URS

Environmental Protection Expenditure by Industry:

2011 UK Survey

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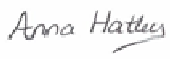
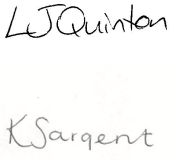
Prepared by	Anna Hatley		May 2013	Consultant
Checked by	Laura Quinton & Kirsty Sargent		May 2013	Principal Consultants
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EXECUTIVE SUMMARY

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 2011.

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 fifteenth survey of this type; previous surveys were carried out in 1994 (a pilot survey), 1997, and annually between 1999 and 2010. As in previous years, the 2011 survey process was overseen by a steering group with representatives from Defra and the Office for National Statistics (ONS).

Methodology

The 2011 survey was provided to companies within the following Standard Industrial Classification (SIC 2007) categories:

- Mining and Quarrying
- Food, Beverages and Tobacco Products
- Coke and Refined Petroleum
- Chemicals and Pharmaceuticals
- Basic and Fabricated Metals
- Machinery and Electrical Equipment
- Energy Production and Distribution
- Water Supply and Treatment

The UK Government's Inter Departmental Business Register (IDBR) provided a stratified random sample of 1,062 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 225, giving a valid response rate of 21.2 per cent (%). 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 2011;
- 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 certification 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 2011 survey

The following comprises a brief overview of key findings from the 2011 survey:

- Gross spending on environmental protection in 2011 by these UK industries was an estimated £2.3 billion (±£260 million at a 95% confidence level);
- The primary spending industry sectors were Energy Production and Distribution (27% of total spend) and Food, Beverages and Tobacco Products (15% of total spend);
- In recent years the distribution of spend amongst sectors has been dominated by a single sector. In 2008 and 2009 the combined Electricity, Gas and Water sector was consistently the dominant sector by spend (81% of total expenditure). In 2010 this combined sector was split, and the sector with the highest spend was the Food, Beverages and Tobacco Products sector (24% of total expenditure in 2010). In 2011 the Energy Production and Distribution sector had the highest spend
- Opex accounted for 90% 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 was for solid waste measures, and for Capex it was air protection measures.
- This spending was offset by an estimated income of £83 million from the sale of by-products and an estimated cost saving of £153 million.
- Overall, 61% of responding companies had an EMS in place in 2011. A total of 43% of responding companies had an EMS certified to ISO 14001, and 1.3% certified to Eco-Management and Auditing Scheme (EMAS).

Comparisons between survey years

A summary of total environmental protection expenditure by businesses for 2008 to 2011 is presented in **Figure E1**. Ranges indicating the 95% confidence intervals associated with each value are provided for the 2011 survey in parenthesis.

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. 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. Please note that as a larger sample frame was used in the 2010 survey, where figures are presented as a percentage of the total spend, only comparable sectors have been selected from the 2010 sample. The 2008 and 2009 surveys used a similar sample frame to that of the 2011 survey with the inclusion of the Paper and Pulp sector instead of the Machinery and Electrical Equipment sectors.

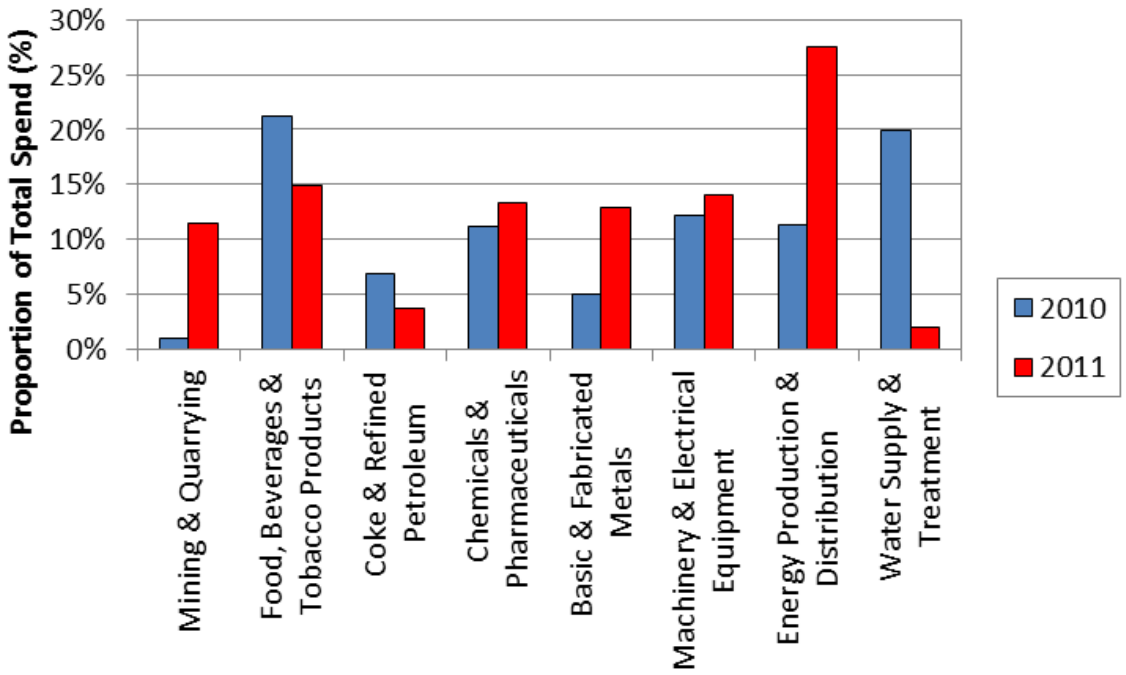
Figure E1 – Summary of Environmental Protection Expenditure by UK Industry: 2008 to 2011

	2008	2009	2010	2011	
	% of gross	% of gross	% of gross	Total expenditure (£M)	% of gross
Operational Expenditure					
In-house	19	37	33	738 (215-1,260)	32
External	33	19	35	1,092 (1,026-1,158)	47
Research & Development	4	2	7	239 (28-451)	10
Total Opex	**55**	**58**	**75**	**2,069** (1,821-2,316)	**90**
Capital expenditure					
End of Pipe	20	29	5	180 (148-213)	8
Integrated processes	24	13	20	52 (38-67)	2
Total Capex	**45**	**42**	**25**	**233** (197-269)	**10**
Gross expenditure					
Total gross spend	**100**	**100**	**100**	**2,302** (2,042-2,561)	**100**
Income					
Income from by-products	0	1	2	83 (30-135)	4
Total net expenditure				**2,219** **(1,953-2,485)**	
Cost savings				**153** **(97-209)**	

Note: Comparisons between years should be treated with caution. Data from the 2010 survey is presented above as the most recent survey. As a larger sample frame was used, the figures have been adjusted be comparable to the SICs included in the 2011 sample. The 2008 and 2009 surveys used a similar sample frame to that of the 2011 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery and Electrical Equipment. Totals and percentages may not add due to the effects of rounding.

A summary of total expenditure by the main industry groups for the 2010 and 2011 survey years are presented in **Figure E2.**

Figure E2 – Total Environmental Expenditure by Industry Sector: 2010 & 2011

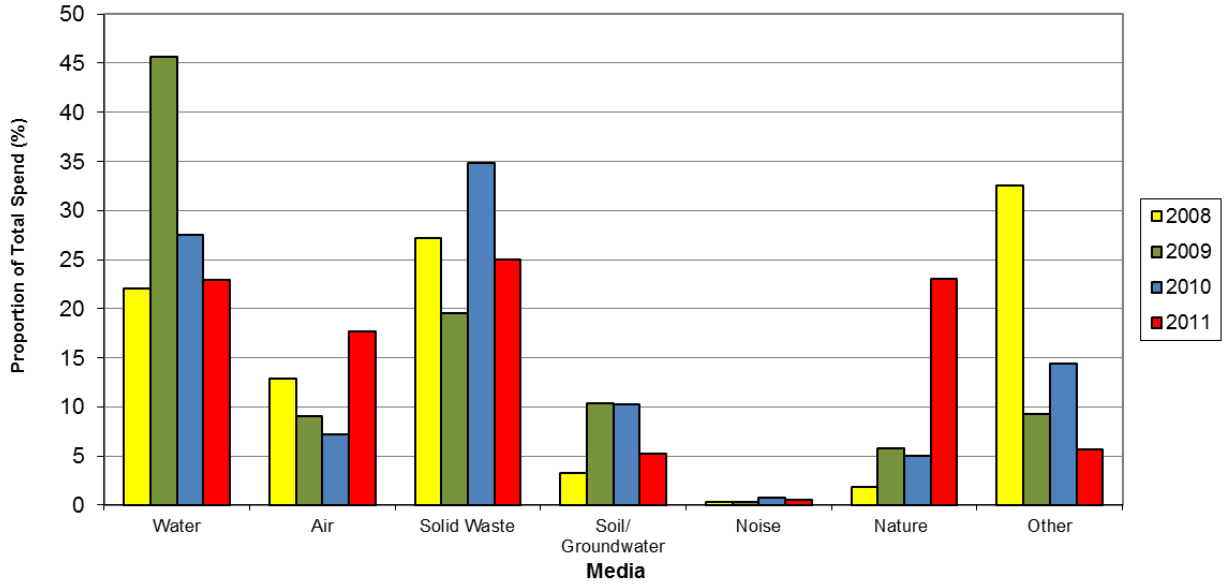


Note: Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

The Energy and Water industry sectors have traditionally dominated the spending in previous surveys. This has continued in part in 2011, with the Energy Production and Distribution sector accounting for the highest proportion of total spend (27%, 13% in 2010), driven by an increase in Opex which may reflect the safeguarding of existing assets. As in previous years, the Food, Beverages and Tobacco Products sector remains a high spending sector with 15% (24% in 2010).

Figures E3 and **E4** show Opex and Capex across environmental media in 2008 to 2011.

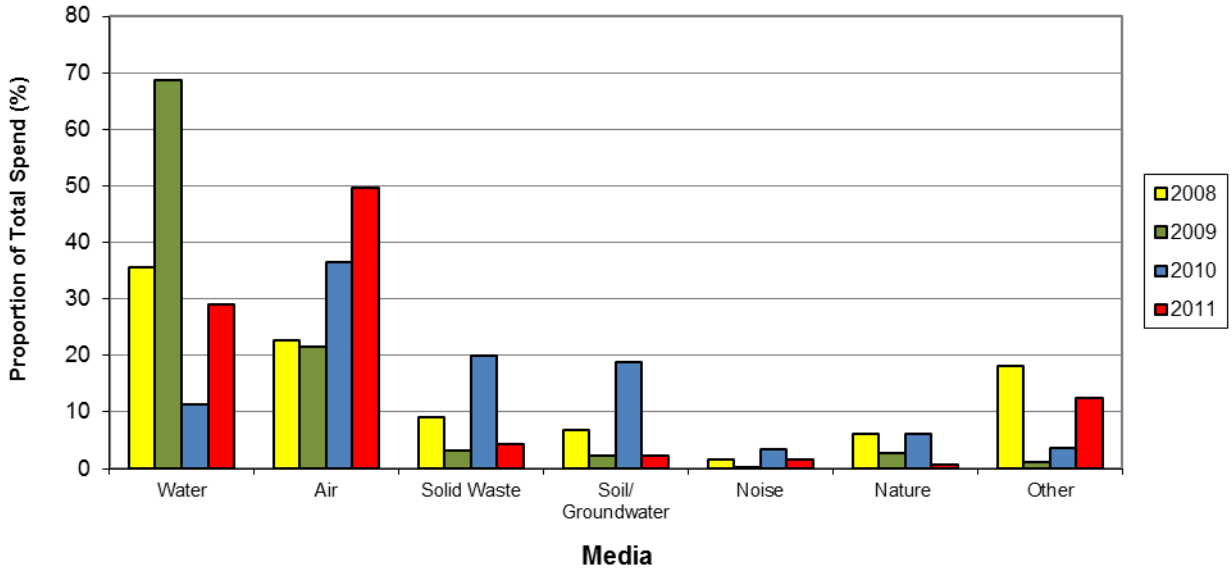
Figure E3 – Operational Environmental Expenditure by Environmental Media: 2008 to 2011



Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

In 2011, spend on solid waste comprised 25% (£458 million) of total Opex, the area of greatest expenditure as in 2010. An increase in expenditure on solid waste measures as compared to 2009, can be attributed to the increasing cost of waste disposal per unit volume. However, water protection Opex has fallen from the levels observed in 2009 and 2010, perhaps contrary to the expected effect of increasing regulation for water environment protection (e.g. Water Framework Directive). Spend associated with Nature Protection has seen a significant increase as compared to previous years (23% as compared to 5% in 2010).

Figure E4 – Capital Environmental Expenditure by Environmental Media: 2008 to 2011



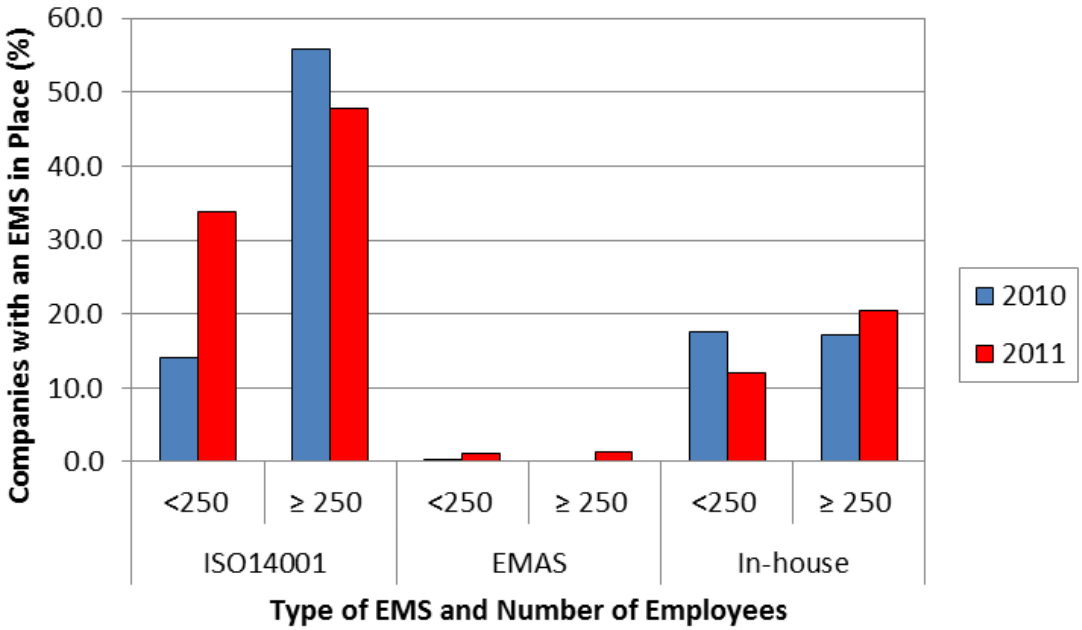
Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

Spend associated with air accounted for half of the total Capex (£116 million). Capex on water accounted for 29% of the total spend (£68 million). Spending in the 'other' category comprised 13% (£29m), whilst solid waste, soil and groundwater, noise and nature protection measures contributed the remaining 9% (£21 million).

Environmental Management Systems

Figure E5 shows the proportion of companies in 2011 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: 2010 & 2011



Note: As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> In-house) has been applied to avoid double counting. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

The proportion of companies with an EMS in place has increased since 2010 (61% of respondents in the 2011 survey, compared with 36% in the 2010 survey). This increase appears to be consistent irrespective of the scheme or company size, with the exception of the uptake of ISO 14001 by larger companies. A total of 43% of responding companies had an EMS certified to ISO 14001, and 1.3% certified to Eco-Management and Auditing Scheme (EMAS).

TABLE OF CONTENTS

1 INTRODUCTION

This report relates to the fifteenth 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 2011 survey data returned by participating UK companies. Previous surveys were carried out to estimate expenditure in 1994 (a pilot survey), 1997, and 1999 to 2010. Throughout this report, surveys are referred to by the year for which the expenditure data was collected rather than the date of publication (normally two years in arrears of actual spend).

The 2011 survey was distributed to a total of 1,062 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 smaller sample size used in the 2009 survey, a larger sample having been used during the interim survey for 2010 as part of the approach to increase efficiency and to reduce 'survey fatigue'.

To provide some context and to allow broad trends to be established, grossed figures from the previous three surveys (2008-2010) are presented with those from the 2011 survey. Sector specific figures are also presented alongside those from the 2008-2010 surveys.

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

- In the 2010 and 2011 surveys, a change has been applied to the validation method of survey returns for the Water Supply and Treatment sector (SIC 36). This was adjusted to reduce the 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 2010 survey was extended to a wider number of industry sectors and participants than the 2008, 2009 and 2011 surveys, as a result only comparable sectors have been selected from the 2010 sample where figures are presented as a percentage of the total spend. As the 2008 and 2009 surveys used a similar sample frame to that of the 2011 survey (with the inclusion of the Paper and Pulp sector instead of the Machinery and Electrical Equipment sectors) they have not been adjusted.
- 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, 2009 and 2011 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 2011 survey covers expenditure incurred in the financial year 2011/2012. In accordance with EU regulations, industries that have been surveyed are those in NACE[1] sections C, D and E (extraction, manufacturing, and energy and water supply). These are classified according to the 2007 SIC codes (listed at the end of this report). 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;
- 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.

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

- **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 2010, and research on environmental protection expenditure in 1994 (pilot study). The current report and those from previous surveys can be downloaded via:
www.gov.uk/government/publications/environmental-protection-expenditure-survey

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** Capex 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 via:
www.gov.uk/government/publications/environmental-protection-expenditure-survey

2 SURVEY METHODOLOGY AND PREPARATION

As in previous years, the 2011 survey consisted of three phases, sub-divided into the following individual tasks/activities:

Pre-survey phase (April 2012 – May 2012):

- Review of the 2010 survey and introduction of modifications
- Promotion of 2010 survey results
- Steering Group meeting participation
- Request submitted for company data from the UK Government's Inter Departmental Business Register (IDBR)

Survey phase (June 2012 – January 2013):

- 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 2011 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 2012 – June 2013):

- 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 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 in the years subsequent to the 2006 survey, to improve both awareness of the survey aims and benefits, and the clarity of survey definitions, to encourage participation and increase the survey response rate. These modifications include, for example, the following activities:

- Linked to the continuation of reducing respondent burden, micro-sized companies (with 1 to 9 employees) were again excluded from the 2011 survey. Similar to previous years, companies received a covering letter tailored to the company size (small to medium sized enterprises (SMEs) versus large companies (those with over 250 employees)). 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 2011 survey questionnaire, an e-mail was sent out to all companies that responded to the 2010 survey which were also included in the 2011 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 initial 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.
- A combination of reminder letter, reminder postcard and follow-up calls were utilised to elicit responses as in the 2009 and 2010 surveys.

Updates were made to the 2010 format for use in the 2011 survey. These are summarised in **Figure 2.1.**

Figure 2.1 - Summary of Questionnaire Modifications since the 2010 survey

Section / Question		Modification
Front Page Header	Data Protection Box Statement	Amended text in line with current requirements
Front Page Header	Return email address	Inserted under the return postal address
Contact Details	Helpdesk Email	Checked and updated each year, as necessary
Classification Details	Contact Details	Insertion of text to clarify name required (of the person completing the form)
2.3	Main reason for Environmental Capital Expenditure	Removal of question as the 2011 survey is a non-benchmark year
3.1	Cost Savings and Income	Removal of column for recording of quantities
3.2	Cost Savings and Income	Text amended from 'annualised' to 'annual'
4.2	EMS costs	Removal of question regarding costs of maintaining an EMS
Additional Information	Return email address	Inserted under return postal address

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 2011, the UK Government's Inter Departmental Business Register (IDBR) provided a random sample of 1,062 companies across the extraction, manufacturing, energy and water supply industries (see **Figure 2.2** below).

Figure 2.2 – Industry sectors covered by the 2011 survey

2007 SIC code	Industry
05 - 09	Mining and Quarrying
10 - 12	Food, Beverages and Tobacco Products
19	Coke and Refined Petroleum
20 & 21	Chemicals and Pharmaceuticals
24 & 25	Basic and Fabricated Metals
27 & 28	Machinery and Electrical Equipment
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, this 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 159 'Top Companies' were selected based on their employee number and turnover (including the top 50 ranked by employee number and turnover), ensuring that all sectors within the sample were represented.

In previous years with a smaller sample size, 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 could mask trends. Therefore the same approach was taken as in the 2010 survey, that is, the two sectors were disaggregated and treated as individual sectors.

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 2010 survey database was updated for use during the 2011 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: 2011

Activity	Quantity	Comment
Pre survey e-mail	1	In previous surveys, e-mails have been issued prior to the survey launch to those companies in the sample that responded or had shown an interest in responding to the previous survey. This was continued for the 2011 survey and the e-mail invited the company to participate in the 2011 survey and provided key information from the previous 2010 survey. Due to the reduction in sample size from the 2010 to 2011 surveys a limited number of companies were included in this process.
Survey questionnaire	1,062	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 and postcard were sent out.
Reminder letter to elicit responses	801	A reminder letter was sent to 75% 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	179	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	0*	Number of returned surveys removed from the sample prior to analysis because they were in effect blank returns.
Helpdesk support	296	Number of times the Helpdesk was contacted by companies, via telephone calls, forms, emails and letters.

*In previous surveys, certain returns were removed as they were in effect blank. However, in the 2011 survey whilst some returns identified zero employees or limited expenditure information, these were retained as they were felt to be representative of the sectors (e.g. many were located in the Energy Production and Distribution sector) and a reflection of the market place. Not included in this figure, is the response from one company which was excluded from the grossing up procedure as the expenditure reported was not felt to be representative of the sector as a whole, but included in the final result.

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.

- **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 2011 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 (2011), 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. An additional factor for many companies declining to participate was the voluntary nature of the survey.

In total, 25% of 2011 Top Companies were classed as uncontactable (including instances where initial contact was made but new contact details were not correct or no message could be left). This is likely to be a result of out-of date contact details as only a small number of companies who completed the 2010 survey were included in the 2011 sample. However, the targeted Top Company calls helped to minimise this issue and increased the response rate largely through identifying the most appropriate person within the organisation and extracting up-to-date contact details.

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: 2011

Response	Quantity
Returned Questionnaire*	**36**
Company declined to participate	19
Indicated the survey would be returned, but URS did not receive completed survey	10
URS left a message	41
Supplied URS with a new contact/number- no response	4
Said they would pass it on to somebody more appropriate	3
Asked for the survey to be resent	15
Company was uncontactable / no response	27

**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 36 surveys were returned from the 159 Top Companies invited to participate (i.e. a response rate of 23%), which is an increase on the 2009 response rate of 18% and only a marginal decrease on the 2010 response rate of 24%.

3.3 HELPDESK SUPPORT

A dedicated Helpdesk, with direct phone, fax lines and email account, was available to participating companies throughout the survey response period (September 2012 – January 2013). 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 2011 survey period: www.gov.uk/government/publications/environmental-protection-expenditure-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 1,062 companies, the total number of validated responses was 225 giving a response rate of 21%, one of the highest response rates in recent surveys. The response rates are summarised in **Figure 4.1** below. The output of the data is presented in **Annex 5**.

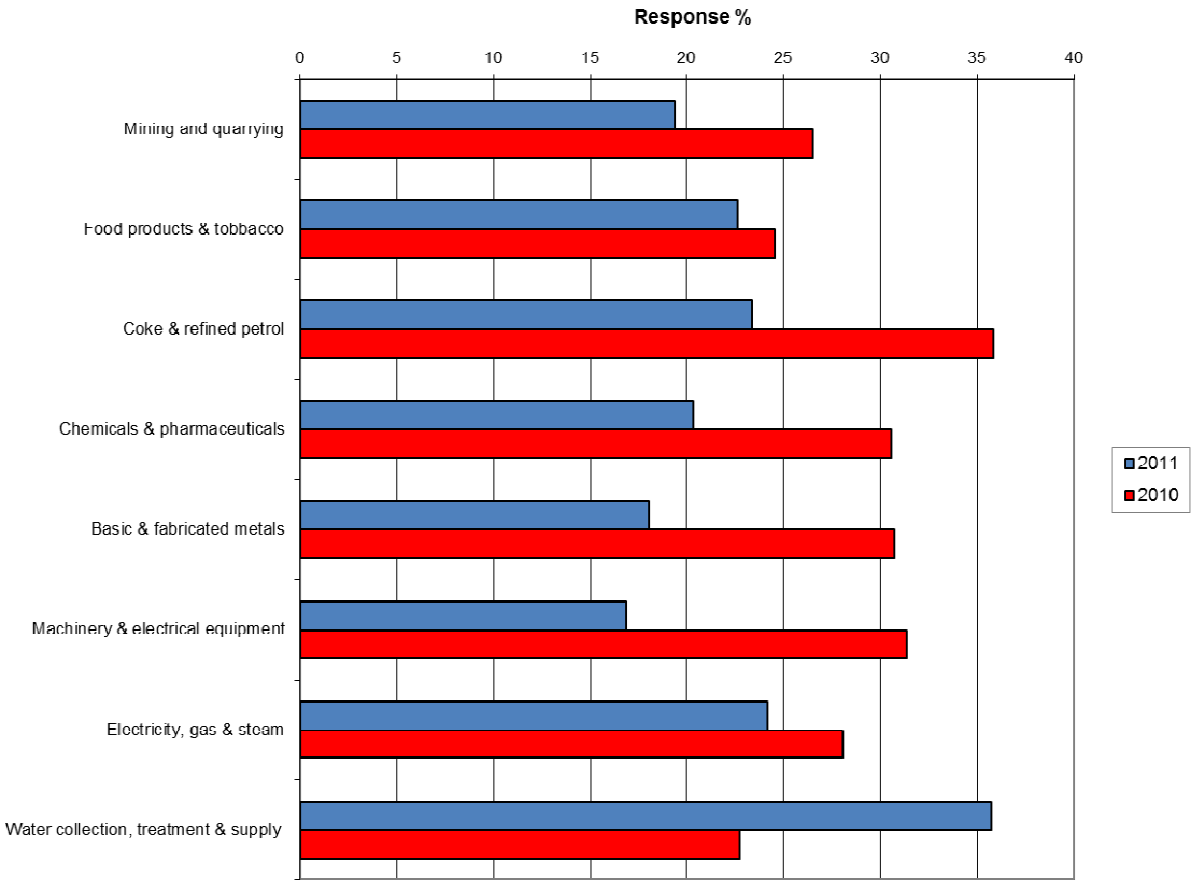
Figure 4.1 – Survey Response Rates: 2008 to 2011

Aspect	2008	2009	2010	2011
Number of companies invited to participate	1008	974	7827	**1062**
Number of (valid) survey returns	204	171	2352	**225**
Proportion of (valid) responses (%)	20.2	17.6	30.0	**21.2**

The 2011 survey sees a return to a response rate similar (although still greater) to that of the smaller surveys (2008 & 2009) following a higher rate for 2010.

As shown by **Figure 4.2** below, in general the response rates for individual sectors decreased as compared to the 2010 survey, this was to be expected given the overall decrease in response rate. The exception to this is for the Water Treatment and Supply sector which has actually seen an increase in response rate since 2010.

Figure 4.2 – Survey Response Rate by Sector: 2010 & 2011



Note: Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

The Water Treatment and Supply sector has seen a return to the high return rates prior to 2010 and is the only sector with a higher response rate than that of 2010. In the 2011 survey the lowest response rate was in the Machinery and Electrical Equipment sector.

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 2011 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 in any one year of the survey (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 Opex, which would be expected to be more consistent from one year to the next. Details of the derivation of standard error and confidence interval are presented in **Annex 7**.

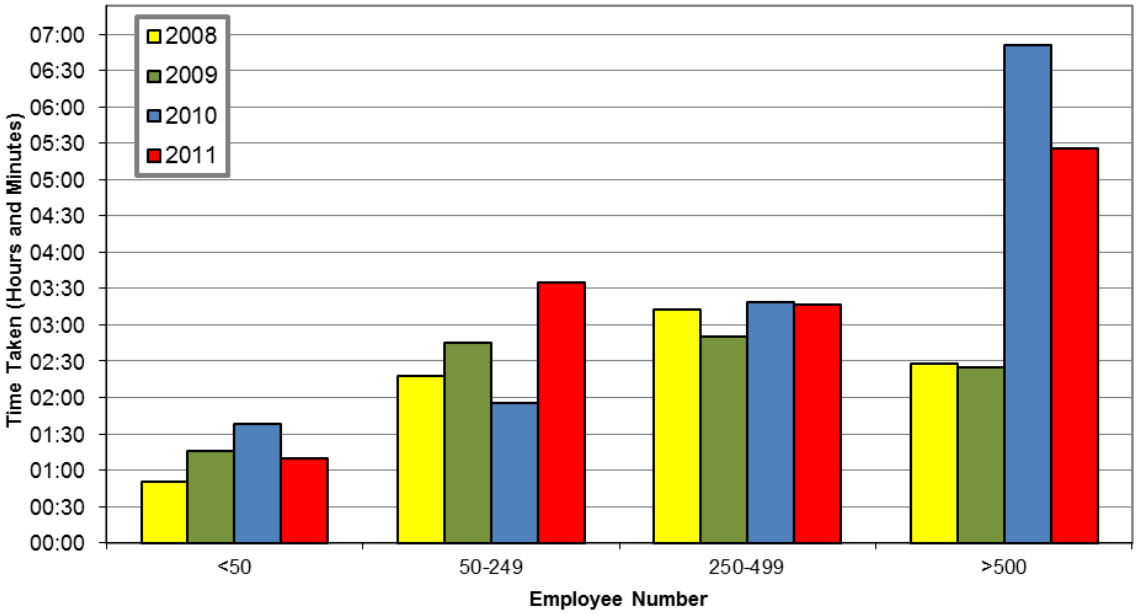
4.5 SURVEY COMPLETION TIME

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 11 minutes to complete the 2011 survey questionnaire (compared to 1 hour 38 minutes for the 2010 survey)
- Between 50 and 250 employees spent an average of 3 hours 37 minutes completing the questionnaire (compared to 1 hour 55 minutes for the 2010 survey).
- Between 250 and 500 employees took, on average 3 hours 17 minutes (comparative to the 2010 average of 3 hours 19 minutes).
- For companies with over 500 employees, completion time was similar to 2010 previous years, with an average completion time of approximately 5 hours 26 minutes (6 hours 51 minutes in 2010).

For the 2011 survey, the average reported time taken for companies with between 50 and 249 employees has significantly increased, whilst companies with less than 50 and more than 500 employees have on average, completed the questionnaire quicker than in 2010.

Figure 4.3 – Breakdown of Mean Survey Completion Time by Company Size: 2008-2011



Note: Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

5 SURVEY RESULTS AND ANALYSIS

5.1 TOTAL EXPENDITURE

The total gross spending on environmental protection in 2011 by UK industry amounted to an estimated £2.3 billion (±£260 million at the 95% confidence level), which equates to a 5% increase on 2010 spend (£2.2 billion).

In 2011, Opex accounted for approximately 90% (£2.1 billion) of total spending, with Capex at 10% (£0.2 billion). This majority spend on Opex is similar to that observed in previous years.

External Opex accounts for a greater proportion (47%) than in-house Opex (32%) reflecting the split seen in 2010 (external accounting for 35% and in-house accounting for 33%). In contrast with 2010, Capex in 2011 comprised largely of spend on end of pipe costs (representing 8% of total 2011 spend, compared to 5% in 2010), with spending on integrated processes accounting for only 2% of the total spend (20% in 2010). Spend on environmental research and development (R&D) has increased proportionally as compared to previous years (10% in 2011, 7% in 2010). The decrease observed in Capex as a proportion of total environmental spend has been seen again in 2011.

A summary of 2011 environmental expenditure is presented in **Figure 5.1,** along with equivalent data for 2008, 2009 and 2010. Ranges indicating the 95% confidence intervals associated with each value are provided in parenthesis for the 2011 data.

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 Protection Expenditure: 2008 to 2011

	2008	2009	2010	2011	
	% of gross	% of gross	% of gross	Total expenditure (£M)	% of gross
Operational Expenditure					
In-house	19	37	33	738 (215-1,260)	32
External	33	19	35	1,092 (1,026-1,158)	47
Research & Development	4	2	7	239 (28-451)	10
Total Opex	**55**	**58**	**75**	**2,069** (1,821-2,316)	**90**
Capital expenditure					
End of Pipe	20	29	5	180 (148-213)	8
Integrated processes	24	13	20	52 (38-67)	2
Total Capex	**45**	**42**	**25**	**233** (197-269)	**10**
Gross expenditure					
Total gross spend	**100**	**100**	**100**	**2,302** (2,042-2,561)	**100**
Income					
Income from by-products	0	1	2	83 (30-135)	4
Total net expenditure				**2,219** **(1,953-2,485)**	
Cost savings				**153** **(97-209)**	

Note: Comparisons between years should be treated with caution. Data from the 2010 survey is presented above as the most recent survey. As a larger sample frame was used, the figures have been adjusted be comparable to the SICs included in the 2011 sample. The 2008 and 2009 surveys used a similar sample frame to that of the 2011 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery and Electrical Equipment. Totals and percentages may not add due to the effects of rounding.

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 25% (£458 million) of the total spend on operational processes in 2011 (£1,830 million), the area with the greatest expenditure in terms of external operating costs. Spend associated with water comprised 23% of total Opex spend.

Spend associated with Nature Protection was the greatest in terms of internal Opex, and represented an increased proportion of total Opex spend from 2010 (23% in 2011, 5% in 2010).

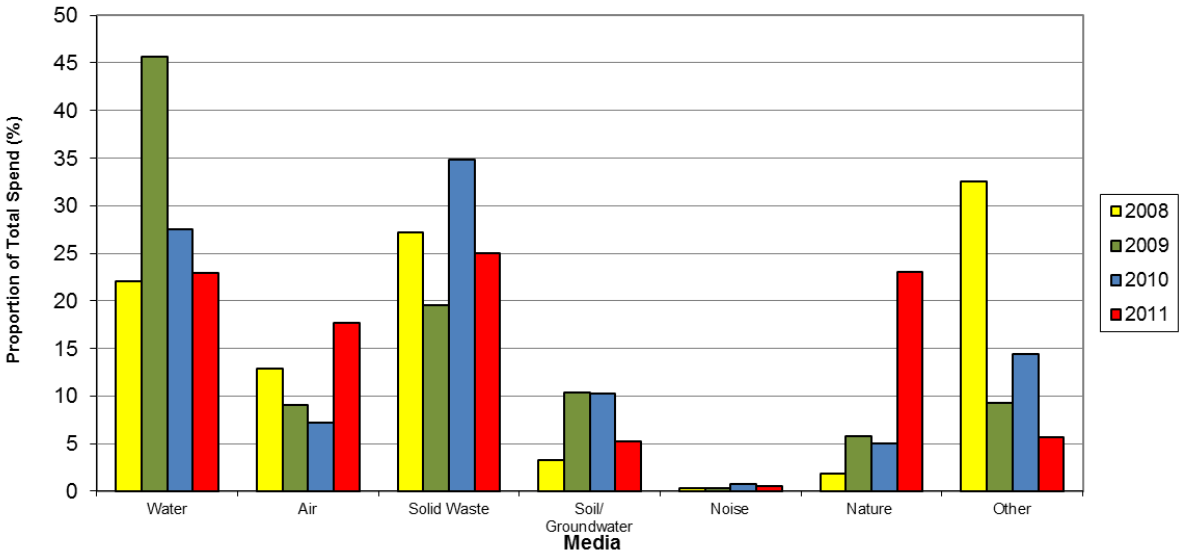
Water protection Opex has decreased from the levels observed in recent years, perhaps contrary to the effect of increasing regulation for water environment protection (e.g. Water Framework Directive).

Figure 5.2 – Environmental Opex by Media: 2008 to 2011

Environmental media	Proportion of Opex (%)				Internal (£M)	External (£M)	Sub-Total (£M)
	2008	2009	2010	2011	2011		
Water	22	46	27	**23**	128.1	290.8	418.9
Air	13	9	7	**18**	149.1	173.9	323.1
Solid waste	27	20	35	**25**	125.6	332.3	457.9
Soil/ groundwater	3	10	10	**5**	22.0	73.0	95.1
Noise	0	0	1	**1**	7.3	2.1	9.4
Nature protection	2	6	5	**23**	249.5	172.2	421.7
Other*	32	9	14	**6**	55.8	4727	103.5
				Total (£M)	**737.5**	**1092.1**	**1829.6**

**Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.*

Figure 5.3 – Environmental Opex by Media: 2008 to 2011



Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

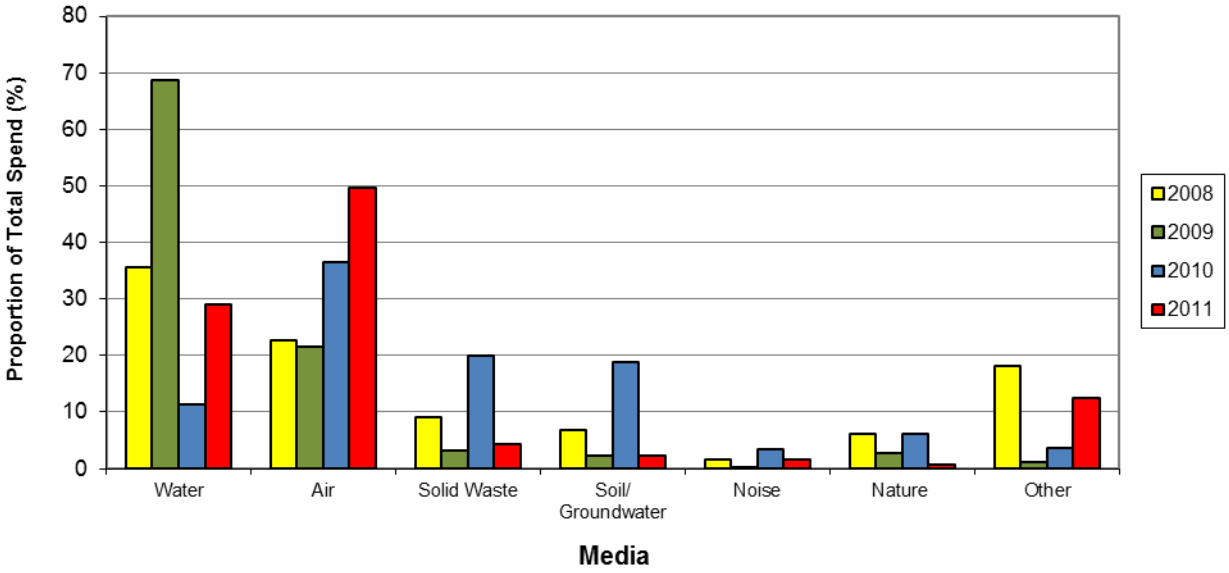
Spend on air protection measures accounted for half (£116 million) of the total Capex (£233 million). This is likely to be partly in response to the introduction (current and forthcoming) of various air quality legislation such as the Industrial Emissions Directive (IED). The second highest media category in terms of Capex spend is water, with a 29% share of the total spend (£68 million). Spending in the other category comprised 13% (£29 million), whilst solid waste, soil and groundwater, noise and nature protection measures contributed the remaining 9% (£21 million).

Figure 5.4 – Environmental Capex by Media: 2008 to 2011

Environmental media	Proportion of Capex (%)				Integrated (£M)	End of Pipe (£M)	Sub-Total (£M)
	2008	2009	2010	2011	2011		
Water	36	69	11	**29**	10.4	57.4	67.8
Air	23	22	37	**50**	10.9	104.8	115.7
Solid waste	9	3	20	**4**	4.6	5.3	9.9
Soil/ groundwater	7	2	19	**2**	2.8	2.5	5.3
Noise	2	0	3	**2**	2.0	1.6	3.6
Nature protection	6	3	6	**1**	0.5	1.0	1.5
Other*	18	1	4	**13**	21.3	7.9	29.2
				Total (£M)	**52.5**	**180.5**	**233.0**

**Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.*

Figure 5.5 – Environmental Capex by Media: 2008 to 2011



Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

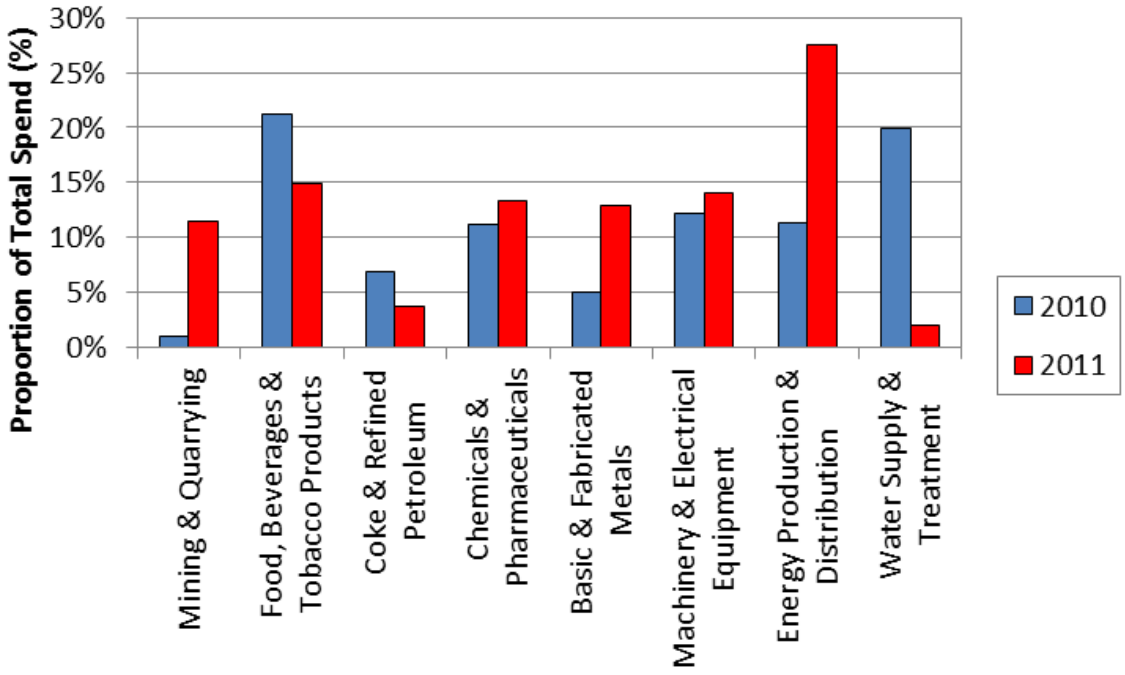
5.3 OVERVIEW OF SECTOR EXPENDITURE

In recent years the distribution of spend amongst sectors has been dominated by a single sector. In 2008 and 2009 the combined 'Electricity, Gas and Water' sector was consistently the dominant sector by spend (81% of total expenditure). In 2010 this combined sector was split[2], and the sector with the highest spend was identified as the 'Food, Beverages and Tobacco Products' sector (24% of total expenditure in 2010). For 2011 spend the 'Energy Production and Distribution' sector (part of the 'Electricity, Gas and Water' sector prior to the 2010 survey) had the highest spend (27% of total expenditure), driven by an increase in Opex which may reflect the safeguarding of existing assets.

Figure 5.6 shows the total expenditure by sector between the 2011 and 2010 surveys.

[2] As recommended in the 2009 survey report and implemented in the 2010 survey, the Energy (SIC 35) and Water (SIC 36) sectors were segregated once again for the 2011 survey to allow more meaningful analysis to be conducted.

Figure 5.6 – Breakdown of Total Environmental Expenditure by Sector: 2010 & 2011



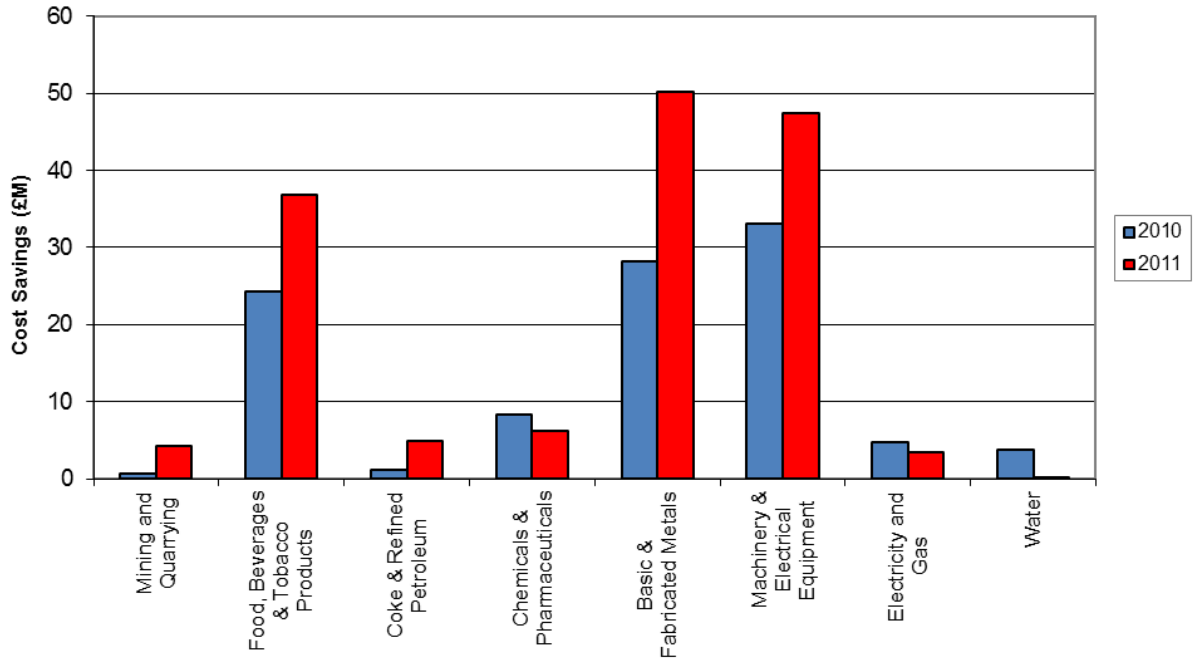
Note: Comparisons between years should be treated with caution. Please note that a larger sample frame covering a greater number of sectors was used in the 2010 survey compared to that used in the 2011 survey. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

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 2011 compared to 2010.

Figure 5.7 – Cost Savings by Sector: 2010 & 2011



Note: Comparisons between years should be treated with caution. Please note that a larger survey frame covering a greater number of sectors was used in the 2010 survey compared to that used in the 2011 survey.

The estimated total cost savings in 2011 were £153 million (equating to 7% of total gross spend), compared to £104 million in 2010 (equating to 5% of total gross spend). The two sectors with the greatest cost savings are the same as those for 2010, with the Basic and Fabricated Metals sector recording total cost savings as £50.3 million (£28.2 in 2010) and the Machinery and Electrical Equipment sector recording savings of £47.4million (£33.1 million in 2010).

Cost savings are broken down by media for 2008 to 2011 in **Figure 5.8** below.

Figure 5.8 – Cost Savings by Environmental Media: 2008 to 2011

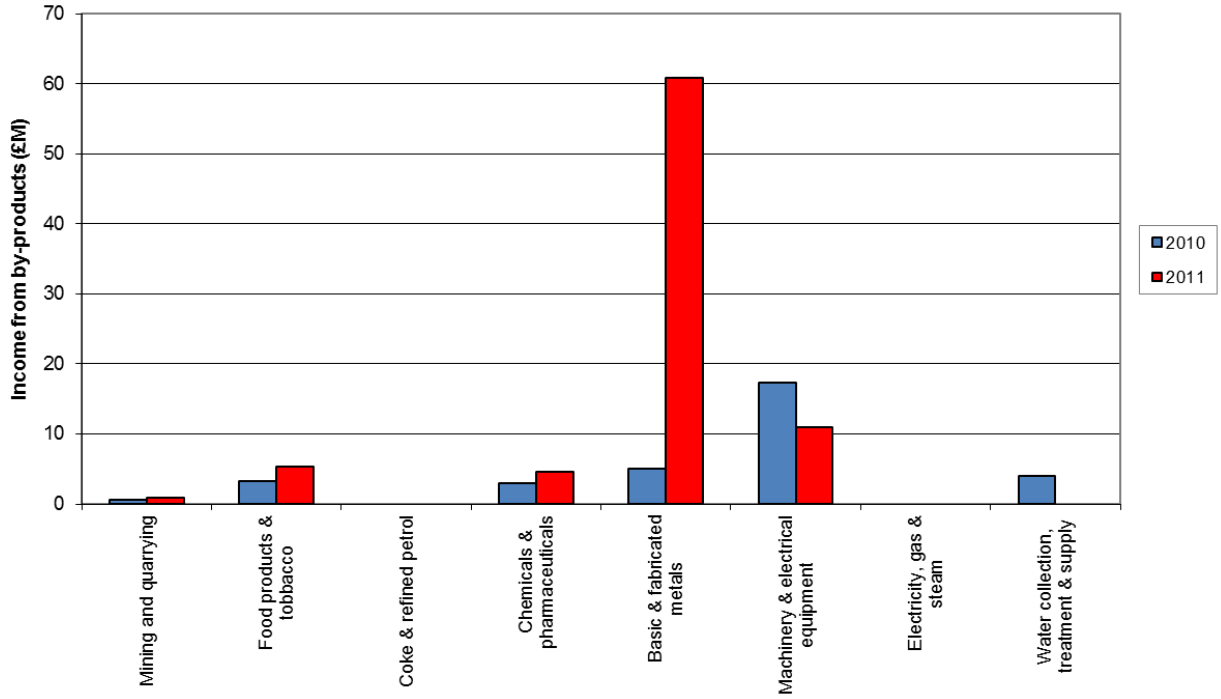
Environmental media	2008	2009	2010	2011	
	% of Total Savings	% of Total Savings	% of Total Savings	**Total Cost Savings (£M)**	**% of Total** Savings
Raw materials	20	10	35	**83.5**	**55**
Water use	10	7	9	**5.8**	**4**
Energy use	28	30	34	**41.5**	**27**
Waste	42	50	22	**19.9**	**13**
Other	1	3	1	**2.3**	**2**
Total	**100**	**100**	**100**	**153.1**	**100**

Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

The highest cost savings in 2011 were associated with improved use or substitution of raw materials (55% of total savings), continuing the increasing trend from 2009. The second highest cost saving category was improved energy use with approximately one-third (27%) of the overall savings similar to previous years. The remaining 19% results from cost savings associated with waste, 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 the 2010 and 2011 surveys are shown in **Figure 5.9** below.

Figure 5.9 – Income from By-Products by Sector: 2010 & 2011



Note: Comparisons between years should be treated with caution.

Income resulting from the sale of by-products in 2011 was £83 million (equating to 4% of total gross spend), continuing the upward trend in recent years. As in 2010, the Basic and Fabricated Metals sectors were the dominant leaders in terms of income generated from the sale of by-products during 2011.

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 2011:

- **Key Expenditure:** Summary of key 2011 data by Opex and Capex categories, along with expenditure in 2008 to 2010.
- **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 2011 data by cost savings and by-product sales, along with data from 2008 to 2010.

As in previous years, experts within the relevant field have been asked to comment on the following sectors, to provide more 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	33
Food, Beverages and Tobacco Products	10-12	36
Coke and Refined Petroleum	19	38
Chemicals and Pharmaceuticals	20 & 21	40
Basic and Fabricated Metals	24 & 25	44
Energy Production and Distribution	35	47
Water Supply and Treatment	36	49

When looking at the sector analyses, it should be remembered that direct comparisons between survey years are not possible due to variances in the sample size between the smaller 2008, 2009 and 2011 surveys and the larger 2010 survey, as well as 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 129 invited to participate in the 2011 survey, a total of 25 companies returned valid responses, giving a response rate for the sector of 19%. This is a significant reduction from the 26% response rate for the 2010 survey.

The Mining and Quarrying sector has a relatively small number of sizable companies in the UK, which do not necessarily participate in the survey each year and thus increases the potential for skewed

results. This has been found to be the case in the 2011 survey, with the returns biased to towards one sub-sector area with very few returns from other sector areas, most notably primary aggregates, (including cement) and brick making. It is therefore considered there is insufficient data to provide any comparative assessment analysis for this year.

Key Expenditure

Environmental expenditure for this sector is shown in **Figure 5.10** for the years 2008-2011. The data is presented separately for Opex and Capex.

Figure 5.11 –Total Environmental Expenditure: Mining and Quarrying, 2008 to 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	Total	End of Pipe	Integrated	Total	
2011	127.4	51.8	0.5	**179.7**	77.8	7.7	**85.5**	**265.2**
2010	75.2	42.8	0.3	**118.3**	20.6	1.5	**22.1**	**22.1**
2009	15.0	8.9	0.3	**24.1**	0.8	6.9	**7.7**	**31.8**
2008	7.6	25.1	0.8	**33.5**	31.7	108.0	**139.7**	**173.2**

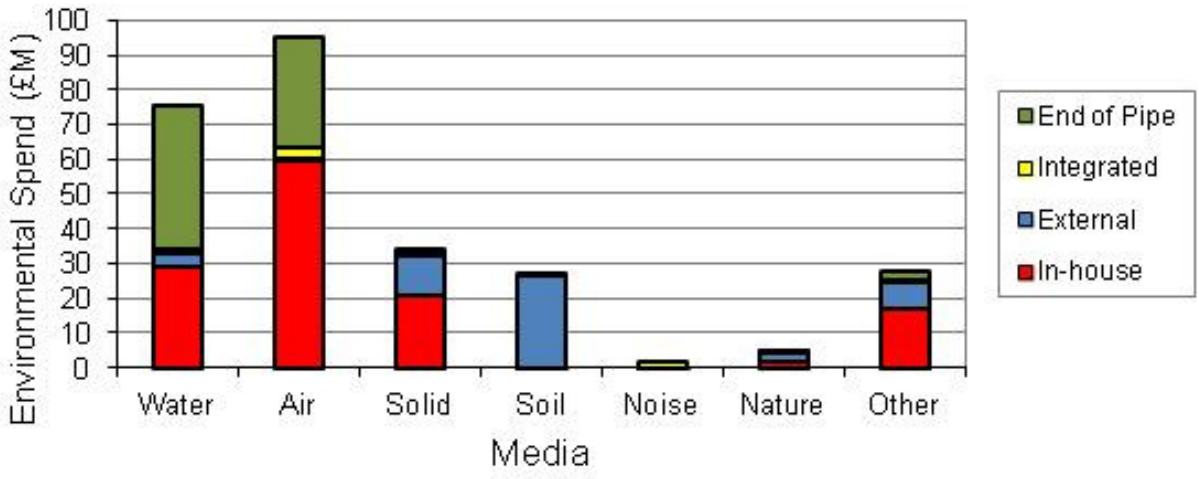
Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution.

The Mining and Quarrying sector spent approximately £265 million in 2011 on environmental protection measures, an apparently significant increase on 2010 spend. The increase in expenditure in 2011 is in contrast to the general decline in the production of primary aggregates during the 2008-2011 period and general economic downturn. With only a limited number of questionnaire returns and without more detailed sub-sector analysis, it is not considered meaningful to propose reasons for the increase in total expenditure.

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, 2011



Note: 'Other' includes regulatory charges.

The greatest environmental spend was on air pollution abatement measures, followed by water measures. Both were dominated by in-house and end of pipe expenditure with integrated expenditure accounting for just 3% of spend by the sector.

Income and Savings

In 2011, income and savings for the Mining and Quarrying sector were approximately £5.1 million. This is presented along with the 2008, 2009 and 2010 survey data in **Figure 5.12**. It should be noted that the change in survey design and the reduced number of companies within the sample/responding may be responsible for the variation within year-on-year results. There has also been a marked reduction in active production units due to trading conditions in the period 2009-11, direct comparisons are therefore difficult.

Figure 5.13 – Income and Savings: Mining and Quarrying, 2008 to 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	0.0	0.1	4.0	0.1	0.0	**4.2**	0.9
2010	0.1	0.0	0.0	0.0	0.5	**0.7**	0.6
2009	0.1	0.1	1.4	0.0	0.1	**1.6**	1.1
2008	0.2	0.3	0.0	0.1	0.1	**0.7**	0.5

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution.

Cost savings in the sector for 2011 increased substantially to £4.2 million and is largely due to energy reduction and/or efficiency. The increase in cost savings is likely due to companies endeavouring to achieve a reduction driven by escalating energy costs.

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

Estimates of environmental protection expenditure and income and savings are provided below for the Food, Beverages, and Tobacco Products sector. Of the 243 companies invited to participate in the 2011 survey, a total of 55 returned valid responses were received, giving a response rate for the sector of 22.6%.

Key Expenditure

The Food, Beverages, and Tobacco Products sector spent approximately £342 million in 2011 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.13** for the years 2008-2011. The data is presented separately for Capex and Opex.

Figure 5.14 – Total Environmental Expenditure: Food, Beverages and Tobacco Products, 2008 to 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2011	100.8	219.6	4.1	**324.5**	10.3	7.4	**17.7**	**342.2**
2010	176.8	232.5	5.5	**414.8**	48.3	8.1	**56.4**	**471.2**
2009	99.2	182.4	1.7	**283.4**	13.4	25.0	**38.4**	**321.8**
2008	135.3	186.9	2.8	**325.0**	127.8	28.5	**156.2**	**481.2**

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution.

As expected Opex accounts for a greater proportion of the total spend in 2011, reflective of a still cautious economy. In the medium to long term future this can be expected to change as companies realise that to make a 'step change', more significant Capex is required e.g. significant redesign of process, adaptation of products. Environmental efficiency savings have been high on the agenda in the Food and Drink industry for many years now and so are reaching the point that all the 'easy wins' have already been achieved.

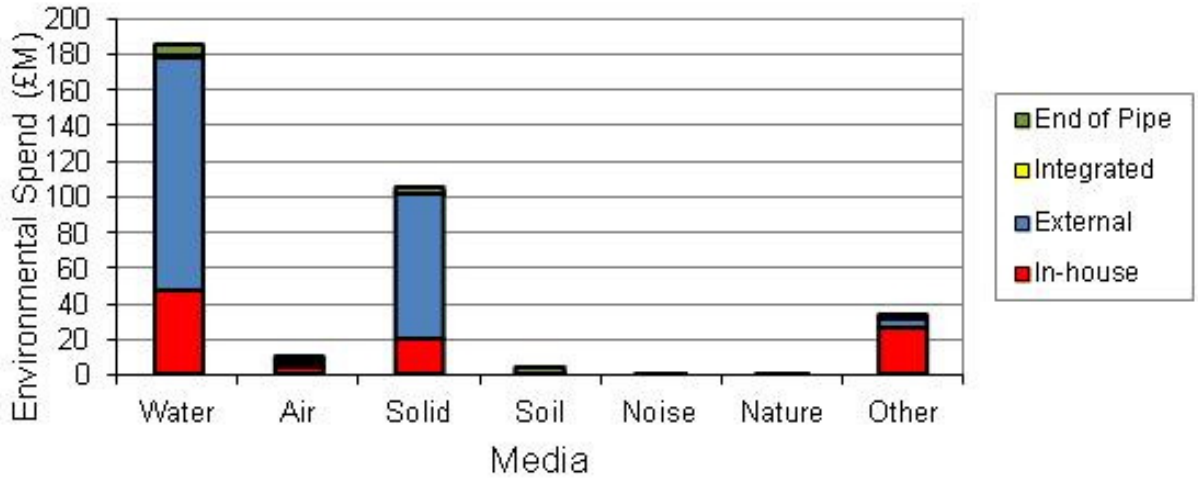
External in-house Opex remains the dominant area of spend in this sector and potentially results from the industry having fixed internal and external operating costs that cannot be reduced beyond a point due to regulatory requirements. End of pipe also continues to dominate Capex, although not to the same extreme as in 2010. This is to be expected as within the payback period that many companies work to (and the economic climate) it is easier to justify spending on an effluent treatment plant rather than a complete redesign of a production facility and potentially the product in order to achieve the same outcome.

Capex related to infrastructure upgrades is expected to increase in the future following the implementation of the IED in early 2013.

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, 2011



Note: 'Other' includes regulatory charges.

As might be expected, water has the largest spend by media, which the sector uses heavily in both the production phase, in cleaning processes and as a raw ingredient in many products. Most was accounted for by external spending which includes wastewater/effluent treatment plant equipment, maintenance and discharge costs. It is expected that water will continue to dominate the Food and Drink sector spending with more integrated/Capex spend in order to reduce external Opex spend.

Income and Savings

In 2011, income and savings for the Food, Beverages, and Tobacco Products sector were approximately £42 million in total. Income and savings for this sector are shown in **Figure 5.16** for the years 2008-2011.

Figure 5.16 – Income and Savings: Food, Beverages and Tobacco Products, 2008 to 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	10.3	4.5	17.3	4.8	0.0	**36.9**	5.4
2010	3.2	7.7	6.3	7.0	0.1	**24.3**	3.2
2009	6.1	2.9	6.5	8.7	2.4	**26.6**	3.4
2008	2.2	1.8	2.0	3.8	0.1	**9.9**	1.0

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 area with the greatest cost savings has fluctuated in previous years, in 2011 it was identified as energy use at a value of £17.3 million. Overall, cost savings and income from by-products has increased, as more and more companies in the food and drink industry are looking at how they can 're-use' their waste rather than dispose of it. This is particularly the case with the Food and Drink sector as the waste streams generated are less hazardous compared to other sectors (e.g. water recycling, segregation of waste streams so they can be re-used rather than disposed of, use as animal feed, installation of small scale energy from waste plants on site, anaerobic digestion, coke using carbon capture from waste processes to use in the drinks).

5.5.3 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 60 invited to participate in the 2011 survey, a total of 14 companies returned valid responses, giving a response rate for the sector of 23.3% (35.8% in 2010).

Key Expenditure

The Coke and Refined Petroleum sector spent approximately £87 million in 2011 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.17** for 2008, 2009, 2010 and 2011. The data is presented separately for Capex and Opex.

Figure 5.17 – Total Environmental Expenditure: Coke and Refined Petroleum, 2008 to 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2011	30.9	34.9	0.9	**66.7**	20.3	0.1	**20.4**	**87.1**
2010	57.9	93.4	0.0	**151.3**	1.0	0.0	**1.0**	**152.3**
2009	9.7	11.5	0.8	**22.0**	0.8	0.1	**0.8**	**22.8**
2008	105.6	242.4	6.5	**354.5**	118.1	27.3	**145.3**	**499.8**

Note: Totals may not add due to the effects of rounding. Comparisons between years should be treated with caution.

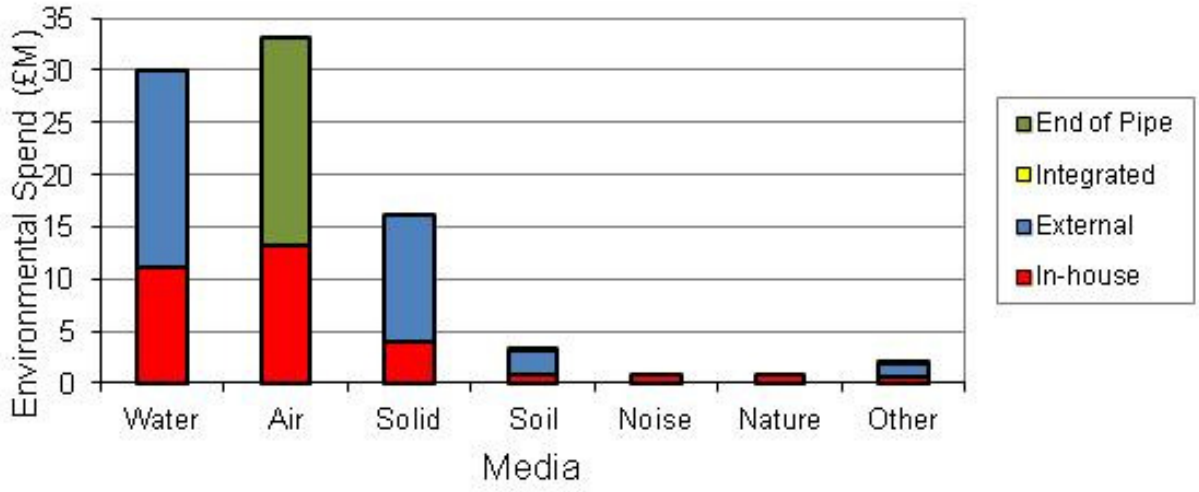
The split between Opex and Capex in 2011 is similar to levels seen in 2008, with a drop in Opex to 77% of total spend in 2011 from over 95% in 2009 and 2010. This is accounted for by both a significant decrease in Opex costs between 2011 and 2010 (from £151 million to £67 million) as well as an increase in end of pipe Capex costs. The reasons for the reduction of Opex costs is not clear, but may well be strongly influenced and biased by which companies responded to the survey. The apparent lack of investment in Capex projects in 2009 and 2010 appears to have changed, and although not at the levels observed in 2008 there is a significantly increased level of investment. It is noted however the overall environmental expenditure for the sector in 2011 represents a 43% decrease from the previous year.

As a result of the introduction of various legislation regarding air and water quality improvements, there is on-going pressure on UK refining operations going forward to commit to significant Capex. As a result, some refining operations have been closed over the last four years, whilst others have been put up for sale or sold by the traditional larger oil companies to smaller operators. Such "up-for sale" companies may be disinclined to invest in large Capex projects when the future of the refinery may be in doubt. Drivers for this change include legislation such as the IED. In addition, the long term market proposes to move away from traditional petroleum production, in favour of alternative energy sources, such as "clean coal" technology, coal gasification or investment in nuclear facilities.

Environmental Expenditure by Media

Environmental expenditure by media for the Coke and Refined Petroleum sector is shown in **Figure 5.18** below.

Figure 5.18 – Spending by Media: Coke and Refined Petroleum, 2011



Note: 'Other' includes regulatory charges.

Over a third (38%) of environmental spend was associated with emissions abatement in 2011, with a further 35% associated with water quality protection. It is envisaged that this investment is a result of the legislative drivers such as the IED. Approximately £16 million was spent on solid waste; it is envisaged that the legislative driver for this investment will continue with the annual incremental increase in landfill tax charges, encouraging companies to reduce waste, or segregate hazardous waste from non-hazardous waste.

Income and Savings

In 2011, income and cost savings for the Coke and Petroleum sector was £4.9 million. These are shown for this sector in **Figure 5.19** for the years 2008 to 2011.

Figure 5.19 – Income and Savings: Coke and Refined Petroleum, 2008 to 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	0.0	0.0	0.0	4.9	0.0	**4.9**	0.0
2010	0.0	0.0	0.0	1.2	0.0	**1.2**	0.0
2009	0.1	0.0	0.3	0.2	0.0	**0.5**	0.0
2008	6.2	5.3	10.7	32.8	0.9	**55.9**	5.3

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.

Since 2009 there has been a steady increase in the income and costs savings realised, with £4.9 million being reported in 2011. All these savings have been realised from waste. This is believed to be as a result of more efficient processes and better waste management controls and procedures. This is still a considerably reduced amount from 2008 where there was a total saving of £61.3 million reported; this large variability of the data may be associated with the sample set of companies who participated in the survey.

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 current assets are therefore likely to have reached a relatively efficient level of operation.

Consequently, future improvements in cost savings and income are most likely to be linked to major Capex projects, which will be primarily business and fuel strategy driven. The poor state of the economy, and the anticipated slow economic recovery is likely to limit Capex and hence cost saving and income in the coming years. This is particularly true if similar operations can be undertaken more cheaply elsewhere in the world where there is less environmental legislation to force increased environmental spend.

5.5.4 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 118 invited to participate in the 2011 survey, a total of 24 companies returned valid responses, giving a response rate for the sector of 20.3% (30.5% in 2010).

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 UK Chemicals and Pharmaceuticals sector continues to struggle to remain competitive with peers based in the Far East, China, and to a lesser extent, Eastern Europe. In addition the downturn in the European economy is impacting the competitiveness of the sector.

Key Expenditure

The Chemicals and Pharmaceuticals sector spent approximately £308 million in 2011 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.20** for the years 2008 to 2011. The data is presented separately for Opex and Capex.

Figure 5.20 – Total Environmental Expenditure: Chemicals and Pharmaceuticals, 2008 to 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2011	119	135.8	0.8	**255.6**	50.0	2.5	**52.5**	**308.1**
2010	87.6	115.5	8.9	**212.0**	28.8	6.0	**34.8**	**246.8**
2009	34.6	51.7	2.1	**88.4**	10.7	5.6	**16.3**	**104.7**
2008	43.5	52.4	95.4	**191.3**	9.5	11.2	**20.6**	**211.9**

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 83% of the total environmental spending by the Chemicals and Pharmaceuticals sector in 2011, which is a similar percentage spend to preceding years. This suggests that the difficult market conditions seen over the last few years may be limiting Capex in the environmental arena, probably to essential equipment replacement.

In recent years, the level of Opex has increased year-on-year, for both in-house and external techniques, and this trend is also observed in 2011. This is likely to be a function of the increasing annual costs associated with waste treatment and disposal and also wastewater effluent treatment.

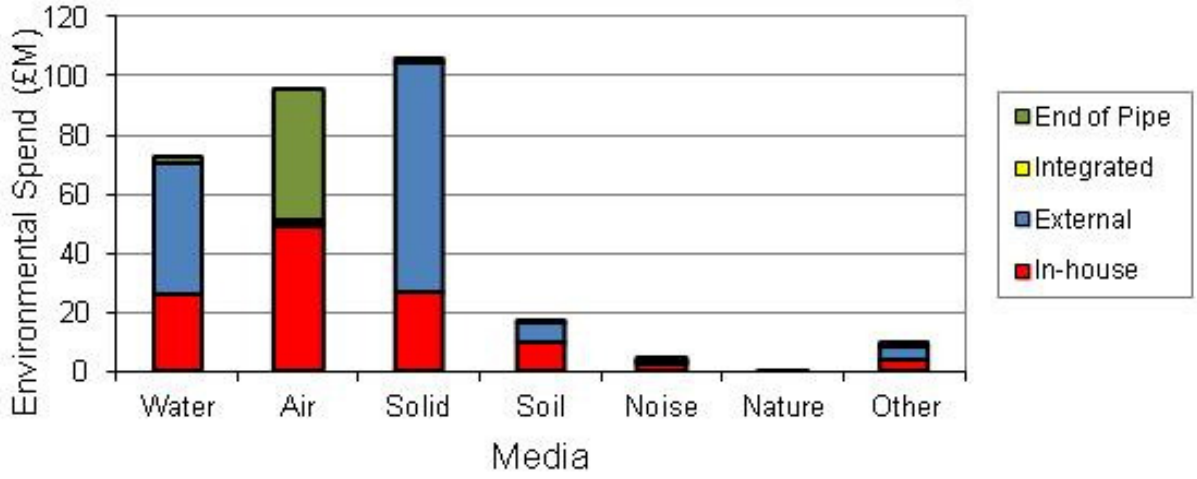
The level of R&D investment (Opex) is very low, which is probably linked to the difficult trading position of the sector and the economy.

The level of Capex for 2011 is higher than that observed in recent years, but for the industry as a whole it remains quite small at £52.5 million. The level of Capex expenditure reflects a mature regulated industry, e.g. under the Environmental Permitting Regulations regime. This is further supported by the observation that most of the Capex is for end of pipe solutions with sector process operators focussing their expenditure on emissions abatement as opposed to investing in new process / production plant and equipment due to continued economic uncertainty.

Environmental Expenditure by Media

Environmental expenditure by media for the Chemicals and Pharmaceuticals sector is shown in **Figure 5.21** below.

Figure 5.21 – Environmental Spending by Media: Chemicals and Pharmaceuticals, 2011



Note: 'Other' includes regulatory charges.

As with previous years, the sector continues to be heavily influenced by external costs for the management of water, waste water and waste from sector operations, which accounts for nominally 58% of the expenditure. The sector continues to outsource some of its environmental protection services and use third parties for managing its solid and liquid waste disposal, as well as providing water as a process raw material and for uses associated with utilities.

However, a higher level of expenditure has been observed in 2011 for in-house costs associated with air pollution control, with this category accounting for the greatest proportion of spend. This is believed to be linked to the difficult trading position of the sector and the economy, whereby expenditure has been brought in-house where possible rather than be externally spent. Spend on air pollution measures comprises a mixture of primarily end of pipe and in-house costs, probably linked to topics such as consumable costs associated with abatement equipment and monitoring costs. This is a similar trend to previous years.

Income and Savings

In 2011, 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 5.22** for the years 2008 to 2011.

Figure 5.22 – Income and Savings: Chemicals and Pharmaceuticals, 2008 to 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	1.5	0.0	2.4	2.1	0.1	**6.2**	4.6
2010	1.0	0.3	5.5	1.1	0.4	**8.3**	2.9
2009	0.0	0.2	12.9	1.2	0.1	**14.3**	7.4
2008	2.6	2.0	11.3	2.0	0.0	**18.0**	0.3

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution.

The level of income and cost savings in 2011 for the Chemicals and Pharmaceuticals sector has remained at the low levels seen in 2010. It is believed that manufacturing operations in the sector have implemented savings measures over the last few years and are operating at near optimum efficiency; hence, there is limited scope for improvement and the observed drop in energy savings.

It can be seen that a potential drop in savings and income due to a reduction in energy savings is balanced by increased revenue from by-product opportunities and waste minimisation; maintaining the income and savings level at £11 million.

Further improvements may well be possible but could require the implementation of significant levels of research and development, and Capex with longer returns on investment. These will be linked to the state of the economy.

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 Environmental Damage (Prevention and Remediation) Regulations 2009 and implementing the requirements of the revised Waste Framework Directive. The implementation of the IED in 2013 is likely to influence the 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 environmental spend is likely to focus on the requirement to maintain compliance and the application of the IED in 2013 may have a significant impact upon environmental spend.

5.5.5 SIC 24 & 25: Basic and Fabricated Metals

Estimates of environmental protection expenditure and income/savings are provided below for this sector. Of the 161 invited to participate in the 2011 survey, a total of 31 companies returned valid responses, giving a response rate for the sector of 19%.

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 £296 million in 2011 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.23** for 2008-2011.

Figure 5.23 – Total Environmental Expenditure: Basic and Fabricated Metals, 2008 to 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2011	*63.2*	*163.5*	*20.6*	***247.3***	*18.7*	*30.0*	***48.7***	**296.0**
2010	78.2	139.1	5.0	**222.3**	10.4	12.8	**23.2**	**111.1**
2009	19.0	46.6	0.7	**66.4**	27.8	7.4	**35.2**	**101.6**
2008	105.6	242.4	6.5	**354.4**	118.1	27.3	**145.3**	**499.7**

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution.

The ratio of environmental expenditure, OPEX/CAPEX, has increased from 2.4 to 5.1 since 2008 which appears to reflect a downturn in environmental capital investment in upgrading and replacement of end of pipe plant and equipment during the economic downturn. This is to be anticipated as older plant is retained for longer than originally planned, unless regulatory drivers for upgrade intervene.

The respective levels of in-house and external have remained broadly similar between 2008 and 2011 with no evident or discernible trends. In most cases, the outsourcing of specialist environmental services took place across the sector prior to 2008 and further major rationalisation is not anticipated in the foreseeable future.

Expenditure on R&D has significantly increased to 8% having remained unchanged between 2008 and 2010 at between 1.1% and 1.8% of total Environmental OPEX. This compares favourably with UK industry as a whole where expenditure for R&D in 2011 stood at 10% of total environmental expenditure.

The data indicates that environmental Capex is now dominated by integrated expenditure as opposed to the more traditional end of pipe approach which has fallen off markedly during the last four years. This trend is likely to continue as it is closely associated with improved process efficiencies and overall

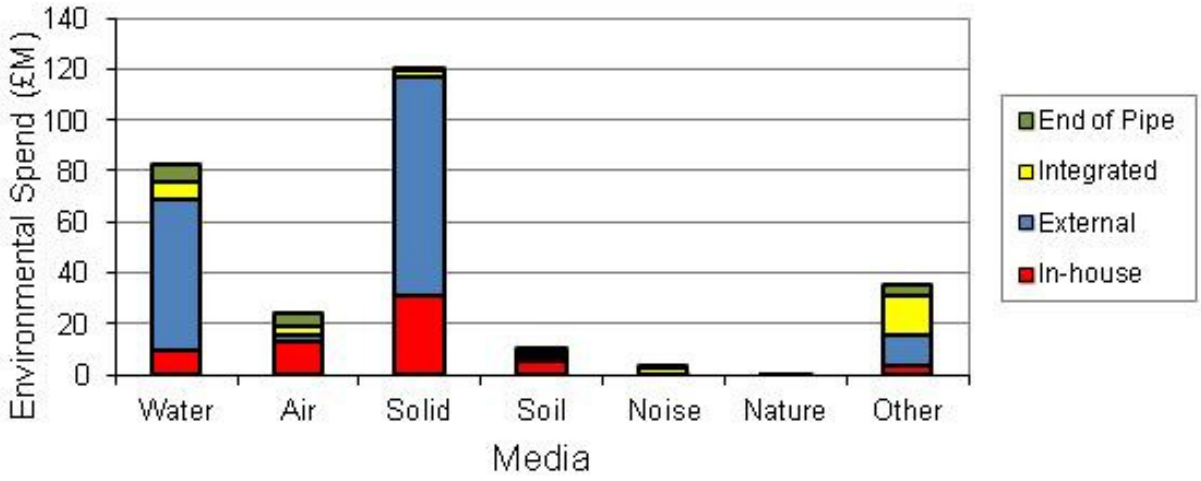
cost savings. This shift appears to be the most significant trend highlighted by the data and is perhaps not surprising given the current level of economic uncertainty in the sector and the need to target CAPEX at process and material efficiencies. Environmental benefits ensue, but do not appear to be the main driving force in what are effectively business / economic decisions.

However, the data do not allow year by year comparison on the absolute levels of environmental CAPEX / OPEX in the sector and it is quite likely that the trends and shifts identified are taking place in the context of depressed spending and investment overall.

Environmental Expenditure by Media

Environmental expenditure by media for the Basic and Fabricated Metals sector is shown in **Figure 5.24** below.

Figure 5.24 – Environmental Expenditure by Media: Basic and Fabricated Metals, 2011



Note: 'Other' includes regulatory charges.

For the sector as a whole waste continues to be the most significant environmental expenditure, followed by water. This is in contrast to industry as a whole, which is dominated by air, followed by water. As stated previously, the trend is very much biased towards integrated expenditure driven by process efficiencies, including more efficient use of raw materials and the use of by-products / recycled materials.

Income and Savings

In 2011, by-product income and savings for the Basic and Fabricated Metals sector were approximately £111 million. Income and savings for this sector are shown in **Figure 5.25** for the years 2008 to 2011.

Figure 5.25 – Income and Savings: Basic and Fabricated Metals, 2008 to 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	35.6	0.3	9.4	2.7	2.2	**50.3**	60.8
2010	0.7	0.6	15.5	11.4	0.0	**28.2**	5.1
2009	3.6	0.1	1.8	61.2	2.0	**68.7**	1.9
2008	6.2	5.3	10.6	32.7	0.9	**55.7**	5.3

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution.

Historically waste has dominated savings by media, but there appears to have been a quite dramatic shift in 2011 where raw materials savings and income from by products now predominate. This shift appears to reflect the emphasis on integrated CAPEX discussed earlier, with the emphasis on process efficiencies and associated cost savings.

5.5.6 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 109 invited to participate in the 2011 survey, a total of 18 companies returned valid responses, giving a response rate for the sector of 17% (31.3% in 2010).

Key Expenditure

The Machinery and Electrical Equipment sector spent approximately £323 million in 2011 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.26** for the years 2010 and 2011.

Figure 5.26 – Total Environmental Expenditure: Machinery and Electrical Equipment, 2010 & 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2011	34.9	74.7	207.4	**317.0**	3.2	2.9	**6.1**	**323.1**
2010	51.5	42.9	141.2	**235.5**	2.7	30.5	**33.2**	**268.7**

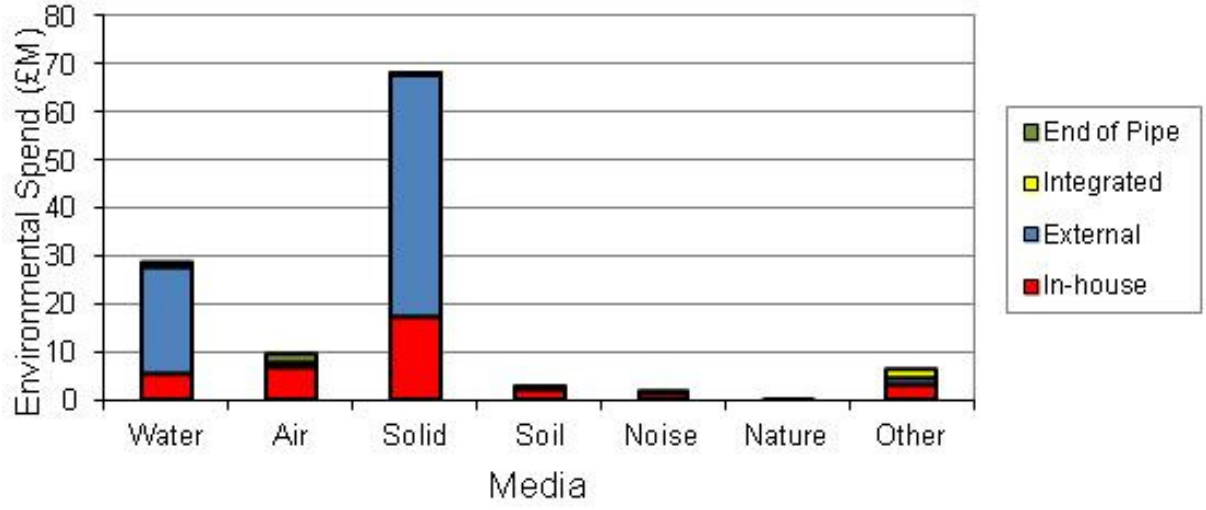
Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. This sector was only included in the survey as of the 2010 survey, therefore data is presented for 2010 and 2011 only.

In 2011, Opex accounted for the large majority (98%) of total environmental spending by the Machinery and Electrical Equipment sector, also seen in 2010 (88%). Within operating costs for the sector, there was further growth in spend on research and development as compared to 2010. In 2011, the spend on integrated Capex appears to have decreased significantly. 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 5.27** below. This sector spent approximately £68 million on dealing with the management and disposal of solid waste, over half of which is accounted for by external Opex.

Figure 5.27 – Environmental Spending by Media: Machinery and Electrical Equipment, 2011



Note: 'Other' includes regulatory charges.

Income and Savings

In 2011, by-product income and environmental cost savings for the Machinery and Electrical Equipment sector were approximately £58 million. Income and savings for this sector are shown in **Figure 5.28** for the years 2010 and 2011.

Figure 5.28 – Income and Savings: Machinery and Electrical Equipment, 2010 & 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	35.1	1.0	7.3	4.0	0.0	**47.4**	10.9
2010	28.2	0.4	3.2	1.4	0.0	**33.1**	17.4

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. This sector was only included in the survey as of the 2010 survey, therefore data is presented for 2010 and 2011 only.

Both cost savings and the income from the sale of by-products appear to have increased for the sector from 2010 to 2011. The majority of savings in 2011 resulted from improved use of or substitution of raw materials, similar to 2010.

5.5.7 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 149 invited to participate in the 2011 survey, a

total of 36 companies returned valid responses, giving a response rate for the sector of 24% (28% in 2010).

Key Expenditure

The Energy Production and Distribution sector spent approximately £633 million in 2011 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.29** for the years 2010 and 2011. The data is presented separately for Opex and Capex.

Figure 5.29 – Total Environmental Expenditure: Energy Production and Distribution, 2010 & 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2011	*251.5*	*380.3*	*0.6*	***632.4***	*0.3*	*0.0*	***0.3***	**632.7**
2010	33.0	68.7	0.7	**102.4**	3.6	143.3	**146.9**	**249.3**

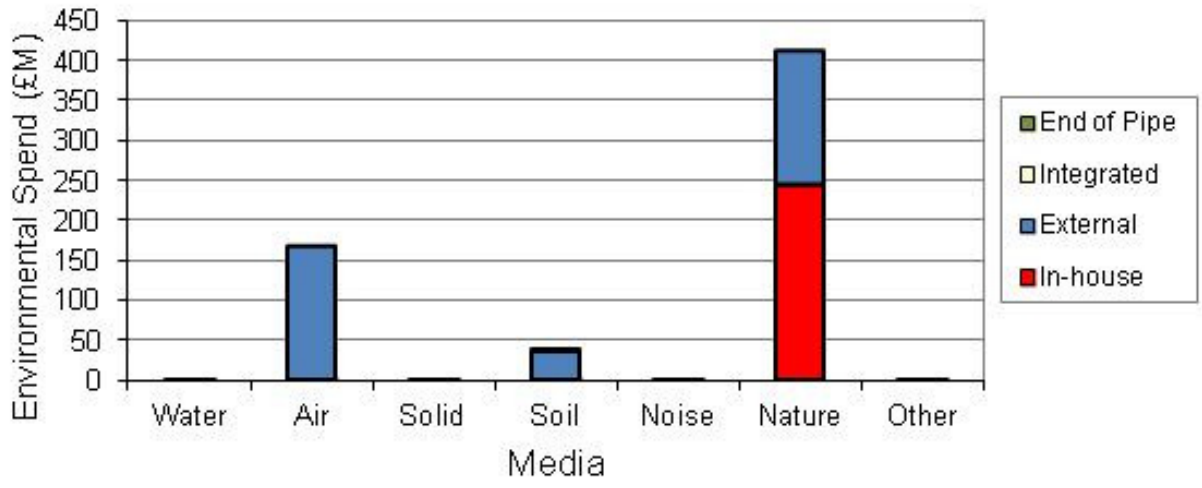
Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. This sector was only included as a separate sector in the 2010 survey, therefore data is presented for 2010 and 2011 only.

There has been a significant drop in the Capex figures for this sector in 2011 compared to 2010 dropping from £147 million to £0.3 million – this may be a reflection of the number of power stations near end-of-life but before new investment for new builds comes on line. Opex on the other hand has increase significantly between 2011 and 2010 from £100 million to £630 million. This may reflect the safeguarding of existing assets. However, given the range of size and activities within the sector and the sampling nature of the survey comparisons between years may not be meaningful.

Environmental Expenditure by Media

Environmental expenditure by media for the Energy Production and Distribution sector is shown in **Figure 5.30** below.

Figure 5.30 – Environmental Spending by Media: Energy Production and Distribution, 2011



Note: 'Other' includes regulatory charges.

Environmental spending in 2011 was dominated by in-house nature protection measures. Potential sector-wide drivers behind this are not clear, and again the trend could be distorted by a small number of site-specific projects.

Income and Savings

In 2011, by-product income and environmental cost savings for the Energy Production and Distribution sector were about £3.4 million. Income and savings for this sector are shown in **Figure 5.31** for the years 2010 and 2011.

Figure 5.31 – Income and savings: Energy Production and Distribution 2010 & 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	0.9	0.0	1.1	1.4	0.0	**3.4**	0.0
2010	3.0	0.0	1.1	0.7	0.0	**4.8**	0.0

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. This sector was only included as a separate sector in the 2010 survey, therefore data is presented for 2010 and 2011 only.

Overall savings continue to decline between 2010 and 2011, although the potential sector-wide drivers behind this are not clear and again the trend could be distorted by a small number of site-specific projects.

Aging plant and the impacts of the IED 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, it may not be captured through this survey.

5.5.8 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 42 invited to participate in the 2011 survey, a total of 15 companies returned valid responses, giving a response rate of 35.7% for this sector (22.7 in 2010).

Key Expenditure

The Water Supply and Treatment sector spent approximately £47.3 million in 2011 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.32** for the years 2010 and 2011.

Figure 5.32 – Total Environmental Expenditure: Water Supply and Treatment, 2010 & 2011

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2011	9.7	31.4	4.3	**45.4**	0.0	1.9	**1.9**	**47.3**
2010	164.3	40.0	2.1	**206.5**	0.5	233.9	**234.4**	**440.9**

Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. This sector was only included as a separate sector in the 2010 survey, therefore data is presented for 2010 and 2011 only.

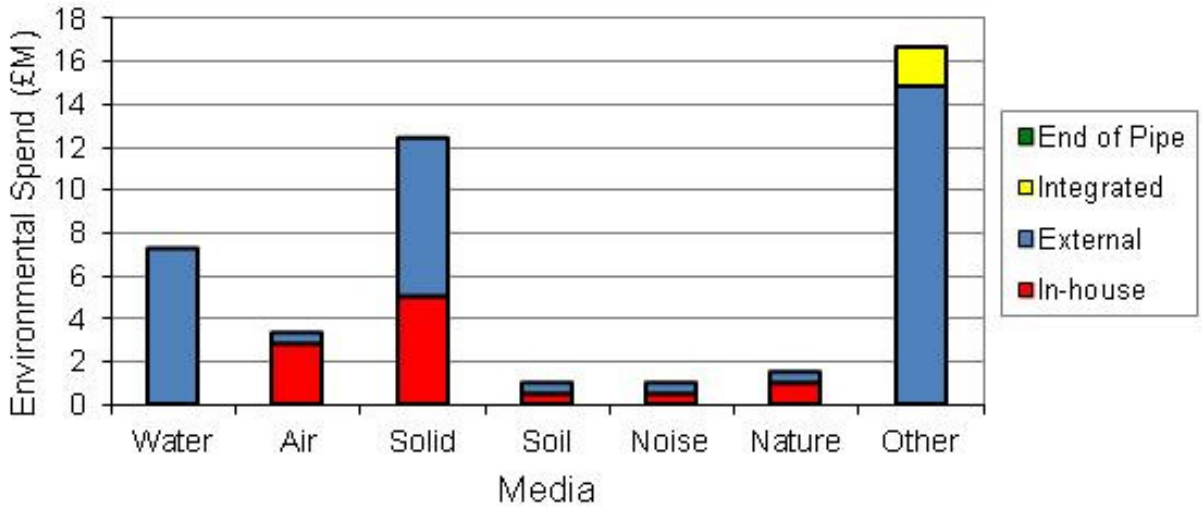
In 2011, Opex accounted for 96% of total spend compared to 47% of total spend in 2010. The majority of Opex in 2011 was dominated by external Opex (69% of Opex; compared to 19% in 2010). In-house Opex accounted for 21% of Opex in 2011, whereas this was 80% in 2010. The 2011 survey has captured substantially lower expenditure than the 2010 survey, which may be due to the larger sample size used in the 2010 survey. In view of the substantially different data sets between the two years, no substantive sector-wide trends should yet be inferred between these years.

The 2011 survey has shown that there was minimal expenditure on "end of pipe solutions" in 2011. In a sector that is dominated by well-defined end of pipe processes, such as sewage treatment, one would expect a high proportion of Capex on "end of pipe" solutions as a proportion of overall total.

Environmental Expenditure by Media

Environmental expenditure by media for the Water Supply and Treatment sector is shown in **Figure 5.33** below.

5.33 – Environmental Spending by Media: Water Supply and Treatment, 2011



Note: 'Other' includes regulatory charges.

The survey shows that 'other' media, wastewater and solid waste appear to account for the largest proportion of environmental expenditure by media in 2011. In the case of wastewater and 'other' media

(which includes regulatory charges), external Opex accounts for the majority of expenditure. This is also that case with solid waste, although in-house Opex accounts for a significant proportion of expenditure.

As noted above the total gross spend by the sector in 2011 (£47 million) was markedly different from 2010 (£441 million). The high proportion of external Opex captured by the 2011 survey could reflect the size of the companies in the sample frame. The majority of companies that responded in this sector were smaller companies which may not have the resources and skills to deliver internal environmental protection measures.

Income and Savings

Income and savings for this sector are shown in **Figure 5.34** for the years 2010 and 2011.

Figure 5.34 – Income and Savings: Water Supply and Treatment, 2010 & 2011

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2011	0.0	0.0	0.0	0.0	0.0	**0.0**	0.0
2010	0.0	0.0	2.5	0.0	0.0	**2.5**	4.9

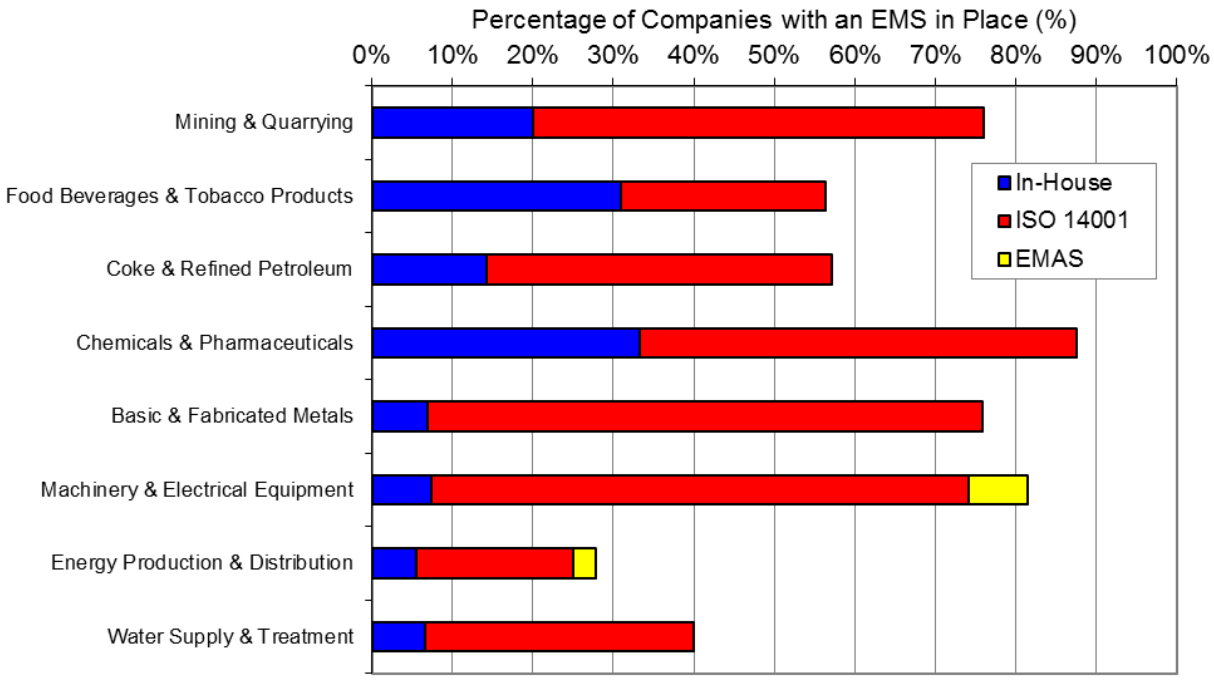
Note: Totals may not add due to the rounding effects. Comparisons between years should be treated with caution. This sector was only included as a separate sector in the 2010 survey, therefore data is presented for 2010 and 2011 only.

Minimal cost savings and income were indicated for 2011, whereas in 2010 these accounted for 2% of overall expenditure (£7.4 million). It is possible that energy savings are increasingly difficult to make over time as "easy wins" have already been made on energy saving. It is also likely that embedded energy saving measures (such as energy from sludge from existing plants) are now factored into the "business as usual" reporting rather than reported as "additional" cost savings.

5.6 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 5.35** below.

Figure 5.35 – Types of EMS used, by SIC Sector, 2011

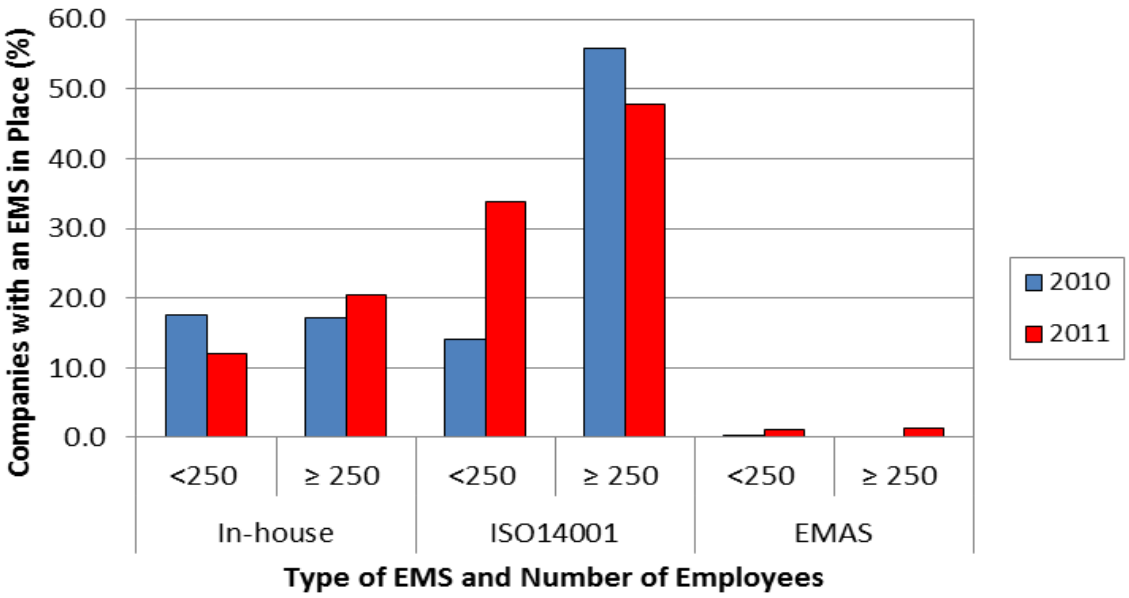


Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample. As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> In-house) has been applied to avoid double counting.

Overall, 61% of responding companies indicated that they had an EMS in place in 2011, a significant increase on 2010 (just 36%). Almost half of responding companies had an EMS certified to ISO 14001, and 1.3% certified to Eco-Management and Auditing Scheme (EMAS). Therefore, just under a quarter of the systems in place in 2011 were not externally certified (e.g. developed and implemented to meet "in-house" requirements). This indicates both an increase in take up of EMS and of externally certified schemes.

Figure 5.36 below shows a breakdown of EMS certification status by company size (i.e. number of employees).

Figure 5.36 –Types of EMS Used, by Company Size, 2011



Note: As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> In-house) has been applied to avoid double counting. Please note that due to the larger selection of sectors for the 2010 survey, figures for 2010 have been adjusted to be comparable with the sectors included in the 2011 survey sample.

In general there appears to have been an increase in smaller companies introducing externally certified EMS'. This is particularly the case with the ISO 14001 scheme, whereas its popularity has fallen among larger companies. The proportion of systems in compliance with the EMAS remains relatively low, although appear to have become more popular amongst larger companies, as have in-house schemes.

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 2011 survey process.

The main sources of feedback were through 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 four clear peaks of activity:

    1. In the first couple of weeks after the survey was initially sent out.
    2. In the fifth and seventh weeks of the survey period following the issue of a reminder letter.
    3. Around the eleventh week following the issue of a reminder postcard.
    4. Around the thirteenth week following a push in the Top company reminder call programme.

  Based on these peaks of return activity and the relatively high response rate for the 2011 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. This was particularly important in the 2011 survey following an issue with incorrect addresses used for a number of surveys in the original mail out. This led to the earlier issue of the reminder letter to those affected but did not appear to affect the end response rate.

- As in previous years, a reminder postcard was issued following the reminder letter. This was sent out following recommendations last year for a pragmatic approach to sending if it was felt it would elicit further responses. Given the issue highlighted above, it was felt it would be appropriate to target companies not issued with the reminder letter. This was an alternative approach to the 2010 survey where no postcard was sent. It is recommended that future surveys should follow a similar

pragmatic approach to the issuing of reminder postcards, based on the response rate and situation at that time.

Questionnaire Availability

- A digital version of the questionnaire was available via the Defra website for download by participating companies. As in the 2010 survey, 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 and implemented in the 2010 survey, the Energy (SIC 35) and Water (SIC 36) sectors were segregated once again for the 2011 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 is 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
URS	URS Infrastructure & Environnent UK Limited

LIST OF STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODES

From the 2007 survey onwards 2007 SIC codes have been used, as published by the Office of National Statistics (ONS) (refer to www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html). A list is provided below.

2007 SIC Code	Industry
05 - 09	Mining & Quarrying
10 - 12	Food, Beverages and Tobacco Products
19	Coke and Refined Petroleum
20 & 21	Chemicals and Pharmaceuticals
24 & 25	Basic and Fabricated Metals
27 & 28	Machinery and Electrical Equipment
35	Energy Production and Distribution
36	Water Supply and Treatment