

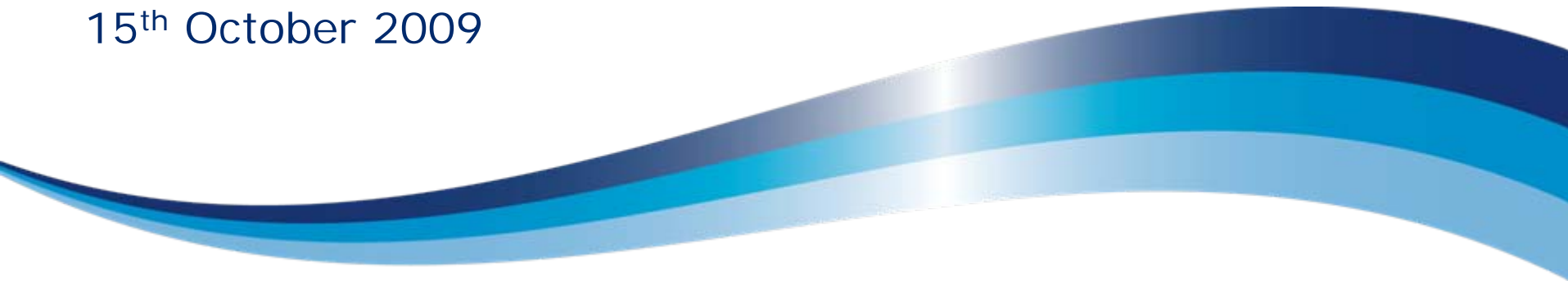


# The Polymer Fuel Cells Challenge

**Launch event**  
**The Hatton**

Dr Robert Trezona  
Head of Research and Development

15<sup>th</sup> October 2009



# Contents

- Rationale for Carbon Trust intervention
- The Polymer Fuel Cells Challenge
- Expression of Interest form
- Q & A

# Background

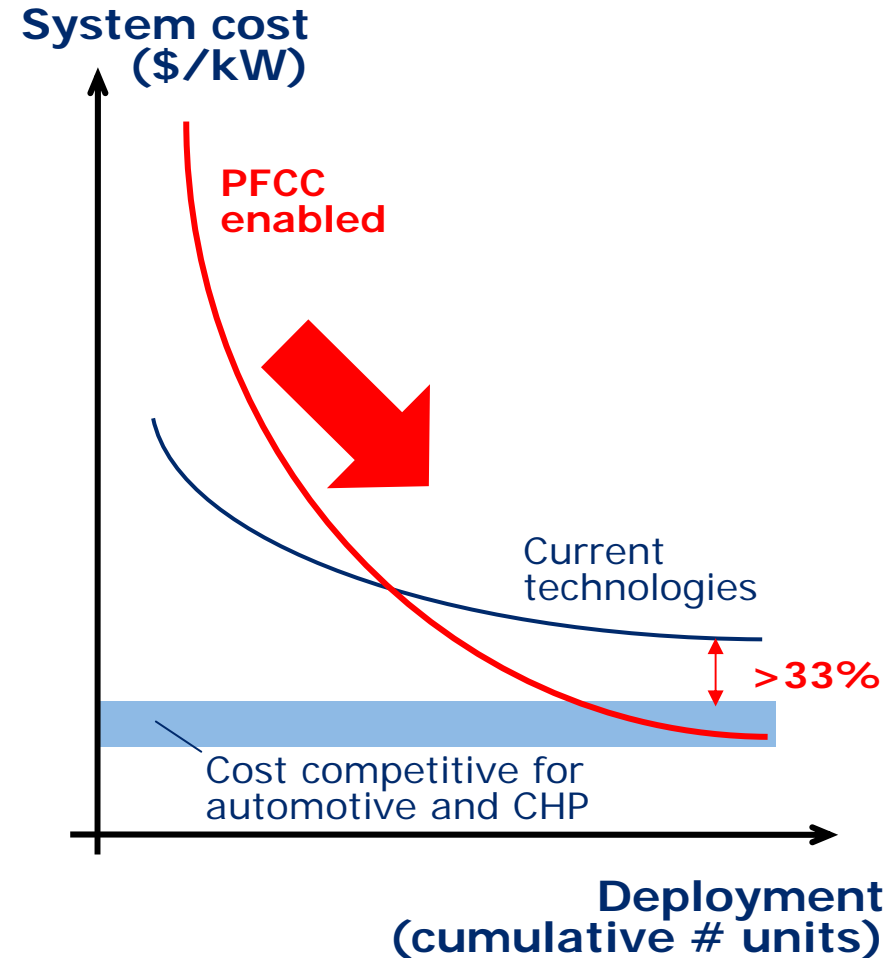
- Recent developments are encouraging ...
  - Rapid growth of niche applications (forklifts, backup power)
  - Developer-customer conversation
  - Many engineering issues have been solved
  - Significant UK research progress
  
- ... but current systems are not competitive in mass markets due to high costs and unproven reliability

# Cost breakthroughs necessary for mass markets

- System and lifecycle cost model
  - current state of the art
  - breakthrough cell technology
- Diffusion modelling of market uptake



- Current technology may not be sufficient to access mass markets (\$180bn worldwide)
- Breakthrough technologies could have significant impact
  - Additional system level cost reductions ~1/3



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# The Polymer Fuel Cells Challenge (PFCC)



## Vision

- **£11m+ investment (£6m from CT) to develop novel polymer fuel cell components** enabling a significantly **lower cost system**
- End deliverable: **contract with a major customer** within 5 years, allowing access to a global market with significant carbon savings

## Mechanism

- The PFCC is a **commercially-focussed investment programme**, not a grant funding scheme
- This ensures optimal leverage and cost-effectiveness of public finance while focussing efforts on real market needs
- CT goals remain not-for-profit, aiming at cost-effective carbon reductions, while leveraging private-sector inputs

# Scope of the PFCC

## Technology

- Polymer electrolyte fuel cells (acid and alkaline)
  - Fuel cell technology enabling largest carbon saving
- Breakthroughs enabling system-level cost reductions ...
- ... expect innovations will mostly be at cell level

## Partners

- Consortia must be led by UK-based organisations
- International partners possible but must be clear UK benefit

## Targets

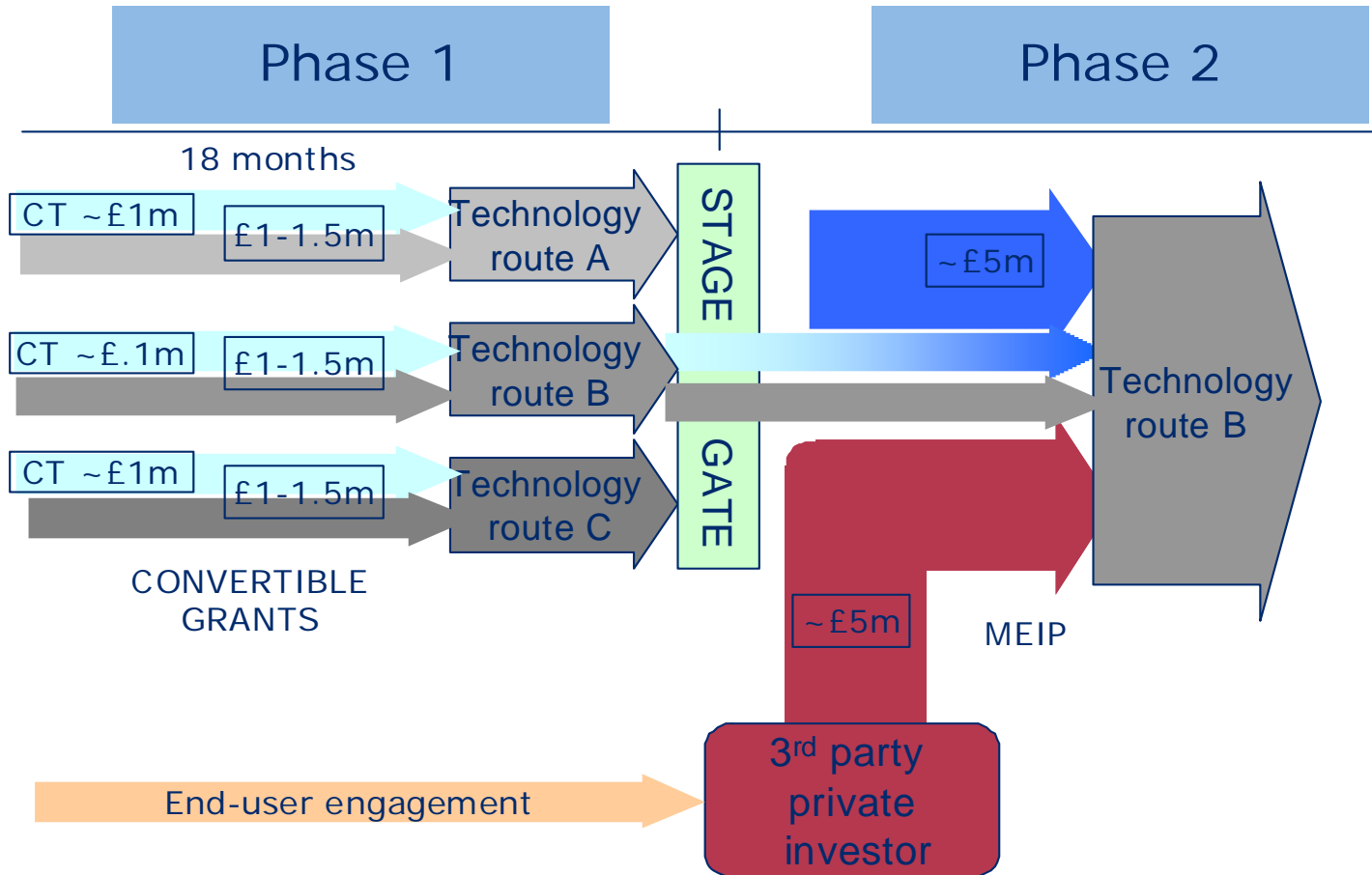
- System **cost savings of at least one third at mass scale** compared to current state-of-the-art technology

# Selection criteria

- Throughout the PFCC, concepts will be evaluated on:
  - size of cost reduction
  - originality
  - existing technology
  - strength of the team - individuals and organisations
  - readiness in 2015 timescale
  - level of technical and commercial risk
  - programme cost effectiveness

NOTE: Carbon Trust is not committed to funding; we will only invest if bids of sufficient quality are received

# Investment structure



# Phase 1

## Research – 18 months

- Up to 3 projects for concept validation
  - Several potential technology routes
  - Engagement with industrial stakeholders
  - De-risk the technology and demonstrate technical feasibility, guided by end-user specifications
- **Up to £1m convertible grants** (subject to State Aid rules)
- Terminate with a competitive review
- One project will be progressed to Phase 2

# Phase 2

## Commercialisation

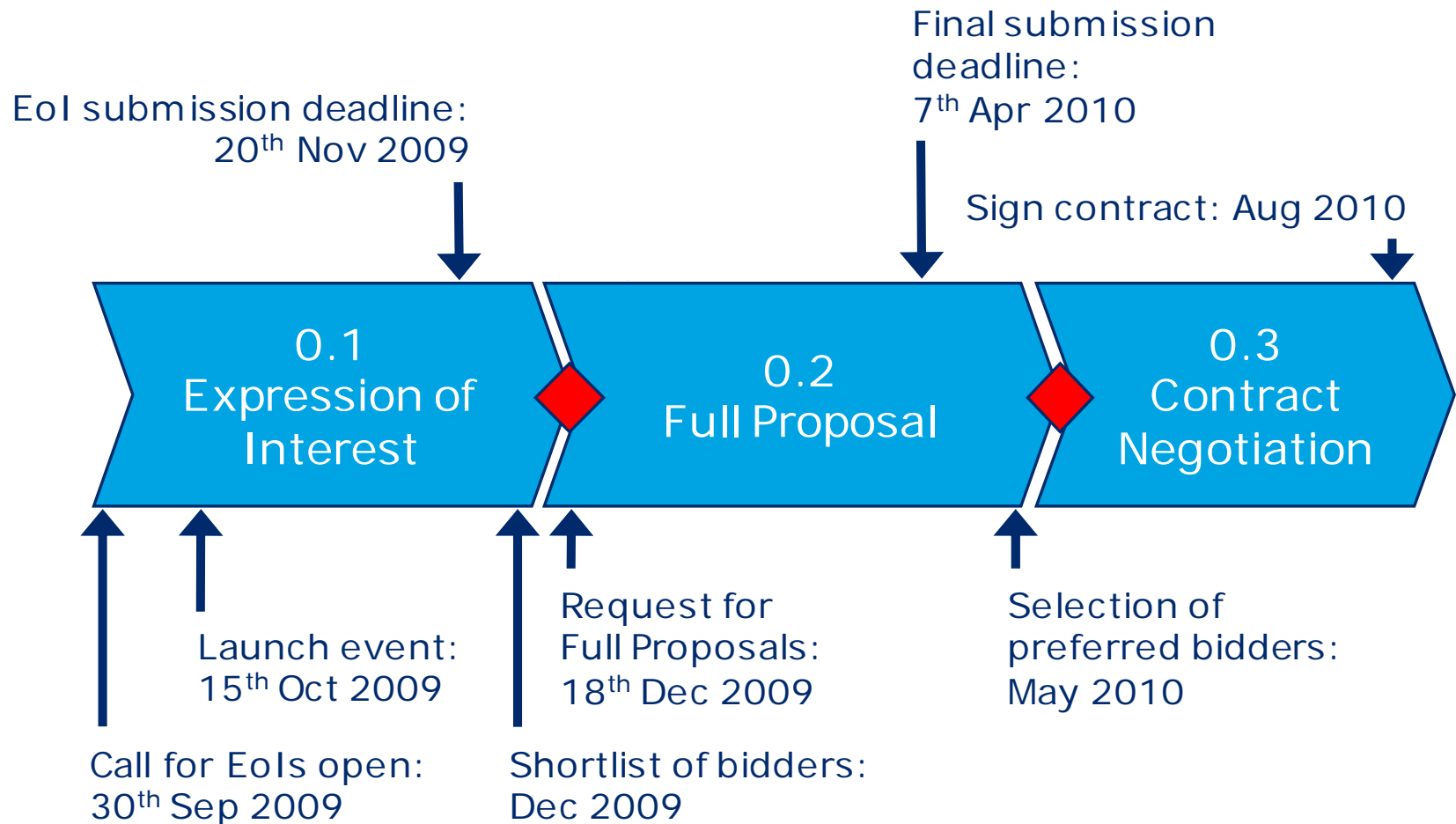


- Detailed commercial arrangements will vary
- Value vested in a commercial vehicle (e.g., company, JV, JDA) with joint stakes by:
  - Project partners (contributing IP, cash and in-kind)
  - Carbon Trust (converting Phase 1 grant funding into equity + **up to £5m of additional finance**)
  - 3<sup>rd</sup> party private investor (VCs / industrial)
- Stakes will reflect value of contributions
- The Carbon Trust has no intention of retaining long-term ownership of IP: overall objective is to develop low-carbon technologies as quickly as possible

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- Application process and Expression of Interest form
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# Application Process timeline



# Application Process details

- Phase 0.1 – Expressions of Interest
- Phase 0.2 – Short list for full proposals
  - Principles of the EoI must be maintained
  - Mentoring and help with techno-economic system analysis
  - Summary of relevant background IP, outline business plan, technical and commercial risks
- Phase 0.3 Contract negotiation
  - Negotiate detailed commercial terms
  - Still a competitive step
  - Real skin in the game

# Expression of Interest (EoI)



- Please read the “PFCC EoI Guidance Notes” carefully
- The EoI Form consists of the following four Sections:
  - 1. Administrative details
  - 2. Project team
  - 3. Previous applications
  - 4. Project description

## Polymer Fuel Cells Challenge Expression of Interest

**NOTE:** This Expression of Interest should be filled in using the Guidance notes document, and must be sent as a PDF file to [pfcc-applications@carbontrust.co.uk](mailto:pfcc-applications@carbontrust.co.uk) by 3pm on Friday 20<sup>th</sup> November 2009. Hardcopies will not be accepted.

If you have any questions regarding the application process or this form, please contact [directed.research@carbontrust.co.uk](mailto:directed.research@carbontrust.co.uk) or Richard Taylor from E4tech on +44 (0) 203 008 6140 before the application deadline.

### 1. Administrative details

#### 1.1. Project details

Project title  
Project Duration  
Earliest practicable start date  
Total project costs

Phase 1:	£	
Phase 2:	£	
Total:	£	
Phase 1:	£	
Phase 2:	£	
Total:	£	

Of which the funding requested from the Carbon Trust is:

#### 1.2. Personal details

The person who will receive all correspondence from the Carbon Trust

Title	Please select
First name	
Surname	
Job title	
Phone number	
Email	
Name of organisation	
Web address	
Nature of organisation	Please select
Sector	Please select
Address Line 1	
Address Line 2	
Town	
Post code	
Region	Please select
Country	

### 2. The project team

#### 2.1. Who are the lead and partner organisations?

	Legal Name of Organisation	Location	Sector
Lead			Please select
Partner A			Please select
Partner B			Please select
Partner C			Please select
Partner D			Please select
			Please select
			Please select
			Please select
			Please select

#### 2.2. Please provide details of any subcontractors:

--

Under special circumstances, the Carbon Trust reserves the right to suggest the formation or re-structuring of consortia, if appropriate. The Carbon Trust may also suggest non-mandatory changes to the project organisations, should this strengthen the proposal.

### 3. Previous applications

#### 3.1. List any previous relevant R&D project applications

	Project Title	Recipient	Source	Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

### 4. Project description

Using a **maximum** of four A4 sides of free text, and three A4 sides of exhibits, please include brief details on each of the following:

- How will your proposed technology route address the system cost-reduction challenge?
- What will you do to take your technology from its current state to proof of commercial viability?
- Why does your team have the skills, experience and resources to carry out this challenging work?
- How you plan to take the technology, if successful in your technical programme, to market?

Further details relating to these questions are given within the accompanying EoI Guidance documentation. You may copy and paste text from another document, using bullets and formatting if desired. Diagrams or figures that help with descriptions may also be included after the project description prose. The project description, then any exhibits, should be appended to this EoI form and submitted as a single PDF document.

# Eol form sections 1, 2 & 3

## Section 1 Administrative details

- Proposed project and costs for **Phase 1** and **Phase 2**
- State Aid: **maximum** of 80% intensity for companies

## Section 2 Project team

- Consortium must have a UK lead organisation
- No limits on organisation size or type
- The same team cannot **lead** multiple consortia (but different teams from the same organisation could) and the same team can participate in multiple consortia
- Funding will be limited for non-UK based partners: expect self-funding for work conducted outside the UK
- Subcontractors are contracted on fully commercial terms

## Section 3 R&D projects in progress or application

# EoI form section 4



- How will your proposed technology route address the system cost-reduction challenge?
- What will you do with up to £11m to take your technology from its current state to proof of commercial viability?
- Why does your team have the skills, experience and resources to carry out this challenging work?
- How do you plan to take the technology, if successful in your technical programme, to market?

# EoI form hints & tips

- Remember to ...
  - Be concise (4 page limit for section 4)
  - Avoid jargon and explain acronyms
  - Where possible provide evidence
  - Complete all sections
  
- Application form should read as a standalone document
  
- Reviewers familiar with polymer fuel cell technology

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# Our website

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

Applied research

Technology  
acceleration

Incubator

Directed Research  
Accelerators

Introduction to  
Directed Research  
Accelerators

Advanced  
Photovoltaics

Advanced Bioenergy  
Accelerators

The Pyrolysis  
Challenge

Algae Biofuels  
Challenge

**Polymer Fuel Cells  
Challenge**

Industrial Energy  
Efficiency Accelerator  
Challenge

## Use your unique perspective to win the £8million Polymer Fuel Cells Challenge

✉ Email to a friend

🖨 Printer friendly



### Can you unlock the power of Fuel Cells?

Fuel cells have the potential to power the planet cleanly and efficiently. But the cost of producing them is currently too great for widespread commercial application.

### Or is it?



#### One amazing challenge

The Carbon Trust is reaching out to UK innovators to submit ideas for a solution.

And you don't even need to be a fuel cells

### Polymer Fuel Cells Challenge

#### Key timeline:

1. Closing date for submissions 3pm, Friday 20th November 2009.
2. Notification of second round applicants: December 2009.
3. Full proposal stage starts December 2009.

Download some FAQs relating to the challenge

[Download](#) 188kb

# Document updates

- The FAQs on our website regularly updated during the EoI stage, (e.g., will be updated with questions raised today)
- We may, as a result of important questions raised at today's event, update the EoI Guidance Notes next week
- If so, we will notify you so you can download it again

# Any more questions ...

- Carbon Trust website  
[www.carbontrust.co.uk/fuelcells](http://www.carbontrust.co.uk/fuelcells)
- Contact for queries  
[directed.research@carbontrust.co.uk](mailto:directed.research@carbontrust.co.uk)  
Richard Taylor on +44 (0)203 008 6140
- Submit your team's Expression of Interest by  
**3pm, Friday 20<sup>th</sup> November 2009** as a single PDF to  
[pfcc.applications@carbontrust.co.uk](mailto:pfcc.applications@carbontrust.co.uk)