A Handbook to Internal Greenhouse Gas Reduction Targets and Plans

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1.0 Introduction

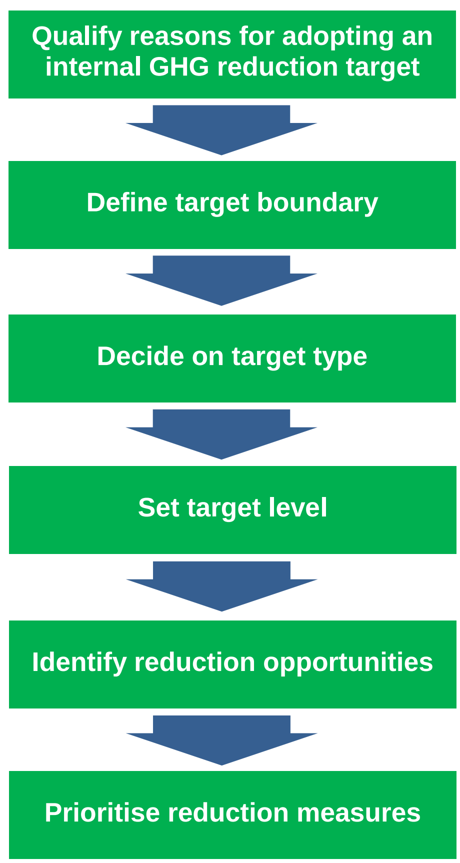
This handbook is meant for companies seeking a CarbonNeutral® certification that have yet to consider how to reduce their greenhouse gas (GHG) emissions. It is intended as a primer for organisations that are just starting to consider how to develop internal GHG reduction targets and plans that are scientifically-relevant and consistent with their strategic objectives.

Internal GHG reductions are reductions made within a company's organisational boundary or supply chain through measures such as energy efficiency, onsite renewable energy and/or fuel substitution. Generally, reductions are delivered through some combination of behavioaral, process and/or capital asset changes.

Identifying and delivering internal GHG reductions is an integral part of a corporate climate change strategy and, when combined with carbon offsets, allows companies to meet their GHG targets in the most cost-efficient way.

The remainder of this handbook outlines the basic steps involved in developing an internal GHG reduction target and plan. Although presented sequentially in Figure 1, in practice this process may be iterative and involve cycling back and forth between the steps.

Figure 1. Steps Involved in Developing an Internal GHG Reduction Target and Plan



2.0 Target setting

There is no one-size-fits-all formula for setting internal GHG targets. Targets are meant to be company-specific and will depend on a company's strategy, culture, competitive position and regulatory environment. It is, therefore, not the purpose of this section to prescribe what a company's target should be, but rather to provide a framework and process for setting one.

2.1 Motivations for setting GHG reduction targets

Companies adopt internal GHG reduction targets for a variety of reasons, with the most common being:

- **Managing regulatory risk:** Regulatory risk is a strong driver for companies with exposure to the costs of meeting future regulations on GHG emissions. Some companies are expecting future regulations to impose significant financial costs related to GHG emissions, either directly through an emissions cap/tax or indirectly through higher energy prices. Companies that invest today in lowering their emissions are therefore improving their competitive market position in a future carbon constrained economy, even if emissions are not regulated today. Adopting a voluntary GHG reduction target also provides companies the opportunity to establish internal systems and procedures and to "learn by doing" in order to prepare for future regulation of GHG emissions.
- **Increasing competitiveness:** A robust carbon management strategy can present immediate opportunities to drive value for a business. By using energy and other resources more efficiently, corporations can reduce production costs and become more competitive. At the same time, by creating products and services that use less energy and produce lower GHG emissions, corporations can differentiate their products and services in an increasingly environmentally conscious marketplace.
- **Demonstrating leadership and corporate responsibility:** Consumers, investors and employees are increasingly considering a company's climate change strategy when making decisions. A commitment such as setting a public GHG target demonstrates leadership and corporate responsibility. This can improve a company's standing with its customers, employees, investors, business partners, and the public and enhance brand reputation.

2.2 Choices of target boundary, type and level

Once a company has qualified its reasons for adopting an internal GHG reduction target, it should then determine the target boundary, what type of target, and what level, are appropriate for its own particular circumstances.

2.2.1 Defining the target boundary

The target boundary defines which GHGs and emissions sources are covered by the target.

- **GHGs:** Targets usually include one or more of the six major GHGs covered by the Kyoto Protocol[1]. When more than one GHG is included, it is customary to express the target in terms of carbon dioxide equivalent (CO_2e). For companies with significant non-CO_2 GHG sources it usually makes sense to include these to increase the range of reduction opportunities.
- **Sources:** Deciding which sources of emissions should be targeted depends largely on a company's motivations for reducing its emissions as well as the availability of reliable emissions data. Companies usually target emission sources over which they have the most control. Including indirect GHG emissions (e.g., emissions from waste disposal) may facilitate more cost-effective reductions by increasing the reduction opportunities available. It, however, can also raise issues with regard to ownership and double counting of reductions, as indirect emissions are, by definition, someone else's direct emissions.

2.2.2 Types of targets

There are two broad types of GHG reduction target a company can set – an absolute target and an intensity target.

Absolute GHG reduction targets compare total GHG emissions in the target year to those in a base year. For example, a target to reduce CO_2 emissions from the combustion of fossil fuel at a company's plants by five percent below the 1990 level is an absolute target for one of the major GHG emissions from plant operations.

By comparison, an intensity target is expressed as a ratio of emissions relative to a particular business metric. Business metrics are typically measured in physical units (e.g., number of employees) or monetary units (e.g., sterling £ of revenue). A target to reduce GHG emissions by 25 percent per full-time employee is an example of an intensity target.

Neither type of target is inherently better or worse, but as illustrated by Table 1, both possess unique pros and cons that should be carefully considered before choosing one type of target over another. It should be noted that some companies adopt both an absolute and intensity-based target.

Table 1. Comparison of absolute and intensity targets

Parameter	Absolute Target	Intensity Target
Environmental Integrity	Ensures a specified quantity of GHG reductions to the atmosphere.	No guarantee that there will be fewer GHG emissions to the atmosphere – absolute emissions may rise even if intensity goes down (and output increases).[2]
Metric Definition	Not applicable.	May be difficult to define a single common business metric for companies with diverse operations. If a monetary variable is used for the business metric (i.e., dollar of revenue or sales), it should be adjusted for changes in product

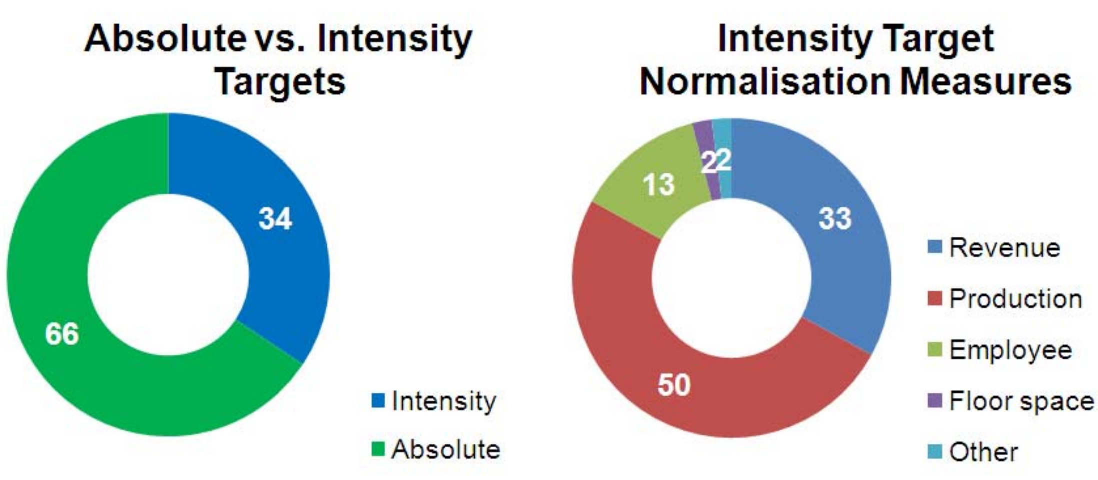
[1] The six Kyoto greenhouse gases are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydroflourocarbons (HFCs), perflourocarbons (PFCs) and sulphur-hexaflouride (SF_6).

[2] It is important note that a growing business can meet an intensity based reduction target whilst increasing absolute emissions, if the rate of business growth exceeds the improvement in carbon efficiency.

Parameter	Absolute Target	Intensity Target
		prices, product mix, and inflation – adds complexity to the tracking process.
Confidentiality	Not applicable – no business metric assigned to target.	May be an issue – data on the business metric needs to be reported.
Effects from Base Year Re-calculations	Target base year recalculations for significant structural changes to the organisation add complexity to tracking progress over time.	GHG changes due to production fluctuations are usually not required.
Relation to Organic Growth or Decline	Recognises a company for reducing GHGs by decreasing production or output (organic decline).	Reflects GHG performance improvements independent of organic growth or decline.
Comparisons of GHG Intensity/Efficiency	Does not allow for comparison of GHG performance between companies, if they choose to do so.	Comparability of GHG performance between companies may be increased.

A study[3] of the world's largest 100 companies found that absolute targets are almost twice as popular as intensity targets, with many companies having both absolute and intensity metrics targeting different parts of the business. Of the intensity based targets half used a normalization measure based on a unit of production and a third used an intensity measure linked to revenue.

Figure 2. The types of reduction targets used by the world's 100 largest companies



[3] Carbon Disclosure Project – The Carbon Chasm

2.2.3 Setting the target level

Once the target type has been selected, the target level should be determined. The process of setting the target level can be either “top-down” or “bottom-up.” In a top-down target-setting process, the level is initially derived for the whole corporation at once. The target may then be allocated to the operating units in various ways, so that the sum of the “sub-targets” equals the corporate target. Under a “bottom-up” process, the corporate target level is based on analysis of potential reductions by individual operating units. Whether a top-down or bottom-up approach is taken, the basic process for setting the target level remains the same.

Normally, the first step in determining the appropriate target level is to develop an emissions inventory. An inventory is a formal system for measuring, aggregating and reporting GHG emissions for a particular organisational boundary and period of time. An inventory is used in setting the target, developing the plan to meet it and tracking progress towards achieving it. For most organisations using this handbook, this step will have already been taken as part of the CarbonNeutral® certification.

The second step is choosing the year in which the target will be achieved. Balancing the target level with the target year is a risk management exercise. A more distant target is not necessarily more or less difficult to achieve than a short-term target, but carries greater risks associated with changes in technology and markets. A popular target year is 2012, which correlates with the final year of the Kyoto Protocol. The popularity of short-term targets is not surprising given that the budget cycles for many businesses tend to be either annual or run over a few years. Some companies, however, have adopted both short- and medium- to long-term targets, recognising the importance of managing their GHG emissions over an extended period of time.

The third step is to project baseline emissions under a business-as-usual scenario. The baseline projection is based on the company’s investment and operations plan, and their future energy use.

The fourth and final step is to assess how reasonable a given target level is compared with the forecasted business-as-usual emissions. Companies with a history of delivering reductions often use past performance as the basis for evaluating future targets, however if a company doesn’t have a history of delivering reductions, it will need to examine specific reduction opportunities to assess the reasonableness of the proposed target.

2.3 Benchmarks

As illustrated by the selected corporate GHG targets in Box 1, GHG targets can vary considerably from one company to another, both in terms of the target level and achievement year.

Box 1. Selected corporate GHG targets

General Electric Company pledges to reduce total global GHG emissions by 1% from 2004 to 2012.

Sun Microsystems, Inc. pledges to reduce total global GHG emissions by 20% from 2007 to 2015.

Cadbury pledges to reduce absolute carbon emissions by 50% from 2010 to 2020.

HSBC pledges to reduce total global GHG emissions by 6% from 2008 to 2011.

PepsiCo pledges to reduce U.S. GHG emissions by 25% per tonne of production from 2006 to 2015.

ACE Group pledges to reduce global GHG emissions by 8% per employee from 2006 to 2012.

EMC Corp. pledges to reduce U.S. GHG emissions by 8% per square foot from 2005 to 2012.

Unilever pledges to reduce global GHG emissions by 25% per tonne of production from 2004 to 2012.

BT pledges to reduce its CO2e emission per unit of contribution to GDP by 80% from 1996/7 to 2020.

Scottish & Southern Energy pledges to reduce carbon intensity by 50% from 2005/06 to 2020 in electricity produced at power stations in which it has an ownership or contractual interest.

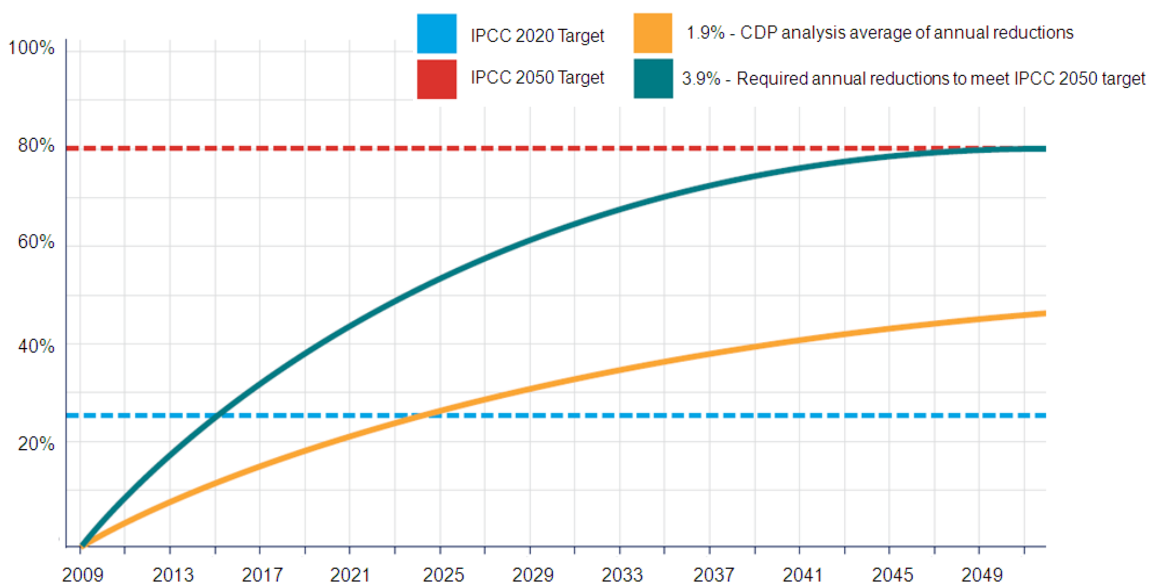
Source; United States Environmental Protection Agency (EPA) Climate Leaders and Carbon Disclosure Project – FTSE 100 Carbon Chasm

This is not surprising given that there is no "correct" internal GHG reduction target. This makes comparing corporate GHG reduction targets difficult at times, particularly when comparing absolute targets and/or targets from companies operating in different business sectors.

One useful benchmark for evaluating corporate GHG targets is the reduction goal called for by the Intergovernmental Panel on Climate Change (IPCC). In 2007, the IPCC stated that developed economies must reduce their GHG emissions by 80-95% by 2050 in order to avoid dangerous climate change. This is roughly equivalent to a minimum annual global reduction rate of 3.9% per annum to 2050.

Box 2. The Carbon Chasm

In 2009, the Carbon Disclosure Project (CDP) used their database of corporate climate change information to analyze how the world's largest companies currently set GHG reduction targets and whether planned reductions are consistent with the IPCC's recommendations. According to the CDP's analysis, the world's largest companies are on track for an annual reduction of just 1.9%, reaching the scientifically recommended level of greenhouse gas cuts by 2089, 39 years too late.



Source: The Carbon Chasm, August 2009, Carbon Disclosure Project.

3.0 Internal reductions

Once an internal GHG reduction target has been adopted, a GHG reduction plan should be developed to deliver against the target, taking into consideration the main sources of GHGs and the likely cost-effectiveness of alternative emission reduction measures.

GHG reduction plans should be reviewed periodically to assess progress against planned actions and to assess the feasibility for further reductions, taking into account the availability of new technologies, enabling policies and incentives provided by government and the overall business context. Where applicable, a director or senior manager should be given the responsibility to develop and implement the plan for reducing emissions.

3.1 Internal reduction measures

This section explores a broad range of emission reduction measures available to companies to reduce their GHG emissions. The measures discussed in the following tables are applicable to most companies, however, in practice, companies may find it necessary to work with experts or consultants in the fields of energy efficiency, conservation and renewable energy to identify those measures that are specific to their company.

Office energy consumption

Office energy consumption is typically a significant contributor to a service-based company's GHG emissions. Some simple emissions reduction measures are detailed below[4]:

Action	Potential saving - %	Examples of CO2 equivalent
Implement a staff awareness campaign.	Up to 10% of electricity consumption.	UK: annual saving of 10 tonnes of CO_2 per 50 person office[5]. US: annual saving of 20 tonnes of CO_2 per 50-person office[6].
Make good use of natural light from windows by ensuring blinds or objects are not obstructing light unnecessarily.	Up to 20% of lighting electricity consumption.	UK: annual saving of 6.7 tonnes of CO_2 per 50 person office[7]. US: annual saving of 15.6 tonnes of CO_2 per 50 person office[8].
Upgrade your office lighting to energy efficient bulbs.	Up to 80% of lighting electricity consumption.	UK: annual saving of 1 tonne of CO_2 for every 10 bulbs replaced[9]. US: annual saving of 1.1 tonne of CO_2 for every 10 bulbs replaced[10].
Install energy management system (EMS) technology to control lighting systems automatically Implement.	10 to 15% of total lighting electricity consumption.	UK: annual saving of 5 tonnes of CO_2 per 50 person office[11]. US: annual saving of 10.3 tonnes of CO_2 per 50 person office[12].

4 Emission savings may be reduced if multiple actions are taken.
5 Derived from Carbon Trust 2005 and Defra 2008.
6 Derived from Carbon Trust 2005, EIA 2006 and IEA 2006. It is assumed that electricity is not used for space heating.
7 Derived from CIBSE 2004, Defra 2008 and RICS 1997.
8 Derived from CIBSE 2004, EIA 2006 and IEA 2006.
9 Derived from Defra 2008 (assuming a 100W bulb is replaced with a 20W bulb).
10 Derived from Defra 2008 (assuming a 100W bulb is replaced with a 20W bulb).
11 Derived from Energy Efficiency Partnership 2009 and EIA 2006.

Action	Potential saving - %	Examples of CO2 equivalent
Switch off monitors rather than using screen savers.	Up to 10% of computer electricity consumption.	UK: annual saving of 0.44 tonnes of CO_2 for every 50 employees who switched off over lunch time for a year[13]. US: annual saving of 0.46 tonnes of CO_2 for every 50 employees who switched off over lunchtime for a year[14].
Purchase ENERGY STAR rated desktop computers rather than typical models.	Up to 30% of computer electricity consumption.	UK: annual saving of 1.2 tonnes of CO_2 per 50 person office [15]. US: annual saving of 1.3 tonnes of CO_2 per 50 person office [16].
Consolidate multiple printers into a single printer in a central location.	Up to 60% of printer electricity consumption.	UK: annual saving of 0.4 tonnes of CO_2 when moving from 5 mid-size printers to 1 large one[17]. US: annual saving of 0.4 tonnes of CO_2 when moving from 5 mid-size printers to 1 large one[18].
Turn heating down by 1°C.	8% of heating energy.	UK: annual saving of 2 tonnes of CO_2 per 50 person office[19]. US: annual saving of 3 tonnes of CO_2 per 50-person office[20].
Regularly maintain air-conditioning (AC) system.	Up to 30% of AC energy consumption.	UK: annual saving of 9 tonnes of CO_2 per 50 person office[21]. US: or an annual saving of 9 tonnes of CO_2 per 50-person office[22].

12 Derived from Energy Efficiency Partnership 2009 and EIA 2006.
13 Derived from Defra 2008 (assuming 85W monitor and 20% energy saving from screen saver).
14 Derived from Defra 2008 and IEA 2006 (assuming 85W monitor and 20% energy saving from screen saver).
15 Derived from Energy Star 2007 and Defra 2008 (assuming energy star category A desktops in place of average 2007 performance desktops).
16 Derived from Energy Star 2007 and Defra 2008 (assuming energy star category A desktops in place of average 2007 performance desktops).
17 Derived from HP 2009 and Defra 2008 (based on replacement of 5 CM3530 printers with 1 CM4730fsk).
18 Derived from HP 2009 and IEA 2009 (based on replacement of 5 CM3530 printers with 1 CM4730fsk).
19 Derived from CIBSE 2004, Defra 2008 and RICS 1997.
20 Derived from CIBSE 2004, IPCC 2006 and EIA 2006.
21 Derived from Carbon Trust 2007, CIBSE 2004, Defra 2008 and RICS 1997.
22 Derived from Carbon Trust 2007, CIBSE 2004, and IEA 2009,

Waste

GHG emissions from waste may be reduced through procurement choices and the presence of recycling facilities. There are additional benefits to minimising waste including lower disposal costs and reduced GHG emissions from waste transportation.

Action	Potential saving - %	Examples of CO2 equivalent
Divert waste from landfill by recycling.	Not applicable, see examples for CO2 equivalent.	UK: 24 kilograms of methane or 600 kilograms of CO_2 equivalent per tonne of waste diverted from landfill[23]. US: 35 pounds of methane or 893 pounds of CO_2 equivalent per tonne of waste diverted from landfill[24].
Divert waste from incineration by recycling.	Not applicable, see examples for CO2 equivalent.	UK: 226 kilograms of CO_2 per tonne of waste diverted from incineration[25]. US: 498 pounds of CO_2 per tonne of waste diverted from incineration[26].

23 Derived from Smith et al 2001, Brown et al 1999, IPCC 2006. Assuming average UK rate of methane capture at landfills.
24 Derived from Smith et al 2001, Brown et al 1999, IPCC 2006. Assuming average US rate of methane capture at landfills.
25 Derived from Smith et al 2001.
26 Derived from Smith et al 2001.

Commuting

Organisations can influence their employees' commuting habits through the location of their workplace, the availability of facilities such as shuttle buses or changing rooms to encourage low carbon forms of transport.

Action	Potential saving - %	Examples of CO2 equivalent
Cycle or walk rather than driving to work.	Up to 100% of commuting emissions.	UK: 33 kilograms of CO_2 per 160 kilometers [27]. US: 79 pounds of CO_2 per 100 miles[28].
Catch the train rather than driving to work.	70% per passenger kilometer in the UK. 50% per passenger mile in the US.	UK: or 23 kilograms of CO_2 per 160 kilometers[29]. US: or 42 pounds of CO_2 per 100 miles[30].
Car pool.	50% per additional passenger.	UK: 33 kilograms of CO_2 per avoided 160 kilometers[31]. US: 79 pounds of CO_2 per avoided 100 miles[32].

27 Derived from Defra 2008
28 Derived from EPA 2008.
29 Derived from Defra 2008 assuming 'average car' of unknown fuel type and 1 passenger per vehicle.
30 Derived from EPA 2008 assuming 'average car' of unknown fuel type and 1 passenger per vehicle.
31 Derived from Defra 2008.
32 Derived from EPA 2008.

Business travel

Along with energy consumption, business travel is often a sizable contribution to a service-based company's carbon footprint. Considerable savings may be achieved through the implementation of some of the measures detailed below.

Action	Potential saving - %	Examples of CO2 equivalent
Travel by train rather than plane for short-haul journeys.	66% per passenger kilometre in the UK. 35% per passenger mile in the US.	UK: 1.3 tonnes of CO_2 per 10 return journeys Edinburgh to London[33]. US: 0.5 tonnes of CO_2 per 10 return journeys New York, NY to Washington, DC[34].
Combine meetings to reduce flight requirements.	100% per avoided flight.	UK: 2.4 tonnes of CO_2 per 10 return short-haul international flights[35]. US: 2.4 tonnes of CO_2 per 10 return medium-haul flights[36].
Fly economy class rather than premium economy for long-haul flights.	37% per passenger kilometer.	UK: 6.8 tonnes CO_2 per 10 typical return international long-haul flights[37]. US: 6.8 tonnes CO_2 per 10 typical return long-haul flights[38].
Fly premium economy rather than business class for long-haul flights.	45% per passenger kilometer.	UK: 14.8 tonnes of CO_2 per 10 typical return international long-haul flights[39]. US: 45% per passenger mile or 14.8 tonnes of CO_2 per 10 typical return long-haul flights[40].
Use video-conferencing equipment instead of flying.	100% per avoided journey.	UK: 2.4 tonnes of CO_2 per 10 return short-haul international flights[41]. US: 2.4 tonnes of CO_2 per 10 return medium-haul flights[42].

33 Derived from Defra 2008, Google maps and Airrouting.com.
34 Derived from Defra 2008, EPA 2008, National Railroad Passenger Corp. 2008,Google maps and Airrouting.com. Note that in the USA for medium and long haul flights, plane travel is currently less carbon intensive than train travel. Elsewhere in the world, however, train travel is typically far less carbon intensive than plane travel.
35 Derived from Defra 2008.
36 Derived from Defra 2008.
37 Derived from Defra 2008, Google maps and Airrouting.com.
38 Derived from Defra 2008, Google maps and Airrouting.com.
39 Derived from Defra 2008, Google maps and Airrouting.com.
40 Derived from Defra 2008, Google maps and Airrouting.com.
41 Derived from Defra 2008.

Additional measures

The following measures will reduce the indirect GHG emissions associated with an organisation's activities but are difficult to quantify so there is no estimations on likely emission savings.

Action
Purchase recycled paper which generates fewer associated GHG emissions in production than paper from virgin sources.
Replace electronics only when necessary. The GHG emissions generated during production are often greater than in-use GHG emissions.
Reduce or cease the use of bottled water and plastic cups within the office to reduce production and waste emissions.
Share printers, faxes and scanners within the office to reduce both production and in-use emissions.
Buy fresh, unpackaged foods for general consumption to reduce waste and production emissions.
Encourage sustainable activities amongst suppliers and associate companies.
Choose local suppliers to reduce travel and delivery emissions.

[42] Derived from Defra 2008.

3.2 Prioritising internal reductions

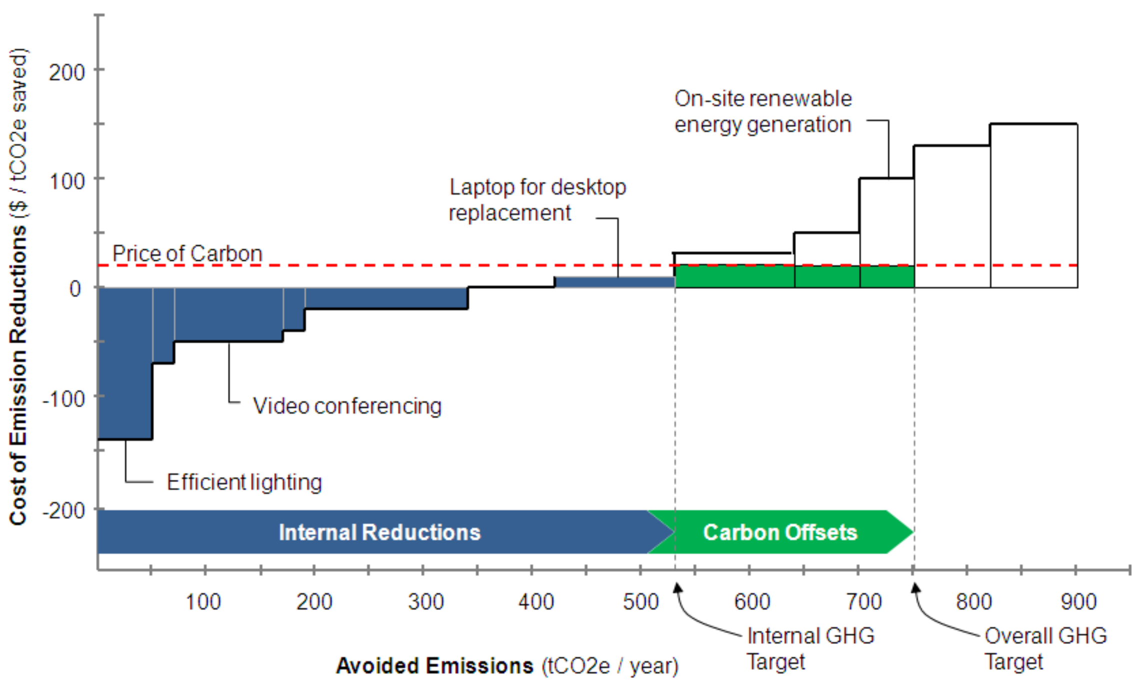
Once a company has identified its various options for reducing emissions, the firm should consider establishing evaluation criteria to prioritise the reduction activities. Such evaluation criteria might include:

- Net Return on Investment
- Type of costs (fixed vs. variable running costs)
- Additional benefits to the firm, the environment and the community
- Time to implement
- Contribution to core business
- Obstacles to implementation

A commonly used strategy for prioritising internal emission reduction measures is to prioritise the *avoidance* of emissions first, then their *reduction* through energy efficiency and finally the *replacement* of high-carbon energy sources with low or zero-carbon alternatives. Generally speaking, measures that help avoid emissions are the most transformative and long-lasting in terms of reducing a company's GHG footprint.

Another particularly useful and commonly used method for prioritising internal reductions is to develop a company-specific GHG marginal abatement cost curve. As illustrated by Figure 2, a GHG marginal abatement cost curve is a set of options available to a company to reduce its GHG emissions, ranked in order of their net cost over the lifetime of the measure (net costs include all fixed and variable costs as well as any avoided costs).

Figure 2. Hypothetical Corporate GHG Marginal Abatement Cost Curve



Each bar represents one option, with its width representing the amount of emissions that can be reduced annually by means of the option and its height representing the average net cost of avoiding one tonne of GHG emissions with the option. A negative cost indicates a net benefit or savings to the company over the lifetime of the option whereas a positive cost means that capturing the option would incur an incremental cost to the company.

Superimposing a company's internal GHG reduction target over its GHG marginal abatement cost curve allows it to identify which emission reduction measures to implement and in what order to meet the target most cost-effectively. It will also show at what point purchasing carbon offsets becomes a more cost-effective solution to achieving a given GHG reduction goal.

Annex A - Additional Resources

For additional information on developing greenhouse gas reduction plans please refer to these commonly used information resources.

Carbon Trust
http://www.carbontrust.co.uk/cut-carbon-reduce-costs/pages/default.aspx

Energy Saving Trust
http://www.energysavingtrust.org.uk/business/Business/Information-centre

Pew Business Environmental Leadership Council
http://www.pewclimate.org/business/belc

WWF Climate Savers
http://www.worldwildlife.org/climate/climatesavers2.html

EPA Climate Leaders
http://www.epa.gov/stateply/