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Carbon

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WILLMOTT DIXON

What is carbon (CO_2)?

CO_2 is made from one carbon and two oxygen molecules. It is vital for life on earth for two main reasons.

It is one of a number of "greenhouse gases" that **trap heat in the atmosphere**. Without CO_2, earth would be frozen and uninhabitable, like Mars.

It also forms part of the **carbon cycle**, by which plants absorb the gas from the air by photosynthesis and convert it into energy (carbohydrates) for themselves, emitting oxygen as a by-product. Meanwhile, humans and other animals absorb oxygen from the air and emit carbon dioxide.

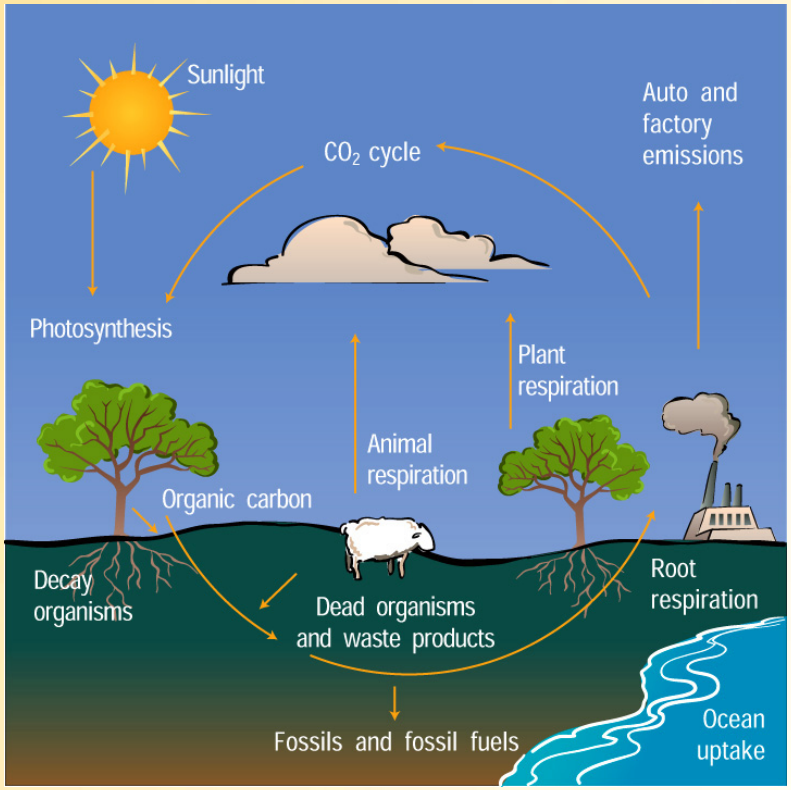


Image courtesy of Windows to the Universe

The Carbon Cycle

The carbon cycle demonstrates that trees and other plants are partially *made from* CO_2. Over the millennia, some of this CO_2 -rich plant matter became converted into forms which make ideal fuels such as oil, coal and natural gas. We use these "fossil fuels" to power our transportation, heat home and businesses and power factories.

Burning these materials contain the very high levels of carbohydrates created by the plants – and releases all their "locked up" CO_2.

What's more, deforestation for development and agriculture releases the carbon stored in living trees and reduces the amount of carbon plant life can absorb. Eighty per cent of the world's tree cover has been cut down and the rest is under threat.

Why is Carbon a problem?

Without mankind's influence, the carbon cycle would continue in a delicately balanced way with $C0_2$ providing a buffer (positive feedback) against potential changes such as orbital cycles that could cause a dangerous drop in temperatures on earth.

In fact, 4.6 billion years go there was 80% more CO_2 in the atmosphere than today and temperatures were much higher. But it was removed from the atmosphere as early organisms evolved. Releasing all this carbon dioxide transforms the greenhouse effect from something that benefits all life to something which forms a risk to a large part of it. That is because an increasing amount of heat has become trapped in the atmosphere.

The concentration of carbon dioxide in the atmosphere has increased more in the northern hemisphere where more fossil fuel burning occurs. Since the industrial revolution the concentration globally has increased by about 40%.

It has been predicted that if the world continues releasing greenhouse gases like carbon dioxide at today's levels then average global temperatures could rise by up to 6°C by the end of this century.

To avoid the most dangerous impacts of climate change, average global temperatures must rise no more than 2°C, and that means global emissions must start falling before 2020 and then fall to at least 50% below 1990 levels by 2050. We are not likely to meet this target and the world's governments are increasingly being advised to concentrate on mitigating the

effects of climate change and making reparations to those affected by it, particularly in poorer areas, which are far more vulnerable to its effects.

The rise in temperature has disrupted long-studied climatic systems and led to **increasingly unpredictable weather**. It has also created more **extreme weather events** such as **increased precipitation** like heavier rain or snow or **heat waves, droughts** and **tropical storms.**

Ice in snow caps and glaciers has been melting in both the northern and southern hemispheres. One sixth of the world's population relies on spring melt water from ice thawing every spring to survive. The water previously locked up in ice is also causing the sea levels to rise, causing some low-lying islands to completely disappear. It also makes flooding worse still.

The **world's seas** absorb extra CO_2 which is slightly acidic. This makes it harder for some animals such as coral and molluscs to effectively create their shells. **Many coral reefs are expected to be extinct in the next decades**. The seas will also to be "full" of CO_2 soon which could cause a sudden build up of the gas in the atmosphere and a sharp rise in climate change.

CO_2e and other greenhouses gases

Carbon dioxide (CO_2) is just one of a number of gases that make up green house gas emissions (GHG), the other gases are water vapour, methane, nitrous oxide, and ozone however CO_2 accounts for 60% of the greenhouse effect.

CO_2e, or carbon dioxide equivalent, is the standard unit for measuring carbon footprints. The idea is to express the impact of each different greenhouse gas in terms of the amount of CO_2 that would create the same amount of warming. That way, a carbon footprint consisting of lots of different greenhouse gases can be expressed as a single number. For example, in 2009, the UK released 474 million tonnes of CO_2. But if you include its emissions of methane, nitrous oxide and F-gases, the country's total emissions work out at 566 million tonnes of CO_2e.

The Kyoto Protocol

The Kyoto Protocol was the first agreement between nations to mandate country-by-country reductions in greenhouse-gas emissions and was finalised in 1997 and came into force in 2005. As of September 2011, 191 states had signed and ratified the protocol with the remaining signatories those of the United States (by far the world's largest emitter per capita), Afghanistan, Andorra and South Sudan.

Under Kyoto, industrialised nations agreed to cut their yearly emissions of carbon by varying amounts, averaging 5.2%, by 2012 as compared to 1990 levels. With growth, that equates to a 29% cut in the values that would have otherwise occurred.

The EU has also set a carbon reduction target by 2020 legally binding all 27 EU countries to slash greenhouse gas emissions by 20% compared to 1990 levels. The EU is on target to meet this requirement.

Climate Change Act 2009

The UK passed legislation in 2008 setting ambitious, legally-binding targets and taking powers to help meet those targets. Key provisions of the Act are:

- A legally binding target of at least an 80% cut in greenhouse gas emissions by 2050,
- A reduction in emissions of at least 34% by 2020.

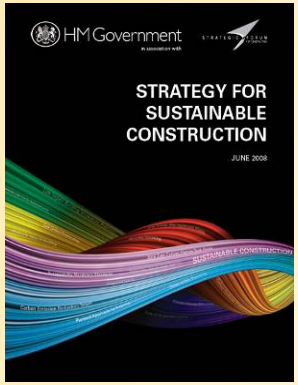
Both targets are against a 1990 baseline. The UK is expected to meet this requirement.

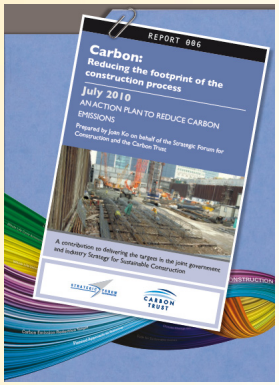
What is the industry doing to reduce carbon?

The UK Construction Industry has an annual turnover of more than £100 billion and accounts for almost 10% of the country's GDP employing two million people. As an industry we are one of the biggest users of energy and natural resources.

In June 2008, the Government and the Strategic Forum for Construction jointly published the Strategy for Sustainable Construction which has a target of reducing carbon emissions from construction processes and associated transport by 15% in 2012 on 2008 levels.

http://www.strategicforum.org.uk/pdf/06CarbonReducingFootprint.pdf



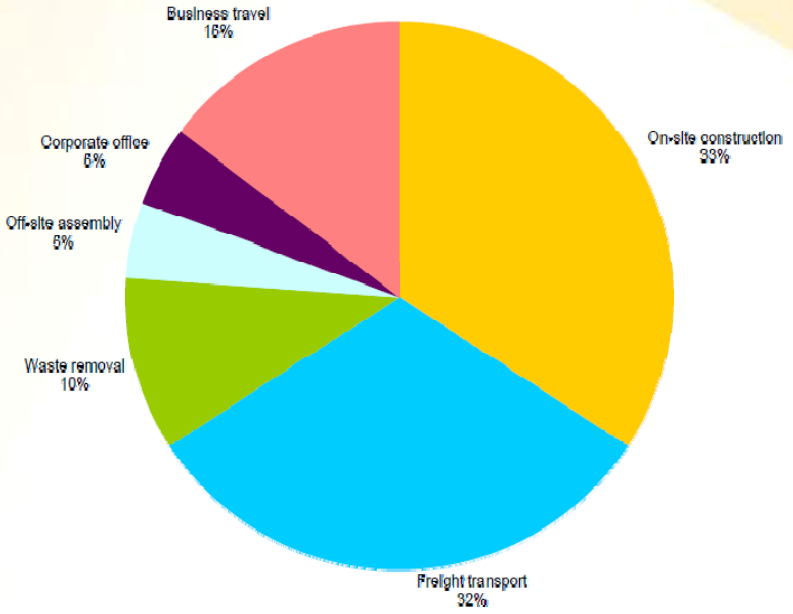


The industry is also charged with creating buildings that are more energy efficient and therefore require less fossil fuels to heat them under legislation such as the Code for Sustainable Homes (CSH).

The industry also has a role in making existing buildings more energy efficient (retrofitting) driven by legislation such as the Carbon Reduction Commitment (CRC) which fines larger high-carbon emitting organisations.

Construction companies should also be looking at the carbon used to make the products that go into their buildings (embodied carbon).

Figure 1 Breakdown of emissions from construction processes in Great Britain for the calendar year 2008



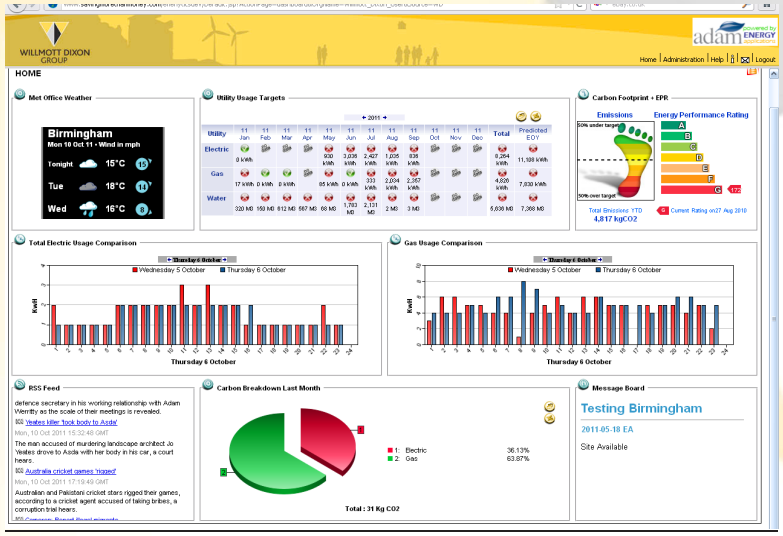
What is Willmott Dixon doing to reduce carbon?

Measurement & Reporting
We have been recording all emissions from our activities since 2008 and publishing these annually in our sustainable development reviews, a copy of this and previous years reports are available here.

http://www.willmottdixongroup.co.uk/sustainability/sustainable-development-review-2010

Carbon Neutrality
We will have to use energy derived from fossil fuels – in offices, on site, in our van fleet, maintaining 140,000 homes, and through our fleet of company cars – for the foreseeable future. However we are taking decisive steps to reduce our reliance on fossil fuel energy and will be offsetting the remainder to be **carbon neutral by the end of 2012.**

Offices
During 2010 we have introduced live energy monitoring with dashboards displayed in all our fixed offices. This will help bring out behavioural change compare the energy use per m^2 between offices. We have also carried out energy audits of our premises, produced display energy certificates (DECs) measuring usage and implemented a planned series of energy efficiency measures to reduce our carbon emissions and reduce our dependants on fossil fuels.



Sites
We are introducing energy monitoring to our large projects to enable the immediate impact of our operations which will electronically capture site energy data for our eKPI system and bring about increased awareness and behavioural change.

In addition with our preferred supplier of temporary site accommodation we have developed a new range of insulated ECO cabins which include many energy-saving technologies such as PIR lighting controls, time clock controlled heating, T5 lighting and double glazed windows. To reduce site fuel we must try to secure the right-sized plant and machinery. For plant we hire directly we try to use plant less than 18 months old and with the most efficient engines in line with our Sustainable Procurement Policy.

Vans

We have taken steps to reduce the emissions of our fleet. By tailoring the types of vans chosen, average emissions across the fleet now stand at 202 grams per kilometre. This is combined with the introduction of technology that allows us to see where each van is located, who is driving the vehicle and which trade they are skilled in.

We can now send the closest and best-qualified person with the best tools to carry out repairs for each assignment. This reduces fuel consumption by up to 40% in some maintenance contracts. We are also considering further incentives to award our drivers with the best skill in improving the miles per gallon achieved.

Company Cars

We have taken steps to progressively reduce the availability of higher-carbon emitting cars available to staff. From July 2011, only cars emitting less than 140 g/km of CO_2 are available, and this will reduces to 130 g/km of CO_2 next year.

Emissions are also reducing and by October 2010 the average across company cars had dropped to 137 grams of carbon dioxide per kilometre. This is below the average for fleet vehicles in the UK which currently stands at 144 grams (data supplied by Energy Saving Trust).

We are also tackling the amount of miles driven and 2010 saw business and commute mileage limits introduced at 25,000.

These limits are backed up by a business unit penalty system of fines to encourage alternate forms of transport, carbon emission reduction and reduce risk to health & well being of drivers.

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