URS

Environmental Protection Expenditure by Industry:

2012 UK Survey

Prepared for:
Department for Environment, Food and Rural Affairs

May 2014
Ref. 47067423

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Project Title:	Environmental Protection Expenditure Survey by Industry
Report Title:	2012 UK Survey
Project No:	47067423
Status:	Draft Report
Client Contact Name:	Adele Storr
Client Company Name:	Department for Environment, Food and Rural Affairs (Defra)
Issued By:	URS Infrastructure & Environment (UK) Limited

Document Production / Approval Record

Issue No: 3	Name	Signature	Date	Position
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Document Revision Record

Issue No	Date	Details of Revisions
1	March 2014	First Draft
2	May 2014	Final Report

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 2012.

The primary objectives of the study were:

- To provide Defra with an annual estimate of environmental protection expenditure by UK industry for 2012;
- To enable Defra to provide these estimates for the biennial Eurostat/OECD Joint Questionnaire on Environmental Protection Expenditure and Revenues; and
- To enable Defra to meet UK obligations under the Structural Business Statistics Regulation.

In addition to these broad objectives, data from this and previous 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 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 in assessing the impact of environmental regulations.

This is the sixteenth survey of this type; previous surveys were carried out in 1994 (a pilot survey), 1997, and annually between 1999 and 2011. As in previous years, the 2012 survey process was overseen by a steering group with representatives from Defra and the Office for National Statistics (ONS).

Methodology

The 2012 survey was provided to companies within the following Standard Industrial Classification (SIC 2007) categories:

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

The UK Government's Inter Departmental Business Register (IDBR) provided a stratified random sample of 1,097 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 227, giving a valid response rate of around 21%. 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 2012;
- 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 2012 survey

The following comprises a brief overview of key findings from the 2012 survey:

- Gross spending on environmental protection in 2012 by these UK industries was an estimated £2.4 billion (±£239 million at a 95% confidence level);
- The primary spending industry sectors were Energy Production & Distribution (29% of total spend) and Food, Beverages & Tobacco Products (16% 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, with the Energy element remaining the highest spending sector in 2011 and 2012 (Energy Production & Distribution);
- Opex accounted for 83% of the total environmental protection expenditure, with Capex making up the remainder (17%);
- Excluding spend on research and development, the area of largest expenditure across Opex was for water measures, and for Capex it was air protection measures.
- This spending was offset by an estimated income of £101 million from the sale of by-products and an estimated cost saving of £249 million.
- Overall, 70% of responding companies had an EMS in place in 2012. A total of 47% of responding companies had an EMS certified to ISO 14001, and just over 1% certified to Eco-Management and Auditing Scheme (EMAS).

Comparisons between survey years

A summary of total environmental protection expenditure by businesses for 2009 to 2012 is presented in **Figure E1**. Ranges indicating the 95% confidence intervals associated with each value are provided for the 2012 survey in parenthesis. As a larger sample frame was used in the 2010 survey (with more sectors), only comparable sectors have been selected from the 2010 sample where figures are presented as a percentage of the total spend.

Figure E1 – Summary of Environmental Protection Expenditure by UK Industry, 2009 to 2012

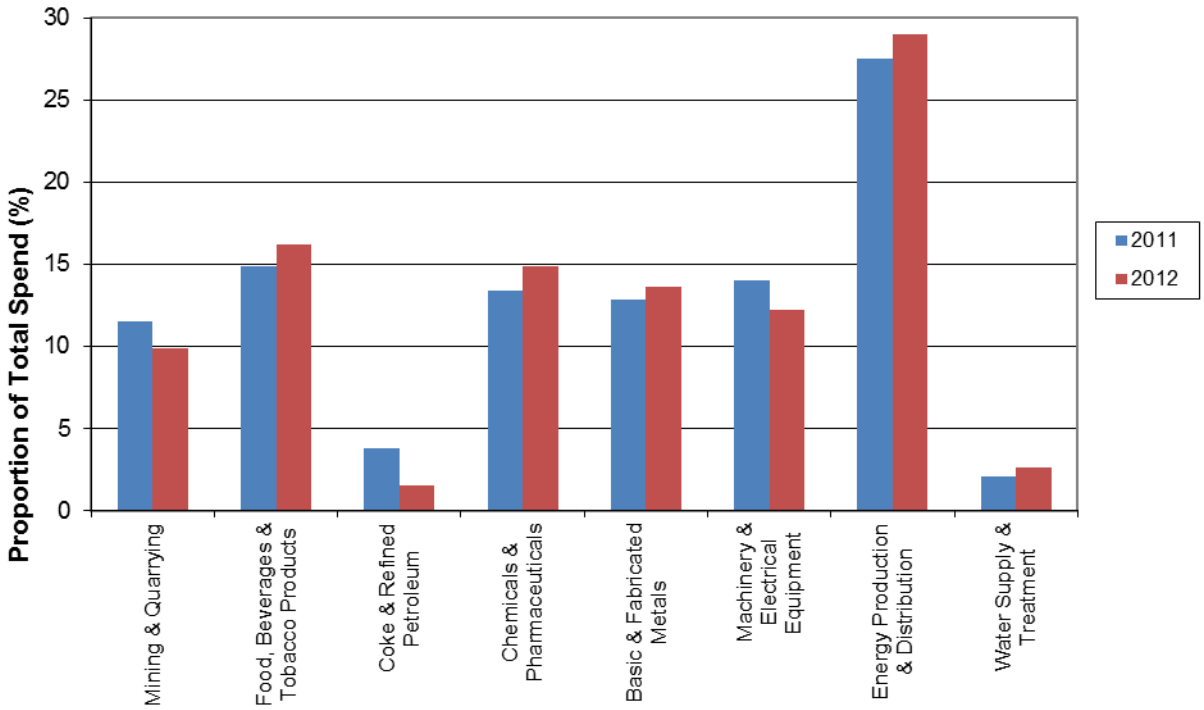
	2009	2010	2011	2012	
	% of gross	% of gross	% of gross	Total expenditure (£M)	% of gross
Operational Expenditure					
In-house	37	33	32	750 (301-1,199)	31
External	19	35	47	1,089 (1,008-1,171)	45
Research & Development	2	7	10	145 (15-274)	6
Total Opex	**58**	**75**	**90**	**1,984** (1,768-2,200)	**83**
Capital expenditure					
End of Pipe	29	5	8	128 (110-145)	5
Integrated processes	13	20	2	287 (234-339)	12
Total Capex	**42**	**25**	**10**	**414** (359-469)	**17**
Gross expenditure					
Total gross spend	**100**	**100**	**100**	**2,398** (2,159-2,637)	**100**
Income					
Income from by-products	1	2	4	101 (30-135)	4
Total net expenditure				**2,297** **(2,053-2,540)**	
Cost savings				**249** **(164-334)**	

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

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.

A summary of total expenditure by the main industry groups for the 2011 and 2012 survey years are presented in **Figure E2.**

Figure E2 – Total Environmental Expenditure by Industry Sector, 2011 & 2012

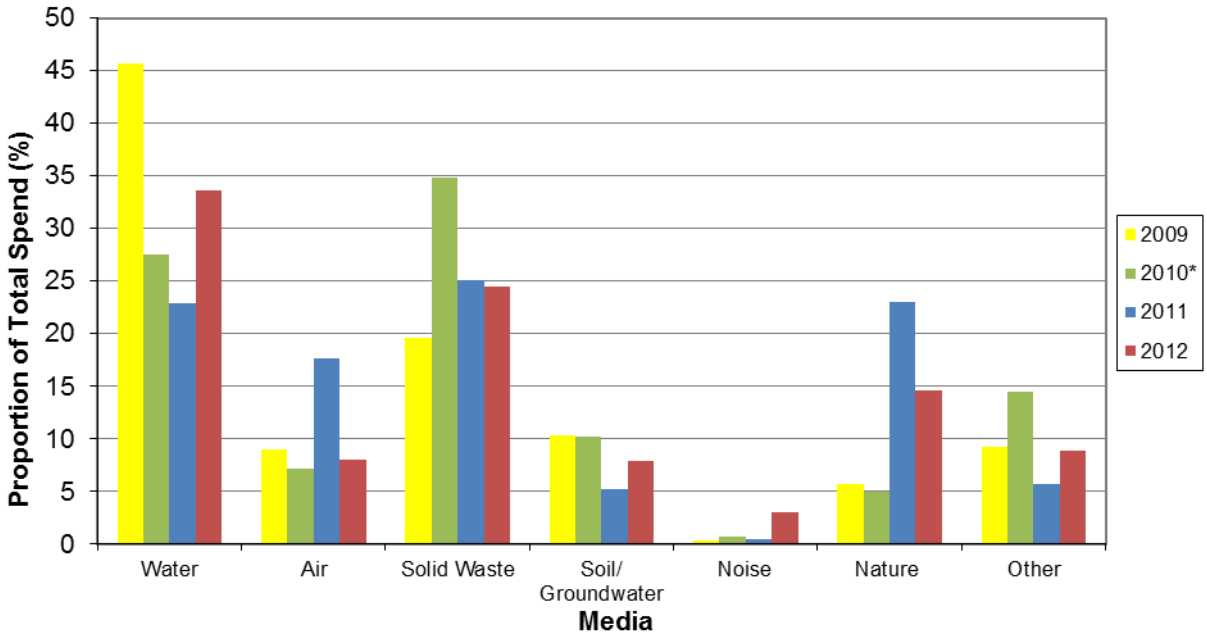


Note: Comparisons between years should be treated with caution. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The Energy and Water industry sectors have traditionally dominated the spending in previous surveys. Similar to 2011, this trend has continued in part in 2012 with the Energy Production & Distribution sector accounting for the highest proportion of total spend (29%, 27% in 2011). In 2012 this is driven by an increase in Capex rather than Opex, in contrast to 2011. As in previous years, the Food, Beverages & Tobacco Products sector remains a high spending sector with 16% (15% in 2011).

Figures E3 and **E4** show Opex and Capex across environmental media in 2009 to 2012.

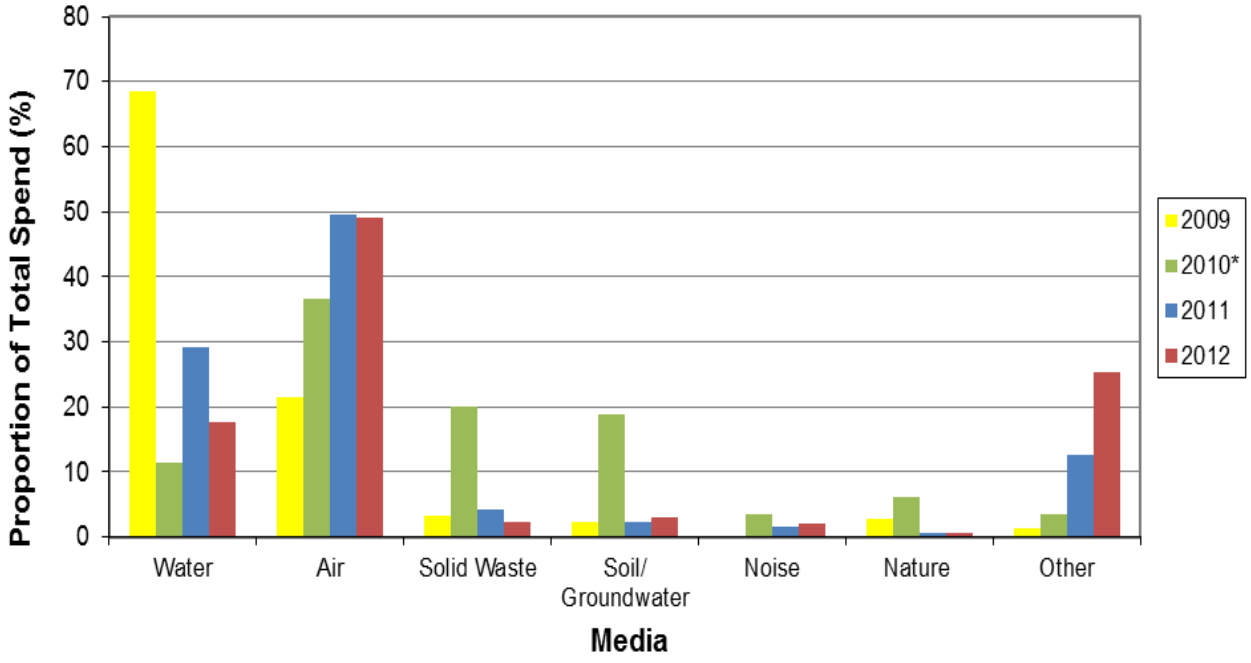
Figure E3 – Operational Environmental Expenditure by Environmental Media, 2009 to 2012



*Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. *As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

In 2012, spend on water comprised 33% (£615 million) of total Opex, the area of greatest expenditure as in 2009, and replacing solid waste as the media with the greatest spend in 2010 and 2011. An increase in expenditure on water measures as compared to 2011, can be attributed to the expected effect of increasing regulation for water environment protection (e.g. Water Framework Directive). Whilst spend on solid waste measures is no longer the media with the greatest spend, proportionately it remains similar to 2011 (24% in 2012, 25% in 2011). Whilst spend associated with nature protection has seen a fall compared to 2011 levels, it still remains significantly greater compared to previous years (14% as compared to 5% in 2010).

Figure E4 – Capital Environmental Expenditure by Environmental Media, 2009 to 2012



*Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. *As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

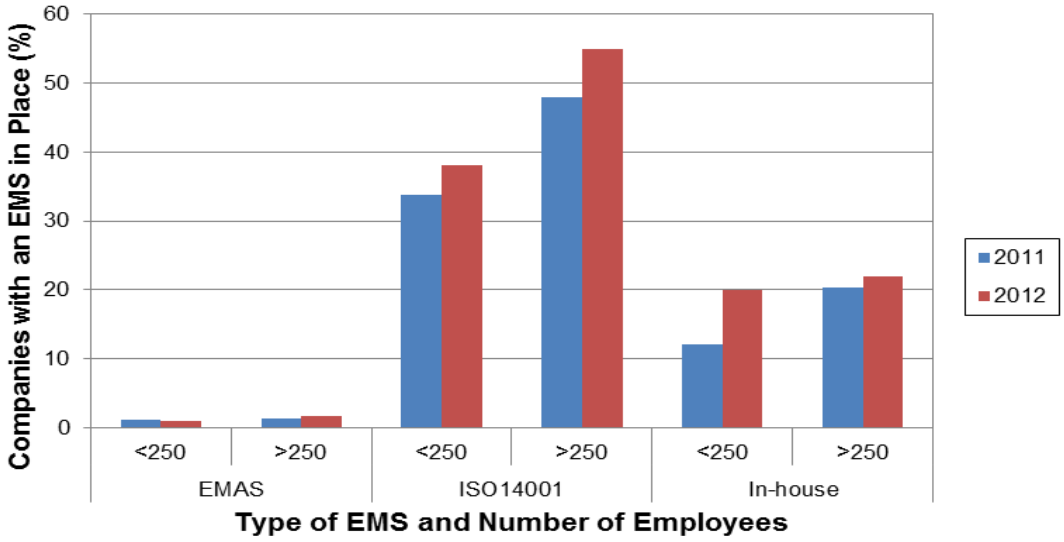
Spend associated with air accounted for just under half of the total Capex (£203 million). Spending in the 'other' category comprised 25% (£105m). Capex on water accounted for 18% of the total spend (£74 million), whilst solid waste, soil and groundwater, noise and nature protection measures contributed the remaining 8% (£33 million).

Environmental Management Systems

The proportion of companies with an EMS in place has increased since 2011 (70% of respondents in the 2012 survey, compared with 61% in the 2011 survey). This overall increase appears to be consistent irrespective of the scheme or company size, with the exception of the uptake of EMAS by smaller companies. A total of 47% of responding companies (across all company sizes) had an EMS certified to ISO 14001, and a consistent 1.3% certified to Eco-Management and Auditing Scheme (EMAS).

Figure E5 shows how company size (in terms of number of employees) affects the proportion of companies with an environmental management system (EMS) in place and the type of EMS selected. Large companies appear to be more likely to have an EMS in place, for example, ISO14001 has been implemented in 38% of smaller companies, whilst 55% of larger companies have implemented such an EMS.

Figure E5 – Breakdown of EMS by Company Size, 2011 & 2012



Note: As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> BS 8555 -> In-house) has been applied to avoid double counting. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

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1 INTRODUCTION

This report relates to the sixteenth 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 2012 survey data returned by participating UK companies. Previous surveys were carried out to estimate expenditure in 1994 (a pilot survey), 1997, and 1999 to 2011. 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 2012 survey was distributed to a total of 1,097 companies across the Mining & Quarrying, Manufacturing, Energy Production and Water sectors, as defined by the UK Standard Industry Classifications for Business (SIC) in 2007. This survey comprised a similar sample size to the 2011 survey, rather than the larger sample used in 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 (2009-2011) are presented with those from the 2012 survey. Sector specific figures are also presented alongside those from the 2009-2011 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 was made to the validation method of survey returns for the Water Supply & 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. In the 2012 survey an additional refinement for this sector was introduced, a tailored covering letter was issued to companies in the Water Supply & Treatment sector along with the questionnaire, asking them to complete for just the supply side of the business. Despite this measure to avoid double counting, some retrospective amendments had to be carried out as some results included the total business. For these returns, the same validation processes as applied in 2010 and 2011 were carried out. None of these adjustments have been applied retrospectively to the corresponding 2009 figures in this report;
- The sample size of the 2010 survey was significantly different than the 2009, 2011 and 2012 surveys, covering a wider number of industry sectors and participants. As a result only comparable sectors have been selected from the 2010 sample where figures are presented as a percentage of the total spend. In consequence numbers presented in this report may not reflect those in the original 2010 survey report. As the 2009 and 2011 surveys used a similar sample frame to that of the 2012 survey (with the inclusion in 2009 of the Paper and Pulp sector instead of the Machinery & Electrical Equipment sectors) figures 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 2009, 2011 and 2012 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;
- To enable Defra to provide these estimates for the biennial Eurostat/OECD Joint Questionnaire on Environmental Protection Expenditure and Revenues; and
- To enable Defra to meet UK obligations under the Structural Business Statistics Regulation.

In addition to these broad objectives, annual data from this and previous 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 environmental spending against that of the industry as a whole, both in the UK and the EU.

1.2 SCOPE AND BACKGROUND

The current 2012 survey covers expenditure incurred in the financial year 2012/2013. 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.

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

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

This survey succeeds the Defra surveys carried out for spend in 1997 and 1999 to 2011, 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/collections/environmental-protection-and-expenditure-epe-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 emissions to air or water; dispose of waste materials; protect land, soil and groundwater; prevent noise and vibration; or protect the natural environment.

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/collections/environmental-protection-and-expenditure-epe-survey

2 SURVEY METHODOLOGY AND PREPARATION

As in previous years, the 2012 survey consisted of three phases, sub-divided into the following individual tasks/activities:

Pre-survey phase (April 2013 – May 2013):

- Review of the 2011 survey and introduction of modifications
- Promotion of 2011 survey results
- Steering Group meeting participation
- Request submitted for company data from the UK Government's Inter Departmental Business Register (IDBR)

Survey phase (June 2013 – January 2014):

- 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 2012 survey dispatch to previous respondents
- Dispatch of survey pack to companies
- Provision of Helpdesk support
- Data entry of survey returns
- Resending of surveys as required
- Dispatch of reminder letter
- Follow-up phone calls with Top Companies

Analysis and Final Reporting (November 2013 – May 2014):

- 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 the following sections. 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, 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 2012 survey. Similar to previous years, companies received a covering letter tailored to the company type ('standard' companies versus 'top' companies). The definitions of these company groups are explained in full in section 3.1 and the cover letters can be seen in **Annex 1**.
- The approach taken for water companies was similar to the previous two years of the survey in that double counting of sewage treatment was avoided through including only environmental protection costs associated with the supply side of the business. However, for the 2012 survey, this was achieved through issuing a cover letter tailored for this purpose, rather than corrections being made retrospectively through the validation process.
- 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 2012 survey questionnaire, an e-mail was sent out to all companies that responded to the 2011 survey which were also included in the 2012 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 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. The use of a reminder postcard was dropped for the 2011 and 2012 surveys and resources used instead to make further follow-up calls.

Many updates were made to the format of the questionnaire between the 2010 and 2011 surveys. These have been carried forward to the 2012 survey and some further updates made to the 2011 format for use in the 2012 survey. These are summarised in **Figure 2.1.**

Figure 2.1 - Summary of Questionnaire Modifications since the 2011 survey

Section / Question		Modification
4.1	EMS-supply chain	Insertion of new question on addressing environmental issues in the supply chain
4.2	EMS	Changed text of question to 'Does your company operate to any of the following environmental management systems?'. Additional option 'BS8555' added and 'in-house' option split into 'in-house written EMS' and 'in-house informal EMS'.

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 2012, the UK Government's Inter Departmental Business Register (IDBR) provided a random sample of 1,097 companies across the extraction, manufacturing, energy and water supply industries (see **Figure 2.2** below).

Figure 2.2 – Industry sectors covered by the 2012 survey

2007 SIC code	Industry
05 - 09	Mining & Quarrying
10 - 12	Food, Beverages & Tobacco Products
19	Coke & Refined Petroleum
20 & 21	Chemicals & Pharmaceuticals
24 & 25	Basic & Fabricated Metals
27 & 28	Machinery & Electrical Equipment
35	Energy Production & Distribution
36	Water Supply & 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 168 'Top Companies' were selected based on employee number and turnover (including the top 50 ranked by employee number and turnover), ensuring that all sectors within the sample were represented.

In the initial years where a smaller sample size was applied (e.g. 2008, 2009), the Water Supply & Treatment (SIC 36) and Energy Production & Distribution (SIC 35) sectors were 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 since the 2010 survey the two sectors have been 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 2011 survey database was updated for use during the 2012 survey through inputting the sample data from the IDBR and making limited, minor updates to the user form to reflect the changes summarised in **Figure 2.1**.

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, 2012

Activity	Quantity	Comment
Pre survey e-mail	210	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 2012 survey with emails tailored to those that had completed the survey previously and those which had not. Both invited the company to participate in the 2012 survey and provided key information from the previous 2011 survey.
Survey questionnaire	1,097	The volume of questionnaires returned was higher in the first few weeks after the survey was sent out and greatest after the reminder letters were sent out.
Reminder letter to elicit responses	1022	A reminder letter was sent to 93% 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 survey returns as well as an increase in the volume of calls to the Helpdesk requesting assistance and survey resends.
Top Company contacts	565	Top Companies that had not returned surveys were contacted by phone up to six 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	211	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 2012 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 & Distribution sector) and a reflection of the market place.

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 types:

- **Top companies**: The top 50 companies by employee numbers and turnover were selected ensuring that the top few in each individual SIC were represented. The 'standard' cover letter emphasised potential benefits of participation, including the potential use of survey information for benchmarking purposes.
- **Standard companies**: The remaining companies not encompassed by the 'top' company criteria. The 'standard' cover letter emphasised the benefits of participation even if the companies' environmental protection expenditure was very low.

- **Water companies**: A tailored cover letter was issued asking them to complete for the supply side only to avoid double counting of costs associated with sewage treatment. This was issued irrespective of whether the company was a 'top' or 'standard' company.

Copies of the 2012 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 (2012), 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, 18% of 2012 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 previously experienced. However, the targeted Top Company calls helped to minimise this issue with a reduction in the percentage of uncontactable companies since 2011 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, 2012

Response	Quantity
Returned Questionnaire*	**38**
Company declined to participate	31
Indicated the survey would be returned, but URS did not receive completed survey	12
URS left a message/sent an email reminder	41
Supplied URS with a new contact/number- no response	5
Said they would pass it on to somebody more appropriate	3
Asked for the survey to be resent	10
Company was uncontactable / no response	24
Company has ceased trading/is in liquidation	4
Total	**168**

**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 38 surveys were returned from the 168 Top Companies invited to participate (i.e. a response rate of 23%), equalling the 2011 response rate, 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 2013 – January 2014). 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 2012 survey period: www.gov.uk/government/collections/environmental-protection-and-expenditure-epe-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 1,097 companies, the total number of validated responses was 227 giving a response rate of just under 21%, following the trend of higher response rates since the 2010 survey. The response rates are summarised in **Figure 4.1** below. The output of the data is presented in **Annex 5**.

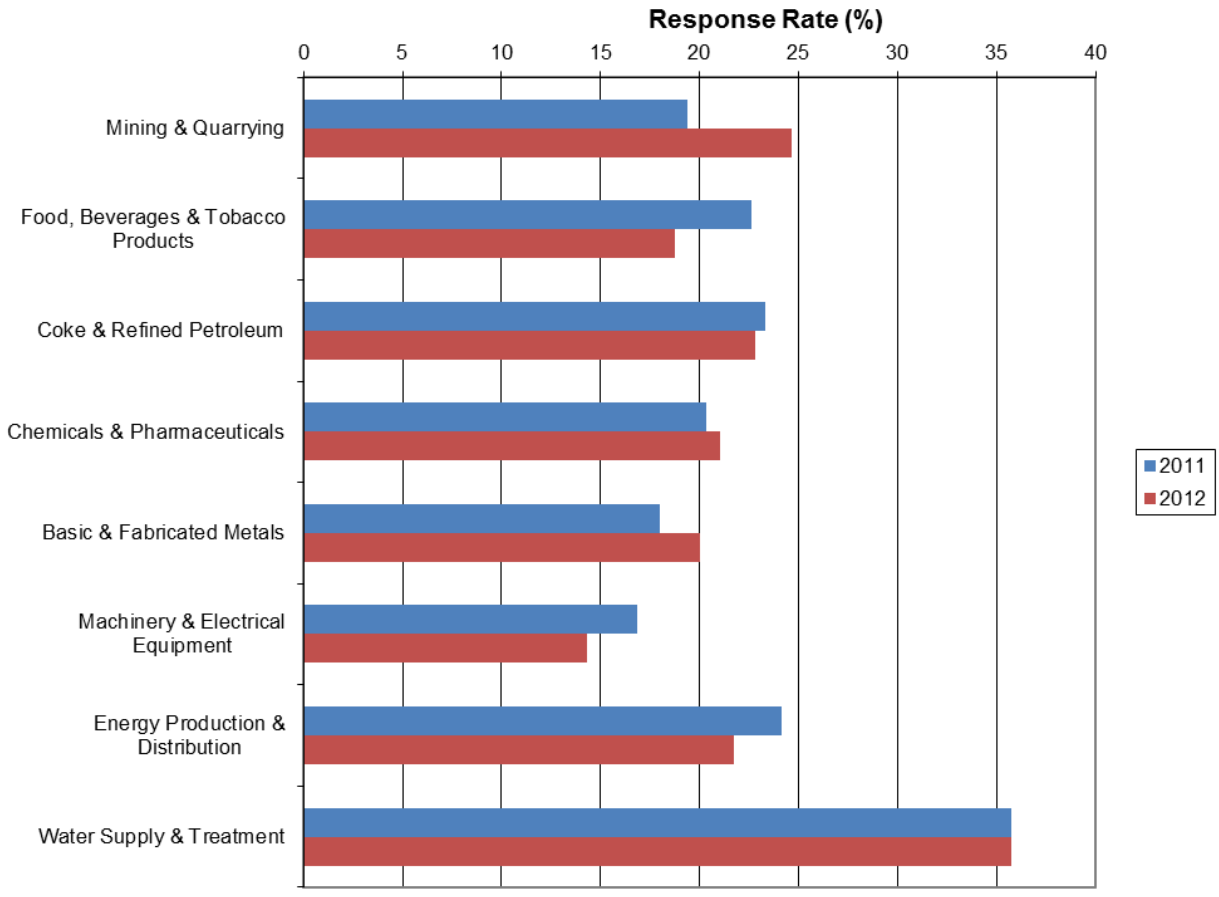
Figure 4.1 – Survey Response Rates, 2009 to 2012

Aspect	2009	2010	2011	2012
Number of companies invited to participate	974	7827	1062	**1097**
Number of (valid) survey returns	171	2352	225	**227**
Proportion of (valid) responses (%)	17.6	30.0	21.2	**20.7**

The 2012 survey sees a return to a response rate similar to that of the smaller surveys (2009 & 2011) following a higher rate for 2010.

As shown by **Figure 4.2** below, in general the response rates for individual sectors was mixed as compared to the 2011 survey, with some performing better such as Mining & Quarrying, and some performing worse such as Energy Production & Distribution. The Water Treatment and Supply sector saw the same response rate as 2011.

Figure 4.2 – Survey Response Rate by Sector, 2011 & 2012



Note: Comparisons between years should be treated with caution. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Despite some difference in response rates between the 2011 and 2012 surveys, in 2012 the sectors with the highest and lowest response rates are the same as in 2011, i.e. the Water Supply & Treatment sector and the Machinery & Electrical Equipment sector respectively.

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 2012 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 between years 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**.

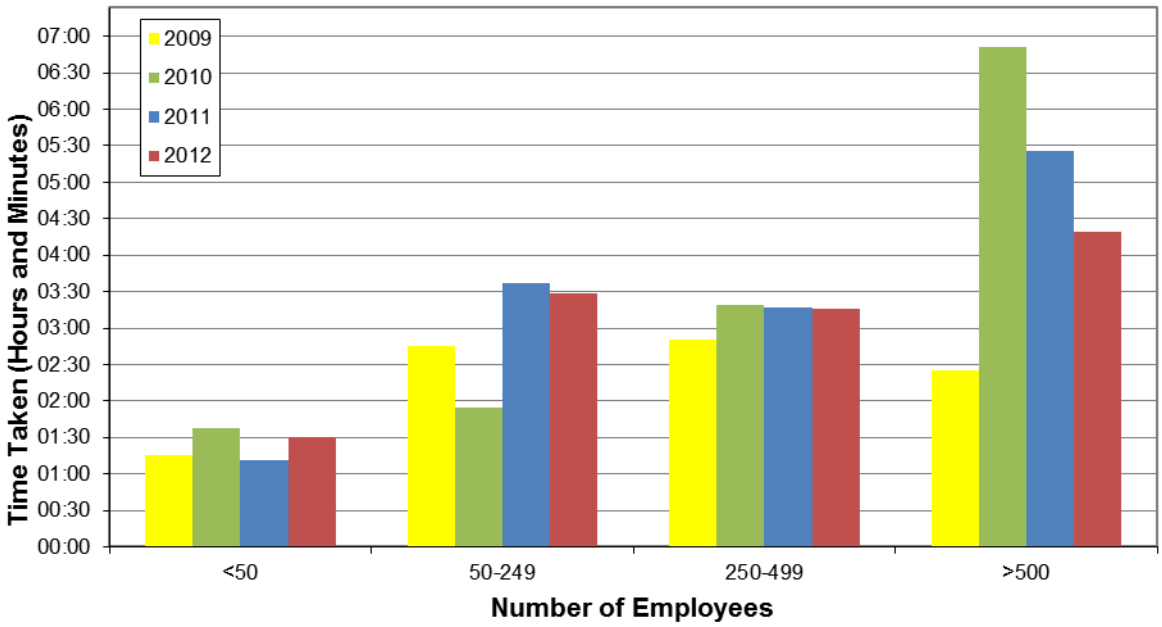
4.5 SURVEY COMPLETION TIME

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 30 minutes to complete the 2012 survey questionnaire (compared to 1 hour 11 minutes for the 2011 survey);
- Between 50 and 250 employees spent an average of 3 hours 29 minutes completing the questionnaire (compared to 3 hour 37 minutes for the 2011 survey);
- Between 250 and 500 employees took, on average 3 hours 16 minutes (comparative to the 2011 average of 3 hours 17 minutes);
- For companies with over 500 employees, completion time was lower than in 2011, with an average completion time of approximately 4 hours 19 minutes (5 hours 26 minutes in 2011).

For the 2012 survey, the average reported time taken for companies with between 50 and 249 employees and between 250 and 499 employees is similar to that in 2011, whilst companies with more than 500 employees have continued the trend of completing the questionnaire quicker than in the previous year.

Figure 4.3 – Breakdown of Mean Survey Completion Time by Company Size, 2009-2012



*Note: Comparisons between years should be treated with caution. *As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

5 SURVEY RESULTS AND ANALYSIS

5.1 TOTAL EXPENDITURE

The total gross spending on environmental protection in 2012 by UK industry amounted to an estimated £2.4 billion (±£239 million at the 95% confidence level), which equates to a 4% increase on 2011 spend (£2.3 billion).

In 2012, Opex accounted for approximately 83% (£2 billion) of total spending, with Capex at 17% (£0.4 billion). This majority spend on Opex is similar to that observed in previous years, although a slight increase in Capex spend is sown.

External Opex accounts for a greater proportion (45%) than in-house Opex (31%) reflecting the split seen in 2011 (external accounting for 47% and in-house accounting for 32%). In contrast with 2011, Capex in 2012 has reverted to the trend seen in 2010, with total spend comprising largely of that integrated processes (12% of total 2012 spend, compared to 2% in 2011), with spending on end of pipe projects accounting for only 5% of the total spend (8% in 2011). Spend on environmental research and development (R&D) has decreased back to levels seen in 2010 (6% in 2012, 10% in 2011, and 7% in 2010). The trend in a decreasing proportion of spend observed in Capex as a proportion of total environmental spend has been reversed in 2012 with a slight increase.

A summary of 2012 environmental expenditure is presented in **Figure 5.1,** along with equivalent data for 2009, 2010, and 2011. Ranges indicating the 95% confidence intervals associated with each value are provided in parenthesis for the 2012 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, 2009 to 2012

	2009	2010	2011	2012	
	% of gross	% of gross	% of gross	Total expenditure (£M)	% of gross
Operational Expenditure					
In-house	37	33	32	750 (301-1,199)	31
External	19	35	47	1,089 (1,008-1,171)	45
Research & Development	2	7	10	145 (15-274)	6
Total Opex	**58**	**75**	**90**	**1,984** (1,768-2,200)	**83**
Capital expenditure					
End of Pipe	29	5	8	128 (110-145)	5
Integrated processes	13	20	2	287 (234-339)	12
Total Capex	**42**	**25**	**10**	**414** (359-469)	**17**
Gross expenditure					
Total gross spend	**100**	**100**	**100**	**2,398** (2,159-2,637)	**100**
Income					
Income from by-products	1	2	4	101 (30-135)	4
Total net expenditure				**2,297** **(2,053-2,540)**	
Cost savings				**249** **(164-334)**	

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals 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**).

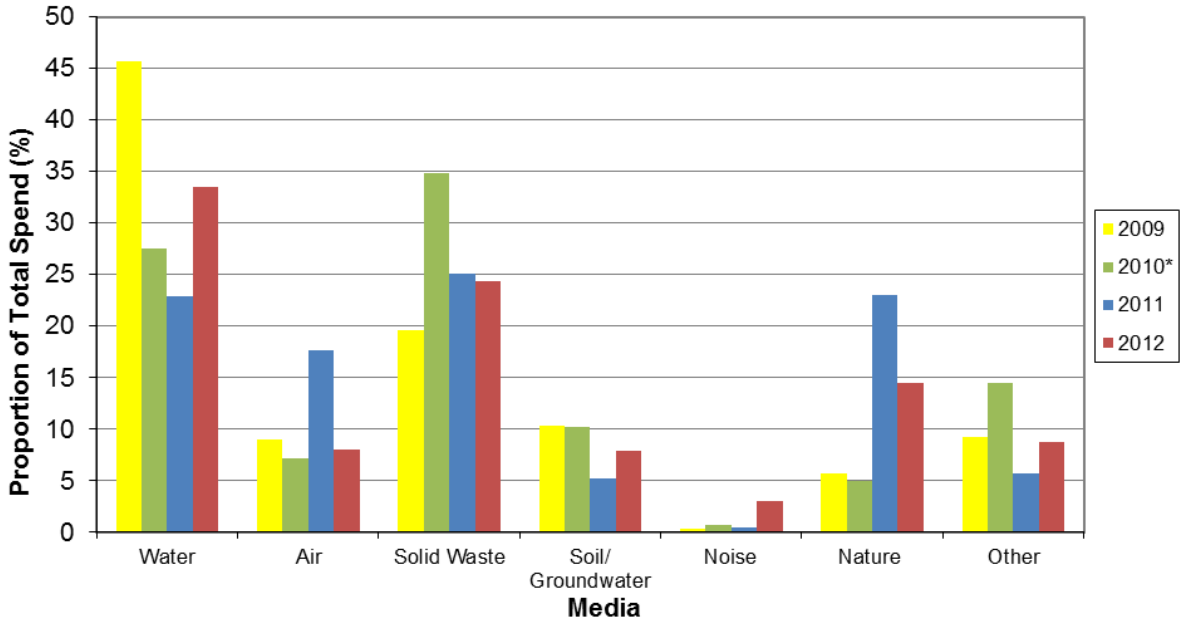
Excluding R&D, water accounted for 33% (£615 million) of the total spend on operational processes in 2012 (£1,830 million), the area with the greatest expenditure across both internal and external Opex. Spend associated with solid waste comprised 24% of total Opex spend, accounting for a similar proportion of spend as in 2011. Whilst spend associated with nature protection has seen a slight fall compared to 2011 levels, it still remains significantly greater compared to previous years (14% as compared to 5% in 2010).

Figure 5.2 – Environmental Opex by Media, 2009 to 2012

Environmental media	Proportion of Opex (%)				Internal (£M)	External (£M)	Sub-Total (£M)
	2009	2010	2011	**2012**	**2012**		
Water	46	27	23	**33**	223.8	391.5	615.3
Air	9	7	18	**8**	83.3	63.2	146.5
Solid waste	20	35	25	**24**	100.8	347.6	448.4
Soil/ groundwater	10	10	5	**8**	19.8	125.7	145.6
Noise	0	1	1	**3**	7.2	48.5	55.7
Nature protection	6	5	23	**14**	206.1	60.2	266.3
Other*	9	14	6	**9**	109.1	52.6	161.7
				Total (£M)	**750.1**	**1089.3**	**1839.4**

**'Other' includes regulatory charges. Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

Figure 5.3 – Environmental Opex by Media, 2009 to 2012



*Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. *As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data from this year to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

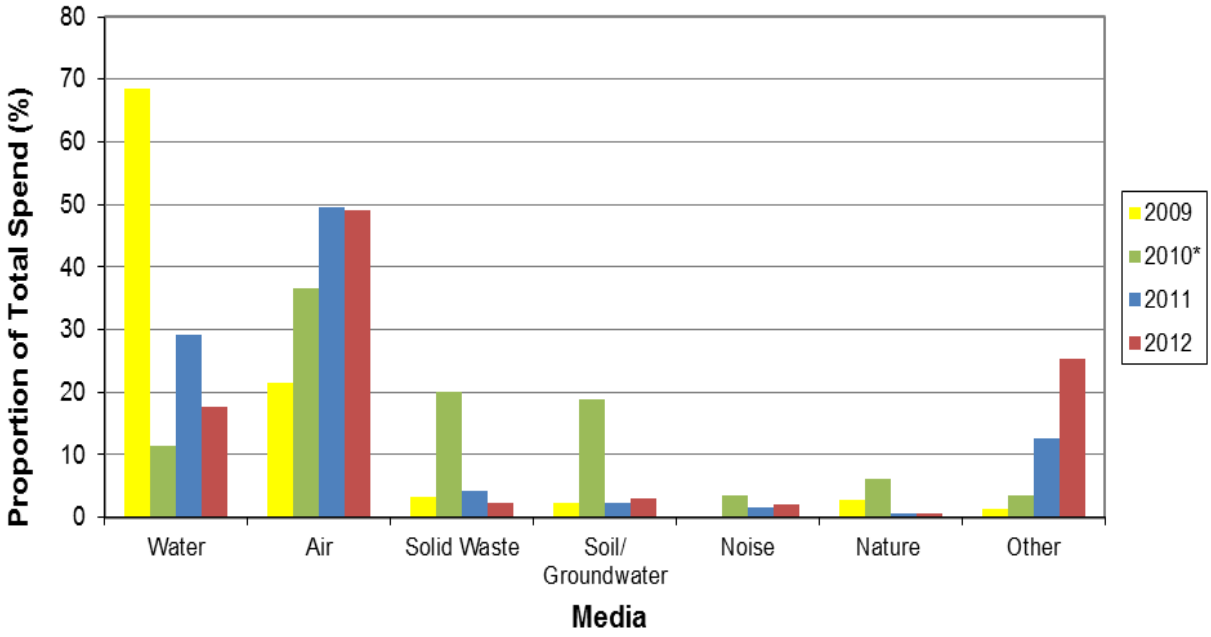
Spend on air protection measures accounted for just under half (£203 million) of the total Capex (£414 million). This is likely to be partly in response to the introduction (current and forthcoming) of various air quality legislation such as the Industrial Emissions Directive (IED). The second highest media category in terms of Capex spend is other which comprises 25% of the total spend (£105 million). Spending on water measures comprised 18% (£74 million), whilst solid waste, soil and groundwater, noise and nature protection measures contributed the remaining 8% (£33 million).

Figure 5.4 – Environmental Capex by Media, 2009 to 2012

Environmental media	Proportion of Capex (%)				Integrated (£M)	End of Pipe (£M)	Sub-Total (£M)
	2009	2010	2011	2012	2012		
Water	69	11	29	**18**	6.7	66.8	73.6
Air	22	37	50	**49**	169.1	34.0	203.1
Solid waste	3	20	4	**2**	3.8	6.1	9.9
Soil/ groundwater	2	19	2	**3**	4.3	8.0	12.2
Noise	0	3	2	**2**	2.1	6.1	8.2
Nature protection	3	6	1	**1**	2.2	0.1	2.2
Other*	1	4	13	**25**	98.4	6.5	104.9
				Total (£M)	**286.5**	**127.5**	**414.1**

** 'Other' includes regulatory charges. Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

Figure 5.5 – Environmental Capex by Media, 2009 to 2012



*Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. *As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

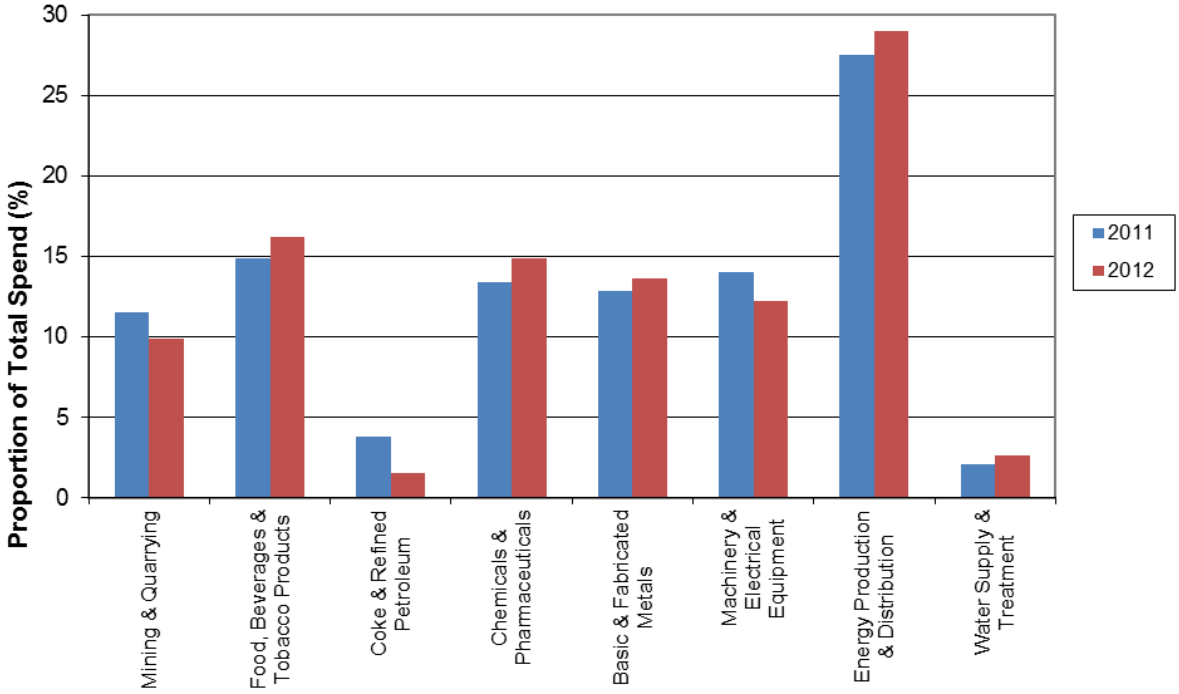
5.3 OVERVIEW OF SECTOR EXPENDITURE

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 & Tobacco Products' sector (24% of total expenditure in 2010). For 2011 spend the 'Energy Production & Distribution' sector (part of the 'Electricity, Gas and Water' sector prior to the 2010 survey) had the highest spend (27% of total expenditure), which has been repeated in 2012, with the sector representing 29% of total expenditure. However, spend in the 'Electricity, Gas and Water' sector was driven by an increase in Capex in 2012, rather than an increase in Opex as seen in 2011. This is aligned to the overall increase in spend in total Capex as compared to 2011.

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 have been segregated since the 2010 survey to allow more meaningful analysis to be conducted.

Figure 5.6 – Breakdown of Total Environmental Expenditure by Sector, 2011 & 2012



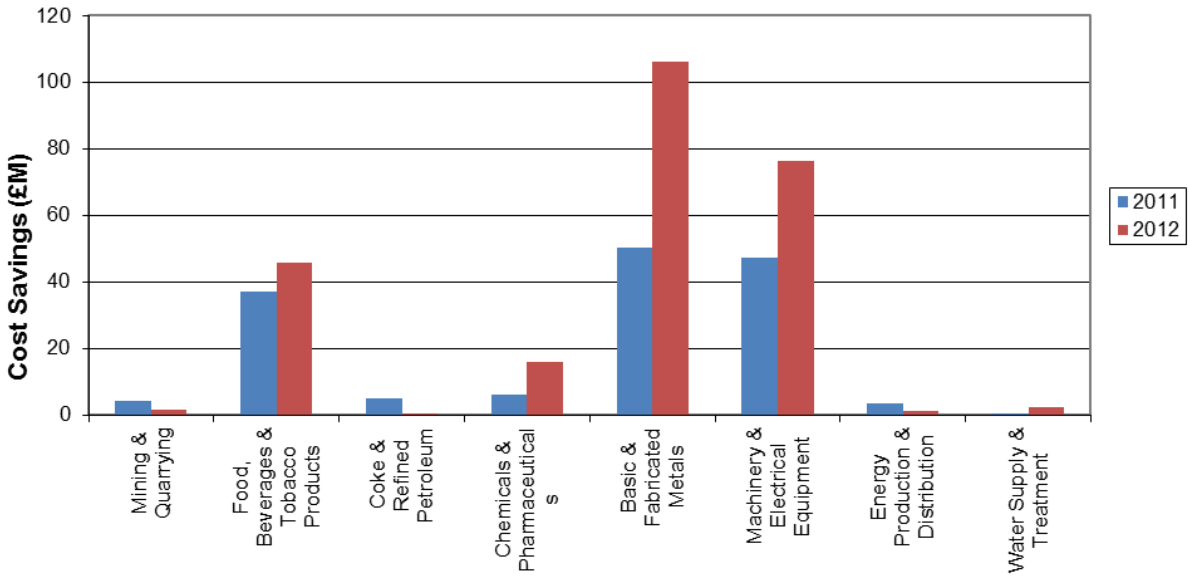
Note: Comparisons between years should be treated with caution. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

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 2012 compared to 2011.

Figure 5.7 – Cost Savings by Sector, 2011 & 2012



Note: Comparisons between years should be treated with caution. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The estimated total cost savings in 2012 were £249 million (equating to 10% of total gross spend), compared to £153 million in 2011 (equating to 7% of total gross spend). The two sectors with the greatest cost savings are the same as those for 2011 but on a greater scale, with the Basic & Fabricated Metals sector recording total cost savings as £106 million (£50 in 2011) and the Machinery & Electrical Equipment sector recording savings of £76 million (£47 million in 2011).

Cost savings are broken down by media for 2009 to 2012 in **Figure 5.8** below.

Figure 5.8 – Cost Savings by Environmental Media, 2009 to 2012

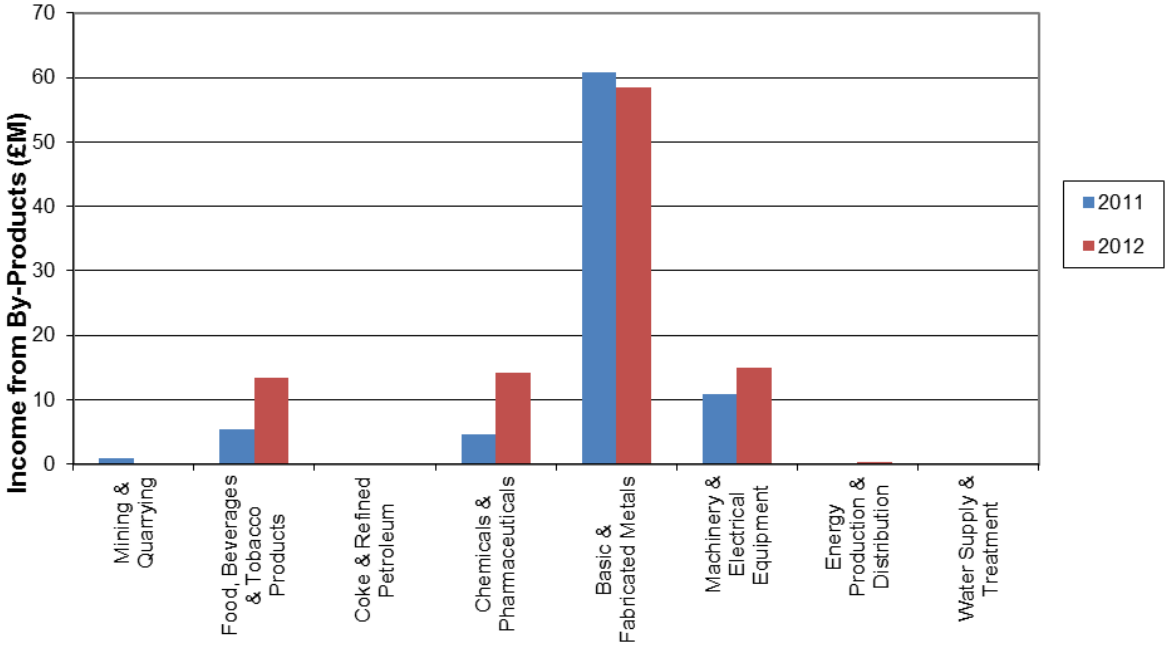
Environmental media	2009	2010	2011	2012	
	% of Total Savings	% of Total Savings	% of Total Savings	**Total Cost Savings (£M)**	**% of Total** Savings
Raw materials	10	35	55	**99.6**	**40**
Water use	7	9	4	**11.5**	**5**
Energy use	30	34	27	**105.8**	**42**
Waste	50	22	13	**30.7**	**12**
Other*	3	1	2	**1.8**	**1**
Total	**100**	**100**	**100**	**249.3**	**100**

**'Other' includes regulatory charges. Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

The highest cost savings in 2012 were associated with improved energy use (42% of total savings), closely followed by cost savings associated with the improved use or substitution of raw materials (40% of total savings). This represents a slight change from 2011, where cost savings associated with the improved use or substitution of raw materials were greater (55% of total cost savings) than those associated with energy use (27% of total cost savings). However, the remaining cost savings in 2012 are similar to those in 2011 with 18% resulting from cost savings associated with waste, water usage and 'other' improvements.

Income received as a result from by-products for the 2011 and 2012 surveys are shown in **Figure 5.9** below.

Figure 5.9 – Income from By-Products by Sector, 2011 & 2012



Note: Comparisons between years should be treated with caution. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Income resulting from the sale of by-products in 2012 was £101 million (equating to 4% of total gross spend), forming a plateau as compared to the upward trend in recent years. As in 2011, the Basic & Fabricated Metals sectors were the dominant leaders in terms of income generated from the sale of by-products during 2012 (£58 million).

5.5 EXPENDITURE BY INDUSTRY SECTOR

This section looks at individual sectors and identifies notable features under the following headings, with a brief analysis of trends and drivers of environmental protection expenditure in 2012:

- **Key Expenditure:** Summary of key 2012 data by Opex and Capex categories, along with expenditure in 2009 to 2011 where available.
- **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 2012 data by cost savings and by-product sales, along with data from 2009 to 2011 where available.

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 2009, 2011 and 2012 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 & Quarrying

Estimates of environmental protection expenditure and income/savings are provided below for the Mining & Quarrying sector. Of the 138 invited to participate in the 2012 survey, a total of 34 companies returned valid responses, giving a response rate for the sector of 25%. This is a significant increase from the 19% response rate for the 2011 survey and sees a return to the response rates of 2010 (26%).

The Mining & 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 2012 survey, with the returns biased towards one sub-sector area with very few returns from other sector areas, most notably mining support service activities.

Key Expenditure

Environmental expenditure for this sector is shown in **Figure 5.10** for the years 2009-2012. The data is presented separately for Opex and Capex.

Figure 5.10 –Total Environmental Expenditure: Mining & Quarrying, 2009 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	Total	End of Pipe	Integrated	Total	
2012	136.7	58.7	0.7	**196.1**	38.8	1.6	**40.4**	**236.5**
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**	**140.4**
2009	15.0	8.9	0.3	**24.1**	0.8	6.9	**7.7**	**31.8**

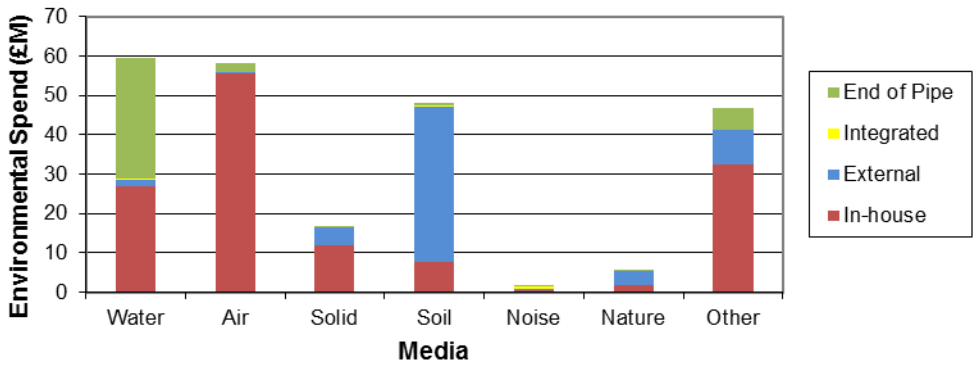
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The Mining & Quarrying sector spent approximately £237 million in 2012 on environmental protection measures, similar to 2011 spend. However, 2012 has seen a shift of spend in the sector towards Opex rather than Capex, contrary with the trend of the overall economy.

Environmental Expenditure by Media

Environmental expenditure by media for the Mining & Quarrying sector is shown below in **Figure 5.11**.

Figure 5.11 – Environmental Expenditure by Media: Mining & Quarrying, 2012



Note: 'Other' includes regulatory charges. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The greatest environmental spend was on water protection measures, closely followed by air pollution abatement measures. In-house and end of pipe account for most of the water protection spend, whilst air is dominated by in-house spend. Integrated Opex accounts for less than 1% of the overall spend by the sector.

Income and Savings

In 2012, income and savings for the Mining & Quarrying sector were approximately £2 million. This is presented along with the 2009, 2010 and 2011 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.

Figure 5.12 – Income and Savings: Mining & Quarrying, 2009 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	0.1	0.1	1.2	0.1	0.1	**1.6**	0.2
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

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Cost savings in the sector for 2012 decreased substantially to under £2 million compared to 2011 but could be considered to be more aligned with the level seen in previous years (i.e. before 2011) and is largely due to lower savings than in 2011 from energy reduction and/or efficiency.

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

Estimates of environmental protection expenditure and income and savings are provided below for the Food, Beverages, and Tobacco Products sector. Of the 224 companies invited to participate in the 2012 survey, a total of 42 returned valid responses were received, giving a response rate for the sector of 19%.

Key Expenditure

The Food, Beverages, and Tobacco Products sector spent approximately £389 million in 2012 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.13** for the years 2009-2012. The data is presented separately for Capex and Opex.

Figure 5.13 – Total Environmental Expenditure: Food, Beverages & Tobacco Products, 2009 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2012	98.6	240.7	2.0	**341.3**	35.1	12.4	**47.5**	**388.8**
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**

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

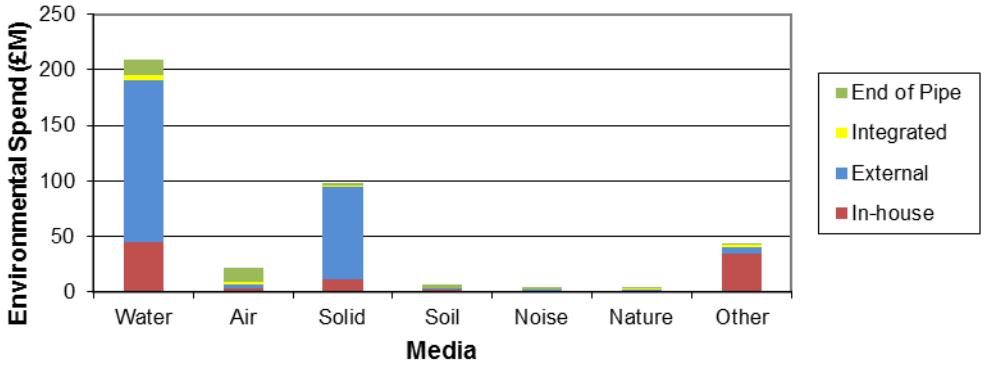
As expected Opex remains the dominant part of spend in 2012. As predicted in the 2011 survey, this is starting to change with capex as a proportion of overall expenditure increasing to 12% from 5% in 2011. Further change may occur in the medium to long term future as companies realise that to make a '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 and 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, which is to be expected as within the payback period that many companies work to (and the economic climate) it is easier to justify spending an end of pipe solution. 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 & Tobacco Products sector is shown in **Figure 5.14** below.

Figure 5.14 – Environmental Expenditure by Media: Food, Beverages & Tobacco Products, 2012



Note: 'Other' includes regulatory charges. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

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 2012, income and savings for the Food, Beverages, and Tobacco Products sector were approximately £59 million in total. Income and savings for this sector are shown in **Figure 5.15** for the years 2009-2012.

Figure 5.15 – Income and Savings: Food, Beverages & Tobacco Products, 2009 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	4.1	5.9	25.3	10.0	0.5	**45.9**	13.3
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

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The area with the greatest cost savings has changed over the years, but in 2012 remains the same as in 2011, that is energy use with a value of £25 million. Overall, cost savings and income from by-products has increased, continuing a rising trend as more and more companies 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 & Refined Petroleum

Estimates of environmental protection expenditure and income/savings are provided below for the Coke & Refined Petroleum sector, which comprises relatively few companies in the UK. Of the 57 invited to participate in the 2012 survey, a total of 13 companies returned valid responses, giving a response rate for the sector of 23% (23% in 2011).

Key Expenditure

The Coke & Refined Petroleum sector spent approximately £37 million in 2012 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.16** for 2009, 2010, 2011 and 2012. The data is presented separately for Capex and Opex.

Figure 5.16 – Total Environmental Expenditure: Coke & Refined Petroleum, 2009 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2012	2.4	23.3	0.4	**26.0**	10.9	0.5	**11.3**	**37.4**
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**

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

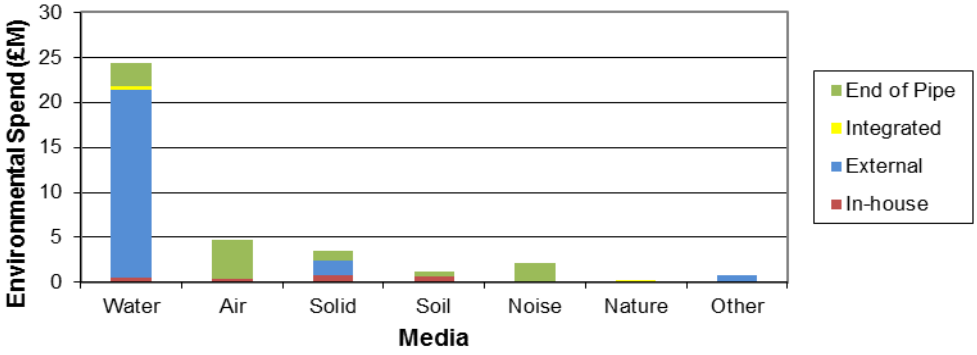
Whilst overall expenditure has decreased since 2010, the split between Opex and Capex in 2012 is similar to the proportion seen in 2011, with a slight drop in Opex to 70% of total spend in 2012 from 77% in 2011. This is driven by a decrease in in-house Opex (from £31 million to £2 million). The contrast to the apparent lack of investment in Capex projects in 2009 and 2010 appears to have remained, and although not at the levels observed in 2010 there is a significantly increased level of investment.

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. This might be reflected in the increased proportion Capex represents of the total spend for the sector in 2012 (30% compared to 23% in 2011). 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 & Refined Petroleum sector is shown in **Figure 5.17** below.

Figure 5.17 – Spending by Media: Coke & Refined Petroleum, 2012



Note: ‘Other’ includes regulatory charges. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Around two thirds (66%, £24 million) of environmental spend was associated with water quality protection in 2012, replacing air as the media with the highest spend in 2011. Contrary to expectations that the legislative driver for investment in solid waste measures would continue with the annual incremental increase in landfill tax charges, encouraging companies to reduce waste, or segregate hazardous waste from non-hazardous waste, spend has decreased compared to 2011 (£4 million in 2012, £16 million in 2011).

Income and Savings

In 2012, income and cost savings for the Coke & Petroleum sector was £0.1 million. These are shown for this sector in **Figure 5.18** for the years 2009 to 2012.

Figure 5.18 – Income and Savings: Coke & Refined Petroleum, 2009 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	0.0	0.0	0.1	0.0	0.0	**0.1**	0.0
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

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The drop in income from cost savings in 2012 reverses the steady increase seen since 2009. This is driven by a significant reduction in savings associated with waste. 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 & Pharmaceuticals

Estimates of environmental protection expenditure and income/savings are provided below for the Chemicals & Pharmaceuticals sector. Of the 114 invited to participate in the 2012 survey, a total of 24 companies returned valid responses, giving a response rate for the sector of 21% (20% in 2011).

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 & 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 & Pharmaceuticals sector spent approximately £356 million in 2012 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.19** for the years 2009 to 2012. The data is presented separately for Opex and Capex.

Figure 5.19 – Total Environmental Expenditure: Chemicals & Pharmaceuticals, 2009 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2012	102.7	171.5	1.6	**275.8**	13.4	67.2	**80.5**	**356.3**
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**

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Opex accounted for 77% of the total environmental spending by the Chemicals & Pharmaceuticals sector in 2012, which is a slightly lower than preceding years reflecting the overall increase in Capex spending. This suggests that the difficult market conditions seen over the last few years limiting Capex in the environmental arena may be improving.

In recent years, the level of Opex has increased year-on-year, although in 2012 this is driven by external Opex rather than both in-house and external techniques. This increase is likely to be a function of the increasing annual costs associated with waste treatment and disposal and also wastewater effluent treatment.

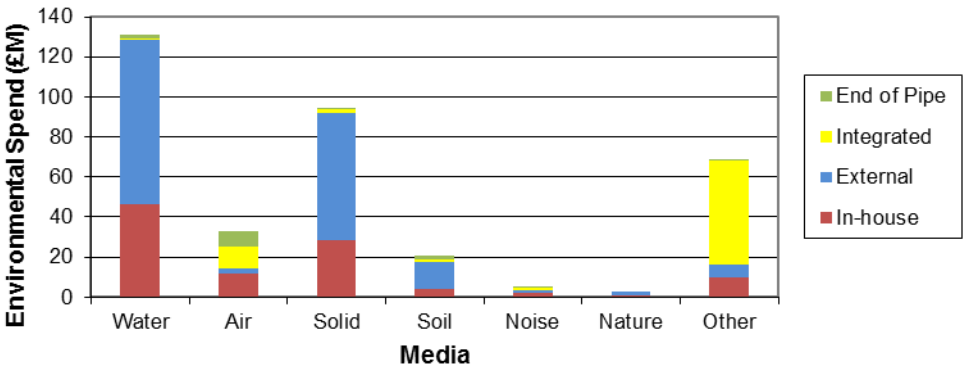
The level of R&D investment (Opex) has increased as compared to 2011 but remains low compared to 2010. This may be linked to the difficult trading position of the sector and the economy.

The level of Capex for 2012 has followed the increasing trend seen in recent years. However, the majority of spend is on integrated processes contrary to previous years, possibly suggesting companies are investing in new process / production plant and equipment due a greater economic certainty.

Environmental Expenditure by Media

Environmental expenditure by media for the Chemicals & Pharmaceuticals sector is shown in **Figure 5.20** below.

Figure 5.20 – Environmental Spending by Media: Chemicals & Pharmaceuticals, 2012



Note: 'Other' includes regulatory charges. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

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 63% 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 2012 for integrated costs associated with other media. This is believed to be linked to the overall increase in spending on Capex.

Income and Savings

In 2012, by-product income and environmental cost savings for the Chemicals & Pharmaceuticals sector was approximately £30 million. Income and savings for this sector are shown in **Figure 5.21** for the years 2009 to 2012.

Figure 5.21 – Income and Savings: Chemicals & Pharmaceuticals, 2009 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	3.0	1.6	5.1	6.0	0.0	**15.8**	14.1
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

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The level of income and cost savings in 2012 for the Chemicals & Pharmaceuticals sector has increased to a similar level seen in 2009. This has been driven by increases across most media with savings associated with waste the highest at £6 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 & Fabricated Metals

Estimates of environmental protection expenditure and income/savings are provided below for this sector. Of the 170 invited to participate in the 2012 survey, a total of 34 companies returned valid responses, giving a response rate for the sector of 20%.

Several industries make up the Basic & 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 & Fabricated Metals sector spent approximately £327 million in 2012 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.22** for 2009-2012.

Figure 5.22 – Total Environmental Expenditure: Basic & Fabricated Metals, 2009 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2012	148.3	154.9	2.7	**305.9**	13.2	8.3	**21.5**	**327.4**
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**	**245.5**
2009	19.0	46.6	0.7	**66.4**	27.8	7.4	**35.2**	**101.6**

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Spend on Opex has increased with the proportion of total spend represented increasing from 84% in 2011 to 93% in 2012. This reflects the observed decrease in environmental capital investment in upgrading and replacement of end of pipe plant and equipment during the economic downturn, and to a greater degree a reduction in spending on integrated processes. This is to be anticipated as older plant is retained for longer than originally planned, unless regulatory drivers for upgrade intervene. However, it does not reflect the trend seen nationwide of an increase in Capex.

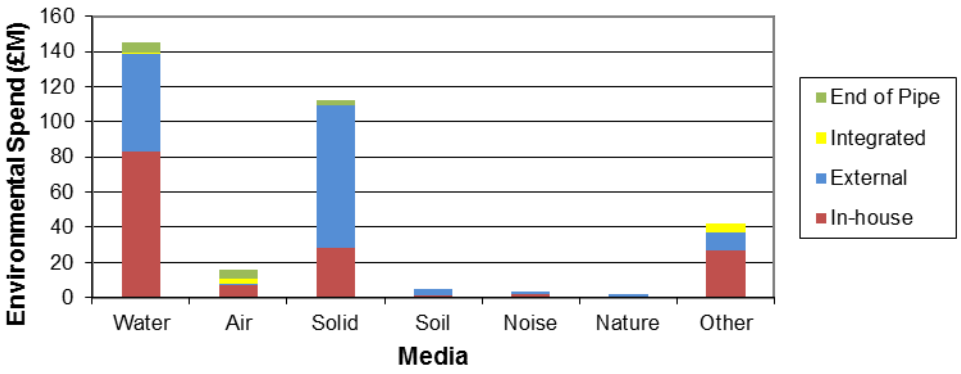
Expenditure on R&D has significantly decreased from 8% to around 1% of Opex similar to the surveys prior to 2011. This is significantly lower than UK industry as a whole where expenditure for R&D in 2012 stood at 7% of total Opex.

The data indicates that environmental Capex is now dominated by end of pipe expenditure as opposed to integrated processes which dominated in recent years. 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 & Fabricated Metals sector is shown in **Figure 5.23** below.

Figure 5.23 – Environmental Expenditure by Media: Basic & Fabricated Metals, 2012



Note: 'Other' includes regulatory charges. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

For the sector as a whole water has replaced waste as the most significant environmental expenditure. The majority of spend associated with water is undertaken through in-house measures, whilst solid waste is dominated by external measures.

Income and Savings

In 2012, by-product income and savings for the Basic & Fabricated Metals sector were approximately £165 million. Income and savings for this sector are shown in **Figure 5.24** for the years 2009 to 2012.

Figure 5.24 – Income and Savings: Basic & Fabricated Metals, 2009 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	34.0	1.4	61.2	8.9	0.5	**106.1**	58.4
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

Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. The 2009 and 2011 survey used a similar sample frame to that of the 2012 survey, with the inclusion of SIC 17: Paper and Pulp instead of SICs 27 & 28: Machinery & Electrical Equipment for 2009. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Savings in energy use dominate savings by media in 2012, although the level of savings associated with the improved use or substitution of raw materials remains similar to 2011. This reflects the increase in spend associated with in-house Opex.

5.5.6 SIC 27 & 28: Machinery & Electrical Equipment

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for the Machinery & Electrical Equipment sector. Of the 154 invited to

participate in the 2012 survey, a total of 22 companies returned valid responses, giving a response rate for the sector of 14% (17% in 2011), the lowest of all sectors.

Key Expenditure

The Machinery & Electrical Equipment sector spent approximately £292 million in 2012 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.25** for the years 2010 to 2012.

Figure 5.25 – Total Environmental Expenditure: Machinery & Electrical Equipment, 2010 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2012	46.8	78.5	130.8	**256.1**	5.2	31.1	**36.3**	**292.3**
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**

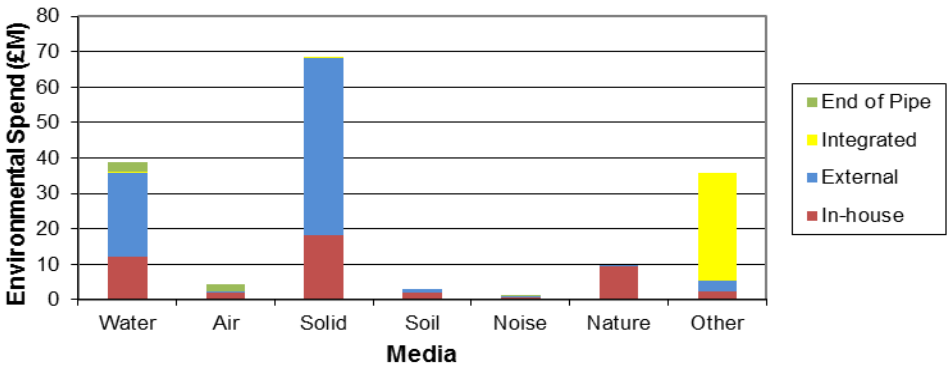
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

In 2012, Opex accounted for the large majority (88%) of total environmental spending by the Machinery & Electrical Equipment sector, similar to 2011 (98%). Within operating costs for the sector, there was a decrease in spend on research and development as compared to 2011, with a fall back to levels seen in 2010. In 2012, the spend on integrated Capex appears to have increased significantly, again back to levels similar to those seen in 2010. 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 & Electrical Equipment sector is shown in **Figure 5.26** below. This sector spent approximately £69 million on dealing with the management and disposal of solid waste, over half of which is accounted for by external Opex.

Figure 5.26 – Environmental Spending by Media: Machinery & Electrical Equipment, 2012



Note: 'Other' includes regulatory charges. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Income and Savings

In 2012, by-product income and environmental cost savings for the Machinery & Electrical Equipment sector were approximately £91 million. Income and savings for this sector are shown in **Figure 5.27** for the years 2010 to 2012.

Figure 5.27 – Income and Savings: Machinery & Electrical Equipment, 2010 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	58.1	2.4	11.7	4.1	0.0	**76.3**	14.9
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: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Cost savings appear to have increased for the sector from 2011 to 2012 continuing the rise from 2010. Income from the sale of by-products has risen since 2011 but not to the levels seen in 2010. The majority of savings in 2012 resulted from improved use of or substitution of raw materials, similar to 2011.

5.5.7 SIC 35: Energy Production & Distribution

Estimates of environmental protection expenditure, environmental expenditure by media and income and savings are provided below for this sector. Of the 198 invited to participate in the 2012 survey, a total of 43 companies returned valid responses, giving a response rate for the sector of 22% (24% in 2011).

Key Expenditure

The Energy Production & Distribution sector spent approximately £696 million in 2012 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.28** for the years 2010 to 2012. The data is presented separately for Opex and Capex.

Figure 5.28 – Total Environmental Expenditure: Energy Production & Distribution, 2010 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2012	208.4	334.5	2.1	**545.0**	0.2	150.4	**150.6**	**695.6**
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**

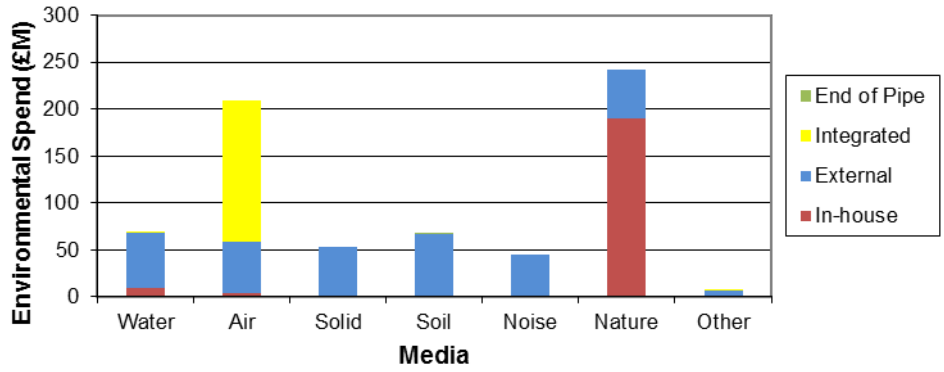
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

There has been a significant rise in the Capex figures for this sector in 2012 compared to 2011 (from less than a million to £151 million) bringing it up to a level similar to that seen in 2010. Opex on the other hand has decreased slightly between 2011 and 2012 from £632 million to £545 million.

Environmental Expenditure by Media

Environmental expenditure by media for the Energy Production & Distribution sector is shown in **Figure 5.29** below.

Figure 5.29 – Environmental Spending by Media: Energy Production & Distribution, 2012



Note: 'Other' includes regulatory charges. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Environmental spending in 2012 was dominated by in-house nature protection measures as in 2011. Potential sector-wide drivers behind this are not clear, and again the trend could be distorted by a small number of site-specific projects. Expenditure on air protection measures were also high in 2012, and dominated by integrated techniques.

Income and Savings

In 2012, by-product income and environmental cost savings for the Energy Production & Distribution sector were just over £1 million. Income and savings for this sector are shown in **Figure 5.30** for the years 2010 to 2012.

Figure 5.30 – Income and savings: Energy Production & Distribution, 2010 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	0.2	0.0	0.1	0.9	0.0	**1.2**	0.2
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: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Overall savings continue to decline between 2011 and 2012, although income from by-products has increased. Cost savings associated with waste still dominated what savings have been made.

5.5.8 SIC 36: Water Supply & Treatment

Estimates of environmental protection expenditure, environmental expenditure by media, and income and savings are provided below for the Water Supply & Treatment sector. Of the 42 invited to participate in the 2012 survey, a total of 15 companies returned valid responses, giving a response rate of 36% for this sector (36% in 2011).

Key Expenditure

The Water Supply & Treatment sector spent approximately £64 million in 2012 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.31** for the years 2010 to 2012.

Figure 5.31 – Total Environmental Expenditure: Water Supply & Treatment, 2010 to 2012

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R & D	**Total**	End of Pipe	Integrated	**Total**	
2012	6.4	27.2	4.2	**37.8**	10.7	15.1	**25.8**	**63.6**
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: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

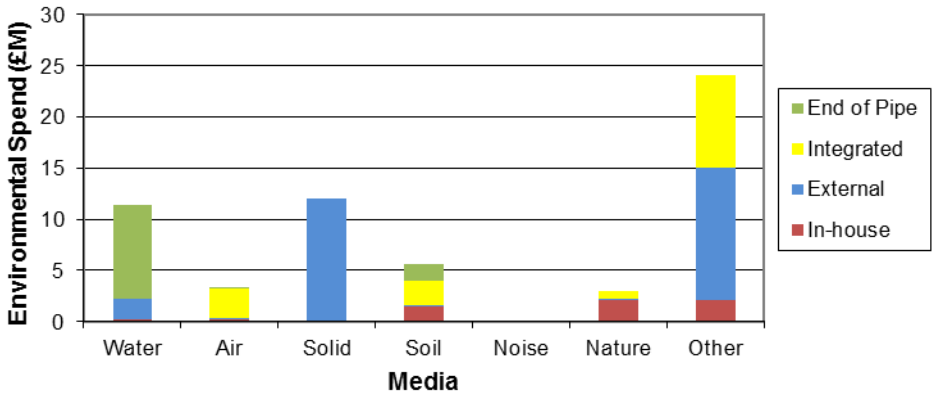
In 2012, Opex accounted for 59% of total spend compared to 96% of total spend in 2011, although this is largely due to a significant increase in Capex. The majority of Opex in 2012 was again dominated by external Opex as in 2011. The 2012 survey has captured higher total expenditure than the 2011 survey, but it is still significantly lower than that recorded in the 2010 survey.

The 2012 survey has reported an increase in expenditure on “end of pipe solutions” than in 2011. But there are still few meaningful trends across the years.

Environmental Expenditure by Media

Environmental expenditure by media for the Water Supply & Treatment sector is shown in **Figure 5.32** below.

Figure 5.32 – Environmental Spending by Media: Water Supply & Treatment, 2012



Note: 'Other' includes regulatory charges.Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The survey shows that 'other' media dominates environmental expenditure by media in 2012. In particular, external costs are large within this media and account for 46% of expenditure within the sector overall. Solid waste accounts for £12 million of spend, the second highest of the individual media and almost totally comprising of external spend.

Income and Savings

Income and savings for this sector are shown in **Figure 5.33** for the years 2010 to 2012.

Figure 5.33 – Income and Savings: Water Supply & Treatment, 2010 to 2012

	Cost savings (£M)						By-products (£M)
	Raw material	Water use	Energy use	Waste	Other	**Total**	
2012	0.0	0.0	1.2	0.5	0.6	**2.3**	0.0
2011	0.0	0.0	0.0	0.0	0.0	**0.0**	0.0
2010	0.0	0.0	3.8	0.0	0.0	**3.8**	4.0

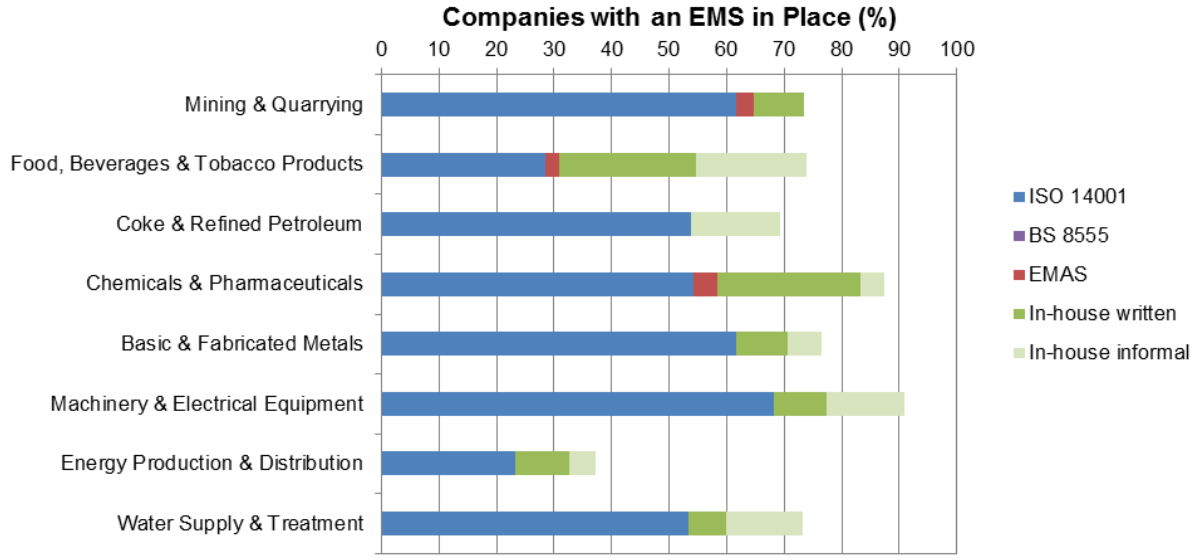
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2012 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Cost savings and income have increased in 2012 as compared to 2011 and represents a similar percentage of overall expenditure in the sector as in 2010 (4% in 2012, 2% in 2010). This increase has been driven by savings associated with energy use and to a lesser extent, waste and 'other' measures.

5.6 ENVIRONMENTAL MANAGEMENT SYSTEMS

This section presents the results of the survey question on environmental management systems (EMS), and the presence of procedures to address environmental issues within supply chains. These were first introduced into the questionnaire in the 2005 survey and 2012 survey respectively. The types of EMS used by different sectors are presented in **Figure 5.34** below.

Figure 5.34 – Types of EMS used, by SIC Sector, 2012



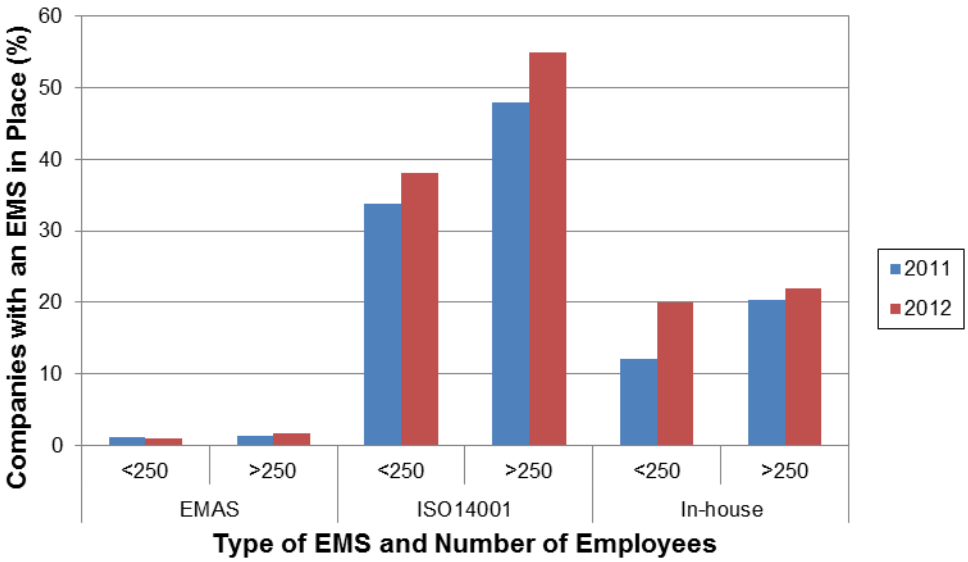
Note: As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> BS 8555 -> In-house) has been applied to avoid double counting. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Overall, 70% of responding companies indicated that they had an EMS in place in 2012, a slight increase on 2011 (61%). Almost half of responding companies had an EMS certified to ISO 14001 (47%), and a small number certified to Eco-Management and Auditing Scheme (EMAS) (1.3%). No companies that responded had an EMS implemented through BS 8555, a new response option for the 2012 survey. Therefore, just under a quarter of respondents in 2012 had an EMS in place which was not externally certified (e.g. developed and implemented to meet “in-house” requirements) (22%). This was broken down in the 2012 survey into ‘written’ and ‘informal’ EMSs. Of the in-house EMSs reported, slightly more were written rather than informal.

The sector with the greatest number of companies with an EMS in place is the Machinery & Electrical Equipment sector (91%). That with the fewest is the Energy Production & Distribution sector (37%).

Figure 5.35 below shows a breakdown of EMS certification status by company size (i.e. number of employees).

Figure 5.35 – Types of EMS Used, by Company Size, 2011 & 2012

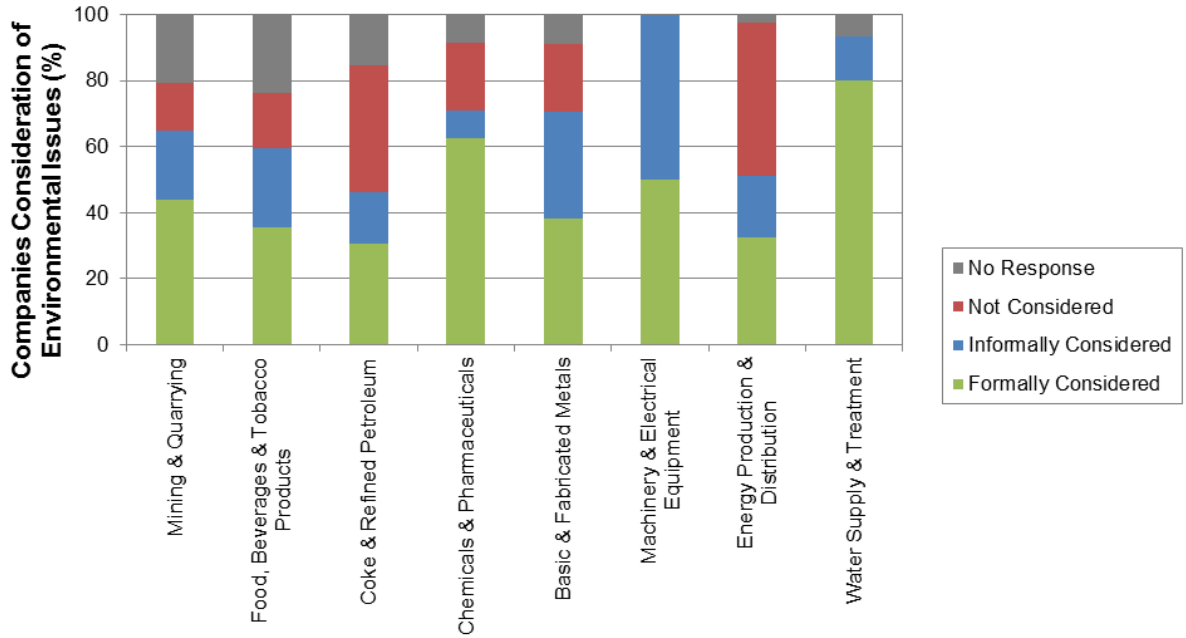


Note: As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> BS 8555 -> In-house) has been applied to avoid double counting. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

In general there appears to have been an increase across companies of all sizes introducing EMS'. The ISO 14001 scheme appears more popular among larger companies, whilst the uptake of EMAS and in-house EMS' seem to be irrelevant of company size.

A new question relating directly to the consideration of environmental issues was introduced in the 2012 survey, the results of which are illustrated in **Figure 5.36**.

Figure 5.36 – Consideration of Environmental Issues in Supply Chains, 2012



Note: Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Of those companies responding to this question, the Machinery & Electrical Equipment sector had the greatest number of companies that considered environmental issues within their supply chains (50% considered issues formally, and 50% informally). The Coke and Refined Petroleum sector had the least number of companies considering such issues, with 38% not considering them at all.

Overall, 67% of companies considered environmental issues within their supply chain (44% formally, 23% informally), 22% did not consider issues at all and 12% did not respond to the question.

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 2012 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. Additionally discussions were held and the outcomes of meetings between Defra and URS during the survey period have further raised potential recommendations which are included in the following section.

Recommendations for future surveys comprise:

Response Rates

- When looking at the response rate over the survey period, there are three clear peaks of activity:
    1. In the first couple of weeks after the survey was initially sent out.
    2. In the sixth and seventh weeks of the survey period following the issue of a reminder letter.
    3. Around the fourteenth week following top company calls and leading up to the final deadline.

  Based on these peaks of return activity and the relatively high response rate for the 2012 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.
- Contrary to the approach in the majority of previous years, a reminder postcard was not issued during the 2012 survey. However, this does not appear to have significantly affected the overall response rate.

Questionnaire Availability

- A digital version of the questionnaire was available via the Defra website for download by participating companies. As in the 2010 and 2011 surveys, 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, logistical issues are more likely to be reported by larger companies, 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, including the 'what's in it for me', 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

- The process of selecting and removing duplicates within the data received from the IDBR database prior to issuing the survey could benefit from review. A balance needs to be achieved between avoiding double counting of expenditure where questionnaires are issued to several sites within one company who each complete for the company as a whole, and omitting companies or sites where multiple sites are removed from the sample.

- As implemented in the 2010 and 2011 surveys, the Energy (SIC 35) and Water (SIC 36) sectors were disaggregated once again for the 2012 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

- As per recommendations from the 2011 survey, this year the survey team undertook validation calls within five days of the survey response being entered into the database. It is recommended that, where possible, this is repeated as it 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
IED	Industrial Emissions Directive
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 & Tobacco Products
19	Coke & Refined Petroleum
20 & 21	Chemicals & Pharmaceuticals
24 & 25	Basic & Fabricated Metals
27 & 28	Machinery & Electrical Equipment
35	Energy Production & Distribution
36	Water Supply & Treatment