

URS

**Environmental
Protection
Expenditure by
Industry:
2010 UK Survey**

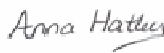
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Issue No: 3	Name	Signature	Date	Position
Prepared by	Anna Hatley		June 2012	Consultant
Checked by	Laura Quinton		June 2012	Principal Consultant
Approved by	Sally Vivian		June 2012	Associate Director

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EXECUTIVE SUMMARY

Introduction

This report presents the findings of a study commissioned by the Department for Environment, Food and Rural Affairs (Defra) and undertaken by URS Infrastructure & Environment Limited (URS), to estimate expenditure by UK industry on environmental protection in 2010.

The primary objectives of the study are:

- To provide Defra with annual estimates of environmental protection expenditure by UK industry; and
- To enable Defra to provide these estimates to the European Commission as required under the European Union (EU) Structural Business Statistics Regulation 295/2008.

In addition to these broad objectives, data from the annual surveys may be used to assess how expenditure is changing, and to compare the levels of industry expenditure in the UK relative to other EU countries. The data also enables companies and trade associations to benchmark their own environmental spending against that of the industry as a whole, both in the UK and the EU. Furthermore, information on companies' environmental expenditure can be used to support evidence based policy-making.

This is the fourteenth survey of this type; previous surveys were carried out in 1994 (a pilot survey), 1997, and annually between 1999 and 2009. As in previous years, the 2010 survey process was overseen by a steering group with representatives from Defra and the Office for National Statistics (ONS).

Methodology

The 2010 survey was provided to companies within the following Standard Industrial Classification (SIC 2007) categories:

- | | |
|-------------------------------------------|---------------------------------------------------------------------|
| • Mining and Quarrying | • Non-Metallic Minerals |
| • Food, Beverages and Tobacco Products | • Basic and Fabricated Metals |
| • Textiles, Clothing and Leather Products | • Computer, Electronic and Optical Products and Other Manufacturing |
| • Wood and Wood Products | • Machinery and Electrical Equipment |
| • Paper and Pulp | • Transport Equipment |
| • Printing and Publishing | • Furniture Manufacture |
| • Coke and Refined Petroleum | • Repair and Installation |
| • Chemicals and Pharmaceuticals | • Energy Production and Distribution |
| • Rubber and Plastics | • Water Supply and Treatment |

The UK Government's Inter Departmental Business Register (IDBR) provided a stratified random sample of 7,827 companies from these industry sectors, who were invited to complete and return a postal or electronic questionnaire on a voluntary basis.

The total number of validated responses was 2,352, giving a valid response rate of 30 per cent (%), the highest response rate reported since the survey started. The responses were subjected to a range of detailed validation checks.

The survey analysed the following expenditure patterns in UK industry:

- Operating expenditure (Opex): In-house operating costs of a company's own environmental protection activities, as well as payments to others for environmental protection services (e.g. waste disposal); and
- Capital expenditure (Capex): 'End of pipe' investments (e.g. equipment to clean up at the end of the production process) and integrated investment expenditure (e.g. equipment to reduce or eliminate emissions and discharges as part of the production process).

The following were also identified:

- By-product income and savings resulting from environmental protection activities carried out in 2010;
- The environmental media (areas) affected by the spending, namely waste water, air, solid waste, soil/groundwater, noise/vibrations and nature protection; and
- The use and accreditation of an environmental management system (EMS).

Expenditure on health and safety equipment or services is excluded. Energy costs are also excluded from the definition of environmental protection expenditure, except where energy is specifically used to run environmental protection equipment or services. Annual savings related to energy are included.

Key findings from the 2010 survey

The following comprise a brief overview of key findings from the 2010 survey:

- Gross spending on environmental protection in 2010 by UK industry amounted to an estimated £2.9 billion (\pm £680 million at a 95% confidence level);
- The primary spending industry sectors were Food, Beverages and Tobacco Products (16% of total spend), Water Supply and Treatment (15% of total spend) and Machinery and Electrical Equipment (9% of total spend);
- Opex accounted for 77% of the total environmental protection expenditure, with Capex making up the remainder;
- Excluding spend on research and development, the area of largest expenditure across Opex and Capex was for solid waste measures, which totalled 34% of total spend. Expenditure on water protection measures accounted for 23%. Air and 'other' protection measures totalled 14% and 12% of the total spend respectively, with the remaining 17% split between soil/groundwater, noise and nature protection;
- This spending was offset by an estimated income of £73 million from the sale of by-products and an estimated cost saving of £166 million.

- Overall, 34% of responding companies had an environmental management system (EMS) in place in 2010. A total of 17% of responding companies had an EMS certified to ISO 14001, and 0.34% certified to Eco-Management and Auditing Scheme (EMAS).

Comparisons between survey years

A summary of total environmental protection expenditure by businesses for 2006 and 2010 is presented in **Figure E1**. Ranges indicating the 95% confidence intervals associated with each value are provided in parenthesis.

Whilst efforts are made each year to increase confidence levels and to keep the survey questionnaire and methodology consistent, direct comparisons between 2006 and 2010 survey years are not possible as:

- The 2003 Standard Industrial Classification (SIC) system was used during the 2006 survey process, whereas 2007 SIC was used for the 2008, 2009 and 2010 surveys;
- The 2006 and 2010 survey sample frames were significantly larger than those for the 2008 and 2009 surveys;
- The 2006 and 2010 surveys also covered a greater number of SIC sectors than the 2008 and 2009 surveys; and
- Since 2006, a number of improvements have been made to the questionnaire design and layout.

In light of this, the following figures include a proportionate breakdown of total spend by Opex and Capex reported in each year, as well as absolute figures.

Figure E1 – Summary of Environmental Protection Expenditure by UK Industry: 2006, 2008 to 2010

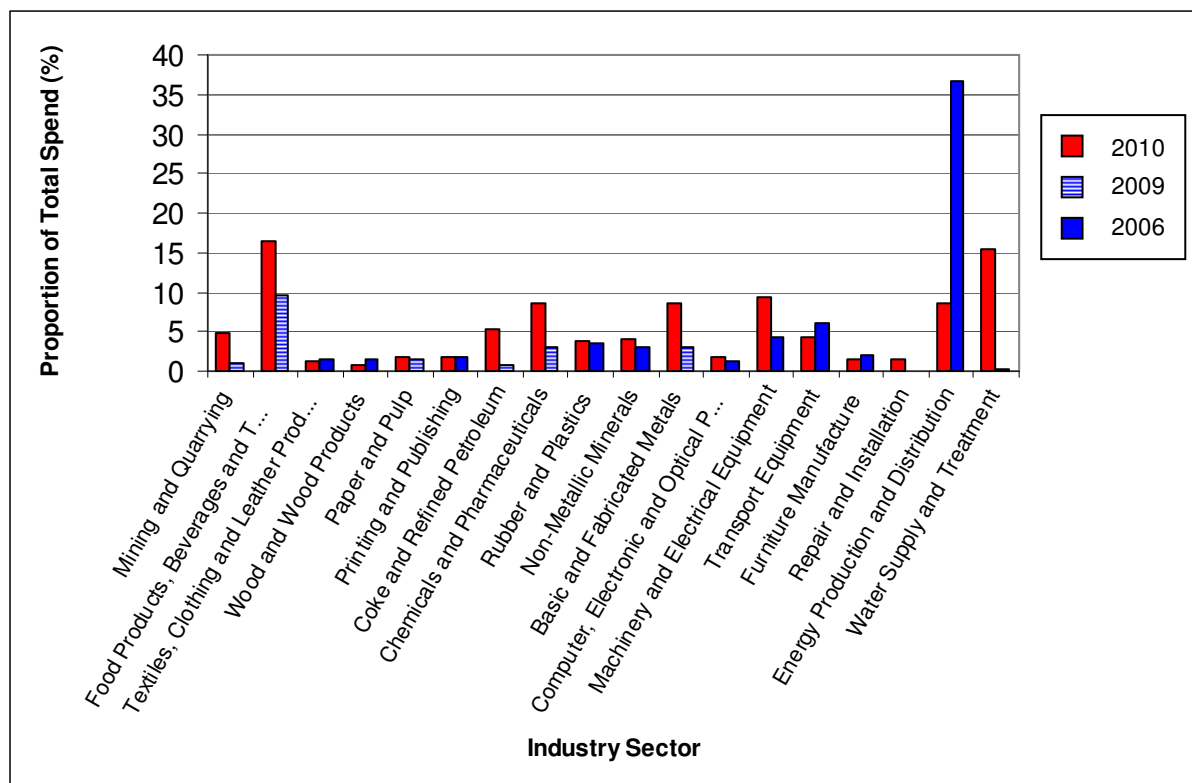
	2006		2008	2009	2010	
	Total expenditure (£M)	% of gross	% of gross	% of gross	Total expenditure (£M)	% of gross
Operational Expenditure						
In-house	912 (644 – 1,180)	22	19	37	894 (661 – 1,097)	31
External	2,025 (1,789 – 2,261)	48	33	19	1,123 (923 – 1,323)	39
Research & Development	80 (66 – 95)	2	4	2	182 (31 - 332)	6
Total Opex	3,017 (2,611 – 3,423)	71	55	58	2,198 (1,762 - 2,635)	77
Capital expenditure						
End of Pipe	352 (238 - 467)	8	20	29	190 (87 - 293)	7
Integrated processes	859 (771 - 946)	20	24	13	481 (68 - 895)	17
Total Capex	1,211 (1,059 - 1,363)	29	45	42	671 (244 - 1,097)	23
Gross expenditure						
Total gross spending	4,228 (3,751-4,706)	100	100	100	2,869 (2,194 – 3,545)	100
Income from by-products	173 (55 - 290)	4	0	1	72 (11 - 133)	2
Total net expenditure	4,055 (3,551-4,561)				2,798 (2,085 - 3,510)	
Cost savings	351 (195-507)				168 (91 - 245)	

Note: Comparisons between years should be treated with extreme caution. More detailed data from the 2006 survey (which used 2003 SIC codes) is presented above to provide a comparison with the most recent survey that had a similar sample frame to that of the 2010 survey.

A summary of total expenditure by the main industry groups for the 2010 survey year and the most recent comparable survey data is presented in **Figure E2**.

The 2010 survey has a larger sample frame covering a broader set of sectors than the 2007, 2008 and 2009 surveys, so whilst the 2009 survey is the most recent dataset overall, for specific sectors not included in 2009 sample frame, the most recent data set is from the 2006 survey. As a result, data from the 2010 survey has been compared with 2009 data where possible, or with 2006 data if the sector was not included in the smaller sample of 2009. However, due to changes in the SIC codes between 2006 and 2010, comparisons should be made with caution.

Figure E2 – Total Environmental Expenditure by Industry Sector: 2006/9 & 2010



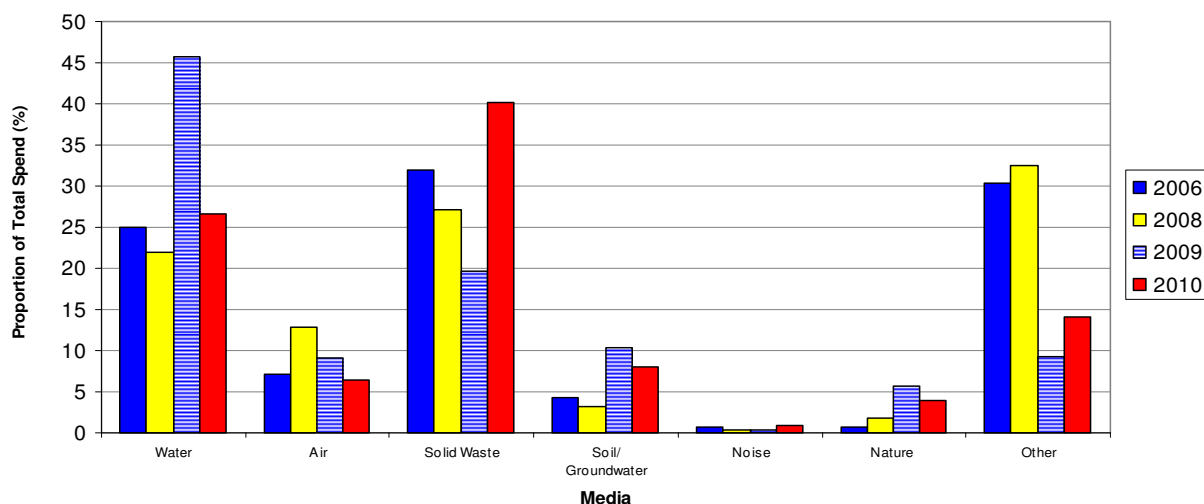
Note: Comparisons between years should be treated with caution. 2010 survey data is presented against 2009 survey data, or where this unavailable (due to its smaller sample frame) against 2006 survey data (which had a similarly large sample frame to that of the 2010 survey).

The Energy and Water industry sectors have traditionally dominated the spending in previous surveys. However, in the 2010 survey period the Water Supply and Treatment sector accounted for 24% of the total expenditure. It is possible that this relatively high expenditure is due to response bias as the 2010 sector sample for the Water Supply and Treatment is relatively small (44 companies, of which 10 provided responded) and the results can therefore be greatly influenced by the spend of individual companies.

The Food, Beverages and Tobacco Products sector has also been a consistently high spending sector (16% of total spend in 2010, 10% in 2009,) whilst the remainder of the sectors in combination typically account for a relatively minor proportion of annual spend (less than 10% in 2010).

Figures E3 and **E4** show the operational and capital expenditure across environmental media in 2006, and 2008 to 2010.

Figure E3 – Operational Environmental Expenditure by Environmental Media: 2006 & 2008 to 2010

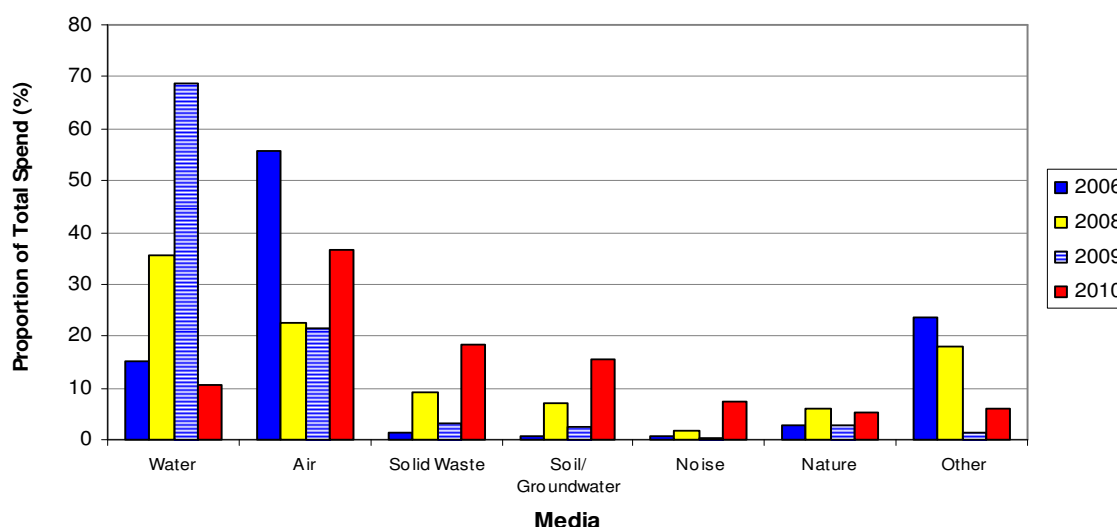


Note: 'Other' includes regulatory charges. 2006 survey data is presented above as to provide a comparison with the most recent survey using a similar sample size whilst the 2008 and 2009 data provide a more recent comparison using the same SIC codes.

In 2010, spend on solid waste comprised 40% (£812 million) of total Opex, the area of greatest expenditure. This is similar to the 2006 results, and reflects an increase in expenditure on solid waste measures as compared to 2008 and 2009, attributable to the increasing cost of waste disposal per unit volume. Water protection Opex has risen from the levels observed in 2006 and 2008, perhaps reflective of increasing regulation for water environment protection (e.g. Water Framework Directive).

The level of 'other' environmental expenditure decreased dramatically in 2009, and this reduced level was observed again in 2010. The 2009 decrease was apparently associated with definition interpretation, with expenditure previously assigned to this category, now accounted for among the other media.

Figure E4 – Capital Environmental Expenditure by Environmental Media: 2006 & 2008 to 2010



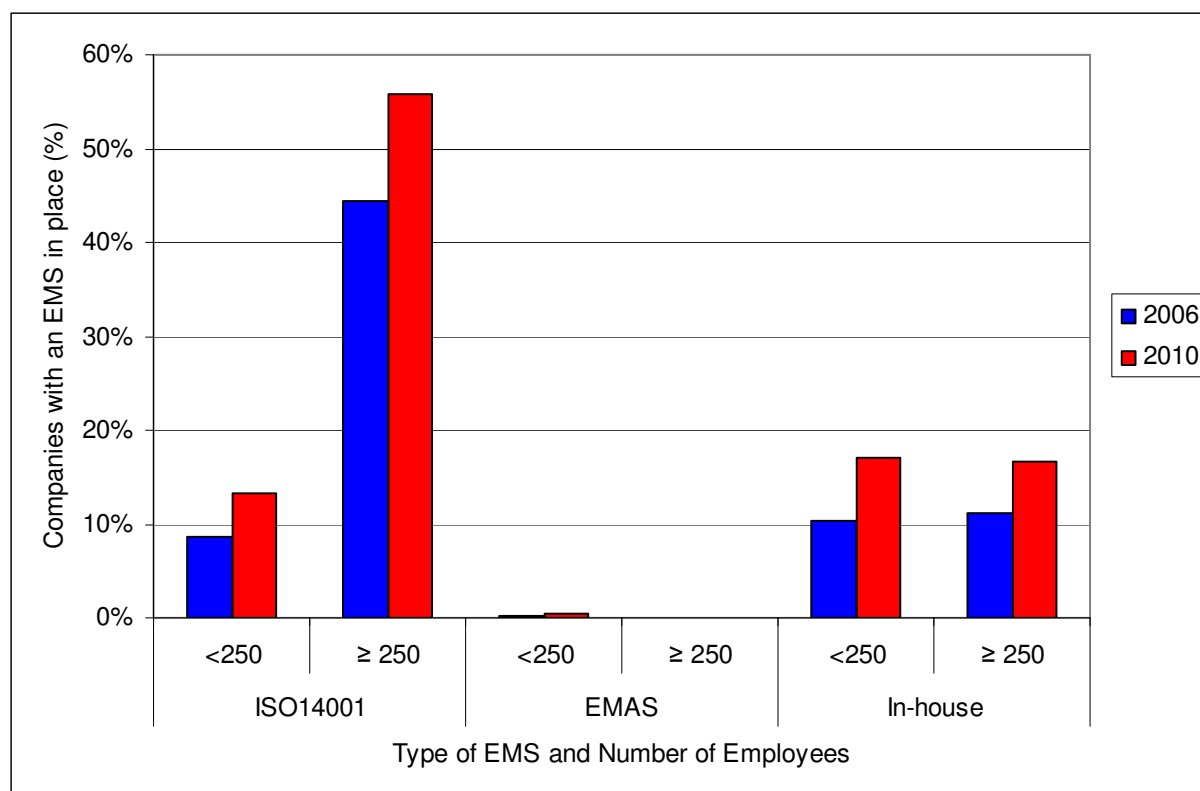
Note: 'Other' includes regulatory charges. Data from the 2006 survey is presented above to provide a comparison with the most recent survey using a similar sample size whilst the 2008 and 2009 data provide a more recent comparison using the same SIC codes.

Spend associated with air accounted for 37% of the total Capex (£247 million). Capex on solid waste accounted for 18% of the total spend (£124 million), mirroring the increase seen in Opex in this area. Soil and groundwater, and water protection measures contributed 16% and 11% respectively, whilst the remaining 3 categories (noise, nature protection and other) made up the residual 18%.

Environmental Management Systems

Figure E5 shows the proportion of companies in 2010 with an environmental management system (EMS) in place, by company size (i.e. number of employees).

Figure E5 – Breakdown of EMS Certification by Company Size: 2006 & 2010



Note. Some systems may be certified to both ISO 14001 and EMAS. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set with a similar sample frame.

The proportion of companies with an EMS in place has increased since 2006, irrespective of company size (34% of respondents in the 2010 survey). Whether certified or not, larger companies are significantly more likely than SMEs to have an EMS system in place. A total of 17% of responding companies had an EMS certified to ISO 14001, and 0.34% certified to Eco-Management and Auditing Scheme (EMAS), the latter being more common within SME's than larger companies.

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1 INTRODUCTION

This report relates to the fourteenth annual study commissioned by the Department for Environment, Food and Rural Affairs (Defra) and undertaken by URS Infrastructure & Environment Limited (URS), to estimate the annual expenditure by UK industry on environmental protection.

This report presents results from the analysis of the 2010 survey data returned by participating UK companies. Previous surveys were carried out to estimate expenditure in 1994 (a pilot survey), 1997, and 1999 to 2009. Throughout this report, surveys are referred by the year for which the expenditure data was collected (normally two years in arrears of actual spend).

The 2010 survey was distributed to a total of 7,827 companies across the mining and quarrying, manufacturing, energy production and water sectors, as defined by the UK Standard Industry Classifications for Business (SIC) in 2007. This signifies a return to the larger sample size used in the 2006 survey, a reduced sample having been used during interim surveys to increase efficiency and to reduce 'survey fatigue'.

To provide some context and to allow broad trends to be established, grossed figures from the 2010 survey are presented with those from the 2006 survey, the last survey that had a similarly large sample frame. Sector specific figures are presented along side those from 2006, and also 2008 and 2009 (i.e. the two preceding surveys, which had limited sample frames).

However, direct comparisons between survey years should be treated with extreme caution for the following reasons:

- Most importantly, the main classification system used to analyse the 2006 data has since been updated to reflect changes in UK industry. The 2006 data was classified using the SIC 2003 system, whilst the 2008, 2009 and 2010 survey data used the SIC 2007 system. Although the survey methodology is broadly consistent across all years, a small number of companies have been reclassified into a different main SIC grouping under the new classification;
- As a consequence of the above point, a change was applied to the validation method of survey returns for 2010 for the Water Supply and Treatment sector (SIC 36). This was adjusted to reduce likelihood of double counting for the treatment of waste water which is captured across all sectors. These adjustments have not been applied retrospectively to the corresponding 2008 and 2009 figures in this report;
- Additionally, the sample size of the 2008 and 2009 surveys was restricted to a more limited number of industry sectors than the 2006 and 2010 surveys, requiring certain individual sectors to be compared to 2006 data;

- A number of improvements have been made to the survey design and layout since the 2006 survey; and
- The process of generating estimates of sectoral expenditure means that it is possible for one company's spending to affect the final figure to a considerable degree; it is possible that an individual company may make a large, 'one-off' investment during the active survey period and then return a small or even a zero response in the following survey. With the smaller sample sizes in the 2008 and 2009 surveys, the potential is greater for sectoral estimates to be skewed in this way.

In light of these issues, comparisons include confidence ranges for the total spending reported in each year or are shown as percentage shares of total spend, as well as absolute figures. However, comparisons between years should still be treated with caution.

1.1 OBJECTIVES

The primary objectives of the study were:

- To provide Defra with annual estimates of environmental protection expenditure by UK industry; and
- To enable the UK Government to meet the requirements of the European Union (EU) Structural Business Statistics Regulation 295/2008, which provides a framework for regular data collection on economic activities and for providing information on the service sector.

In addition to these broad objectives, annual data from the surveys may be used to assess how expenditure is changing and to compare the levels of expenditure of UK industries relative to other EU countries. The data enables companies and trade associations to benchmark their own environmental spending against that of the industry as a whole, both in the UK and the EU.

1.2 SCOPE AND BACKGROUND

The current 2010 survey covers expenditure incurred in the financial year 2010/2011. In accordance with EU regulations, industries that have been surveyed are those in NACE¹ sections C, D and E (extraction, manufacturing, and energy and water supply). Expenditure estimates across these sectors are provided for the following:

- In-house and external operating costs (including research and development, regulatory charges etc);
- End-of-pipe capital investments;
- Integrated or 'clean' technology capital investments; and

¹ NACE: 'Nomenclature Générale des Activités Economiques dans les Communautés Européennes'

- By-product income and environmental cost savings.

This expenditure is also reported by the environmental media to which they relate:

- **Waste water:** Collection and transport of waste water, the prevention or reduction in quantity of waste water and of substances in waste water, the prevention of incidental water pollution, the treatment of cooling water before draining to the surface or groundwater and monitoring of surface water.
- **Air:** Prevention or reduction of gaseous, liquid or particulate emissions to the atmosphere and the monitoring of air emissions.
- **Solid Waste:** Prevention or reduction of wastes including the collection, transport, treatment and disposal and monitoring of waste.
- **Soil/groundwater:** Decontamination of polluted soils and cleansing of polluted ground water. Includes the protection of soil and groundwater against pollution infiltration, monitoring of soil and groundwater and the transport and disposal of contaminated soil.
- **Noise/vibration:** Measures to decrease noise and vibration levels at source, to isolate receivers from noise/vibration and the monitoring of levels. Protection of the workplace is excluded.
- **Nature protection:** Protection of species, landscapes and habitats; rehabilitation of damaged landscapes due to past or current actions (including reforestation).

This survey succeeds the Defra surveys carried out for spend in 1997 and 1999 to 2009, and research on environmental protection expenditure in 1994 (pilot study). The current report and those from these surveys can be downloaded at: www.defra.gov.uk/statistics/environment/environmental-survey/survey-results/

1.3 DEFINITION OF ENVIRONMENTAL PROTECTION EXPENDITURE

The definition of environmental protection expenditure used for this survey was established by the Statistical Office of the European Community (SOEC) as follows:

'Environmental protection expenditure is the sum of capital and current expenditure on environmental protection activities. Environmental protection is an action or activity (involving the use of equipment, labour, manufacturing techniques and practices, information networks or products) where the main purpose is to collect, treat, reduce, prevent, or eliminate pollutants and pollution or any other degradation of the environment resulting from the activity of the company. Environmental protection expenditure may relate to activities that generate marketable by-products, or results in savings, or are financed by subsidies or capital allowances. In such cases, environmental protection expenditure should be reported gross of any such cost offsets.'

Environmental protection expenditure includes: expenditure to reduce or prevent emission to air and water; expenditure to protect or clean up soil and groundwater; expenditure to prevent noise and vibration; and expenditure to reduce, treat and dispose of waste materials.

Expenditure may be operating expenditure (Opex) or capital expenditure (Capex):

- Opex includes the **operating costs** of a company's own environmental protection equipment and services and also **payments to others** for environmental protection services (including waste disposal and sewage treatment).
- Capex consists of **end-of-pipe** expenditure and expenditure on **integrated processes**. **End-of-pipe** capital expenditure is defined as expenditure on equipment used to treat, handle, measure or dispose of emissions and wastes from production. Examples include effluent treatment plants, exhaust air scrubbing systems and solid waste compactors.
- Capex on **integrated processes** relates to new or modified production facilities designed to integrate environmental protection into the production process. This might include adaptation of an existing installation/process whereby the integrated expenditure is then the total purchase cost of the adaptation. It also includes installing a new process in which the design takes environmental protection into account. In this case the expenditure counted is only the extra cost compared with installing a less environmental friendly alternative.

Expenditure on health and safety equipment or services is excluded. Energy costs are also excluded from the definition of environmental protection expenditure, except where energy is specifically used to run environmental protection equipment or services. Annual savings relating to energy are included.

1.4 REPORT STRUCTURE

This report consists of the following sections:

Section 1	Introduction
Section 2	Survey Methodology and Preparation
Section 3	Conducting the Survey
Section 4	Analysis of Responses
Section 5	Survey Results and Analysis
Section 6	Recommendations for Future Surveys

This main report is supplemented by detailed annexes, which are presented as separate documents:

Annex 1	Technical Guidance Note and Cover Letters
Annex 2	Validation of Responses
Annex 3	Response Codes for Sorting Correspondence
Annex 4	Drivers Behind Participation
Annex 5	Output of Data Analysis

Annex 6 Grossing-up Procedure

Annex 7 Method for Derivation of Standard Error and Confidence Intervals

This report and Annexes can be downloaded from the Defra website at:

www.defra.gov.uk/statistics/environment/environmental-survey/survey-results/

2 SURVEY METHODOLOGY AND PREPARATION

As in previous years, the 2010 survey consisted of three phases, sub-divided into the following individual tasks/activities:

Pre-survey phase (April 2011 – May 2011):

- Review of the 2009 survey and introduction of modifications
- Promotion of 2009 survey results
- Steering Group meeting participation
- Request submitted for company data from the UK Government's Inter Departmental Business Register (IDBR)

Survey phase (June 2011 – January 2012):

- Selection of sample from the IDBR and subsequent database work
- Review and submission of mail out materials to Defra
- Amendments and approval of mail out materials as required
- Coordination of printing and preparation of mail out materials
- E-mail notice of the 2010 survey dispatch to previous respondents
- Dispatch of survey pack to companies
- Provision of Helpdesk support
- Data entry of survey returns
- Resend surveys as required
- Reminder letter dispatch
- Top company follow-up phone calls

Analysis and Final Reporting (November 2011 – June 2012):

- Creation/updating of validation process
- Continuous validation (statistically and via participant consultation)
- Grossing/aggregation of results
- Estimation of non-response bias
- Supply of survey database to Defra
- Analysis of survey data
- Final reporting and feedback

As in previous years, progress of the survey has been guided by a Steering Group, chaired by a professional statistician from Defra and comprising representatives from Defra and the Office for National Statistics (ONS).

Certain activities outlined above are described in more detail in Section 2.1 below. These include modifications introduced since the 2006 survey (when a larger sample size was last used), preparation of sampling methodology, and updates to the database design.

2.1 MODIFICATIONS INTRODUCED SINCE THE 2006 SURVEY

Several modifications have been made to the survey process and questionnaire since 2006, to improve both awareness of the survey aims and benefits, and the clarity of survey definitions, in order to encourage participation and increase the survey response rate. These modifications include, for example, the following activities:

- To ensure the continuation of reducing respondent burden, micro-sized companies (with 1 to 9 employees) were again excluded from the 2010 survey. Similar to previous years, small to medium sized enterprises (SMEs) (those with between 10 and 250 employees) received a simplified cover letter that asked them to complete only specific sections of the questionnaire. Large companies (those with over 250 employees) received a slightly different cover letter emphasising different issues. The definitions of these company groups are explained in full in section 3.1 and the cover letters can be seen in **Annex 1**.
- Helpdesk staff were trained to encourage companies to fill in specific/minimum questions in cases where individuals felt the survey was not relevant to their business. This approach was carried over from the previous surveys, as it proved useful in persuading companies to respond when they contacted the Helpdesk.
- Prior to the launch of the 2010 survey questionnaire, an e-mail was sent out to all companies that responded to the 2009 survey which were also included in the 2010 sample. The e-mail invited each company to participate in the survey and also provided the key results from the previous survey. This enabled the company to prepare for the survey and provide the Helpdesk with the most appropriate contact details.
- Survey returns were accepted several weeks after the deadline, which amongst other reasons, allowed enough time for the questionnaire to reach the most appropriate person within the company.
- Calling each Top Company up to five times significantly increased their survey returns by allowing the most appropriate person to be identified and then contacted.
- The reminder postcard used in previous years was not sent out for the 2010 survey as the response rate was already high and it was felt that a combination of a reminder letter and follow up calls would provide a more targeted and efficient method of eliciting responses.

Minor, limited updates were made to the 2009 format for use in the 2010 survey. This was generally to allow for the larger sample size in the 2010 survey, which was of a similar size to that used in the 2006 survey.

Modifications to the questionnaire since 2006 are summarised in **Figure 2.1**.

Figure 2.1 - Summary of Questionnaire Modifications since the 2006 survey

Section / Question		Modification
Front Page Header	Company Information	Insertion of box so the company reference number can be entered
Instructions	Results	Removal of tick box for receiving survey results
Contact Details	Helpdesk Email	Checked and updated each year, as necessary
Classification Details	Employee Number	Amended to reflect the unit reported on the questionnaire
Classification Details	Turnover	Amended to reflect the unit reported on the questionnaire
Classification Details	Capital Expenditure	Amended to reflect the unit reported on the questionnaire
1.2	Operating costs paid to external organisations	Reference amended from 'IPC Authorisation' to 'Environmental Permit'
2.3	Reason for capital expenditure	Title amended to 'Main Reason for Environmental Capital Expenditure'
2.3	Main reason for Environmental Capital Expenditure	Amended option from 'Customer environmental requirement' option to 'Greenhouse gas emission reduction'
3.1	Cost Savings and Income	Text amended to 'Annual savings against business as usual'
3.1	Cost Savings and Income	Amended option from 'reductions in water use or production of effluent' to 'more efficient water use or reductions in effluent'
3.1	Cost Savings and Income	Amended option from 'reductions in energy use' to 'more efficient energy use'
3.1	Cost Savings and Income	Additional column inserted to allow quantities to be recorded as well as financial savings
3.2	Cost Savings and Income	Text amended from 'annualised' to 'annual'
4.3 a-c	EMS costs	Clarification of questions and amendments made to layout to request a reason if answer is given as 'none'
Additional Information	Comments	Expanded text

2.2 SAMPLING METHODOLOGY

The final stage of preparation involves selecting the sample of companies that are to be invited to participate in the survey. In 2010, the UK Government's Inter Departmental Business Register (IDBR) provided a random sample of 7,827 companies across the extraction, manufacturing, energy and water supply industries (see **Figure 2.2** below).

Figure 2.2 – Industry sectors covered by the 2010 survey

2007 SIC code	Industry
05 - 09	Mining & Quarrying
10 - 12	Food, Beverages and Tobacco Products
13 - 15	Textiles, Clothing and Leather Products
16	Wood and Wood Products
17	Paper and Pulp
18	Printing and Publishing
19	Coke and Refined Petroleum
20 & 21	Chemicals and Pharmaceuticals
22	Rubber and Plastics
23	Non-Metallic Minerals
24 & 25	Basic and Fabricated Metals
26 & 32	Computer, Electronic and Optical Products and Other Manufacturing
27 & 28	Machinery and Electrical Equipment
29 & 30	Transport Equipment
31	Furniture Manufacture
33	Repair and Installation
35	Energy Production and Distribution
36	Water Supply and Treatment

A census was taken of the larger companies (i.e. all of those with 250 or more employees were invited to participate) using a stratified sampling approach, weighted towards the industry sectors with known high expenditure rates, which was used to sample the smaller companies. To reduce the burden for respondents, micro-sized (1 to 9 employees) companies were not sampled.

A total of 283 'Top Companies' were selected based on their employee number and turnover (including the top 150 ranked by employee number and turnover), ensuring that all sectors were represented.

In previous years, the Water Supply and Treatment (SIC 36) and Energy Production and Distribution (SIC 35) sectors have been combined for the purposes of the survey. However, as these two sectors have demonstrated very different expenditure trends, it was considered likely that grouping them together would mask any trends for the two sectors within one total. Therefore, the two sectors were disaggregated and treated as two individual sectors for the current 2010 survey.

2.3 DATABASE DESIGN

A database was specifically designed and built using Microsoft Access to store information from the surveys and intended for use by URS personnel to:

- Gather information from postal questionnaires and other correspondence;
- Carry out continuous validation checks of the data entry process; and
- Conduct statistical analysis of each year's data.

The 2009 survey database was updated for use during the 2010 survey through inputting the sample data from the IDBR and making limited, minor updates to the user form.

As described in **Annex 2**, certain validation checks are incorporated into the database, which has a number of advantages:

- Checks can be run more frequently and consistently;
- Validation tests take account of the data types and conversions;
- There is no delay between the data entry and the return of the validation checks, as the whole process is undertaken within the same programme;
- Companies could be contacted promptly after returning their completed questionnaires with any queries; and
- Results of validation calls or changes are input into the database.

After the validation tests were run, the results were stored for manual validation. The records within the database would not change until the validation tests were run again.

3 CONDUCTING THE SURVEY

3.1 METHODOLOGY

The stages involved in the survey implementation are summarised in **Figure 3.1**.

Figure 3.1 – Survey Implementation Summary: 2010

Activity	Quantity	Comment
Pre survey e-mail	208	Prior to the launch of the survey e-mails were sent out to those companies in the 2010 sample that responded or had shown an interest in responding to the 2009 survey. The e-mail invited the company to participate in the 2010 survey and provided key information from the previous 2009 survey.
Survey questionnaire	7,827	The volume of questionnaires returned was greatest in the first few weeks after the survey was sent out. The same trend was seen after the reminder letter was sent out.
Reminder letter to elicit responses	6,901	A reminder letter was sent to 88% of the companies originally invited to participate five weeks after the dispatch of the survey. The letter was not sent to those companies that had either already returned the questionnaire or had declined to participate. The reminder letter produced a surge in the volume of calls to the Helpdesk requesting assistance and survey resends.
Top Company contacts	283	Top Companies that had not returned surveys were contacted by phone twice as a minimum and up to eight times in total.
Survey returns removed from sample	53*	Number of returned surveys removed from the sample prior to analysis, because they were in effect blank returns.
Helpdesk support	3,987	Number of times the Helpdesk was contacted by companies, via telephone calls, forms, emails and letters.

*An additional survey response was removed as it was felt the expenditure did not come under the scope of the survey.

The survey questionnaire was sent out in a package along with a cover letter, technical guidance notes and a Freepost return envelope. The cover letters were tailored for specific company sizes:

- **Small to Medium Enterprises (SMEs):** Companies with ≥ 10 to < 250 employees. The SME cover letter emphasised the benefits of participation even if the companies' environmental protection expenditure was very low. Companies were asked, as a minimum, to confirm basic sector classification details and external expenditure for the disposal of solid waste and wastewater. The SME survey pack also contained a postcard to highlight the reasons they were included in the survey sample.
- **Larger companies:** Those with ≥ 250 employees. The 'standard' cover letter emphasised potential benefits of participation, including the potential use of survey information for benchmarking purposes.

Copies of the 2010 survey questionnaire, cover letters and technical guidance notes are provided in **Annex 1**.

3.2 TOP COMPANY FOCUS

Owing to its success in increasing participation levels, dedicated Top Company follow-up (repeat calls/reminder emails) has been continued for all post-1999 surveys. The following advantages have been consistently identified:

- The telephone calls enable the survey team to build on their existing contact lists, and help minimise future issues normally experienced in identifying and contacting the right person within the different organisations.
- The calls offer the opportunity to increase the profile of the survey, encourage companies to allocate time/resources to complete the survey, and to offer assistance in doing so, where possible.
- Follow-up telephone conversations are helpful in data validation and quality control processes and also provide an insight into the way companies interpreted the questions and presented their data as responses.
- Feedback received from companies is an integral part of the questionnaire design for the following year.

3.2.1 Lessons learnt from the Dedicated Top Company Follow-up

For those Top Companies that declined to participate in this year's survey (2010), the most common reasons were similar to previous surveys; that they did not have the resources or time available at present to complete the survey and that the information required was not readily available. Related to this response was that due to the size and nature of the companies, gathering the required information would necessitate too much time to be devoted to it and the company's accounting procedures did not separately identify environmental protection expenditure.

Calling each Top Company at least twice and up to eight times increased the response rate. The phone calls also enabled the most appropriate person within the organisation to be identified and contacted. In total, 9% of 2010 Top Companies were classed as uncontactable (including instances where no message could be left). Following the initial deadline, calls were made to Top Companies to let them know that survey returns would still be accepted until the end of January 2012. These calls were prioritised based on whether they had shown an interest in participating and a viable contact identified. The follow up calls after the final deadline to companies that had indicated they would fill in the survey but failed to return it, also increased the response rate.

3.2.2 Impact of the Top Company Focus

The end result of Top Company calls are summarised below in **Figure 3.2**. An analysis of reminder calls for Top Companies is also provided. Specific codes used for recording the correspondence received by the Helpdesk are presented in **Annex 3**.

Figure 3.2 – Outcomes of Top Company Engagement: 2010

Response	Quantity
Returned Questionnaire*	67
Company declined to participate	59
Said will complete if have time/resources	13
Indicated the survey would be returned, but URS did not receive completed survey	13
URS left a voicemail message	72
URS sent email reminder	2
Supplied URS with a new contact/number- no response	9
Said they would pass it on to somebody more appropriate	10
Asked for the survey to be resent	20
Company was uncontactable / no response	16

**Includes Top Companies who had returned the questionnaire prior to the start of the calling period*

It appears that the numerous reminder calls made to the Top Companies helped to improve the overall response rate. A total of 67 surveys were returned from the 283 Top Companies invited to participate (i.e. a response rate of 24%), which is an increase on the 2006 response rate of 19% and on the 2009 response rate of 18%.

3.3 HELPDESK SUPPORT

A dedicated Helpdesk, with direct phone and fax lines and email account, was available to participating companies throughout the survey response period (September 2011 – January 2012). Companies were encouraged to use any or all of these methods to contact a member of the URS survey team.

The Helpdesk enabled companies to discuss all aspects of the survey, providing an insight into the context from which the data has been derived. As a result, contact made through the Helpdesk allowed the data to be validated more efficiently and feedback to be obtained from companies regarding their individual experiences with the survey.

These facilities, in conjunction with the Defra website, have proved to be a valuable part of the survey process. The feedback provided has enabled the survey team to identify the reasons behind participation and constraints highlighted by potential survey participants. **Annex 4** identifies the main

drivers behind participation and also the reasons why companies declined to participate. This feedback will be considered when designing future surveys.

Companies that used the Helpdesk service commented that it had provided useful information, clarification and assistance in completing the survey questionnaire.

The Defra website has been maintained and supported throughout the 2010 survey period: www.defra.gov.uk/statistics/environment/environmental-survey/. The website has been used, in conjunction with the Helpdesk, to provide companies with additional copies of the questionnaire, technical guidance notes and other information relating to the survey. When requested, the website was used as a primary means of providing additional, digital copies of the survey questionnaire, a digital copy sent by e-mail was used as a secondary means, and a paper copy by post was only offered as a final resort.

4 ANALYSIS OF RESPONSES

4.1 RESPONSE RATES

From a sample of 7,827 companies, the total number of validated responses was 2,352 giving a response rate of 30%, the highest since the survey was first started. The response rates are summarised in **Figure 4.1** below, with a breakdown by employee number (i.e. 'company size') for 2006 and 2010, where a larger sample size allows this. A breakdown by company size is not available for the 2008 and 2009 surveys, due to a smaller sample size used in these years. The output of the data is presented in **Annex 5**.

Figure 4.1 – Survey Response Rates: 2006 & 2008 to 2010

Aspect	2006			2008	2009	2010		
	< 250 employees	≥ 250 employees	Total	Total	Total	< 250 employees	≥ 250 employees	Total
Number of companies invited to participate	5,909	1,941	7,850	1,008	974	6,568	1,259	7,827
Number of (valid) survey returns	1,303	296	1,599	204	171	2,149	203	2,352
Proportion of (valid) responses	22.1%	15.2%	20.4%	20.2%	17.6%	32.7%	16.1%	30.0%

Note: The sample frame was received from the IDBR in July 2011 and the surveys were returned between September 2011 and January 2012. During the intervening period, the number of employees per company may have changed. Data from the 2006 survey is presented above to provide a comparison with the most recent survey that used a similar sample frame to that of the 2010 survey, whilst the 2008 and 2009 data provide a more recent comparison using the same SIC codes.

The increased rate of survey returns between the two larger 2006 and 2010 surveys is driven by companies with fewer than 250 employees, whilst the larger company response rate has increased only slightly. The high response rate for the 2010 survey reverses the trend of a declining response rate over previous years. This might be due to the use of a reduced sample frame in the 2008 and 2009 surveys, as the majority of companies targeted in the 2010 survey will not have received the survey since the 2006 survey period.

The increase in smaller company responses in the 2010 survey may also be explained by the adoption of this approach, leading to 'response fatigue'. The percentage of companies included in both the 2009 and 2010 surveys is much higher for larger companies (41% of larger companies included in 2010) than for smaller companies (2% of SMEs included in 2010).

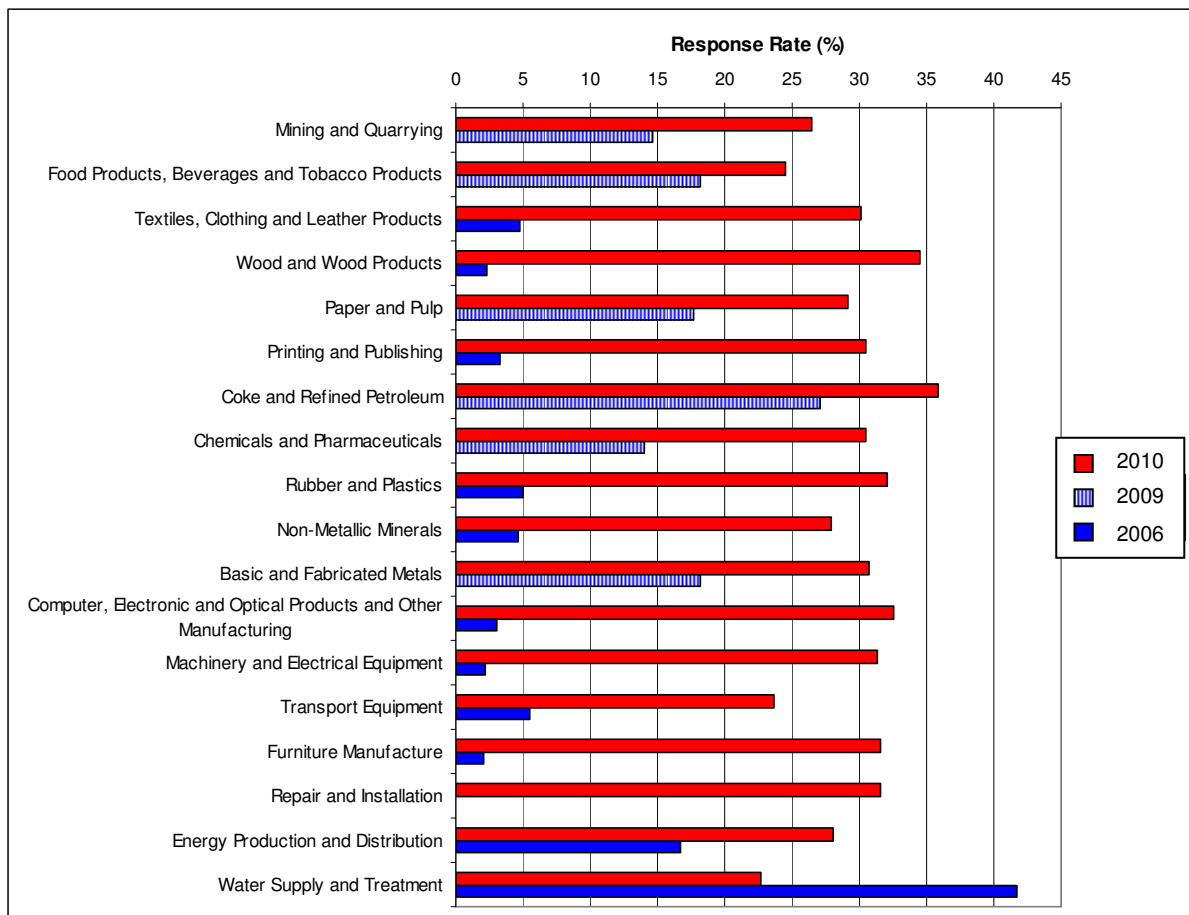
During the 2010 survey, responses received from 53 companies were removed from the sample as they were effectively null responses with no quantitative values provided (An additional survey response was removed as it was felt the expenditure did not come under the scope of the survey).

Reasons given by companies for returning such responses included that the company no longer operated, participation was declined, or the company had 'nothing to report'.

As shown by **Figure 4.2** below, the response rates for individual sectors has fluctuated between the 2006/2009 and 2010 surveys. However, in many cases the sectors represent different companies as the SIC codes have been reclassified, making direct comparisons difficult.

The 2010 survey has a larger sample frame covering a broader set of sectors than the 2007, 2008 and 2009 surveys, so whilst the 2009 survey is the most recent dataset overall, for specific sectors not included in 2009 sample frame, the most recent data set is from the 2006 survey. As a result data from the 2010 survey in **Figure 4.2** has been compared with 2009 data where possible, or with 2006 data if the sector was not included in the smaller sample of 2009. However, due to changes in the SIC codes between 2006 and 2010, comparisons should be made with caution.

Figure 4.2 – Survey Response Rate by Sector: 2006, /2009 & 2010



Note: Comparisons between years should be treated with caution. 2010 survey data is presented against 2009 survey data, or where unavailable (due to a smaller sample size) in comparison to 2006 survey data (which had a more similar sample frame).

In the 2010 survey, the Coke and Refined Petroleum sector had the highest response rate of just over 35%. The sector with the lowest response rate is that of the Water Supply and Treatment sector, with around 23% of invited companies responding to the 2010 survey. For the Water Supply and Treatment sector, which has seen a reduction from 42% in 2006 to 23% in 2010, the response rates have been consistently higher than in previous years across all sectors.

4.2 WEIGHTED RESPONSE RATES

The overall response rate given above considers each company as an equal contributor to the final results. The survey sample has, however, been designed to target higher spending sectors and the largest employers. This means that the effective response rate measures may be somewhat higher, in terms of expenditure covered.

4.3 RESPONSE BIAS

As in previous surveys, the following potential response biases have been identified in the 2010 survey:

- Companies with zero or low expenditure are more likely to respond, as it takes less time and effort to complete the questionnaire;
- Companies with dedicated environmental resource are more likely to respond, due to greater data and resource availability; and
- Companies that have completed the survey in previous years are more likely to participate and return a completed questionnaire.

The effect of these possible biases is likely to be reduced by the stratified sampling and grossing arrangements (refer to **Annex 6** for further details). This means that using a relatively large number of cells (determined by size of company and SIC) to categorise companies with similar characteristics that any bias is then 'contained' within the cell.

4.4 ANALYSIS METHODOLOGY

In comparing the data sets from different survey years, a number of factors need to be considered. The ranges indicated by the confidence intervals for the total expenditure are relatively large, and there have been improvements made to the questionnaire design and estimation procedure. Hence, comparing the absolute values should be undertaken with caution.

The process of generating estimates of expenditure from the sample sets means that it is possible for one company's expenditure to affect the final figure to a considerable degree. Furthermore the nature of environmental protection expenditure is such that an individual company may make a large "one-off" investment (e.g. capital equipment upgrade). Therefore, whilst these large figures may make a considerable difference in the final expenditure, they should still be included. This principally relates to

Capex rather than operating expenditure, which would be expected to be generally more consistent from one year to the next. Details of the derivation of standard error and confidence interval are presented in **Annex 7**.

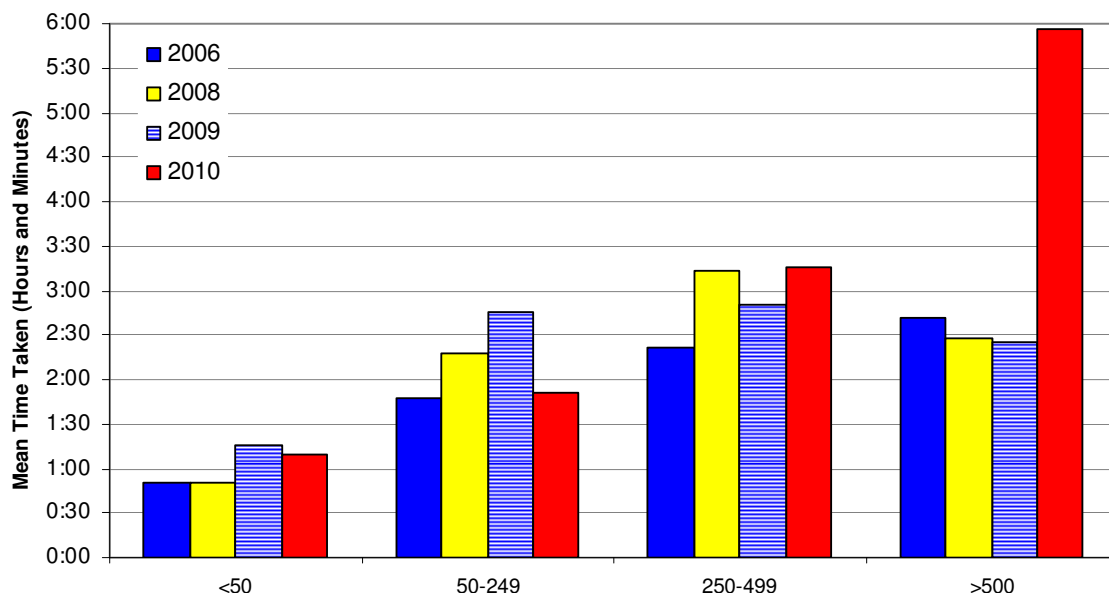
4.5 SURVEY COMPLETION TIME

The breakdown of survey completion time as compared to previous survey years is presented in **Figure 4.3**. Responses indicate that companies with:

- Less than 50 employees took on average 1 hour 10 minutes to complete the 2010 survey questionnaire (compared to 1 hour 7 minutes for the 2009 survey)
- Between 50 and 250 employees spent an average of 1 hour 51 minutes completing the questionnaire (compared to 2 hours 17 minutes for the 2009 survey).
- Between 250 and 500 employees took, on average, almost three times as long as those with less than 50 employees, with an average completion time of approximately 3 hours 16 minutes (comparative to the 2009 average of 2 hours 39 minutes).
- For companies with over 500 employees, completion time increased considerably compared to previous years, with an average completion time of approximately 6 hours.

For the 2010 survey, the average reported time taken for companies with more than 500 employees to complete the questionnaire has significantly increased compared to previous years.

Figure 4.3 – Breakdown of Mean Survey Completion Time by Company Size: 2006 & 2008 to 2010



5 SURVEY RESULTS AND ANALYSIS

5.1 TOTAL EXPENDITURE

The estimated total gross spending on environmental protection in 2010 by UK industry amounted to an estimated £2.9 billion (\pm £0.68 billion at the 95% confidence level), which equates to a 32% decrease on 2006 spend (£4.2 billion).

In 2010, Opex accounted for approximately 77% (£2.2 billion) of the total spending, with Capex at 23% (£0.7 billion). This majority spend on Opex is similar to that observed in previous years, with external Opex accounting for a greater proportion than in-house Opex reflecting the split seen in 2006 and 2008.

Capex in 2010 also followed a similar trend to that of 2006, with spending on integrated processes accounting for 17% of the total spend (20% in 2006), and end-of-pipe costs less than half at 7% (8% in 2006). As in previous years, spend on environmental research and development (R&D) continues to be a minor element of total spend (6% in 2010).

Following a relative increase for 2008 (45%) and 2009 (42%), Capex in 2010 as a proportion of total environmental spend has returned to a level similar to that in 2006 (29%).

A summary of 2010 environmental expenditure is presented in **Figure 5.1**, along with equivalent data for 2006, 2008 and 2009. Ranges indicating the 95% confidence intervals associated with each value are provided in parenthesis.

As noted previously comparisons between years should be treated with extreme caution due to variances in the sample frame (size and sectors) across the survey years, as well as improvements made to the questionnaire design and layout.

Figure 5.1 – Summary of Total Environmental Expenditure: 2006 & 2008 to 2010

	2006		2008	2009	2010	
	Total expenditure (£M)	% of gross	% of gross	% of gross	Total expenditure (£M)	% of gross
Operational Expenditure						
In-house	912 (644 – 1,180)	22	19	37	894 (661 – 1,097)	31
External	2,025 (1,789 – 2,261)	48	33	19	1,123 (923 – 1,323)	39
Research & Development	80 (66 – 95)	2	4	2	182 (31 - 332)	6
Total Opex	3,017 (2,611 – 3,423)	71	55	58	2,198 (1,762 - 2,635)	77
Capital expenditure						
End of Pipe	352 (238 - 467)	8	20	29	190 (87 - 293)	7
Integrated processes	859 (771 - 946)	20	24	13	481 (68 - 895)	17
Total Capex	1,211 (1,059 - 1,363)	29	45	42	671 (244 - 1,097)	23
Gross expenditure						
Total gross spending	4,228 (3,751-4,706)	100	100	100	2,869 (2,194 – 3,545)	100
Income from by-products	173 (55 - 290)	4	0	1	72 (11 - 133)	2
Total net expenditure	4,055 (3,551-4,561)				2,798 (2,085 - 3,510)	
Cost savings	351 (195-507)				168 (91 - 245)	

Note: Comparisons between years should be treated with caution. Data from the 2006 survey (based on 2003 SIC scheme) is presented above as the most recent survey that used a similar sample frame to the 2010 survey, whilst the 2008 and 2009 data provide a more recent comparison using the same 2007 SIC codes as the 2010 survey.

5.2 EXPENDITURE BY ENVIRONMENTAL MEDIA

This section summarises the amount of expenditure allocated to various environmental protection categories (refer to Section 1.2 for definitions). Responses are classified under Opex (**Figures 5.2 and 5.3**) and Capex (**Figures 5.4 and 5.5**).

Solid waste accounted for 40% (£812 million) of the total spend on operational processes in 2010, the area with the greatest expenditure, both in terms of internal and external operating costs. This is similar to the 2006 results, and reflects an increase in expenditure on solid waste measures as compared to 2008 and 2009, most likely reflecting the increasing cost of waste disposal per unit volume.

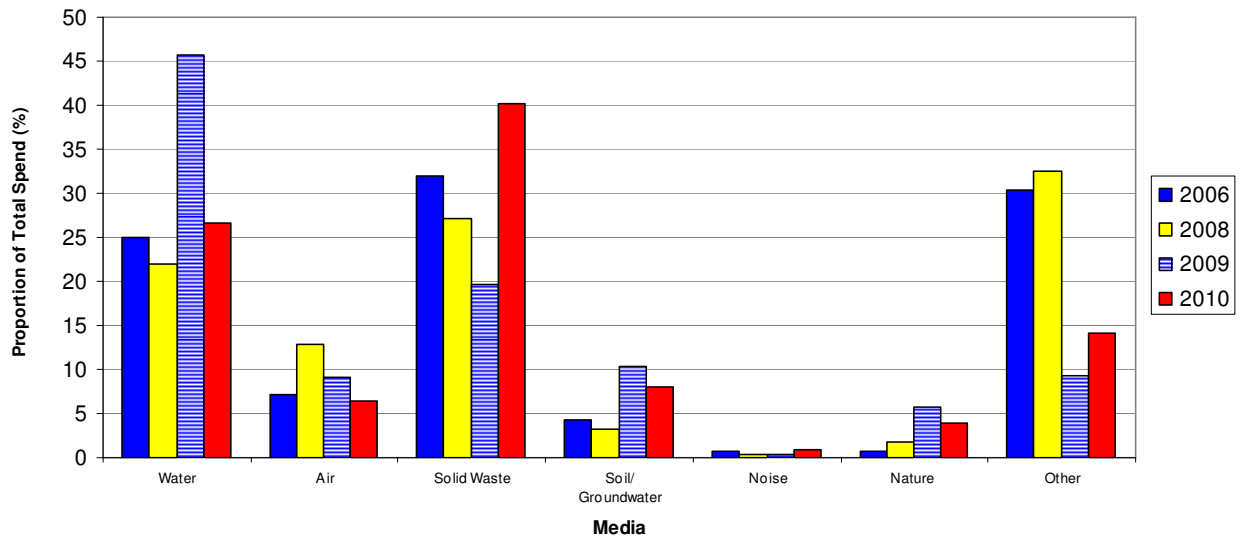
Water protection Opex has risen from the levels observed in 2006 and 2008, perhaps reflective of increasing regulation for water environment protection (e.g. Water Framework Directive).

Figure 5.2 – Environmental Opex by Media: 2006 & 2008 to 2010

Environmental media	Proportion of Opex (%)				Integrated (£M)	End-of-Pipe (£M)	Sub-Total (£M)
	2006	2008	2009	2010			
Water	25	22	46	27	187	349	536
Air	7	13	9	6	127	3	130
Solid waste	32	27	20	40	274	538	812
Soil/ groundwater	4	3	10	8	67	94	161
Noise	1	0	0	1	16	1	17
Nature protection	1	2	6	4	76	3	79
Other	30	32	9	14	148	136	284
Total (£m)					894	1,123	2,017

Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Data from the 2006 survey (based on 2003 SIC scheme) is presented above as the most recent survey that used a similar sample frame to the 2010 survey, whilst the 2008 and 2009 data provide a more recent comparison using the same 2007 SIC codes as the 2010 survey.

Figure 5.3 – Environmental Opex by Media: 2006 & 2008 to 2010



Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. 2006 survey data (based on 2003 SIC) is presented above as the most recent survey that used a similar sample frame to the 2010 survey, whilst the 2008 and 2009 data provide a more recent comparison using the same 2007 SIC as the 2010 survey.

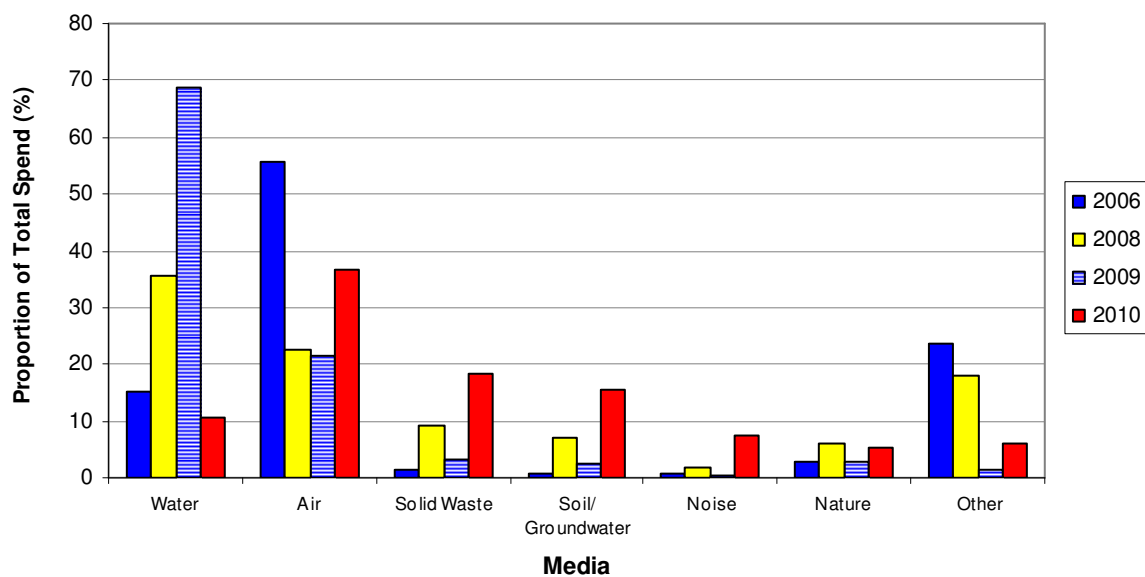
Capex on air protection measures accounted for over a third of the total Capex (£247 million), with a 37% share of the total spend. The second highest media category in terms of Capex spend is solid waste, with an 18% share of the total spend (£124 million), mirroring the increase seen in Opex within this media category. Soil and groundwater, and water protection measures contributed 16% and 11% respectively. The final three media categories (noise, nature protection and other) made up the remaining 18% of Capex (£124 million).

Figure 5.4 – Environmental Capex by Media: 2006 & 2008 to 2010

Environmental media	Proportion of Capex (%)				Integrated (£M)	End-of-Pipe (£M)	Sub-Total (£M)
	2006	2008	2009	2010			
Water	16	36	69	11	13	58	71
Air	51	23	22	37	179	68	247
Solid waste	4	9	3	18	107	17	124
Soil/ groundwater	2	7	2	16	102	3	105
Noise	2	2	0	7	19	30	49
Nature protection	3	6	3	5	34	2	36
Other	23	18	1	6	28	12	39
Total (£m)					481	190	671

Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. 2006 survey data (based on 2003 SIC) is presented above as the most recent survey that used a similar sample frame to the 2010 survey, whilst the 2008 and 2009 data provide a more recent comparison using the same 2007 SIC as the 2010 survey.

Figure 5.5 – Environmental Capex by Media: 2006 & 2008 to 2010



Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. 2006 survey data (using 2003 SIC codes) is presented above as the most recent survey that used a similar sample frame to the 2010 survey, whilst the 2008 and 2009 data provide a more recent comparison based on the same 2007 SIC scheme as the 2010 survey.

5.3 OVERVIEW OF SECTOR EXPENDITURE

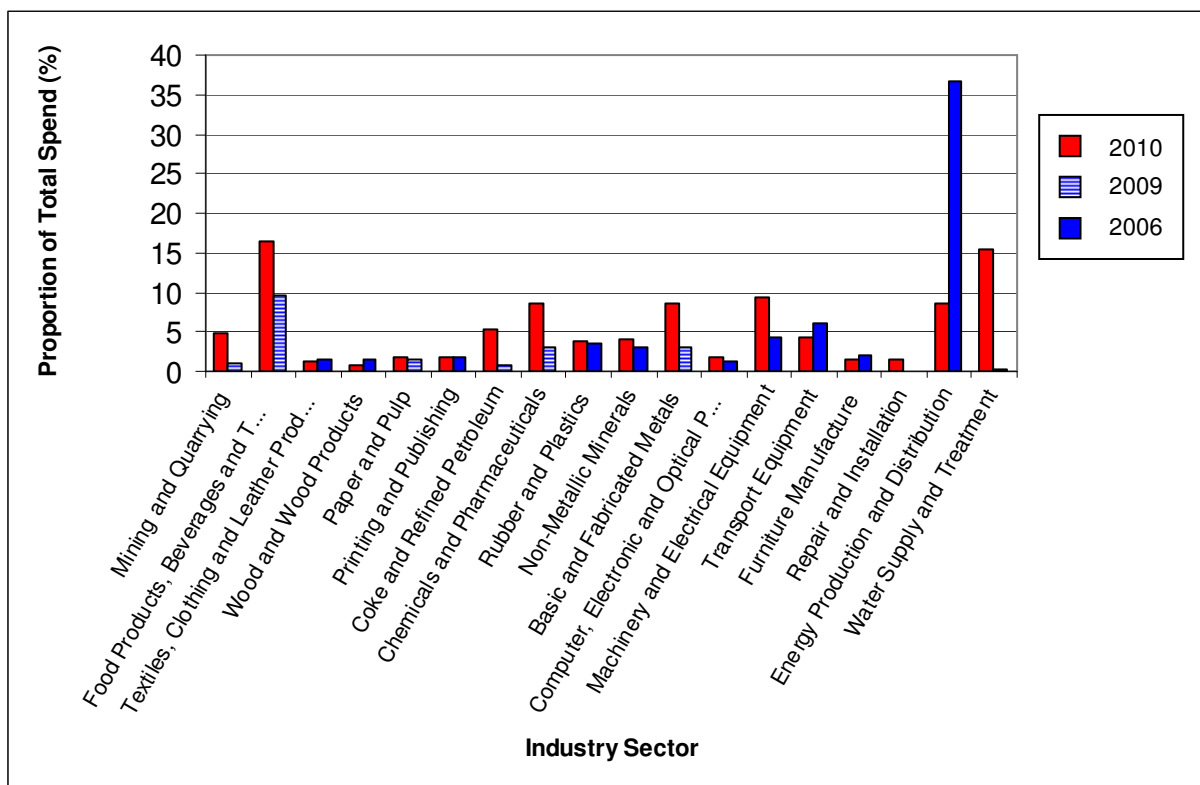
In recent years the distribution of spend amongst sectors has been dominated by a single sector. In 2006 this was the Energy Production and Distribution sector (36% of total expenditure) whilst in the subsequent three survey periods the combined Electricity, Gas and Water sector was consistently the dominant sector by spend (81% of total expenditure).

Whilst the 2010 survey sees these two sectors maintaining a high expenditure, accounting for 24% of the total expenditure between them, separately neither sector represents the greatest expenditure. It should also be noted that the sample for the Water Supply and Treatment is relatively small (44 businesses of which 10 responded) and as such is largely influenced by the spend of individual companies.

The sector with the highest spend is the Food, Beverages and Tobacco Products sector (16% of total expenditure in 2010, 10% in 2009,). The remainder of the sectors all account for less than 10% of the spend.

Figure 5.6 shows the total expenditure by sector between 2010 and the most recent comparable data from either the 2006 or 2009 survey.

Figure 5.6 – Breakdown of Total Environmental Expenditure by Sector: 2006/2009 & 2010



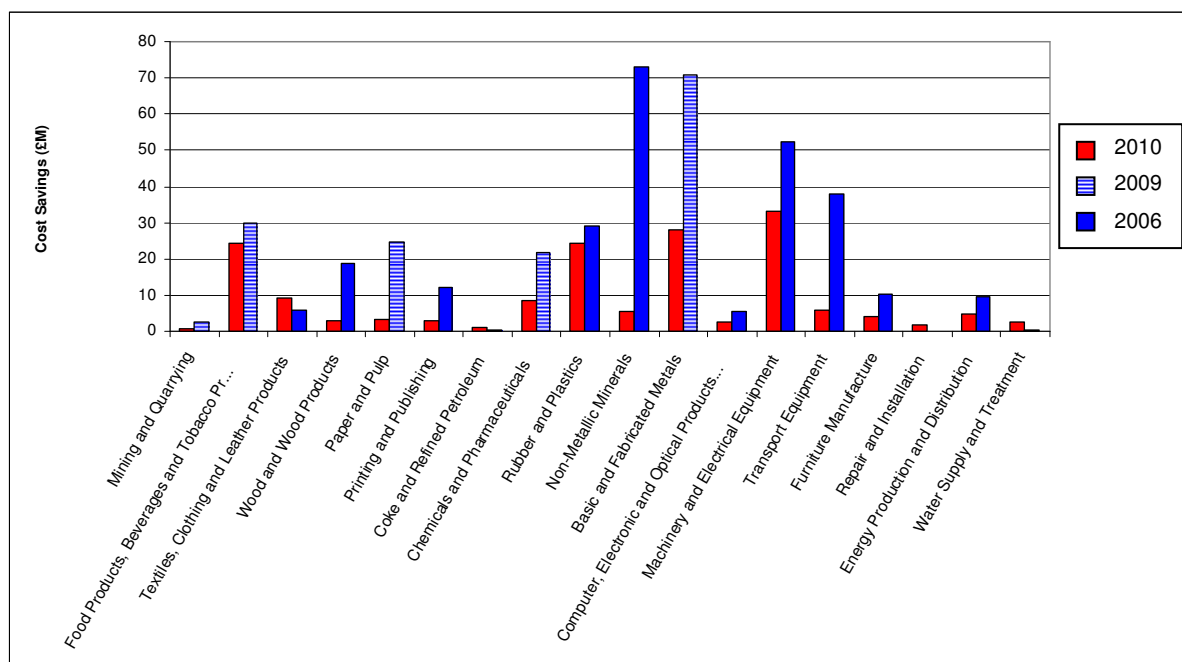
Note: Comparisons between years should be treated with caution. 2010 survey data is presented against 2009 survey data, or where unavailable (due to a smaller sample size) in comparison to 2006 survey data (which had a more similar sample frame).

5.4 COST SAVINGS AND INCOME

This section summarises the amount of by-product income and environmental cost savings that are generated by environmental measures.

Figure 5.7 below shows the cost savings in 2010 and the most recent comparable data from the 2006 and 2009 surveys. As mentioned previously, direct comparisons between survey years should be treated with caution.

Figure 5.7 – Cost Savings by Sector: 2006/2009 & 2010



Note: Comparisons between years should be treated with caution. 2010 survey data is presented against 2009 survey data, or where unavailable (due to a smaller sample size) in comparison to 2006 survey data (which had a more similar sample frame).

The estimated total cost savings in 2010 were £166 million, compared against £146 million in 2009 and £351 million in 2006. The Machinery and Electrical Equipment sector recorded the highest total cost savings resulting from environmental protection measures in 2010 (£33.1 million). The second largest cost saving was in the Basic and Fabricated Metals sector which recorded a saving of around £28 million.

Cost savings are broken down by media for 2006, and 2008-2010 in **Figure 5.8** below.

Figure 5.8 – Cost Savings by Environmental Media: 2006 & 2008 to 2010

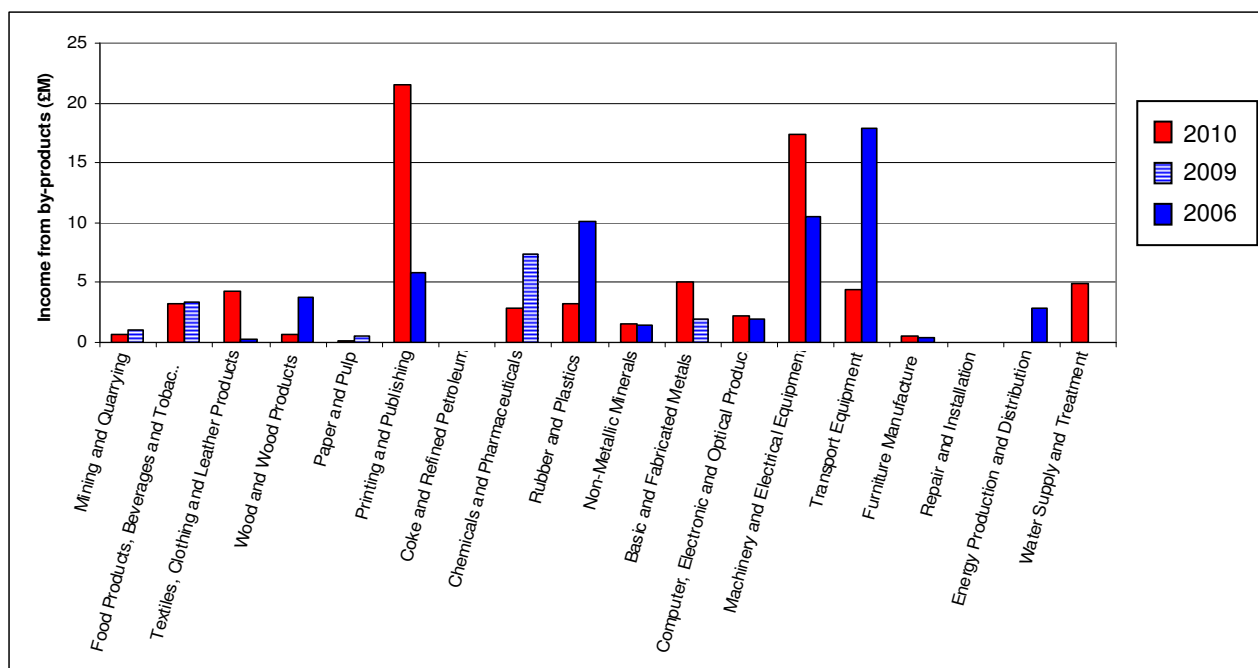
Environmental media	2006		2008		2009		2010	
	Total Cost Savings (£M)	% of Total	Total Cost Savings (£M)	% of Total	Total Cost Savings (£M)	% of Total	Total Cost Savings (£M)	% of Total
Raw materials	114.9	33	18.7	20	15.2	10	62.0	37
Water use	18.7	5	9.4	10	10.5	7	10.6	6
Energy use	152.5	43	26.1	28	43.2	30	58.4	35
Waste	56.4	16	39.5	42	72.6	50	33.1	20
Other	8.8	3	1.2	1	4.5	3	2.3	1
Total	351.3	100	95.1	100	145.9	100	166.4	100

Note: 'Other' includes regulatory charges. Data from the 2006 survey is presented above to provide a comparison with the most recent survey using a similar sample size whilst the 2008 and 2009 data provide a more recent comparison using the same 2007 SIC scheme.

The highest cost savings were associated with improved use or substitution of raw materials in 2010 (37%), reflecting an increase in this area compared to previous years. This was followed by improved energy use with approximately one-third of the overall saving attributed to this category (35%), and waste with 20% of the total cost savings. The remaining seven percent result from cost savings from water usage and 'other' improvements. Overall the top three media categories with the highest cost savings have remained constant over the survey years (raw materials, energy use and waste), although the relative proportions for each have fluctuated.

Income received as a result from by-products for 2010 as well as the most recent comparable data from the 2006 and 2009 surveys is shown in **Figure 5.9** below.

Figure 5.9 – Income from By-Products by Sector: 2006/9 & 2010



Note: Comparisons between years should be treated with caution. 2010 survey data is presented against 2009 survey data, or where unavailable (due to a smaller sample size) in comparison to 2006 survey data (which had a more similar sample frame).

Income resulting from the sale of by-products in 2010 was £73 million, which whilst a considerable increase in comparison to more recent surveys, is still less than half of that reported in the 2006 survey. The Printing and Publishing sector received an income of £22 million from the sale of by-products which is a substantial increase on 2006 (£6 million). This was followed by the Machinery and Electrical Equipment sector with an income of approximately £17 million.

5.5 EXPENDITURE BY INDUSTRY SECTOR

This section looks at individual sectors and identifies notable features under the following headings, with a brief analysis of trends and drivers of environmental protection expenditure in 2010:

- **Key Expenditure:** Summary of key 2010 data by Opex and Capex categories along with expenditure in 2006, 2008 and 2009, as appropriate.
- **Expenditure by Media:** Expenditure by media type (i.e. water, solid waste, noise, air soil/groundwater, nature protection and 'other') is shown in a graphical format for external, in-house, integrated and end-of-pipe expenditure.
- **Income and savings:** Summary of key 2010 data by cost savings and by-product sales, along with data from 2006, 2008 and 2009 as appropriate.

As in previous years, experts within the relevant field have been asked to comment on the following sectors to provide meaningful interpretation and opinion on the data set:

Figure 5.10 – Sectors Receiving Expert Comment

Sector	2007 SIC code	Page Number
Mining and Quarrying	5-9	28
Food, Beverages and Tobacco Products	10-12	30
Paper and Pulp	17	36
Printing and Publishing	18	38
Coke and Refined Petroleum	19	39
Chemicals and Pharmaceuticals	20 & 21	42
Basic and Fabricated Metals	24 & 25	48
Energy Production and Distribution	35	60
Water Supply and Treatment	36	63

When looking at the sector analyses, it should be remembered that direct comparisons between survey years are not possible due to changes in the classification system used to analyse survey data, variances in the sample size between the smaller 2008 and 2009 surveys and the larger 2006 and 2010 surveys, and the improvements made to the questionnaire design and estimation procedures.

5.5.1 SIC 05 to 09: Mining and Quarrying

Estimates of environmental protection expenditure and income/savings are provided below for the Mining and Quarrying sector. Of the 336 invited to participate in the 2010 survey, a total of 89 companies returned valid responses, giving a relatively low response rate for the sector of 26%.

The Mining and Quarrying sector has a relatively limited number of companies in the UK, and with several large companies responding to the survey in one year and not in the others necessarily, the potential for skewed results may be increased.

The most significant and recent regulatory drivers of change in the UK Mining and Quarrying industry are the Mining Waste Directive, EU Landfill Directive, Integrated Pollution Prevention and Control (IPPC) Directive and Water Framework Directive. The consequences on future spend of the Localism Act 2011 and new National Planning Policy Framework (in England), along with the abolition of Regional Spatial Strategies (including regional apportionment production figures), and subsequent implications on environmental policy and sector guidance which may result, are uncertain at this stage.

Key Expenditure

The Mining and Quarrying sector spent approximately £140 million in 2010 on environmental protection measures, which equates to 3% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.11** for 2008, 2009 and 2010.

Figure 5.11 –Total Environmental Expenditure: Mining and Quarrying, 2008 to 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Inte-grated	Total
2010	<250 emp's (88%)	9.5	15.7	0.3	25.5	0.7	1.5	2.2
	≥250 emp's (12%)	65.7	27.2	0.0	92.9	19.9	0.0	19.9
	Total	75.2	42.8	0.3	118.3	20.6	1.5	22.1
2009	Total	15.0	8.9	0.3	24.1	0.8	6.9	7.7
2008	Total	7.6	25.1	0.8	33.5	31.7	108.0	139.7

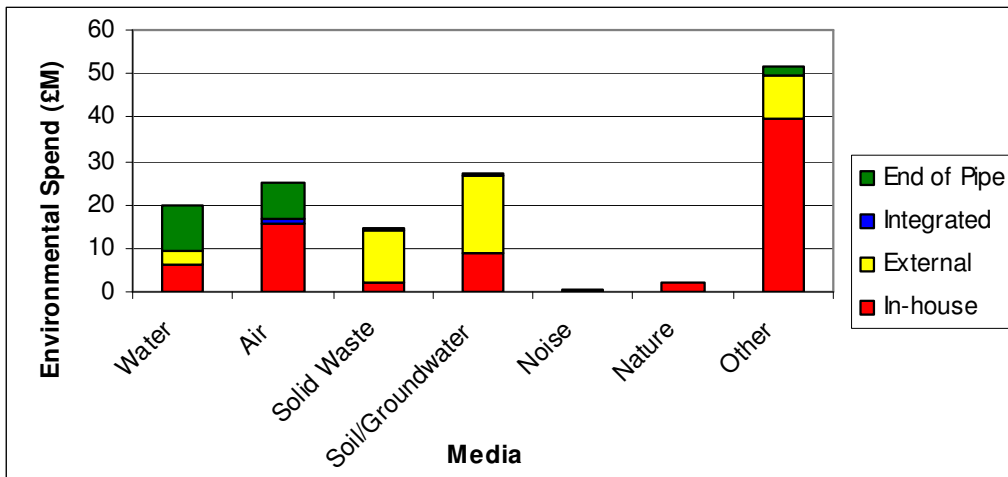
Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified. 'Emps': Employees

The dramatic reduction in spending from 2008 to 2009 (particularly in Capex) was reversed in 2010, increasing by a factor of more than four. External expenditure in 2010 was higher than in-house costs, maintaining the unpredictability within Opex seen over recent years. This is likely to be a reflection of trading levels and productivity forecasts influencing spending cycles in 2009. More stable economic conditions are required to identify longer term, more accurate trends.

Environmental Expenditure by Media

Environmental expenditure by media for the Mining and Quarrying sector is shown below in **Figure 5.12**.

Figure 5.12 – Environmental Expenditure by Media: Mining and Quarrying, 2010



Note: 'Other' includes regulatory charges.

By the very nature of mining and quarrying activities, wastewater, solid waste and air quality management is expected to account for the majority of expenditure in the sector. This may be due to the completion of, for instance, air emission upgrade programmes as a result of IPPC rather than greater attention being afforded water resources. 'Other' environmental protection expenditure was the area of greatest spend, which includes regulatory and consultancy costs.

The Mining Waste Directive covers the management of 'extractive waste' resulting from the prospecting, extraction, treatment and storage of mineral resources and the working of quarries. It may lead to the reduction in waste disposal costs observed in future surveys as certain waste materials are reclassified and/or alternative uses or treatment options are developed.

Income and Savings

In 2010, by-product income and environmental cost savings for the Mining and Quarrying sector were approximately £1.8 million. This result is shown along with the 2008 and 2009 survey data in **Figure 5.13**. It should be noted that the change in survey design and the reduced number of companies within the sample may be responsible for the variation within results from one survey to the next. There has also been a marked reduction in active production units due to trading conditions in the period 2009-11, like for like comparisons are therefore difficult.

Figure 5.13 – Income and Savings: Mining and Quarrying, 2008 to 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.1	0.0	0.0	0.0	0.5	0.7	0.6	1.2
2009	0.1	0.1	1.4	0.0	0.1	1.6	1.1	2.7
2008	0.2	0.3	0.0	0.1	0.1	0.7	0.5	1.2

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

Income and cost savings in the sector for 2010 were £1.2 million, of which the sale of by-products accounted for approximately half of this saving. This is a decrease back to 2008 levels and is consistent across both the cost savings and income from by-products.

5.5.2 SIC 10 to 12: Food, Beverages and Tobacco Products

Estimates of environmental protection expenditure and income/savings are provided below for the Food, Beverages, and Tobacco Products sector. Of the 607 invited to participate in the 2010 survey, a total of 149 companies returned valid responses, giving a relatively low response rate for the sector of 25%.

Key Expenditure

The Food, Beverages and Tobacco Products sector spent approximately £471 million in 2010 on environmental protection measures, which equates to 9% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.14** for the years 2008, 2009 and 2010.

Figure 5.14 – Total Environmental Expenditure: Food, Beverages and Tobacco Products, 2008 to 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emps (82%)	29.1	75.3	0.5	104.9	6.1	0.1	6.1
	≥250 emps (18%)	147.7	157.2	5.0	309.9	42.3	8.1	50.3
	Total	176.8	232.5	5.5	414.8	48.3	8.1	56.4
2009	Total	99.2	182.4	1.7	283.4	13.4	25.0	38.4
2008	Total	135.3	186.9	2.8	325.0	127.8	28.5	156.2

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified. 'Emps': Employees

The split between Opex and Capex has remained consistent with 2009 figures (88% Opex and 12% Capex) for the Food, Beverages, and Tobacco Products sector in 2010.

With regards to Opex, whilst there appears to be a significant increase in the total figure there also seems to be an increase in the proportion of in-house expenditure compared to external expenditure whilst expenditure in research and development has remained constant at only 1% of total spend. This change in proportions within Opex may reflect that often internal operating costs within the industry such as those associated with operational and regulatory requirements may be fixed and not determined by throughput (e.g. labour, equipment).

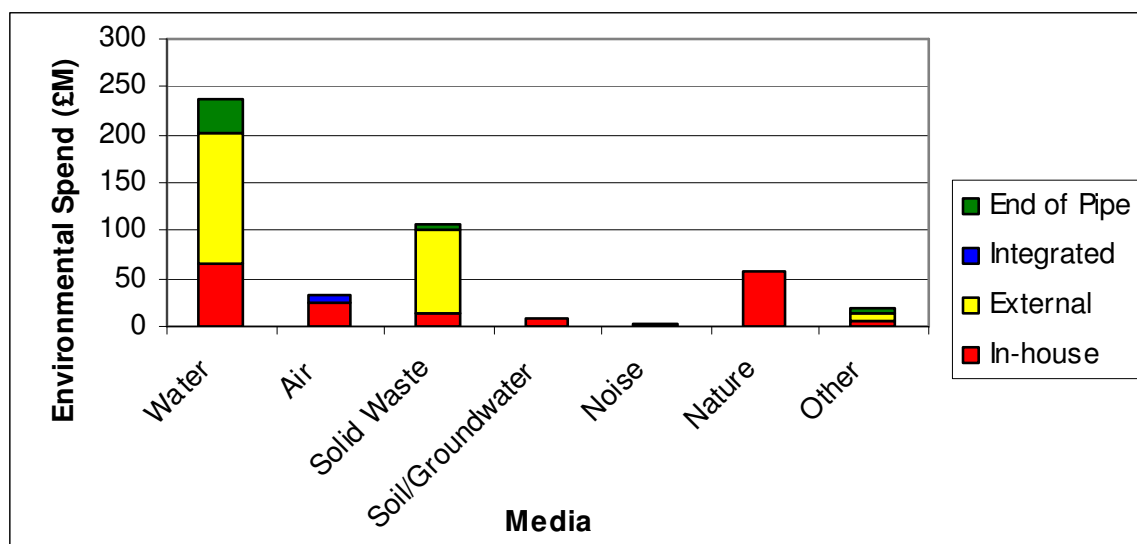
Capex for end-of-pipe activities such as effluent treatment plants, air abatement kit has more than doubled from 2009 levels, whereas expenditure on integrated activities such as modified/new production facilities has dropped significantly between 2009 and 2010.

Despite these fluctuations the split between Opex and Capex has remained consistent with 2009 rather than with 2008 when the split was more equal. This could suggest that industry remains capital averse due to the volatile state of the economy.

Environmental Expenditure by Media

Environmental expenditure by media for the Food, Beverages and Tobacco Products sector is shown in **Figure 5.15** below.

Figure 5.15 – Environmental Expenditure by Media: Food, Beverages & Tobacco Products, 2010



Note: 'Other' includes regulatory charges.

The distribution of expenditure by media in this sector is consistent with previous years; water and solid waste remain the dominant environmental issues for the industry. The larger of these two is water, which the sector relies on heavily for cleaning, production and to incorporate into products (e.g.

beverage sector). Most was accounted for by external spending which includes wastewater/effluent treatment plant equipment, maintenance and discharge costs. Similarly, expenditure for solid waste is dominated by external expenditure, which is consistent with the disposal of solid wastes off site by third party waste disposal providers.

It is likely that the dominance of spending in the water and solid waste areas will continue into 2011 and beyond, as these areas remain an integral part of the manufacturing processes within the industry and the increase of initiatives such as the Federation House Commitment (to achieve a 20% reduction in water use by the year 2020 (refer to www.fhc2020.co.uk).

Income and Savings

In 2010, by-product income and environmental cost savings for the Food, Beverages, and Tobacco Products sector were approximately £27.5 million in total. Income and savings for this sector are shown in **Figure 5.16** for the years 2008 to 2010.

Figure 5.16 – Income and Savings: Food Products, Beverages and Tobacco Products, 2008 to 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	3.2	7.7	6.3	7.0	0.1	24.3	3.2	27.5
2009	6.1	2.9	6.5	8.7	2.4	26.6	3.4	30.0
2008	2.2	1.8	2.0	3.8	0.1	9.9	1.0	11.0

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

The greatest cost savings are identified in water use at a value of approximately £7.7 million, closely followed by solid waste (£7 million) and energy (£6.3 million). Savings in water continue to increase. This is likely due to increased focus on re-use and recycling of water within the manufacturing process and a shift in water re-use, previously confined to cleaning processes only. Cost savings and income from the sale of by-products can be expected to increase as a whole in the future, as more and more companies in this industry are looking to use their waste better, for example through energy from waste and anaerobic digestion processes.

5.5.3 SIC 13 to 15: Textiles, Clothing and Leather Products

Estimates of environmental protection expenditure and income/savings are provided below for the Textiles, Clothing and Leather Products sector, which is relatively small in the UK. Of the 395 invited to participate in the 2010 survey, a total of 119 companies returned valid responses, giving a response rate for the sector of 42%.

Key Expenditure

The Textiles, Clothing and Leather Products sector spent approximately £38 million in 2010 on environmental protection measures, which equates to 1% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.17** for the years 2006 and 2010.

Figure 5.17 – Environmental Expenditure: Textiles, Clothing and Leather Products, 2006 & 2010

	Opex (£M)				Capex (£M)		
	In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	9.6	26.4	0.7	36.7	0.2	0.7	1.0
2006*	14.9	48.4	1.1	64.4	3.6	0.4	3.9

* 2003 SIC codes 17, 18 & 19.

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

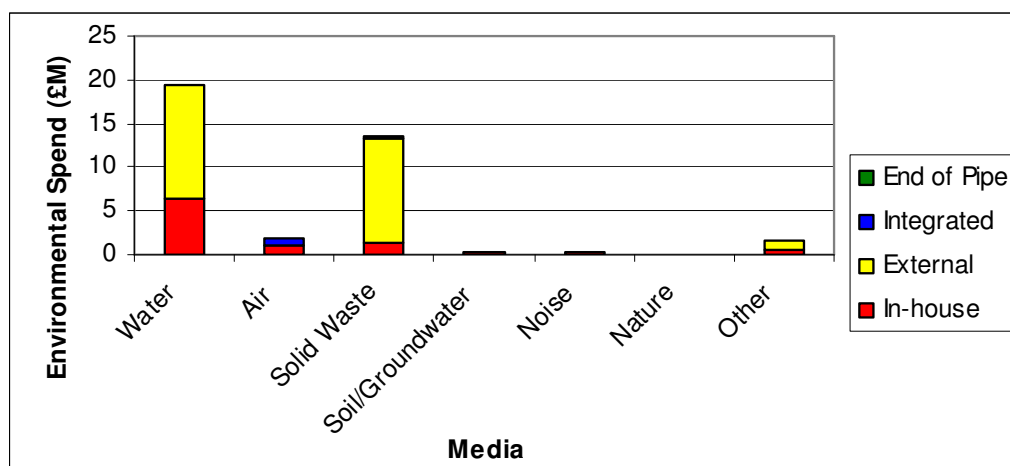
In 2010, Opex accounted for approximately 97% of total environmental spending by the Textiles, Clothing and Leather Products sector in 2010 (a similar split to that seen in 2006). The external expenditure in 2010 was much greater than in-house expenditure, as was the case in 2006. Spending on research and development remains relatively low.

Unlike Opex, 2010 Capex does not reflect the split seen in 2006. Expenditure was greater for integrated processes in 2010, than for end-of-pipe activities.

Environmental Expenditure by Media

Environmental expenditure by media for the Textiles, Clothing and Leather Products sector is shown in **Figure 5.18** below. This sector spent £20 million on water protection measures, of which a significant proportion is accounted for by external Opex. Just over £13 million was spent on disposal of solid waste, most of which is again due to external Opex.

Figure 5.18 – Environmental Spending by Media: Textiles, Clothing and Leather Products, 2010



Note: 'Other' includes regulatory charges.

Income and savings

In 2010, by-product income and environmental cost savings for the Textiles, Clothing and Leather Products sector was approximately £13.5 million. Income and savings for this sector are shown in **Figure 5.19** for the years 2006 and 2010.

Figure 5.19 – Income and savings: Textiles, Clothing and Leather Products, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	4.2	0.6	3.5	0.9	0.1	9.3	4.3	13.5
2006*	1.0	0.4	4.2	0.0	0.0	5.7	0.2	5.9

*2003 SIC codes 17, 18 & 19.

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Cost savings in 2010 for the Textiles, Clothing and Leather Products sector were approximately £9.3 million. The bulk of which resulted from savings from measures to improve the use or substitution of raw materials and from improved energy efficiency/usage. Revenue from the sale of by-products brought in approximately £4.3 million, an increase on 2006 levels.

5.5.4 SIC 16: Wood and Wood Products

Estimates of environmental protection expenditure and by-product income and cost savings are provided below for the Wood and Wood Products sector. Of the 232 invited to participate in the 2010 survey, a total of 80 companies returned valid responses, giving a response rate for the sector of 34%.

This is a relatively small sector with limited forestry operations in the UK harvesting trees to produce wood/timber for construction or conversion into Pulp and Paper Products. The industry tends to make efficient use of its natural resource (both from an environmental as well as economic perspective), with a range of products depending on raw material quality.

Key Expenditure

The Wood and Wood Products sector spent approximately £19 million in 2010 on environmental protection measures, which equates to 0.4% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.20** for the years 2006 and 2010.

Figure 5.20 – Total Environmental Expenditure: Wood and Wood Products, 2006 & 2010

	Opex (£M)				Capex (£M)		
	In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	5.2	13.0	0.1	18.3	0.7	0.0	0.7
2006*	14.1	34.8	3.6	52.5	6.9	6.3	13.1

* 2003 SIC code 20.

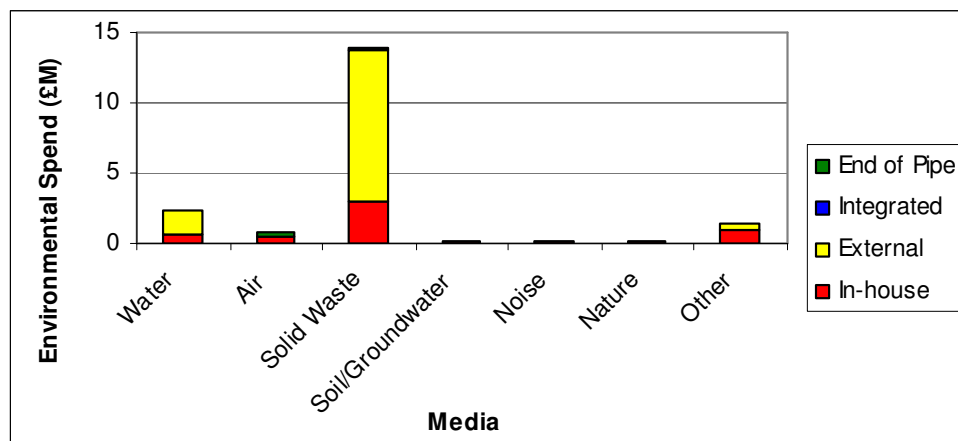
Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

The proportion of total environmental protection spending attributed to Opex in 2010 (96%) is similar to 2006 (80%) for the Wood and Wood Products sector. Similarly, as in 2006, the external spending in 2010 was higher than in-house costs, and Capex was higher for end-of-pipe activities than integrated processes in 2010. A marked decrease in spend on integrated processes was seen in 2010.

Environmental Expenditure by Media

Environmental expenditure by media for the Wood and Wood Products sector is shown in **Figure 5.21** below. This sector spent approximately £14 million on dealing with solid waste, of which the majority was external expenditure. In total, just over £3 million was spent on air and water protection measures. The pattern of expenditure was fairly similar to 2006, where the highest spending area was solid waste.

Figure 5.21 – Environmental Spending by Media: Wood and Wood Products, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

Income and savings for this sector are shown in **Figure 5.22** for the years 2006 and 2010.

Figure 5.22 – Income and savings: Wood and Wood Products, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.1	0.1	1.4	1.3	0	3	0.7	3.6
2006*	12.2	0.3	0.7	1.5	0.5	15.2	3.7	19.0

* 2003 SIC code 20.

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

In 2010, income and savings for the Wood and Wood Products sector was approximately £3.6 million, a significant decrease from the 2006 level of £19 million. Total cost savings have considerably decreased from 2006 to 2010, primarily due to a significant reduction in savings made around raw materials. Whilst still relatively small, savings associated with energy have doubled since 2006.

Income from by-product sales has decreased from £3.7 million in 2006 to approximately £0.7 million in 2010. Thinnings are the main by-product in this sector, which are then sold on to the Pulp and Paper industry.

5.5.5 SIC 17: Paper and Pulp

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for the Paper and Pulp sector. Of the 127 invited to participate in the 2010 survey, a total of 37 companies returned valid responses, giving a response rate for the sector of 29%.

The UK has reduced its pulping capability and imports now form a significant proportion of its paper manufacture. The range of paper products manufactured is extensive, ranging from specialty and security papers through to bulk printing and writing grades, tissue and newsprint. Key issues for the sector include energy efficiency, water use, sludge disposal, the quality and mix of waste papers used for recycling, effluent quality and the trend towards more secondary effluent treatment.

Key Expenditure

The Paper and Pulp sector spent approximately £53 million in 2010 on environmental protection measures, which equates to 1% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.23** for the years 2008 to 2010.

Figure 5.23 – Total Environmental Expenditure: Paper and Pulp, 2008 to 2010

	Opex (£M)				Capex (£M)		
	In-house	External	Tot R & D	Total	End of Pipe	Integrated	Total
2010	7.6	36.8	0.1	44.5	0.3	8.5	8.8
2009	16.5	24.4	0.0	40.9	3.1	3.7	6.8
2008	4.0	34.6	0.1	38.7	7.3	0.0	7.3

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

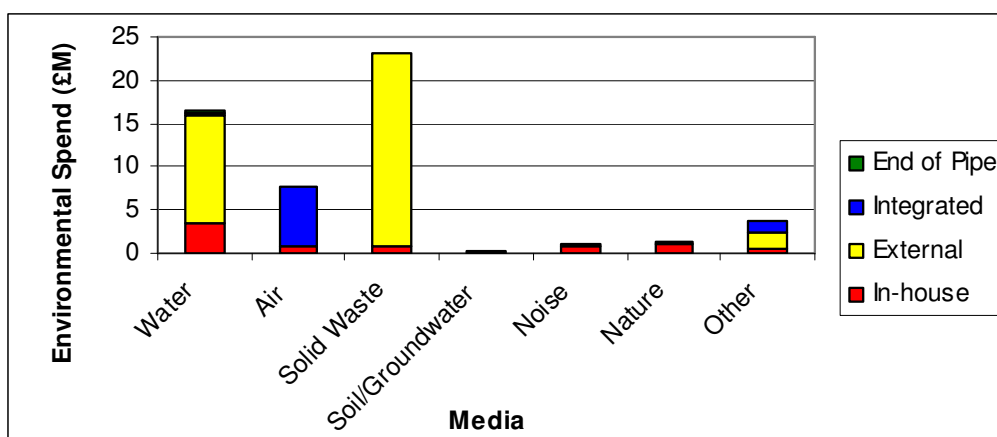
Opex accounted for approximately 83% of total environmental spending for the Paper and Pulp sector in 2010. Expenditure is primarily due to external processes, reflecting the split seen in 2008 and 2009 (although in-house costs rose steeply in 2009). This may relate to a continuing trend of out-sourcing specialist environmental protection services, such as monitoring and managing solid and liquid waste disposal.

Capex continued the trend away from end-of-pipe activities towards more integrated solutions. This may be linked to sector process operators focusing expenditure on modified production facilities, for example, incorporating water reuse; having previously incurred expenditure on the treatment and reuse of waste water, such as treatment plant and equipment.

Environmental Expenditure by Media

Environmental expenditure by media for the Paper and Pulp sector is shown in **Figure 5.24** below. This sector's spend on solid waste is now greater than its spend on water, waste water and aqueous liquid waste. This large increase in solid waste costs since 2009 probably reflects the increasing costs of disposal and the limited management options available, rather than an increase in waste volumes necessarily. The sector continues to out-source certain environmental protection services and to use third parties for managing solid and liquid waste disposal, accounting for the large contribution from external costs.

Figure 5.24 – Environmental Spending by Media: Paper and Pulp, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2010, by-product income and environmental cost savings for the Paper and Pulp sector were approximately £6.5 million. Income and savings for this sector are shown in **Figures 5.25** for the 2008 to 2010 period.

Figure 5.25 – Income and Savings: Paper and Pulp, 2008 to 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.6	0.0	2.3	0.6	0.0	3.5	0.1	3.6
2009	3.2	7.2	13.8	0.1	0.0	24.2	0.5	24.7
2008	6.6	0.0	0.0	0.2	0.0	6.8	0.8	7.6

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

Income and cost savings for the Paper and Pulp sector decreased to £6.5 million in 2010, from £24.7 million in 2009. This may reflect the completion of major projects to reduce overheads and a shift away from cost savings towards production, in line with an anticipated upturn in the sector.

Sales of by-products continue to decrease. As predicted in the 2009 report, this is likely to continue until the quality protocol for end-of-waste criteria for Paper Sludge Ash (PSA) is agreed (currently under review by the Environment Agency). Waste cost savings should also increase as a result of diversion of PSA from landfills.

5.5.6 SIC 18: Printing and Publishing

Estimates of environmental protection expenditure and income/savings are provided below for the Printing and Publishing. Of the 416 invited to participate in the 2010 survey, a total of 127 companies returned valid responses, giving a response rate for the sector of 31%.

The Printing and Publishing sector remains under pressure from digital and electronic media. This is likely to increase in the coming years with a move away from paper-based printing and publishing, which will impact on the nature and level of investment in environmental protection measures.

Key Expenditure

The Printing and Publishing sector spent almost £49 million in 2010 on environmental protection measures, which equates to 1% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.26** for 2006 and 2010.

Figure 5.26 – Total Environmental Expenditure: Printing and Publishing, 2006 & 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emps (94%)	13.9	21.6	0.4	35.9	1.4	5.6	7.0
	≥250 emps (6%)	1.1	3.3	0.0	4.5	0.8	0.3	1.1
	Total	15.0	25.0	0.4	40.4	2.2	5.9	8.1
2006*	Total	20.9	37.0	1.7	59.5	15.4	0.9	16.3

*SIC 22 using SIC03

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

'Emps': Employees

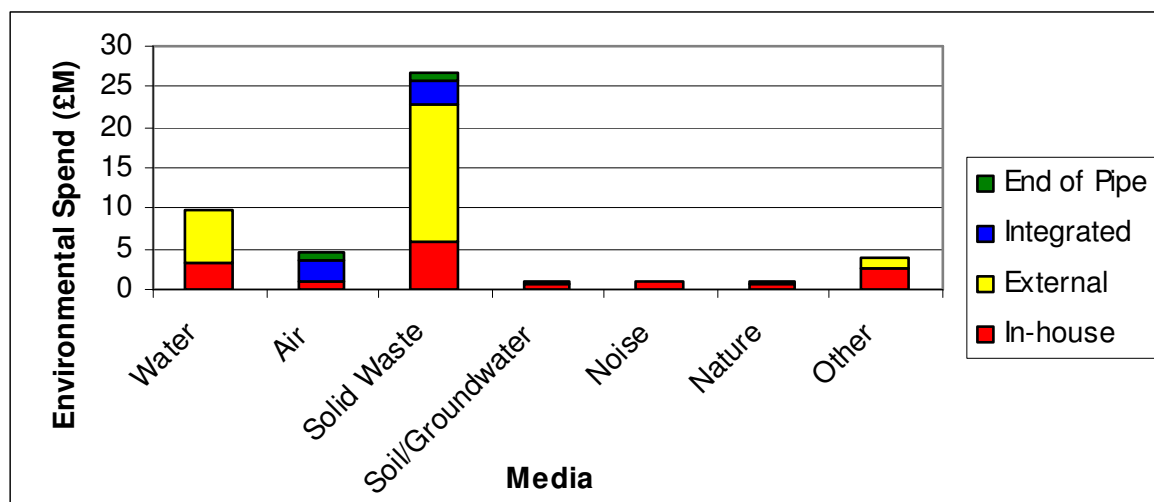
As in 2006, Opex accounted for the majority (83%) of total environmental spending by the Printing and Publishing sector in 2010. Whilst external expenditure decreased in absolute terms, it still formed the greater proportion of the operational spending in 2010, regardless of company size.

Capex fell in the intervening period between 2006 and 2010, both in absolute terms and relative to the total expenditure. This may reflect the changing nature of the industry and a shift from end-of-pipe solutions e.g. (liquid and solid waste disposal) to integrated solutions (such as, switching from solvent to aqueous based inks, and the increased use of electronic technology).

Environmental Expenditure by Media

Environmental expenditure by media for the Printing and Publishing sector is shown in **Figure 5.27** below. Solid waste disposal remains the largest single expenditure item for the sector, with over half of the total £27 million spend associated with external costs. Water and air protection measures have seen a significant decrease since 2006, probably as a result of the changing technology within the industry and the rise in the use of aqueous and low solvent inks.

Figure 5.27 – Environmental Spending by Media: Printing and Publishing, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2010, by-product income and environmental cost savings for the Printing and Publishing sector were approximately £24.6 million. Income and savings are shown for the years 2006 and 2010 in Figure 5.28 below.

Figure 5.28 – Income and Savings: Printing and Publishing, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	1.0	0.1	1.6	0.3	0.0	3.1	21.5	24.6
2006*	1.1	0.1	2.4	2.7	0.0	6.3	5.8	12.1

*SIC 22 using SIC03

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Income from the sale of by-products has increased significantly since 2006 to £21.5 million, whilst savings have slightly decreased with less cost savings coming from energy and waste.

5.5.7 SIC 19: Coke and Refined Petroleum

Estimates of environmental protection expenditure and income/savings are provided below for the Coke and Refined Petroleum sector, which comprises relatively few companies in the UK. Of the 53 invited to participate in the 2010 survey, a total of 19 companies returned valid responses, giving a response rate for the sector of 36%.

Key Expenditure

The Coke and Refined Petroleum sector spent approximately £152 million in 2010 on environmental protection measures, slightly less than 3% of the total spend for all of the sectors in 2010. Environmental expenditure for this sector is shown in **Figure 5.29** for 2008, 2009 and 2010.

Figure 5.29 – Total Environmental Expenditure: Coke and Refined Petroleum, 2008 to 2010

	Opex (£M)				Capex (£M)		
	In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	57.9	93.4	0.0	151.3	1.0	0.0	1.0
2009	9.7	11.5	0.8	22.0	0.8	0.1	0.8
2008	105.6	242.4	6.5	354.5	118.1	27.3	145.3

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

Opex accounted for the majority of the environmental spending by the Coke and Refined Petroleum sector in 2009 at £22 million (96.5%). There is currently low investment in this sector, which could account for Opex being greater than Capex at this time.

The cause for the apparently large variances in Opex between 2008 (£354.5 million), 2009 (£22 million) and 2010 (£151 million) is unclear. Whilst some increase could have been a result of the Capex alleviation from 2008 to 2009, it is perhaps more likely to be a consequence of the nature of participating companies, as the data will be strongly influenced and biased by the sub-sector to the companies belong (i.e. coke or refined petroleum).

The level of Capex has remained fairly stable from £0.8 million in 2009 to £1 million in 2010. However, it should be noted that the Capex seen in 2008 (£145 million) is of a completely different scale to that observed in 2009 and 2010. As with fluctuations in Opex, this may relate to the nature of the participating companies.

Refining operations are regulated under the Environmental Permitting Regulations regime and it is understood that future capital investment will be required at refining operations associated with reducing emissions of acid gases (oxides of nitrogen and sulphur dioxide), improving water emissions to controlled waters and improvements in bulk fuel storage requirements. However, whilst it is expected that significant Capex associated with environmental regulation will be observed, both capital and operational expenditure may be impacted in the simplification of environmental regulations by the UK Government, the 'Red Tape Challenge' (refer to www.redtapechallenge.cabinetoffice.gov.uk).

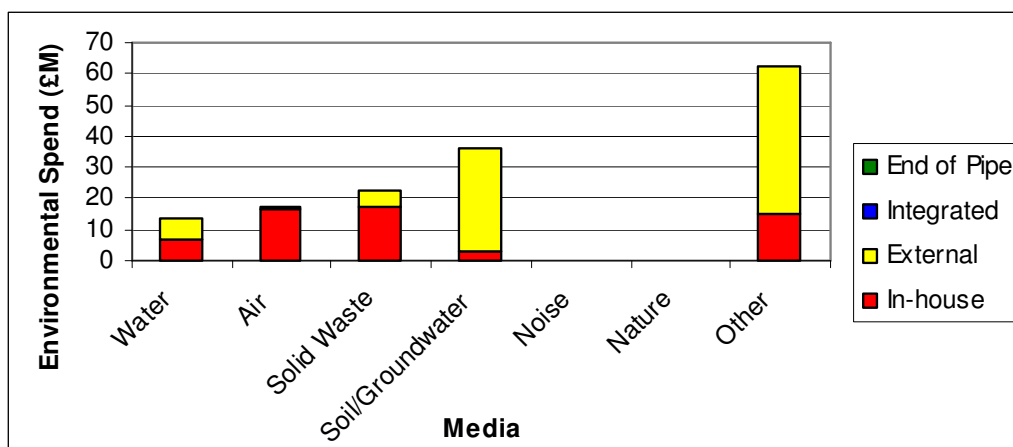
In addition, the long term market is moving away from petroleum production, in favour of alternative energy sources, such as 'clean coal' technology, coal gasification or investment in nuclear facilities.

Investment in Carbon Capture and Storage (CCS) is also increasing with high Capex costs likely going forward. It is anticipated that CSS will show in the 'air protection' measures section of future surveys, even with the recent demonstration projects being abandoned.

Environmental Expenditure by Media

Environmental expenditure by media for the Coke and Refined Petroleum sector is shown in **Figure 5.30** below.

Figure 5.30 – Spending by Media: Coke and Refined Petroleum, 2010



Note: 'Other' includes regulatory charges.

Over one third of spend during 2010 (£62 million) has occurred in 'other' areas of environmental protection measures and provisions (e.g. regulator charges) not covered by the specified media categories. Soil/groundwater has seen a spend of £38 million during the same period. Both these spends have similar profiles in that the majority of the Opex was undertaken by external processes. The capital spend (£1 million) related solely to air protection measures/provisions.

Income and Savings

In 2010, by-product income and environmental cost savings for the Coke and Refined Petroleum sector was £1.2 million. Income and savings for this sector are shown in **Figure 5.31** for the years 2008, 2009 and 2010.

Figure 5.31 – Income and Savings: Coke and Refined Petroleum, 2008 to 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.0	0.0	0.0	1.2	0.0	1.2	0.0	1.2
2009	0.1	0.0	0.3	0.2	0.0	0.5	0.0	0.5
2008	6.2	5.3	10.7	32.8	0.9	55.9	5.3	61.3

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

The level of income and cost savings has increased from £0.5 million in 2009 to £1.2 million in 2010. It is noted that all these savings have primarily been made in waste costs, which could be as a result of more efficient processes and better waste management controls and procedures.

Income and savings in 2010 and 2009 are considerably lower than that observed in 2008 (£61.3 million). This may be a consequence of the weak economic climate and/or the nature of participating companies (i.e. coke or refined petroleum based).

Refining operations are regulated under the Environmental Permitting Regulations regime and the assets and infrastructure are mature. As a consequence they have, in the main, investigated and exploited income and savings opportunities. The assets are therefore understood to be operating as efficiently as is practicable. This is consistent with the 2010 and 2009 income and savings figures. Consequently, future improvements in cost savings and income are therefore likely to be linked to major Capex projects, which will be primarily business and fuel strategy driven. The relatively weak economic climate, moving into 2011, and the anticipated slow economic recovery is likely to limit Capex and, hence, cost saving and income in the coming years.

5.5.8 SIC 20 & 21: Chemicals and Pharmaceuticals

Estimates of environmental protection expenditure and income/savings are provided below for the Chemicals and Pharmaceuticals sector. Of the 1113 invited to participate in the 2010 survey, a total of 340 companies returned valid responses, giving a response rate for the sector of 31%.

This sector is made up of two sub-sectors which can be summarised as:

- Basic chemicals: high volume and low margin bulk chemicals; and
- Pharmaceuticals: high-margin products manufactured in stringent clean conditions, supported by substantial research and development.

The Chemicals and Pharmaceuticals sector continues to struggle to remain competitive with competitors based in China, and to a lesser extent, Eastern Europe. This is believed to be particularly prevalent in basic chemical manufacture, with a number of large basic chemicals manufacturing sites ceasing operation, e.g. Nylon, Ethylene Oxide etc.

Key Expenditure

The Chemicals and Pharmaceuticals sector spent approximately £246 million in 2010 on environmental protection measures, which equates to 5% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.32** for the years 2008, 2009 and 2010. The 2010 data is also broken down by company size.

Figure 5.32 – Total Environmental Expenditure: Chemicals and Pharmaceuticals, 2008 to 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emp's (94%)	35.3	66.5	8.5	110.2	24.2	4.5	28.6
	≥250 emp's (6%)	52.3	49.0	0.4	101.7	4.6	1.5	6.1
	Total	87.6	115.5	8.9	212.0	28.8	6.0	34.8
2009	Total	34.6	51.7	2.1	88.4	10.7	5.6	16.3
2008	Total	43.5	52.4	95.4	191.3	9.5	11.2	20.6

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified. 'Emps': Employees

Opex accounted for 86% of the total environmental spending by the Chemicals and Pharmaceuticals sector in 2010, which was a similar proportion to that observed 2009. However, in absolute terms the total spend has more than doubled from the level observed in 2009, for both in-house and external protection measures/activities.

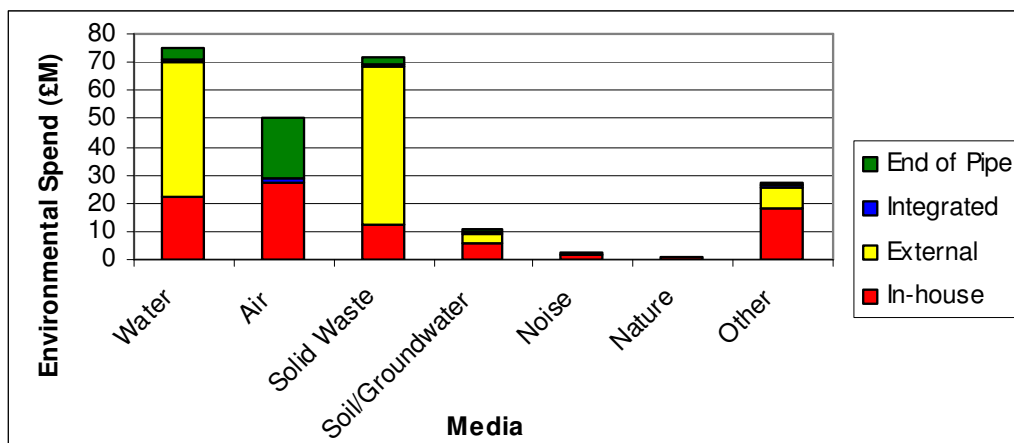
The level of research and development expenditure remains low, and may be linked to the difficult trading position of the sector and the economy in general.

The level of Capex for 2010 is nominally double that of 2009, but for UK industry as a whole, it remains relatively small at £34.8 million. The level of Capex may reflect a more mature regulated industry, e.g. under the Integrated Pollution Prevention and Control (IPPC) / Environmental Permitting Regulations regime. This is reflected in capital spend, where the majority of expenditure is for end-of-pipe solutions, with sector process operators focussing expenditure on emissions abatement, as opposed to investing in new process/production plant and equipment, due to economic uncertainty.

Environmental Expenditure by Media

Environmental expenditure by media for the Chemicals sector is shown in **Figure 5.33** below. This sector spent a total of £70 million on waste and water protection measures, of which most is accounted for by external and in-house Opex.

Figure 5.33 – Environmental Spending by Media: Chemicals and Pharmaceuticals, 2010



Note: 'Other' includes regulatory charges.

The sector is dominated by external costs for the management of water, waste water and waste, which accounts for some 40% of expenditure. Companies in the Chemicals and Pharmaceuticals sector continue to outsource certain environmental protection services and to use third parties, such as managing solid and liquid waste disposal. External and in-house operating costs comprise the majority of the expenditure for the two media with highest spend, solid waste and water.

Income and Savings

In 2010, by-product income and environmental cost savings for the Chemicals and Pharmaceuticals sector was approximately £11 million. Income and savings for this sector are shown in **Figure 5.34** for the years 2008 to 2010.

Figure 5.34 – Income and Savings: Chemicals and Pharmaceuticals, 2008 to 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	1.0	0.3	5.5	1.1	0.4	8.3	2.9	11.2
2009	0.0	0.2	12.9	1.2	0.1	14.3	7.4	21.7
2008	2.6	2.0	11.3	2.0	0.0	18.0	0.3	18.3

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

Income and cost savings in 2010 (£11 million) represents a nominal 40-50% reduction on 2009 and 2008 levels. This decrease is primarily due to a reduction in energy savings and a marked decrease in revenue from by-products. This may reflect manufacturing operations in the sector having implemented savings measures over the last few years and are now operating at near optimum efficiency; hence, there is limited scope for improvement and the observed drop in energy savings.

Further improvements may well be possible, but may require the implementation of significant levels of Capex and longer returns on investment.

Predictions for future changes are likely to be associated with further implications and drivers associated with the Environmental Permitting Regulations, REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals), the Energy Efficiency Carbon Reduction Commitment (CRC) scheme, the Environmental Damage (Prevention and Remediation) Regulations 2009, and requirements of the revised Waste Framework Directive. On a longer timescale, the implementation of the Industrial Emissions Directive (IED) will influence environmental spend for those operators covered by the Integrated Pollution Prevention and Control (IPPC) regime.

Other than legislative drivers, the cost of fuel both directly and indirectly, for example energy use and waste management logistic transport costs, may also have an impact. Future spend is likely to focus on the requirement to maintain compliance and to save money, e.g. resource efficiency, solid and liquid waste minimisation, and water use efficiencies.

5.5.9 SIC 22: Rubber and Plastics

Estimates of environmental protection expenditure and income/savings are provided below for the Rubber and Plastics sector. Of the 462 invited to participate in the 2010 survey, a total of 148 companies returned valid responses, giving a response rate for the sector of 32%.

Key Expenditure

The Rubber and Plastics sector spent approximately £111 million in 2010 on environmental protection measures, which equates to 2% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.35** for the years 2006 and 2010. The 2010 data is broken down by company size.

Figure 5.35 – Total Environmental Expenditure: Rubber and Plastics, 2006 & 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emp's (93%)	12.6	40.0	2.2	54.8	3.5	6.8	10.3
	≥250 emp's (7%)	26.0	12.8	0.2	38.9	3.2	3.8	7.1
	Total	38.6	52.8	2.4	93.7	6.7	10.6	17.4
2006*	Total	51.2	63.6	2.5	117.3	10.8	18.1	28.8

*SIC 25 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector. 'Emps': Employees

Opex accounted for approximately 84% of total environmental spending by the Rubber and Plastics sector in 2010, similar to that observed in 2006 (80%). For smaller companies, the majority of 2010

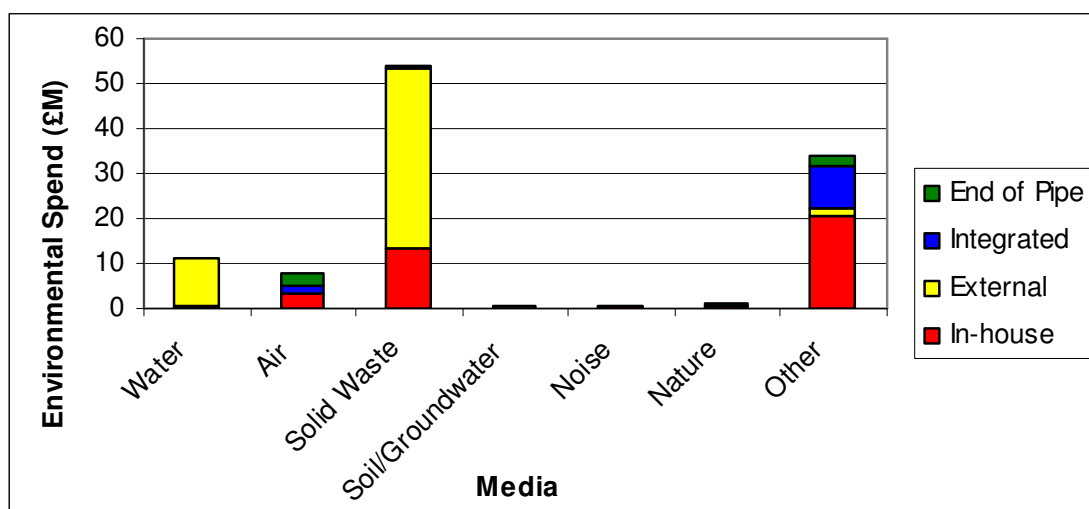
Opex was for external services, whilst larger companies spent a greater proportion on in-house costs, which may reflect a greater internal capability. Spend on research and development has slightly increased in relative terms from 2006 (1.7%) to 2010 (2.1%).

As in 2006, capital spending in 2010 on integrated solutions was greater than that for end-of-pipe processes, regardless of company size.

Environmental Expenditure by Media

Environmental expenditure by media for the Rubber and Plastics sector is shown in **Figure 5.36** below. Trends seen in 2010 are similar to those seen in 2006, with the greatest spend on solid waste (£54 million), of which a significant proportion relates to external expenditure. The second largest area of spending was for 'other' areas of environmental protection, most of which is accounted for by in-house operational costs.

Figure 5.36 – Environmental Spending by Media: Rubber and Plastics, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2010, by-product income and environmental cost savings for the Rubber and Plastics sector were approximately £28 million. Income and savings for this sector are shown in **Figure 5.37** for the years 2006 and 2010.

Figure 5.37 – Income and Savings: Rubber and Plastics, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	16.2	0.2	5.3	2.5	0.0	24.2	3.3	27.5
2006*	13.4	0.2	3.8	1.5	0.0	18.9	10.1	29.0

*SIC 25 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Cost savings in 2010 showed an increase on 2006 figures, reporting a total of just over £24 million. As in 2006, the majority of savings in 2010 resulted from measures to improve the use or substitution of raw materials (£16.2 million), as well as reduction in energy use to a lesser extent (£5.3 million). The sale of by-products generated an income of £3.3 million, a third of that reported in 2006.

5.5.10 SIC 23: Non-Metallic Minerals

Estimates of environmental protection expenditure and income/savings are provided below for the Non-Metallic Minerals sector. Of the 204 invited to participate in the 2010 survey, a total of 57 companies returned valid responses, giving a response rate for the sector of 28%.

Key Expenditure

The Non-Metallic Minerals sector spent approximately £118 million in 2010 on environmental protection measures, which equates to 2% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.38** for the years 2006 and 2010.

Figure 5.38 – Total Environmental Expenditure: Non-Metallic Minerals, 2006 & 2010

	Opex (£M)				Capex (£M)		
	In-house	External	R&D	Total	End of Pipe	Integrated	Total
2010	6.9	53.2	6.0	66.0	48.4	3.1	51.5
2006*	31.5	59.9	2.7	94.1	34.4	0.1	34.5

**SIC 26 using SIC03*

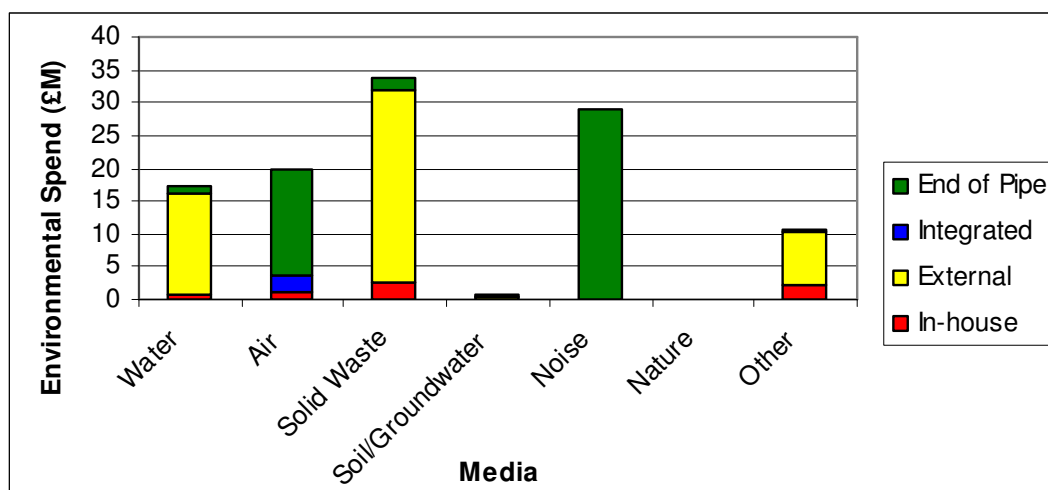
Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Opex accounted for approximately 56% of the total environmental spending by the Non-Metallic Minerals sector. This is a decrease in both absolute and relative terms as compared to 2006, with a corresponding increase in Capex. End-of-pipe processes continue to be the focus of Capex in 2010.

Environmental Expenditure by Media

Environmental expenditure by media for the Non-Metallic Minerals sector is shown in **Figure 5.39** below.

Figure 5.39 – Environmental Spending by Media: Non-Metallic Minerals, 2010



Note: 'Other' includes regulatory charges

Protection measures relating to the management/disposal of solid waste were the highest spending area at almost £34 million, with the expenditure focusing on external costs. The proportional breakdown of 2010 expenditure by media is similar to that in 2006, with the exception of noise which has seen an increase to £29 million in end-of-pipe activities.

Income and Savings

In 2010, by-product income and environmental cost savings for the Non-Metallic Minerals sector were approximately £7.3 million. Income and savings for this sector are shown in **Figure 5.40** for the years 2006 and 2010.

Figure 5.40 – Income and Savings: Non-Metallic Minerals, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	1.9	0.0	2.9	0.2	0.7	5.7	1.6	7.3
2006*	3.7	2.7	30.7	1.9	0.0	39.1	1.4	73.2

*SIC 26 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Cost savings of approximately £5.7 million have been achieved, with the majority resulting from improvements in energy efficiency/usage (£2.9 million). However, this represents a magnitude decrease compared to 2006 energy cost savings (£30.7 million). Income from sales of by-products has remained stable, at around £1.6 million in 2010.

5.5.11 SIC 24 & 25: Basic and Fabricated Metals

Estimates of environmental protection expenditure and income/savings are provided below for this sector. Of the 1178 invited to participate in the 2010 survey, a total of 362 companies returned valid responses, giving a response rate for the sector of 31%.

Several industries make up the Basic and Fabricated Metals sector, including basic manufacture and first processing of iron and steel, aluminium, copper lead zinc and tin, and the production of metal products.

Key Expenditure

The Basic and Fabricated Metals sector spent approximately £246 million in 2010 on environmental protection measures, which equates to 9% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.41** for 2008-2010.

Figure 5.41 – Total Environmental Expenditure: Basic and Fabricated Metals, 2008 to 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emp's (95%)	38.7	77.1	4.2	120.0	6.7	7.0	13.7
	≥250 emp's (5%)	39.5	62.0	0.8	102.3	3.7	5.8	9.5
	Total	78.2	139.1	5.0	222.3	10.4	12.8	23.2
2009	Total	19.0	46.6	0.7	66.4	27.8	7.4	35.2
2008	Total	105.6	242.4	6.5	354.4	118.1	27.3	145.3

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified. 'Emps': Employees

After reduced spending in 2009, Opex levels have increased across the board although they remain below the higher figures seen in 2008. However, capital spending remains relatively low, in line with 2009.

The level of environmental Capex in the sector has declined markedly between 2008/2009 and 2010. Environmental Capex as a percentage of total environmental expenditure stood at 29% in 2008, 34% in 2009. In 2010 this figure had decreased to just 9%. This figure reflects a reduced level of investment in environmental controls in a sector facing wider economic uncertainties in 2010. Perhaps surprisingly, the figure for environmental Capex as a proportion of total environmental expenditure was higher for smaller companies, 10%, when compared to larger companies, 8%.

The level of environmental Capex for the sector has decreased markedly compared to the industrial manufacturing sector as a whole, reflecting the economic difficulties the sector is facing. The sector

appears to be investing only about one third the amount of environmental capital when compared to manufacturing as a whole.

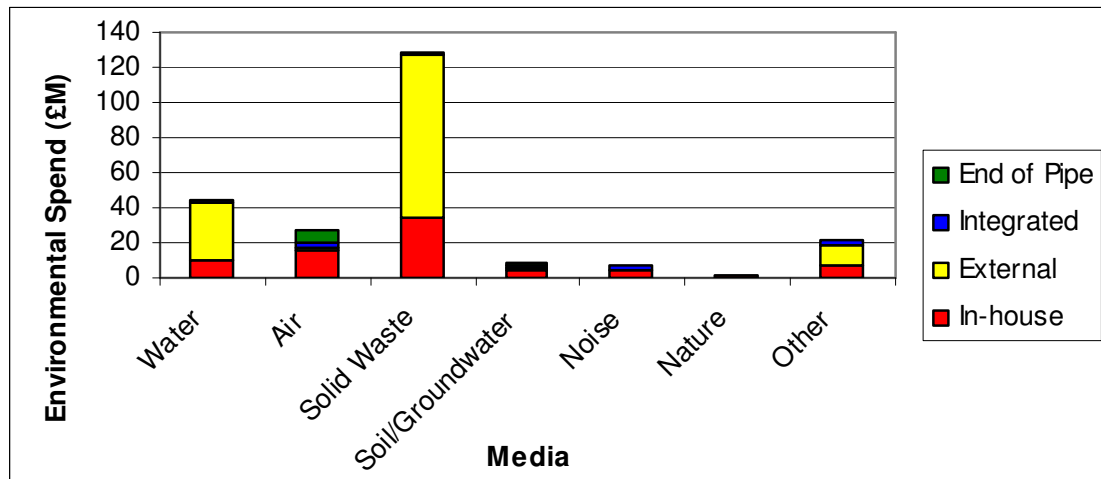
The proportion of Opex on research and development has remained fairly stable between 2008 (1.8%) and 2010 (2.2%). This compares unfavourably with UK industry as a whole where research and development spend in 2010 stood at 6% of total environmental expenditure.

The figures for both Capex and research and development are indicative of a lack of investment, and possibly confidence in the future of the sector as a whole, especially when compared to the manufacturing sector generally.

Environmental Expenditure by Media

Environmental expenditure by media for the Basic and Fabricated Metals sector is shown in **Figure 5.42** below.

Figure 5.42 – Environmental Expenditure by Media: Basic and Fabricated Metals, 2010



Note: 'Other' includes regulatory charges.

Processes to deal with solid waste continue to be the largest area of environmental spend for the sector, totalling £129 million in 2010 (mostly Opex). This area will continue to be the dominant area of spend, given the nature of the sector and increasing waste disposal costs in the UK. It also emphasises the importance of waste reduction in driving down costs for the sector.

Many firms still face significant regulatory and practical barriers when it comes to dealing with their waste cost-effectively. These include the economic viability of recycling and recovering residual waste, especially when only low volumes are present. Linked to this is a lack of local or regional treatment infrastructure, which can force companies to accept higher costs for disposal.

Income and Savings

In 2010, by-product income and savings for the Basic and Fabricated Metals sector were approximately £33.3 million. Income and savings for this sector are shown in **Figure 5.43** for the years 2008 to 2010.

Figure 5.43 – Income and Savings: Basic and Fabricated Metals, 2008 to 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.7	0.6	15.5	11.4	0.0	28.2	5.1	33.3
2009	3.6	0.1	1.8	61.2	2.0	68.7	1.9	70.6
2008	6.2	5.3	10.6	32.7	0.9	55.7	5.3	61.1

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. Data from the 2010 survey is presented alongside data from the most recent surveys in 2008 and 2009 to enable trends to be identified.

In 2010 cost savings in energy use and waste dominated total cost savings, representing 55% and 40% of the total respectively. This partly reflects the prominence of waste disposal and recycling as an issue for the sector as a whole.

The figures suggest that there have been fluctuations across all of the environmental media categories when considering cost savings over the past few surveys.

Income and savings as a proportion of Opex are similar between 2010 and 2008 (15% in 2010 compared with 17% in 2008) whereas the 2009 figures appear to be anomalous in that savings relative to Opex for the year are at 106% and are difficult to explain in the absence of identifiable internal or external factors.

5.5.12 SIC 26 & 32: Computer, Electronic and Optical Products, and Other Manufacturing

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for the Computer, Electronic and Optical Products and Other Manufacturing sector. Of the 1,004 invited to participate in the 2010 survey, a total of 327 companies returned valid responses, giving a response rate for the sector of 33%.

This sector manufactures electronic components and products including optical equipment such as photographic and optical precision equipment and medical and dental instruments.

Key Expenditure

The Computer, Electronic and Optical Products and Other Manufacturing sector spent approximately £50 million in 2010 on environmental protection measures, which equates to 1% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.44** for the years 2006 and 2010.

Figure 5.44 – Total Environmental Expenditure: Computer, Electronic and Optical Products and Other Manufacturing, 2006 & 2010

	Opex (£M)				Capex (£M)		
	In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	12.5	26.2	3.1	41.8	1.4	6.6	8.0
2006*	22.5	21.7	5.2	49.5	1.0	5.0	5.9

*SIC 32 & 33 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

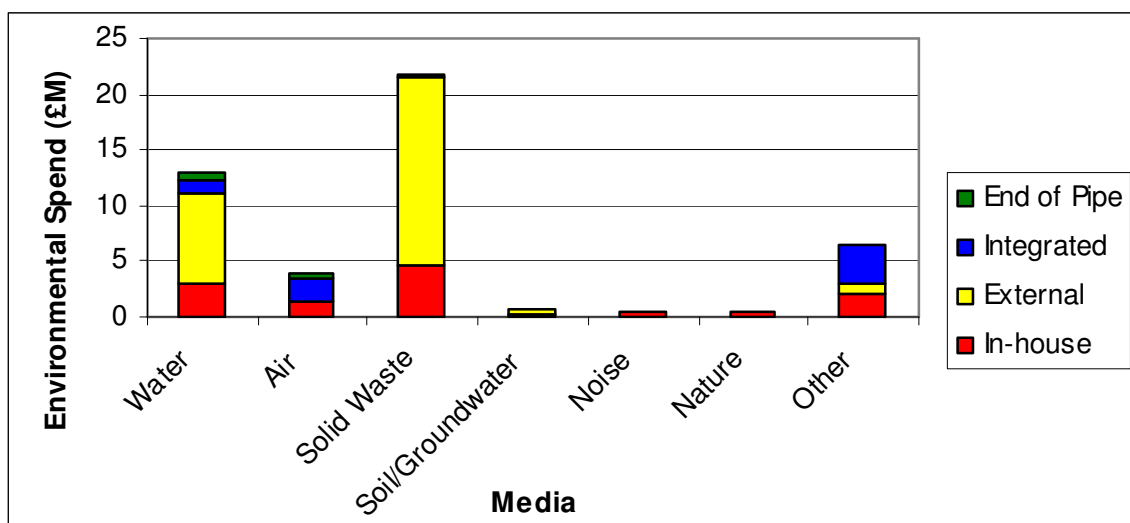
In 2010, Opex accounted for approximately 84% of total environmental spending by the sector. External spending was greater than in-house expenditure, whereas a more balanced split was observed in 2006. Spend on research and development, in terms of proportion of Opex, has decreased slightly to 7.4% in 2010, from 10.5% in 2006.

Capital spending in 2010 remained relatively low for the sector, and was dominated by expenditure on integrated activities, as in 2006.

Environmental Expenditure by Media

Environmental expenditure by media for the Computer, Electronic and Optical Products and Other Manufacturing sector is shown in **Figure 5.45** below. The major expenditure was associated with management/disposal of solid waste (£22 million) and to a lesser extent, water use (accounting for £13 million). The breakdown of expenditure by media is similar to 2006.

Figure 5.45 – Environmental Spending by Media: Computer, Electronic and Optical Products and Other Manufacturing, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2010, by-product income and environmental cost savings for the sector were approximately £4.9 million. Income and savings for this sector are shown in **Figure 5.46** for the years 2006 and 2010.

Figure 5.46 – Income and Savings: Computer, Electronic and Optical Products and Other Manufacturing, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.6	0.1	1.2	0.8	0.0	2.7	2.2	4.9
2006*	0.1	0.0	2.8	0.6	0.0	3.5	1.9	5.4

*SIC 32 & 33 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Cost savings were a reported total of about £2.7 million with energy usage accounting for the majority of the savings in 2010. Whilst energy and therefore total cost savings have seen a decrease compared to 2006, income achieved from the sale of by-products has increased in 2010 to £2.2 million.

5.5.13 SIC 27 & 28: Machinery and Electrical Equipment

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for the Machinery and Electrical Equipment sector. Of the 718 invited to participate in the 2010 survey, a total of 225 companies returned valid responses, giving a response rate for the sector of 31%.

Key Expenditure

The Machinery and Electrical Equipment sector spent approximately £269 million in 2010 on environmental protection measures, which equates to 5% of the total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.47** for the years 2006 and 2010. The 2010 data is broken down by company size.

Figure 5.47 – Total Environmental Expenditure: Machinery and Electrical Equipment, 2006 & 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R&D	Total	End of Pipe	Integrated	Total
2010	<250 emp's (90%)	35.7	27.3	27.0	90.0	1.4	0.7	2.1
	≥250 emp's (10%)	15.7	15.6	114.2	145.5	1.2	29.8	31.0
	Total	51.5	42.9	141.2	235.5	2.7	30.5	33.2
2006*	Total	83.4	89.5	4.3	177.2	3.8	6.0	9.8

*SIC 29, 30 & 31 using SIC03

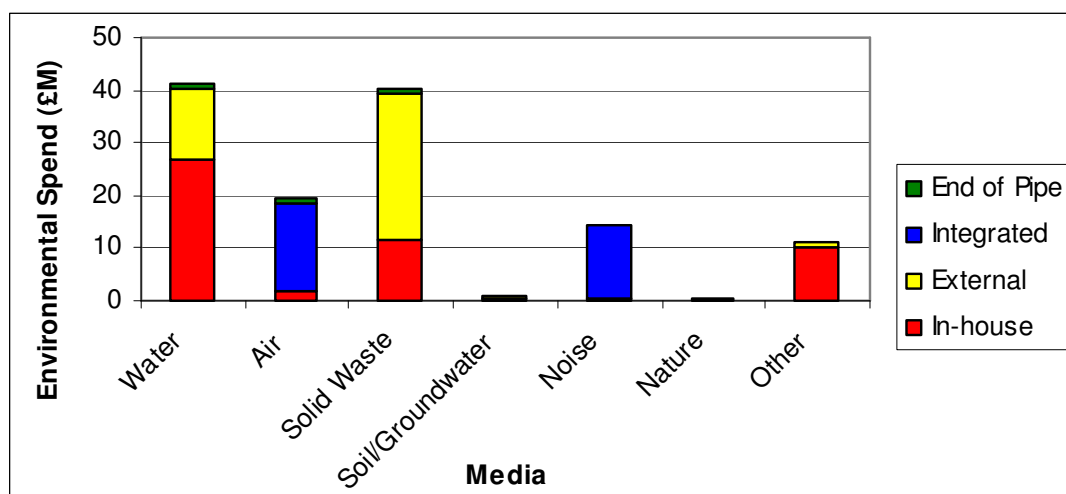
Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector. 'Emps': Employees

In 2010, Opex accounted for the large majority (88%) of total environmental spending by the Machinery and Electrical Equipment sector, as seen in 2006. Within operating costs for the sector, there was considerable growth in spend on research and development as compared to 2006. In 2010, the spend on integrated Capex appears to have increased significantly, with the majority associated with larger companies. It is possible that potential variance in the sample frames for the two surveys has led to bias in the estimated expenditure figures.

Environmental Expenditure by Media

Environmental expenditure by media for the Machinery and Electrical Equipment sector is shown in **Figure 5.48** below. This sector spent approximately £41 million on water protection measures, over half of which is accounted for by in-house Opex. This is closely followed by spend dealing with the management and disposal of solid waste (£40 million).

Figure 5.48 – Environmental Spending by Media: Machinery and Electrical Equipment, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2010, by-product income and environmental cost savings for the Machinery and Electrical Equipment sector were approximately £51 million. Income and savings for this sector are shown in **Figure 5.49** for the years 2006 and 2010.

Figure 5.49 – Income and Savings: Machinery and Electrical Equipment, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	28.2	0.4	3.2	1.4	0.0	33.1	17.4	50.6
2006*	4.6	0.6	8.0	28.1	0.4	41.7	10.5	52.2

**SIC 29, 30 & 31 using SIC03*

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Whilst cost savings appear to have decreased for the sector from 2006 to 2010, the sale of by-products has noticeably increased. The majority of savings in 2010 resulted from improved use of or substitution of raw materials, whereas in 2006, savings were primarily related to reduced waste costs.

5.5.14 SIC 29 & 30: Transport Equipment

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for the Transport Equipment sector. Of the 368 invited to participate in the 2010 survey, a total of 87 companies returned valid responses, giving a relatively low response rate for the sector of 24%.

Key Expenditure

The Transport Equipment sector spent approximately £123 million in 2010 on environmental protection measures, which equates to 2% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.50** for the years 2006 and 2010. The 2010 data is broken down by company size.

Figure 5.50 – Total Environmental Expenditure: Transport Equipment, 2006 & 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emp's (71%)	7.3	19.7	1.2	28.2	0.6	1.3	2.0
	≥250 emp's (29%)	20.7	58.4	1.3	80.4	7.5	4.9	12.4
	Total	28.0	78.1	2.5	108.6	8.2	6.2	14.4
2006*	Total	170.3	69.5	3.2	243.0	11.3	3.1	14.4

*SIC 34 & 35 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector. 'Emps': Employees

In 2010, Opex accounted for the large majority (88%) of total environmental spending by the Transport Equipment sector, as in 2006. Regardless of company size, a higher proportion of Opex in 2010 was for external rather than internal costs, which contrasts with the split observed in 2006.

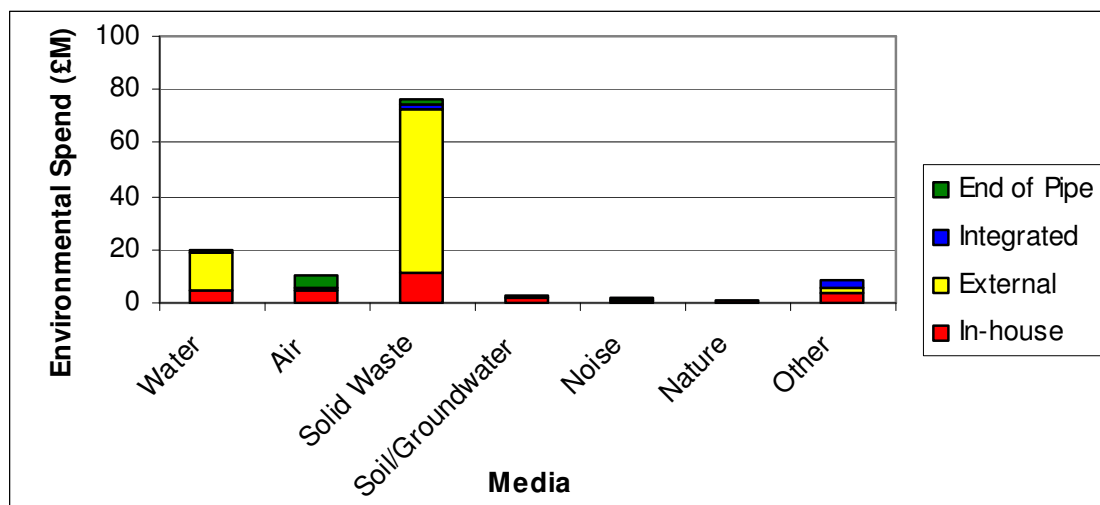
Whilst in absolute terms Capex has remained stable between 2006 and 2010, relative to total spend it has decreased over this period. The proportion of capital spend on end-of-pipe processes appears to have decreased, whilst integrated expenditure has increased compared to 2006.

It is possible that the relatively low response rate (24%) for the 2010 survey has introduced bias to the estimated expenditure figures.

Environmental Expenditure by Media

Environmental expenditure by media for the Transport Equipment sector is shown in **Figure 5.51** below. This sector spent approximately £76 million dealing with solid waste, most of which is accounted for by external costs, which contrasts with the in-house spend seen in 2006. The high costs for solid waste are likely to be associated with increasing external disposal/waste management costs, and not necessarily a factor increased waste volumes

Figure 5.51 – Environmental Spending by Media: Transport Equipment, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2006, total by-product income and environmental cost savings for the Transport Equipment sector was approximately £38 million. Income and savings for this sector are shown in **Figure 5.52** for the years 2003 to 2006.

Figure 5.52 – Income and Savings: Transport Equipment, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.3	0.1	3.5	1.9	0.1	5.9	4.4	10.3
2006*	0.4	0.8	17.3	1.4	0.1	20.0	17.9	37.9

*SIC 34 & 35 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Cost savings in 2010 have significantly decreased in comparison to levels observed in 2006 for the Transport Equipment sector, which reported a total saving of approximately £6 million, although the bulk of the savings remain a result of improved energy efficiency/usage. The incomes from by-product sales also appear to have decreased, with £4.4 million reported in 2010.

It is possible that the relatively low response rate for this sector (24%) has introduced bias to the estimated 2010 income and savings figures.

5.5.15 SIC 31: Furniture Manufacture

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for the Furniture Manufacture sector. Of the 244 invited to participate in the 2010 survey, a total of 77 companies returned valid responses, giving a response rate for the sector of 32%.

Key Expenditure

The Furniture Manufacture sector spent approximately £47 million in 2010 on environmental protection measures, which equates to 1% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.53** for the years 2003 to 2006.

Figure 5.53 – Total Environmental Expenditure: Furniture Manufacture, 2006 & 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emp's (90%)	13.8	18.3	0.7	32.8	2.6	0.2	2.8
	≥250 emp's (10%)	5.3	3.2	1.2	9.7	0.6	1.4	2.0
	Total	19.1	21.5	1.8	42.5	3.1	1.6	4.7
2006*	Total	27.3	42.7	2.6	72.7	9.8	6.6	16.4

*SIC 36 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector. 'Emps': Employees

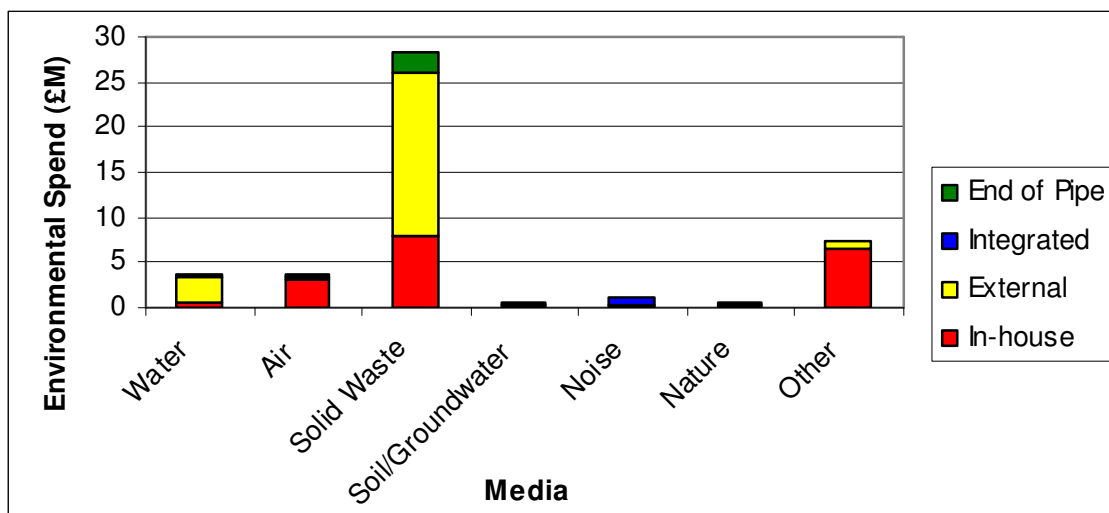
Total environmental spend by the Furniture Manufacture sector appears to have halved from 2006 to 2010. In 2010, Opex still accounted for the large majority (90%) of the total environmental spending by the sector, as seen in 2006 (81%). Operating spend in 2010 appears to have been led by smaller companies, who had a fairly balanced split between in-house and external costs.

Capital spending in 2010 declined both relatively and absolutely from 2006 figures, however, the proportion of end-of-pipe and integrated Capex remained similar.

Environmental Expenditure by Media

Environmental expenditure by media for the Furniture Manufacture sector is shown in **Figure 5.54** below. The area of greatest spend for the sector was solid waste measures (£28 million). Spend associated with this medium was concentrated on external costs, and to a lesser extent, in-house costs.

Figure 5.54 – Environmental Spending by Media: Furniture Manufacture, 2006 & 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2010, total by-product income and environmental cost savings for the Furniture Manufacture sector was approximately £4.4 million, less than half of those reported for 2006. Income and savings for this sector are shown in **Figure 5.55** for the years 2006 and 2010.

Figure 5.55 – Income and Savings: Furniture Manufacture, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.6	0.0	1.2	1.8	0.3	4.0	0.5	4.4
2006*	1.5	0.9	2.5	5.0	0.0	9.8	0.4	10.3

*SIC 36 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Whilst total cost savings have decreased in 2010 compared to 2006, income from the sale of by-products has increased marginally to £0.5. Cost savings associated with waste management and disposal remain the highest, with improved energy efficiency/usage being another key area of savings.

5.5.16 SIC 33: Repair and Installation

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for this sector. Of the 212 invited to participate in the 2010 survey, a total of 67 companies returned valid responses, giving a response rate for the sector of 32%.

The Repair and Installation sector includes the repair of fabricated metal products, equipments and machinery as well as the installation of industrial machinery and equipment.

As a new sector under the 2007 SIC classification, this sector has no direct comparison from previous surveys and therefore the figures for this sector are presented without comparison to previous survey periods.

Key Expenditure

The Repair and Installation sector spent approximately £47 million in 2010 on environmental protection measures, which equates to 1% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.56** for the 2010 survey.

Figure 5.56 – Total Environmental Expenditure: Repair and Installation, 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emps (82%)	2.7	9.8	0.7	13.1	0.2	0.0	0.2
	≥250 emps (18%)	24.4	4.8	0.2	29.4	2.9	1.6	4.5
	Total	27.1	14.6	0.8	42.5	3.1	1.6	4.7

*Note: Totals may not add due to the rounding effects.
'Emps': Employees*

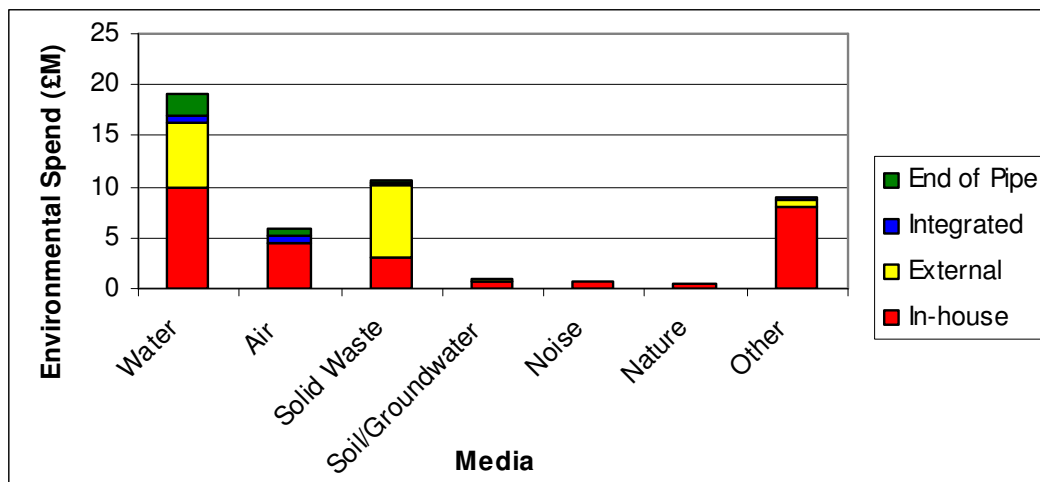
In 2010, Opex comprised the majority (90%) of the total environmental expenditure by the Repair and Installation sector. For larger companies, the majority of this spend was on in-house processes, whereas smaller companies spent a greater proportion on external services.

Whilst larger companies led on capital spending in 2010, a similar balance in terms of greater end-of-pipe activities versus integrated solutions was seen across the board.

Environmental Expenditure by Media

Environmental expenditure by media for the Repair and Installation sector is shown in **Figure 5.57**. In 2010, the three areas of greatest spend were water, solid waste and 'other' environmental protection measures. Approximately £19 million was spent on water protection measures, with over half spent on in-house measures. Whereas the £11 million spent on solid waste was concentrated on external costs. As with water, in-house costs contributed the most to the £9 million spent on 'other' environmental protection expenditure.

Figure 5.57 – Environmental Spending by Media: Repair and Installation, 2010



Note: 'Other' includes regulatory charges.

Income and Savings

In 2010, by-product income and environmental cost savings for the Repair and Installation sector were approximately £1.9 million. Income and savings for this sector are shown in **Figure 5.58** for the 2010 survey period.

Figure 5.58 – Income and Savings: Repair and Installation, 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.3	0.3	1.2	0.1	0.0	1.9	0.0	1.9

Note: Totals may not add due to the rounding effects.

In 2010, cost savings associated with improved energy efficiency/usage were the greatest, comprising 63% of the total. No income through the sale of by-products was recorded for this sector in 2010.

5.5.17 SIC 35: Energy Production and Distribution

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for this sector. Of the 114 invited to participate in the 2010 survey, a total of 32 companies returned valid responses, giving a response rate for the sector of 28%.

Key Expenditure

The Energy Production and Distribution sector spent approximately £249 million in 2010 on environmental protection measures, which equates to around 5% of total spend by UK industry.

Environmental expenditure for this sector is shown in **Figure 5.59** for the years 2006 and 2010. The 2010 data is broken down by company size.

Figure 5.59 – Total Environmental Expenditure: Energy Production and Distribution, 2006 & 2010

		Opex (£M)				Capex (£M)		
		In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	<250 emp's (84%)	11.0	7.8	0.0	18.8	3.0	0.1	3.0
	≥250 emp's (16%)	21.9	61.0	0.7	83.6	0.6	143.2	143.8
	Total	33.0	68.7	0.7	102.4	3.6	143.3	146.9
2006*	Total	71.9	703.2	23.6	798.8	42.3	713.2	755.5

*SIC 40 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector. 'Emps': Employees

There appears to have been a significant decrease in the operating and capital expenditure levels in 2010 (£249 million) compared to 2006 (£1.5 billion) to £100 million – this may be a reflection of the number of power stations coming towards the end of their lives and a shift in focus towards new build rather than on site improvements. However, given the size of the sector, range of activities within it and the sample frame, comparisons between years may not be meaningful.

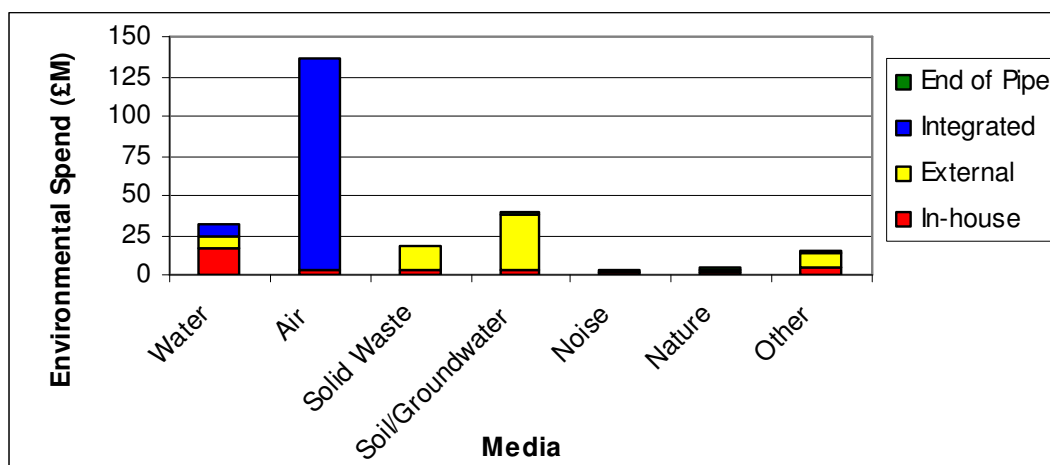
In 2010, Opex by larger companies continued to focus more on external costs (as seen in 2006), whereas the split between in-house and external costs was more balanced for smaller companies. Spend on research and development remains limited, regardless of company size.

Again, the pattern of Capex by larger companies in 2010 is similar to that seen in 2006, with greater spend on integrated costs whilst, smaller companies spend more on end-of-pipe solutions. It is possible that the Capex reported by larger companies in 2010 could be dominated by a single investment scheme (for example, the installation of NOx abatement equipment).

Environmental Expenditure by Media

Environmental expenditure by media for the Energy Production and Distribution sector is shown in **Figure 5.60** below.

Figure 5.60 – Environmental Spending by Media: Energy Production and Distribution, 2010



Note: 'Other' includes regulatory charges.

Environmental spending in 2010 was dominated by integrated air abatement, which again points to a small number of major retrofit emissions abatement projects. The distribution of costs in this sector across the different media varies greatly from the 2006 survey, where the majority of expenditure was on 'other' environmental protection measures.

Income and Savings

In 2010, by-product income and environmental cost savings for the Energy Production and Distribution sector were about £4.8 million. Income and savings for this sector are shown in **Figure 5.61** for the years 2006 and 2010.

Figure 5.61 – Income and savings: Energy Production and Distribution

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	3.0	0.0	1.1	0.7	0.0	4.8	0.0	4.8
2006*	1.9	0.0	4.4	0.2	0.0	6.6	2.9	9.5

*SIC 40 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

Overall savings have declined over the period 2006 to 2010 although the drivers behind this are not clear and again the trend could be distorted by a small number of projects/initiatives.

The impacts of the Large Combustion Plant Directive mean that spending on existing plant is likely to continue to fall, whilst the industry gears up for a new phase of building over the coming years. Whilst this is likely to result in environmental improvements through reduced emissions, this may not be captured through this survey.

5.5.18 SIC 36: Water Supply and Treatment

Estimates of environmental protection expenditure, environmental expenditure by media, and income and savings are provided below for the Water Supply and Treatment sector. Of the 44 invited to participate in the 2010 survey, a total of 10 companies returned valid responses, giving a relatively low response rate of 23% for this sector, which itself comprises a small number of companies.

Key Expenditure

The Water Supply and Treatment sector spent approximately £441 million in 2010 on environmental protection measures, which equates to around 15% of total spend by UK industry. Environmental expenditure for this sector is shown in **Figure 5.62** for the years 2006 and 2010.

Figure 5.62 – Total Environmental Expenditure: Water Supply and Treatment, 2006 & 2010

	Opex (£M)				Capex (£M)		
	In-house	External	R & D	Total	End of Pipe	Integrated	Total
2010	164.3	40.0	2.1	206.5	0.5	233.9	234.4
2006*	0.8	3.1	0.2	4.1	2.2	1.0	3.2

**SIC 41 using SIC03*

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

In 2010, Opex accounted for 47% of total spend, roughly equivalent to that observed in 2006 (56%). The majority of this in 2010 was related to in-house expenditure, a switch from largely external expenditure in 2006.

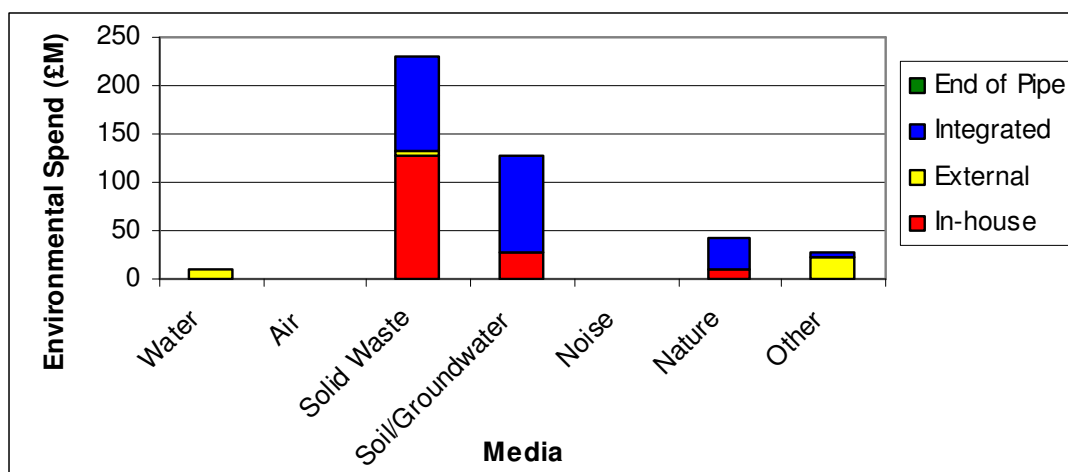
Companies spent a high proportion of Capex on integrated solutions as a proportion of overall total in 2010 (72%). This sees a switch from the trend seen in 2006.

It would appear that the sector had substantially higher expenditure in 2010 than in 2006. However, the size of the sector and the relatively low response rate could have introduced bias to the estimated expenditure figures for either or both years.

Environmental Expenditure by Media

Environmental expenditure by media for the Water Supply and Treatment sector is shown in **Figure 5.63** below.

5.63 – Environmental Spending by Media: Water Supply and Treatment, 2010



Note: 'Other' includes regulatory charges.

The sector spent approximately £231 million on solid waste management and disposal in 2010, which is mainly accounted for by in-house and integrated processes. Waste water treatment costs are not encompassed in these figures as costs associated with such protection measures are captured within individual company's returns as payments to water service companies for sewage and water treatment.

The high proportion of in-house expenditure in 2010 may reflect the larger size of companies in the sector, as these are more likely to have the resources and skills to deliver internal solutions for environmental protection.

Income and Savings

In 2010, total by-product income and environmental cost savings for the Water Supply and Treatment was £7.4 million. Income and savings for this sector are shown in **Figure 5.64** for the years 2006 and 2010.

Figure 5.64 – Income and Savings: Water Supply and Treatment, 2006 & 2010

	Cost savings (£M)						By-products (£M)	Total (£M)
	Raw material	Water use	Energy use	Waste	Other	Total		
2010	0.0	0.0	2.5	0.0	0.0	2.5	4.9	7.4
2006*	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.3

*SIC 41 using SIC03

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set encompassing this sector.

As with total expenditure, by-product revenue and cost savings for the sector in 2010 were substantially higher than in 2006. Savings on energy use made in 2010 were 0.6% of overall expenditure compared to 4% of overall expenditure in 2006.

Whilst the energy cost savings may be in response to an increase in targeted measures to improve energy efficiency and usage, it is interesting to note that the revenue from by-product sales has also increased substantially.

It is possible that the size of the sector and the relatively low response rate have introduced bias to the estimated income and savings figures for either or both years. The data may also be skewed by the larger companies responding to the 2010 survey.

5.7 DRIVERS FOR CAPITAL EXPENDITURE

Approximately 28% of responding companies listed at least one reason for their capital expenditure in the 2010 survey (655 companies in total). Regardless of company size, the most common drivers described were compliance with environmental regulation/legislation (55%), and equipment upgrades (20%). This mirrors the primary Capex drivers reported in previous years.

Owner or parent company corporate responsibility policy was cited by 12% of companies as the primary driver behind their capital expenditure, whilst environmental taxes and greenhouse gas emission reduction were given as a reason by 3% and 4% of companies respectively. 'Other' reasons were given by 7% of companies and included expenditure to reduce waste production, and to implement an EMS.

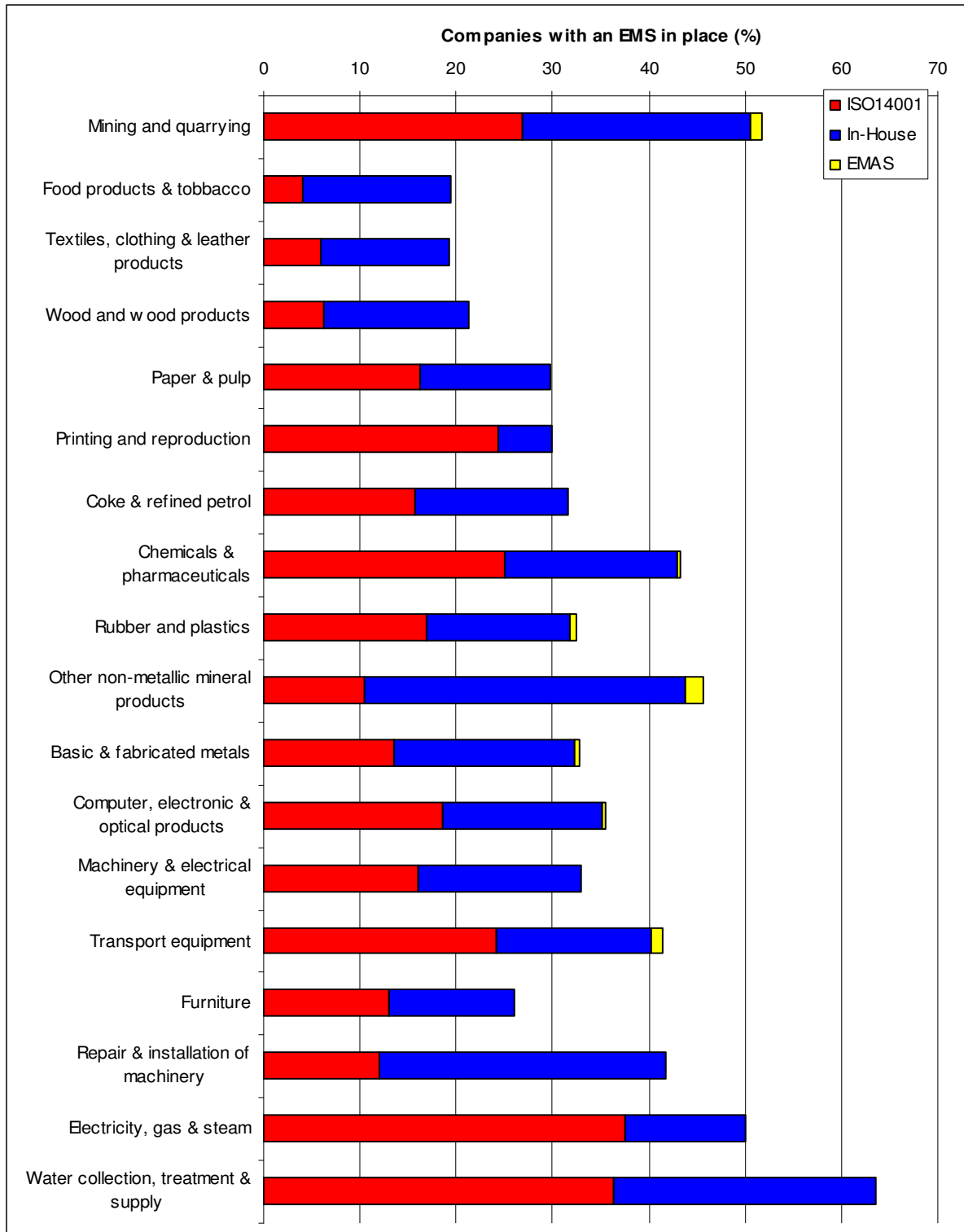
For the large majority of sectors, regulatory compliance was cited as the main driver behind capital expenditure in 2010. A notable exception was the Non-Metallic Minerals sector, where equipment upgrade was the main driver for the majority of companies.

Whilst there are some differences between sectors in terms of the primary drivers for capital expenditure, it should be noted that there is a potential for simple random variation within the sample frame to impact findings, especially where sectors comprise a limited number of companies and/or have had a relatively low survey response rate.

5.8 ENVIRONMENTAL MANAGEMENT SYSTEMS

This section presents the results of the survey question on environmental management systems (EMS), first introduced into the questionnaire in the 2005 survey. The types of EMS used by different sectors are presented in **Figure 5.65** below.

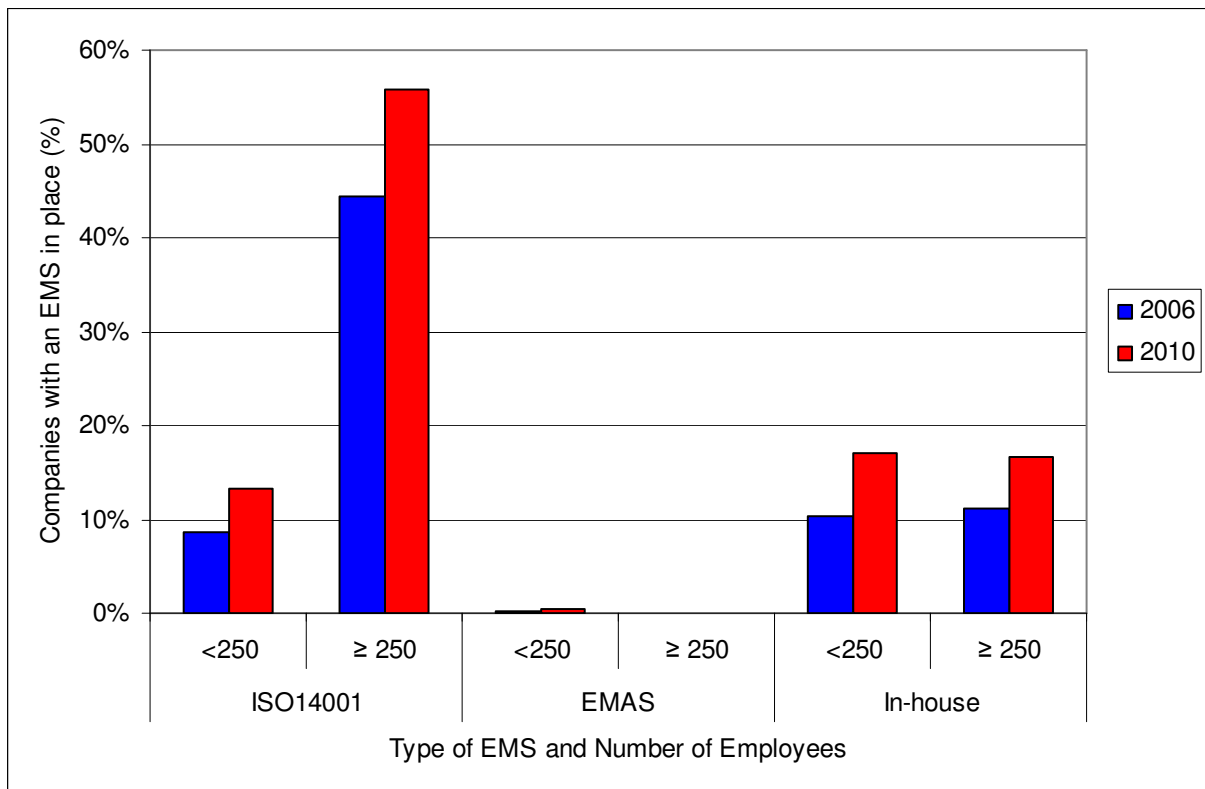
Figure 5.65 – Types of EMS used, by SIC Sector – 2010



Overall, 34% of responding companies indicated that they had an EMS in place in 2010, along with its certification status. A total of 17% of responding companies had an EMS certified to ISO 14001, and 0.34% certified to Eco-Management and Auditing Scheme (EMAS). Therefore, roughly half of the systems in place in 2010 were not externally accredited (e.g. developed and implemented to meet “in-house” requirements).

Figure 5.66 below shows a breakdown of EMS certification status by company size (i.e. number of employees).

Figure 5.66 –Types of EMS Used, by Company Size – 2010



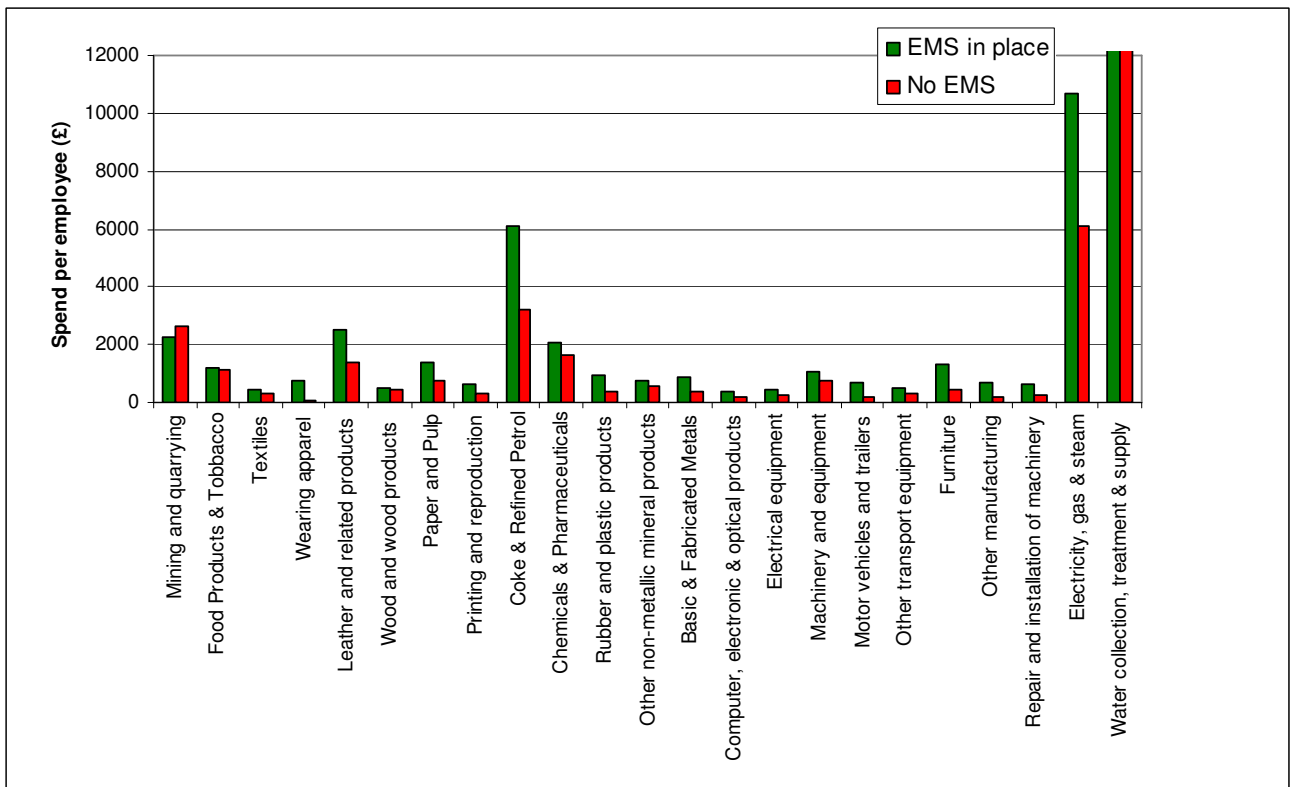
Note: For 2006 survey, 'conformance with 'other standards' combined with 'in-house EMS'. Systems can comply with both ISO 14001 and EMAS. The 2010 survey data is presented in comparison to the 2006 survey data as this is the most recent data set using a similar sample frame.

Whilst larger companies were significantly more likely than SME's to have an ISO 14001 EMS in place, the percentage of total companies regardless of size with ISO 14001 in place has increased since 2006. The proportion of systems in compliance with the EMAS remains relatively low, and are more common within SME's than larger companies.

5.8.1 Expenditure within EMS systems

Figure 5.67 below shows the average spend per employee for each industry sector, for companies that do and do not have an EMS in use.

Figure 5.67 – Average spend per employee for companies with and without an EMS.



Note. The spend per employee for the water sector equates to £43,000 for companies with an EMS and £21,000 for companies without an EMS – this is larger than the scale for spend per employee.

As seen in previous years for the majority of industry sectors, companies with an EMS in place have spent more per employee than companies without an EMS. The only exception being the Mining and Quarrying sector.

5.8.2 EMS Implementation and Maintenance Cost

A total of £765,000 was spent on EMS implementation and £5 million on EMS maintenance during 2010, by the 34% of companies who indicated they had an EMS in place in 2010 (i.e. 807 companies). As not all companies with an EMS provided associated costs in their survey return, the total spend on system implementation and maintenance are likely to be higher than this in reality.

For those companies indicating expenditure associated with maintaining or implementing an EMS during 2010:

- An average of £11,094 was spent on implementation of an EMS to ISO 14001 standards, by 56 companies;
- An average of £15,870 was spent on maintenance of an EMS to ISO14001 standards, by 261 companies;
- No companies recorded expenditure associated with implementing an EMS to EMAS standards;
- An average of £3,395 was spent on maintaining an EMS to EMAS standards, by 4 companies;

- An average of £5,120 was spent on implementation of an EMS to in-house specifications, by 28 companies; and
- An average of £8,710 was spent on maintenance of an EMS to in-house specifications/standards, by 99 companies.

In 2010, annual maintenance costs were, on average, greater than those for implementation. Whilst a number of companies with an EMS did not record their expenditure on the returned questionnaire, it is considered likely that this trend is correct, as it reflects that observed in previous years.

6 RECOMMENDATIONS FOR FUTURE SURVEY

The following section provides recommendations for subsequent surveys based on the experience of the URS project team in conducting the study, and feedback received during the 2010 survey process.

The main sources of feedback were phone calls made by companies to the Survey Helpdesk, and phone calls made by the URS project team during Top Company follow-up and during data validation. Useful feedback was also obtained from comments made within returned questionnaires, and letters from companies to the Helpdesk to indicate non-participation. All such feedback was recorded in the survey database.

Recommendations for future surveys comprise:

Response Rates

- When looking at the response rate over the survey period, there are three clear peaks of activity:
 1. In the first couple of weeks after the survey was initially sent out.
 2. Between the fifth and seventh weeks of the survey period following the issue of a reminder letter.
 3. Around the eleventh and twelfth weeks following some 390 calls made to Top Companies over the preceding two-week period.

Based on these peaks of return activity and the high response rate for the 2010 survey overall, it is recommended that a similar strategy concerning the timing of reminder letter dispatch and the timing and number of Top Company Calls is carried forward for future surveys.

- The reason behind the effectiveness of the reminder letters in increasing the response rate appears twofold:
 1. They act as a prompt for companies who may have put the questionnaire aside;
 2. They act as a prompt for other companies to contact the Helpdesk, for instance where the original survey did not reach the most appropriate person. This allowed the Helpdesk to obtain the correct contact details and provided an opportunity to encourage the company to complete and return the questionnaire.

Based on the latter and the high response rate for the 2010 survey overall, it is recommended that similar reminder letters are used in future surveys.

- In previous years, a reminder postcard was issued following the reminder letter. However, the postcard was not issued during the 2010 survey, as the response rate was already high and it was felt that a combination of the follow up calls would provide a more targeted and efficient method of eliciting responses. As the final response rate for the 2010 survey was greater than in previous

years, it is recommended that future surveys should follow a similar pragmatic approach to the issuing of reminder postcards, based on the response rate at that time.

Questionnaire Availability

- A digital version of the questionnaire was available via the Defra website for download by participating companies. Where companies contacted the Helpdesk for an additional copy of the questionnaire, they were in the first instance directed to the Defra website. It is recommended that this approach is carried forward in future surveys, so as to minimise the number of hard copies re-sent by post.

Survey Benefits

- As in previous years, larger companies have reported more logistical issues such as the co-ordination of all the data from various sites, whilst smaller companies tend to question the relevance of the questionnaire to their company and seek assistance with technical questions. Further promotion of the benefits of collecting such data will improve the response rate both through encouraging better data collation at a company level and secondly through providing a business case for completing the questionnaire. This can be done through the initial mail out material and also through the website text. This is particularly important in the current economic climate when cut backs are being made across industry.

Survey Sample

- As recommended in the 2009 survey report, the electricity and gas (SIC 35) and water (SIC 36) sectors were segregated for the 2010 survey. Due to the different nature of companies in these groupings, this allowed more meaningful analysis to be conducted and it is recommended that this is repeated in subsequent surveys where the number of returns allows.

Validation Process

- It is recommended that, where possible, the validation process is carried out as soon as the data are entered for each company. This enables companies to remember their responses and minimise the changes in personnel responsible between submitting the survey and being called for validation checks.

LIST OF ACCRONYMS

Acronym	
Capex	Capital Expenditure
Defra	Department for Environment, Food and Rural Affairs
EMS	Environmental Management System
EU	European Union
IDBR	Inter Departmental Business Register
IPPC	Integrated Pollution Prevention and Control
NACE	Nomenclature Générale des Activités Economiques dans les Communautés Européennes
ONS	Office for National Statistics
Opex	Operating Expenditure
SIC	Standard Industrial Classification
SMEs	Small or Medium Sized Enterprises
TGN	Technical Guidance Notes
URS	URS Infrastructure & Environnement UK Limited

LIST OF STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODES

The published SIC codes are periodically updated by the Office of National Statistics (ONS) (refer to <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html>).

The environmental expenditure surveys conducted in 2006 and earlier used the 2003 SIC codes, whereas surveys from 2007 onwards have used the 2007 SIC codes. The table below sets out the SIC codes that are relevant to the environmental expenditure surveys, mapped from the 2007 to the 2003 SIC schemes. There is not always a direct correspondence between 2003 and 2007 SIC codes, and so for the purposes of this survey, a 'compatibility' rating is also indicated in the table below.

2007 SIC code	Industry	2003 SIC code	Compatibility Rating*
05 - 09	Mining & Quarrying	10 – 14	High
10 - 12	Food, Beverages and Tobacco Products	15 & 16	High
13 - 15	Textiles, Clothing and Leather Products	17 – 19	High
16	Wood and Wood Products	20	High
17	Paper and Pulp	21	High
18	Printing and Publishing	22	Medium
19	Coke and Refined Petroleum	23	High
20 & 21	Chemicals and Pharmaceuticals	24	High
22	Rubber and Plastics	25	High
23	Non-Metallic Minerals	26	High
24 & 25	Basic and Fabricated Metals	27 & 28	High
26 & 32	Computer, Electronic and Optical Products and Other Manufacturing	32 & 33	High
27 & 28	Machinery and Electrical Equipment	29 – 31	Low
29 & 30	Transport Equipment	34 & 35	High
31	Furniture Manufacture	36	Low
33	Repair and Installation	N/a	N/a
35	Energy Production and Distribution	40	High
36	Water Supply and Treatment	41	High

The ratings are based on the proportion of businesses classified under a specific 2003 SIC code that the ONS has mapped across to the most compatible 2007 SIC code (based on data from the "Weighted Table for SIC 03 – SIC 07" spreadsheet, see ONS webpage above). The ratings are classified as follows: Low = <50%, Medium = 50-75%, High = >75% of businesses mapped from SIC 03 to SIC 07.