



The Carbon Trust: a unique approach to
stimulating innovation and creating value -
presentation to the
UK-NZ clean technology workshop

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Carbon Trust, London
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Overview



➤ **The Carbon Trust**

- origins, rationale and governance;
- scope;
- approach;
- business structure.

➤ **Informed intervention to accelerate innovation:**

- why doesn't low carbon innovation happen naturally;
- technology commercialisation;
- incubator mentoring;
- early stage investment;
- informing policy development.

➤ **Offshore wind accelerator**

➤ **Marine energy technology development**

➤ **Summary**

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 (currently around £170m).
- 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 – scope



- 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 identify 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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Why doesn't low carbon innovation happen naturally?



- There are significant barriers to low carbon technology innovation and commercialisation including:
 - the absence of a reliable, high enough market price for carbon;
 - the extent to which economies, utilities and end users have become “locked in” to conventional, high carbon energy technologies;
 - the uncertain and incomplete policy and regulatory regime intended to encourage these new technologies;
 - the high cost and technological risk of current generation low carbon technologies are unattractive to potential investors.
- The Carbon Trust has analysed these barriers and has designed a set of public policy interventions which provide the “stepping stones” for new and emerging low carbon and clean energy technologies to come to market:
 - support to improve technology performance, address market barriers, and reduce capital and operating costs;
 - incubator support for start up low carbon businesses;
 - venture capital investment for early stage, higher risk low carbon businesses.

Technology commercialisation: support to improve performance and reduce costs



- Providing grant support for RD&D helps but is not enough: through its team of experts, Carbon Trust also provides independent knowledge, technology focus and commitment;
- Our research accelerators address technological risk (eg our next generation solar photo-voltaics research consortium);
- Our technology accelerators address market barriers to take up and seek to deliver cost reduction and other commercial objectives (eg our micro-co-generation field trials; and our low carbon buildings refurbishment demonstration projects);
- Since 2001, we have screened over 1,900 research proposals and have offered a total of £28m funding to 190 projects. This investment has attracted commitments of an additional £32m from the private sector;
- Over 65% of completed projects have gone on to generate new patents, receive further investment or make commercial sales.

Incubator mentoring for start-up low carbon businesses



- Working with promising low carbon technology companies to make them “investor ready”
- 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 then raised around £86 million in private investment
 - leveraged £16 of private funding for every £1 spent


















Early stage investments



Carbon Trust Investments finances early stage low carbon enterprises that have commercial potential but are too risky for private venture capital. By delivering commercial returns, we encourage others to invest, thereby accelerating the transition to a low carbon economy.

£250,000 to £3 million invested per company. 15 live investments totalling over £17m have been made, leveraging a further £139m of private investment into low carbon companies, two of which have gone on to list on the Alternative Investment Market.

<p>June 2003 NBT Innovative Building Materials</p> 	<p>January 2004 CMR Fuel Cell</p> 	<p>July 2004 Pelamis Wave</p> 	<p>April 2005 Whitfield Solar Concentrated PV</p> 	<p>May 2008 Evince Technology Power electronics</p> 
<p>August 2005 Heliswirl Biomimetic Fluid-</p> 	<p>February 2007 Acal Enerav</p> 	<p>July 2007 CamSemi</p> 	<p>September 2007 Green Biologics</p> 	<p>October 2009 Plaxica Biopolymers</p> 
<p>July 2008 4energy Passive Cooling</p> 	<p>September 2009 RLTec Smart grid</p> 	<p>April 2007 Ashe Morris</p> 	<p>December 2007 St Andrews Fuel Cells</p> 	<p>December 2009 Waste to energy</p> 

Informing policy development to support clean energy development and deployment



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

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Offshore wind accelerator



- As well as reducing the UK's carbon emissions, offshore wind is a real opportunity to generate UK economic benefit
- However, the scale of the undertaking is huge: offshore wind will be the biggest engineering challenge of the decade. The challenges are huge:
 - CAPEX requirements: developing the 29GW required is expected to cost ~£75bn;
 - size of structures: 220m from blade tip to base 30m under seabed;
 - build rate: turbine installation rates need to increase to 2.5/day by 2020;
 - depth of sites: 70% of Round 3 wind farms will be in water >30m deep
 - distance of sites from land: new wind farms are 65km from shore
- Deployment needs to happen faster, cheaper and more safely.
- The objective of the offshore wind accelerator is to reduce delivered energy costs by 10%.

Offshore wind accelerator



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

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



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Marine Energy Challenge study reviewed the potential of marine energy for the UK



➤ Potential to meet energy demands	➤ UK: 15-20% annual electricity demand ➤ Worldwide: 2000-4000 TWh/year
➤ Potential to make carbon savings	➤ UK: Tens of MtCO₂ ➤ Worldwide: Hundreds of MtCO₂
➤ Security of supply	➤ Large indigenous energy resources
➤ Potential to create economic benefits	➤ UK: Significant export opportunities. ➤ Est. 16,000 Jobs from wave alone^[3].
➤ UK advantages over other countries	➤ Strong academic R&D capacity ➤ Concentration of technology development companies ➤ Ability to exploit knowledge/skills in traditional maritime/offshore industries

Sources: 1. L.E.K. Consulting 2. Entec UK 3. Carbon Trust Focus for Success

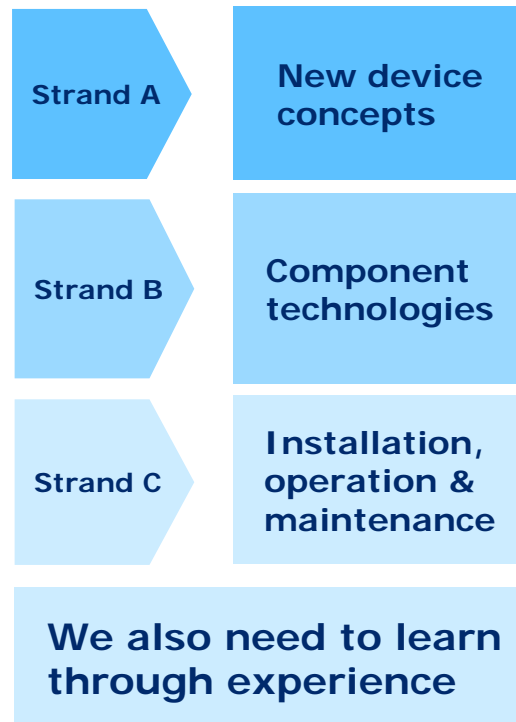
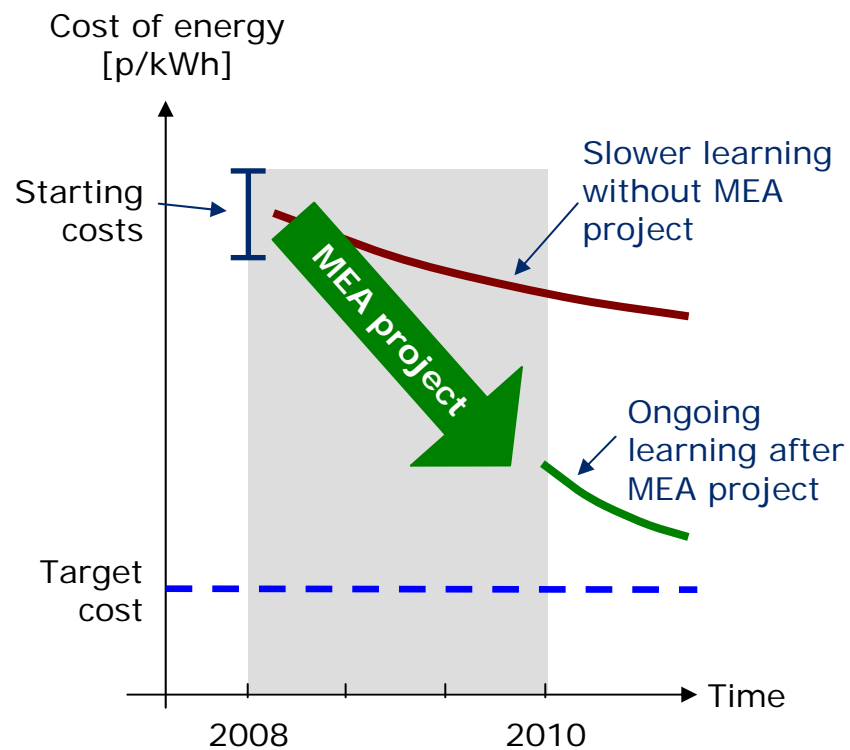
Marine Energy Challenge helped identify the barriers to marine energy development



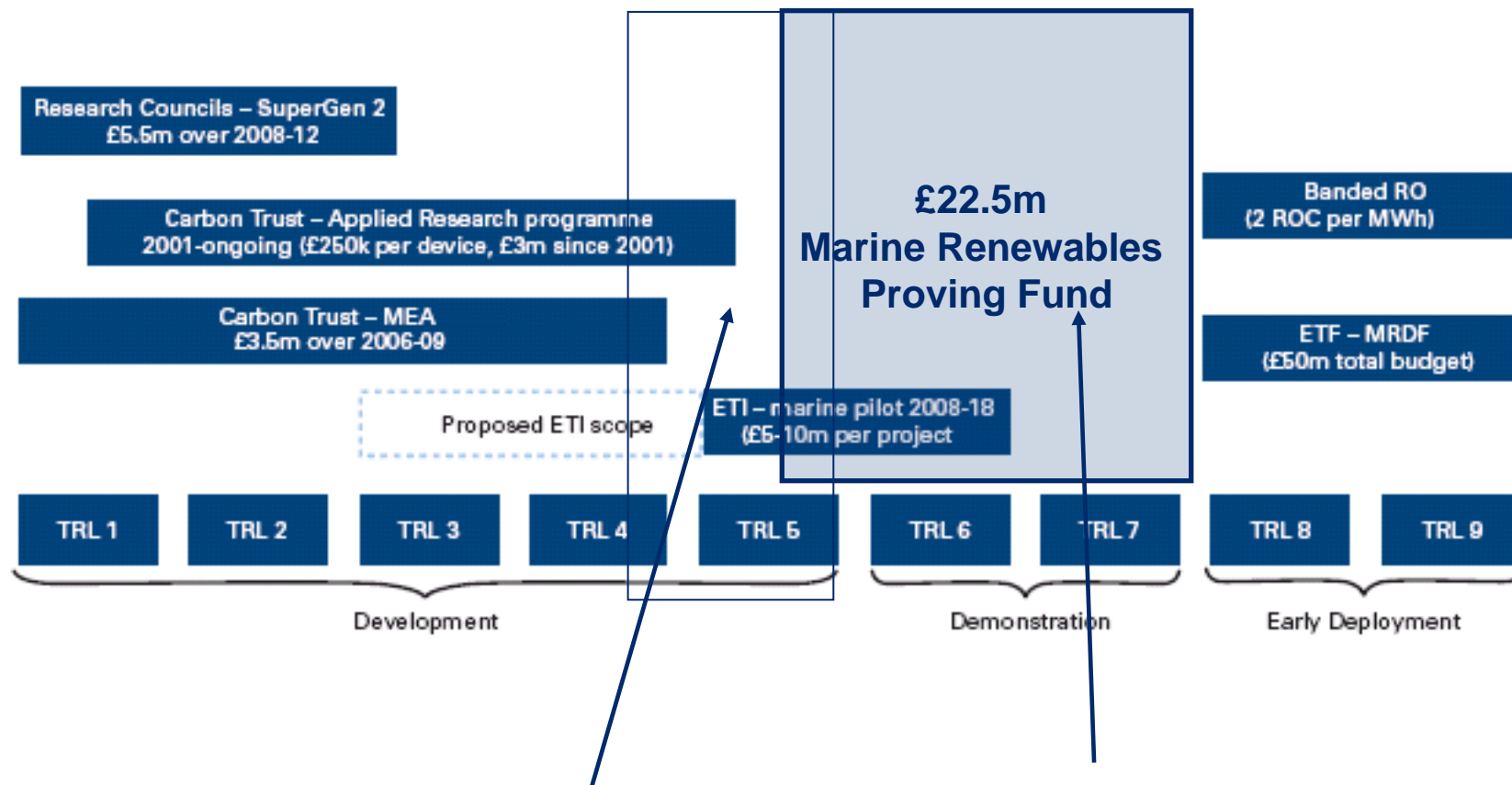
➤ Technology barriers	<ul style="list-style-type: none">➤ Engineering complexity means early technology carries high risk and is expensive to develop.➤ Costs of energy seen as too high relative to other form of generation.
➤ Market and financial Barriers	<ul style="list-style-type: none">➤ Limited of investment in technology development, Slower returns than other investments➤ Stop-start nature of funding➤ Market pull too weak/risks too high for the nascent industry➤ Requirement for clearer, longer term market signals from Government.➤ Costs of energy uncompetitive
➤ Functional barriers	<ul style="list-style-type: none">➤ Environmental impacts uncertain, leading to a cautious approach➤ Electricity networks constrained near energy resources

Marine Energy Accelerator has identified a number of routes to cost reduction

Objective: to accelerate progress of cost reduction to bring forward time when marine energy becomes cost-competitive so that significant carbon reductions are achieved



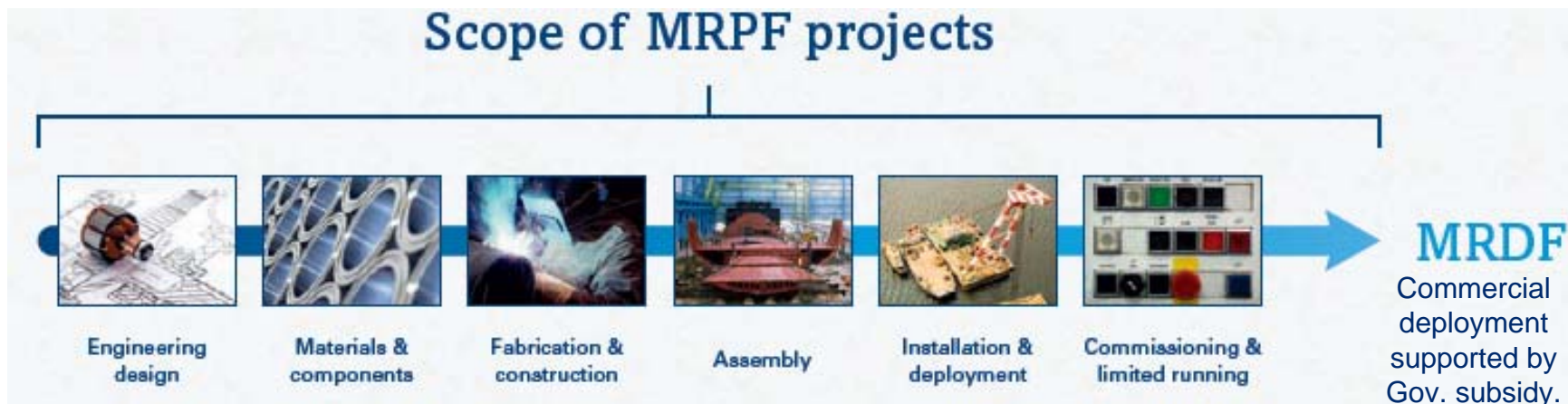
The funding gap between research and deployment was a barrier to development



Most technology developers are here

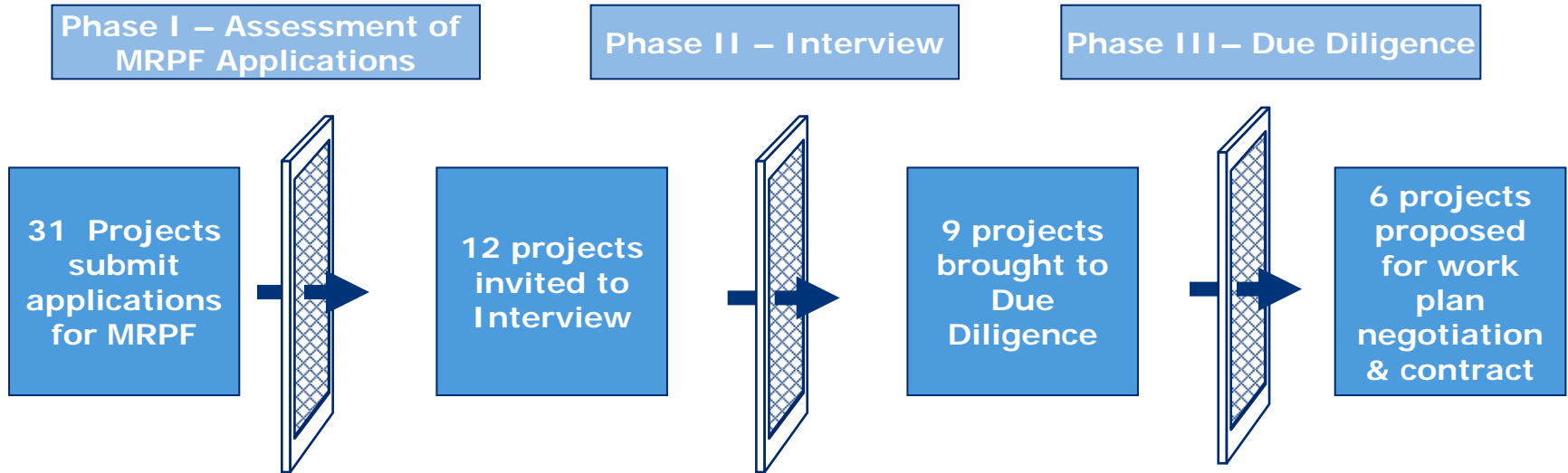
A significant gap exists in the marine energy funding landscape

Marine Renewables Proving Fund will accelerate the best technologies towards the Marine Renewables Deployment Fund



- Conceived and setup by the Carbon Trust, the £22m Proving Fund will accelerate development, help address stop-start funding, and reinforce government commitment to wave and tidal energy.
- The Proving Fund is providing grant funding between £1.7m and £5.1m
- The Carbon Trust has put in place a team of technical experts to provide advice and project mentoring to ensure projects stay on track.
- All projects will deliver complete full scale grid connected devices which have the potential to qualify for MRDF

Marine Renewables Proving Fund received 31 applications for consideration



Grants have been awarded to the 6 most promising concepts: 2 wave, 4 tidal.

MRPF will help inform the development of these technologies



MCT

Pelamis

Hammerfest
Strøm
UK

Aquamarine

Voith

Atlantis

- In these 6 technologies we are confident that we have selected the strongest current technologies with best long term potential
- With these projects the MRPF will unlock £40.2m of private money, and make the difference with pending investments for all six
- The MRPF will make a material difference to the development rate of these technologies, and accelerate them towards MRDF and commerciality

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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 CO₂ in the last 200 years.) Energy supply security is also on the international agenda as more countries import energy supplies to fuel their economic growth.
- Energy efficiency and decarbonised energy supplies are essential to make the move to a low carbon economy.
- Relative to incumbent technologies, low carbon and clean energy technologies are in their infancy. Their development and deployment need accelerating to reduce emissions, reduce costs and add economic value.
- The Carbon Trust's approach is to identify and address barriers to innovation; 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 faster.
- We are happy to share our experiences with others who are facing similar challenges.



Making Business Sense of Climate Change

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