Proving Marine Energy

The Carbon Trust
Accelerating the move
to a low carbon economy

Dr Stephen Wyatt
Technology Acceleration Manager – Marine Energy

Overview

- About the Carbon Trust
- Carbon Trust and Marine Energy
- Overcoming Challenges for Marine Energy
  - Economics: Marine Energy Accelerator
  - Demonstration: Marine Energy Proving Fund

About the Carbon Trust

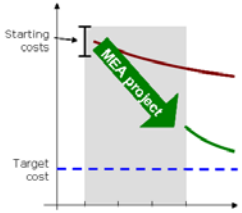
- **An independent company set up in 2001 by government**

- We cut carbon now by
  - Providing specialist advice and finance to help organisations cut carbon
  - Setting standards for carbon reduction

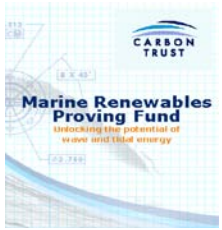
- We cut future carbon emissions by
  - Opening markets for low carbon technologies
  - Leading industry collaborations to commercialise technologies
  - Investing in early stage low carbon companies

To date the Carbon Trust have committed ~£30m to marine energy

Marine Energy Challenge
2003-2006
Understanding the issues



Marine Energy Accelerator
2007-2010
Demonstrating cost reduction



Marine Renewable Proving Fund
2009-2011
Proving the technology

EMEC® ORKNEY
The European Marine Energy Centre Ltd

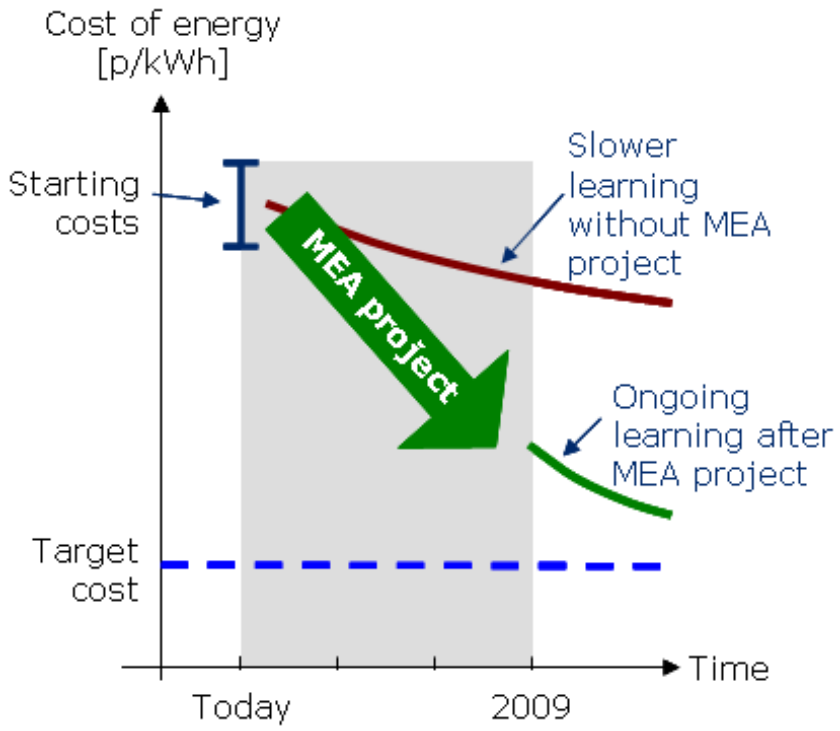
Founding Funder

Marine Energy has three fundamental challenges:

1) Economics – Need more innovation to drive cost reduction
2) Track record – Need more time in the water
3) Clear pathway to deployment – Need a holistic approach

Marine Energy Accelerator: Accelerating cost reduction

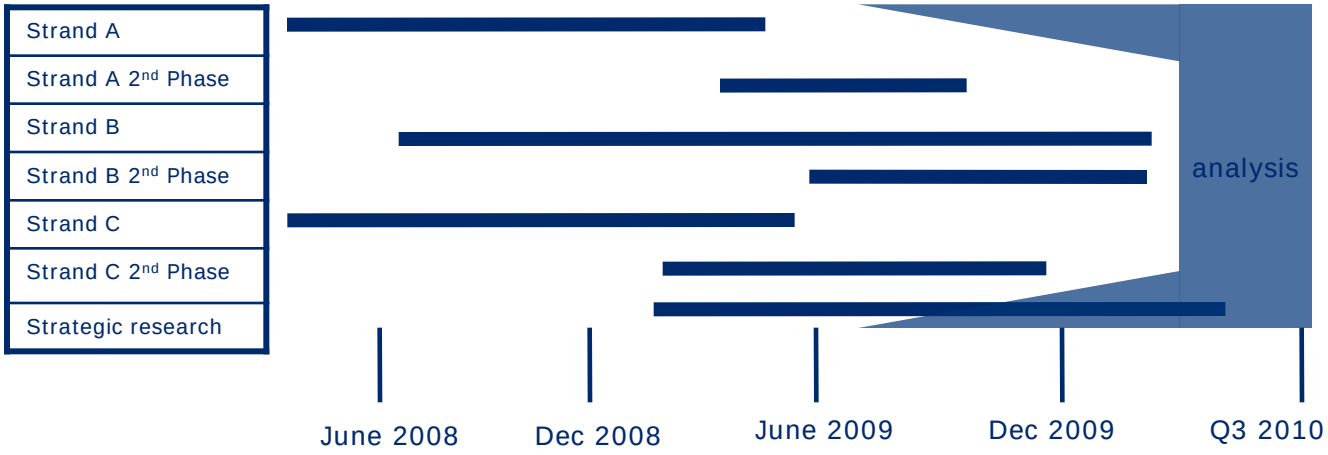
- Accelerate cost reduction to bring forward time when marine energy becomes cost-competitive

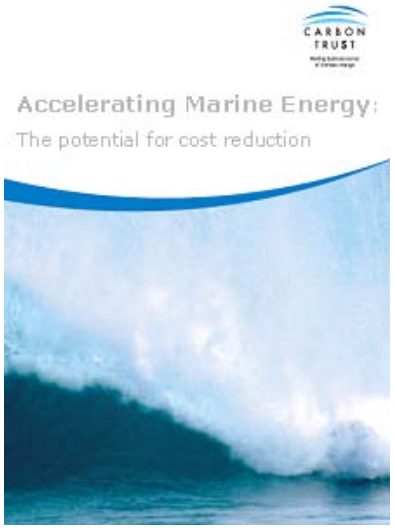


Three routes to cost reduction:

1. Working with the existing industry to understand and reduce cost form areas like O&M, and deployment
2. Driving innovation in the supply chain to develop lower cost, better performing components
3. Looking for the next generation of device technologies, but only support them if they are significantly better than today's front runners

MEA timeline





Final report – July 2010

Industry status:
Update on Wave and Tidal economics
Update on resource assessment
Other industry barriers

Future of wave and tidal
Economics
Learning rates
The commercial reality

Potential for cost reduction:
Step change concepts
Component technologies
Deployment and O&M

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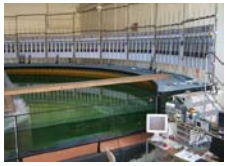
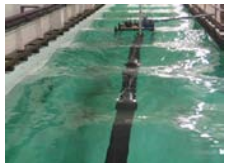
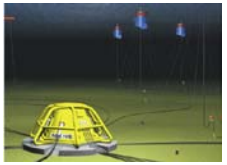
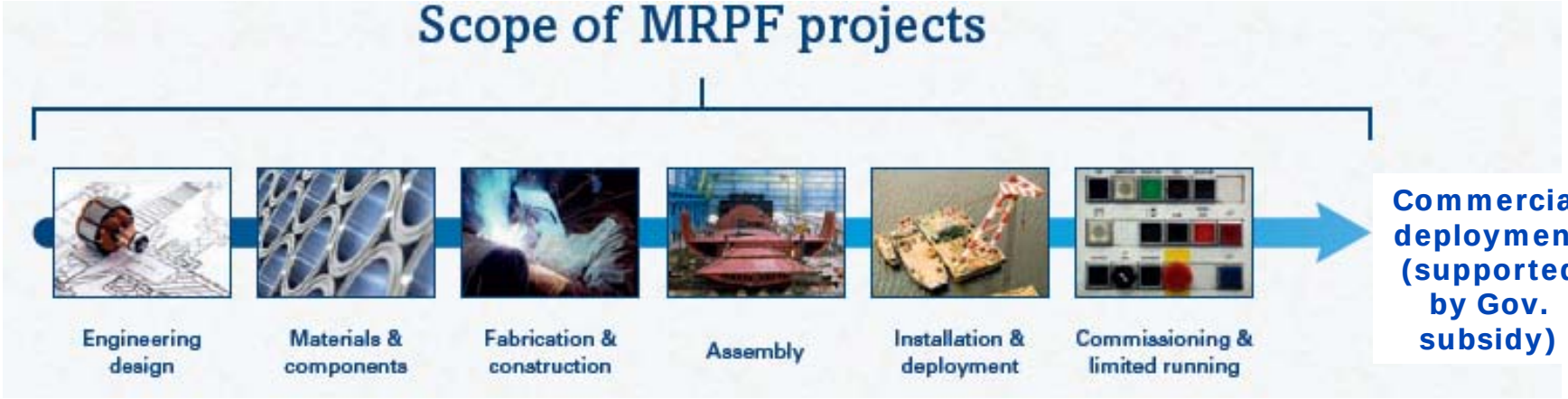
Does marine energy represent a higher risk proposition than other low carbon technologies?

Marine energy is around here

	Basic research	Applied research	Early demon-stration	Full demon-stration	Market accumulation	Market diffusion
Technology journey	Early design/ tank tests	Proof of concept	Scale at sea testing	Full scale prototype	First array 2-5 devices	First round of farms
						
Indicative cost for activity at this stage	~£10k	~£100k	~£1m	~£10m	~£30m	~£100'sm
Typical investors	Technology developers & Business angel	Business angel and VC	VC	VC? Some strategic investment	Strategic investment from utilities and industrials	Utilities and industrials

- Many companies are ready to demonstrate wave and tidal technologies at full scale, but…
- Costs to move to this stage are high, and can represent an unacceptable risk for private investment.
- The cost required to gain certainty around each of these stages are higher for wave and tidal than many other low carbon technologies.
- **Public funding is needed to share the risk of developing wave and tidal technologies, particularly in the current economic climate.**

The Marine Renewables Proving Fund puts public money into leading wave and tidal projects to de-risk private capital



- Conceived and setup by the Carbon Trust, the 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 of up to £5m
- Funding full scale grid connected prototypes for the most promising technologies
- All projects will deliver devices which have the potential to qualify for MRDF.

The six MRPF Projects are scheduled for one of two deployment windows

End of MRPF

Q1 2010	Q2 2010	Q3 2010	Q4 2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011

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Deployment window 1
summer 2010


MCT **Pelamis**

2

Deployment window 2
summer 2011


Aquamarine **HSUK**


Atlantis **Voith**

1



MRDF

Assembly | Installation & deployment | Commissioning & limited running

2





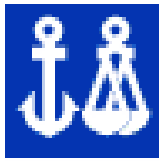

MRDF

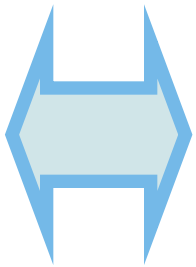
Engineering design | Materials & components | Fabrication & construction | Assembly | Installation & deployment | Commissioning & limited running

CT has put in place an expert team to Mentor project and assess deliverables

- The Carbon Trust Technical Services Team (TST) have identified risks to delivery for each project milestone
- Risks are mitigated through additional support from the TST
- Developers can also request support from TST adhoc.

Carbon Trust Technical Services Team

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MRPF will help *prove* that wave & tidal can make an economic, sustainable & material contribution to the UKs low carbon energy mix

MCT | Pelamis | HSUK | Aquamarine | Voith | Atlantis

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

These projects will:

- Demonstrate what today's front running technologies can achieve.
- Provide insights into construction, deployment and operational challenges.
- Develop the track record and credentials of the industry.
- Prepare the industry for first arrays of wave and tidal energy devices, and help prove the potential of marine energy.

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stephen.wyatt@carbontrust.co.uk

carbontrust.co.uk / marine