing cultural change strategies (Knott *at al.*, 2008)



3.4 Technology

A paper by Midden, Kaiser and McCalley (2007) highlights the important contribution of technology to PEBC. Technology can act as an intermediary, amplifier, determinant, and/or promoter of environmentally significant behaviour. The NetRegs site is primarily limited to acting as a promoter of environmentally significant behaviour. There is potential to explore a new role for NetRegs as a determinant, potentially improving its effectiveness in supporting PEBC.

3.5 Language

The Institute of Public Policy Research (IPPR) has published two papers on the language used and understood by members of the public who do not regularly engage in discussions on sustainable development and climate change. The IPPR's findings indicate that tangible, peer-to-peer, descriptive and pragmatic language is most effective for encouraging individuals and organisations to take action to reduce the impacts of climate change, as shown in Figure 3.5.

Figure 3.5: Effective discourses in the climate change area (IPPR, 2007)

	National	Residual/ dominant local	Emergent local
Mode of representation	Symbolic and abstract - unimaginable	→	Real, tangible, visible, imaginable
Actions	Small individual actions	→	Collective actions, collective decisions
Address	Citizen of UK, inhabitant of the planet, member of human race	→	Member of town/village/district community
Authority/voice	Top-down authority	→	Peer-to-peer
Tense and modality	Imperative (we/you must), conditional (if we all) or modal (you can do this)	→	Descriptive; present and future tense (<i>we are doing...</i> , <i>we're going to save the planet, starting with x</i>)
Construction of problem/action	War: tackle, stop, combat climate change	→	Pragmatic, leapfrogging to a new future. A whole new vocabulary: <i>energy descent; beyond oil, transition, carbon constrained, energy lean</i>
Discourse	Political (<i>campaign</i>) and public sector/govt)	→	Language of popular culture and advertising (<i>Manchester is my Planet; the Big Ask; the Magic Boiler Scheme; Planet St Helens; Love Lewisham</i>)

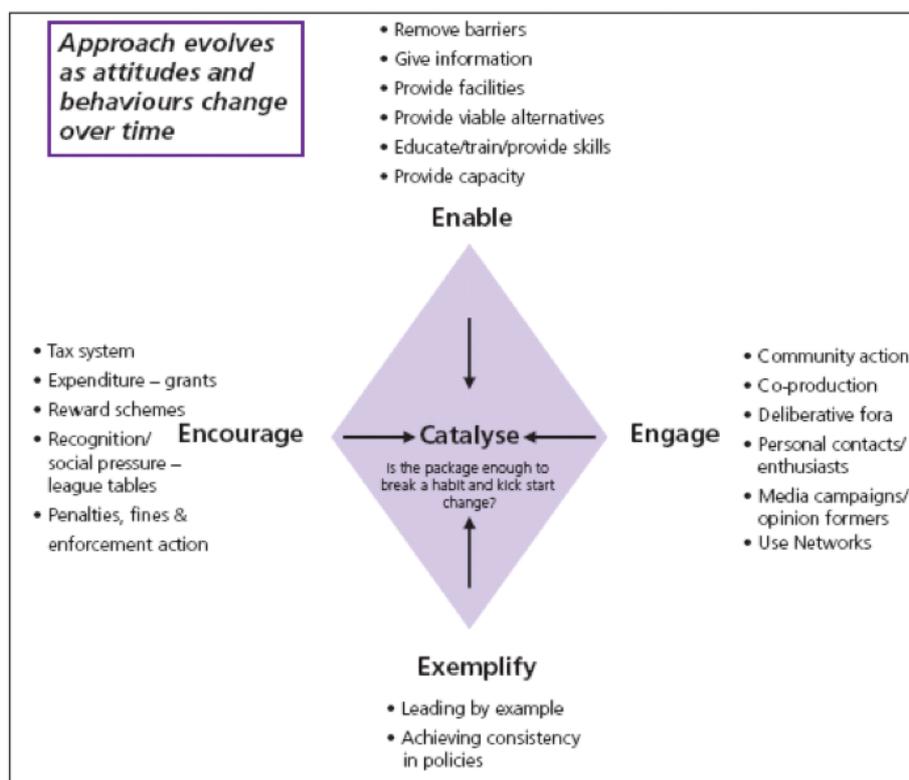
4 Case Studies

Case studies were used to gain insight into how PEBC may be instigated in SMEs. Defra's '4Es Model' (described below) is used as a basis for comparing the behaviour change techniques employed by the case study organisations. Two of the three case study interventions were funded by Defra's Environmental Action Fund (EAF).

4.1 Defra 4Es Model

The 4Es Model is used in this report to describe the behaviour change techniques employed by the case study organisations. Defra developed this simple model to describe the types of actions necessary to stimulate behaviour change within an individual or group. These actions are grouped and categorised by the '4Es' of encouraging, enabling, engaging and exemplifying (Defra, 2006a). This model is used to analyse the PEBC techniques used by each case study. The model is relatively simplistic, and does not account for all of the variables. However, it succinctly identifies the major elements of each technique being evaluated and in future may find use as an evaluation tool, allowing comparison between different schemes. Figure 4.1 identifies the characteristics of encouraging, enabling, engaging and exemplifying that were sought when assessing each case study's performance on each criteria.

Figure 4.1: Defra's approach to pro-environmental behaviour change as attitudes and behaviours change over time using the 4Es Model (Defra, 2008b)



This report has piloted the use of the Defra 4E's framework to evaluate case studies of pro-environmental behaviour change. The case studies were plotted graphically to identify which types of techniques were used. Defra have suggested activities that could fall within the 4E categories of enable, engage, exemplify, and encourage. These activities may not necessarily correspond with their expected category, for example,

literal interpretations of engagement often fall under the Defra 4Es category of encourage, as encouragement does under enable. The methodology used in this report was based on a compilation of possible techniques explored by Defra (Defra, 2006a and Defra, 2008a) and the Cabinet Office (Knott *et al.*, 2008). One point was given for each behaviour change technique used under each category, for each case study, with no upper limit applied. A value of four was assigned for each organisation for the exemplify category as they all led by example in their own ways. These graphical plots are intended to demonstrate the potential of the 4E's model as an evaluation tool for behaviour change interventions, and it is recognised that a robust methodology has not been developed or presented.

4.2 Case Study One: BioRegional Development Group One Planet Products

4.2.1 Project objectives

The objectives of One Planet Products (OPP) changed over time based on organisational learning and public engagement. First of all, OPP was a “*members-owned bulk-buying club which focuses on sustainable products for use in residential construction and refurbishment*” (BioRegional Development Group, 2007). “*Market research by BioRegional indicated that the construction industry wasn't adopting sustainable construction methods and products because it was too time-consuming, complicated and expensive to decide what to use and how*” (BioRegional Development Group, 2008b).

However, after the first 18 months of research, operation and stakeholder engagement, the focus of the program shifted. It became a “*buyer's group for developers, housing associations and the construction industry... making it easier and more cost effective to choose sustainable building products in new build and refurbishment*” (Defra, 2008c). This new focus “*helps its members to purchase and specify green construction products easily and affordably and helps them build knowledge in sustainability*” (BioRegional Development Group, 2008a).

BioRegional's long-term aim for this project is that “*By pooling demand and creating a market, [we aim] to enable suppliers to increase production and therefore reduce costs of sustainable products currently only produced at low volume. We [anticipate] that ... longer-term bulk purchase orders [will] stimulate further innovation in greener building products and services, as well as making sustainable products available for bulk orders at a competitive price*” (BioRegional Development Group, 2008b).

4.2.2 Target audience

OPP's initial target audience was housing associations and developers; however, it has broadened its target audience “*to include architects, consultants and other specifiers. [OPP is] also in discussion with a variety of public bodies about extending our services to them*” (BioRegional Development Group, 2007). OPP is not specifically targeted at SMEs.

4.2.3 Resources required and funding

The OPP project required varying skills sets and resources to inform the project, and “*in-kind contributions from BioRegional Consulting Ltd, WWF UK, BioRegional Quintain Ltd,*

Building Research Establishment, Chevin Housing, Rydon Construction and Project Place. Representatives from BioRegional Development Group, WWF UK, the Building Research Establishment, SEEDA and the Green Building Council sit on One Planet Products' advisory board' (BioRegional Development Group, 2007). The advisory board no longer exists; instead there is a core members group to inform the project.

Direct funding for this project totalled £440,000 over three years from two primary sponsors: The Esmée Foundation and Defra's Environmental Action Fund (BioRegional Development Group, 2007). Details can be found in Supplementary Information.

4.2.4 Delivery methods

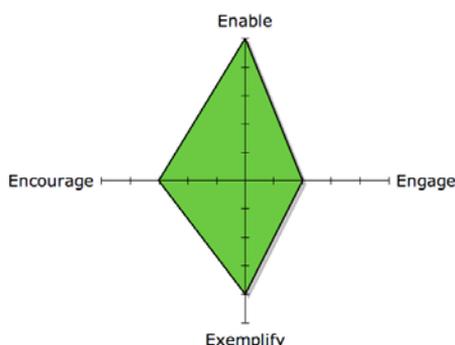
One Planet Products offers a subscription-based membership for the construction industry. Membership allows companies access to an online database of information on products and their sustainability implications. The website also provides supplier lists that allow these items to be procured (Murnaghan, 2008a). Overall, this method allows subscribers to self-select sustainable choice editing. Membership fees vary from £95 to £10,000 per annum, depending on the size of organisation and membership type.

4.2.5 Behaviour change approach

BioRegional's OPP was not designed as a behaviour change project. However, as an external observer it demonstrates characteristics of aiming to achieve PEBC. In terms of Defra's 4Es Model, OPP encourages by leveraging social pressure as a member of the organisation, having a fee to join (tax) and ability to interact socially with other members. OPP enables by removing barriers, providing information, facilitating procurement, educating members and providing in-house capacity. It also engages by creating a network of likeminded businesses and use of its network by membership. Finally, OPP exemplifies by engaging with stakeholders to ensure the sustainability of itself and its customers. Figure 4.2 visually represents BioRegional Development Group's behaviour change approach.

Figure 4.2: Visual representation of BioRegional Development Group's 4Es approach (*this diagram has been used to demonstrate the potential of the 4Es framework as an evaluation tool only, and is not based on a robust methodology*)

Application of Defra's 4Es Model to BioRegional Project



4.2.6 Results

The positive results of OPP is demonstrated by their membership increasing from 12 at launch to 32 by December 2008 (Murnaghan, 2008a). Members cited cost savings,

independent and reliable research, knowledge of legislation, access to markets, brand identity and improvements in sales (BioRegional Development Group, 2008b) as motivators for being part of OPP. Additionally, members found that this database reduced the barriers to engaging in more sustainable procurement (Murnaghan, 2008a).

4.2.7 Unintended impacts

Some members of OPP have seen unintended impacts within their organisations. For example, Rydon Construction has reported increased awareness of sustainability within their organisation. Megaman/Lampspecs has noted increased environmental awareness throughout their supply chain (BioRegional Development Group, 2008b).

A surprising unintended impact for BioRegional Development Group is that their current product does not resemble their initial business model. After operating on their initial model for the first 18 months, the group realised that the database was massively complex, members were not able to select the products that best met their needs and the group was not generating high enough volumes to obtain discounts for their consortium. Thus, they engaged with their members to determine what information and format would be most beneficial for their desired outcomes (Murnaghan, 2008a).

4.2.8 Evaluation

The overall evaluation of success of this project is that it is now a self-sufficient business. With more members, and many market opportunities, OPP will be able to continue to provide sustainable product information to its subscribers.

In terms of behaviour change, OPP was more of a social marketing approach. The team looked at specific barriers and systematically removed them. This approach has proven successful in the construction sector, one of the worst offending sectors identified. OPP has also shown that web-based tools can be effective when they provide information at the point of decision making.

4.2.9 Transferable lessons and good practice
The first good practice is that of engaging end-users in the design and revision of the business model. This produces a better service, creates stronger relationships and results in better overall sustainability outcomes.

The second good practice is the design of the web interface. There is a limited amount of information displayed as a result of users' input. This limits information overload. This type of technique could be beneficial to NetRegs.

4.3 Case Study Two: Cumbria Action for Sustainability (formerly Eden Local Agenda 21) Collaborative Waste Project

4.3.1 Project objectives

The project aim for the CWP was “*creating environmental business networks which collaboratively create economies of scale for recycling commercial waste*” (Defra, 2008c). This fits within the Cumbria DEVICE Programme whose objective is to determine “*how small ‘devices’ can be used to generate far larger collective gains in sustainability*” (Defra, 2008c).

4.3.2 Target audience

This project “*aimed to assist groups of businesses throughout Cumbria to work together to establish ‘collaborative recycling facilities’... The programme has been promoted through Cumbria Business Environment Network (CBEN) and Cumbria Rural Enterprise Agency (CREA) via meetings with stakeholders, website communication, newsletters and through the environmental auditors. Presentations were delivered to all CREA staff (including contracted staff who are in regular contact with other businesses around the county), to West Cumbria Development Agency advisors, to West Coast and South Lakeland Strategic Partnership members. The programme was also highlighted at regional meetings including ENWORKS partners meetings and at all CBEN events.*” (Eden Local Agenda 21, 2008a)

4.3.3 Required resources and funding

The overall funding for the entire Eden Local Agenda 21 project totalled £219,408. However, it is estimated that the portion of this funding that supported the Collaborative Waste Project (CWP) was approximately £30,000 over two years. These funds worked out to approximately “*10 hours a week and office costs*” (Eden Local Agenda 21, 2008a). “*Defra EAF grant funding of up to 50 per cent (£750 each monetary value) would be matched by 50 per cent (£750+) by the businesses involved*” (Ibid, 2008a).

4.3.4 Delivery methods

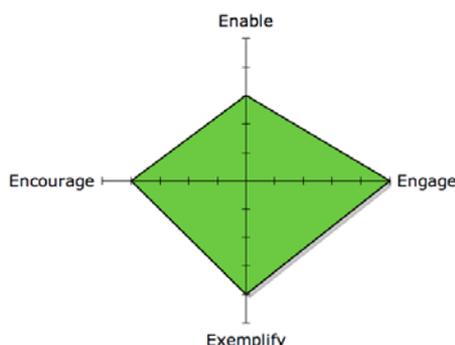
Many delivery methods were explored over the course of this project. The most successful method was to identify a recycling company with idle capacity and businesses with similar recycling streams, then to engage with these organisations to set up a route for collection (Eden Local Agenda 21, 2008c). The burden of work lay with Eden Local Agenda 21 on this project.

4.3.5 Behaviour change approach

This project intended to get businesses to work together on recycling. In terms of Defra’s 4Es Model, the CWP encourages by introducing businesses to one another, by social pressure in setting up recycling groups, by grants for the collection of materials and by one-to-one coaching throughout the set-up process. CWP enables by liaising with recycling companies, removing barriers of establishing which recycling routes have idle capacity and by providing viable alternatives to sending waste to landfill. SMEs are engaged by personal contact, community-focused action, contact with an enthusiast, need-based networks and leveraging existing networks. CAfS exemplifies by demonstrating previous projects where this has been successful. Figure 4.3 represents Cumbria Action for Sustainability’s behaviour change approach.

Figure 4.3: Visual representation of Cumbria Action for Sustainability’s 4Es approach (*this diagram has been used to demonstrate the potential of the 4Es framework as an evaluation tool only, and is not based on a robust methodology*)

Application of Defra’s 4Es Model to Collaborative Waste Project



4.3.6 Results

The CWP saw many successes. Over two years, this programme enabled “over 60 businesses to recycle the commercial waste that they had previously sent to landfill” (Eden Local Agenda 21, 2008c). A successful approach to creating CWPs was identified. This included “first contacting (by leaflet, phone, in person) groups of businesses located in the same area and/or having the same waste items; then to link businesses with a recycling company willing to run a bespoke collection service; and finally offering the businesses a comparative or cheaper price than when previously sending their waste to landfill” (Eden Local Agenda 21, 2008c).

The CWP also experienced difficulties. First of all, it proved exceptionally laborious and low payback to “encourage groups of businesses to share the cost, the use and the responsibility of a single recycling facility [to] perhaps engender wider collaborative work on logistics, energy use etc.” (Eden Local Agenda 21, 2008c). This was due to lack of cooperation: “Even when a business was happy to host the recycling facility, when it came to the cost of collections a group could not decide who would contribute what proportion of service costs. This was obviously most problematic where a broad range of kgs/tonnages of commercial waste was involved” (Eden Local Agenda 21, 2008c).

Further obstacles included the “onerous legislation (Duty of Care, Waste Transfer Licence and other Environment Agency requirements); deciding who should pay what share of the initial costs and what share of collection costs according to the differing amounts of waste from each business; and the question of overall responsibility” (Eden Local Agenda 21, 2008c). Each of these issues had to be addressed individually.

4.3.7 Unintended impacts

By promoting commercial recycling, commercial waste collectors lost out; this conflict had not been anticipated (Murnaghan, 2008c). “Working with the waste sector, whether private or community, was relatively difficult, as there was extreme competition between local recycling organisations. Any help to one and not the other caused friction and this had to be handled very sensitively” (Eden Local Agenda 21, 2008c).

“A recycling company in North Cumbria ... purchased glass bins and distributed them to six pubs in its local town where previously glass waste had been sent to landfill.

Depending on the success of this collection scheme, the company is looking to expand the collection to local golf clubs and hotels” (Eden Local Agenda 21, 2008a). This shows that an SME can carry out this project for commercial success, and on the flip side, SMEs can benefit from reduced landfill costs and better environmental performance.

4.3.8 Evaluation

Overall, the CWP was a success in terms of reaching its target audience. However, Eden Local Agenda 21 found it difficult to measure and report on the full sustainability impacts of its work (Murnaghan, 2008c).

The introduction of CWP at SME sites resulted in behaviour change. Whether this behaviour change will continue is yet to be seen. To date, most of the CWPs set up are still running (Murnaghan, 2008c). There is limited data, and thus it is difficult to infer the extent of behaviour change.

4.3.9 Transferable lessons and good practice

The first lesson is that the Environment Agency’s Duty of Care, Waste Transfer Licence and other requirements may present a real or perceived obstacle to SMEs pooling their commercial recycling. This problem represents a regulatory barrier to engaging in PEBC for some SMEs.

Secondly, when dealing with SMEs, the PEB must be seen as central to business operation, and not peripheral. If it is not seen as central, there will be little action or follow up (Murnaghan, 2008c).

4.4 Case Study Three: Global Action Plan SmartWorks

4.4.1 Project objectives

The programme aims to help SMEs reduce their environmental impact through improved energy efficiency, waste management and procurement methods. This is achieved by providing each business practical advice on low-cost measures they can take, tailored to their needs. The advice covers a range of areas focusing on those that appear most feasible following initial discussions with the business and also includes information on how to achieve behaviour change in the organisation to support environmental change.

4.4.2 Target audience

Global Action Plan (GAP) targets SMEs with fewer than 250 employees, primarily in the London area. This geographic restriction affects the types of businesses they work with (Murnaghan, 2008b).

4.4.3 Required resources and funding

The project is funded by the London Development Agency and resource is allocated to each individual business by GAP depending upon their predicted needs. Assessment of how much resource to allocate to each business is based upon initial conversations indicating the potential for environmental savings at the business, which in turn takes into account the current impact of the business and the feasibility/commitment of Management to make changes.

4.4.4 Delivery methods

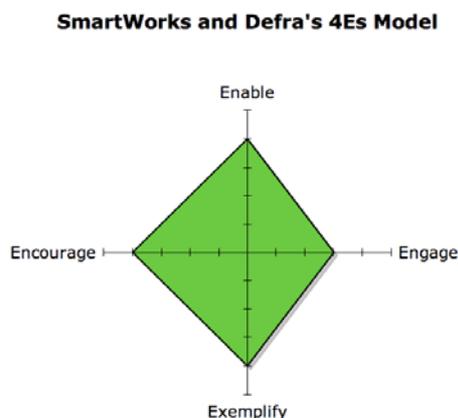
SmartWorks is delivered in a common format with content ranging from simple to extensive based on the end-user's needs. At early stages, GAP attempts to ensure senior management approval for the project. It has been GAP's experience that this is necessary for a project to move forward (Murnaghan, 2008b).

An initial benchmark is carried out over the phone and in most cases is followed by an onsite visit to the business premises. At this stage the advisor can assess the potential for actions and also discuss a number of initial recommendations directly with the staff involved in the project. Next, the SME is provided with a report and Action Plan as to how to roll out their programme within their organisation. This Action Plan is further discussed with the business following the visit to ensure feasibility and so the advisor can answer any questions the business may have about carrying out the actions. A follow up call is made a couple of months into the Action Plan to see how things are progressing and a follow-up audit is conducted around one year later to assess how well the business has performed. Throughout this process, GAP is available by phone and e-mail to provide ongoing support (Murnaghan, 2008b).

4.4.5 Behaviour change approach

The behaviour change approach of this model is to allow the business to build change from within by providing the tools and support to reach its sustainability objectives (Murnaghan, 2008b). In terms of Defra's 4Es Model, SmartWorks encourages by, creating social pressure from previous successes, recognising the efforts of the organisation and creating a rewarding feeling for the business and its staff and also by clearly communicating the financial and environmental savings that are attached to various recommended actions. This programme enables by providing tailored and practical support, removing barriers, providing training and introducing viable alternatives when difficulties arise and helping to prioritise a course of action for the business. SmartWorks engages by involving employees, providing a personal contact for any questions or problems and advising on how to engage employees in the business to effect environmental change. GAP exemplifies by providing case studies of other organisations who have engaged in this programme and helping to quantify environmental and financial savings achieved through actions taken in the follow-up audit. Figure 4.4 represents Global Action Plan's behaviour change approach.

Figure 4.4: Visual representation of Global Action Plan's 4Es approach (*this diagram has been used to demonstrate the potential of the 4Es framework as an evaluation tool only, and is not based on a robust methodology*)



4.4.6 Results

Global Action Plan has supported over 300 businesses so far through the SmartWorks programme with over 150 of these receiving an on-site visit. Follow-up audits are currently taking place with many businesses but where savings were able to be quantified a minimum annual saving of 2 tonnes of CO₂ per business was identified and as was an average saving of 23.7m³ water. Where data is available for annual electricity consumption, savings identified were on average 16% of overall use of this resource.

4.4.7 Unintended impacts

Interim feedback suggests that staff often take environmental awareness messages home with them and that ideas on how and why to reduce impacts are often passed on from business to business.

4.4.8 Evaluation

The results so far show that SmartWorks has been effective in reducing negative environmental impacts in a large proportion of the businesses it has worked with. Results indicate that the level of action taken by a business varies greatly between SMEs depending on their own situation and providing them with tailored information is more likely to result in them taking action.

4.4.9 Transferable lessons and good practice

This programme shows that auditable environmental action plans can result in PEBC in SMEs. Using NetRegs to sign SMEs up to short actionable action plans may be more successful in engaging SMEs in PEB than the current standard NetRegs approach. Furthermore, this programme allows the business to choose its objectives, which could be integrated into NetRegs.

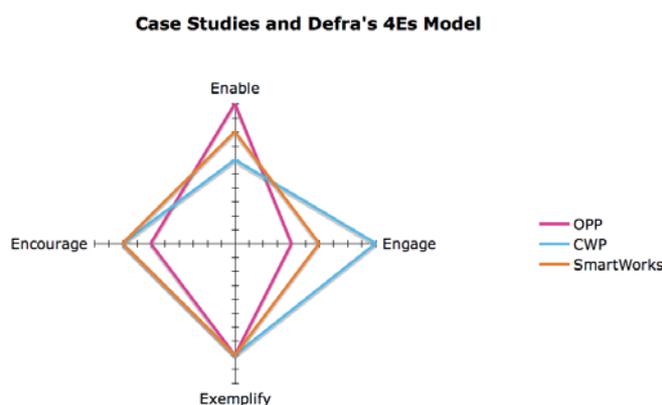
4.5 Collective learning from case studies

There are many lessons to be learnt from these case studies. First of all, engagement with end users to revise business models can result in better uptake and sustainability results. Secondly, tailoring the information each user receives from the database can reduce the likelihood of overwhelming SMEs. Thirdly, when suggesting PEB, the changes must be core to the SME's operations, otherwise they are unlikely to be adopted. Fourthly, simple auditable environmental action plans allow businesses to engage in PEBC internally. Finally, the Environment Agency's Duty of Care, Waste Transfer Licence and other requirements pose a barrier to SMEs pooling their commercial recycling.

Although each organisation had a different delivery method, funding structure and non-governmental status, their practices are still applicable to Environment Agency operations. Furthermore, as shown in Figure 4.5, behaviour change approaches that focus on different elements of the 4Es can be effective in changing behaviour.

Figure 4.5: Case study behaviour change approaches (*this diagram has been used to demonstrate the potential of the 4Es framework as an evaluation tool only, and is not based on a robust methodology*)

Summary of Application of Defra's 4Es Model to all Case Studies



The diagrams of the case studies offer a starting point to developing an evaluation tool and methodology based on the Defra 4E's framework. The exemplify category was particularly difficult to characterise, due to its complexity and the need to obtain feedback from the parties who had worked with the case study organisations.

5 Recommendations

The recommendations of this review are set out in three areas: concepts, actions and further research. Each concept has been developed throughout the project.

5.1 Concepts

The Environment Agency should set out a definition of PEBC that can be consistently applied across its activities. For the purpose of this paper the following definition was used: change in behaviour that results in incrementally positive environmental outcomes over the short, medium and long term. Each project should be designed with targets for positive environmental outcomes on one or more timescales. The duration of each timescale should be identified based on resources required by SMEs to reach the set milestones. Consideration should be given to alternative behaviours that are holistically more positive. For example, using fewer resources is incrementally more environmentally positive than recycling, which in turn is incrementally more environmentally positive than landfill. These alternative behaviours can be used as intermediate steps from short to long term.

The Environment Agency should use tangible, peer-to-peer, descriptive and pragmatic solutions to help SMEs reduce their negative environmental behaviours. These four overarching language principles will best meet the needs of SMEs as a target group.

The Environment Agency should promote PEBC using justifications that meet the needs of SMEs. Each business must see the desired behaviour change as core to its business operations. Examples include tangible cost savings for recycling instead of sending rubbish to landfill and increased efficiency in redesigning operations to use fewer inputs per output.

5.2 Actions

The Environment Agency should consider how SME recycling networks could operate within the Duty of Care, Waste Transfer Licence and other waste regulations. A programme for shared Waste Transfer Licences may help reduce the barriers to recycling, a tangible PEBC. Furthermore, this may present a commercial opportunity for small scale recycling, impacting the SME contribution of approximately 60 per cent of commercial waste.

The Environment Agency should maintain NetRegs to improve environmental awareness, and therefore promote environmentally positive behaviour. Ways to further develop NetRegs to increase its effectiveness as a determinant of behaviour should be explored.

The Environment Agency should consistently advise SMEs to use NetRegs. From this base, area offices can provide consistent support to their local business communities.

The Environment Agency should reduce the amount of information an SME initially receives when using NetRegs. This will reduce the likelihood of overwhelming and discouraging this user group. Techniques such as a more thorough search engine and/or limits on the amount of data presented can perceptually achieve this end.

The Environment Agency should consider the creation of simple auditable environmental action plans allowing businesses to adopt PEBC internally. These action plans could be a standalone or complimentary service provided within the NetRegs framework. A potential concept for such a programme is a one-page checklist of activities to be completed by an SME before graduating into the more detailed information contained within the comprehensive NetRegs database. This would allow each SME to build understanding and confidence in achieving incrementally positive PEBC before engaging with the complex regulations governing each sector in the UK. This type of programme could be disseminated through delivery agents such as Business Link.

The Environment Agency should provide ongoing case studies of SMEs carrying out PEBC programmes. SMEs would be able to learn from the experiences of similar businesses that face the same constraints. Government would also be able to evaluate programme effectiveness by using these case studies.

5.3 Further research

The Environment Agency should work with SMEs to find out what delivery agent business models best suit engagement in PEBC. It is important to include SMEs of all sizes, structures and sectors in this analysis. This type of assessment could be carried out for NetRegs to look at creating a delivery model that reaches more SMEs.

The Environment Agency should explore the potential of social marketing techniques to determine whether this model is more effective than using behaviour change models. Current behaviour change indicators are complex and have limited ability to predict PEBC. On the other hand, social marketing could allow the Environment Agency to focus on PEBC by moving the target group closer to a position where they are likely to change their behaviour. Although this would not predict PEBC, it could put the SME in a better position to adopt the desired behaviour change.

The Environment Agency should develop a better model for identifying, representing and comparing pro-environmental behaviour change techniques. As understanding of the factors involved increases, it will be possible to design more effective programmes.

The Environment Agency should conduct further research into the cultural capital framework. If it is possible to apply this framework at the population level to all SMEs, it may be a much more effective way to use scarce financial and human resources to achieve PEBC in this group of businesses.

5.4 Conclusions

This project provides a preliminary basis for the Environment Agency to understand and promote pro-environmental behaviour change in small and medium-sized enterprises. This target group is economically significant and environmentally detrimental. Furthermore, there is little regulatory momentum behind monitoring this group. Thus, behaviour change has been suggested as an alternative solution to improve environmental performance with minimal burdens on SMEs. Industries for immediate focus include construction and manufacturing (water, energy, food and drink, and chemicals). Local authorities and waste companies are potential sources to deliver environmental information to SMEs.

6 Supplementary information

BERR data on number of enterprises, employment and turnover for the whole UK economy (SBS BERR, 2006)

Number of enterprises, employment and turnover in whole economy by number of employees, UK, start 2006

	Number			Turnover ¹ (/ £ million)	Percent			Turnover ¹
	Enterprises	Employment (/ 1,000)	Employees (/ 1,000)		Enterprises	Employment	Employees	
Whole economy								
All enterprises	4,550,930	29,331	25,460	2,820,025	100.0	100.0	100.0	100.0
<i>With no employees</i> ²	3,270,105	3,570	440	207,617	71.9	12.2	1.7	7.4
All employers	1,280,830	25,761	25,020	2,612,408	28.1	87.8	98.3	92.6
1-4	845,375	2,376	1,845	232,507	18.6	8.1	7.2	8.2
5-9	218,795	1,530	1,429	161,726	4.8	5.2	5.6	5.7
10-19	118,120	1,638	1,584	173,370	2.6	5.6	6.2	6.1
20-49	60,575	1,874	1,840	217,197	1.3	6.4	7.2	7.7
50-99	18,925	1,316	1,308	164,223	0.4	4.5	5.1	5.8
100-199	9,120	1,271	1,267	170,404	0.2	4.3	5.0	6.0
200-249	1,810	404	403	66,932	0.0	1.4	1.6	2.4
250-499	3,700	1,287	1,285	211,081	0.1	4.4	5.0	7.5
500 or more	4,415	14,065	14,058	1,214,967	0.1	48.0	55.2	43.1
SME TOTAL								
0 to 249	4,542,825	13,979	10,116	1,393,976	99.8	47.7	39.6	49.3
1 to 249	1,272,720	10,409	9,676	1,186,359	27.9	35.5	37.9	41.9

Source: BERR Enterprise Directorate Analytical Unit

1. All turnover figures exclude Section J (financial intermediation) where turnover is not available on a comparable basis.
2. "With no employees" comprises sole proprietorships and partnerships comprising only the self-employed owner-manager(s), and companies comprising only an employee director.

Numbers of enterprises are rounded, in order to avoid disclosure. Consequently, the "All Enterprises" and "All Employers" totals may not exactly match the sum of their parts.

Number of enterprises, employment and turnover in the whole economy by number of employees, UK, start 2006

	Number			Turnover ¹ (/ £ million)	Percent			Turnover ¹
	Enterprises	Employment (/ 1,000)	Employees (/ 1,000)		Enterprises	Employment	Employees	
Private sector (including public corporations and nationalised bodies)								
All enterprises	4,466,700	22,402	18,531	2,613,907	100.0	100.0	100.0	100.0
<i>With no employees</i> ²	3,262,715	3,570	440	207,615	73.0	15.9	2.4	7.9
All employers	1,203,980	18,832	18,091	2,406,292	27.0	84.1	97.6	92.1
1-4	800,275	2,289	1,758	227,111	17.9	10.2	9.5	8.7
5-9	205,260	1,440	1,339	157,393	4.6	6.4	7.2	6.0
10-19	110,050	1,529	1,475	168,771	2.5	6.8	8.0	6.5
20-49	55,930	1,733	1,699	211,120	1.3	7.7	9.2	8.1

50-99	17,090	1,186	1,178	158,422	0.4	5.3	6.4	6.1
100-199	7,920	1,101	1,096	162,849	0.2	4.9	5.9	6.2
200-249	1,520	339	338	64,480	0.0	1.5	1.8	2.5
250-499	3,045	1,056	1,054	202,832	0.1	4.7	5.7	7.8
500 or more	2,895	8,160	8,153	1,053,314	0.1	36.4	44.0	40.3
SME TOTAL								
0 to 249	4,460,760	13,187	9,323	1,357,761	99.9	58.7	50.4	52.0
1 to 249	1,198,045	9,617	8,883	1,150,146	26.9	42.8	48.0	44.1

Source: BERR Enterprise Directorate Analytical Unit

1. All turnover figures exclude Section J (financial intermediation) where turnover is not available on a comparable basis.
2. "With no employees" comprises sole proprietorships and partnerships comprising only the self-employed owner-manager(s), and companies comprising only an employee director.

Numbers of enterprises are rounded, in order to avoid disclosure. Consequently, the "All Enterprises" and "All Employers" totals may not exactly match the sum of their parts.

Italics added to highlight totals for businesses with fewer than 250 employees.

BERR data on employment and turnover generated by SMEs (SBS BERR, 2006)

	Employment (/ 1,000) Size (number of employees)					Turnover (/ £ million, excluding VAT) ² Size (number of employees)				
	(=100%)	None ¹	1 - 49	50 - 249	250 +	(=100%)	None ¹	1 - 49	50 - 249	250 +
All industries	22,402	15.9	31.2	11.7	41.1	2,613,907	7.9	29.2	14.8	48.1
Agriculture, Hunting and Forestry; Fishing Mining and Quarrying; Electricity, Gas and Water Supply	439	40.0	54.4	*	*	29,397	24.1	64.9	*	*
Manufacturing	161	5.5	5.6	*	*	88,875	1.9	6.3	*	*
Construction	3,345	7.2	25.8	21.3	45.7	501,486	1.9	15.4	17.2	65.5
Wholesale and Retail Trade; Repairs	2,010	41.1	33.1	9.1	16.7	218,738	22.9	32.5	12.2	32.4
Hotels and Restaurants	4,836	8.0	30.2	9.2	52.6	920,052	4.1	31.9	16.3	47.7
Transport, Storage and Communication	1,649	1.8	43.5	11.5	43.3	67,678	3.3	43.1	11.3	42.3
Financial Intermediation Real Estate, Renting and Business Activities	1,734	14.0	16.8	8.1	61.1	216,280	5.9	21.8	11.5	60.8
Education	1,096	5.2	9.6	6.5	78.7	-	-	-	-	-
Health and Social work Other Community, Social and Personal Service Activities	4,245	20.0	36.2	12.2	31.5	387,506	15.6	40.2	14.6	29.5
	351	33.7	31.0	*	*	14,067	23.3	41.4	*	*
	1,228	17.7	44.4	15.9	22.1	51,930	12.5	54.5	17.9	15.1
	1,309	32.2	34.2	7.7	26.0	117,899	13.7	26.8	7.0	52.5

Source: BERR Enterprise Directorate Analytical Unit

1. "None" comprises sole proprietorships and partnerships comprising only the self-employed owner-manager(s), and companies comprising only an employee director.
2. Turnover excludes Section J (financial intermediation), where turnover is not available on a comparable basis.

Numbers of enterprises are rounded, in order to avoid disclosure.

A * symbol replaces data that is deemed to be disclosive.

Italics added to highlight totals for businesses with fewer than 250 employees.

BERR data on employment generated by SMEs (1,000s) (SBS BERR, 2006)

	Size (number of employees)				SME Total
	None ¹	1 - 49	50 - 249	250 +	
All industries	3,562	6,989	2,621	9,207	13,172
Agriculture, Hunting and Forestry; Fishing	176	239	*	*	414
Mining and Quarrying; Electricity, Gas and Water Supply	9	9	*	*	18
Manufacturing	241	863	712	1,529	1,816
Construction	826	665	183	336	1,674
Wholesale and Retail Trade; Repairs	387	1,460	445	2,544	2,292
Hotels and Restaurants	30	717	190	714	937
Transport, Storage and Communication	243	291	140	1,059	675
Financial Intermediation	57	105	71	863	233
Real Estate, Renting and Business Activities	849	1,537	518	1,337	2,904
Education	118	109	*	*	227
Health and Social work	217	545	195	271	958
Other Community, Social and Personal Service Activities	421	448	101	340	970

Source: BERR Enterprise Directorate Analytical Unit

1. "None" comprises sole proprietorships and partnerships comprising only the self-employed owner-manager(s), and companies comprising only an employee director.

Numbers of enterprises are rounded, in order to avoid disclosure.

A * symbol replaces data that is deemed to be disclosive.

BERR data on turnover generated by SMEs (£ million, excluding VAT) (BERR, 2006)

	Size (number of employees)				SME Total
	None ¹	1 - 49	50 - 249	250 +	
All industries	206,499	763,261	386,858	1,257,289	1,356,618
Agriculture, Hunting and Forestry; Fishing	7,085	19,079	*	*	26,163
Mining and Quarrying; Electricity, Gas and Water Supply	1,689	5,599	*	*	7,288
Manufacturing	9,528	77,229	86,256	328,473	173,013
Construction	50,091	71,090	26,686	70,871	147,867
Wholesale and Retail Trade; Repairs	37,722	293,497	149,968	438,865	481,187
Hotels and Restaurants	2,233	29,169	7,648	28,628	39,050
Transport, Storage and Communication	12,761	47,149	24,872	131,498	84,782
Financial Intermediation	-	-	-	-	-
Real Estate, Renting and Business Activities	60,451	155,777	56,576	114,314	272,804
Education	3,278	5,824	*	*	9,101
Health and Social work	6,491	28,302	9,295	7,841	44,089
Other Community, Social and Personal Service Activities	16,152	31,597	8,253	61,897	56,002

Source: BERR Enterprise Directorate Analytical Unit

1. "None" comprises sole proprietorships and partnerships comprising only the self-employed owner-manager(s), and companies comprising only an employee director.

2. Turnover excludes Section J (financial intermediation), where turnover is not available on a comparable basis.

Numbers of enterprises are rounded, in order to avoid disclosure.

A * symbol replaces data that is deemed to be disclosive.

Data on top five most economically important SMEs sectors by BERR breakdown (BERR, 2006)

Sector	Size	Turnover (£ million, excluding VAT)
Wholesale and Retail Trade; Repairs	1 - 49	293,497
Real Estate, Renting and Business Activities	1 - 49	155,777
Wholesale and Retail Trade; Repairs	50 - 249	149,968
Manufacturing	50 - 249	86,256
Manufacturing	1 - 49	77,229

Data on top five most important sources of employment by SMEs sectors, BERR breakdown (BERR, 2006)

Sector	Size	Employment (/1,000)
Real Estate, Renting and Business Activities	1 - 49	1,537
Wholesale and Retail Trade; Repairs	1 - 49	1,460
Manufacturing	1 - 49	863
Real Estate, Renting and Business Activities	None	849
Construction	None	826

Case study funding sources

	<i>Defra</i> 2005-2006	<i>Esmée</i> 2006	<i>Defra</i> 2006-2007	<i>LDA</i> 2007	<i>Defra</i> 2007-2008	TOTAL
<i>BioRegional Development Group</i>	£101,133.00	£174,000.00	£106,391.00	£0.00	£58,780.00	£440,304.00
<i>Eden Local Agenda 21</i>	£100,264.00	£0.00	£69,910.00	£0.00	£49,234.00	£219,408.00
<i>Global Action Plan (SmartWorks)</i>	£0.00	£0.00	£0.00	Undisclosed	£0.00	Undisclosed

Sources: Defra, 2005a, 2006d and 2007c; Esmée, 2006

Compiled by Carolyn Murnaghan.

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List of abbreviations

4Es	Encourage, enable, engage and exemplify (Defra's approach to behaviour change)
BERR	Department for Business, Enterprise and Regulatory Reform
BiTC	Business in the Community
BRASS	Economic and Social Research Council Centre for Business Relationships, Accountability, Sustainability and Society
CAfS	Cumbria Action for Sustainability (formerly Eden Local Agenda 21)
CCF	Cultural Capital Framework
CSR	Corporate social responsibility
CWP	Collaborative Waste Project
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EAF	Environmental Action Fund (Defra)
ESRC	Economic and Social Research Council
FSB	Federation of Small Businesses
GAP	Global Action Plan
IPPR	Institute for Public Policy Research
NCC	National Consumer Council
OPP	One Planet Products
PEB	Pro-environmental behaviour
PEBC	Pro-environmental behaviour change
SBS	Small Business Service, Department for Business, Enterprise and Regulatory Reform
SCR	Sustainable Consumption Roundtable
SD	Sustainable development
SME(s)	Small and medium-sized enterprise(s)
UK	United Kingdom

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