Carbon footprinting

The next step to reducing your emissions

Contents

67%

of UK consumers surveyed are
more likely to buy a product with a low
carbon footprint

About this guide

This guide introduces two types of carbon footprinting that affect businesses – one that measures an organisation's overall activities, and one that looks at the life cycle of a particular product or service.

Calculating either or both of these footprints is a useful starting point for any wider work to reduce your organisation's carbon emissions, and will give you an initial benchmark against which to measure your progress.

In this guide we explain what is included in both types of footprint, how you can measure and communicate them, and the benefits of doing so. We also set out the specific steps you need to take to calculate your footprint(s), and some of the key things to consider if you do.

Finally, we explain how the Carbon Trust can help you calculate your carbon emissions, and work with you to develop a full carbon management strategy for your organisation.

Introduction to carbon footprinting

As a first step towards managing and reducing your organisation's greenhouse gas emissions, you need to understand what emissions are caused by its activities or products.

All businesses have the opportunity to reduce their carbon emissions, and the business case for doing so is growing ever stronger.

Higher and more volatile energy costs are increasing the value of energy savings.

- Climate change regulations such as the EU Emissions Trading Scheme (EU ETS) and the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme are creating new requirements and opportunities to benefit from emissions reductions.

- Companies that manage their carbon emissions responsibly can enhance their brand value, and make themselves more attractive to potential customers and investors.

A carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organisation, event or product, and is expressed as a carbon dioxide equivalent (CO_2e). A carbon footprint accounts for all six Kyoto GHG emissions:

- carbon dioxide (CO_2)

- methane (CH_4)

- nitrous oxide (N_2O)

- hydrofluorocarbons (HFCs)

- perfluorocarbons (PFCs)

- sulphur hexafluoride (SF_6).

Carbon dioxide equivalent

Carbon dioxide equivalent (CO_2e) is the unit of measurement which allows different greenhouse gases to be compared on a like for like basis relative to one unit of CO_2. CO_2e emissions are calculated by multiplying the emissions of each of the six greenhouse gases by its 100-year global warming potential (GWP).

Different types of carbon footprints

This publication looks at two types of carbon footprint:

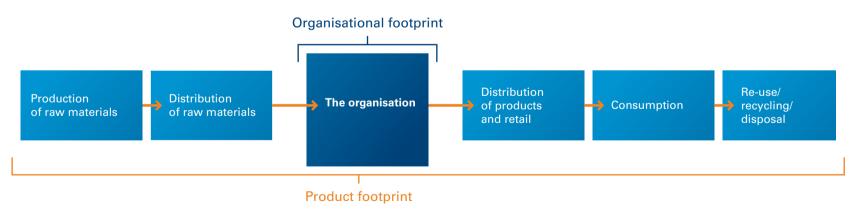- Organisational carbon footprint

- Product carbon footprint.

An organisational carbon footprint measures the GHG emissions from all the activities across the organisation, including energy used in buildings, industrial processes and company vehicles.

A product carbon footprint measures the GHG emissions over the whole life of a product (goods or services), from the extraction of raw materials and manufacturing right through to its use and final re-use, recycling or disposal.

The different boundaries of organisational and product footprints are illustrated below.

The production process itself is part of the product life cycle, but would also be included in the organisational footprint – so there is some crossover between the two types.

Production is often a key focus when companies are looking at carbon management, and calculating one or both carbon footprints can help with this work.

Figure 1 *The different boundaries of organisational and product footprints*

Organisational footprint

Production of raw materials → Distribution of raw materials → **The organisation** → Distribution of products and retail → Consumption → Re-use/recycling/disposal

Product footprint

Organisational carbon footprints

An organisational carbon footprint measures the direct and indirect GHG emissions arising from all the activities across an organisation.

What is it used for?

Quantifying GHG emissions will help you understand what your key emission sources are, how your organisation contributes to global emissions, and what opportunities you have to reduce your emissions. You can then develop a carbon reduction plan, identifying ways to reduce your carbon footprint and limit emissions from future activities – and then measure what progress you have made.

Once you've calculated your organisational carbon footprint, you can report it internally, externally or both.

The Greenhouse Gas Protocol Standard

The Greenhouse Gas Protocol is a widely used standard that sets out how to account for your GHG emissions. It categorises emissions into three groups or 'scopes':

- **Scope 1:** Direct emissions that result from activities within your organisation's control. This might include on-site fuel combustion, manufacturing and process emissions, refrigerant losses and company vehicles.

- **Scope 2:** Indirect emissions from any electricity, heat or steam you purchase and use. Although you're not directly in control of the emissions, by using the energy you are indirectly responsible for the release of CO_2.

- **Scope 3:** Any other indirect emissions from sources outside your direct control. Examples of scope 3 emissions include employee commuting and business travel, outsourced transportation, waste disposal and water consumption.

Under the GHG Protocol, all organisational footprints must include scope 1 and 2 emissions. There is more flexibility when choosing which scope 3 emissions to measure and report, and you can tailor these to reflect your environmental and commercial goals.

The best approach depends on what you intend to use the footprint for, the data available to calculate it, what you want to monitor and which sources you can influence. Organisations commonly include waste sent to landfill and employee business travel from scope 3.

Figure 2 **Three 'scopes' of carbon emissions**

Scope 1	Scope 2	Scope 3
Fuel combustion	Purchased electricity, heat and steam	Transport – business
Company vehicles		Waste disposal
Process emissions		Transport – product
Fugitive emissions		Transport – commuting
		Leased assets, franchises, outsourcing
		Production of purchased materials
		Use of products

Following protocol

The Greenhouse Gas Protocol (GHG Protocol) is an accounting tool used by business and governments. It was created in 2001, when the World Resources Institute and the World Business Council for Sustainable Development identified a need for consistency in how organisations accounted and reported emissions, and together introduced the new standard.

Since then, it's been used by more than 1,000 businesses and organisations worldwide, including many Fortune 500 companies.

You can find out more about the Protocol at **www.ghgprotocol.org**

Why calculate your organisational carbon footprint?

Calculating your organisational carbon footprint is the first step towards reducing it. It also means you can report the figure or gain independent certification for marketing or corporate responsibility purposes, or to meet the requirements of climate change legislation.

There are two primary reasons to calculate your organisational carbon footprint:

- Manage your GHG emissions and make reductions over time.

- Report your footprint accurately to a third party.

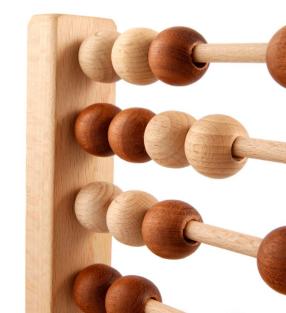## Manage your GHG emissions and make reductions over time

Quantifying your GHG emission sources will help you understand what impact your organisation is having on climate change. This will help you identify and prioritise areas for reducing emissions, which will often result in cost savings as well.

The Carbon Reduction Commitment

The Carbon Reduction Commitment (CRC) Energy Efficiency Scheme is an emissions trading scheme aimed at reducing carbon emissions in large non-energy intensive organisations by 1.2 million tonnes of carbon per year by 2020.

It is a mandatory scheme, targeting emissions currently not included in the EU Emissions Trading Scheme or Climate Change Agreements. It applies to organisations that used more than 6,000 megawatt hours of electricity through half-hourly meters during 2008.

Read more about the CRC on **DECC's website**.

Report your footprint accurately to a third party

Increasingly, companies are calculating their carbon footprint in order to share the information with other organisations (for public disclosure). You might also want to do this in order to:

- meet the mandatory reporting requirements of climate change legislation such as the CRC or EU ETS

- report emissions as part of a corporate social responsibility programme or for marketing purposes

- respond to requests from business, customers and investors for carbon emissions data

- participate in carbon reporting initiatives such as the Carbon Disclosure Project

- measure your emissions levels as part of a carbon reduction or offsetting strategy.

If you are going to publicly disclose your footprint or progress with its reduction, it's important to use a robust approach to calculating your carbon emissions. The GHG Protocol is the standard that the majority of organisations follow. Obtaining independent certification or validation can give external stakeholders more confidence that the methods have been used correctly and that the results are accurate.

Carbon Disclosure Project

The Carbon Disclosure Project (CDP) collects and distributes information about organisations' carbon emissions.

Launched in 2001, it's a not-for-profit organisation that holds the largest database of corporate climate change information in the world. This data can be viewed by anyone, and is often of particular interest and use to investors, policymakers and their advisors, government bodies and academics.

Read more on the CDP website at **www.cdproject.net**

What kind of organisation measures its footprint?

The types of organisations that have had their carbon footprints verified include:

- **Insurers** – Aviva

- **Universities** – University of Manchester

- **Steel producers** – Corus UK

- **Fire brigades** – Lancashire Fire and Rescue Service

- **Food manufacturers** – Branston

- **Hotels** – Hilton International Hotels

- **Hospital trusts** – North Wales NHS Trust

- **Police forces** – Merseyside Police

- **Paving stone suppliers** – Pavestone UK

- **Galleries and museums** – The National Gallery

- **Supermarkets** – Tesco

- **Aviation companies** – British Airways

- **Self storage suppliers** – Big Yellow Group

- **Pharmaceutical companies** – GlaxoSmithKline

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" Quantifying your GHG emission sources will help you understand what impact your organisation is having on climate change "

How to calculate an organisational carbon footprint

Accounting for all your carbon emissions can be a complex task, but calculating a basic carbon footprint that includes the main emissions sources is straightforward.

1 Decide on the method to be followed	2 Define organisational and operational boundaries	3 Collate the data	4 Apply emissions factors	5 Verify the results (optional)	6 Verify that you have taken action to reduce your emissions (optional)

The key steps in calculating an organisational carbon footprint are:

❶ Decide on the method to be followed

It is important to use a consistent method to ensure an accurate result, particularly if you will rely on several people to help collect and interpret data.

The GHG Protocol is one of the most commonly used standards. It provides detailed guidance on methods, and is available free of charge online. Another recognised standard is from the International Organization for Standardization,

ISO 14064, which builds on many of the concepts introduced by the GHG Protocol. Both provide further explanation of the steps covered here.

❷ Define organisational and operational boundaries

Set clear, explicit boundaries on which parts of your organisation are included in the footprint. This can be complex if you have many subsidiaries, joint ventures or leased assets, but it's an important step.

The operational boundary determines which emission sources will be quantified. It should include the full range of emissions from activities under your operational control. All material scope 1 and 2 emissions should be included, but you can choose which scope 3 emissions to include.

Be realistic when choosing a boundary and make sure you consider the practicalities of collecting complete and accurate data. It may help to fit in with your other reporting periods and legislative requirements, or the requirements of schemes operated by third party certifiers, such as the Carbon Trust Standard.

❸ Collate the data

The accuracy of the footprint relies on collating consumption data for all of the emission sources within your established boundary.

For gas and electricity, collect data in kilowatt hours (kWh) from meter readings or bills. You can record data for other fuels in a variety of units, such as litres, kWh or megajoules (MJ). For transport emissions, collect fuel consumption by fuel type where possible (from fuel cards etc). Where this is not available, you can estimate consumption based on the mileage of the vehicles and fuel economy assumptions.

It's important to clarify any gaps in the data and list any assumptions that have been made in calculating the footprint.

❹ Apply emissions factors

The carbon footprint is measured in tonnes of CO_2 equivalent (tCO_2e), and is calculated using the activity data collated multiplied by standard emissions factors. You can find updated emissions factors on the Carbon Trust website at www.carbontrust.co.uk

❺ Verify the results (optional)

You may choose to have a third party verify your carbon footprint, to add credibility and confidence to your carbon reporting for public disclosure.

❻ Verify your emissions reductions (optional)

Many companies have not only measured their carbon footprint but have taken action to reduce it progressively over time. Reduction is something that a third party can certify to add credibility and confidence to your reduction claims.

For further information on measuring, verifying and certifying your organisation's carbon footprint call us on 0800 085 2005

Communicating your organisational carbon footprint

Once you've calculated your footprint, you're ready to publish it. Reporting your carbon footprint – and having it independently certified – can help engage your employees, customers and other stakeholders, and enhance your reputation.

If you decide to report your carbon footprint internally or externally, make sure the data is presented transparently.

This means providing complete information about each of the six steps in the previous section, including methods, footprint boundaries, data quality and assumptions. Try to keep a consistent approach when reporting changes over different years and explain the context, e.g. changes in the business structure.

Why communicate your footprint internally?

Communicating your organisational carbon footprint to employees can help engage them in the process of carbon reduction and energy management.

If you are going to ask people to try and save energy, it's important to show them what difference they are making to your organisation's emissions – which means they need to know the starting point and, ideally, the progress they are making. The data you collect may also help employees identify efficiencies in existing processes and practices.

Gaining certification can also give employees something to aim for and, once achieved, can help to retain and attract an increasingly environmentally-aware workforce.

Plus, of course, if you do manage to save energy, you'll see a reduction in costs – and a better bottom line.

Why communicate your footprint externally?

Communicating your organisational footprint externally – in your corporate social responsibility (CSR) report, for example – demonstrates that you are concerned with the impact your business is having on the environment.

If you are a service-led or business-to-business (B2B) organisation, it may not be possible or practical to footprint individual products or services. In this case, gaining independent certification of your organisational carbon footprint, and demonstrating reductions, could help enhance your reputation and attract customers or business partners with similar concerns.

Product carbon footprint

A product carbon footprint is a measure of the greenhouse gas emissions across the life of a particular product throughout its 'life cycle'.

In contrast to an organisational carbon footprint, the product carbon footprint also considers GHG emissions outside the boundaries of your own activities. This includes those of your suppliers, customers and distributors related to the manufacture and use of the product. It also covers emissions created by disposing of any waste, and the impact of recycling.

What is it used for?

A product carbon footprint is a useful tool to engage with employees, suppliers, investors and customers. It can motivate employees to take action to reduce emissions, build brand awareness and value, and support the actions of suppliers and customers in reducing emissions. It may also identify inefficiencies and cost savings in your own processes, and in the supply chain.

Measuring emissions from all stages of the product life cycle

A product carbon footprint is a measure of GHG emissions at each stage of the product's life, including:

- extraction and production of raw materials

- transportation of raw materials

- production (or service provision)
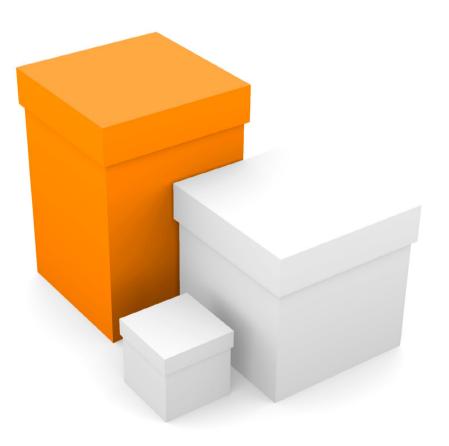
- distribution

- product use

- disposal/recycling.

At each stage the analysis should include GHG emissions resulting from any material inputs to, or outputs from, the process. Commonly, these include energy use, transportation fuel and direct

gas emissions such as refrigerant losses from air conditioning units and waste.

In the case of a 'service product' the life cycle stages are defined individually for each service.

Publicly Available Specification (PAS) 2050 (see page 15) provides a widely recognised, internationally applied and consistent method for assessing product life cycle GHG emissions. It can be used for a wide range of product and service types, including:

- goods and services

- manufacturers, retailers and traders

- B2B and business-to-consumer (B2C)

- supply chains – both UK and international.

" A product carbon footprint can help to differentiate your product or service and enhance your brand image "

Why calculate your product carbon footprint?

A product carbon footprint offers a number of benefits, both in terms of differentiating the product or service you assess, and helping you better understand and manage your supply chains.

The three main reasons to calculate the carbon footprint of your product or service are to:

- drive change and reduce costs and emissions within your company

- tell people

- drive wider change in the supply chain.

Reduce costs and emissions

Identifying areas where you can reduce GHG emissions will often result in cost savings, in terms of transport energy, waste and packaging, for example.

Understanding the carbon impact of your supply chain more clearly can also help you manage the potential risks climate change

might bring to your business – and reduce your emissions – by changing:

- suppliers

- choice of materials

- manufacturing processes

- product designs.

It can also help you gain the support of your employees, and encourage them to take action.

Tell people

Customers, employees and shareholders are becoming increasingly aware of the environmental impact of the goods and services they use. A product carbon footprint can help to differentiate your product or service and enhance your brand image. Committing to or demonstrating carbon reductions can help you

attract new customers. You may also consider using third party endorsement of the footprint – e.g. through the Carbon Reduction Label – to increase the power of your claims.

Drive wider change in the supply chain

It's important to look at your whole product supply chain, rather than just one part, as this will let you see all the opportunities to reduce emissions. You can then take positive action to reduce the total emissions, which will benefit everyone more than shifting emissions within the chain.

It can also help you develop better relationships with your suppliers, by helping them identify and eliminate inefficiencies in their own processes.

How to assess your product carbon footprint

Assessing the carbon footprint of a product requires a consistent approach to enable you to compare it with other products or services.

Use a standard method

Current guidance for calculating a product carbon footprint includes the PAS 2050, which was published in October 2008 following extensive development and international consultation. PAS 2050 is applicable to a wide range of goods and services, and includes the scope of analysis, collating data and calculating GHG emissions. It gives guidance on how to treat emissions relating to issues such as recycling, renewable energy and land use change. PAS 2050 is reviewed every two to three years by the UK Accreditation Service through a consultative user process.

The Carbon Trust has also developed guidance for communicating the results of a product footprint developed under PAS 2050, and calculating reductions in product emissions over time. See *The Code of Good Practice for Product GHG Emissions and Reduction Claims (CTC745)*, which you can download from our website.

To make sure your calculations are consistent, it's a good idea to use baseline data (including standard emission factors and process calculators) as well as the guidance provided by PAS 2050. Baseline data from across sectors is available from a number of sources, including the Carbon Trust Footprinting Company, Ecoinvent and GaBi. Sector-specific data is available from specialist companies.

In the future, the International Life Cycle Database (ILCD) will provide consistent data across sectors.

Define the scope and objectives of the product carbon footprint

Before you start, be clear about:

- **why you are measuring the footprint** – is it to be used internally to analyse the supply chain or publicly disclosed?

- **what level of detail you need** – is a high-level approach that identifies carbon hot spots sufficient, or do you need a detailed analysis that can be independently verified?

- **resources** – who is available internally to carry out the analysis, and how long will it take?

The next step is to choose a representative product or service 'functional unit' on which the carbon footprint will be based and reported – e.g. per kg or per hour of service – and work to engage your supply chain in the measurement process.

Assessing the product footprint

The PAS 2050 sets out five basic steps to determine a product carbon footprint:

Step 1	Step 2	Step 3	Step 4	Step 5
Build a process map	Check boundaries and determine priorities	Collect data	Calculate the footprint	Verify your footprint

Step 1 – Build a process map

List all of the materials, activities and processes that contribute to each stage of the chosen product's life cycle.

Step 2 – Check boundaries and determine priorities

Some emissions can be excluded, e.g. consumer travel to retail outlets. Calculating a high-level footprint first will help focus data collection on the main GHG emission sources and eliminate others.

Step 3 – Collect data

Collect activity data (e.g. litres of fuel consumed per product unit) and select appropriate emissions factors (e.g. $kgCO_2$ per litre of fuel). Where possible, use primary data based on actual meter readings or records rather than estimates.

Step 4 – Calculate the footprint

Calculate the GHG emissions ($kgCO_2e$ per product unit) from each source by multiplying the activity data by the emissions factors.

Step 5 – Verify your footprint

You can verify your footprint in three ways:

- self-verification
- verification by another party, such as another company
- accredited independent third-party verification.

While self-verification is a simple choice, it lacks the reputational value of accredited independent verification.

Verification by another party provides greater impartiality by ensuring someone not involved in the process reviews the footprint assessment.

However, independent third-party verification provides the greatest certainty and impartiality in the accuracy of the footprint, as the verifier has been independently certified by a national accreditation body.

A product carbon footprint is a useful tool to engage with employees, suppliers, investors and customers

Communicating your product carbon footprint

Now that you've calculated the carbon footprint of your product you need to tell people about it, and ideally about your commitment to reducing it.

You can communicate your carbon footprint in a number of ways, such as labelling your products, or providing information on your company's website or marketing campaigns. The method of communication will depend on what sort of business you have, how you want to communicate your footprint and who you want to tell.

Communicating internally

Communicating the carbon footprint of your product or service to your company as a whole can have several benefits.

- **Lower energy costs**. Using less energy to enable a reduction in your product footprint can help improve your bottom line.

- **Engaging with employees.** Communicating a product's footprint to your employees shows them your commitment to reducing climate change. It can also help to gain their buy-in to emissions reduction.

- **Optimising processes.** The information you've gained about the processes used in manufacturing your product or creating your service can help identify inefficiencies.

Business-to-business

B2B companies can realise significant benefits by communicating their product carbon footprints.

- **Engaging up the supply chain.** The information you've gathered during the process can also help your suppliers reduce their emissions, thereby reducing the footprint of your product.

- **Engaging down the supply chain.** You can provide your customers with valuable information about the carbon footprint of goods or services they purchase. This allows your customers to make an informed decision about what they buy and makes it easier for them to calculate their own carbon footprint.

  It also differentiates your product or service. As a B2B supplier you can provide your business customers with certified product carbon footprint data up to their gate, thereby reducing the time and cost they need to footprint their own products.

Business-to-consumer

B2C organisations can distinguish themselves from other companies by communicating their product or service carbon footprints and reduction commitments. This can be done through:

- point of sale
- reporting
- advertising
- labelling.

Communicating your footprint to consumers by all or any of these methods, and then committing to reducing it, can help you realise further benefits, including:

- increased cost and emissions savings
- product differentiation – and increased sales
- enhanced brand reputation.

44%

of consumers would switch to a lower carbon product even if the brand was not their first choice

You can support even further emissions reduction in two ways. First, the public commitment to reduce emissions over time helps create a sense of urgency across the supply chain. Second, by putting credible information in the hands of consumers, you help provide them with the knowledge they need to reduce their own impact on climate change.

Communicating your product carbon footprint can also help you differentiate your products. Consumers and retailers are beginning to demand 'low carbon' products and the information they need to make informed choices:

- 67% of UK consumers surveyed are more likely to buy a product with a low carbon footprint.

- 44% would switch to a lower carbon product even if the brand was not their first choice.

All of this will serve to reinforce your brand's reputation among consumers, and help make sure they continue to buy your product or service.

Labelling

Other research has shown that, regardless of the product's actual carbon footprint, consumers prefer products that are carbon labelled:

- 49% are more likely to buy a product if the label is displayed on the pack.

- 65% declared a label indicating that suppliers have committed to reducing a product's emissions would make them more likely to buy it.

Organisations that provide labelling schemes can offer communication support. For example, having a labelling company endorse the measurement of your footprint, and your commitment to reducing it, offers additional ways to differentiate your product or service.

Who is footprinting their products?

A wide and diverse range of UK and international companies, ranging from supermarkets to banks, have calculated the carbon footprint of their products and services. They include:

Haymarket – Ends Report and Marketing magazines

Marshalls – paving products

Continental Clothing – range of 800 t-shirts

British Sugar – granulated sugar, top soil, stones and LimeX

Morphy Richards – irons

Sentinel – central heating cleaning fluid

Allied Bakeries – Kingsmill bread

Innocent – smoothies

PepsiCo – Tropicana and Quaker oats

Tesco – a range of own brand products, including milk, potatoes and light bulbs

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Further services from the Carbon Trust

The Carbon Trust advises businesses and public sector organisations on their opportunities in a sustainable, low carbon world. We offer a range of information, tools and services including:

Website – Visit us at www.carbontrust.co.uk for our full range of advice and services.

↳ www.carbontrust.co.uk

Publications – We have a library of publications detailing energy saving techniques for a range of sectors and technologies.

↳ www.carbontrust.co.uk/publications

Case Studies – Our case studies show that it's often easier and less expensive than you might think to bring about real change.

↳ www.carbontrust.co.uk/casestudies

Carbon Trust Advisory – Delivers strategic and operational advice on sustainable business value to large organisations.

↳ www.carbontrust.co.uk/advisory

Carbon Trust Certification – Delivers certification and verification services to companies and runs the Carbon Trust Standard and Carbon Reduction Label.

↳ www.carbontrust.co.uk/certification

Carbon Trust Implementation – Delivers services to business in support of implementation of energy efficient equipment and energy efficiency financing.

↳ www.carbontrust.co.uk/implementation

The Carbon Trust is a not-for-profit company with the mission to accelerate the move to a low carbon economy. We provide specialist support to business and the public sector to help cut carbon emissions, save energy and commercialise low carbon technologies. By stimulating low carbon action we contribute to key UK goals of lower carbon emissions, the development of low carbon businesses, increased energy security and associated jobs.

We help to cut carbon emissions now by:

- providing specialist advice and finance to help organisations cut carbon
- setting standards for carbon reduction.

We reduce potential future carbon emissions by:

- opening markets for low carbon technologies
- leading industry collaborations to commercialise technologies
- investing in early-stage low carbon companies.

www.carbontrust.co.uk

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