The Carbon Trust
origins, role, business model and activities

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Overview

- Context: the climate change and sustainable energy challenges.
- The Carbon Trust:
  - origins, rationale and governance;
  - role;
  - approach;
  - business structure.
- Cutting carbon emissions now:
  - specialist advice;
  - finance;
  - setting standards;
  - creating business opportunities today.
- Carbon future - developing low carbon technologies:
  - opening markets;
  - technology commercialisation;
  - investment.
- The Carbon Trust's international portfolio.
- Achievements and summing up.

Context: the climate change and sustainable energy challenges

- **The risk of adverse climate change impacts:**
  - rising temperatures and reducing fresh water supplies are affecting habitat, increasing desertification and compromising the viability of species, food growing, etc;
  - rising sea levels are increasing the risk of coastal city flooding;
  - increasing and more extreme weather events are with us now.
- **The need to have strategic options for energy supplies:**
  - energy supplies are essential to economic development and societal welfare;
  - energy price rises and volatility adds to costs and creates investment uncertainty;
  - rapid rise of the new economies is increasing global energy demand;
  - energy efficiency has huge potential for cost and carbon savings but is not top of mind; we have to develop the policies which will drive investment;
  - clean energy technologies take time to come to market: we have to start to develop them now.

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The Carbon Trust – origins, rationale and governance

Our mission is to accelerate the move to a low carbon economy.

- The Carbon Trust is a not for profit company set up in 2001 by the UK Government following recommendations from business facing the introduction of the climate change levy.
- Business wanted Government to set up an independent entity to help them save energy and develop low carbon technologies.
- Our annual budget is determined by the UK Government: we receive regular payments to meet our expenditure during the financial year.
- Our Board considers and approves our business plans and the budget allocation to each business area which best meets our goals.
- Our use of public funds is scrutinised by the Government's National Audit Office. National Audit Office Value for Money report 2007 *"the Carbon Trust's advice to business has proved value for money and its Innovation Programme appears to be on course to do likewise".*

The Carbon Trust – role

- 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 to lower carbon emissions, to develop low carbon businesses, to increase energy security and stimulate the generation of associated jobs.

- **We help to cut carbon emissions now by:**
  - providing specialist advice and finance to help organisations cut their carbon emissions; and
  - setting standards for carbon emissions reduction.

- **We reduce potential future carbon emissions by:**
  - opening up markets for low carbon technologies;
  - leading industry collaborations to commercialise technologies;
  - investing in early stage low carbon companies.

The Carbon Trust – approach

- Independent, focused, holistic, business-like.
- We seek to catalyse the market: we don't substitute for it.
- We analyse the barriers to market provision of low carbon goods, services and new technology development and deployment.
- We design interventions to address those barriers, making sure to test periodically whether our interventions are still relevant.
- We work with policy makers to inform them how their policies are working in order to help make them more effective.
- We change, or terminate, our interventions as and when markets are ready to provide "willing buyer willing seller" energy efficient, low carbon goods and services on a commercial basis.
- We identify and share the risks of low carbon technology innovation: our aim is to help create commercialisable intellectual property, reduce market entry risk, and accelerate the rate of market penetration of low carbon technologies.

The Carbon Trust - business structure

Insights

Explains the opportunities & challenges surrounding climate change

Solutions

Delivers carbon & money savings via energy efficiency

Innovations

Develops low carbon technologies for future carbon savings

Enterprises

Creates low carbon businesses for a low carbon economy

Investments

Finances clean energy businesses for a green growth economy

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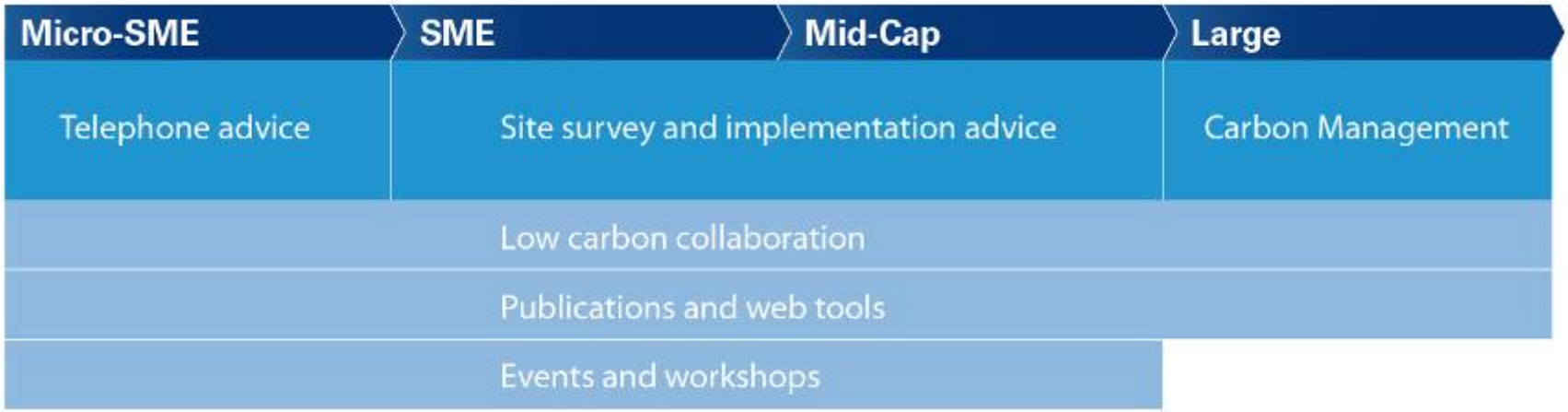
Cutting carbon emissions now - specialist advice



- Since our launch we have supported tens of thousands of customers, helping them to save 23MtCO2 and £1.4 billion.
- We work with large organisations to help them develop, implement and maintain a carbon strategy. Our dedicated sector managers provide strategic and implementation support. We have advised 75% of FTSE 100 companies.
- Our public sector carbon management programme has worked with over 436 organisations, including universities, hospitals, local authorities, government departments.

Cutting carbon emissions now – finance

- **Interest-free, unsecured loans for business energy efficiency:**
  - £100m of loans to help SMEs upgrade or replace equipment with energy efficient alternatives;
  - £3,000 - £500,000 available per loan; payback up to five years;
  - since the scheme started in 2003 we have offered nearly £80 million in loans; saved over 500,000tCO2; and saved businesses approximately £80 million
- **Enhanced capital allowances:**
  - provides incentive to invest in energy-efficient equipment;
  - qualifying equipment specified on Energy Technology List (ETL) managed by Carbon Trust on behalf of Government;
  - more details at www.eca.gov.uk/etl
- **Public sector invest to save:**
  - managed by Salix Finance, an independent, publicly funded company
    set up by the Carbon Trust;
  - £10.2 million committed during 2008/09

Case study: Fox Wire, independent manufacturer and distributor of steel wires: 72 employees

- Existing conventional air compressor was still running at almost full power even at weekends and at night, when the factory needed the least amount of compressed air.
- Received a £12,000 loan to install a variable speed air compressor to supply pneumatic power at its factory.
- The company now reads its meters weekly and has calculated that, thanks to the new system, it is saving 100MWh per year – equating to over £6,500 pa and a 30% reduction in the electricity bill.

"The interest-free loan from the Carbon Trust enabled Fox Wire to install this essential technology and helped us save energy and money." – Martin Lowe, Engineering Manager, Fox Wire Ltd.

Case study: Aaronson Noon artistic glass manufacturer: 9 employees

- Creative and dynamic company producing contemporary handmade glass designed by Adam Aaronson, one of the UK's leading glass artists;
- Energy bill of approx £49,000 pa;
- An energy efficiency loan helped Aaronson Noon purchase a new glass furnace, which reduced CO2 emissions by ~100 tonnes and saved the company about £11,000 pa.

"The Carbon Trust made it very straightforward for us to re-engineer one of our key business processes. The Energy-Efficiency Loan has made a dramatic impact on our energy costs and also improved our production economics." Adam Aaronson, Designer.

Cutting carbon emissions now – setting standards and recognising real carbon reduction

- Standard approach to organisation carbon footprint measurement
- Rewards real carbon emission reductions and enables clear communication to customers and stakeholders
- Early action benefits under the CRC Energy Efficiency Scheme
- Currently awarded to over 150 organisations

Cutting carbon emissions now – setting standards and recognising commitment to carbon reduction in products

- Standard, comparable approach to carbon footprinting of products and services
- Rewards commitment to real carbon emissions reductions
- Carbon Reduction Label awarded to more than 2,500 products and services
- Product footprinting and labelling projects in USA, Europe and Asia

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Carbon future: opening markets - providing insights and analysis on policy

International Policy

- Series on EU ETS
- Publications on linking international trading scheme and leakage

Energy Efficiency

- Review of Climate Change Programme led to CRC Energy Efficiency Scheme
- Major review of buildings policy and market

Energy Supply

- UK renewables support mechanisms and commercialisation strategy
- Offshore wind acceleration

Carbon future: opening markets - demonstrating commercial viability

- Carbon Trust Enterprises is the commercial arm of the Carbon Trust
- Develops carbon reducing business ideas
  and turns them into reality
- Provides co-investment and strategic opportunities for partners.

- Companies launched with investment partners include:
  - Partnerships for Renewables
  - Insource Energy
- Companies 100% owned by Carbon Trust:
  - The Carbon Trust Footprinting Company
  - The Carbon Trust Standard Company

Carbon future: opening markets - technology acceleration

- Our technology accelerators address barriers to technology development and deployment
- Tackle sector specific market barriers
- Emphasis often on cost reduction
- We work closely with industry partners

- Current technology accelerators include:
  - Offshore wind
  - Marine energy
  - Biomass heat
  - Micro combined heat and power (CHP)
  - Low carbon buildings
  - Industrial energy efficiency

Carbon future: opening markets - technology acceleration – offshore wind

Opportunity

- Generate 25% of UK's total energy needs by 2020
- 250,000 new jobs, £65 billion economic value by 2050, £2.5 billion a year global industry

Challenge

- Reduce cost of offshore wind energy by addressing: foundations; wake effects; access, logistics and transportation for wind farm construction and operation; and electrical systems efficiency

Solution

- Up to £50 million, 5-year Offshore Wind Accelerator to cut costs of offshore wind energy by at least 10%
- Collaborating with co-funders from across the sector

Airtricity DONG energy RWE The energy to lead Statoil SCOTTISHPOWER RENEWABLES

Carbon future: technology commercialisation - research acceleration

- Research accelerators target innovation gaps
- Build on areas where UK research capabilities are world-class
- New model for accelerating the commercialisation of R&D
  - Combination of longevity and public good objective of state support with commercial focus and cost-effectiveness of venture capital-style equity investment
- Significant scopes of work: up to £10 million each over 3-5 years
- Current research accelerators include:
  - Organic solar photovoltaics (PV)
  - Pyrolysis (biodiesel from waste)
  - Algae biofuels
  - Polymer fuel cells

Carbon future: technology commercialisation – algae biofuels research accelerator

Algae Biofuels Challenge

Opportunity

- Potential for CO_2 savings of up to 80% relative to fossil fuels
- 5-10 fold increase in biomass yield per hectare compared with conventional biomass feedstocks – without need for arable land or fresh water

Challenge

- To make a significant contribution towards commercialising the use of algae biofuel by 2020

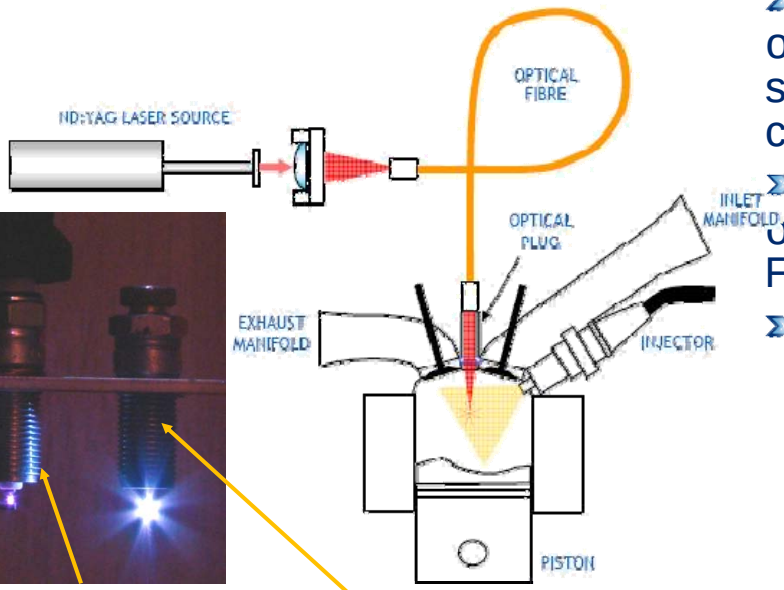
Solution

- Algae Biofuels Challenge
  - Phase 1: 3-year £8 million R&D project
  - Phase 2: 5-year £20 million large-scale demonstration project

Carbon future: technology commercialisation - applied research grants

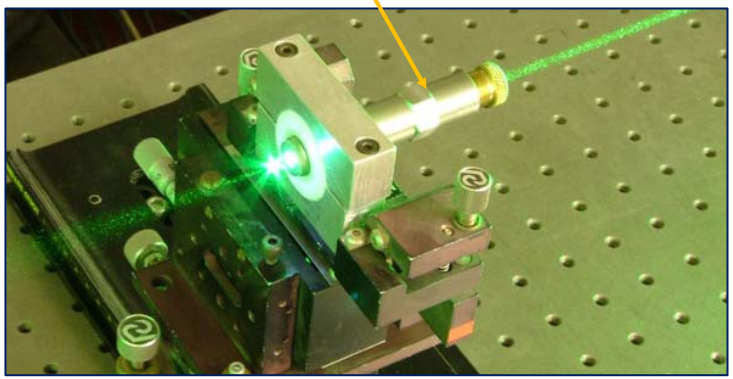
- Develop and commercialise technologies with potential to reduce UK carbon emissions
- Open competitive process run two-three times a year
  - Over 1,900 research proposals screened
  - £28 million in funding offered to 190 projects
  - £32 million leveraged from the private and public sectors
- Projects that have received funding include:
  - nano-porous solutions: manufacturing multi-layer hollow fibres
  - University of Liverpool: laser ignition of vehicle engines
- Over 65% of completed projects have gone on to generate new patents, receive further investment or make commercial sales, or expect to do so shortly.

Applied Research: Laser Ignition project



Conventional spark plug

Laser optical plug



- **Project aim:** to develop a Laser Ignition (LI) optical system for automotive engines, replacing spark plugs with optical laser plugs at comparable cost to conventional ignition
- £200k grant from the Carbon Trust to University of Liverpool Engineering Dept; partnering with Ford Motor Co. ltd
- **Advantages:**
  - significantly improved, leaner combustion:
  - increased combustion speed
  - controllable ignition location across whole cylinder
  - multiple ignition points possible
  - no cold start spark-plug fouling
  - no flow disturbance due to protruding plug
- **Main benefits include:**
  - improved efficiency & CO_2 reduction
  - reduction of regulated pollutant emissions
  - lighter weight
  - improved cold start capability…
  - … enabling wider uptake of biofuels

Carbon future: technology commercialisation - business incubation

- Working with promising low carbon technology companies
- Provides strategic and business development consultancy to accelerate growth
- Companies typically spend 12-18 months in incubator
- To date we have:
  - incubated 90 companies who have gone to raise around £86 million in private investment
  - leveraged £16 of private funding for every £1 spent

4energy
CeresPower
evance
EVO electric
irt surveys
nujira
Scotrenewables

Scotrenewables

Helping to turn the tide

- Developing tidal turbine system
- Grant funding from Applied Research Open Call
- £6.2 million private investment raised

Scotrenewables

Helping to turn the tide

- Renewable energy solutions provider
- Orkney Islands, Scotland
- Founded in 2002

Our incubator programme has:

– Provided expert advice to develop the design

– Worked with Scotrenewables to develop a business model

– Helped the company secure private investment

"The company needed to expand rapidly and the Carbon Trust's incubator scheme gave us the expert support and advice we needed to develop a comprehensive business plan and get investment ready."

Barry Johnson
Managing Director of Scotrenewables

Carbon future: technology commercialisation - early stage venture capital investments

- Support growth of innovative, low-carbon businesses with strong commercial potential
- Catalyse private sector investors and generate attractive ROI
- Current portfolio of 14 venture capital investments
  - £250,000 to £3 million invested per company
  - £13.5 million invested to date
  - £115.8 million of private funding leveraged

CamSemi
SAFC
plaxica
greenbiologics
AMTechnology
Constant Innovation
CMR FUELCELL
NBT
4energy
acal energy
newEARTH SOLUTIONS
WhitfieldSolar
eVince technology
Heliswirl
RLtec
Innovative energy solutions
pelamis
wave power

Carbon future: technology commercialisation - early stage venture capital investments - 4energy

- £1 million invested in 2008
- 4energy are providers of innovative cooling systems for mobile base station and data centre markets
- Strong demand in the UK
- Trials ongoing in Egypt, India and China

"We are delighted to have Carbon Trust Investments as a venture investor in 4energy. The Carbon Trust investment team are real sector specialists and bring a lot of value to the company in regards to UK and international market insights, strategic input and customer and investor

Pat Tindale
CEO of 4energy

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Carbon Trust's international portfolio

- **US:**
  - Memorandum of Understanding with Florida to set up a Carbon Trust;
  - cooperation with the California Air Resources Board and others on options for a Carbon Trust style entity in California;
  - carbon footprint and product labelling services with major US companies like Pepsi, Coca Cola etc;
  - appointed a head of US operations; setting up a representative office in New York;
- **China**:
  - a £10m incubator and investment Joint Venture with the China Energy Conservation Investment Corporation;
- **Australia:**
  - collaboration project to set up the Australian Carbon Trust;
- **Korea:**
  - Memorandum of Understanding to cooperate on carbon footprint analysis and labelling; exploring Carbon Trust model for Korea
- **Canada:**
  - cooperation to inform a Carbon Trust style initiative in Ontario.

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Carbon Trust - achievements

- Delivered 23Mt of carbon savings and over £1.4bn in operating cost savings. (Figures have third party assurance from KPMG.);
- Screened over 1,900 research proposals screened; offered £28m to 190 projects; leveraged £32m from other sources;
- Incubated 90 companies who have gone to raise £86m in private investment; leveraged 16:1 of private funding;
- Built a portfolio of 14 venture capital investments; £250k to £3m invested per company; invested £13.5m to date; leveraged £116m million of private funding
- We focus on cost effectiveness:
  - our costs range on average from ~£4-6/tCO2 abated;
  - we leverage on average £7 of private sector investment per £ of public funding.

Summing up

- The increasing risk of adverse climate change impacts is on the international agenda. (The scientific basis for observed climate change is well understood. By far the most plausible explanation is the rapid increase in anthropogenic atmospheric CO_2.) Energy supply security is also on the international agenda as more countries import energy supplies to fuel their economic growth.
- More and more countries are looking at market mechanisms for carbon abatement. However, a carbon price is only one of the elements essential to moving to a low carbon economy. What is also needed is a means whereby governments, business, investors and the research community can share the transitional risk.
- Our approach is to identify and address barriers to energy efficiency; to manage and share the risks of developing and deploying clean energy technologies; and to inform the development of the policy and market landscape to drive low carbon investment.
- The Carbon Trust model, appropriately adapted, has the potential to make a valuable contribution to helping other countries achieve their carbon emissions reduction and energy security goals.

CARBON TRUST

Making Business Sense of Climate Change

www.carbontrust.com
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