AECOM

Environmental Protection Expenditure by Industry: 2013 UK Survey

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The views and recommendations expressed in this report are those of the authors and do not necessarily represent the views of the Department for Environment, Food and Rural Affairs, its ministers or officials.

Executive Summary

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Introduction

This report presents the findings of a study commissioned by the Department for Environment, Food and Rural Affairs (Defra) and undertaken by AECOM Infrastructure & Environment UK Ltd (AECOM), to estimate expenditure by UK industry on environmental protection in 2013. The primary objectives of the study were:

- To provide Defra with an annual estimate of environmental protection expenditure by UK industry for 2013;
- To enable the UK to provide these estimates for the biennial Eurostat/OECD Joint Questionnaire on Environmental Protection Expenditure and Revenues; and
- To enable the UK to meet obligations under the Structural Business Statistics Regulation.

In addition to these broad objectives, data from this survey is now being utilised as part of the Environmental Goods and Services Sector (EGSS) regulation and also informs the UK's Environmental Accounts. This survey and previous annual surveys may also 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 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 seventeenth survey of this type; previous surveys were carried out in 1994 (a pilot survey), 1997, and annually between 1999 and 2012. As in previous years, the 2013 survey process was overseen by a steering group with representatives from Defra and the Office for National Statistics (ONS).

Methodology

The 2013 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 1,166 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 247, giving a valid response rate of just over 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 2013;
- The environmental media (areas) affected by the spending, namely waste water, air, solid waste, soil/groundwater, noise/vibrations and nature protection;
- The use and certification of an environmental management system (EMS);
- Consideration of environmental issues in contractual or procurement procedures; and
- The use of environmental foot printing methodologies.

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 2013 survey

The following comprises a brief overview of key findings from the 2013 survey:

- Gross spending on environmental protection in 2013 by these UK industries was an estimated £2.7 billion (±£916 million at a 95% confidence level);
- The primary spending industry sectors were Energy Production & Distribution (20% 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 one of the resulting sectors, Energy Production & Distribution, consistently the highest spending sector since 2011.
- Opex accounted for 77% of the total environmental protection expenditure, with Capex making up the remainder (23%);
- Excluding spend on research and development, the area of largest expenditure across Opex remains on water measures, whilst for Capex air protection measures remain the largest.
- This spending was offset by an estimated income of £87 million from the sale of by-products and an estimated cost saving of £293 million.

- Overall, 67% of responding companies had an EMS in place in 2013. Of these nearly three quarters had an EMS certified to ISO 14001, with the remainder reporting an in-house management system.

Comparisons between survey years

A summary of total environmental protection expenditure by businesses for 2010 to 2013 is presented in **Figure E1**. Ranges indicating the 95% confidence intervals associated with each value are provided for the 2013 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 E.1a – Graphical Summary of Total Environmental Protection Expenditure, 2010 to 2013

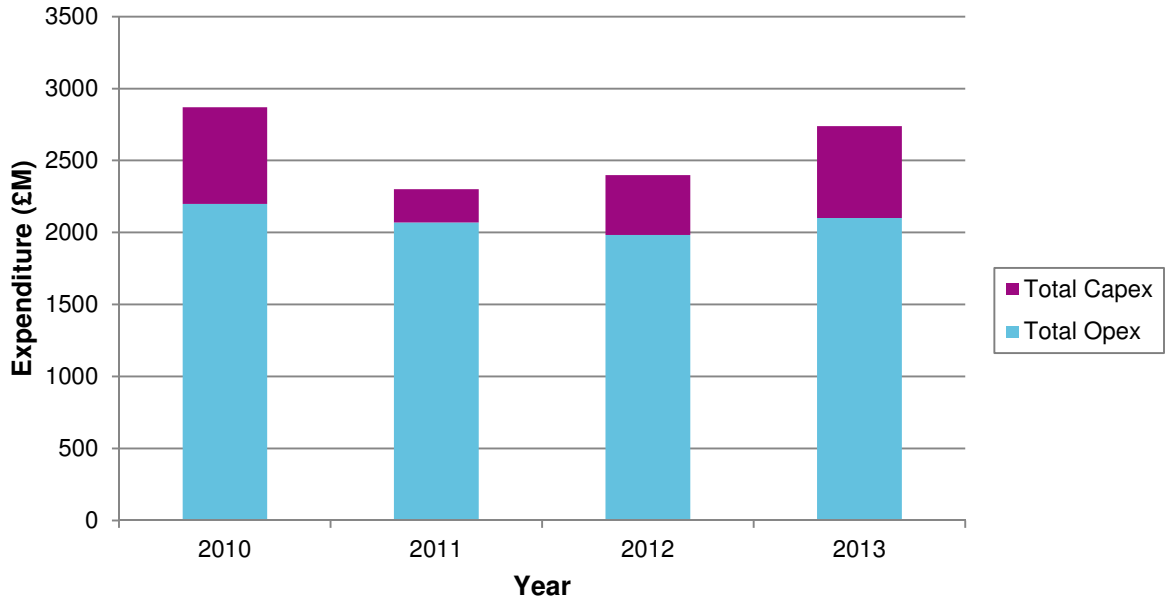


Figure E.1b – Tabulated Summary of Total Environmental Protection Expenditure, 2010 to 2013

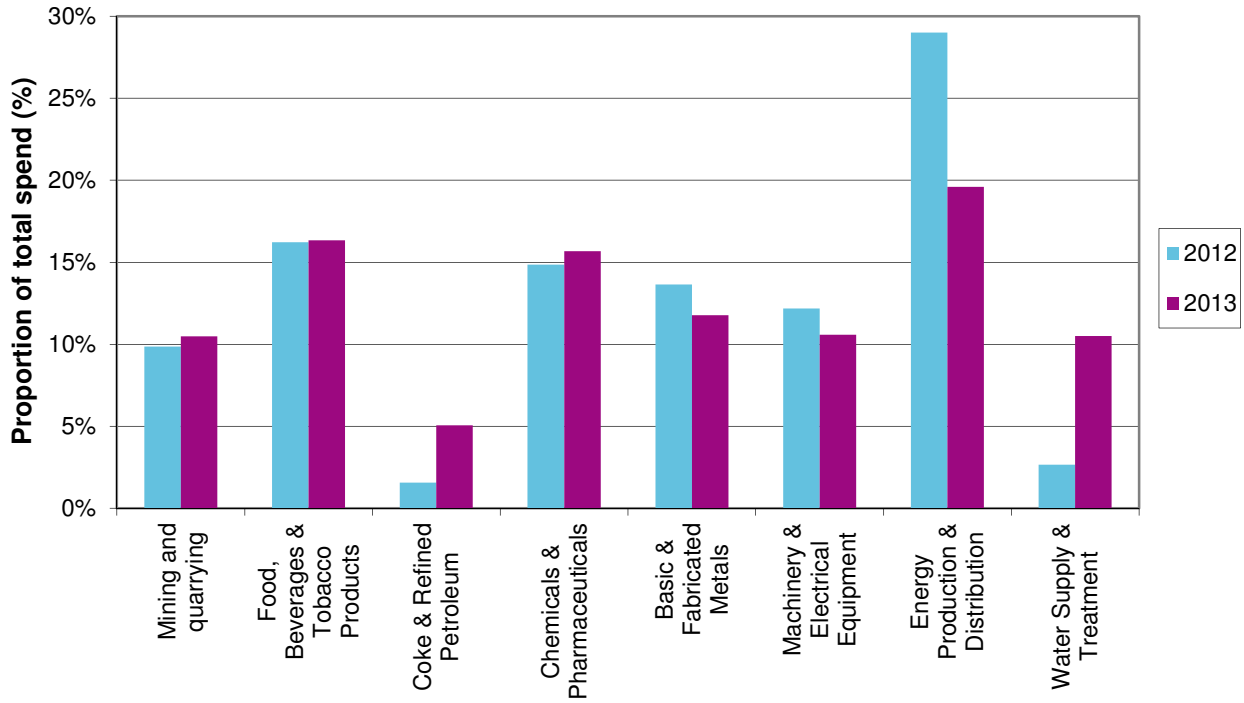
	2010	*2011*	*2012*	*2013*	
	% of gross	*% of gross*	*% of gross*	*Total expenditure (£M)*	*% of gross*
Operational Expenditure					
In-house	33	32	31	603 (323-883)	22
External	35	47	45	1,346 (793-1,897)	49
Research & Development	7	10	6	153 (0-363)	6
Total Opex	75	90	83	**2,102** (1,322-2,883)	77
Capital Expenditure					
End of Pipe	5	8	5	179 (94-264)	7
Integrated processes	20	2	12	457 (144-771)	17
Total Capex	25	10	17	**636** (295-977)	23
Gross Expenditure					
Total gross spend	100	100	100	**2,739** (1,823-3,569)	100
Income					
Income from by-products				87 (29-146)	3
Total net expenditure				**2,651** (1,734-3,569)	
Cost savings				293 (115-470)	

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. 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. Also note that the figures presented in this report are not adjusted for inflation but are presented as reported by responding companies following the grossing up procedure (see Annex 6 for further information).

A summary of how total expenditure is distributed across the main industry groups for the 2012 and 2013 survey years are presented in **Figure E2**.

Figure E2 – Total Environmental Expenditure by Industry Sector, 2012 & 2013



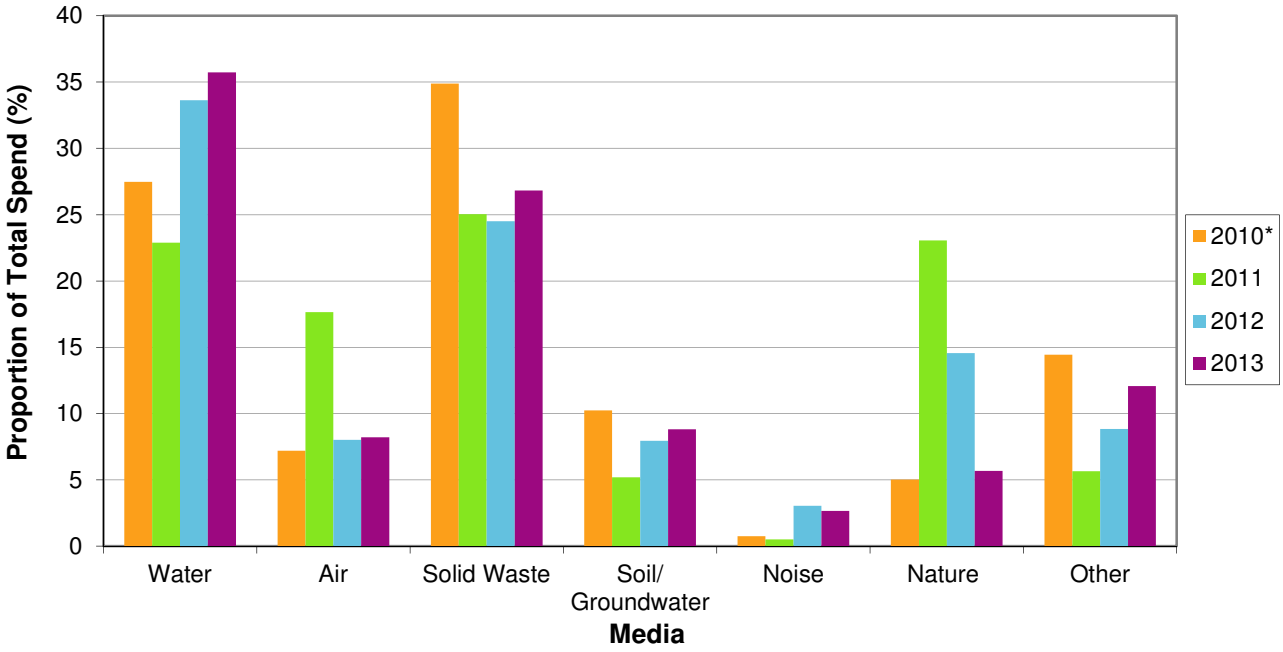
Note: Comparisons between years should be treated with caution. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The Energy Production & Distribution sector remains the sector accounting for the highest proportion of total spend (20%, 29% in 2012)[1]. Although total spend has decreased slightly, it remains driven by Opex, with this comprising 80% of the total spend in this sector. As in previous years, the Food, Beverages & Tobacco Products sector remains a high spending sector with 16% (16% in 2012).

Figures E3 and E4 show how Opex and Capex are distributed across environmental media in 2010 to 2013.

[1] In the initial surveys 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.

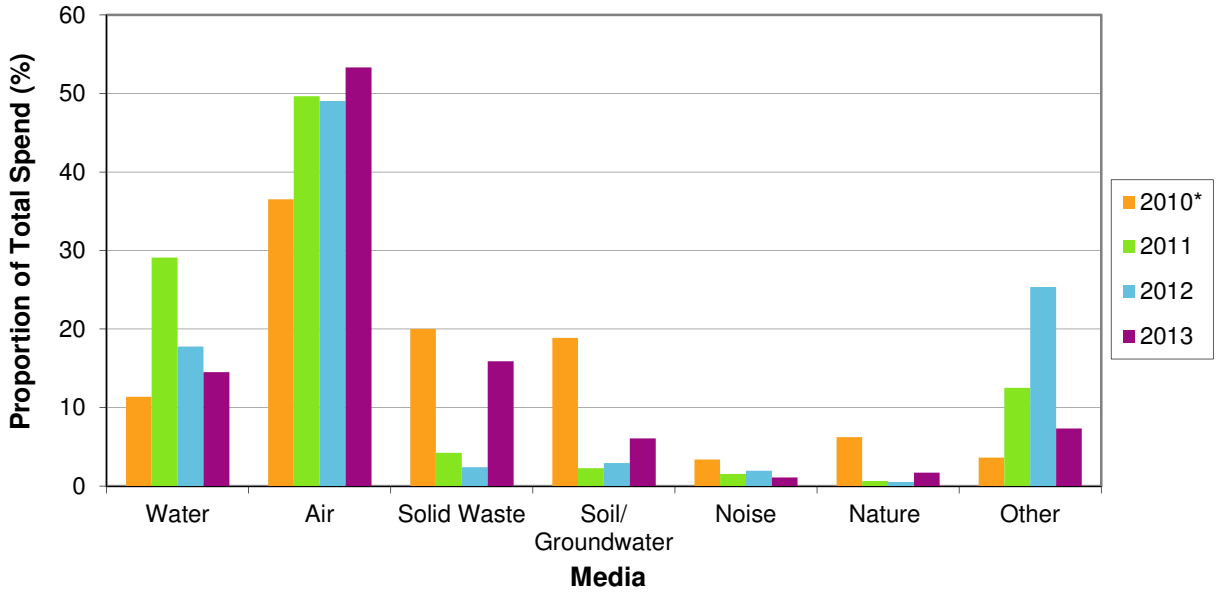
Figure E3 – Operational Environmental Expenditure by Environmental Media, 2010 to 2013



*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 2013 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

In 2013, spend on water comprised 36% (£751 million) of total Opex, the area of greatest expenditure as in 2012 and 2009. Spend on solid waste measures remains similar to the previous two years (27% in 2013, 24% in 2012, and 25% in 2011). Spend associated with nature protection has seen a further fall compared to 2011 levels and is now at a similar level to that in 2010 (6% 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.*

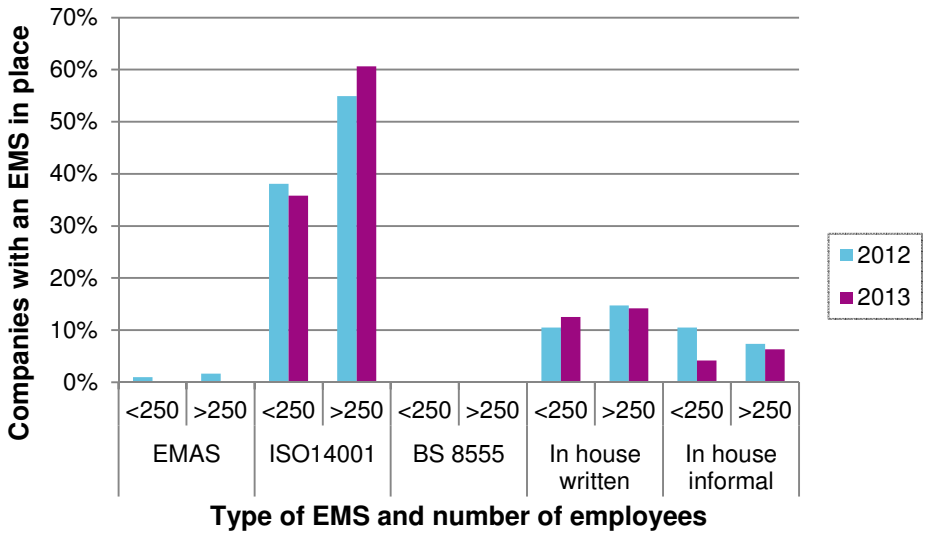
Spend associated with air accounted for just over half of the total Capex (£339 million). Spending in the 'other' category has decreased from 25% in 2012 to just 7% in 2013. Capex on solid waste accounted for 17% of the total spend, whilst water, soil and groundwater, noise and nature protection measures contributed the remaining 23%.

Environmental Management Systems

The proportion of companies with an Environmental Management System (EMS) in place has shown a slight decrease since 2012 (67% of respondents in the 2013 survey, compared to 70% in the 2012 survey). A decrease in uptake of EMAS by all companies is also noted. Of the 67% just under three quarters (73%) had an EMS certified to ISO 14001, the remainder reported in-house systems. For the first time since the various certifications were broken down in the results, no companies had an EMS certified to the Eco-Management and Auditing Scheme (EMAS).

Figure E5 shows the number of companies with an EMS in place and the type of EMS selected, by company size (in terms of number of employees). Large companies appear to be more likely to have an EMS in place, for example, ISO14001 has been implemented in 36% of smaller companies, whilst 61% of larger companies have implemented such an EMS.

Figure E5 – Breakdown of EMS by Company Size, 2012 & 2013



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.

Contents

Introduction

01

01 *Introduction*

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

This report presents results from the analysis of the 2013 survey data returned by participating UK companies. Previous surveys were carried out to estimate expenditure in 1994 (a pilot survey), 1997, and 1999 to 2012. 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).

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

The 2013 survey was distributed to a total of 1,166 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 2012 survey, rather than the larger sample used in 2010. Decreasing the sample size between periodic larger surveys was introduced following the 2006 survey as part of the approach to increase efficiency and to reduce 'survey fatigue'. Across the last few years increased survey participation has been observed.

To provide some context and to allow broad trends to be established, grossed figures from the previous three surveys (2010-2012) are presented with those from the 2013 survey. Sector specific figures are also presented alongside those from the 2010-2012 surveys. However, direct comparisons between survey years should be treated with extreme caution for the following reasons:

- In the 2010 survey a change was introduced in the way survey returns for the Water Supply & Treatment sector (SIC 36) were validated. 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. This was continued in 2013. Despite this measure to avoid double counting, retrospective amendments had to be carried out as some results included the total business. For these returns, the same validation processes as applied since 2010 were carried out;
- The sample size of the 2010 survey was significantly different than the subsequent 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 2011 and 2012 surveys used a similar sample frame to that of the 2013 survey, these 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 2011, 2012 and 2013 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. Also note that the figures presented in this report are not adjusted for inflation but are presented as reported by responding companies following the grossing up procedure (see Annex 6 for further information).

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 2013 survey covers expenditure incurred in the financial year 2013/2014. In accordance with EU regulations, industries that have been surveyed are those in NACE sections C, D and E (extraction, manufacturing, and energy and water supply). These are classified according to the 2007 SIC codes (listed at the end of this report). Expenditure estimates across these sectors are provided for the following:

- In-house and external operating costs (including research and development, regulatory charges etc.);
- End of pipe capital investments;
- Integrated or 'clean' technology capital investments;
- By-product income and environmental cost savings.

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

- Waste water: Collection and transport of waste water, the prevention or reduction in quantity of waste water and of substances in waste water, the prevention of incidental water pollution, the treatment of cooling water before draining to the surface or groundwater and monitoring of surface water.
- Air: Prevention or reduction of gaseous, liquid or particulate emissions to the atmosphere and the monitoring of air emissions.
- 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 2012, 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.

Survey Methodology and Preparation

02

02 *Survey Methodology and Preparation*

As in previous years, the 2013 survey consisted of three phases, sub-divided into the following individual tasks/activities:

Pre-survey phase (April 2014 – May 2014):

- Review of the 2012 survey and introduction of modifications
- Promotion of 2012 survey results
- Steering Group meeting participation
- Request submitted for company data from the UK Government's Inter Departmental Business Register (IDBR)

Survey phase (June 2014 – January 2015):

- 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 2013 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 2014 – May 2015):

- 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 2013 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 3.2 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. The same approach was used as in 2012 for the 2013 survey, 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 and 2013 survey questionnaire, an e-mail was sent out to all companies that responded to the previous survey which were also included in the current 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 (see section 2.2 for definition) 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 in subsequent surveys and resources used instead to make further follow-up calls.
- In 2012 a new question was inserted on addressing environmental issues in the supply chain. This was retained in 2013.
- In 2012 a wider array of responses was included for question 4.2 on EMS, to include 'BS 8555' and both 'in-house written EMS' and 'in-house informal EMS'. Again, this has been retained in 2013.

The format of the questionnaire has been updated since the 2012 surveys and the changes are summarised in **Figure 2.1.**

Figure 2.1 - Summary of Questionnaire Modifications since the 2010 survey

Section/Question		*Modification*
4.1	EMS-supply chain	Changed text of question to 'Does your company have procedures to address environmental issues associated with your suppliers?'
4.3	EMS-environmental foot printing	Inserted a new question: part a) 'Do you apply any environmental foot printing methodologies to your products or organisation?' with response options 'Yes' 'No' and 'Don't know'. Part b) If 'yes', focusing on products, you're your business apply more than one methodology to a single product?' with response options 'Yes', 'No', and 'Don't know'.

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 2013, the UK Government's Inter Departmental Business Register (IDBR) provided a random sample of 1,166 companies across the extraction, manufacturing, energy and water supply industries (see **Figure 2.2** below).

Figure 2.2 – Industry sectors covered by the 2013 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). A stratified sampling approach, weighted towards the industry sectors with known high expenditure rates, 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 153 '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 AECOM 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 2012 survey database was updated for use during the 2013 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 did not change until the validation tests were run again.

Conducting the Survey

03

03 *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, 2013

Activity	*Quantity*	*Comment*
Pre survey e-mail	274	As in previous surveys, e-mails were 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. The email was tailored to those that had completed the survey previously and those which had not. Both versions invited the company to participate in the 2013 survey and provided key information from the previous 2012 survey.
Survey questionnaire	1,166	A slightly higher number of questionnaires were issued compared to the 2012 survey. As previously, the volume of questionnaires returned was higher in the first few weeks after the survey was sent out and also after the reminder letters were sent out. The response rate was highest in the week of the deadline, with a total of 247 returned over the period.
Reminder letter to elicit responses	1,080	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. As for previous years, 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	550	Top Companies that had not returned surveys were contacted by phone up to five 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	257	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 2013 survey whilst some returns were removed at the validation stage and some returns were 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 'top company' 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 2013 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; and
- Feedback received from companies is an integral part of the questionnaire design for the following year.

3.2.1 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, 2013

Response	*Quantity*
Returned Questionnaire*	**40**
Company declined to participate	34
Indicated the survey would be returned, but AECOM did not receive completed survey	9
AECOM left a message/sent an email reminder	44
Supplied AECOM with a new contact/number- no response	3
Said they would pass it on to somebody more appropriate	6
Asked for the survey to be resent	6
Company was uncontactable / no response	11
Company has ceased trading/is in liquidation	0
Total	**153**

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

3.2.2 Lessons learnt from the Dedicated Top Company Follow-up

In total, 7% of 2013 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, this has decreased since 2012 (18%) and it is attributed to the targeted Top Company calls which have helped to minimise this issue through identifying the most appropriate person within the organisation and extracting up-to-date contact details. Additionally, the contact database has been updated over three years and is more complete.

As in previous surveys, for those Top Companies that declined to participate in this year's survey (2013), the most common reasons were 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.

It appears that the numerous reminder calls made to the Top Companies helped to improve the overall response rate. A total of 40 surveys were returned from the 153 Top Companies invited to participate (i.e. a response rate of 26%), an increase on the previous three survey response rates for Top Companies.

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 2014 – January 2015). Companies were encouraged to use any or all of these methods to contact a member of the AECOM 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 2013 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. As in previous surveys, 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.

Analysis of Responses

04

04 *Analysis of Responses*

4.1 Response Rates

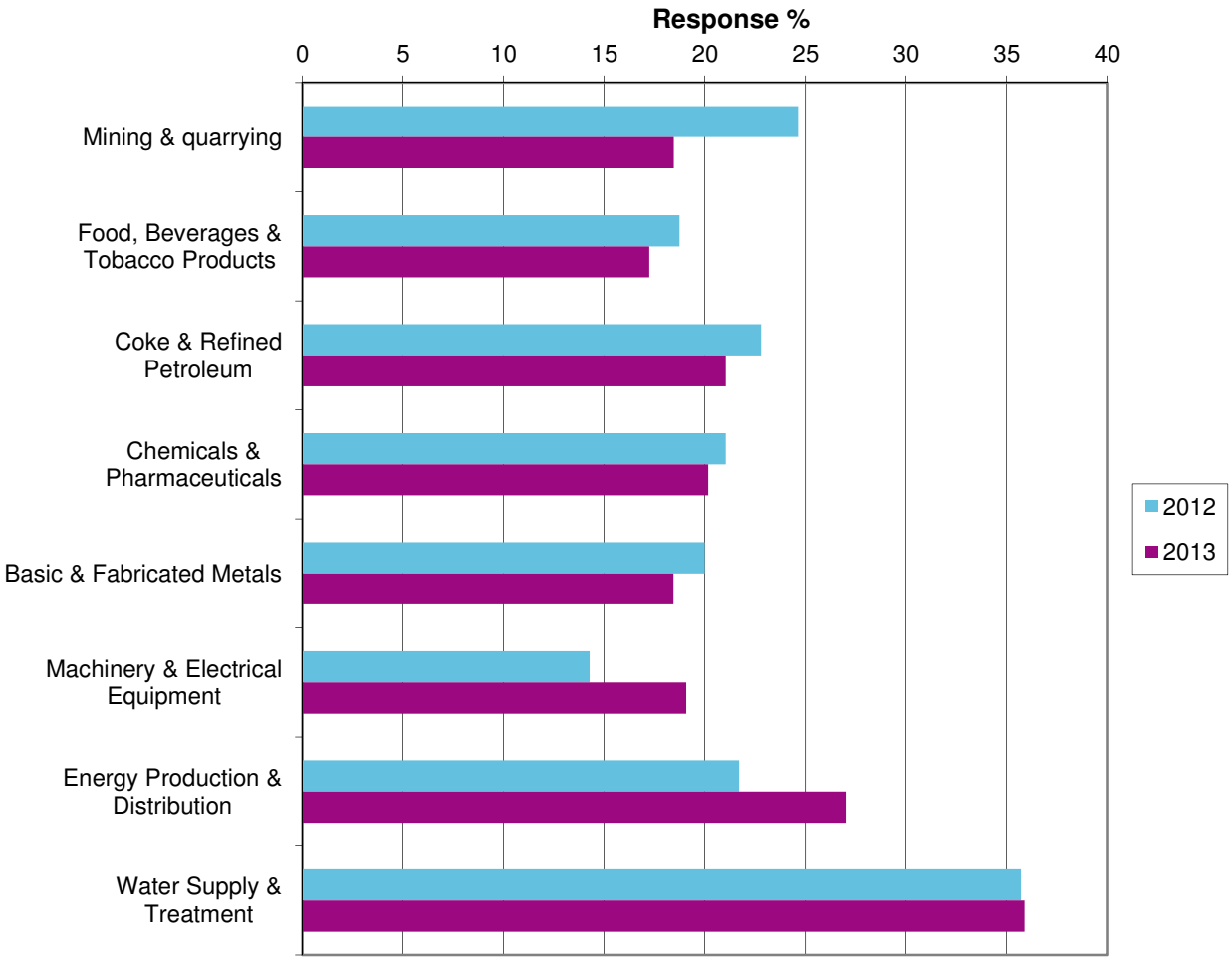
From a sample of 1,166 companies, the total number of validated responses was 247 giving a response rate of just over 21%, following the trend of higher response rates since the 2010 survey and maintaining the level of just over 20% that we have seen since 2011. The response rates are summarised in **Figure 4.1** below. The output of the data is presented in Annex 5.

Figure 4.1 – Survey Response Rates, 2010 to 2013

Aspect	*2010*	*2011*	*2012*	*2013*
Number of companies invited to participate	7827	1062	1097	**1166**
Number of (valid) survey returns	2352	225	227	**247**
Proportion of (valid) responses (%)	30.0	21.2	20.7	**21.2**

As shown by Figure 4.2 below, the response rates for five individual sectors in 2013 were lower compared to the 2012 survey; Water Supply & Treatment was marginally higher in 2013, whilst Machinery & Electrical Equipment and Energy Production & Distribution performed much better than in 2012.

Figure 4.2 – Survey Response Rate by Sector, 2012 & 2013



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 2012 and 2013 surveys, in 2013 the sector with the highest response rate remains the same as in 2012, i.e. the Water Supply & Treatment sector. However the sector with the lowest response rate has changed from Machinery & Electrical Equipment in 2012 to Food, Beverages & Tobacco Products in 2013.

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 2013 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, results in any bias being '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.

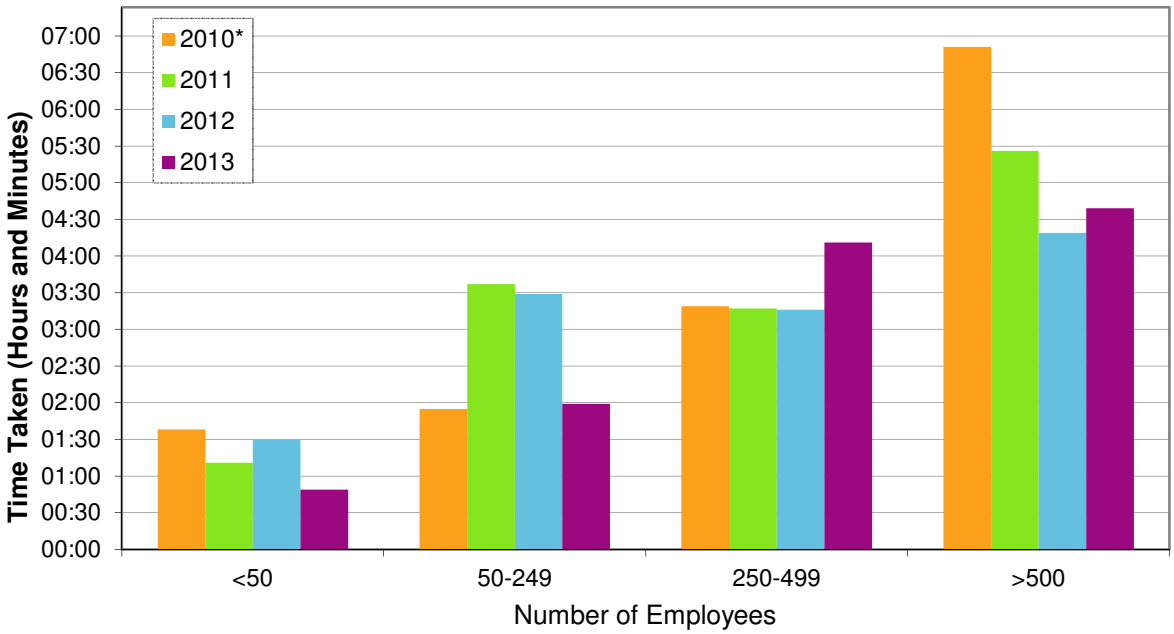
4.5 Survey Completion Time

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 49 minutes to complete the 2013 survey questionnaire (compared to 1 hour 30 minutes for the 2012 survey);
- Those with between 50 and 249 employees spent an average of 1 hours 59 minutes completing the questionnaire (compared to 3 hour 29 minutes for the 2012 survey);
- Companies with between 250 and 499 employees took, on average 4 hours 11 minutes (comparative to the 2012 average of 3 hours 16 minutes);
- For companies with over 500 employees, completion time was similar to that in 2012, with an average completion time of approximately 4 hours 39 minutes (4 hours 19 minutes in 2012).

For the 2013 survey, the average reported time taken for companies with less than 249 employees is much lower compared to that in 2012, whilst companies with between 250 and 499 employees took longer in 2013 to complete the questionnaire as compared to 2012. Companies with more than 500 employees completed the questionnaire in a similar time to 2012.

Figure 4.3 – Breakdown of Mean Survey Completion Time by Company Size, 2010-2013



*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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

Survey Results and Analysis

05

05 *Survey Results and Analysis*

5.1 Total expenditure

The total gross spending on environmental protection in 2013 by UK industry amounted to an estimated £2.7 billion (±£916 million at the 95% confidence level), which equates to a 12.5% increase on 2012 spend (£2.4 billion).

In 2013, Opex accounted for approximately 77% (£2.1 billion) of total spending, with Capex at 23% (£0.6 billion). This majority spend on Opex is similar to that observed in previous years, although a slight increase in Capex spend is shown; this is similar to that seen in 2010. External Opex accounts for a greater proportion of overall spend (49%) than in-house Opex (22%) reflecting the broad split seen in 2011 and 2012 (external accounting for 47% and 45% and in-house accounting for 32% and 31% respectively) but with an increase towards external Opex.

Similar to 2012, Capex in 2013 has continued the trend seen in 2010 and 2012, with total spend comprising largely of that integrated processes (17% of total 2013, 12% of total 2012 spend and 20% of total spend in 2010), with spending on end of pipe projects accounting for only 7% of the total spend. Spend on environmental research and development (R&D) has remained at 6% as seen in 2012. Overall, the proportion of spend in Capex as a proportion of total environmental spend has increased again in 2012 from 17% in 2012 to 23% in 2013.

A summary of 2013 environmental expenditure is presented in **Figure 5.1,** along with equivalent data for 2010, 2011 and 2012. Ranges indicating the 95% confidence intervals associated with each value are provided in parenthesis for the 2013 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 5.1a – Graphical Summary of Total Environmental Protection Expenditure, 2010 to 2013

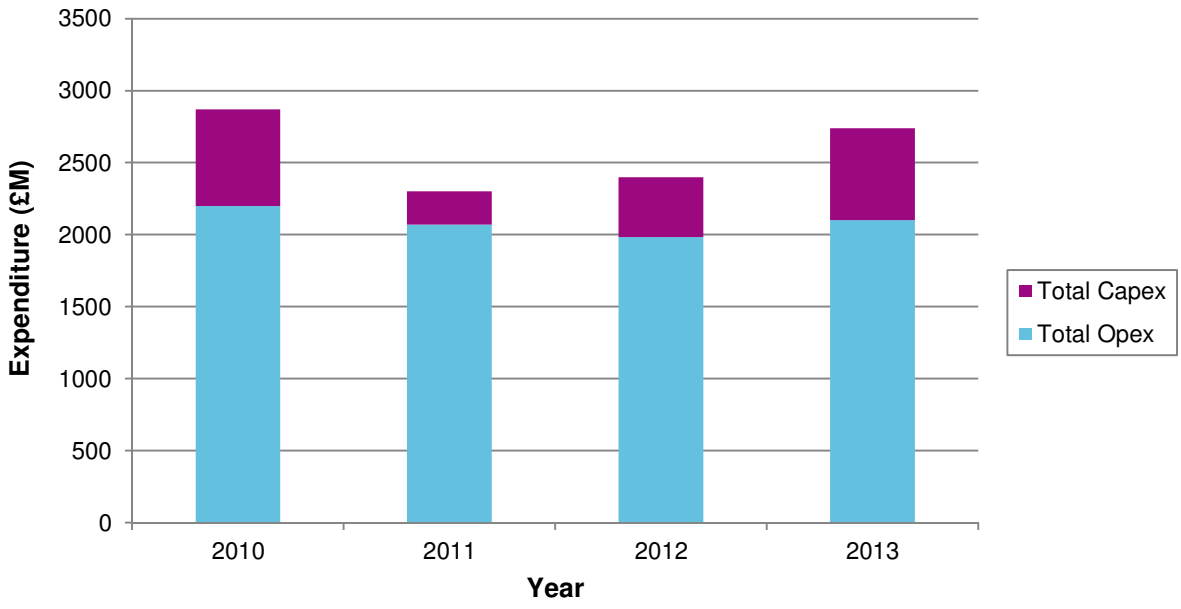


Figure 5.1b – Tabulated Summary of Total Environmental Protection Expenditure, 2010 to 2013

	2010	*2011*	*2012*	*2013*	
	% of gross	*% of gross*	*% of gross*	*Total expenditure (£M)*	*% of gross*
Operational Expenditure					
In-house	33	32	31	603	22
				(323-883)	
External	35	47	45	1,346	49
				(793-1,897)	
Research & Development	7	10	6	153	6
				(0-363)	
Total Opex	75	90	83	**2,102**	77
				(1,322-2,883)	
Capital Expenditure					
End of Pipe	5	8	5	179	7
				(94-264)	
Integrated processes	20	2	12	457	17
				(144-771)	
Total Capex	25	10	17	**636**	23
				(295-977)	
Gross Expenditure					
Total gross spend	100	100	100	**2,739**	100
				(1,823-3,569)	
Income					
Income from by-products				87	3
				(29-146)	
Total net expenditure				**2,651**	
				(1,734-3,569)	
Cost savings				293	
				(115-470)	

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. 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**).

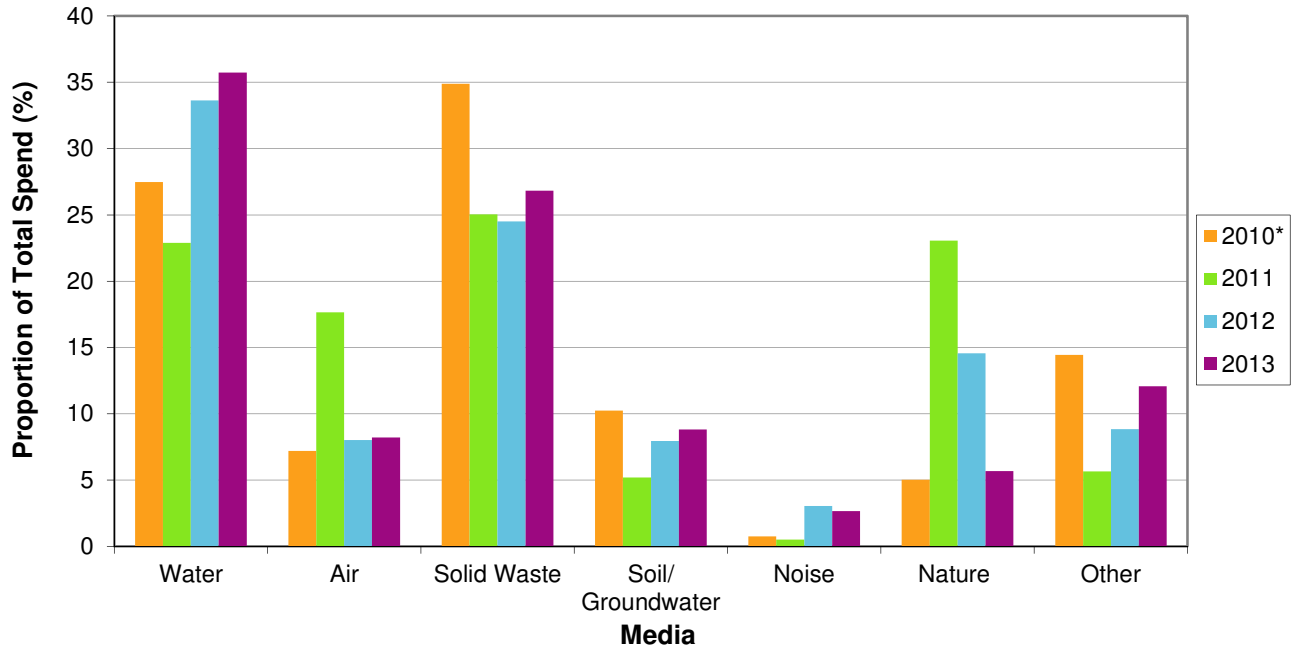
Excluding R&D, water was the area with the greatest expenditure across both in-house and external Opex; accounting for 36% (£697 million) of the total spend on operational processes in 2013 (£1,949 million). Spend associated with solid waste comprised 27% of total Opex spend, accounting for a similar proportion of spend as in 2012. Spend associated with nature protection has seen a decrease back to 2010 levels (6% as compared to 5% in 2010).

Figure 5.2 – Environmental Opex by Media, 2010 to 2013

Environmental Media	*Operating Expenditure (%)*				*In-house (£M)*	*External (£M)*	*Sub-Total (£M)*
	2010	*2011*	*2012*	*2013*	*2013*		
Water	27	23	34	**36**	248.7	447.9	696.6
Air	7	18	8	**8**	104.9	55.4	160.2
Solid Waste	35	25	25	**27**	82.3	440.7	523.0
Soil/groundwater	10	5	8	**9**	14.7	157.3	172.0
Noise	1	1	3	**3**	5.8	45.9	51.7
Nature Protection	5	23	15	**6**	65.5	45.1	110.6
*Other**	14	6	9	**12**	81.5	153.7	235.2
Total (£M)					**603.4**	**1,346.0**	**1,949.4**

**'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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. 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, 2010 to 2013



*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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

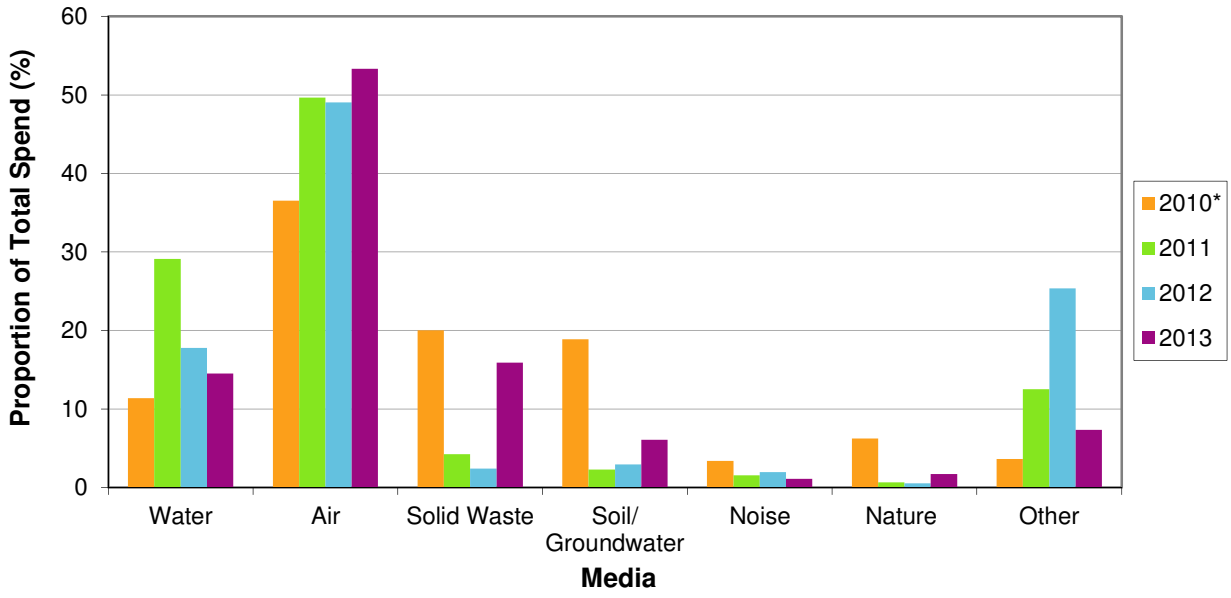
Spend on air protection measures maintains a steady level, accounting for just over half (£339 million) of the total Capex (£636 million). The second highest media category in terms of Capex spend is solid waste which comprises 16% of the total spend (£101 million). Spending on water measures is close behind and comprised 15% (£93 million), whilst soil and groundwater, noise, nature protection and other measures contributed the remaining 16% (£103 million).

Figure 5.4 – Environmental Capex by Media, 2010 to 2013

Environmental Media	Capital Expenditure (%)				End of Pipe (£M)	Integrated (£M)	Sub-Total (£M)
	2010	2011	2012	2013			
Water	11	29	18	**15**	84.1	8.4	92.5
Air	37	50	49	**53**	38.0	301.5	339.4
Solid Waste	20	4	2	**16**	10.6	90.5	101.1
Soil/groundwater	19	2	3	**6**	33.1	5.6	38.7
Noise	3	2	2	**1**	6.2	0.8	7.0
Nature Protection	6	1	1	**2**	1.1	9.7	10.8
Other*	4	13	25	7	5.9	41.0	46.8
				Total (£M)	**178.9**	**457**	**636.4**

** '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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. 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, 2010 to 2013

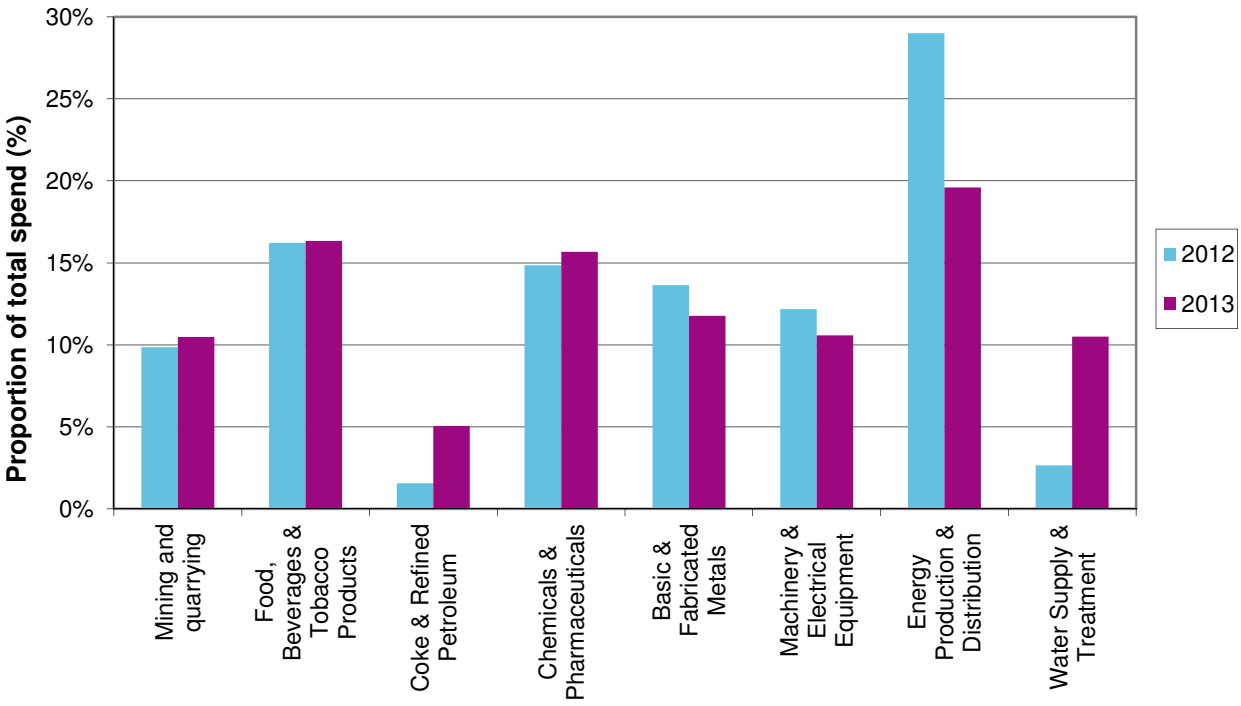


*Note: 'Other' includes regulatory charges. Comparisons between years should be treated with caution. *As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. 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 and 2012 spend the 'Energy Production & Distribution' sector (part of the 'Electricity, Gas and Water' sector prior to the 2010 survey) had the highest spend (27% and 29% of total expenditure respectively). Whilst still the highest in 2013, spend by this sector has fallen proportionately to 20%. This drop in spend in the 'Electricity, Gas and Water' sector was driven by an overall decrease in spend across both Capex and Opex. **Figure 5.6** shows the total expenditure by sector between the 2012 and 2013 surveys.

Figure 5.6 – Breakdown of Total Environmental Expenditure by Sector, 2012 & 2013



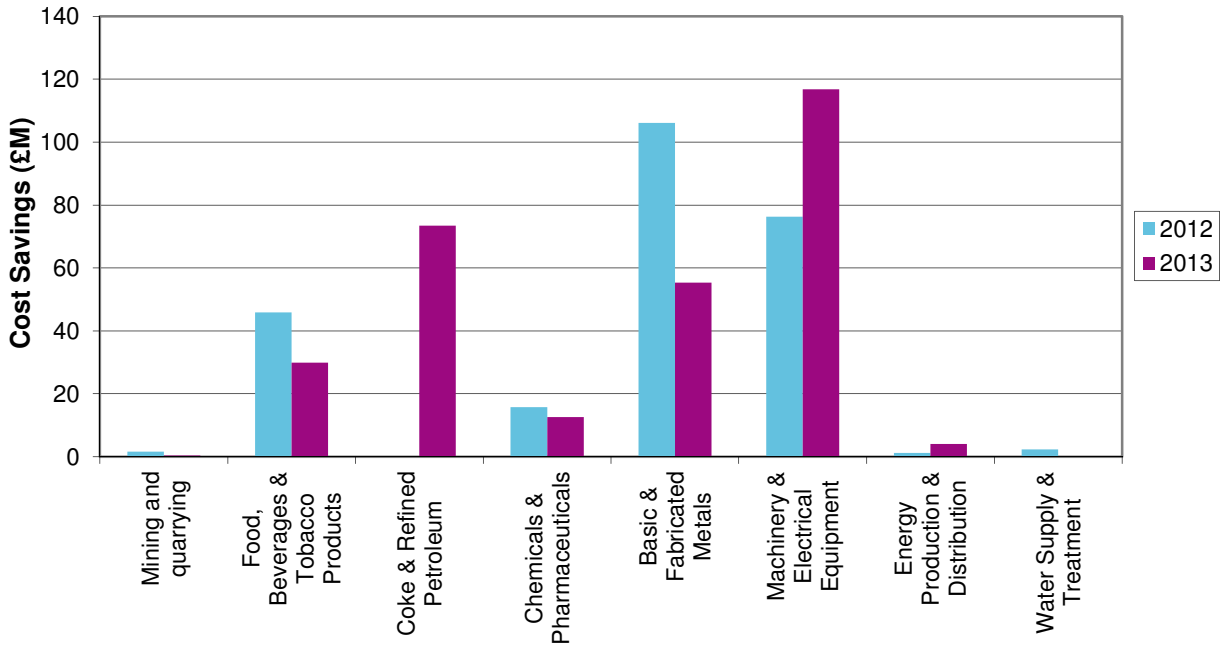
Note: Comparisons between years should be treated with caution. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

[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.

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 2013 compared to 2012.

Figure 5.7 – Cost Savings by Sector, 2012 & 2013



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 2013 were £293 million (equivalent to 11% of total gross spend) compared to £249 million in 2012 (10% of total gross spend). The sectors with the greatest cost savings have changed since 2012, with Machinery & Electrical Equipment increasing from £76 million in 2012 to £117 million in 2013, whilst Coke & Refined Petroleum has increased dramatically from almost no cost savings to £73 million in 2013. Cost savings are broken down by media for 2010 to 2013 in **Figure 5.8** below.

Figure 5.8 – Cost Savings by Environmental Media, 2010 to 2013

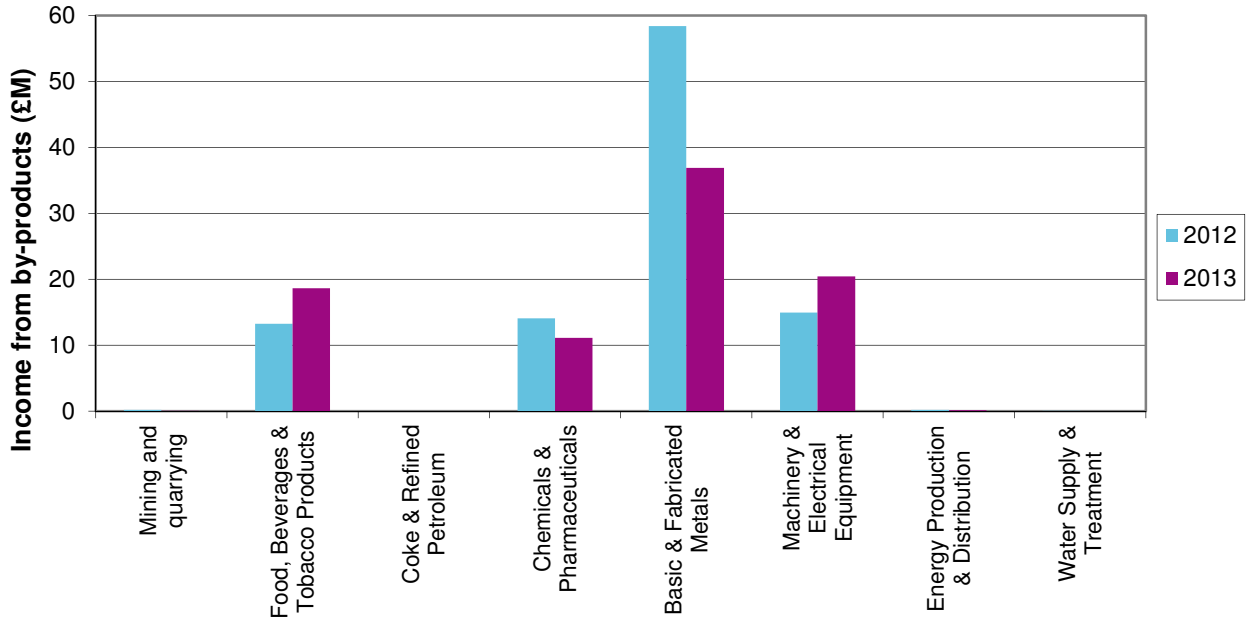
Environmental Media	% of Total Savings				Total Cost Savings (£M)
	2010	2011	2012	2013	2013
Raw Materials	35	55	40	**66**	193.5
Water Use	9	4	5	**4**	10.4
Energy Use	34	27	42	**27**	79.0
Waste	22	13	12	**3**	9.5
Other*	1	2	1	**0**	0.1
Total	**100**	**100**	**100**	**100**	**292.5**

**'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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.*

The highest cost savings in 2013 reflect those seen in 2011, with the media with the greatest savings being the improved use or substitution of raw materials and the second greatest being energy use. There has been a decrease in cost savings associated with waste, but the remaining cost savings in 2013 are similar to those in 2012 with 4% resulting from cost savings associated with water usage and 'other' improvements.

Income received as a result from by-products for the 2012 and 2013 surveys are shown in **Figure 5.9** below.

Figure 5.9 – Income from By-Products by Sector, 2012 & 2013



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 2013 was £87 million (equating to 3% of total gross spend), a slight decrease from the previous two surveys. As in 2012, the Basic & Fabricated Metals sectors were the leaders in terms of income generated from the sale of by-products during 2013 (£37 million). However, the sectors' dominance has decreased in line with the overall decrease in income resulting from the sale of by-products and also the increase seen in income within the Food, Beverages & Tobacco Products and the Machinery & Electrical Equipment sectors.

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 2013:

- **Key Expenditure:** Summary of key 2013 data by Opex and Capex categories, along with expenditure in 2010 to 2012.
- **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 2013 data by cost savings and by-product sales, along with data from 2010 to 2012.

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 2011, 2012 and 2013 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 130 invited to participate in the 2013 survey, a total of 24 companies returned valid responses, giving a response rate for the sector of 19%. This is a slight decrease from the 25% response rate for the 2012 survey and sees a return to the response rates of 2011 (19%).

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 again in the 2013 survey, with the returns biased towards one sub-sector area (mining support service activities) with very few returns from other sector areas,.

Key Expenditure

Environmental expenditure for this sector is shown in **Figure 5.10** for the years 2010-2013. The data is presented separately for Opex and Capex.

Figure 5.10 –Total Environmental Expenditure: Mining & Quarrying, 2010 to 2013

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R&D	Total	End of Pipe	Integrated	Total	
2013	126.7	92.9	0.3	**219.8**	30.5	36.6	**67.1**	**286.9**
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	**0.0**	20.6	1.5	**22.1**	**22.1**

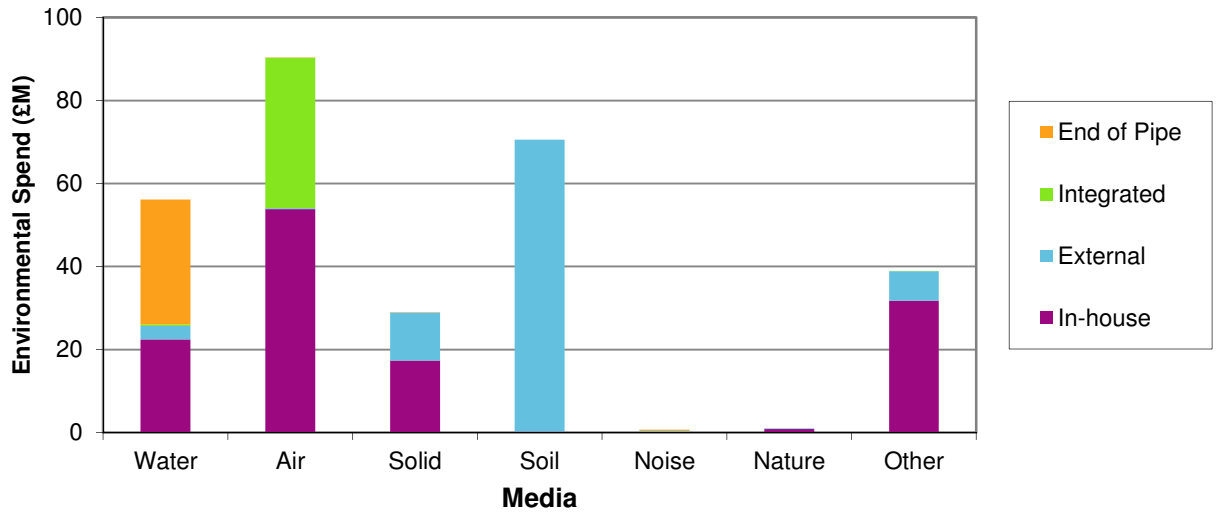
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

The Mining & Quarrying sector spent approximately £287 million in 2013 on environmental protection measures, an increase on 2012 spend. However, 2013 has seen a slight shift of spend in the sector towards Capex rather than Opex, contrary with the trend seen in 2012.

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, 2013



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 air protection measures, driven by in-house and integrated spend and replacing water protection measures as the area of greatest spend in 2012. This is in contrast with the second highest media spend soil, which almost exclusively comprises external spend.

Income and Savings

In 2013, income and savings for the Mining & Quarrying sector were approximately £0.4 million. This is presented along with the 2010, 2011 and 2012 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, 2010 to 2013

	Cost Savings (£M)						*By-products (£M)*	*Total Savings and Income*
	Raw Material	*Water Use*	*Energy Use*	*Waste*	*Other*	*Total*		
2013	0.2	0.0	0.1	0.0	0.0	**0.4**	0.0	**0.4**
2012	0.1	0.1	1.2	0.1	0.1	**1.6**	0.2	**1.8**
2011	0.0	0.1	4.0	0.1	0.0	**4.2**	0.9	**5.1**
2010	0.1	0.0	0.0	0.0	0.5	**0.7**	0.6	**1.2**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2012 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Cost savings in the sector for 2013 have continued to decrease since 2011, falling to just £0.4 million as compared to £1.6 million in 2012. Similarly the fall seen in income generated from the sale of by-products over recent years has also continued in 2013.

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 232 companies invited to participate in the 2013 survey, a total of 40 returned valid responses were received, giving a response rate for the sector of 17%.

Key Expenditure

The Food, Beverages, and Tobacco Products sector spent approximately £448 million in 2013 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.13** for the years 2010-2013. The data is presented separately for Capex and Opex.

Figure 5.13 – Total Environmental Expenditure: Food, Beverages & Tobacco Products, 2010 to 2013

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R&D	Total	End of Pipe	Integrated	Total	
2013	80.1	272.1	2.4	**354.6**	46.1	46.8	**92.9**	**447.5**
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**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

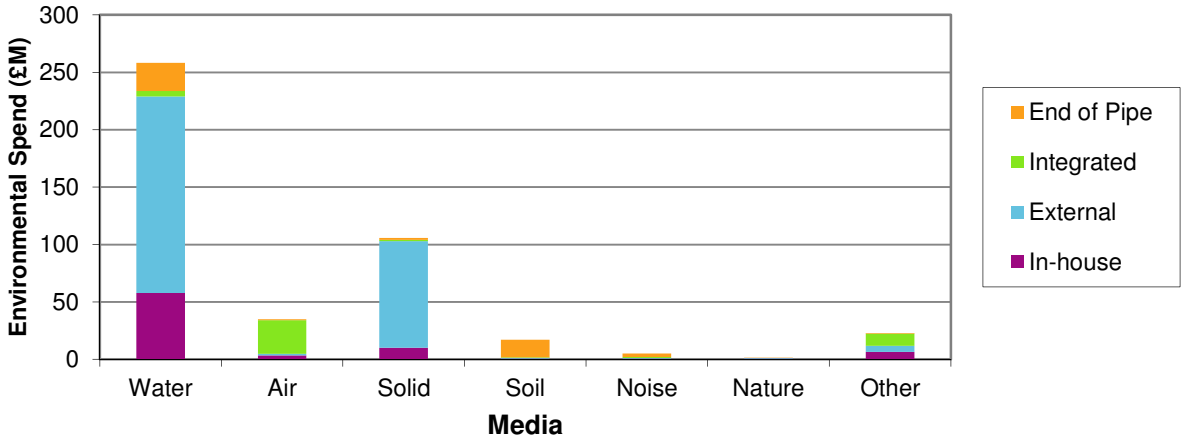
As expected based on previous surveys, Opex remains the dominant part of spend in 2013. As predicted in the 2011 survey, this is continuing to change with Capex as a proportion of overall expenditure increasing from 5% to 21% in 2011 (it represented 12% in 2012). Further change may occur in the medium 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.

External and in-house Opex remains the dominant area of spend in this sector and potentially results from the industry having fixed in-house and external operating costs that cannot be reduced beyond a certain point due to regulatory requirements. End of pipe no longer dominates Capex, and instead there is a relatively even distribution between this and integrated Capex. Capex has almost doubled as compared to 2012 (£93 million in 2013 as compared to £48 million in 2012), this may well be linked to infrastructure upgrades following the implementation of the Industrial Emissions Directive (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, 2013



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

As was predicted in the 2012 survey, water continues to dominate spend in this sector and overall the spend associated with each category is very similar to that in 2012. Water is used 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.

Income and Savings

In 2013, income and savings for the Food, Beverages, and Tobacco Products sector were approximately £49 million in total. Income and savings for this sector are shown in **Figure 5.15** for the years 2010-2013.

Figure 5.15 – Income and Savings: Food, Beverages & Tobacco Products, 2010 to 2013

	Cost Savings (£M)						*By-products (£M)*	*Total Savings and Income*
	Raw Material	*Water Use*	*Energy Use*	*Waste*	*Other*	*Total*		
2013	0.3	5.4	21.1	3.0	0.1	**29.9**	18.7	**48.6**
2012	4.1	5.9	25.3	10.0	0.5	**45.9**	13.3	**59.2**
2011	10.3	4.5	17.3	4.8	0.0	**36.9**	5.4	**42.3**
2010	3.2	7.7	6.3	7.0	0.1	**24.3**	3.2	**27.5**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2012 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Despite a fall in cost savings, the area with the greatest cost savings remains the same as in 2011 and 2012 that is energy use with a value of £21 million. Overall, 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).

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 2013 survey, a total of 12 companies returned valid responses, giving a response rate for the sector of 21% (23% in 2012).

Key Expenditure

The Coke & Refined Petroleum sector spent approximately £139 million in 2013 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.16** for 2010 to 2013. The data is presented separately for Capex and Opex.

Figure 5.16 – Total Environmental Expenditure: Coke & Refined Petroleum, 2010 to 2013

	Opex (£M)				*Capex (£M)*			*Total Spend*
	In-house	*External*	*R&D*	*Total*	*End of Pipe*	*Integrated*	*Total*	
2013	16.1	73.4	0.0	**89.4**	28.7	20.3	**49.0**	**138.5**
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**

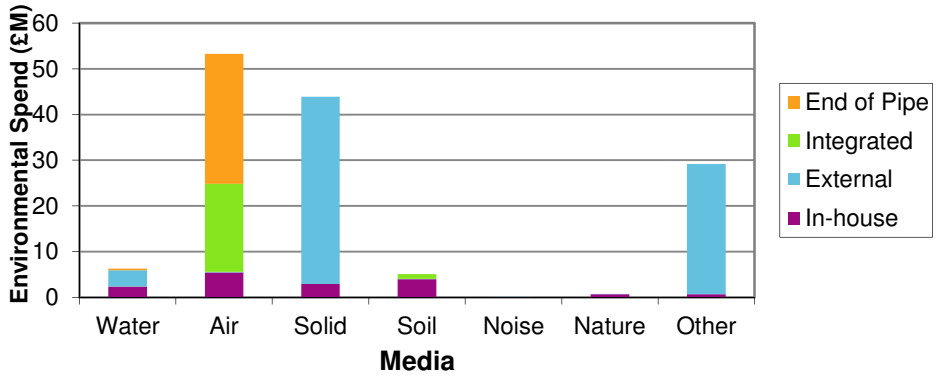
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2012 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Overall expenditure has increased back up towards the levels seen in 2010. However, the split between Opex and Capex in 2013 has continued the trend seen in more recent surveys with continued drop in Opex to 65% of total spend in 2013 from 70% in 2012. The apparent lack of investment in Capex projects in recent years appears to have reversed, increasing from £11 million in 2012 to £49 million in 2013. This may be a reflection of the on-going pressure on UK refining operations going forward to commit significant Capex following the introduction of various legislation regarding air and water quality improvements. 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, 2013



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

The media with the highest spend in 2013 was air, reverting back to the trend seen in 2011 and replacing water as the media with the highest spend in 2012. Around 38% was attributed to air protection measures (£53 million) in 2013. Solid waste is close behind comprising 32% of the total spend. This meets expectations expressed in previous surveys 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.

Income and Savings

In 2013, income and cost savings for the Coke & Petroleum sector was £73 million. These are shown for this sector in **Figure 5.18** for the years 2010 to 2013.

Figure 5.18 – Income and Savings: Coke & Refined Petroleum, 2010 to 2013

	Cost Savings (£M)						*By-products (£M)*	*Total Savings and Income*
	Raw Material	*Water Use*	*Energy Use*	*Waste*	*Other*	*Total*		
2013	55.1	0.0	18.4	0.0	0.0	**73.4**	0.0	**73.4**
2012	0.0	0.0	0.1	0.0	0.0	**0.1**	0.0	**0.1**
2011	0.0	0.0	0.0	4.9	0.0	**4.9**	0.0	**4.9**
2010	0.0	0.0	0.0	1.2	0.0	**1.2**	0.0	**1.2**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

A large increase in income from cost savings has occurred in 2013, increasing from £0.1 million to £73 million in 2013. This is driven by a significant increase in savings associated with raw material substitution and improved energy use and is larger than seen in any of the previous surveys since 2010. This large variability of the data may be associated with the sample set of companies who participated in the survey.

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 2013 survey, a total of 23 companies returned valid responses, giving a response rate for the sector of 20% (21% in 2012).

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 £429 million in 2013 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.19** for the years 2010 to 2013. The data is presented separately for Opex and Capex.

Figure 5.19 – Total Environmental Expenditure: Chemicals & Pharmaceuticals, 2010 to 2013

	Opex (£M)				*Capex (£M)*			*Total Spend*
	In-house	*External*	*R&D*	*Total*	*End of Pipe*	*Integrated*	*Total*	
2013	119.4	197.5	4.7	**321.5**	11.6	96.2	**107.8**	**429.3**
2012	102.7	171.5	1.6	**275.8**	13.4	67.2	**80.5**	**356.3**
2011	119.0	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**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

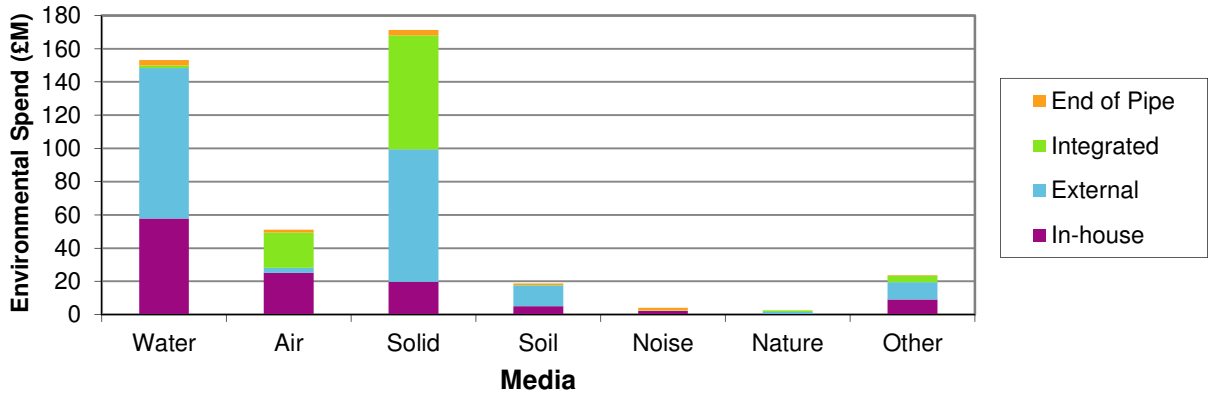
Opex accounted for 75% of the total environmental spending by the Chemicals & Pharmaceuticals sector in 2013, which is a slightly lower than preceding years reflecting the overall increase in Capex spending. This suggests that the difficult market conditions seen over the last few years limiting Capex in the environmental arena may be improving. In recent years, the level of Opex has increased year-on-year, with external Opex comprising over 60% of the total. 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 continued to increase although not quite to the levels seen in 2010.

The level of Capex for 2013 has followed the increasing trend seen in recent years. However, the majority of spend is on integrated processes similar to 2012 but contrary to previous years, possibly suggesting companies are investing in new process / production plant and equipment due a greater economic certainty or the implementation of the IED in 2013.

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, 2013



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 76% of the expenditure (63% in 2012). 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.

Income and Savings

In 2013, by-product income and environmental cost savings for the Chemicals & Pharmaceuticals sector was approximately £24 million. Income and savings for this sector are shown in **Figure 5.21** for the years 2010 to 2013.

Figure 5.21 – Income and Savings: Chemicals & Pharmaceuticals, 2010 to 2013

	Cost Savings (£M)						By-products (£M)	Total Savings and Income
	Raw Material	Water Use	Energy Use	Waste	Other	Total		
2013	0.0	0.1	10.7	1.8	0.0	**12.6**	11.1	**23.8**
2012	3.0	1.6	5.1	6.0	0.0	**15.8**	14.1	**29.9**
2011	1.5	0.0	2.4	2.1	0.1	**6.2**	4.6	**10.8**
2010	1.0	0.3	5.5	1.1	0.4	**8.3**	2.9	**11.2**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. 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 2013 for the Chemicals & Pharmaceuticals sector has decreased slightly as compared to 2012 (from £30 million to £24 million). This has been driven by both a decrease in cost savings and income from the sale of by-products.

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 168 invited to participate in the 2013 survey, a total of 31 companies returned valid responses, giving a response rate for the sector of 19%. 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 £322 million in 2013 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.22** for 2010-2013.

Figure 5.22 – Total Environmental Expenditure: Basic & Fabricated Metals, 2010 to 2013

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R&D	Total	End of Pipe	Integrated	Total	
2013	36.1	187.1	21.2	**244.5**	15.3	62.6	**77.9**	**322.3**
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**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

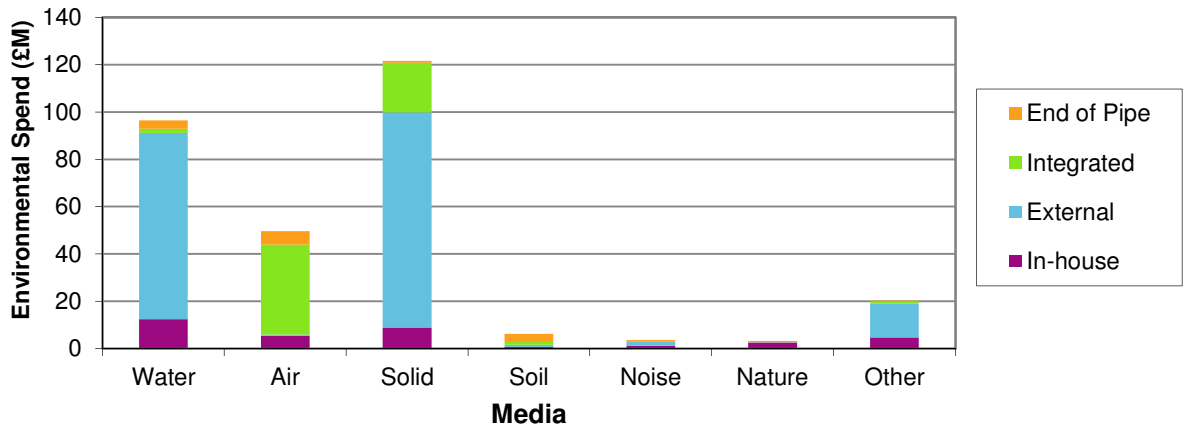
Spend on Opex has decreased with the proportion of total spend represented decreasing from 93% in 2012 to 76% in 2013. In contrast Capex has increased both absolutely from £22 million in 2012 to £78 million in 2013 and proportionately, now accounting for 24% of spend by the sector (from 7% in 2012). This suggests a move towards investing in Capex possibly as a result of better economic conditions. Expenditure on R&D has significantly increased from £3 million to £21 million, similar to the 2011 survey.

The data indicates that environmental Capex is now dominated by integrated expenditure as in surveys prior to 2012. 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, 2013



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

The media with the highest spend is solid waste, as in 2011. The majority of spend associated with waste is undertaken through external measures, whilst water the second highest area of spend is also dominated by external measures.

Income and Savings

In 2013, by-product income and savings for the Basic & Fabricated Metals sector were approximately £92 million. Income and savings for this sector are shown in **Figure 5.24** for the years 2010 to 2013.

Figure 5.24 – Income and Savings: Basic & Fabricated Metals, 2010 to 2013

	Cost Savings (£M)						*By-products (£M)*	*Total Savings and Income*
	Raw Material	*Water Use*	*Energy Use*	*Waste*	*Other*	*Total*		
2013	32.2	1.4	19.2	2.5	0.0	**55.3**	36.9	**92.2**
2012	34.0	1.4	61.2	8.9	0.5	**106.1**	58.4	**164.5**
2011	35.6	0.3	9.4	2.7	2.2	**50.3**	60.8	**111.0**
2010	0.7	0.6	15.5	11.4	0.0	**28.2**	5.1	**33.3**

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 2013 sample. The 2011 and 2012 survey used a similar sample frame to that of the 2013 survey. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Savings in raw material substitution account for almost 60% of cost savings, accounting for a similar amount as in 2012 (£32 million in 2013 and £34 million in 2012). Savings in energy use comprise the majority of the remaining savings (£19 million), suggesting that the significant increase in 2012 may have been due to particular respondents in that survey.

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 152 invited to participate in the 2013 survey, a total of 29 companies returned valid responses, giving a response rate for the sector of 19% (14% in 2012).

Key Expenditure

The Machinery & Electrical Equipment sector spent approximately £290 million in 2013 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.25** for the years 2010 to 2013.

Figure 5.25 – Total Environmental Expenditure: Machinery & Electrical Equipment, 2010 to 2013

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R&D	Total	End of Pipe	Integrated	Total	
2013	55.3	69.4	118.6	**243.4**	11.0	35.7	**46.7**	**290.1**
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**

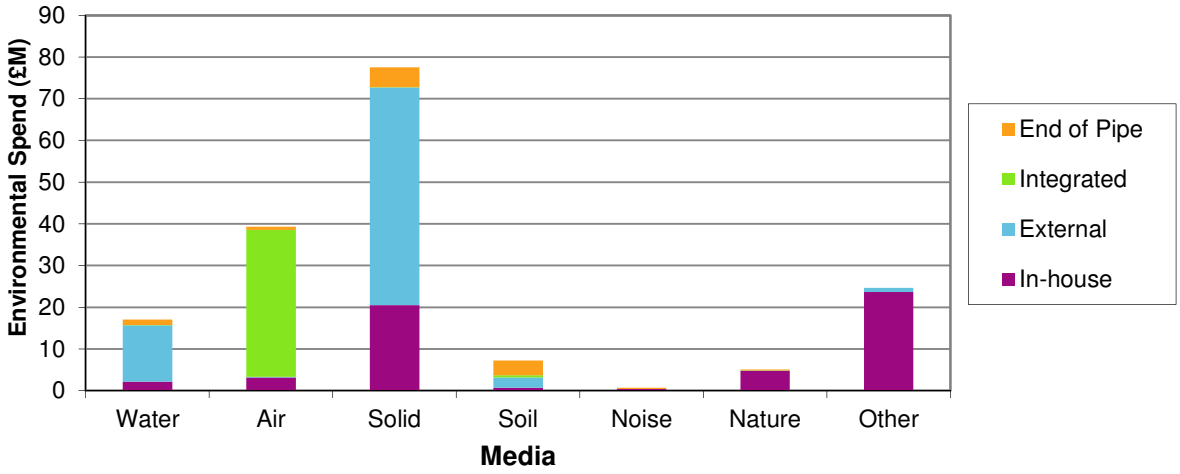
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2013 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Although Opex has decreased slightly in 2013, it still accounts for the large majority (84%) of total environmental spending by the Machinery & Electrical Equipment sector. Within operating costs for the sector, there was a further decrease in spend on research and development as compared to 2011, with a fall below levels seen in 2010. In 2013, the spend on integrated Capex appears to have increased, above levels seen in 2010.

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 £78 million on dealing with the management and disposal of solid waste, over half of which is accounted for by external Opex, similar to the 2012 survey (£69 million spend on solid waste, over half of which was also accounted for by external Opex).

Figure 5.26 – Environmental Spending by Media: Machinery & Electrical Equipment, 2013



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 2013, by-product income and environmental cost savings for the Machinery & Electrical Equipment sector were approximately £137 million. Income and savings for this sector are shown in **Figure 5.27** for the years 2010 to 2013.

Figure 5.27 – Income and Savings: Machinery & Electrical Equipment, 2010 to 2013

	Cost Savings (£M)						*By-products (£M)*	*Total Savings and Income*
	Raw Material	*Water Use*	*Energy Use*	*Waste*	*Other*	*Total*		
2013	105.5	3.5	6.7	1.1	0.0	**116.8**	20.4	**137.3**
2012	58.1	2.4	11.7	4.1	0.0	**76.3**	14.9	**91.2**
2011	35.1	1.0	7.3	4.0	0.0	**47.4**	10.9	**58.2**
2010	28.2	0.4	3.2	1.4	0.0	**33.1**	17.4	**50.6**

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 2013 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 from 2012, continuing the rise from 2010. Income from the sale of by-products has risen since 2012 above the levels seen in 2010. The majority of savings in 2013 resulted from improved use of or substitution of raw materials, similar to 2012 although to a greater extent.

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 274 invited to participate in the 2013 survey, a total of 74 companies returned valid responses, giving a response rate for the sector of 27% (22% in 2012).

Key Expenditure

The Energy Production & Distribution sector spent approximately £537 million in 2013 on environmental protection measures, the lowest since 2010. Environmental expenditure for this sector is shown in **Figure 5.28** for the years 2010 to 2013. The data is presented separately for Opex and Capex.

Figure 5.28 – Total Environmental Expenditure: Energy Production & Distribution, 2010 to 2013

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R&D	Total	End of Pipe	Integrated	Total	
2013	74.2	336.6	2.6	**413.4**	0.9	122.3	**123.2**	**536.6**
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**

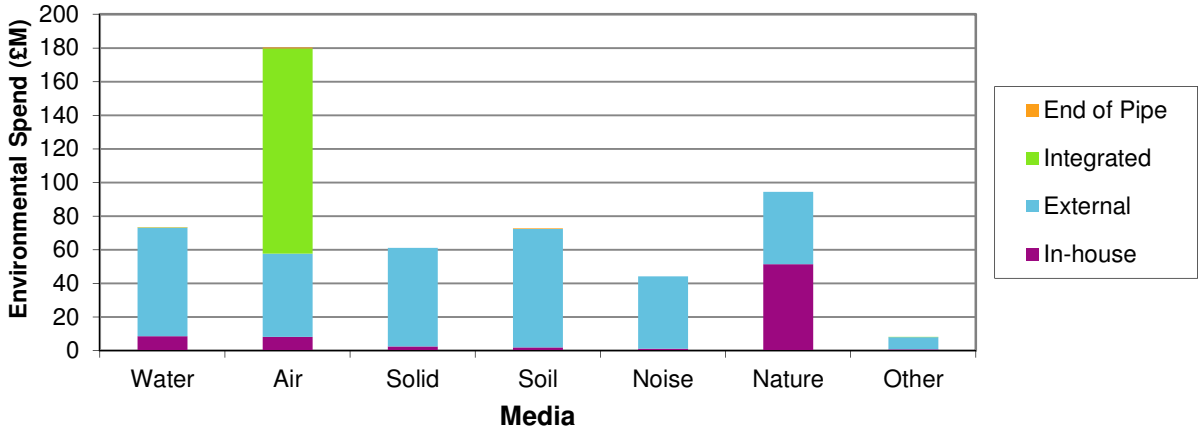
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2013 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

After a significant increase from 2010 to 2011, Opex has continued to fall from £632 million in 2011 to £413 million in 2013, although it is still much higher than in 2010 (£102 million). There has also been a slight decrease in the Capex figures for this sector in 2013 compared to 2012 (from £151 million to £123 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, 2013



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

2013 has seen a change in spend by media. Previously spend was dominated by in-house nature protection measures, whereas in 2013 it is dominated by spend associated with air protection measures, in particular integrated Capex. Potential sector-wide drivers behind this are not clear, and again the trend could be distorted by a small number of site-specific projects. This change is largely driven by a decrease in the spend associated with in-house Opex.

Income and Savings

In 2013, by-product income and environmental cost savings for the Energy Production & Distribution sector were just over £4 million. Income and savings for this sector are shown in **Figure 5.30** for the years 2010 to 2013.

Figure 5.30 – Income and savings: Energy Production & Distribution, 2010 to 2013

	Cost Savings (£M)						*By-products (£M)*	*Total Savings and Income*
	Raw Material	*Water Use*	*Energy Use*	*Waste*	*Other*	*Total*		
2013	0.1	0.0	2.9	1.1	0.0	**4.1**	0.2	**4.2**
2012	0.2	0.0	0.1	0.9	0.0	**1.2**	0.2	**1.4**
2011	0.9	0.0	1.1	1.4	0.0	**3.4**	0.0	**3.4**
2010	3.0	0.0	1.1	0.7	0.0	**4.8**	0.0	**4.8**

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 2013 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Savings have reversed the trend seen in recent years, and have increased as compared to 2012 from £1.4 million to £4.2 million. This is driven by an increase in cost savings, which are largely made up of savings associated with improved energy use.

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 39 invited to participate in the 2013 survey, a total of 14 companies returned valid responses, giving a response rate of 36% for this sector (also 36% in 2012).

Key Expenditure

The Water Supply & Treatment sector spent approximately £288 million in 2013 on environmental protection measures. Environmental expenditure for this sector is shown in **Figure 5.31** for the years 2010 to 2013.

Figure 5.31 – Total Environmental Expenditure: Water Supply & Treatment, 2010 to 2013

	Opex (£M)				Capex (£M)			Total Spend
	In-house	External	R&D	Total	End of Pipe	Integrated	Total	
2013	95.6	117.0	3.2	**215.8**	34.9	36.8	**71.7**	**287.5**
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 2013 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

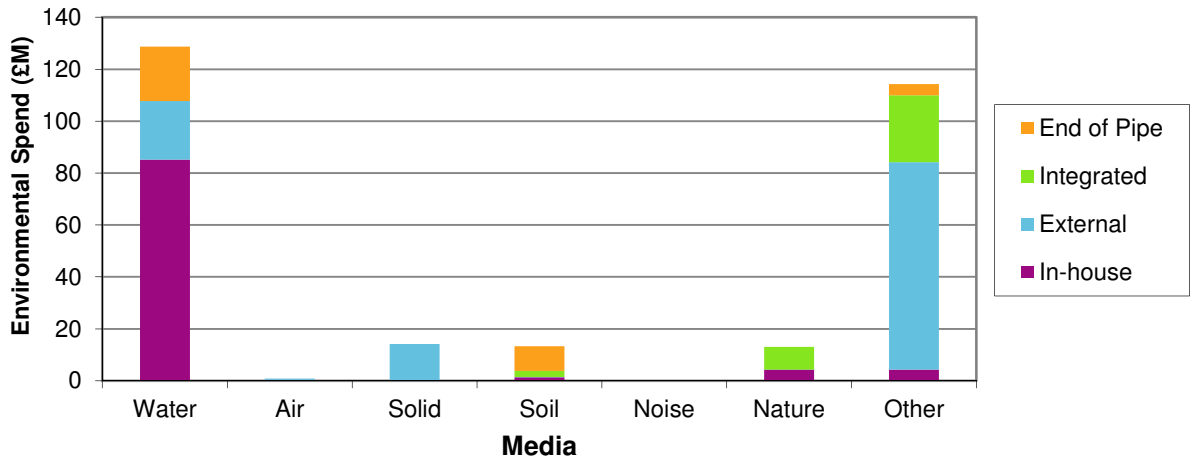
In 2013, Opex dominates again as in 2011, accounting for 75% of total spend compared to 59% of total spend in 2012. Despite this increase in Opex overall, external spend again accounted for over 50% of Opex. The 2013 survey has captured higher total expenditure than the 2012 survey, seeing Opex return to a similar level as that recorded in the 2010 survey.

The 2013 survey has reported an increase in expenditure on both end of pipe solutions and integrated solutions, continuing the rise seen in 2012.

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, 2013



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 both water and 'other' media dominate environmental expenditure by media in 2013 (in 2012 spend was only dominated by 'other' media). However, in-house expenditure is largest within spend associated with water whilst external expenditure dominates the 'other' media.

Income and Savings

Income and savings for this sector are shown in **Figure 5.33** for the years 2010 to 2013.

Figure 5.33 – Income and Savings: Water Supply & Treatment, 2010 to 2013

	Cost Savings (£M)						*By-products (£M)*	*Total Savings and Income*
	Raw Material	*Water Use*	*Energy Use*	*Waste*	*Other*	*Total*		
2013	0.0	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0
2012	0.0	0.0	1.2	0.5	0.6	**2.3**	0.0	2.3
2011	0.0	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	7.8

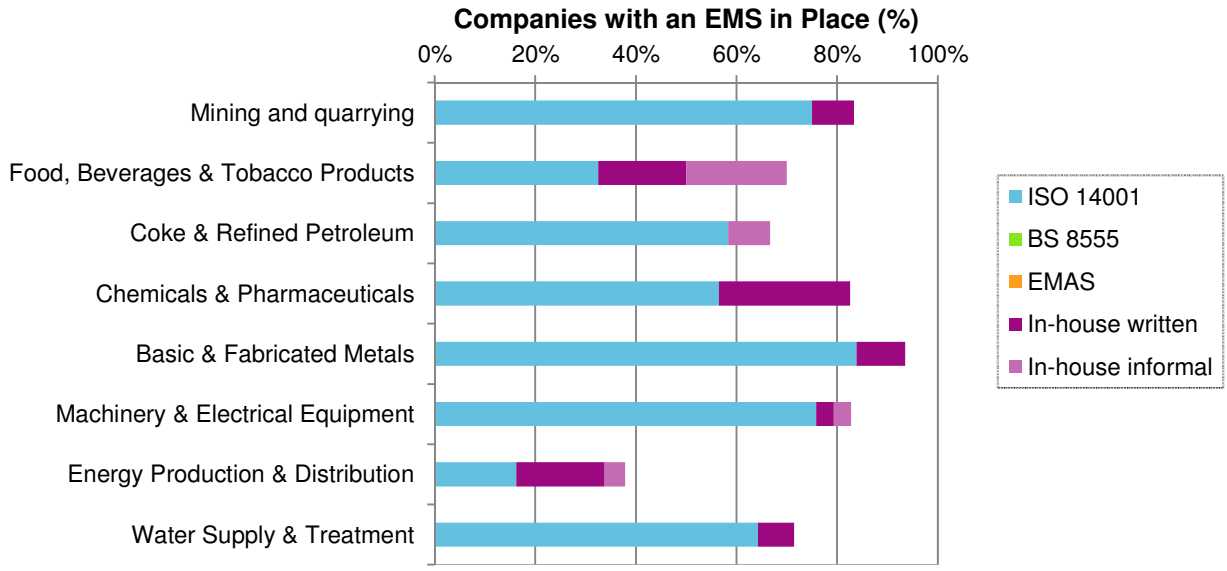
Note: Comparisons between years should be treated with caution. As a larger sample frame was used in 2010, the figures have been adjusted for the 2010 data to be comparable to the SICs included in the 2013 sample. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

There were minimal cost savings and income in 2013, a decrease compared to 2012 and back to levels seen in 2011.

5.6 Environmental Management Systems

This section presents the results of the survey question on environmental management systems (EMS), the presence of procedures to address environmental issues within supply chains and the application of environmental foot printing methodologies. These were first introduced into the questionnaire in the 2005, 2012 and 2013 surveys 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, 2013



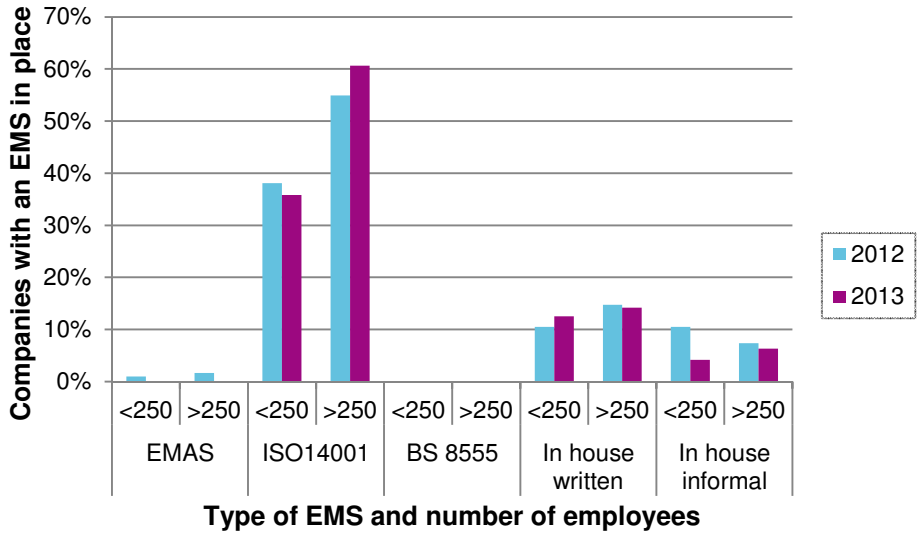
Note: As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> BS 8555 -> In-house) has been applied to avoid double counting. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Overall, 67% of responding companies indicated that they had an EMS in place in 2013, a slight decrease on 2012 (70%). Of these nearly three quarters had an EMS certified to ISO14001; this is a slight increase from 2012 where only two thirds of reported EMS were certified to ISO14001. No companies that responded had an EMS implemented through EMAS or BS 8555, representing a decrease from the 1.3% who had EMAS in place in 2012. Of the companies that reported an EMS which was not externally certified (e.g. developed and implemented to meet “in-house” requirements), over 70% were written rather than informal.

The sector with the greatest number of companies with an EMS in place is the Basic & Fabricated Metals sector (94%). That with the least is the Energy Production & Distribution sector (38%), as in 2012 (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, 2012 & 2013

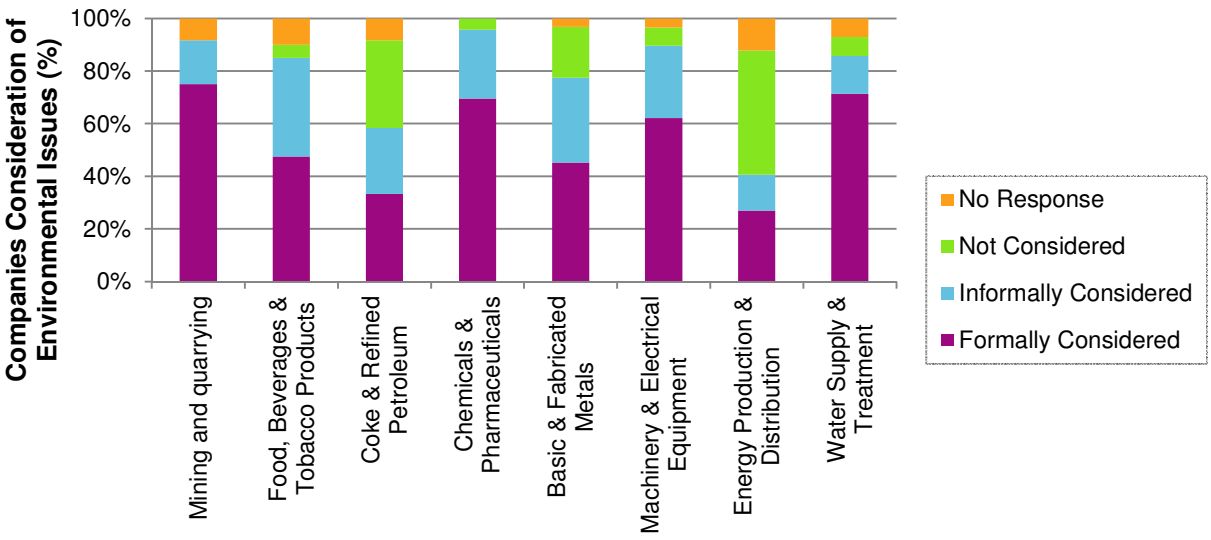


Note: As companies can have multiple systems in place, a hierarchy (EMAS -> ISO 14001 -> BS 8555 -> In-house) has been applied to avoid double counting. Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

As shown in **Figure 5.35** the slight decrease overall of companies with an EMS in place appears to be largely inconsistent across scheme type and company size. All schemes appear more popular among larger companies (although this is marginal in the case of 'in-house EMS'), for example, 61% of larger companies have implemented an EMS certified to ISO14001, whilst only 36% of smaller companies have implemented such a system.

A question relating directly to the consideration of environmental issues in procurement was introduced in the 2012 survey and the wording refined in 2013 (due to this refinement, the results of the 2012 survey are not presented here as it is not considered comparable). The results for this year's survey are illustrated in **Figure 5.36**.

Figure 5.36 – Consideration of Environmental Issues in Procurement and Contract Management, 2013



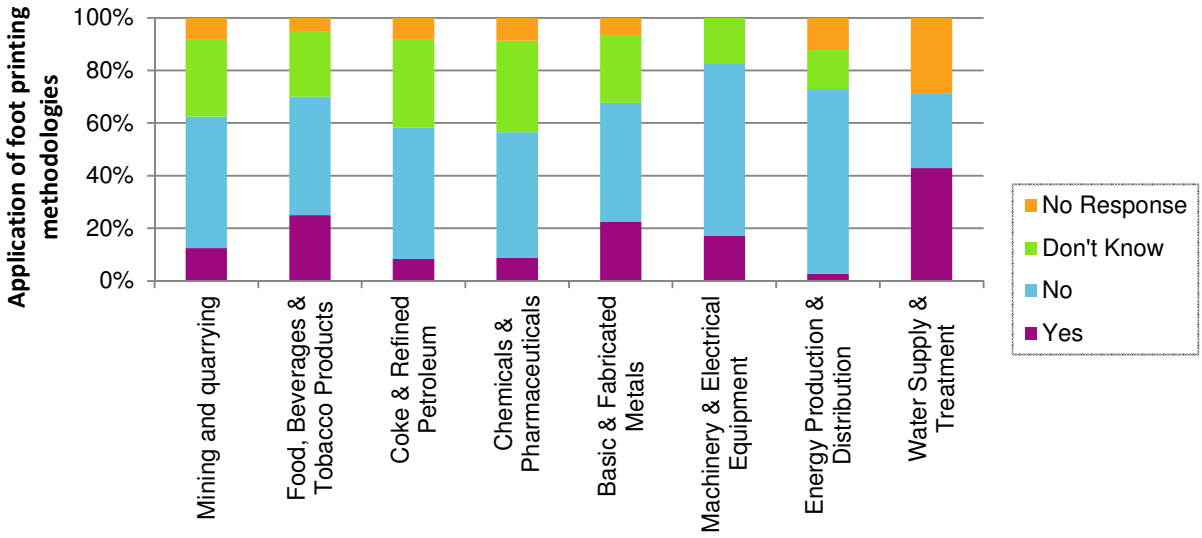
Note: Values and percentages may not add up to sub-totals and totals due to the effects of rounding.

Of those companies responding to this question, the Chemicals & Pharmaceuticals sector had the greatest number of companies that considered environmental issues during procurement and contract management (70% considered issues formally, and 26% informally). The Energy Production & Distribution sector had the least number of companies considering such issues, with 47% not considering them at all.

Overall, 72% of companies considered environmental issues during procurement and contract management (48% formally, 24% informally), 21% did not consider issues at all and 8% did not respond to the question.

A new question introduced in the 2013 survey sought to establish whether companies applied environmental foot printing methodologies to either their products or on an organisational level. These methodologies provide a structure or framework for measuring the environmental impacts of a product, good or service over its full life cycle. Examples include ISO 14044, ISO 14064, UK PAS 2050 and the GHG Protocol.

Figure 5.37 – Application of Environmental Foot Printing Methodologies, 2013



Overall 15% of companies applied an environmental foot printing methodology to their products or organisation. Of these 36% applied multiple methodologies to a single product, 44% did not, 11% didn't know and 8% did not respond to this part of the question.

The sector which has the highest application of environmental foot printing methodologies is the Water Supply & Treatment sector (43%), whilst the Energy Production & Distribution sector has the lowest application of environmental foot printing methodologies (3%).

Recommendations

06

06 *Recommendations for Future Survey*

The following section provides recommendations for subsequent surveys based on the experience of the AECOM project team in conducting the study, and feedback received during the 2013 survey process.

The main sources of feedback were through phone calls made by companies to the Survey Helpdesk, and phone calls made by the AECOM 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 AECOM 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 eighth weeks of the survey period following the issue of a reminder letter and the beginning of the top company reminder calls.
    3. Around the twelfth week following further top company calls and the week of the final deadline.

  Based on these peaks of return activity and the relatively high response rate for the 2013 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.
- As in the 2012 survey, a reminder postcard was not issued during the 2013 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 recent surveys, where companies contacted the Helpdesk for an additional copy of the questionnaire, they were in the first instance directed to the Defra website and then offered to receive the survey by email. 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

- As implemented in recent surveys, the Energy (SIC 35) and Water (SIC 36) sectors were disaggregated once again for the 2013 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

- Following on from the introduction in the 2012 survey, this year the survey team again 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.

Water Companies

- Whilst the approach for water companies was the same as in the 2012 survey, whereby they received a tailored covering letter and a flyer explaining how to complete the survey, a high proportion of companies were surprised upon receiving validation calls that they should have completed the survey for just the supply side of the business. Many had not seen the flyer or covering letter as it had been passed through the company and been lost on the way. It is recommended that this is made clearer in future surveys, either through a tailored questionnaire or through attaching the flyer to the questionnaire.

6.1 List of acronyms

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

6.2 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

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