



## Mandatory Energy Efficiency Inspections of Air-conditioning Systems

### How the Carbon Trust can help

Tullyglass Hotel, Ballymena  
5<sup>th</sup> November 2009



## We help business and public sector organisations to deliver carbon savings now and in the future



### **We cut carbon emissions now**

- By providing business and the public sector with expert advice, finance and accreditation
- By stimulating demand for low carbon products and services

### **We cut future carbon emissions**

- By developing new low carbon technologies through project funding and management, investment and collaboration
- By identifying market failures and practical ways to overcome them



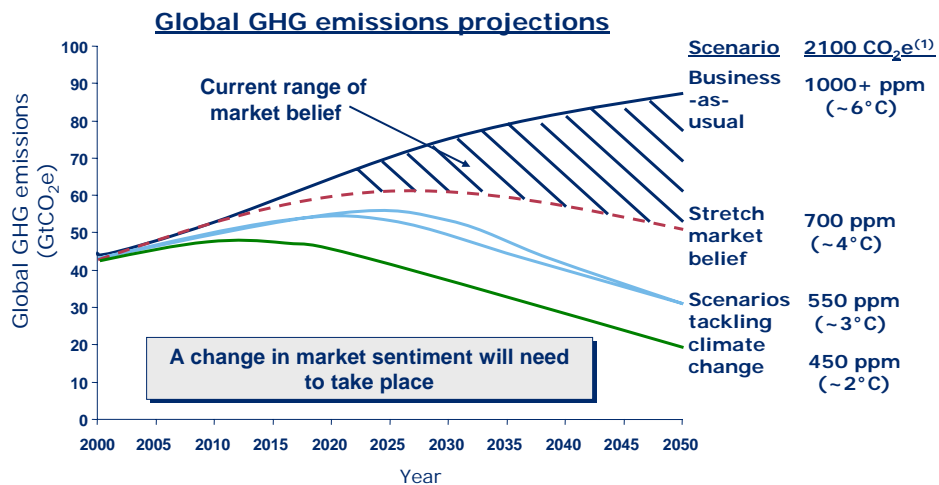
## Cutting carbon now



### Key achievements in Northern Ireland include:

- ✦ Saving our customers over £70m per annum through reduced energy bills
- ✦ Stimulated over £100m of investment in energy efficiency and low carbon technologies
- ✦ Reducing carbon emissions by over 685,000 tCO<sub>2</sub> per annum
- ✦ Identified a further £100m+ pa of energy savings and associated carbon savings of nearly 1mtCO<sub>2</sub>
- ✦ Awarded £12m in interest-free loans to enable 170 local companies to invest in energy and carbon saving technologies that will reduce their energy costs by £5m pa
- ✦ Over 6,300 delegates have attended 115 low carbon skills and knowledge transfer seminars and workshops

## Annual global emissions in 2050 will need to be well below today's



## Pathways to a low carbon economy



- **Some industries will be truly revolutionised:** each of the power sector, automotive and the construction sectors will be revolutionised. The global power sector could be more than 60% decarbonised by 2030, representing an enormous shift from the current 30% level. The automotive sector could be making up to 40% of new hybrid vehicles by 2030. The construction sector will need to make new homes and commercial buildings to radically higher standards of energy efficiency over the period to 2030.
- **Some major new industries will be born:** obvious new industries will arise in the form of Carbon Capture & Storage, which is anticipated to provide more than 10% of all power generation as well as capturing 3.6Gt CO<sub>2</sub>e per annum from 2030. This should offer major commercial opportunities for capture, transport and storage of carbon dioxide.
- **Some industries will experience potentially revolutionary pressures:** The carbon-intensive industries such as steel, cement and chemicals are, according to the cost curves, likely to continue to grow. However, the likely policy tool of choice – an imposed cost of carbon, will impose uneven costs on operations depending on the relative carbon intensity and may reduce demand through increased costs and potential competition with alternative substitute products.

Source: Pathways to a Low-Carbon Economy, Version 2  
McKinsey & Company, January 2009

## There is a large opportunity for carbon reduction across the stock...



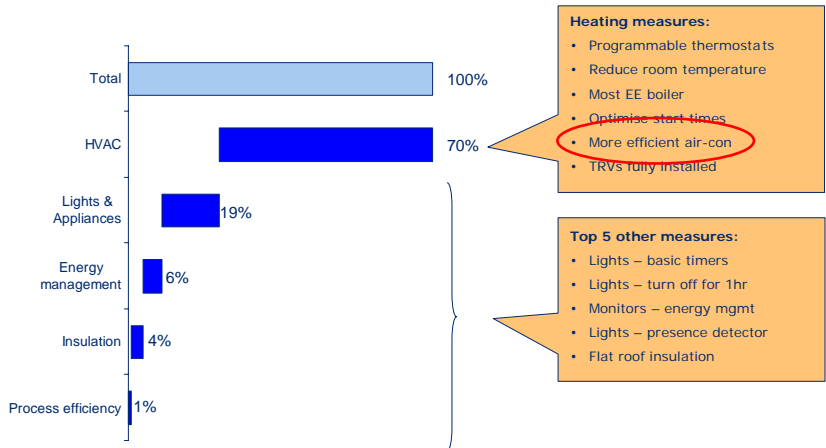
- 30-35% reductions are possible from energy conservation and efficiency measures, both for existing and new buildings
- 15% reductions are possible cost effectively
- This is before we consider the potential from renewables or the impact of decarbonising the electrical supply

... with most of the cost effective opportunity being from simple, low/no cost measures which can be implemented today



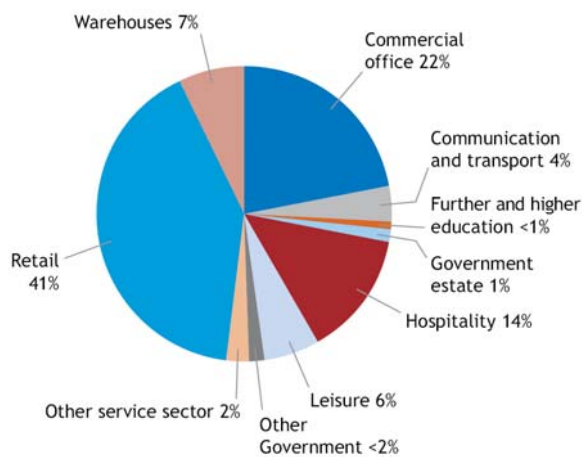
**Cost effective energy efficiency measures carbon abatement potential in non-domestic buildings in the UK**

% of total CO2 emissions



Source: Carbon trust analysis - CCC (data for public sector and commercial buildings, exc. Industrial)

**Air conditioning energy use by UK sector**



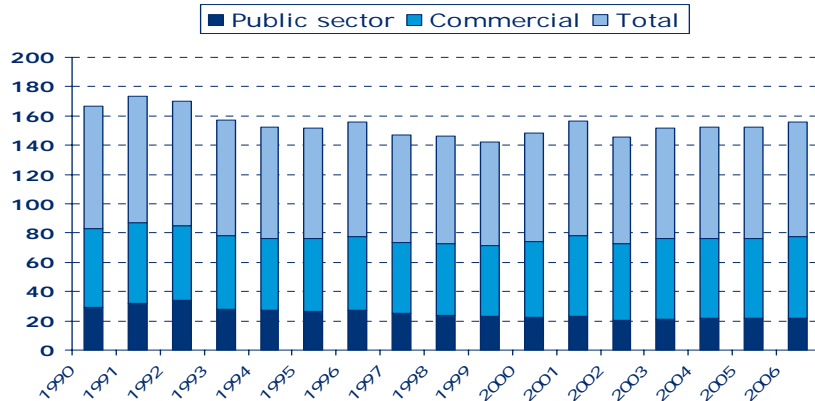
Note: Agriculture, health and school sectors each had less than a 1% share.

Source: CTG005, Air Conditioning technical guide, Mar 2007

## Historical carbon emissions from 1990 to 2006 have only fallen slightly



M tons CO<sub>2</sub>



Source: Committee on Climate Change (data for public sector and commercial buildings, exc. Industrial)

## Large scale change required



➤ To get to at least an 80% reduction in carbon emissions by 2050, there is **little choice in the measures which need to be implemented**

- Grid decarbonisation **PLUS** improvements to our buildings
- New **AND** Existing buildings
- Energy conservation and efficiency **AND** on/near site renewables

## Large scale change required



➤ The **order and speed** at which these measures are implemented is therefore a much more vital issue

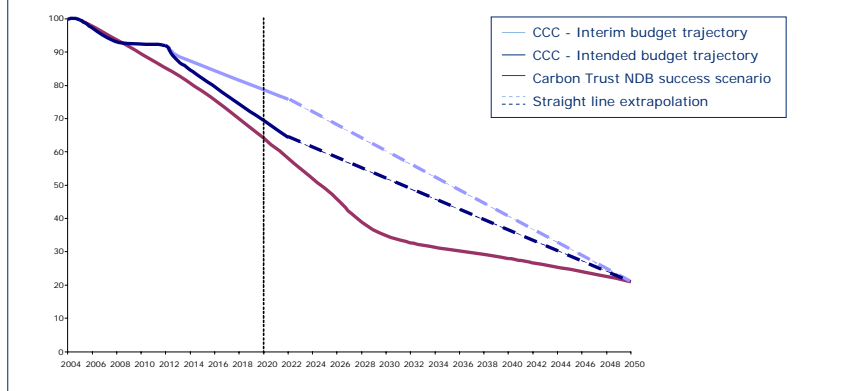
1. Implement almost all of the simple, **cost-effective energy efficiency measures over the next decade**
2. Second, **in the medium to long term**, on/near-site renewables, currently non-cost-effective energy efficiency measures, and electrical based heating will need to be implemented at scale and a much lower cost than today

## Large scale change required



➤ Emissions should be reduced by 35% by 2020 vs. 2005 in order to maximise the economic benefits

Indexed emissions reduction pathway, 2004-2050



Source: CCC, Arup, Carbon Trust analysis

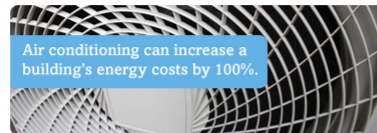
## Carbon Trust website



- [Why save carbon?](#)
- [Start saving](#)
- [Introduction](#)
- [Top Tips](#)
- [Starter Pack](#)
- [Employee awareness posters](#)
- [Employee Influence](#)
- [Savings by Sector](#)
- [Savings by Technology](#)
- [Project planning tool](#)
- [Assess your organisation](#)
- [Taking action](#)
- [Loans](#)
- [Loans suppliers](#)

### Air Conditioning

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Air conditioning can use a huge amount of energy. In fact, air conditioning can increase a building's energy consumption and associated carbon emissions by up to 100%.

Even though air conditioning can use lots of energy, lots of organisations choose to use it – not least because of the extra heat generated by increasing use of IT equipment.

Luckily, there are some simple, low-cost ways to save energy and make your air conditioning system more efficient.

#### Our top three recommended carbon saving air conditioning projects:

- **Temperature control**  
Make sure your air conditioning doesn't operate below 24°C.
- Also, make sure that you don't have the heating and cooling systems competing with each other – it's a waste of money. The

#### Advice in this technology

Air conditioning home

##### Basic carbon saving measures

- [Housekeeping](#)
- [Maintenance](#)

##### Advanced carbon saving measures

- [Upgrading equipment and systems](#)
- [Planning a project](#)

[Other technologies](#)

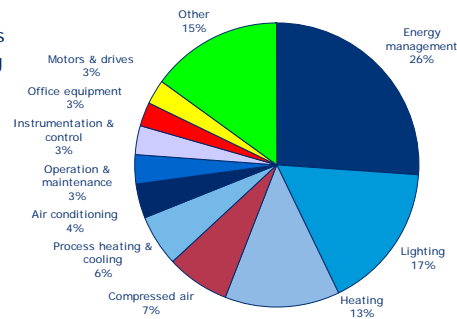
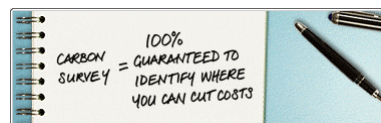
For further information on this topic see our [Related publications](#)

#### Related links

## Carbon Trust Survey



- 100% guaranteed to show you where you can reduce your energy bills
- Free, to businesses with an annual energy spend of £50,000 or greater
- Impartial and authoritative
- On average, we've helped UK businesses save 20% on their energy bills after doing a Carbon Survey
- Visit and survey your premises
- Identify immediate energy saving opportunities with no or low cost of implementation
- Offer practical advice to help you reduce business costs over time, including implementation support



Source: Carbon Trust survey analysis 2008

## Carbon Trust Interest-Free Loans



The objective of the Carbon Trust's interest-free loan scheme is to encourage businesses to invest in energy efficiency & renewable energy projects

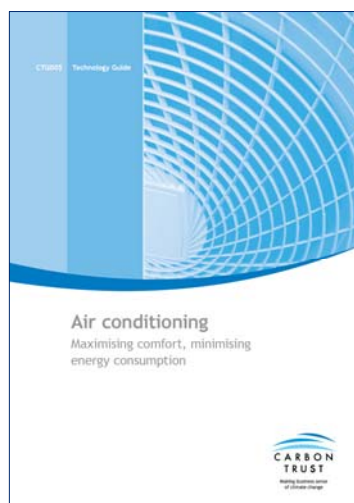
Key features of the interest-free Loan Scheme:

- £3,000 to £400,000
- 0% Interest
- No other fees
- Unsecured
- Repayment period reflects energy payback – up to max 48 month
- Minimum 'red tape'



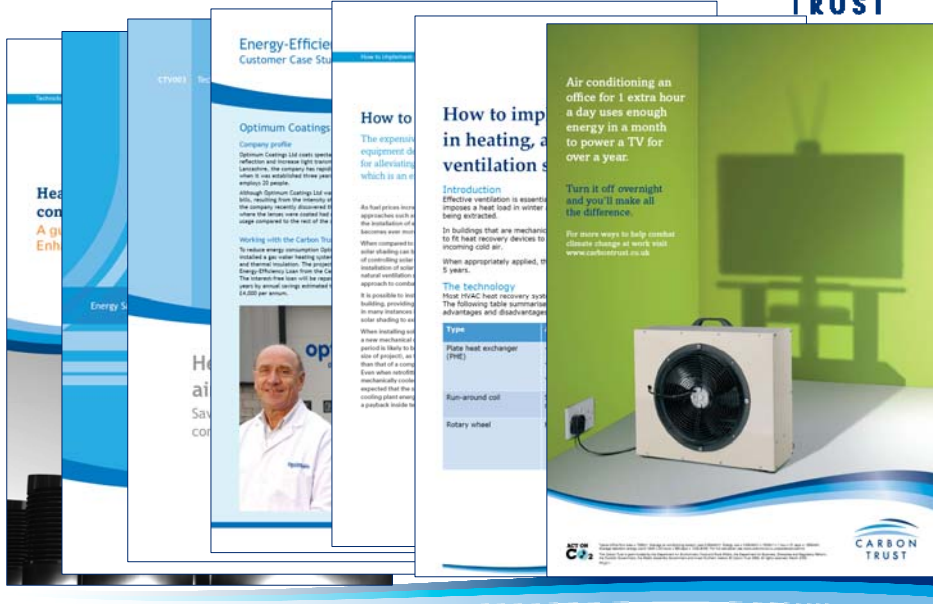
**Loan offers can be made in 2 weeks from receipt of a complete application**

## Carbon Trust Air Conditioning publications



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## Carbon Trust Air Conditioning publications



## Carbon Trust Innovations R&D and Technology Accelerators



### Activity

### Overall Aim



**Industrial Energy**

Deliver step-change improvements in industrial energy efficiency



**LC Buildings**

Accelerate low carbon building refurbishments



**LC Buildings Programme**

Accelerate market understanding and uptake of holistic low-carbon buildings



**Applied Research**

Commercialise the technology of the UK's leading low carbon innovators

# Applied Research grants: Air Conditioning Projects



### NATURAL LARGE COOLING USING MIMETIC

**LEAD ORGANISATION**  
NBT  
35 John's Innovation Centre  
Clarendon Road  
Cambridge  
CB2 3RQ  
Contact: Susan Fitzgerald  
E-mail: s.fitzgerald@nbt.co.uk  
www.nbt.co.uk

**PARTNER:**  
School of Pathology  
8F 90

**COST AND DURATION**  
The Carbon Trust contribution towards this project is £75,000. The project started in November 2006 and is due for completion in December 2008.

**PROJECT REFERENCE NUMBER**  
INC 079

### LOW COST SUSTAINABLE COOLING

**LEAD ORGANISATION**  
The Carbon Trust  
100 Broad Street  
London  
E14 4DU  
Tel: 020 7521 2777  
E-mail: info@carbontrust.co.uk

**COST AND DURATION**  
The Carbon Trust contribution towards this project is £10,000. The project started in February 2006 and is due for completion in February 2008.

**PROJECT REFERENCE NUMBER**  
2005 9 110

### SUSTAINABLE COOLING

**LEAD ORGANISATION**  
Bath University  
Bath University  
Department of Engineering Systems  
Faculty of Engineering  
Science and the Built Environment  
22B Bathway Road  
London  
W11 2AS  
Tel: 0202 818 7629  
E-mail: s.fitzgerald@bath.ac.uk

**PARTNER:**  
Fusion Underground Limited  
The Chairman's residence of Building Services Engineers  
02022

**COST AND DURATION**  
The Carbon Trust contribution towards this project is £75,000. The project started in April 2006 and is due for completion in June 2007.

**PROJECT REFERENCE NUMBER**  
INC 11027

### SELF-OPTIMISING INCORPORATING EFFICIENCY, ELECTRICITY CONTROLLED MO

**LEAD ORGANISATION**  
University of Leicester  
Department of Engineering  
4th Floor, Leazes Road  
University Road, Leicester  
LE1 7RH  
Tel: 0116 252 2869  
E-mail: g.parkinson@le.ac.uk  
http://www.le.ac.uk/engineering/research\_group/rgeneral/aircond/leazes.htm

**COST AND DURATION**  
The Carbon Trust contribution towards this project is £14,000. The project started in May 2005 and is due for completion in the end of September 2006.

**PROJECT REFERENCE NUMBER**  
2005 7 123

### LOW-CARBON COOLING FOR TELECOMMUNICATION BASE STATIONS

**LEAD ORGANISATION**  
Energy Ltd  
Energy  
10115  
Contact: Ian Taylor  
Tel: 0118 927 2715  
E-mail: i.taylor@energy.co.uk  
www.energy.co.uk

**COST AND DURATION**  
The Carbon Trust contribution towards this project is £19,142. The project started in July 2007 and is due for completion in October 2008.

**PROJECT REFERENCE NUMBER**  
INC 120

**OBJECTIVES**  
The primary aim of this project is to develop low-carbon cooling equipment for installation in new and existing unattended telecommunication base stations. A secondary aim is to develop the road map for adopting these technologies to provide breakthrough cooling solutions for computer air air-cooled systems to be up to 50% of the carbon footprint of industrial buildings to the UK.

**OBJECTIVES**  
Electronics and electrical equipment used in base stations is affected by thermal stress. Non-mechanical stress may also be generated by higher power levels as bandwidth, speed and coverage are increased. The accepted industry solution is to use direct compression air-conditioning from the building services sector. To run cooling systems, extensive testing indicates that each base station emits upwards of 3 tonnes of CO<sub>2</sub> equivalent per year. The project target will be a minimum of 20% reduction (about 2.5 tonnes CO<sub>2</sub> equivalent per year) for retrofit equipment with a payload of less than 2 tons. For new base stations, the target carbon reduction will be upwards of 60% (about 3 tonnes CO<sub>2</sub> equivalent per year).

**These carbon reductions will be achieved through:**

- Improved, low-carbon cooling of the most thermally sensitive equipment
- Directed air flow
- Filtering elements that do not require servicing and enable the installation of longer filter
- Reduction in the embodied energy used during construction
- Recycled insulation materials
- Smaller fans that move significantly less air
- Reduced room volume

A strong relationship at all stages of this project with telecommunication operators is vital to provide end-user input into the development. Major UK-based operators are involved in the project and their capabilities will be used to provide the development and on-line testing opportunities.

# Carbon Trust Investment Partners LLP



<p>Since May 2003 Innovative Building Materials</p> <p>£2.8 million investment Co-lead Investor</p>	<p>Since June 2004 Marine Energy Converter</p> <p>£34.9 million investment Co-Investor</p>	<p>Since June 2005 Concentrated PV Solar</p> <p>£1.7 million investment Lead Investor</p>	<p>Since December 2005 Biomimetic Fluid-Flow</p> <p>£1.3 million investment Co-Investor</p>
<p>Since February 2007 Fuel Cell Components</p> <p>£1.9 million investment Lead Investor</p>	<p>Since October 2007 Liquid Biofuel</p> <p>£1.6 million investment Co-lead Investor</p>	<p>Since October 2007 Integrated Circuits</p> <p>£12.6 million investment Co-Investor</p>	<p>Since July 2008 Passive Cooling</p> <p>£2 million investment Co-lead Investor</p>



## Making Business Sense of Climate Change

For further advice and to access the services from the  
Carbon Trust, visit our website at:

**[www.carbontrust.co.uk](http://www.carbontrust.co.uk)**

or ring our customer centre on:

**0800 085 2005**

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