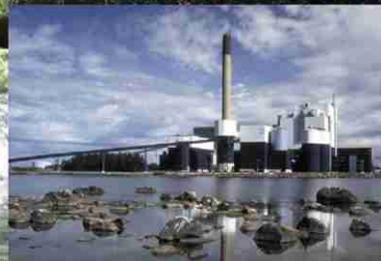
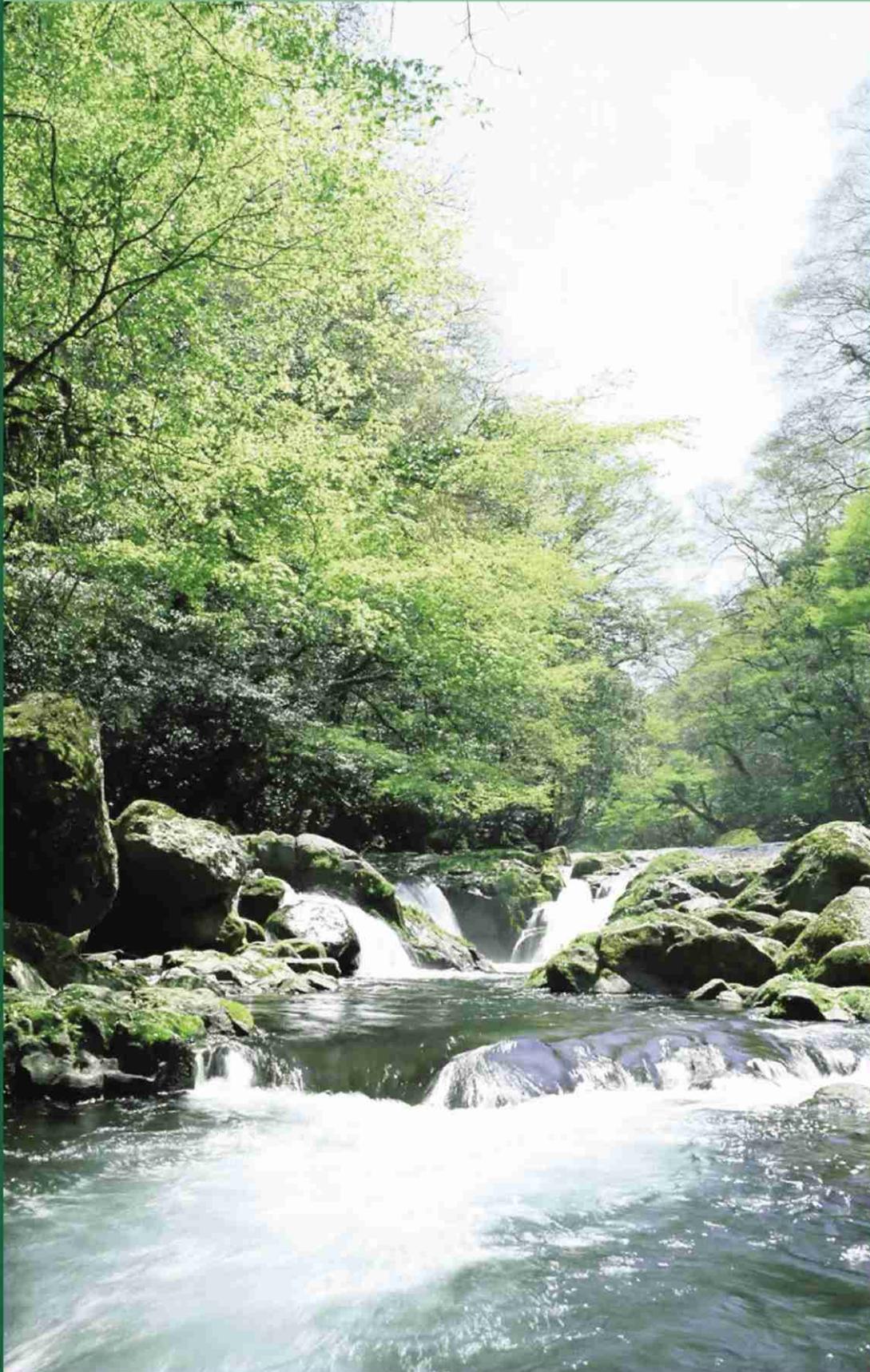


Workshop on Carbon Abatement Technologies

Implementing the Strategy

**Wednesday
27 February
2008**

**BERR
Conference Centre
London**



**UK ADVANCED POWER GENERATION TECHNOLOGY
FORUM**

**WORKSHOP ON CARBON ABATEMENT
TECHNOLOGIES
- DEVELOPMENT AND IMPLEMENTATION OF
FUTURE UK STRATEGY**

REPORT ON QUESTION & ANSWER SESSION

BERR Conference Centre, London, 27 February 2008

INTRODUCTION

Carbon capture and storage (CCS) is seeing increasing funding in the UK going into research, development and demonstration (RD&D) together with an increasing number of proposals for full scale demonstrations of CCS or of advanced 'capture ready plant'. Early rapid deployment of CCS technologies is now recognised as an important issue in meeting the climate change mitigation targets agreed across Europe and providing a serious option worldwide. As a result there has been a significant expansion in the engagement of the stakeholder community including industry, researchers, NGOs and government departments. This has culminated in the announcement of the UK CCS Demonstration Competition and the formation of several organisations that recognise the importance of CCS and CATs for fossil fuels. These include the Energy Research Partnership (ERP) and the Energy Technology Institute (ETI), both of which have strong support from government and industry. The Technology Strategy Board also remains an established UK Government funding route for CAT R&D. Parallel developments are also occurring elsewhere in the world, especially in the EU with the Zero Emissions Platform (ZEP) and the priority of CCS in the EC Framework Programme FP7 in Energy.

The UK Advanced Power Generation Technology Forum (APGTF) provides the focus for the Power Generation sector in the UK on the research and development activities on fossil fuel, including biomass and waste, and associated technologies including CO₂ capture and storage. This focussing role is becoming increasingly important with the UK RD&D landscape in energy getting more complex. The APGTF sees itself as a preferred stakeholder body for giving advice and information on CAT and CCS RD&D strategy, its implementation and priorities.

As part of this function the APGTF organised this workshop with the following aims :

- to provide an update on the fossil energy CAT/CCS strategy in the UK and the EU
- to hear from the major funding and strategy stakeholders on their CAT/CCS strategy and their needs for advice or information on future RD&D
- to discuss the priorities for RD&D and how the APGTF should move forward

The workshop consisted of invited presentations covering the UK and EU strategies and initiatives, with an opening talk from Malcolm Wicks, Minister for Energy; the presentations can be found on the APGTF web-site (www.apgtf-uk.com). This was followed by a Question & Answer session in which all delegates were invited to participate to consider the priorities for RD&D and discuss how the APGTF should move forward.

This document is a report of the Question & Answer session and the accompanying discussions. The output from the workshop will be fed into the Government and other national and international funding agencies to help ensure success with CAT/CCS for the UK and it will be used to help develop the role of the APGTF and its mode of operation.

THE QUESTION & ANSWER SESSION

The session was facilitated by George Marsh of BERR. The following introductory text and the Questions were given to the delegates on arrival at the workshop to allow them time to consider their responses.

Introduction

The potential role of Carbon Abatement Technologies (CATs) in reducing GHG emissions is gaining increasing recognition and importance both in the UK and internationally. This is illustrated by a number of key developments over the last 12 months. The UK can rightly claim to be showing leadership through the launch of its competition for a full-scale demonstration of post combustion CCS. The European Technology Platform for Zero Emission Power Plant (ETP-ZEP) recommendation for 10 to 12 CCS demonstrations to be operational by 2015 across the EU was endorsed in the Commission's communication to the 2007 Spring Council. And the IEA's presentation to the UNFCCC's Bali conference gave results showing that 600 CCS power plant will be required by 2030 if the atmospheric concentration of CO₂ is not to exceed 450ppm.

So we are not short of challenging targets for CCS, but are we, and in particular the UK doing enough of the right things to help meet these targets?

The purpose of this session is to discuss what should go into a future UK strategy for Carbon Abatement Technologies. This needs to address issues such as:

- What should the balance be between the three areas for action in the present CAT Strategy (ie efficiency improvement, co-firing and CCS)?*
- What should the balance be between work on CO₂ capture, transport and storage?*
- What should the balance be between research, pilot scale demonstration and full-scale demonstration?*
- Do we need more full-scale demonstration projects, and if so how should they be supported?*

The session used an interactive scoring system that posed a number of propositions that delegates voted on and then discussed after seeing the answers. These propositions, the voting and the main points in the subsequent discussion, are presented below.

Question 1

What type of organisation are you representing?

Fuel Supplier - Coal	Fuel Supplier – Oil & Gas	Equipment Supplier	Utility/ Power Generator	Consulting Engineer	Finance /Law	R&D/ Academia	Government / Funding Agency	Other (e.g. NGO)
0	2	13	14	16	0	29	12	14

Question 2

The UK’s CAT Strategy aims to support five complementary areas of research, development and prototype demonstration, namely:

- **Improvement in generation efficiency**
- **Co-firing with biomass**
- **Carbon dioxide capture**
- **Carbon dioxide transport**
- **Carbon dioxide storage**

Is this correct, and what should be the order of priority between these areas?

Improved Efficiency	Co-firing	CO₂ Capture	CO₂ transport	CO₂ storage
3rd	5th	1st	4th	2nd

Question 3

What are the priority areas for innovation in each of the CAT areas? That is:

- **Blue skies R&D**
- **Applied/industrial R&D**
- **Pilot scale demonstration**
- **Full-scale demonstration**
- **Other**

Only voted on 1st, 2nd and 3rd priorities from Question 2

	Blue skies R&D	Applied R&D	Pilot Scale demonstration	Full-scale demonstration	Other
Improved Efficiency	4th	1st	3rd	2nd	5th

	Blue skies R&D	Applied R&D	Pilot Scale demonstration	Full-scale demonstration	Other
CO₂ Capture	4th	3rd	1st	2nd	5th

	Blue skies R&D	Applied R&D	Pilot Scale demonstration	Full-scale demonstration	Other
CO₂ Storage	4th	3rd	2nd	1st	

Comments on the voting and views from delegates in the discussion of the results for Question 3:

Improved efficiency – the absolute scores for 1st, 2nd and 3rd priorities were very close, suggesting that the delegates believe all three to be important

CO₂ Capture – there was some surprise at the ‘Blue skies R&D’ score, which although it was 4th, its absolute score was still significant. Delegates’ comments were that there was still potential for new ideas in this area eg new solvents, membranes; also some felt that the demonstration projects would create the need for underpinning R&D and some delegates classified this as ‘Blue skies R&D’.

CO₂ Storage – all the scores were significant but of the three areas (efficiency, capture and storage), this one was the most heavily weighted towards demonstrations; a general view from the delegates was that this reflected the times-scale requirement and its urgency. Some geologists felt the emphasis should be on pilot scale but the overall consensus was that full-scale demonstration was the first priority.

UQuestion 4

What other actions could the Government take, in addition to its current activities on the CCS demonstration, the CAT programme and CCS Regulation to support the implementation of near zero emission fossil fuel technologies?

Support for component/sub-system RD&D	Support for Storage prospecting	Feasibility studies for pipeline networks	Acceleration of the demonstration competition activities	Other
4th	3rd	2nd	1st	5th

Comments on the voting and views from delegates in the discussion of the results for Question 4:

The 1st, 2nd and 3rd choices all scored highly, although the 1st choice was highest by a significant margin.

A few delegates expressed the view that for ‘Acceleration of the demonstration competition activities’, process issues eg planning, could be the main limitation.

There was some surprise that ‘Feasibility studies for pipeline networks’ scored so highly, when according to some delegates there are five different, ongoing studies of this.

UQuestion 5

The UK Government is currently committed to supporting one full-scale demonstration of CCS. If the Government was to support additional CCS capacity what type of incentive should it use?

Regulation making CCS mandatory	CCS Obligation on electricity suppliers	Contract for differences on ETS permit price	Free allocation of ETS permits	Emission limit regulation	Leave it to the ETS	Other
3rd	2nd	1st	5th	4th	6th	5th

Comments on the voting and views from delegates in the discussion of the results for Question 5:

The voting for the 1st, 2nd and 3rd choices was very close and significantly above that of the remaining choices.

UQuestion 6

CCS plant may take 3-5 years to build and commission. When should the Government aim to introduce an incentive for additional CCS capacity?

Now	By 2010	By 2015	By 2020	Later
1st	2nd	3rd	4th	5th

Comments on the voting and views from delegates in the discussion of the results for Question 6:

The voting was heavily in favour of sooner rather than later, with 68% voting for 'Now', 18% for 'By 2010' and 8% for 'By 2015'.

Question 7

What are the greatest non-technical barriers to the commercial realisation of CCS?

Need for regulation/legislation	Financial mechanism	Health and safety	Social acceptance	Other
2nd	1st	4th	3rd	5th

Comments on the voting and views from delegates in the discussion of the results for Question 7:

The 1st, 2nd and 3rd choices all scored highly, although the 1st choice was highest by a significant margin.

Some delegates were surprised that 'Social acceptance' did not rank higher because if the media or public perception were anti-CCS, it could be a show-stopper.

The voting for 'Other' was small but significant. Other issues that were felt to be potential barriers included: problems with recruitment and the skills base; the size of the manufacturing base and whether it can be grown quickly enough.

CHAIRMAN'S CLOSING REMARKS

The Chairman thanked the speakers and delegates for making it a successful workshop. He hoped that there would be significant progress on the main issues raised for CCS to report at next year's workshop.

UK ADVANCED POWER GENERATION TECHNOLOGY FORUM

WORKSHOP ON CARBON ABATEMENT TECHNOLOGIES - DEVELOPMENT AND IMPLEMENTATION OF FUTURE UK STRATEGY BERR Conference Centre, 1 Victoria Street, London, 27 February 2008 PROGRAMME

0915-0945	Registration and Coffee	
0945	Chairman's Introduction	<i>Nick Otter, Chairman APGTF ALSTOM Power</i>
1000	Opening Talk	<i>Malcolm Wicks, Minister for Energy</i>
Part 1	The International Scene	
1020	A Vision for roll-out of CCS	<i>Lord Oxburgh, President CCSA</i>
1040	Carbon Abatement Technology Strategy in the EU	<i>Pierre Dechamps, European Commission</i>
1100	Clean Fossil Power Generation in IEA World Energy Outlook 2007	<i>Brian Ricketts, IEA</i>
1120	Q&A and Discussion	
Part 2	UK Strategy and Initiatives for CCS	
1140	UK CAT/CCS Strategy	<i>Bronwen Northmore, BERR</i>
1200	A View from the Energy Technologies Institute	<i>David Clarke, Chief Exec, ETI</i>
1220	Q&A and Discussion	
1230-1330	Lunch + Posters	
1330	A View from the Technology Strategy Board	<i>David Way, TSB</i>
1350	UK Research Councils' Programme for CAT/CCS	<i>Alison Wall, EPSRC</i>
1410	An Industrial Viewpoint	<i>Mike Farley, Doosan Babcock</i>
1430	Q&A and Discussion	
Part 3	The Future for APGTF and Priorities	
1450	APGTF Vision and Way Forward	<i>Nick Otter, Chairman APGTF</i>
1510-1540	Tea and Refreshments	
Part 4	Delegates Views on Key Issues	
1540	Facilitated session with delegates	
1645	Chairman's summing up	
1700	Close	
	Reception	