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Environmental Key Performance Indicators

Reporting Guidelines for UK Business

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Department for Environment, Food and Rural Affairs
Nobel House
17 Smith Square
London SW1P 3JR
Telephone 020 7238 6000
Website: www.defra.gov.uk

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Foreword by Sir Digby Jones

Responsible businesses are at the heart of society. Companies that understand their links with the communities they operate in, and their impact on the environment, are most likely to prosper in the long-term.

At the same time, interest from stakeholders in firms' environmental performance is at an all-time high. The Accounts Modernisation Directive means that whether you are a plc or a large private company, you will need to report to investors on how environmental issues will affect your profitability. And growing environmental awareness means more firms than ever are coming under scrutiny from community groups and NGOs.

Reporting on your environmental performance will benefit you in two ways:

- It will provide you with management information to help you exploit the cost savings that, in my experience, good environmental performance usually brings; and,

- It gives you the chance to set out what you believe is significant in your firm's environmental performance.

But producing a report of value both to your business and to stakeholders can be a challenging task. As the environmental debate moves on, this can be true even if you have produced one before. These guidelines are designed to make the process less daunting. They propose most firms concentrate on five or fewer performance indicators of greatest relevance, and suggest which indicators these might be for firms in your sector. But don't forget you know your business better than anyone – if you think there are other indicators that are more relevant, include those and explain why.

These guidelines are voluntary – it is up to you whether to use them or not. But I'm a strong believer in businesses communicating their successes and being honest about the challenges faced. Reporting on your environmental performance gives you the opportunity to do this.

Sir Digby Jones
Director General
CBI

Executive Summary

There is an increasing recognition that good environmental performance makes good business sense. Environmental risks and uncertainties impact to some extent on all companies, and affect investment decisions, consumer behaviour and Government policy. Management of energy, natural resources or waste will affect current performance; failure to plan for a future in which environmental factors are likely to be increasingly significant may risk the long-term future of a business.

Companies that measure, manage and communicate their environmental performance are inherently well placed. They understand how to improve their processes, reduce their costs, comply with regulatory requirements and stakeholder expectations and take advantage of new market opportunities. Over a third of FTSE 350 companies already report KPIs according to the guidance specified here. Nevertheless, the landscape of environmental, sustainability and corporate responsibility reporting can be complex. These Guidelines seek to help companies report their environmental impacts in a meaningful and cost-effective way. The Guidelines are consistent with other standards and reporting guidance as far as possible.

There is an increasing demand for company reporting that is sharper and more focused on the key impacts on the business and on the environment. The requirement for a Business Review[1] is designed to improve company reporting, and requires companies to report on environmental matters where necessary for an understanding of the business. The use of Key Performance Indicators (KPIs) will help companies manage and communicate the links between environmental and financial performance.

These Guidelines seek to make this process easier for businesses by setting out 22 environmental KPIs, together with information on how environmental impacts arising from the supply chain and from the use of products can be taken into account. Although 22 direct KPIs are described, no one company is expected to report on all of these. An analysis of business sectors suggests that around 80 per cent of companies are likely to have 5 or fewer KPIs. Whilst some companies already have sophisticated reporting systems in place, these Guidelines aim to help many more companies reach a level where they understand their environmental performance and can improve it.

1 Introduced into the Companies Act 1985 from the EU Accounts Modernisation Directive.

Contents

Chapter 1

1.1 The purpose of the Guidelines

The purpose of these Guidelines is to:

- Give clear guidance to companies on how to report on their environmental performance using environmental Key Performance Indicators (KPIs)
- Define which KPIs are most relevant to which sectors, and
- Set out the business rationale for managing environmental performance using KPIs.

These Guidelines place no new mandatory requirements on business and they have been designed, as far as possible, to be compatible with other reporting guidelines and frameworks. Companies using them will be well-placed to respond to requirements for a business review brought in by the EU Accounts Modernisation Directive.

The Guidelines aim to help businesses address their most significant environmental impacts, and report on these impacts in a way that meets the needs of a range of stakeholders. They set out 22 environmental KPIs that are significant to UK businesses and describe which KPIs are most significant to which business sectors. The majority of sectors (c.80 per cent) have five or fewer relevant KPIs and no sector needs to report on more than ten. For most companies greenhouse gas emission is the most significant KPI and the Government expects business to tackle its climate change impacts.

1.2 Who are these Guidelines for?

These Guidelines are for all businesses operating in the UK. The Government believes that there are sections of the business community that will find these Guidelines particularly useful, for example:

- **First-time reporters:**
  There are many companies that do not currently report their environmental performance. These Guidelines are a practical guide to identifying and reporting environmental KPIs and signpost to other guides and frameworks which might be useful;
- **Businesses required to produce a Report Business Review under the Accounts Modernisation Directive (AMD):**
  If the directors have decided that there are environmental matters which should be included in the Business Review then these Guidelines offer KPIs which can be used to quantifiably report this information;

- **Small and Medium-Sized Enterprises (SMEs):**
  Some SMEs are already effectively managing and reporting on their environmental performance; others have such a negligible impact on the environment that reporting will be a low priority. But there are SMEs that can benefit from improving, and reporting on, their environmental performance; for example, an SME might be part of a supply chain containing a larger company that expects its suppliers to behave responsibly. These Guidelines show how SMEs can cost-effectively manage and report their environmental performance using KPIs. Tools such as BS8555 will also be of assistance in helping SMEs manage their environmental performance;

- **Experienced reporters:**
  The Guidelines show how companies can address environmental impacts in their supply chains and products, and demonstrate their own environmental performance to existing and potential customers; and,

- **The Public Sector:**
  Whilst aimed at businesses, some of the KPIs will be relevant to public sector organisations.

In addition, there will also be secondary users of the Guidelines, i.e. users of the information which companies disclose, for example:

- **Shareholders:**
  When a company reports using the standard framework provided by these Guidelines investors will be able to assess environmental performance effectively. Where a business does not use these Guidelines, investors will need to consider whether that business is using other recognised, sector-specific and/or bespoke environmental KPIs to manage and improve their environmental performance;

- **Other stakeholders:**
  A business can demonstrate to other stakeholders its progress towards sustainable development through the use of recognised guidelines and frameworks with appropriate performance indicators; and,

- **Government:**
  The Government is committed to evidence-based policy making; the extent to which business uses these, and other recognised guidelines and frameworks will help shape future policy in this area.

1.3 Policy and regulatory context

Sustainable Development

The Government recently published the UK Sustainable Development Strategy *Securing the Future*[2] which sets out a vision through to 2020. One of four priorities for immediate action is sustainable consumption and production. The strategy sets out how this is being taken forward, through measures to promote:

- better products and services, which reduce the environmental impacts from the use of energy, resources, or hazardous substances;
- cleaner, more efficient production processes, which strengthen competitiveness; and
- shifts in consumption towards goods and services with lower impacts.

Sustainable businesses and organisations can be powerful drivers for more sustainable production and consumption. In this context, the strategy challenges the FTSE All Share and large private companies to report their performance in a transparent and meaningful way.

However, companies that qualify as medium sized[3] are not required to included non-financial key performance indicators, but are required to produce a Business Review.

The Accounts Modernisation Directive (AMD)

The EU Accounts Modernisation Directive introduces requirements for companies to include a balanced and comprehensive analysis of the development and performance of the business in their Directors' Report. The analysis should "include both financial and, where appropriate, non-financial key performance indicators relevant to the particular business, including information relating to environmental and employee matters". This part of the EU Accounts Modernisation Directive is effective for financial years beginning on or after 1 April 2005. The EU Accounts Modernisation Directive applies to over 36,000 large and medium GB businesses (including over 1,200 quoted companies). However, companies that qualify as medium are not required to include non-financial key performance indicators.

To assist companies with reporting on significant 'environmental matters', the Government has provided some guidance on the interpretation of this term. 'Environmental matters' include:

- Environmental impacts, both of the company on the environment (e.g. greenhouse gas emissions, waste to landfill), and of the environment on the company (e.g. a depleting natural resource base, how a company is operating in a carbon constrained world);

2 Securing the Future – The UK Government Sustainable Development Strategy, March 2005.

3 'Medium company' turnover not more than £22.8m, balance sheet not more than £11.4m, not more than 250 employees.

- Company policies – how a company is managing, or intending to manage, these impacts; and,
- Company performance, in managing their impacts and against their policies.

Defra Environmental Reporting Guidelines

Defra has previously produced General Environmental Reporting Guidelines with supplements on Waste, Water and Greenhouse Gases. These are superseded by this document with its web links to technical reporting protocols (e.g. on greenhouse gas emissions). The old Guidelines are still available from the Defra website[4].

1.4 Why manage and report environmental performance?

Managing and reporting on environmental performance can lead to significant business benefits as well as benefits for the environment.

Cost savings and productivity gains

Businesses can save costs and increase efficiency through reducing and managing resource use. Typical areas where cost savings are identified include the use of raw materials and supplies, reductions in waste, water and energy use and transport, travel, and packaging. By reducing environmental impacts, such as waste to landfill, businesses can significantly reduce any associated taxes or levies, or avoid the cost of compliance altogether. Responsible management of risks and liabilities can lead to reduced insurance costs.

The Environment Agency estimates British manufacturing would save £2–3 billion each year, equivalent to 7 per cent of profits by adopting best practice waste minimisation techniques, often with little or no investment.

Improved sales

Businesses can benefit from improved reputation amongst their customers (and potential customers) by reporting on relevant environmental issues in a clear and transparent way. Good reporting improves customer confidence. Informing customers of your efforts to improve your organisation's environmental performance can lead to increased confidence in your products and services.

4 http://www.defra.gov.uk/environment/business/envrp/guidelines.htm

Preferred supplier status

Large organisations are increasingly requiring suppliers and contractors to submit environmental performance information to satisfy the expectations of their own shareholders. Reporting on environmental information can make you a more attractive supplier than your competitors.

74 per cent of the British population say more information on a company's social and ethical behaviour would influence their purchasing decisions. MORI CSR Study, 2003.

Increased attractiveness to the investment community

Investors, financial analysts and brokers are now asking questions about the sustainability of business operations. Reporting on environmental matters provides a good indication of what measures an organisation is taking to reduce risks and develop opportunities. For example, the UNEP Finance Initiative (UNEP FI)[5] works closely with over 200 financial institutions who are signatories to the UNEP FI Statements, and a range of partner organisations, to develop and promote linkages between the environment, sustainability and financial performance.

Product and service innovation

Measuring and managing environmental impacts drives and supports innovation in product and service development, helping to secure new markets and customers or safeguard existing ones.

In Spring 2005, the Government appointed a business-led Sustainable Procurement Task Force to develop a national action plan for Sustainable Procurement across the public sector by April 2006. Public sector expenditure is over £125bn.

Employee recruitment

Clear reporting of an organisation's efforts to manage its environmental performance helps to attract high-calibre employees as good environmental reputation and performance can be an important factor in an employee's choice of employer.

Example 1: GE's research-and-development investments in eco-friendlier technologies will rise from $700 million in 2004 to $1.5 billion in 2010.

Example 2: The Carbon Trust estimates there has been over £1 billion of investment in UK clean technology companies since 2000.

5 http://www.unepfi.org

Three in five people want to work for a company whose values are consistent with their own. Source: A survey of 1,200 undergraduates across the 20 largest economies in the world by Environics' Global Campus Monitor (2003).

Licence to operate

Managing environmental impacts and minimising the organisation's impact on the environment can reduce the exposure to fines. It can improve relations with regulators and help ensure the company maintains its licence to operate by providing assurances about compliance with environmental legislation and conformity with other relevant laws and regulations.

1.5 Why use environmental KPIs?

Environmental Key Performance Indicators (KPIs) provide businesses with a tool for measurement. They are quantifiable metrics that reflect the environmental performance of a business in the context of achieving its wider goals and objectives. KPIs help businesses to implement strategies by linking various levels of an organisation (business units, departments and individuals) with clearly defined targets and benchmarks.

The impact of environmental matters on business performance is increasing and will continue to do so. For example, poor management of energy, natural resources or waste can affect current performance; failure to plan for a future in which environmental factors are likely to be significant may risk the long-term value and future of a business. Therefore, the Government expects that businesses will need to use environmental KPIs to adequately capture the link between environmental and financial performance.

There are additional reasons why KPIs are important:

- They focus on 'key' measures – i.e. those most important to an understanding of a business and they mitigate the need for lengthy reports on a wide range of measures many of which may be less relevant; and

- New regulations such as the Business Review required by the EU Accounts Modernisation Directive require significant environmental issues to be reported using KPIs.

Many companies are already collecting the data required to report on environmental KPIs, either because they can be calculated from standard business data, such as energy bills, or because the company separately already reports such information to a regulator.

1.6 Current reporting situation

The latest study by corporateregister.com[6] notes that over 1,500 companies worldwide now produce a separate Corporate Social Responsibility (CSR) Report, compared with less than 100 reports in 1993. In the UK, some good progress has been made – 145 of the FTSE250 report to some extent on their sustainability performance[7].

However, there is still a lack of quantification in most reporting. The Environment Agency study of Annual Reports and Accounts of the FTSE All Share companies[8], noted that the majority of reports lack depth, rigour or quantification. The study concluded that quantified environmental disclosure levels in Annual Reports and Accounts were found to be low. Only 10 per cent of FTSE All Share companies report quantitatively on climate change, water and waste.

1.7 Types of report

Companies can report on environmental matters in two contexts:

1. Mandatory reports – for example a Business Review and/or,
2. Voluntary reports – for example a Corporate Responsibility (CR) report.

Mandatory reports

Some 89 per cent of FTSE All Share companies currently report on environmental issues in their Annual Report and Accounts according to the Environment Agency study. Many businesses will now have to produce a Business Review that will include discussion of environmental matters where necessary for an understanding of the business.

Voluntary reports

Organisations publish environmental information in Corporate Social Responsibility (CSR), Corporate Responsibility (CR), Sustainability, or stand-alone Environmental reports. The Government does not believe that one type of report is necessarily better than another; what is important is that organisations understand and can be transparent about their actions to reduce the harmful environmental and social impacts of their activities, products and services.

These Guidelines are relevant to both mandatory and voluntary reports. In fact, the same information can be used in different reports. For example, a company might disclose its climate change performance as a part of a voluntary report, and take the view that, since this will affect the financial performance and shareholder value of the company, it should also be reported in the Annual Report or Business Review.

6 Towards transparency: progress on global sustainability reporting 2004, corporateregister.com, ACCA

7 Salterbaxter/Context, 'Directions: trends in CSR reporting 2003–2004', 2004, joint report by Salterbaxter and Context.

8 Environmental Disclosures in the Annual Report & Accounts of companies in FTSE All-Share, The Environment Agency, 2004

1.8 Guidelines and frameworks

The increasing demand for businesses to be transparent about the environmental and other corporate responsibility challenges they face, has meant that a number of reporting guidelines and frameworks have evolved.

Reporting guidelines and frameworks

These Guidelines seek to help companies report their environmental impacts in a meaningful and cost-effective way and, where possible, the Government has sought to ensure that the Guidelines are consistent with other standards and reporting guidance.

In a recent report[9], Chatham House recommended that the Government bring clarity to the international CSR agenda by supporting a limited number of 'gold standard' initiatives. One such framework proposed in the Chatham House report is the Global Reporting Initiative (GRI)[10] which provides a detailed, globally applicable framework for sustainability reporting. There are also a number of other reporting frameworks[11].

Environmental Management Systems (EMSs)

EMSs can be used by companies of all sizes as a means to improve their overall environmental performance. These systems will also provide useful information from a reporting perspective. The Government's EMS Position Statement[12] sets out policy in this area in more detail; it recommends the following types of certified EMSs:

- The global standard ISO 14001
- The European Regulation EMAS (the EU Eco Management and Audit Scheme) and
- Businesses that wish to take a phased approach to implementing an EMS can follow the BS8555 process[13]; this is particularly appropriate for SMEs.

9 'Following up the World Summit on Sustainable Development commitments on Corporate Social Responsibility', Chatham House, 2005.

10 http://www.globalreporting.org

11 'Guidelines on environmental management accounting', International Federation of Accountants, http://www.ifac.org; and, 'The Greenhouse Gas Protocol: a corporate accounting and reporting standard', World Business Council for Sustainable Development (WBCSD), http://www.wbcsd.org

12 http://www.defra.gov.uk/environment/business/scp/index.htm

13 http://www.theacorntrust.org and http://www.bsi-global.com

Stakeholder engagement

UNEP's Stakeholder Engagement Manual[14] provides comprehensive information on how a company can undertake a rigorous stakeholder engagement process. The GRI also provides comprehensive guidance on this.

Assurance

The use of independent third party assurance statements adds credibility to a business' reporting and provides an important feedback mechanism for the business. A number of organisations provide this service, and an assurance framework – AA1000 – has been developed[15].

1.9 Principles of reporting

General principles

Regardless of which framework a company uses, there are some common principles which, if followed, can provide assurance to a business and its stakeholders that appropriate processes and procedures have been followed. This information can be included in the narrative part of a report, to add context to quantitative KPIs.

Principle 1 – transparency

Transparency is essential to producing a credible report. Internal processes, systems and procedures are just as important as the quantitative data, i.e. the value of the quantitative data will be greatly enhanced if accompanied by a description of how and why the data are collected. Particular issues which could be relevant to this principle are:

- The level of public disclosure
- Responsibility for environment/sustainable development exists
- Clear definition of boundaries of the company to which the report applies, and
- An explanation of internal processes to manage and report risk.

14 http://www.uneptie.org

15 http://www.accountability.org.uk/aa1000/default.asp#

Principle 2 – accountability

A company can be accountable to a variety of different people for its behaviour. In a financial sense directors are ultimately accountable to the owners of the company. Particular issues which could be relevant to this principle are:

- The definition, level and nature of stakeholder engagement
- The existence and quality of a third party assurance statement
- Integration of environmental reporting within the Annual Report and Accounts, and Business Review
- The existence and success of a communications strategy, and
- The extent to which information is specifically identified and tailored to the needs of institutional investors.

Principle 3 – credibility

It is essential that any reporting is placed in context, to link the specific impacts and understanding of the company to the wider movement by society to embed the principles of sustainable development. Particular issues which could be relevant to this principle are:

- Understanding of the concept of sustainable development and how it applies to the business;
- A company's procurement policy and efforts to manage the impacts of its supply chains and products; and,
- The existence and description of an externally certified (or other) environmental management system (EMS), and other data collection, measurement and management procedures.

KPI principles

In addition to these general reporting principles, there are also some common KPI-specific principles:

Principle 1 – quantitative

KPIs should be measured, and should therefore be quantitative in nature. This also means that they can be acted upon; for example, targets can be set to reduce a particular emission if it is expressed in a quantitative term. In this way the effectiveness of environmental policies and management systems can be substantiated.

Measurement of environmental impacts often requires some form of conversion methodology or estimation, such as the estimation of carbon dioxide emissions resulting from the consumption of heating oil. There are many standards that can be used to perform this type of calculation, and it is important to report on the protocols used to determine these impacts. More information regarding relevant protocols can be found in the description of each KPI, below.

Units of measurement should be uniform, such as metric tonnes rather than imperial tons. Sources of underlying data should be as readily available as possible. This adds to reporting transparency, and should enable independent analysts to undertake in-depth research.

Principle 2 – relevance

In addition to the quantitative information, a KPI should be accompanied by a general narrative, explaining its purpose and impacts (likely impacts are set out in the definitions of each KPI in Section 4). As part of this narrative, all relevant information and comparators should be taken into account for that KPI. Each KPI should describe the process undergone, the calculation methods and any relevant assumptions. Progress should also be discussed, including against targets, whether improvements or set-backs have occurred and how these are being tackled. Any information relating environmental performance (i.e. the environmental KPI) to financial performance should be also discussed. This can include environmental fines and expenditures.

Principle 3 – comparability

The Government is seeking to stimulate the provision of comparable, comprehensive and quantitative data, whilst avoiding the problem of over-prescriptive guidance leading to 'boilerplate' or 'cut and paste' responses. As far as possible, all companies should be able to report data in a comparable format, so users of reports can assess the performance of a single company over time and relative to its competitors. It is important that companies avoid using bespoke KPIs to hide poor environmental performance; the narrative part of a report provides the opportunity for a company to discuss any tensions which exist between providing comparable data and reporting company-specific KPIs.

KPIs should be expressed in absolute terms that cover the entire business for each period of reporting (most commonly annually), and also related to a normalising factor. Two commonly used normalising factors are turnover and production output; but there are others which may be relevant for companies in a particular sector, for example companies with offices may normalise to floor space.

This allows stakeholders to know how much environmental impact companies have relative to a given amount of goods and/or services produced. Normalised data can be particularly helpful in demonstrating environmental improvements in a growing business.

Environmental information should be published at the same time as Annual Reports and Accounts, and relate to the same accounting period. Reporting should be consistent with other types of company reporting as far as possible.

Chapter 2

2.1 How were these key performance indicators determined?

These Guidelines are derived from an analysis of the impact that UK businesses have on the natural environment. The analysis takes into account the value of a number of different ecosystem services[16]. Ecosystems, and the biological diversity contained within them, provide goods and services essential to our economic and social welfare. Ecosystems tend to be significantly undervalued by society and in many cases no formal market exists for the services that ecosystems provide. In this analysis a value has been placed on these services in order to determine the relative importance of different environmental impacts.

2.2 The KPIs

There are 22 Key Performance Indicators considered to be significant to UK businesses. These are supplemented by sections on supply chains and products:

Emissions to air

1. Greenhouse Gases

2. Acid Rain, Eutrophication and Smog Precursors

3. Dust and Particles

4. Ozone Depleting Substances

5. Volatile Organic Compounds

6. Metal emissions to air

Emissions to water

7. Nutrients and Organic Pollutants

8. Metal emissions to water

[16] For further information on the value of ecosystem services please refer to the recently published United Nations Millennium Ecosystem Assessment, a 4-year study involving 1,360 experts worldwide. This can be found at http://www.millenniumassessment.org

Emissions to land

9. Pesticides and Fertilisers

10. Metal emissions to land

11. Acids and Organic Pollutants

12. Waste (Landfill, Incinerated and Recycled)

13. Radioactive Waste

Resource use

14. Water Use and Abstraction

15. Natural Gas

16. Oil

17. Metals

18. Coal

19. Minerals

20. Aggregates

21. Forestry

22. Agriculture

Every business should also consider reporting on how it influences the environmental performance of its supply chain and products, the following additional sections in Chapter 4 provide guidance on this:

- Supply chains
- Products

These KPIs have been designed with company reporting in mind. Where possible, recommendations as to how to measure these KPIs make use of information that is routinely collected by companies. Accordingly, many of the KPIs described can be calculated from information such as quantity of fuel consumed per annum, business mileage, and how much electricity has been purchased.

Biodiversity

These guidelines do not include a KPI specifically for biodiversity.

There is no single, universally accepted method for measuring the impacts of company activity on biodiversity. However, there are developing initiatives and schemes which provide a model for companies to report qualitatively on their biodiversity impacts in a holistic and integrated way such as the Global Reporting Initiative (GRI).

This will be particularly relevant for certain sectors of business who are involved with supply chain issues (see Section 4.5). This will also be important for those industries with significant impacts on biodiversity, including but not limited to the extractive industries, natural resource use (including forestry) and agriculture (including pesticides/fertilisers).

Many of the KPIs in this guidance will provide a contribution to understanding how business activities will affect biodiversity. Most of the KPIs (indirectly or directly) do take account of some of the activities which will have biodiversity impacts. Performance against the KPIs will allow companies to assess the ecosystem services whose degradation can result in biodiversity loss (i.e. emissions to water), allowing for a more strategic assessment of impacts to be made.

Further guidance is available to assist business[17].

Environmental fines and expenditures

Businesses can incur environmental fines and expenditures during the course of their operations. Linking these types of costs to specific KPIs provides a financial context to those stakeholders that are interested, especially institutional investors. Some expenditure may be attributable to a specific KPI, for example waste, in which case it should be described alongside the information disclosed on each KPI. Other fines and expenditures may be harder to attribute to one specific KPI, in which case they should be reported separately.

[17] The Global Reporting Initiative suggests nine indicators which will assist companies in reporting on their impacts. http://www.globalreporting.org

- The Convention on Biological Diversity (CBD) has developed trial indicators for measuring biodiversity loss which may also be useful in an evaluation of the indirect and direct effects of business activities on biodiversity: http://www.biodiv.org/doc/publications/cbd-2010-brochure-en.pdf
- Earthwatch have produced guidance for business on biodiversity impacts management http://www.businessandbiodiversity.org/action_options.html
- The Business and Biodiversity Strategy Implementation Group (BBSIG) is looking at issues of biodiversity, reporting and corporate responsibility as part of its remit under the England Biodiversity Strategy.

All businesses must comply with environmental legislation that applies to them. It is important that businesses that have incurred fines report on them. For each financial accounting year, a summary of the number of prosecutions and the size of the fines and associated costs should be reported, regardless of actual size. Incident locations could also be reported if deemed relevant, as regulatory regimes can differ significantly. The Environment Agency has launched a free website *(www.netregs.gov.uk)* designed to help small and medium businesses understand and comply with their environmental obligations.

Environmental expenditures are classified as types of costs aimed at directly preventing, reducing or ceasing pollution and nuisances created by a company's activities, including accumulated liabilities, provisions, public funding or other grants, and capital expenditures related to environmental issues. Where these expenditures can be separated from mainstream operational costs businesses should consider reporting them.

2.3 How to determine reporting boundaries

Determining reporting boundaries can be complicated. The polluter pays principle is a way to clarify reporting boundaries. This principle assigns responsibility to those parties that directly cause the pollution or use a natural resource. Using this model, emissions caused or resources used directly by the company fall under its direct responsibility; all other impacts are indirect.

Direct environmental impacts result from a businesses own operations and include greenhouse gas emissions from heating boilers and vehicles, other emissions from any manufacturing operations, and waste produced. The purchase of finished products, such as electricity and outsourced logistics, results in upstream indirect (supply chain) impacts that are embedded in the products and services supplied. Thus, the purchase of electricity, any form of transport where a company does not pay for the fuel, and supplied water, raw materials and finished products are considered indirect impacts. Downstream indirect (products in use) environmental impacts can be caused by the use or disposal of a product after it has been sold. ***Figure 1*** sets out some direct and indirect impacts.

Energy and Water Use

Even though energy and water use are indirect impacts, the Government believes that responsibility for managing these is shared; this is because more than one company can influence this impact. For example, an electricity generator can reduce the carbon content of the electricity which it generates, but equally, a company which uses that electricity can improve its energy efficiency. In this example, both companies can improve their performance so both can usefully measure, manage and report their performance against this impact. For this reason, the Greenhouse Gas and Water Key Performance Indicators, and the Supply Chain section contain information on energy and water use.

The Government accepts that in this situation two companies will be reporting the same impact. However, these Guidelines do not establish an emissions trading regime where it is necessary to avoid this.

2.4 Reporting on direct and indirect KPIs

The Government expects businesses to report on their significant environmental impacts whether they are direct or indirect.

Businesses are likely to derive benefit from positively influencing their indirect environmental impacts for at least three reasons:

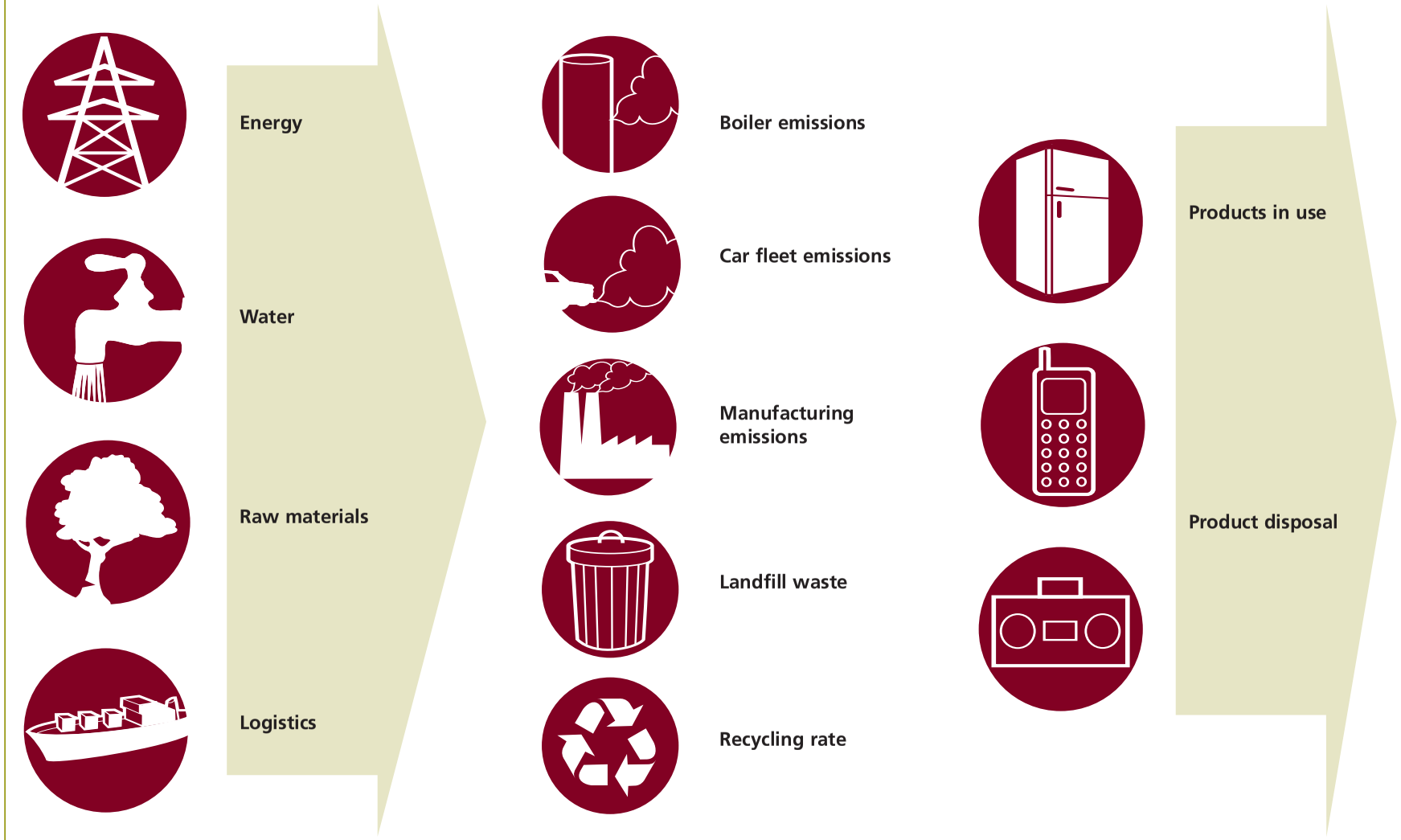
- The issues may be significant in terms of the organisation's overall environmental impact;
- Organisations need to be able to demonstrate that reducing their direct impacts is not at the expense of increased impacts elsewhere; and,
- Some stakeholders may deem them accountable for supply-chain impacts, particularly where they have significant purchasing power in the marketplace.

These issues are best tackled by adopting a strategic approach to environmental purchasing and supply-chain management that is set within the wider context of an organisation's purchasing and environmental management activities. There is a wide range of support and guidance available to organisations from the relevant professional bodies including the "Strategic Supply-Chain Group"[18] and the handbook "Environmental Purchasing in Practice"[19].

[18] http://www.sscf.info

[19] Environmental Purchasing in Practice – guidance for organisations, 2002, Institute for Environmental Management and Assessment, Chartered Institute for Purchasing and Supply, NHS Purchasing and Supply Agency.

Figure 1: Direct Key Performance Indicators by Sector type

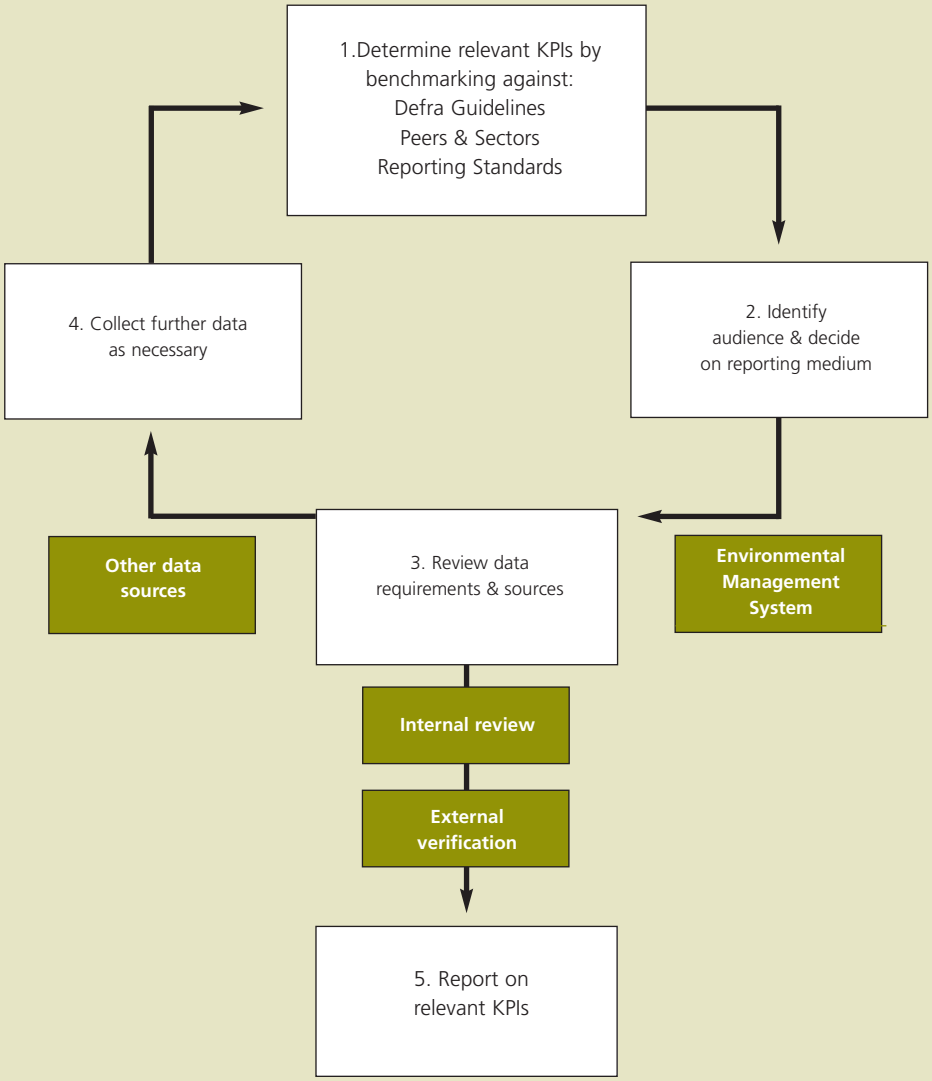


Chapter 3

3.1 The reporting process

Figure 2 sets out the recommended environmental reporting processes.

Figure 2: Process for reporting environmental KPIs



Step 1: Determine relevant KPIs

There are a number of different ways to do this and the most appropriate way will depend on the internal resources and expertise available, and whether the organisation is experienced at reporting.

For many businesses these Guidelines will provide a useful guide as to which environmental impacts are relevant for particular sectors. ***Figure 4*** describes the KPIs that are typically significant for over 50 sectors, and this information can be used to help with deciding on the most appropriate KPIs to report. There is more information on using these Guidelines in the next section. Many businesses also review what their peer companies are reporting so that they have a good benchmark of the relative extent of reporting.

Finally, for organisations that expect to report on a diverse and wide range of KPIs it may be useful to refer to other standards that exist for environmental reporting, such as the Global Reporting Initiative, in addition to these Guidelines. This may be especially useful for those organisations that already report and wish to make their environmental reporting more extensive and appeal to a wider set of stakeholders.

Step 2: Identify audience & decide on reporting medium

It is important to ensure that when reporting environmental performance, the KPIs selected meet the expectations of the key audiences or stakeholders. Audiences can include shareholders, employees, government, suppliers, customers, academics/consultancies, the local community and NGOs.

Step 3: Review data requirements & sources

The next step is to gather the data as appropriate. Companies that are already reporting may have the appropriate systems in place; new reporters will need to consider the most appropriate way of gathering the information.

Environmental Management Systems (EMS)

Environmental Management Systems (such as ISO14001, EMAS and BS8555) are described in Chapter 1. The Government believes that these systems are a robust and effective way of managing the data-gathering process to an appropriate standard. More information about EMS can be found at: http://www.defra.gov.uk/environment/business/scp/index.htm

Other data sources

In some cases it will be possible to collect information using standard business systems such as transactional systems. These Guidelines describe how businesses can use information that is already collected, such as fuel and electricity bills, to calculate environmental KPIs.

Step 4: Collect further data as necessary

Once the data requirements and systems have been assessed, it may be necessary to collect more information than is currently available. This may involve implementing or expanding the data collection systems currently in place.

Step 5: Report on relevant KPIs

Once the appropriate information has been gathered, the relevant KPIs can be reported. This process can be repeated for every reporting period. Most companies that report on environmental KPIs do so annually.

Figure 3 illustrates how a number of KPIs could be reported for a typical service industry company.

3.2 How to use these Guidelines

The recommended way to use this document is:

1. ***Find the appropriate Sector Classification for your company.*** Figure 4 (p66) contains information on 56 sector types, the most significant direct KPIs, and other KPIs. Look up the sector type, or types, that most accurately reflect your business type.

2. ***Assess direct KPIs.*** Assess the relevance of the direct KPIs to your business. Each sector cross-references page numbers for each KPI. Please refer to each individual KPI for further information on the definition, the process and sectors that give rise to the impact, how to measure or calculate it, and how to report it.

3. ***Assess indirect KPIs.*** Once you have determined relevant direct KPIs, please refer again to Figure 4 to assess Indirect Impacts (Upstream). When examining your sector in the table, refer to the column that states Significant Supplier Industries. Look up the relevant direct KPIs for each supplier sector in order to determine which issues are relevant for a given supplier industry. Then refer to the sections on Supply Chains and Products.

4. ***Measure and report on KPIs according to Guidelines.*** These Guidelines provide details of how to measure each KPI, in many cases making use of standard business data that may already be collected. The Guidelines also describe in clear terms how to report on each KPI.

Figure 3 illustrates the way in which a number of KPIs for a typical service industry company could be reported.

Figure 3: Sample Company Plc – Environmental Key Performance Indicators

Environmental Key Performance Indicators – Financial Year 2005

Direct Impacts (Operational)			**Quantity**					
Greenhouse Gases	**Definition**	**Data source & Calculation Methods**	**Absolute Tonnes CO2**		**Normalised Tonnes CO2 Per £M Turnover**			
			2004	**2005**	**2004**	**Target**	**2005**	**Target**
Gas	Emissions from utility boilers.	Yearly consumption in kWh collected from fuel bills, converted according to Defra Guidelines.						
Vehicle Fuel	Petrol and diesel used by staff and van hire fleet.	Expense claims and MOT recorded mileage, converted according to Defra Guidelines.						
Waste	**Definition**	**Data source & Calculation Methods**	**Quantity**					
			Absolute Tonnes		**Normalised Tonnes Waste Per £M Turnover**			
			2004	**2005**	**2004**	**Target**	**2005**	**Target**
Landfill	General office waste, which includes a mixture of paper, card, wood, plastics and metals.	Volume of waste generated per annum, calculated by recording the number of bins and skips removed, converted to tonnes according to Defra Guidelines.						
Recycled	General office waste recycled, primarily cardboard.	Volume of waste recycled per annum, calculated by recording the number of bins and skips removed for recycling, converted to tonnes according to Defra Guidelines.						
Indirect Impacts (Supply Chain)								
Greenhouse Gases	**Definition**	**Data source & Calculation Methods**	**Quantity**					
			Absolute Tonnes CO2		**Normalised Tonnes CO2 Per £M Turnover**			
			2004	**2005**	**2004**	**Target**	**2005**	**Target**
Energy use	Directly purchased electricity, which generates Greenhouse Gases including CO2 emissions.	Yearly consumption of directly purchased electricity in kWh, converted according to Defra Guidelines.						
Water	**Definition**	**Data source & Calculation Methods**	**Quantity**					
			Absolute Cubic Metres		**Normalised Cubic Metres Water Per £M Turnover**			
			2004	**2005**	**2004**	**Target**	**2005**	**Target**
Supplied water	Consumption of piped water. No water directly abstracted by the Group.	Yearly consumption of purchased water.						

Chapter 4

4.1 Emissions to Air

KPI 1 Greenhouse Gases

Definition

Greenhouse gases (GHGs) are so called because they contribute towards the greenhouse effect. The greenhouse effect describes the natural phenomenon where certain gases in the atmosphere increase the Earth's surface temperature due to an ability to trap heat, similar to the way in which glass traps heat in a greenhouse.

The six main GHGs are covered by the Kyoto Protocol, these gases are outlined in the box below. Each GHG has a different capacity to cause global warming, depending on its radiative properties, its molecular weight and its lifetime in the atmosphere. The so-called global warming potential (GWP) of a gas encapsulates these factors. The GWP used for the Kyoto Protocol is defined as the warming influence over a 100-year time horizon relative to that of carbon dioxide. The GWP of methane is 21 (i.e. a 1kg emission of methane to the atmosphere will cause an equivalent warming effect as 21kg of carbon dioxide over 100 years). GWP of nitrous oxide is 310, for F-gases GWP can be several thousands. GWP for carbon dioxide is, by definition, 1.

Greenhouse Gases covered by the Kyoto Protocol

Carbon Dioxide – CO_2 Emitted mainly from the burning of fossil fuels, carbon dioxide accounted for some 86 per cent of the UK's human-induced (anthropogenic) GHG emissions in 2003. Typically quantified in tonnes of CO_2 per year.

Methane – CH_4 Emitted mainly from agriculture, waste disposal, leakage from the gas distribution system and coal mining, methane contributed to over 6 per cent of UK anthropogenic GHG emissions in 2003.

Nitrous Oxide – N_2O The main anthropogenic sources of nitrous oxide emissions are agriculture, transport, industrial processes and coal combustion. Nitrous oxide accounted for approximately 6 per cent of UK GHG emissions in 2003.

Hydrofluorocarbons – HFCs, Perfluorocarbons – PFCs and Sulphur Hexafluoride – SF_6 Collectively known as 'F-gases' they are emitted mainly from air conditioning and refrigeration and industrial processes. Together F-gases accounted for around 2 per cent of the UK's anthropogenic GHG emissions in 2003.

There is considerable scientific evidence that the increase in atmospheric concentrations of GHGs due to human-induced (anthropogenic) GHG emissions is having a noticeable effect on climate. The Intergovernmental Panel on Climate Change (IPCC) was set up in 1988 to assess the science of climate change[20]. Reports are prepared by thousands of scientists from around the world and agreed at intergovernmental meetings of the IPCC. The IPCC's Third Assessment Report, issued in 2001, makes the following observations: "The Earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era, with some of these changes attributable to human activities. Human activities have increased the atmospheric concentrations of greenhouse gases and aerosols since the pre-industrial era. The atmospheric concentrations of key anthropogenic greenhouse gases (i.e. carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and tropospheric ozone (O_3) reached their highest recorded levels in the 1990s, primarily due to the combustion of fossil fuels, agriculture, and land-use changes." The increase in the natural process of the greenhouse effect caused by human activities is known as the enhanced greenhouse effect and leads to global warming. Globally, the ten hottest years on record have all occurred since the beginning of the 1990s. Current climate models predict that global temperatures could increase from between 1.4 and 5.8°C over the next 100 years, depending on the amounts of GHGs emitted and the sensitivity of the climate system[21]. The social, environmental and economic costs associated with this could be considerable.

The contributing role of man-made GHGs to climate change is accepted by most countries. A large number of global, national and local initiatives are developing that will limit the number of GHGs emitted by corporations. At an international level, the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol have established a framework within which many countries are taking action to limit or reduce GHG emissions. The Kyoto Protocol entered into force on 16 February 2005 and imposes a legally binding GHG emission reduction target on the UK of 12.5 per cent[22] of base year emissions[23] between 2008 and 2012. The Government has also committed to a domestic goal of a 20 per cent reduction in CO_2 emissions by 2010. At a UK and EU level, this has led to initiatives which include the UK Climate Change Programme, the European Climate Change Programme, the Greenhouse Gas Emissions Trading Scheme Regulations, and the EU Emissions Trading Scheme.

20 http://www.ipcc.ch

21 http://www.defra.gov.uk/environment/climatechange/

22 Reduction of UK carbon dioxide emissions from 1990 levels as apportioned under the Burden Sharing Agreement.

23 Base year emissions are 1990 for CO2, CH4 and N2O and 1995 for the F-gases.

EU ETS, UK ETS and CCAs

The EU Emissions Trading Scheme (EU ETS) that commenced in 2005 is one of the main policies being introduced across Europe to tackle emissions of carbon dioxide and fight climate change. Participants in the Scheme are allocated allowances, each allowance representing a tonne of the relevant emission, in this case carbon dioxide. Installations must then monitor and report their CO_2 emissions and at the end of the year surrender an equivalent number of allowances from their account. Emissions trading gives companies the flexibility to meet emission reduction targets according to their own strategy; for example by reducing emissions on site or by buying allowances from other companies who have made reductions and consequently have excess allowances available to sell. The EU ETS will become one of the main ways to cut carbon dioxide emissions, while maintaining economic growth. Phase 1 of the EU ETS (2005 to 2007) involves around 1,100 installations from a range of sectors, including power stations, iron and steel, pulp and paper, and oil refineries in the UK, and regulates approximately 45 per cent of EU CO_2 emissions[24].

The UK Emissions Trading Scheme (UK ETS) that began in March 2002 was the world's first economy-wide greenhouse gas emissions trading scheme. Thirty-one organisations ('Direct Participants' in the scheme) have voluntarily taken on emission reduction targets to reduce their emissions against 1998–2000 levels, delivering 11.88 million tonnes of additional carbon dioxide equivalent (CO_2 e) emission reductions over the life of the scheme (2002–2006). In the first year (2002), the Direct Participants achieved emission reductions of 4.64 million tonnes CO_2 e against their baselines and in the second year (2003) they achieved emission reductions of nearly 5.2 million tonnes CO_2 e against their baselines. A reduction of 5.9 million tonnes CO_2 e was achieved by direct participants against their baselines in the 2004 compliance period.

The UK ETS trading facility is also open to the 6000 companies with Climate Change Agreements (CCAs). These negotiated agreements between business and Government set energy-related targets. Companies meeting their targets will receive an 80 per cent discount from the Climate Change Levy, a tax on the business use of energy. These companies can use the scheme either to buy allowances to meet their targets, or to sell any over-achievement of these targets. Anyone can open an account on the registry to buy and sell allowances.

Processes

The most significant activity that contributes to GHG production is the combustion of fossil fuels; mostly for the generation of energy for businesses and homes, but also and increasingly for transportation. In addition to fossil fuel combustion, other significant human induced sources of GHG include agriculture (enteric fermentation, manure management and others), industrial processes (particularly the production of cement, glass chemicals, steel, and food and drink), land-use change and forestry, waste management (landfill and incineration), and others. Significant GHG intensive activities are cement production (resulting in process CO_2) and chlorofluorocarbons (CFC) production or use.

[24] Further information: http://www.defra.gov.uk/environment/climatechange/trading/eu/index.htm

Sectors

Every business sector is responsible for GHG emissions. Companies could be affected by present or future regulation due to either direct impacts as a result of their own operations or indirect impacts arising from their supply chain.

Boundaries

Companies may decide to report on impacts that occur outside their normal financial reporting boundaries and this is common practice in the case of GHG emissions.

Direct impacts

The most significant contributor to GHG production is the combustion of fossil fuels, so any business that burns large amounts of fuel will have significant direct GHG emissions.

Indirect impacts – energy use

Many companies report on the GHG emissions incurred in the generation of the electricity they consume and for service companies these indirect emissions can be more important than their direct environmental impacts. There are also some ways that companies can mitigate these emissions, for example by paying a renewables tariff or improving energy efficiency. As such the Government encourages companies to measure and understand the GHG emissions in supplied electricity. The detailed advice below on how this can be calculated is therefore repeated within the supply chain section (4.5) of this document. It is important to note that these indirect GHG emissions should be reported separately from direct emissions.

Over 70 per cent of UK electricity is generated from fossil fuels[25]. Businesses that consume a large amount of electricity will be indirectly responsible for significant GHG emissions. These emissions should be reported separately from the GHG that companies emit directly as described in KPI 1.

If you have not defined any special requirements with regard to your electricity supply (i.e. you are supplied standard grid electricity) you should use Defra's standard electricity generation factor to estimate emissions from kWh of electricity consumed. Guidance on standard conversion factors can be found on Defra's website, in the annex sections of Defra's Guidelines for Company Reporting on Greenhouse Gas Emissions, at: http://www.defra.gov.uk/environment/business/envrp/gas/index.htm

25 http://www.dti.gov.uk/energy/inform/energy_stats/electricity/index.shtml

If you have operations outside of the UK that are supplied electricity, you can apply the appropriate conversion factor for each country, as different countries have different generation mixes. The United Nations Conference on Trade and Development (UNCTAD) has published guidance on standard emission factors for each country, which is available from their website[26].

Calculation or measurement procedures

GHGs can be measured by recording emissions at source by continuous emissions monitoring or by estimating the amount emitted using activity data (such as the amount of fuel used) and conversion factors (e.g. calorific values, emission factors, oxidation factors). For instance, factors can be used to calculate the amount of CO_2 emitted as a result of burning a particular quantity of oil in a heating boiler. Conversion factors are published by a number of agencies. It is recommended that UK companies not already reporting for regulatory purposes use Defra's conversion protocols. These can be found on Defra's website, in the annex sections of Defra's Guidelines for Company Reporting on Greenhouse Gas Emissions, at: http://www.defra.gov.uk/environment/business/envrp/index.htm

Conversion factors are categorised as follows:

Category	Explanation
Fuel	For example, conversion of tonnes of oil used in heating boilers to tonnes of CO_2 emitted.
Combined Heat and Power	Conversion of kWh to tonnes of CO_2 emitted.
Electricity conversion factors	For example, conversion of kWh to tonnes of CO_2 emitted.
Typical process emissions	Identification of emissions derived from certain processes. For example, cement production results in CO_2 emissions.
Greenhouse gas conversion protocols	Conversion of individual GHGs to CO_2 equivalents.
Transport: Road, Rail, Air, Road Freight and Other Freight	For example, conversion of miles travelled in medium-sized petrol car to tonnes of CO_2 emitted.

The National Atmospheric Emissions Inventory is also a useful source of information: http://www.naei.org.uk/

26 A Manual for the Preparers and Users of Eco-efficiency Indicators. UNCTAD, 2004. http://www.unctad.org

Many of the initiatives mentioned in the definition of this KPI, such as the EU and UK Emissions Trading Schemes, have specific monitoring and reporting requirements that must be used by the installations involved[27,28]. For example, the monitoring requirements for installations in the EU ETS are specified in their greenhouse gas permit conditions in accordance with the Commission's Monitoring and Reporting Decision. Failure to meet these permit conditions could lead to prosecution. However, there may be other sources or types of greenhouse gases that are emitted from the site that are not part of the Scheme and are not included on the permit (for example CO_2 from transport emissions on a site). For example, non-CO_2 gases are included in the UK ETS but not included in the EU ETS at this stage. To calculate the total CO_2 and CO_2 equivalents from the site as a whole, installations can use these Guidelines. It should therefore be recognised that businesses will report different emissions under the UK ETS and EU ETS because of their different scope and coverage. Where emissions are reported there should be a clear statement about what sources they cover and a clear explanation for any variation in total annual emissions figures (including variations due to the different nature of the UK ETS and EU ETS).

Reporting guidance

Greenhouse gases should be reported in metric tonnes emitted per annum individually. If an estimation method has been used this should also be reported.

Greenhouse gases should always be reported in this way. For normalising purposes, GHGs can also be reported as CO_2 equivalents.

KPI 2 Acid Rain and Smog Precursors

Definition

Acid Rain and Smog Precursors, for purposes of this KPI, are sulphur dioxide (SO_2), nitrous oxides (NO_x), ammonia (NH_3) and carbon monoxide (CO). Other acid rain and smog precursors include VOCs and particulate matter, but these are covered by other KPIs.

Acid rain and smog precursors (which can also be eutrophication precursors) are emissions to air which, with dispersion, can be transported in the atmosphere over distances of hundreds to thousands of miles, and eventually deposited through precipitation or by direct "dry" processes. The term *acid rain* refers to all types of precipitation (rain, snow, fog, dew) or dry deposition (fly ash, sulphates, nitrates) that are acidic in nature. Eutrophication is the process by which excess nutrient is added to an ecosystem. Significant inputs of nutrients to water can stimulate the growth of plant life, subsequently affecting other aquatic life by depleting oxygen levels.

27 See: http://www.defra.gov.uk/environment/climatechange/trading/eu/permits/index.htm for EU ETS monitoring and reporting Guidance.

28 See: http://www.defra.gov.uk/environment/climatechange/trading/uk/index.htm for UK ETS reporting.

The most significant acidification precursors are sulphur dioxide (SO_2), nitrous oxides (NO_x) and ammonia (NH_3). Nitrous oxides (NO_x) and ammonia are also the most common eutrophication precursors. Both acid rain and eutrophication precursors can have adverse effects on biodiversity. Emissions from industrial activities of these pollutants are heavily regulated, including the Integrated Pollution Prevention and Control Directive (IPPC) at the EU level, the Clear Skies Initiative in the US and the Pollution Prevention and Control Act in the UK.

Smog precursors can be a variety of pollutants, including nitrogen oxides, carbon monoxide and a huge range of Volatile Organic Compounds. When combined with sunlight, these precursors interact in a complex reaction to produce ground level ozone and peroxyacetic nitric anhydride (PAN) which, along with particulate matter, are the main components of photochemical smog. Photochemical smog is a health hazard and, as sunlight is a factor in smog formation, it is usually more severe in summer when light levels are higher. Ground-level ozone is also damaging to plant life and can destroy synthetic material if long-term exposure occurs.

Processes

Smog precursors are emitted by a wide variety of natural and human-influenced processes. The primary human-influenced processes that emit smog precursors are fossil fuel combustion, for example in road transport and electricity generation, and processes that release VOCs. Nitrogen oxides are also used in the Ostwald process, an industrial process that produces nitric acid from ammonia. Nitric acid is commonly used in the production of ammonium nitrate fertilisers. The heavy use of nitrogen-based fertilisers and the intensive farming of animals leads to releases of ammonia from these activities – 80–85 per cent of UK ammonia emissions come from agriculture, with the great majority resulting from the collection, storage and disposal of animal waste.

Pollutant	Impact	Source
Nitrogen Oxides	Precursor to ozone formation, secondary particulate matter formation, acid deposition (including acid rain), and eutrophication. NO_2 is also toxic.	Fuel combustion
Sulphur Dioxide	Precursor to acid deposition (including acid rain) and secondary particulate matter formation. Also toxic.	Fuel combustion (especially coal)
Ammonia	Precursor to eutrophication, acid rain and secondary particulate matter formation.	Animal wastes and fertilisers
Carbon Monoxide	Carbon monoxide – toxic, binds to haemoglobin in blood, ozone (smog) precursors.	Fuel combustion, paints and finishes, solvent based cleaners and de-greasing agents

Sectors

Sectors that use fossil fuels will contribute towards acid rain, eutrophication and smog. For more information please refer to Figure 4.

Calculation or measurement procedures

Although ozone is one of the primary components of smog, it is produced through secondary processes that occur naturally rather than directly from industrial processes or fuel consumption. However, the precursors (see table) are primary emissions and can be measured, as can the other main component of smog – primary emissions of particulate matter (note that particulate matter is covered by a separate KPI). These emissions arise from the consumption of fossil fuels and can be calculated using standard emissions factors, provided the quantity and type of fuel combusted is known, along with the type of boiler or engine.

Producers of nitric acid who utilise the Ostwald process should be able to calculate their emissions of nitrogen oxide based on the efficiency of their process (which can be calculated by comparing the mass of products compared to the mass of reactants). In a 100 per cent efficient process, no nitrogen oxides would be emitted, however it is unlikely that the process would be 100 per cent efficient.

Reporting guidance

SO_2, NO_x, NH_3 and CO should be reported in metric tonnes emitted per annum. If an estimation method has been used this should also be reported.

KPI 3 Dust and Particles

Definition

Dust and particulate matter, alternatively referred to as particulates, aerosols or fine particles, are tiny particles ranging from 10 nanometres to 100 micrometres in diameter. There are two types of processes that contribute to ambient particles: (1) primary emissions of particles, where particles are emitted directly to the atmosphere, and (2) emissions of precursor gases that react in the atmosphere to form secondary particles. Exposure to particulate matter (PM) is associated with a number of health outcomes including shortened life expectancy, cardiovascular and lung disease. Particles smaller than 10 micrometres (PM_{10}) are small enough to enter the airways and lungs.

The EU has set strict limits on the level of airborne PM_{10}. These limit values came into force in 2005. Ambient PM_{10} concentrations are expected to fall as improved vehicle engine technologies are adopted and stationary fuel combustion emissions are controlled through abatement or the use of low sulphur fuels such as natural gas. Despite this, some areas of the country, particularly near to some busy roads, are expected to exceed the 24-hour average EU limit value. It is expected that concentrations of PM_{10} will remain a hazard to public health in most of the urban areas of the UK for the near future. This is partly due to increased use of diesel vehicles in car fleets and also due to high background levels of PM resulting from regional and trans-boundary emissions of secondary PM precursor gases such as NO_x and SO_2.

Processes

Combustion of fossil fuels is the primary source of ambient particulate matter, although other activities such as non-exhaust emissions from road traffic (e.g brake and tyre wear) and re-suspension contribute to ambient levels near roads. Processes such as waste handling and minerals extraction can also cause emissions of PM_{10}. Primary particulate emissions from combustion are chiefly composed of unburned hydrocarbons, carbon (soot), sulphur, salts and toxic metals. Secondary particles arise when ammonia interacts with acidic species in the atmosphere – note that this is covered by the Acid Rain and Smog Precursors KPI.

Sectors

The main sectors contributing to primary particulate emissions are the energy industry (fossil fuel burning electricity generators) and road transport. The main sectors directly contributing to secondary particulate emissions are the power generation sector and any company that owns petrol/diesel powered vehicles. All sectors indirectly contribute to ambient particulate levels as a result of electricity consumption, although this is an indirect impact. For more information please refer to Figure 4.

Calculation or measurement procedures

Primary particulate matter emissions arise from the consumption of fossil fuels and can be calculated using estimation methods[29], provided the quantity and type of fuel combusted is known, along with the type of boiler or engine.

Reporting guidance

Primary particulate matter emissions should be reported in metric tonnes emitted per annum, by size of particle. If an estimation method has been used this should also be reported.

[29] For further guidance please refer to the US Environmental Protection Agency's website.
Oil-fired boilers: http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s03.pdf table 1.3-4 in the Tables section.
Gas-fired boilers: http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

KPI 4 Ozone Depleting Substances

Definition

Ozone depleting substances (ODS) catalyse the destruction of ozone in the upper atmosphere (the ozone layer).

The most important Ozone Depleting Substances are Chlorofluorocarbons (CFCs and Freons), Hydrochlorofluorcarbons (HCFCs), Halons, Methyl Chloroform, Carbon Tetrachloride (the main precursor of Freons) and Methyl Bromide. There are a wide range of Ozone Depleting Substances, but the majority of uses of them have been phased out following the 1987 Montreal Protocol. CFCs were used as refrigerants, propellants in aerosol cans, cleaning solvents for circuit boards and blowing agents for making expanded plastics. They have been replaced with HCFCs, which still contribute to ozone destruction but are less harmful, and other non-ozone depleting substances. HCFCs are also being phased out of use. Currently in the EU HCFCs can only be used to refill existing air conditioning and refrigeration systems; halons can only be used for specific critical uses; and methyl bromide can only be used for agreed critical uses and for quarantine and pre-shipment purposes.

Processes

HCFC emissions are caused largely by leakage from air conditioning and refrigeration systems. Halons are used in fire extinguisher systems on aeroplanes and other highly specialised uses, where fires must be extinguished as quickly as possible, and are emitted when these systems are used.

Sectors

For more information please refer to Figure 4.

Calculation or measurement procedures

Ozone Depleting Substances are often only emitted to the environment by accident. Companies should record the ODS currently in use (which can be estimated based on the type of refrigeration, air conditioning or fire extinguisher system containing the ODS) and the amount emitted if leakage occurs, or fire extinguishers are used. The manufacturer of the system should be able to provide data on the quantity of ODS used in the system and the likely amount emitted in the case of a fault.

Ozone Depleting Potentials or Global Warming Potentials can be used to compare the effects of ODS[30] substances.

[30] http://www.epa.gov/docs/ozone/ods.html

Reporting guidance

ODS should be reported in metric tonnes by type emitted per annum. If an estimation method has been used this should also be reported.

KPI 5 Volatile Organic Compounds

Definition

Volatile organic compounds (VOC) are a group of commonly used chemicals that evaporate when exposed to air. VOCs are able to act as a solvent, or carrier, for many substances and as such are widely used as cleaning and liquefying agents in fuels, degreasers, solvents, polishes, cosmetics, drugs, and dry cleaning solutions. Some common VOCs are trichloroethylene (TCE), tetrachloroethylene (which is a dry cleaning fluid), trichloroethane, benzene, toluene, and xylenes. Methane is also a VOC, but it is covered by the Greenhouse Gas KPI.

VOCs are either emitted to air as gases from certain substances or as a by-product of fossil fuel combustion. There are thousands of different substances which emit VOCs, such as paints, lacquers, paint strippers, cleaning supplies, pesticides, building materials, office equipment and materials, adhesives, photographic solutions and many more.

Processes

Industrial processes that emit VOCs include manufacturing, mining, textiles and paper production. VOCs also arise from fuel consumption. However, given the broad range of VOCs and their multitude of uses, it is often impractical to give an exhaustive list of the processes that produce them.

Sectors

For more information please refer to Figure 4.

Calculation or measurement procedures

VOC emissions from fuel consumption can be calculated using the appropriate fuel conversion protocols which convert fuel used to VOC emitted, provided the amount and type of fuel and the type of boiler or engine is known. VOC emissions from specific industrial processes can be estimated based on the specific type of chemical known, its volatility/vapour pressure and the amount used. Solvent mass inventories can also be used to measure VOC emissions (amount of solvent used subtracted from the amount of solvent recovered).

Reporting guidance

VOCs should be reported in metric tonnes emitted per annum. If an estimation method has been used this should also be reported. The combustion of fuel gives rise to many different types of VOC, so it is impractical to record them individually, in which case the masses of individual VOCs should be totalled together. This approach should also be taken where the amount of any individual VOC emitted is negligible (i.e. in kilograms per annum). In cases where a large quantity of an easily identifiable VOC is emitted (e.g. formaldehyde) the specific name and amount of that VOC should be reported.

KPI 6 Metal Emissions to Air

Definition

Metals that can have significant environmental impacts include lead, mercury, cadmium, arsenic and nickel. Certain heavy metals that are in common usage are often emitted to air as particulates or dust. Metals emitted to air are eventually deposited on land or water and accumulate in soil, water, sediments and sludge, depending on the atmospheric conditions and type of metal. From here they can then accumulate in flora and fauna and, as they are often toxic, this can have highly harmful effects on the environment. The relative mobility of metals differs, and consequently their environmental effects can also be varied. For example, once lead has fixed into soil it takes a very long time to migrate out, and as such lead can have long-term effects on soil quality. Mercury (and to a lesser extent Cadmium) quickly leaches out of soil and into watercourses; once there it is rapidly taken up by fish and subsequently accumulates in the food chain.

Processes

Heavy metals can be emitted from the burning of coal or oil and are also emitted from a variety of industrial processes. Metal ore mining causes metal based dust formation, as do manufacturing processes that involve working with large amounts of metal (in particular foundries, auto-manufacturers and heavy manufacturing). Smaller amounts of metal will be emitted from light manufacturing (for example, electronics) and power generation will have high emission rates if the combustion of coal or oil is involved.

Sectors

For more information please refer to Figure 4.

Calculation or measurement procedures

The amounts of metal emitted as a result of fuel combustion can be estimated using standard fuel emission factors, based on both the type of fuel used and the type of boiler/engine it is combusted in. The quantity of fuel used can often be estimated from fuel bills.

In the case of industrial processes, emissions are likely to be highly localised and can be calculated by direct measurement at emission sources (as required under PPC permit conditions) or estimated by sampling and analysing the local air quality. The best way of sampling varies between industrial practices but generally involves the analysis of dust samples to determine metal content and particle size and an estimation of how much dust is produced.

Reporting guidance

Metal emissions to air should be reported in metric tonnes emitted per annum. If an estimation method has been used this should also be reported.

As metals vary in toxicity, reporting should involve a discussion of the type of metal, the mass emitted (kilograms or tonnes), particle size (which has a large effect on potential toxicity) and the means by which it is emitted – i.e. from a point or dispersed source.

4.2 Emissions to Water

KPI 7 Nutrients and Organic Pollutants

Definition

Organic matter is commonly found in groundwater and inland waters, and can cause significant pollution and disruption to aquatic habitats. Significant discharges of organic waste into bodies of water can cause eutrophication in rivers, lakes, estuaries, coastal and marine waters (where the growth of plant life is stimulated by excess nutrients, subsequently affecting other aquatic life by depleting oxygen levels).

While nutrients have an indirect effect on oxygen levels, oxygen-demanding pollutants have a direct effect. They are contained in organic effluents such as sewage discharges and discharges from the industrial sectors (food and drink) listed in Annex III of the Urban Waste Water Treatment Directive. Organic effluent includes contaminants such as Polychlorinated Biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs), Hexachlorocyclohexanes (HCH), Benzene, Toluene, Xylenes, Ethylbenzene, Dioxins and Phenols, as well as general brewing waste and sewage. Oil spills can also contribute to organic pollutants.

Processes

Sources of nutrients commonly include human sewage, crops and animal production, food processing, pulp and paper manufacturing, detergents manufacturing and fertiliser manufacturing. Organic contaminants can lead to the death of animals and fish as well as changes in appearance, reproductive patterns or behaviour. Organic pollutants can be found in influent and effluent of wastewater treatment, drinking water, boiler feed water, cooling water and storm water.

Sectors

Many sectors are responsible for emitting organic pollutants to water. The processes that commonly result in these emissions are described above. For more information please refer to Figure 4.

Calculation or measurement procedures

Discharged organic substances are commonly measured in one of two ways: by determining the concentration of the emitted substances where it is known that specific substances have been emitted (where few of them are emitted or when they are easy to identify in processes) or by assessing the overall quality of the effluent when specific assessments are difficult to make due to the diverse nature of the components of the discharge. For specific measures, standard laboratory tests can be performed to determine the concentration of the contaminant in the water. Water quality measures are more varied. Combined parameters to assess potential eutrophication in water include:

- Biochemical Oxygen Demand (BOD), which refers to the amount of oxygen that would be used if all the organic components in water were consumed by bacteria.

- Total Suspended Solids (TSS or SS) are solids in water, which constitute an indication of high concentrations of bacteria, nutrients or pesticides and can harm the aquatic life/cause problems for the industrial use of water.

General organic matter concentration can be defined by the following measures:

- Total Organic Carbon (TOC), which measures the organic content of a sample that can be oxidised to Carbon Dioxide.

- Chemical Oxygen Demand (COD), which is the amount of oxidisable material as measured by the potassium dichromate test.

Materials and data collection processes are particular to each one of the methods stated and require more or less costly investments in resources and equipment depending on the technique used.

Reporting guidance

Total discharge of effluents should be recorded in absolute cubic meters per annum, and the content of effluent described. In addition, specific or general water quality measures should be undertaken to assess the impact of these emissions to water. For specific measures, the kg of pollutant per cubic metre should be reported. If spills have contributed to organic pollutant emissions to water directly, the absolute number of spills should be reported, and the volume of individual spills if they are significant. If an estimation method has been used this should also be reported. Discharge consents should also be discussed where relevant.

KPI 8 Metal Emissions to Water

Definition

Metals and metal compounds can be found in effluent, drinking water, cooling water and run-off water. Metal emissions to water include: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn). Other metals that are regularly detected in waters comprise antimony (Sb), barium (Ba), beryllium (Be), boron (B), cobalt (Co), manganese (Mn), selenium (Se), silver (Ag) and vanadium (V).

Metal can affect the aquatic environment in a number of different ways, and for some metals their concentration can increase in the food chain at each trophic level, a process called biological magnification.

Pollutants [31]	Processes & Sectors
Antimony	Petroleum refineries Fire retardants Electronic production Ceramic production Steel production (solder)
Arsenic	Glass production Electronic production Fruit production
Barium	Metal refineries Mining
Beryllium	Metal refineries Electronic and electrical production Aerospace and defence industries
Boron	Pyrotechnic flares Insulation fibreglass Sodium bleach and disinfectants Manufacture of borosilicate glasses Boron filaments in aerospace structures

[31] Main source: United States Environmental Protection Authority

Pollutants	Processes & Sectors
Cadmium	Corrosion of pipes Stabilisers for PVC Alloys and electronic compounds Landfill Metal refineries Refined petroleum products Batteries Paint Coatings (marine - aerospace applications)
Chromium	Steel production (metal alloys) Landfill Pigments for paper, paints, cement and rubber
Cobalt	Cobalt-bearing portables Rechargeable batteries
Copper	Corrosion of pipes Landfill Additives to control algal growth
Lead	Corrosion of pipes Batteries Petrol additives (forbidden in the EU) Pigments Landfill Cable sheathing Ammunition
Manganese	Used in quantitative analysis and medicine Paints Landfill Glass colourant Alloys
Mercury	Refineries Crop production Landfill Batteries Lamps Thermometers Fillings (dentistry)

Pollutants	Processes & Sectors
Nickel	Stainless steel and related alloys Coins Landfill Electronic devices' batteries
Selenium	Petroleum refineries Mining
Silver	Photographic material and processes Mirrors Electric conductors Batteries Table cutlery Dental and medical
Vanadium	Aerospace titanium alloys Chemical catalyst for glass and ceramics Dyes Target material for X-rays

Sectors

For more information please refer to Figure 4.

Calculation or measurement procedures

Metal emissions to water arise from various processes as described in the table above. These emissions can be calculated using emission estimation techniques and manuals. Sampling and source monitoring procedures for analyses vary from country to country and requirements for direct measurement methods depend on the reporting requirements and methods established by pollution inventories. In the EU various tools have been developed to quantify emissions of metal to water.

Reporting guidance

Substances should be reported as absolute kilograms emitted per annum. Where discharges are made to surrounding controlled waters discharge consents are required which may provide useful data. Details of the technique used for sampling and monitoring should be given to enable comparisons to be made.

4.3 Emissions to Land

KPI 9 Pesticides and Fertilisers

Definition

Pesticides and fertilisers are distributed predominantly on farmland, and can have a significant impact on the natural environment.

Fertilisers

The primary nutrients in fertilisers are nitrogen, phosphorus and potassium. Secondary nutrients include sulphur, magnesium and calcium. The use of fertilisers can have an adverse effect on the environment. They can lead to poor drainage of soil and excessive use of fertilisers leads to micronutrient deficiency in soil. The organic matter of British soils has decreased by approximately 50 per cent in the past 20 years. Surplus fertiliser discharged into bodies of water can cause river/lake eutrophication (where the growth of plant life is stimulated by excess nutrients, subsequently affecting other aquatic life by depleting oxygen levels).

Pesticides

A pesticide is any agent used to kill or limit damaging effects by any of the following: insects, rodents, birds, unwanted plants (weeds), fungi, or micro-organisms such as bacteria and viruses. The term pesticide is a general one which encompasses individual product types i.e. herbicides (including plant growth regulators), fungicides, microbiocides, rodenticides and various other substances used to control pests. Agriculture has become both more productive and intensive. High-yielding crop varieties are often more prone to diseases and pest attack and the manner in which they are grown (e.g. large areas of monocultures) can exacerbate this. In addition greater productivity also requires weed control to prevent yield losses. This has led to the extensive use of pesticides. All approved pesticides are tested using a stringent risk assessment process which includes independent scientific scrutiny to determine safe thresholds of application. The effect of pesticides on the environment can be through long-term persistence in the soil or by affecting aquatic systems if the pesticide is highly mobile. For some pesticides their concentration in the food chain is magnified at each trophic level: a process called biological magnification.

Processes

Pesticide and fertiliser emissions to land are produced by deposition of these substances on farmland.

Sectors

For more information please refer to Figure 4.

Calculation or measurement procedures

The amount of pesticides and fertilisers applied to land in a given accounting year should be measured.

Reporting guidance

Pesticide or fertiliser emissions to land should be measured in terms of the total weight applied (kilograms). Companies could also report the total area treated (hectares). If an estimation method has been used this should also be reported.

KPI 10 Metal Emissions to Land

Definition

Emissions of metals to land by business processes can have a serious impact on the local environment. All metals can have adverse effects on natural habitats depending on the amount emitted and the acceptable biological limit. In particular, metals such as mercury, cadmium, arsenic, chromium, copper, zinc and lead, can be extremely toxic. Elevated concentrations of certain metals in soil impede, for example, the ability of micro-organisms to break down plant matter, hindering the release of nutrients.

Processes

Metals are emitted directly to land by a number of industrial processes or by heavy metal leaching from mineral wastes at mining facilities. Metals can also be found in sewage sludge used as fertiliser.

Metal [32]	Sources of Emissions to Land
Mercury	Disposal of batteries, thermometers and other mercury-containing products. Precious metal mining operations may emit to land.
Arsenic	The use of pesticides, fungicides, weed killers and wood treatment products all release arsenic to land.
Cadmium	Cadmium is emitted to land from waste – cadmium is found in many domestic products, such as tobacco products, phosphate fertilisers, tyres, electronic components, heating elements in electric kettles and hot water systems, batteries and ceramic glazes. Zinc minerals contain cadmium as a common impurity which will be released when zinc is refined.
Copper	Emissions to land may result from mining and primary extraction processes (mineral processing, smelting, electrolytic processing, leaching and solvent extraction), and from manufacturing of products using and/or containing copper (electrical goods, pipes, alloys, etc.). Diffuse sources are agricultural and gardening applications such as fungicides, catalysts for organic reactions, pigments for ceramics, and insecticides.
Zinc	Emissions to land can occur at all stages of production and processing of zinc, particularly from mining and refining of zinc ores and from galvanising plants. Sewage treatment plants and waste sites for industrial and household wastes can be sources of zinc. Corrosion of galvanised structures can release zinc to land. Uncontrolled release from application of fertilisers or herbicides may be possible.
Lead	Contaminated soil near lead refineries and waste sites. Releases to land occur from use of lead-containing rodenticides and insecticides. Lead pellets from spent ammunition can also result in emissions of lead to land.

Sectors

Any sectors involved in activities listed in the exhibit above should report on this KPI. For more information please refer to Figure 4.

Calculation or measurement procedures

Metal emissions to land can be determined with emissions estimation methods, ranging from sampling or direct measurement and mass balance calculations to conversions using emissions factors. Procedures for analyses vary from country to country and requirements for direct measurement methods depend on the reporting requirements and methods established by pollution inventories. In the EU various tools have been developed to quantify emissions of metal to land.

Reporting guidance

Metal emissions to land arising from industrial activities should be reported as absolute quantities in metric tonnes or kilograms emitted to land. The list of metal emissions that are reported on should include, but not be restricted to, the substances in the exhibit above. Additional metal emissions should be reported if their disclosure to a pollutant inventory, such as the European Pollutant Emission Register[33], requires it. If an estimation method has been used this should also be reported.

32 Adapted from National Pollutant Inventory of Australia

33 http://www.eper.cec.eu.int/

KPI 11 Acids and Organic Pollutant Emissions to Land

Definition

There is a wide range of organic chemicals that can be emitted to land – for example, long chain hydrocarbons (from oil, petrol or diesel) and organic chemicals from industrial processes (e.g. solvents such as formaldehyde and alcohols). Organic and inorganic acids are also used in many industrial processes and can be emitted to land. These emissions are usually caused by accidental spillage. The effects are varied: some chemicals bind to soil and act as long term contaminants, whilst others will leach into local water sources and contaminate water supplies. Acids can concentrate in soil (and bodies of water) and can have highly detrimental effects on the local flora and fauna, as they are often highly sensitive to changes in pH.

Processes

Any process using either oil-based fuels or lubricants can give rise to these emissions, as can accidental spillages. Similarly any process using large amounts of industrial acids or organic chemicals may also give rise to this impact.

Sectors

For more information please refer to Figure 4.

Calculation or measurement procedures

Spillages can be estimated by comparing the volume/mass of a substance before and after a production process. If the spillage occurs at the end of a pipe or hose then the emission can be estimated by monitoring the flow rate and duration of spill.

Reporting guidance

This KPI should be reported by type of emission and total mass of product spilled. The total amount emitted in tonnes per annum of each type of chemical should be reported. The absolute number of spills should be reported, and the volume of individual spills if they are significant. If an estimation method has been used this should also be reported.

Note that any contaminated land disposed of should also be reported according to the criteria set out in KPI 12 – Waste.

KPI 12 Waste (Recycling, Recovery and Landfill)

Definition

In the UK waste now has to be disposed of and treated according to the type of waste – co-disposal of hazardous (non municipal) and non- hazardous waste is no longer permitted. Non-hazardous waste includes municipal (e.g. household) waste and office waste such as paper, cardboard, plastic and metal packaging and organic materials.

http://www.defra.gov.uk/environment/waste/index.htm

Probable sources of hazardous waste are covered in greater detail in other KPIs, including pesticides and fertiliser, metal emissions to land and acids and organic pollutants.

There are four main routes for the management of waste:

Landfill (and Hazardous Landfill)

A significant proportion of waste is sent to landfill sites, which are closely regulated by the Environment Agency in the UK. Waste material is contained in specific cells where emissions such as methane, a greenhouse gas and leachate are carefully monitored. Methane released at landfill sites can be captured and flared off, or fed into biogas engines to generate power.

Recovery – Energy from Waste (EfW)

Waste is combusted at very high temperatures under controlled conditions, monitored by the Environment Agency. Waste incineration can be a significant source of renewable energy. Incineration releases large amounts of Carbon Dioxide. Incineration also results in other emissions such as Nitrogen Oxides (NO_x), Sulphur Dioxide SO_2 and ash, although these emissions can be reduced by physical processes. Ash can contains concentrated amounts of heavy metals and can be difficult to dispose of. The application of sewage sludge to agricultural land can be considered a recovery operation.

Recycling

Once waste is sorted and processed it is then sent on to a recycling facility. Recycling waste is more energy efficient than extracting virgin materials. Recycling aluminium is 95 per cent more energy efficient than producing virgin aluminium, recycling glass is 50 per cent more energy efficient that producing virgin glass and recycling paper is 60 per cent more energy efficient than producing virgin paper. For waste to be recycled it must be sorted and sent to an appropriate recycling facility.

Re-use

Reusing waste is an area where community groups have led the way: they have been instrumental in promoting the reuse of items which would otherwise end up as waste, through activities as far-ranging as re-distribution of unwanted furniture and computers, to community composting; all of which are helping to reduce the amount of waste going to landfill.

Processes

Non-hazardous waste arises from day-to-day activities in all businesses. Any office will generate waste paper, packaging, glass and other waste. Increased amounts of organic waste will be generated by businesses that produce foodstuffs (or even just have a canteen). Many businesses have recycling bins in their offices, which mean that some sorting can be carried out prior to the waste leaving company premises.

Sectors

All sectors produce waste to some extent. For more information please refer to Figure 4.

Calculation or measurement procedures

Waste can be measured by estimating the number and weight of waste containers that leave the business over a set period of time. If the waste is sorted prior to recycling, e.g. to comply with the Producer Responsibility Obligations (Packaging Waste) Regulations 2005[34] then more detailed measurement of specific waste (e.g. tonnes of glass) can be taken. Further guidance on how to measure waste is available on Defra's website, at: *http://www.defra.gov.uk/environment/business/envrp/*

[34] http://www.defra.gov.uk/environment/waste/topics/packaging/index.htm

Reporting guidance

Waste should be reported in metric tonnes per annum. In the UK many companies will already be recording levels of waste sent to landfill, as the UK landfill tax is charged per tonne. Where possible, waste materials should be broken down into types (e.g. paper, glass, aluminium). Companies obligated under the packaging Regulations should have records of the amount, and different types of packaging waste they send to a recycler, in order to demonstrate that they have met their recovery and recycling obligations. The final waste management route should be also reported (e.g. 50 per cent to landfill, 20 per cent incinerated, 20 per cent recycled, 10 per cent re-used). If an estimation method has been used this should be reported.

KPI 13 Radioactive Waste

Definition

Radioactive waste is a by-product of the manufacture of nuclear fuel and also results from the production of electricity and from the use of radioactive materials. Radioactive waste can be classified into three main categories:

- High Level Waste (HLW) is heat-generating waste produced by the reprocessing of spent nuclear fuel.
- Intermediate Level Waste (ILW) arises from the dismantling and reprocessing of spent fuel and from the general operation of nuclear plants.
- Low Level Waste (LLW) contains radioactive materials but those which do not exceed certain defined activity levels.

Radioactive waste in the UK is highly regulated. Companies must have authorisation from the environmental regulators under the Radioactive Substances Act 1993 (RSA93) to accumulate or dispose of radioactive waste and strict limits are imposed. There are also various EU Directives and international conventions covering the safety of nuclear facilities and disposal of radioactive waste. In 2006 the Committee on Radioactive Waste Management (CoRWM)[35], a Government appointed body, will make recommendations to Ministers on the long-term management of higher activity radioactive waste. A separate review of Government policy on Low Level Radioactive Waste is also due to end with the production of a new policy statement in summer 2006.

Processes

Radioactive waste is produced by a number of industrial and medical processes. The majority of such waste, however, arises from the production of nuclear fuel, the use of nuclear fuel to generate electricity and the reprocessing of spent fuel from both UK and foreign electricity generators.

35 http://www.corwm.org.uk/

Sectors

The two sectors from which the majority of radioactive waste arises are the "Electricity, gas, steam, and hot water supply" sector, and the "Manufacture of coke, refined petroleum and nuclear fuel" sector. Many other industries, such as the medical sector and research establishments, also produce radioactive waste but in much lower quantities. For more information please refer to Figure 4.

Calculation or measurement procedures

Companies measuring radioactive waste should follow guidelines from the environmental regulators. More information can be found at:
http://www.defra.gov.uk/environment/radioactivity/waste/index.htm

Companies that produce electricity from nuclear power should measure spent fuel. The weight of spent rods should be recorded by the company's management system and then totalled for the year in order to report in metric tonnes per annum.

Reporting guidance

Solid radioactive waste should be reported at the company level on an annual basis in kg or metric tonnes of HLW, ILW and LLW.

For LLW it is normal practice to report on disposals or transfers as a proxy for LLW generation. Where this is done, the information provided to the Environment Agency (for the purpose of monitoring compliance with the relevant transfer or disposal authorisation under RSA 93) should be reported.

For HLW and ILW, it is normal practice to use estimates based on the information which the company has reported to Nirex for inclusion in the National Radioactive Waste Inventory.

Nuclear power generators should report on the quantity of spent fuel used in power stations, in metric tonnes of uranium (teU) per annum. In addition, electricity producers should report the amount of electricity produced each year using nuclear energy in TWh.

If an estimation method has been used this should also be reported.

4.4 Resource Use

KPI 14 Water Abstraction

Definition

Water is an essential resource that is required for a healthy environment and is used in the production and provision of numerous goods and services, such as electricity. In the UK approximately a third of drinking water is abstracted from groundwater, whilst the remainder comes from surface water.

Abstraction of water can have significant local, or more widespread, impacts on the environment. The threat of climate change, resulting in severe droughts, floods and storms, also constitutes a challenge for water resources management. Countries around the world are aware of the need to use water resources more efficiently and reduce waste in order to ensure availability of the resource in the long term. To achieve this goal various market and financial instruments have been put in place, such as abstraction charges, effluent consents and pricing mechanisms.

Processes

Water can be abstracted for public water supply to produce drinking water following treatment. It can also be abstracted directly for use by businesses for a wide variety of uses including irrigation and for industrial processes (e.g. coolant, carrier or solvent purposes).

Sectors

Water is abstracted by various companies including water and sewerage companies, industrial and chemical companies, and power companies. Many sectors rely heavily on supplied water, although this impact should be reported as a supply chain impact and not a direct KPI. For more information please refer to Figure 4 and to the section on supply chains (Section 4.5) .

Calculation or measurement procedures

For abstracted water, the majority of charges are levied according to the licensed volume, but actual volumes abstracted are reported to the Environment Agency. It is the actual volumes abstracted that should be measured.

Reporting guidance

The table overleaf illustrates the scope of measures that should be reported. In most cases reporting will be much simpler, as most companies focus on a specific type of abstraction.

The most appropriate way of reporting abstracted water should be in cubic metres. If an estimation method has been used this should also be reported. Compliance with any abstraction consents, such as those provided by the Environment Agency in the UK, should also be reported. Companies should also discuss whether water has been re-used or returned to source (e.g. cooling water). Direct abstraction should be reported as the volume taken, not the licensed volume.

	Tidal (Saline) Water	Non-Tidal (Fresh) Water		
		Groundwater	River or Reservoir Water	Recovered Water (eg rainwater, recycled water)
Abstracted Water (m3/year)				

Water use

It is important to distinguish water abstraction from the use of supplied water. The environmental impacts associated with supplied water use are indirect and more guidance on how these can be reported can be found in section 4.5 – Supply Chains.

KPI 15 Natural Gas

Definition

Natural gas is a fossil fuel resource that is necessary for many economic activities, including electricity production. Natural gas is a combustible mixture of hydrocarbon gases. While natural gas is primarily comprised of methane, it can also include ethane, propane, butane and pentane. Found in reservoirs underneath the earth, natural gas is commonly associated with oil deposits. After refining, the clean natural gas is transported through a network of pipelines or compressed into Liquid Natural Gas (LNG).

Natural gas is a finite resource and as such its continued extraction and use will eventually lead to depletion. In addition, every mining aspect of gas extraction has associated environmental impacts: the natural habitat is usually disrupted, and other extraction processes and by-products can have serious environmental consequences. Storage of natural gas is an environmental issue as leakages and explosions may occur.

Substitution of natural gas with renewable energy sources (such as wind energy or solar power) where technically and economically feasible can also reduce the demand for the planet's resources.

Note that emissions caused by the combustion of natural gas, such as greenhouse gases, are covered by other KPIs.

Processes

Resource depletion of natural gas arises as a result of extraction of natural gas.

Sectors

Every mining operation that extracts natural gas (the primary ISIC sector type is "Extraction of crude petroleum and natural gas"). For more information please refer to Figure 4.

Calculation or measurement procedures

Extraction of natural gas is commonly measured at source.

Reporting guidance

Reporting of natural gas quantities should be in cubic metres or barrels of oil equivalent extracted per annum.

KPI 16 Oil

Definition

Oil is a fossil fuel resource that is a necessary energy provider for many economic activities, including a significant proportion of the UK's energy needs.

Crude oil mainly consists of hydrocarbons. A comparatively volatile liquid, bitumen is composed principally of hydrocarbon with traces of sulphur, nitrogen or oxygen compounds and can be removed from the earth in a liquid state.

Oil is a finite resource and as such its continued extraction and use will eventually lead to depletion. In addition, every aspect of oil extraction has associated environmental impacts: the natural habitat is usually disrupted, and extraction processes and by-products can have serious environmental consequences.

Spills that occur during transport are covered by Acids and Organic Pollutant Emissions to Land (KPI 11) and Water KPIs (KPI 14). Emissions caused by the combustion of oil, such as greenhouse gases (KPI 1) and dust and particles (KPI 3), are also covered by other KPIs.

Substitution of oil with renewable energy sources (such as wind energy or solar power) where technically and economically feasible can also reduce the demand for the planet's resources.

Processes

Resource depletion of oil arises as a result of extraction of oil.

Sectors

Every mining operation that extracts oil (the primary ISIC sector type is "Extraction of crude petroleum and natural gas"). For more information please refer to Figure 4.

Calculation or measurement procedures

Extraction of crude oil is commonly measured at source.

Reporting guidance

Crude oil should be reported in cubic metres or barrels of oil equivalent extracted per annum.

KPI 17 Metals

Definition

Metals are non-renewable resources and are necessary raw materials for many economic activities. The most commonly used metallic resources are iron, aluminium (bauxite), copper, lead, nickel, zinc, gold and silver.

Metal resources are non-renewable resources and as such their continued extraction and use will eventually lead to their depletion. Higher-grade metal deposits are being increasingly depleted, requiring the mining companies to move towards less economical deposits, such as lower-grade deposits or deposits that are harder to exploit. In addition, every aspect of mining has environmental impacts: the natural habitat is usually disrupted, and mining processes and by-products can have serious environmental consequences.

Where technically and economically feasible, recycling, covered in a separate KPI (KPI 12), ensures that resources, such as metals are put back into productive use. This alleviates the demand for the planet's metal resources and avoids the need to extract virgin materials.

Processes

Metals are extracted through mining (surface or underground). This indicator only includes metal commodities that are extracted rather than those that are recovered through recycling.

Sectors

Every mining operation that mines metals (the primary ISIC sector type is "Mining of metal ores"). For more information please refer to Figure 4.

Calculation or measurement procedures

Extraction of metals is commonly measured at source.

Reporting guidance

Metals extracted should be reported in metric tonnes extracted per annum, broken down by type of metal.

KPI 18 Coal

Definition

Coal is a fossil fuel resource that is a necessary energy provider for many economic activities, including a significant proportion of the UK's energy needs.

Coal resources are non-renewable resources and as such their continued extraction and use will eventually lead to their depletion. Better-quality coal deposits are being increasingly depleted, requiring mining companies to move towards less economical deposits, such as lower-quality deposits or deposits that are harder to exploit. In addition, every aspect of mining has environmental impacts: the natural habitat is usually disrupted, and mining processes and by-products can have serious environmental consequences.

Substitution of coal with renewable energy sources (such as wind energy or solar power) where technically and economically feasible can reduce the demand for the planet's coal resources.

Emissions caused by the combustion of coal, such as greenhouse gases and dust and particles, are covered by other KPIs.

Processes

Coal is extracted by quarrying and mining operations (surface or underground).

Sectors

Every mining operation that mines coal (the primary ISIC sector type is "Mining of coal and lignite; extraction of peat"). For more information please refer to Figure 4.

Calculation or measurement procedures

Extraction of coal is commonly measured at source.

Reporting guidance

Coal should be reported in metric tonnes extracted per annum, broken down by type of coal (such as lignite or hard coal) and extraction (deep or open cast).

KPI 19 Minerals

Definition

Minerals are naturally occurring inorganic substances which have a characteristic and homogeneous chemical composition, definite physical properties and, usually, a definite crystalline form. Minerals include asbestos, barite, boron, diamonds, diatomite, feldspar, flurospar, graphite, gypsum, guano, mangnesite, perlite, phosphate, potash, salt sulphur, talc, vermiculite and zirconium. Metal extraction is covered by the Metals KPI. Aggregates are covered by the Aggregates KPI.

Mineral resources are considered non-renewable resources and as such their continued extraction and use will eventually lead to their depletion. In addition, every mining activity has environmental impacts: the natural habitat is usually disrupted, and other mining processes and by-products can have serious environmental consequences. Some minerals are often not destroyed in use and therefore can be recycled. However, other minerals are non-recyclable and thus their finite nature becomes even more important. Waste minerals are covered in KPI 12 (waste)

There are many different uses for minerals. For example gypsum is one of the most widely used minerals in the world and has a multitude of uses. The most recognised use of gypsum is for the wallboard found in most homes and buildings. A typical new home contains more than seven metric tonnes of gypsum alone.

Processes

Minerals are extracted by quarrying and mining operations. This indicator includes only minerals that are extracted rather than those that are recovered through recycling.

Sectors

Every mining operation that extracts minerals (the primary ISIC sector type is "Other mining and quarrying"). For more information please refer to Figure 4.

Calculation or measurement procedures

Extraction of mineral material is commonly measured at source. Companies should measure the quantity of mineral (not ore) that is extracted.

Reporting guidance

Minerals extracted should be reported in metric tonnes extracted per annum, broken down by type of mineral.

KPI 20 Aggregates

Definition

Natural aggregates, which consist of crushed stone, sand and gravel, are natural resources used as a basic raw material by many industries including construction, agriculture and industries employing complex chemical and metallurgical processes. Despite the low value of the basic products, aggregates mining is one of the most important mining industries in the world in terms of production volume (15,000 Mtpa), second only to fossil fuels in terms of production value (US$62,000 Mtpa)[36].

Natural aggregates are finite resources and as such their continued extraction and use will eventually lead to their depletion. In addition, every mining activity has environmental impacts: the natural habitat is usually disrupted, and other mining processes and by-products can have serious environmental consequences.

Other sources of aggregates, such as secondary and recycled aggregates, including inert construction and demolition waste, further reduce the impact on natural resources.

Processes

Aggregates are extracted by quarrying and mining operations. This indicator only includes aggregates that are extracted from a primary source, rather than those that arise from secondary sources e.g. demolition waste.

Sectors

Every mining operation that extracts aggregates (the primary ISIC sector type is "Other mining and quarrying"). For more information please refer to Figure 4.

Calculation or measurement procedures

Extraction of aggregate material is commonly measured at source.

Reporting guidance

Aggregates should be reported in metric tonnes extracted per annum, broken down by type of aggregate.

36 http://www.eurogeosurveys.org/foregs/groups/group_2_raport_2001_a1.htm

KPI 21 Forestry

Definition

This KPI focuses on timber and the harvesting of various wood products. Although forestry and wood are often considered renewable resources over-exploitation of these resources, especially from plantations which are not sustainably managed, threatens the environment as a whole and in particular biodiversity. Although many governments have taken measures to encourage sustainable forest management and tackle illegal logging, including supporting certification schemes and reducing the exploitation of forests, illegal logging continues to be a problem in many timber-producing countries particularly in the developing world. The ecological functions of forests are highly valuable (genetic, species and ecosystem diversity) and should be maintained. Harvesting and appropriate use of timber from legal or sustainably managed forests may be a positive indicator of environmental performance.

Processes

Resource depletion of forestry arises as a result of the unsustainable harvesting of forests.

Sectors

Every operation that harvests wood, including operations that clear forests to change the land use (the primary ISIC sector type is "Forestry, logging and related activities"). For more information please refer to Figure 4.

Calculation or measurement procedures

Forest management operations should monitor the environmental impacts of their operations on a regular basis and should measure the volume of wood harvested, including waste and residues. The frequency and intensity of monitoring will depend on the scale and intensity of the operation.

Reporting guidance

Harvested timbers and other wood products, as well as residues of harvesting, should be reported in absolute cubic metres per annum by type of wood (prior to any drying process). The geographical area that the wood was sourced from (check whether felling is permitted in that area and if there are any restrictions on felling), and any evidence of whether the wood was sourced from legal or sustainably managed forests, should also be reported.

Reporters may also find it useful to state whether the species harvested is listed on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

KPI 22 Agricultural Produce

Definition

Agricultural produce[37] includes a wide variety of products including foodstuffs such as meat and fish, tobacco, rubber and other crops that form the raw materials of many products. Harvesting of wood is not addressed here as it is covered by the Forestry KPI (KPI 21).

Over-exploitation of environmental resources can have a negative environmental impact and can lead to depletion of resources in the long term. For example, open access fishing zones, where property rights are not specifically assigned to any organisation, often result in a race to harvest the resource, which can significantly reduce the fishing stock. As a result, many fish stocks in EU waters are severely depleted and appear to be outside safe biological limits[38]. When a property right is exercised on animal or fish farms, however, the owner's preference is usually to extract the resource with restraint. Companies that harvest crops, botanical and zoological resources are encouraged to report on their use of the natural resources and often do so. Consuming resources at a sustainable rate ensures that stocks do not decline, and therefore continue to provide food and other amenities.

Processes

There are many types of fishing carried out on a large scale, harvesting a huge variety of fish and aquatic mammals. On land, there are many different ways of growing and harvesting agricultural and animal produce, from intensive farming techniques to free range and organic methods. These different ways of growing and harvesting will have very different impacts on the environment, including on local biodiversity.

Sectors

Every operation that harvests agricultural produce (the primary ISIC sector types are "Fishing, aquaculture and service activities incidental to fishing, growing of crops, market gardening and horticulture, farming of Animals"). For more information please refer to Figure 4.

Calculation or measurement procedures

Sellers of agricultural resources are likely to collect data on the types and amounts of resources its company produces or extracts and should therefore be able to measure the overall quantities produced on a yearly basis. Crops, botanical and zoological resources should be regularly weighed as this will provide clear and reliable data on agricultural resource use.

37 For the purposes of these Guidelines, agricultural produce includes any product harvested from land or water, excluding wood which is captured by a separate Forestry KPI.

38 Please refer to the European Environment Agency website for further information: http://themes.eea.eu.int/Sectors_and_activities/fishery/

Reporting guidance

Extracted or sold agricultural resources should be reported in metric tonnes extracted per annum, and broken down into type of resource or species. The wet weight of the resource should be reported, prior to any drying process.

4.5 Supply Chains

Most business will have supply chain impacts that they should understand and consider reporting. There is no single, quantifiable measure that companies can use as a KPI for the effect of their upstream supply chain on the environment. Businesses can, however, use the environmental information that suppliers report in order to make better procurement decisions.

Many businesses have significant supply chain impacts and will wish to engage with their suppliers to reduce their environmental impacts. The following is an example of a strategic process that can be used to determine the impacts upstream in the supply chain. This is:

1. Determine which companies your business spends its money with. This information should be contained within the company's purchase ledger.

2. Categorise your expenditure into sector groupings by ISIC code where possible (see Figure 4).

3. Assess the typical environmental impacts and risks each supplier sector has. Refer to Figure 4 for a list of KPIs by sector.

4. Determine where to focus your efforts. Clearly some suppliers, even suppliers in the same sector, have more significant environmental impacts than others. It is important to prioritise your suppliers in a way that takes into account both the amount of money you spend with them and the relative environmental impact they have. This is especially important for companies with a significant number of suppliers.

5. Engage with your suppliers. Encourage your suppliers to report on the environmental KPIs relevant to their sector.

6. Establish a process enabling suppliers to record, measure and report back on their environmental impact.

7. Influence purchasing decisions with the information gathered. Improvements in your suppliers' environmental performance will be more likely if they know that their environmental performance is a factor in your company's buying decisions.

8. Consider post-contract supplier development to focus on engaging suppliers in continuous improvement in environmental management.

These Guidelines highlight which supplier sectors have the most significant environmental impact for a given buyer sector. This can provide valuable information to inform a strategic assessment of where, in a company's supply chain, the most significant environmental impacts are occurring (See Figure 4, Significant Supplier Industries column).

These supplier sectors have been determined by assessing which supplier industries are likely to have a significant environmental impact given the typical amount of products or services that a given sector buys[39]. Organisations can consider whether environmentally significant suppliers have also measured and reported relevant environmental KPIs. This will help ensure that the environmental performance of the supply chain as a whole is understood and improved and that environmental impacts are not simply displaced elsewhere.

Energy and water use

Some companies will wish to report their indirect energy and water use impacts as part of their supply chain performance. As described in KPIs 1 and 14, these should be reported separately from direct impacts.

For example, over 70 per cent of UK electricity is generated from fossil fuels[40]. Businesses that consume a large amount of electricity will be indirectly responsible for significant GHG emissions. These emissions should be reported separately from the GHG that companies emit directly as described in KPI 1. Greenhouse gas emissions from electricity consumption can be calculated in two ways: asking the supplier of the electricity or calculating the emissions based on the standard factor for UK grid electricity.

Businesses that have been supplied by an electricity company that has an atypical generation mix, or has been supplied with a renewables tariff, can engage the supplier (or suppliers) so that indirect greenhouse emissions can be accurately estimated.

If you have not defined any special requirements with regard to your electricity supply (i.e. you are supplied standard grid electricity) it may be more appropriate and easier to use Defra's standard electricity generation factor to estimate emissions from kWh of electricity consumed. More guidance on standard conversion factors can be found on Defra's website, in the annex sections of Defra's Guidelines for Company Reporting on Greenhouse Gas Emissions, at: http://www.defra.gov.uk/environment/business/reporting/conversion-factors.htm

If you have operations outside of the UK that are supplied electricity, you can apply the appropriate conversion factor for each country, as different countries have different generation mixes. The United Nations Conference on Trade and Development (UNCTAD) has published guidance on standard emission factors for each country, which is available from their website[41].

39 This analysis makes use of Government Input-Output tables, and enabled an assessment of the typical purchases a given sector makes.

40 http://www.dti.gov.uk/energy/inform/energy/stats/electricity/index.shtml

41 A Manual for the Preparers and Users of Eco-efficiency Indicators. UNCTAD, 2004. http://www.unctad.org

Nearly every business is supplied water, and water use can be relatively easily measured. Measurements can be obtained by automatic meter readings or by periodically reviewing bills provided by water suppliers. Alternatively, companies can contact their water supplier directly if this information is not readily available.

4.6 Products

These Guidelines do not attempt to suggest KPIs for the downstream impacts of products – the individual product streams are too numerous and the impacts too diverse to offer solutions that can sensibly fit all these different circumstances. The techniques of assessing life cycle impacts of products and subsequent eco-design solutions for more sustainable products, are not as well established as in other disciplines of environmental performance – though the Government will be consulting on ways in which these product-related disciplines could be embedded more strongly in business, professions and policy-making.

Meanwhile, however, there is a great deal that individual sectors or businesses can do to identify the key performance issues for their downstream impacts.

1. First, the assessment of relevant impacts need not involve complicated life-cycle analyses of a particular product. Often there is much that can be done by a common-sense look at key phases of the product's life, including end-of-life impacts. Impacts can be calculated by multiplying impacts per unit, multiplied up by the number of units sold:

    - **The distribution phase.** Is there a significant amount of energy involved in getting the product to its markets – either because of its volume, or weight or distances covered?

    - **The use phase.** Does the product consume energy or water when operated by the consumer? Does the product (or materials that may be used with it) give rise to emissions to land, air or water?

    - **The end-of-life phase.** Is the product routinely re-used, recovered or recycled? Or if the product enters the waste stream (which generally means going to landfill), will the product continue to have negative environmental impacts i.e. is the product biodegradable or does the product have the potential to be hazardous?

2. Secondly, in the light of the indicators suggested by this kind of assessment, **performance measures** can be developed as goals for future product design. For example:

    Can the material inputs to the product be further reduced?

    - Can the product be designed to use less energy and water when is use. Can the product be designed to produce less waste? Can any other impacts associated with the product's use by the consumer be reduced, through design features of better information?

- Can the product be readily recovered and recycled as things stand, or are there design or business practice changes which would enable easier disassembly, or higher rates of recycling, or lower hazards in the waste stream?

An increasing amount of Governmental effort is being applied in this latter area of frameworks and incentives, so the expectations for a business response are bound to rise. Chapter 3 of the Government's Sustainable Development Strategy, *Securing the Future*, outlines the actions that will be required – from Government, business and consumers – to make the consumption and production of goods and services more sustainable. As a member of the European Single Market, the UK is restricted in the actions it can take unilaterally to establish environmental standards for products, where these might create a barrier to trade. However, it is increasingly clear that EU environmental policy and regulations are focusing on manufacturers and the products they make. Already Directives on packaging, on the Restriction of Hazardous Substances (RoHS) in electrical and electronic equipment on Waste Electrical and Electronic Equipment (WEEE), and on End-of-Life Vehicles (ELV) all seek to return responsibility for the environmental impacts of products to manufacturers. These are powerful incentives for manufacturers to engage with their supply chains, to ensure that components and materials do not contain hazardous substances above permitted levels. In future, it is inevitable that more manufacturers will need to develop closer working relationships with their suppliers to ensure that they meet mandatory requirements.

Looking ahead, the European Commission's Communication on Integrated Product Policy (IPP) sets out the ways in which voluntary and mandatory measures might be used to improve the environmental profile of products. This overarching strategy, together with specific new measures such as the framework Directive on the Eco-design of Energy-using Products (EuP), will encourage new products to be developed which have less impact on the environment.

Figure 4: Direct Key Performance Indicators by Sector Type

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Activities auxiliary to financial intermediation	Greenhouse Gases						Electricity, gas, steam and hot water supply; Air transport; Collection, purification and distribution of water	28
Activities of membership organisations	Greenhouse Gases						Electricity, gas, steam and hot water supply; Publishing, printing and reproduction of recorded media; Sewage and refuse disposal, sanitation and similar activities	28
Agricultural and animal husbandry service activities, except veterinary activities	Greenhouse Gases	Acid Rain & Smog Precursors					Farming of Animals; Manufacture of chemicals and chemical products; Growing of crops, market gardening & horticulture	28, 33
Air transport	Greenhouse Gases	Acid Rain & Smog Precursors	Waste				Manufacture of coke, refined petroleum products and nuclear fuel; Electricity, gas, steam and hot water supply; Supporting and auxiliary transport activities; activities of travel agencies	28, 33, 49
Collection, purification and distribution of water	Water Abstraction	Greenhouse Gases	Acid Rain & Smog Precursors	Nutrients & Organic Pollutants			Electricity, gas, steam and hot water supply; Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of chemicals and chemical products	53, 28, 33, 40
Computer and related activities	Greenhouse Gases	Acid Rain & Smog Precursors					Electricity, gas, steam and hot water supply; Air transport; Publishing, printing and reproduction of recorded media	28, 33

[42] International Standard Industrial Classification Code.

[43] Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Construction	Greenhouse Gases	Water Abstraction	Acid Rain & Smog Precursors	Waste			Manufacture of coke, refined petroleum products and nuclear fuel; Electricity, gas, steam and hot water supply; Manufacture of other non-metallic mineral products	28, 53, 33, 49
Education	Greenhouse Gases	Waste	Acid Rain & Smog Precursors				Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Air transport	28, 49, 33
Electricity, gas, steam and hot water supply	Greenhouse Gases	Waste	Acid Rain & Smog Precursors	Radioactive Waste	Water Abstraction	Metal Emissions to Land Metal Emissions to Air Metal Emissions to Water	Mining of coal and lignite; extraction of peat; Extraction of crude petroleum and natural gas; Manufacture of coke, refined petroleum products and nuclear fuel	28, 49, 33, 51, 53, 46, 39, 42
Extraction of crude petroleum and natural gas	Greenhouse Gases	Water Abstraction	Acid Rain & Smog Precursors	Oil	Natural Gas	Waste	Electricity, gas, steam and hot water supply; Manufacture of coke, refined petroleum products and nuclear fuel; Construction	28, 53, 33, 55, 54, 49
Farming of Animals	Water Abstraction	Pesticides & Fertilisers	Greenhouse Gases	Acid Rain & Smog Precursors	Agricultural Produce		Growing of crops, market gardening & horticulture; Electricity, gas, steam and hot water supply; Manufacture of food products and beverages	53, 45, 28, 33, 61
Financial intermediation, except insurance and pension funding	Greenhouse Gases	Waste					Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Publishing, printing and reproduction of recorded media	28, 49
Fishing, aquaculture and service activities incidental to fishing	Greenhouse Gases	Acid Rain & Smog Precursors	Agricultural Produce				Farming of animals; Agricultural and animal husbandry service activities, except veterinary activities; Growing of crops, market gardening & horticulture	28, 33, 61

[42] International Standard Industrial Classification Code.

[43] Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Forestry, logging and related service activities	Forestry	Greenhouse Gases					Farming of animals; Growing of crops, market gardening & horticulture; Agricultural and animal husbandry service activities, except veterinary activities	60, 28
Growing of crops, market gardening and horticulture	Water Abstraction	Greenhouse Gases	Pesticides & Fertilisers	Agricultural Produce	Acid Rain & Smog Precursors		Manufacture of chemicals and chemical products; Collection, purification and distribution of water; Electricity, gas, steam and hot water supply	53, 28, 45, 61, 33
Health and social work	Greenhouse Gases	Waste					Electricity, gas, steam and hot water supply; Manufacture of chemicals and chemical products; Publishing, printing and reproduction of recorded media	28, 49
Hotels and restaurants	Greenhouse Gases	Waste					Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Growing of crops, market gardening & horticulture	28, 49
Insurance and pension funding, except compulsory social security	Greenhouse Gases						Air transport; Publishing, printing and reproduction of recorded media; Electricity, gas, steam and hot water supply	28
Land transport and transport via pipelines	Greenhouse Gases	Acid Rain & Smog Precursors	Waste				Manufacture of coke, refined petroleum products and nuclear fuel; Extraction of crude petroleum and natural gas; Electricity, gas, steam and hot water supply	28, 33, 49
Manufacture of basic metals	Water Abstraction	Metal Emissions to Land	Greenhouse Gases	Waste	Metal Emissions to Air	Acid Rain & Smog Precursors	Electricity, gas, steam and hot water supply; Mining of metal ores; Manufacture of coke, refined petroleum products and nuclear fuel	53, 46, 28, 49, 39, 33

[42] International Standard Industrial Classification Code.

[43] Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Manufacture of chemicals and chemical products	Water Abstraction	Greenhouse Gases	Metal Emissions to Land	Waste	Volatile Organic Compounds	Metal Emissions to Air Ozone Depleting Substances Nutrients & Organic Pollutants Acid Rain & Smog Precursors	Electricity, gas, steam and hot water supply; Manufacture of coke, refined petroleum products and nuclear fuel; Land transport & transport via pipelines	53, 28, 46, 49, 38, 39, 37, 40, 33
Manufacture of coke, refined petroleum products and nuclear fuel	Greenhouse Gases	Water Abstraction	Metal Emissions to Land	Acid Rain & Smog Precursors	Waste	Metal Emissions to Air Radioactive Waste	Manufacture of basic metals; Electricity, gas, steam and hot water supply; Manufacture of chemicals and chemical products	28, 53, 46, 33, 49, 39, 51
Manufacture of electrical machinery and apparatus	Water Abstraction	Greenhouse Gases	Metal Emissions to Land				Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of basic metals; Electricity, gas, steam and hot water supply	53, 28, 46
Manufacture of fabricated metal products, except machinery and equipment	Greenhouse Gases	Water Abstraction	Waste	Acid Rain & Smog Precursors			Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of basic metals; Electricity, gas, steam and hot water supply	28, 53, 49, 33
Manufacture of food products and beverages	Water Abstraction	Greenhouse Gases	Waste	Acid Rain & Smog Precursors	Nutrients & Organic Pollutants		Farming of animals; Growing of crops, market gardening & horticulture; Electricity, gas, steam and hot water supply	53, 28, 49, 33, 40
Manufacture of furniture; Manufacturing	Greenhouse Gases	Waste	Water Abstraction	Acid Rain & Smog Precursors			Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of textiles; Electricity, gas, steam and hot water supply	28, 49, 53, 33

[42] International Standard Industrial Classification Code.

[43] Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Manufacture of machinery and equipment	Greenhouse Gases	Water Abstraction	Waste	Metal Emissions to Land			Manufacture of coke, refined petroleum products and nuclear fuel; Electricity, gas, steam and hot water supply; Manufacture of chemicals and chemical products	28, 53, 49, 46
Manufacture of medical, precision and optical instruments, watches and clocks	Greenhouse Gases	Acid Rain & Smog Precursors	Water Abstraction	Waste			Electricity, gas, steam and hot water supply; Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of basic metals	28, 33, 53, 49
Manufacture of motor vehicles, trailers and semi-trailers	Greenhouse Gases	Water Abstraction	Waste				Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of basic metals; Electricity, gas, steam and hot water supply	28, 53, 49
Manufacture of office, accounting and computing machinery	Greenhouse Gases	Water Abstraction	Waste	Metal Emissions to Land			Manufacture of coke, refined petroleum products and nuclear fuel; Electricity, gas, steam and hot water supply; Manufacture of other non-metallic mineral products	28, 53, 49, 46
Manufacture of other non-metallic mineral products	Greenhouse Gases	Acid Rain & Smog Precursors	Waste	Metal Emissions to Air	Metal Emissions to Land	Water Abstraction	Electricity, gas, steam and hot water supply; Mining of coal and lignite; extraction of peat; Other mining and quarrying	28, 33, 49, 39, 46, 53
Manufacture of other transport equipment	Greenhouse Gases	Water Abstraction	Waste				Manufacture of coke, refined petroleum products and nuclear fuel; Electricity, gas, steam and hot water supply; Manufacture of basic metals	28, 53, 49
Manufacture of paper and paper products	Water Abstraction	Greenhouse Gases	Waste	Volatile Organic Compounds	Acid Rain & Smog Precursors	Metal Emissions to Land Metal Emissions to Water Nutrients & Organic Pollutants	Electricity, gas, steam and hot water supply; Mining of coal and lignite; extraction of peat; Manufacture of chemicals and chemical products	53, 28, 49, 38, 33, 46, 42, 40

[42] International Standard Industrial Classification Code.

[43] Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Manufacture of radio, television and communication equipment and apparatus	Greenhouse Gases	Water Abstraction	Metal Emissions to Land	Waste			Electricity, gas, steam and hot water supply; Manufacture of chemicals and chemical products; Manufacture of basic metals	28, 53, 46, 49
Manufacture of textiles	Water Abstraction	Greenhouse Gases	Acid Rain & Smog Precursors	Waste	Nutrients & Organic Pollutants		Electricity, gas, steam and hot water supply; Growing of crops, market gardening & horticulture; Farming of Animals	53, 28, 33, 49, 40
Manufacture of tobacco products	Water Abstraction	Waste	Greenhouse Gases				Growing of crops, market gardening & horticulture; Mining of coal and lignite; extraction of peat; Electricity, gas, steam and hot water supply	53, 49, 28
Manufacture of wood and of products of wood and cork, except furniture; Manufacture of articles of straw and plaiting materials	Greenhouse Gases	Waste	Acid Rain & Smog Precursors	Volatile Organic Compounds			Electricity, gas, steam and hot water supply; Forestry, logging and related service activities; Land transport & transport via pipelines	28, 49, 33, 38
Mining of coal and lignite; Extraction of peat	Coal	Greenhouse Gases	Water Abstraction	Metal Emissions to Land	Acid Rain & Smog Precursors	Waste	Electricity, gas, steam and hot water supply; Other mining and quarrying; Manufacture of coke, refined petroleum products and nuclear fuel	57, 28, 53, 46, 33, 49
Mining of metal ores	Metals	Water Abstraction	Metal Emissions to Air	Greenhouse Gases	Metal Emissions to Water	Acid Rain & Smog Precursors Metal Emissions to Land Waste Pesticides & Fertilisers	Electricity, gas, steam and hot water supply; Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of coke, refined petroleum products and nuclear fuel	56, 53, 39, 28, 42, 33, 46, 49, 45

[42] International Standard Industrial Classification Code.

[43] Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Other business activities (legal, accounting, management consulting, administrative etc)	Greenhouse Gases	Waste					Electricity, gas, steam and hot water supply; Air transport; Collection, purification and distribution of water	28, 49
Other mining and quarrying	Aggregates	Water Abstraction	Minerals	Greenhouse Gases	Acid Rain & Smog Precursors	Dust and Particles Waste	Electricity, gas, steam and hot water supply; Mining of coal and lignite; extraction of peat; Manufacture of coke, refined petroleum products and nuclear fuel	59, 53, 58, 28, 33, 35, 49
Other service activities (laundry, hairdressing funeral services etc)	Greenhouse Gases						Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Farming of Animals	28
Post and courier activities	Greenhouse Gases	Waste					Manufacture of coke, refined petroleum products and nuclear fuel; Sewage and refuse disposal, sanitation and similar activities; Land transport & transport via pipelines	28, 49
Public administration and defence; compulsory social security	Greenhouse Gases	Acid Rain & Smog Precursors					Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Air transport	28, 33
Publishing, printing and reproduction of recorded media	Greenhouse Gases	Waste	Water Abstraction	Metal Emissions to Land	Acid Rain & Smog Precursors	Volatile Organic Compounds	Manufacture of paper and paper products; Electricity, gas, steam and hot water supply; Manufacture of chemicals and chemical products	28, 49, 53, 46, 33, 38

42 International Standard Industrial Classification Code.

43 Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Real estate activities	Greenhouse Gases	Waste					Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Sewage and refuse disposal, sanitation and similar activities	28, 49
Recreational, cultural and sporting activities	Greenhouse Gases	Acid Rain & Smog Precursors	Waste				Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Farming of animals	28, 33, 49
Renting of machinery and equipment without operator and of personal and household goods	Greenhouse Gases	Acid Rain & Smog Precursors	Waste				Manufacture of coke, refined petroleum products and nuclear fuel; Electricity, gas, steam and hot water supply; Collection, purification and distribution of water	28, 33, 49
Research and development	Greenhouse Gases	Waste					Electricity, gas, steam and hot water supply; Manufacture of other non-metallic mineral products; Manufacture of chemicals and chemical products	28, 49
Retail trade, except of motor vehicles and motorcycles; Repair of personal and household goods	Greenhouse Gases	Waste					Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Sewage and refuse disposal, sanitation and similar activities	28, 49
Sale, maintenance and repair of motor vehicles and motorcycles; Retail sale of automotive fuel	Greenhouse Gases	Waste	Acid Rain & Smog Precursors				Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Manufacture of motor vehicles, trailers and semi-trailers	28, 49, 33

[42] International Standard Industrial Classification Code.

[43] Top five direct Key Performance Indicators.

ISIC Sector [42]	Significant Direct Key Performance Indicators [43] 1	2	3	4	5	Other Direct Key Performance Indicators	Significant Supplier Industries	Page Number(s) Page numbers correspond to the order KPIs appear in the columns
Sewage and refuse disposal, sanitation and similar activities	Greenhouse Gases	Metal Emissions to Land	Water Abstraction	Acid Rain & Smog Precursors	Nutrients & Organic Pollutants	Metal Emissions to Air Waste	Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Manufacture of chemicals and chemical products	28, 46, 53, 33, 40, 39, 49
Supporting and auxiliary transport activities; Activities of travel agencies	Greenhouse Gases	Acid Rain & Smog Precursors	Waste				Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Publishing, printing and reproduction of recorded media	28, 33, 49
Tanning and dressing of leather; Manufacture of luggage, handbags, saddlery, harness and footwear	Greenhouse Gases	Waste	Acid Rain & Smog Precursors	Nutrients & Organic Pollutants			Manufacture of textiles; Electricity, gas, steam and hot water supply; Manufacture of food products and beverages	28, 49, 33, 40
Telecommunications	Greenhouse Gases	Acid Rain & Smog Precursors	Waste				Electricity, gas, steam and hot water supply; Collection, purification and distribution of water; Publishing, printing and reproduction of recorded media	28, 33, 49
Water transport	Greenhouse Gases	Acid Rain & Smog Precursors	Waste				Manufacture of coke, refined petroleum products and nuclear fuel; Land transport & transport via pipelines; Electricity, gas, steam and hot water supply	28, 33, 49

42 International Standard Industrial Classification Code.

43 Top five direct Key Performance Indicators.

PB 11321

Nobel House,
17 Smith Square,
London SW1P 3JR

www.defra.gov.uk