

## **Methodological Note: Estimating expenditure for non-sampled industrial sectors**

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### **Background**

The Environmental Protection Expenditure (EPE) survey adopts a 4 year rotated sample design with a benchmark survey, where all industries are included, carried out every fourth year (2006 and 2010). In the intervening 3 years a smaller survey is carried out, where only industries in specific sectors are surveyed. The sectors included in the smaller surveys are shown in Annex 1. As a result, in non-benchmark years estimates for the non-surveyed manufacturing industries are made in order to obtain an overall estimate for industry as a whole.

This sample design is extremely efficient – the surveyed sectors account for £2.3 billion out of the total estimated spend of £3.0 billion. The sample is also heavily stratified by size of business, with 58% of spending accounted for by survey respondents (compared with the company response rate of about 20%).

### **Methodology**

The underlying assumption is that the percentage change from a reference year in spending per employee in a non-surveyed sector is the same as the percentage change in spending in one or more of the surveyed sectors. For this purpose the previous two benchmark years were taken to calculate the weighted average of spending per employee in 2006 and 2010. In the past we have used the average of 2005 and 2006, however due to the new sampling approach, we do not have two consecutive years and it was decided the most appropriate method would be to combine the two most recent benchmark years (2006 and 2010). The percentage increase in the selected surveyed sectors was then applied to the average spend per employee in the non-surveyed sectors and multiplied by the number of employees to establish a yearly spend.

Due to the different pattern of spending in the different sectors, the estimates of spending increase from the reference year were based on the combined sectors of 'Chemicals and Chemical products', 'Electrical equipment', 'Machinery and Equipment' and 'Food, Beverage and Tobacco'. It was felt that the mining, energy producing, and water sectors would not be representative of the non-sampled sectors and hence they were excluded from the calculation.

In technical terms, the basic expression used is:

$y_{1M} / y_{2M} * y_{2mSIC} * Emp_{mSIC}$ , where:

$y_1$  : denotes expenditure per employee in 2011

$y_2$  : denotes expenditure per employee in 2006/2010 (weighted average)

$M$  : denotes the surveyed manufacturing industries (excluding coke/petroleum/nuclear fuel)

$mSIC$  : denotes the non-surveyed manufacturing sector for which an estimate was required

$Emp$  : denotes employment population in 2011

### **Changes since 2009**

The sectors sampled in the 2011 non-benchmark survey year were changed from those sampled in 2009: the 'Pulp and Paper' sector was not sampled whereas businesses in the 'Electrical Equipment' and 'Machinery and Equipment' sectors were. Also in the 2009 methodology, the categories 'nature', 'noise', 'soil' and 'other' were aggregated into an 'All

others' category. For 2011, we have re-worked the model (using the same formula set out above) so that nature, noise, soil and other are now each a separate category. As noted above, we previously used an average spend per employee based on a weighted average of 2005/2006, this has now been changed to a weighted average of 2006 and 2010.

**Annex 1: Standard Industrial Codes (SICs) sampled in the 2011 Survey**

<b>SIC07</b>	<b>Description</b>
05-09	Mining & Quarrying & Support
10-12	Food, Beverages & Tobacco
19	Coke and refined petroleum products
20-21	Chemicals and chemical products, pharmaceutical products
24-25	Basic and fabricated metals
27-28	Electrical equipment and Machinery and Equipment
35	Energy production and distribution
36	Water Supply and Treatment