



Doosan Babcock Energy

ACCAT (Advisory Committee on Carbon Abatement Technologies for Fossil Fuels) – Recommendations to Ministers

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All-Energy CCS Session May 2009

**ACCELERATING
THE DEPLOYMENT
OF CARBON
ABATEMENT
TECHNOLOGIES**

**WITH SPECIAL FOCUS
ON CARBON CAPTURE
AND STORAGE**

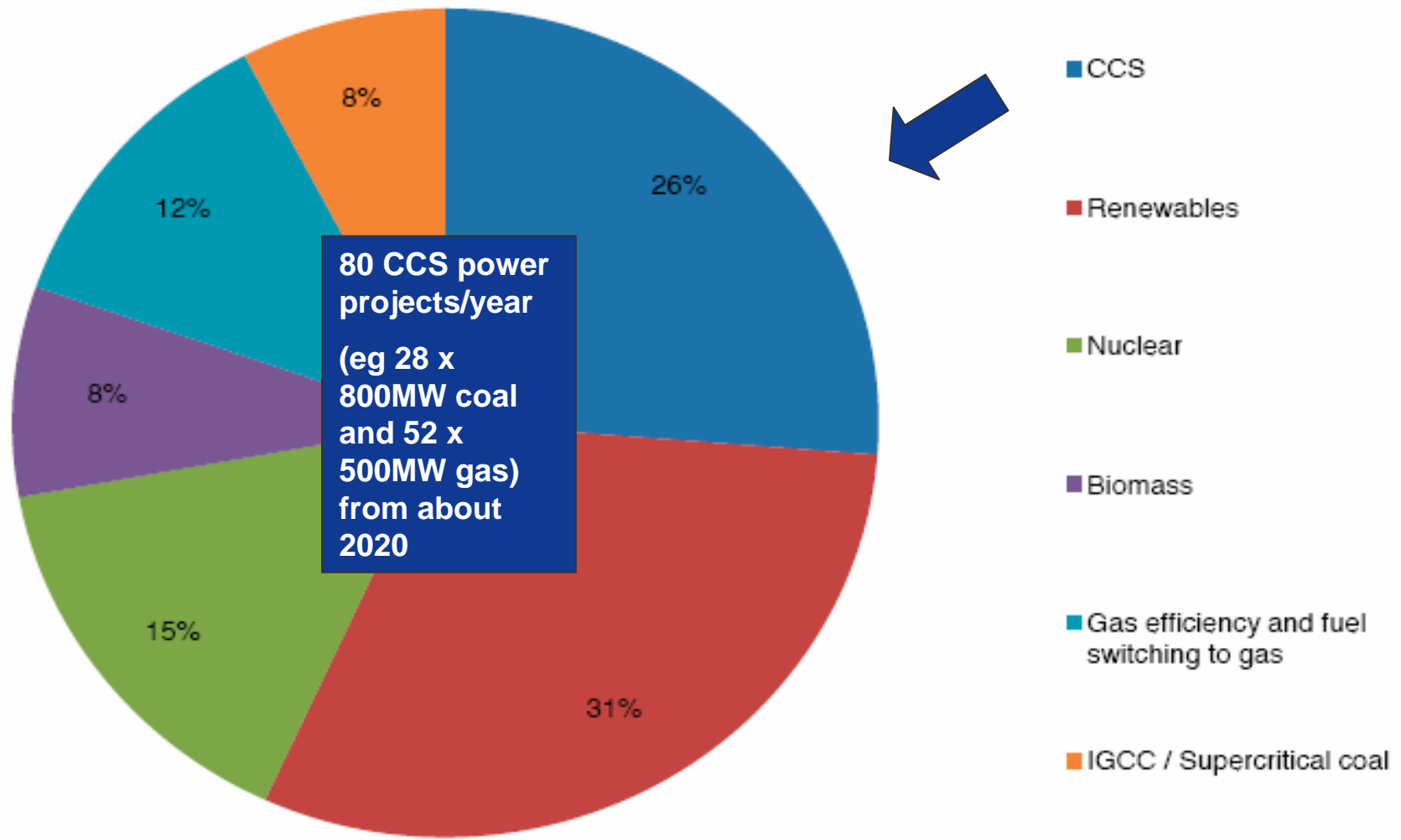
*Auxiliary document from ACCENT
Executive Summary*



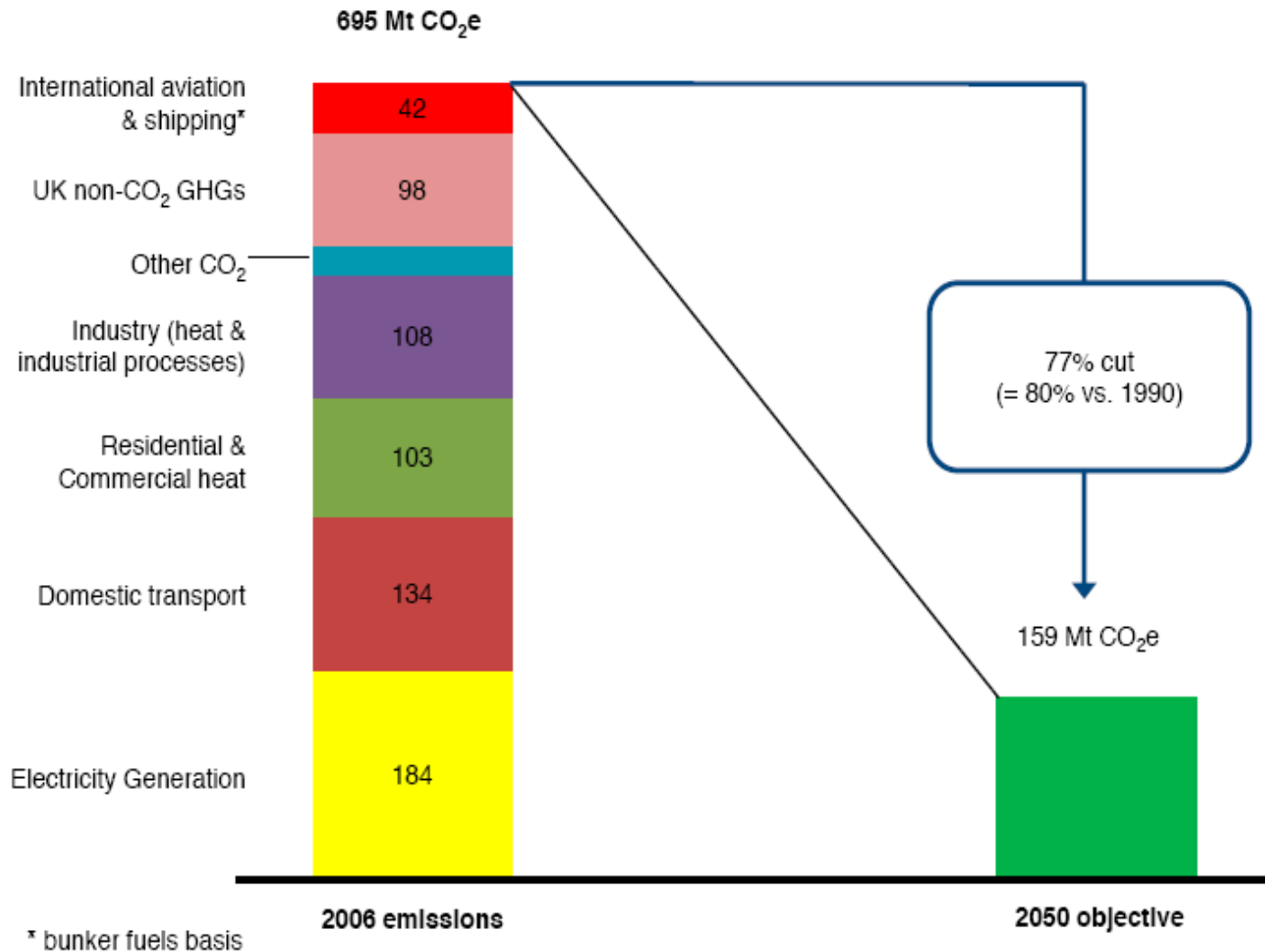
Introduction

- Report produced by ACCAT in response to wide calls for acceleration of development, demonstration and deployment of CCS
- G8 calling for commercialisation by 2020
- UK Climate Change Committee said policy must be designed to facilitate a major take off of CCS in the 2020s

Global power generation abatement in 2050 (IEA BLUE Map scenario)



The scale of the challenge for target emissions reductions (UKCCC)



Source: UK National Atmospheric Emissions Inventory (2008).

- **Background**
- **Need and urgency: the rationale for a revised Carbon Abatement Technologies strategy**
- **Current world status of Capture and Storage of CO₂**
- **Global initiatives**
- **Status of CAT-related industries in the UK**
- **Opportunities and constraints for the UK**
- **Demonstration and deployment of CATS in the UK**
- **CAT strategy and actions**
- **Conclusions and recommendations**

CCS Demonstration – timescales and ambitions

Research and Development	Now and continuing
UK Regulations	2010, with adaptation to 2025
Early demonstration projects (including capture-ready plant)	2012/15
UK Competition 300 MW CCS demonstration on pulverised coal	Operational by 2014
Phase 3 of ETS	From 2013
10-12 demonstrations in Europe	Operational by 2015
EU target for full commercialisation	By 2020
World CCS requirement to 2030 based on IEA data ^[2] , "450 stabilisation" case	22 coal (800 MW) CCS and 20 gas (500 MW) CCS power plants per year from 2013 to 2030 ¹
World CCS requirement to 2050 based on IEA data ^[3] , "BLUE Map" scenario	28 coal (800 MW) CCS and 52 gas (500 MW) CCS power plants per year from 2020 to 2050 ²

Scale-up of CCS capacity needed to commercialise CCS on power plant by 2020

IEA Energy Technology Perspectives

In support of the G8 Plan of Action
“Scenarios and Strategies to 2050”
“Blue Map Scenario” has CCS on power plant responsible for 19% of CO₂ savings in 2050

GAP
between
current
policies and
needs

80 CCS power projects/year
(eg 28 x 800MW coal and 52 x 500MW gas)
from about 2020

5.6 Gt/y

x1000

20 full scale CCS demonstrations globally (10 - 12 in the EU), operational by 2015

25Mt/y

More than 6 industrial scale demonstrations 60-250MW planned, for operation 2009 -2012

2009 -2012

Pilot scale demonstrations in the 10 – 40MW range for operation by 2012

x5

5Mt/y

CO₂ Stored

CCS projects/yr

20 CCS projects over 7 years

80 CCS projects/year for 30 years

RECOMMENDATIONS

1. The revised CAT strategy sets some challenging targets:

- **Adoption of a target for the successful deployment of CATs, in particular CCS, so that 10% of UK power generation capability (approximately 40 TWh/y) would be provided by fossil-fuel plant operating with CCS by 2020.**
- **Implementing measures to create a capability in CCS in the UK, so that CCS can make a major contribution to the requirement for a 80% CO₂ emission reduction by 2050 (against a 1990 baseline)**
- **Positioning the UK for success in the global markets and influence in the EU and global policy dialogue.**

Recommendations (continued)

2. ACCAT recommends that this strategy be adopted by Government in order to achieve these targets and to retain its position amongst the leading nations. The following key elements of this strategy need to be pursued urgently:

- The UK should be hosting three coal and one gas full-scale CCS demonstration projects, to be operational by 2015. A range of geological storage settings should also be tested by these projects, including 2 or 3 different types of saline aquifer, a depleted gas field, and a depleted hydrocarbon field (with or without enhanced oil recovery).

Recommendations (continued)

- Plans must be developed for large-scale deployment of transport infrastructure, including recognition of likely obstacles, such as financing and permits; identify options for overcoming these barriers.
- The Government must urgently establish incentives for deployment of a tranche of “early stage deployment” projects additional to the initial full-scale demonstrations. Such incentives should supplement the incentive of the carbon price, until this provides sufficient incentive itself.
- The Government and industry must work with national and international bodies to develop long-term, stable regulatory and financial frameworks to enable the global deployment of CCS.

Recommendations (continued)

- A sustained programme of R,D&D support for universities and industry is needed to provide underpinning support to the demonstration programme and to perform strategic research at a level competitive with rival and partner nations in the EU and world.
- A strategic programme of competencies and skills development is required, to develop researchers, professional engineers, technicians and skilled craftsmen.
- The Government and industry must promote understanding of CATs, particularly CCS and engage the full range of stakeholders including the public.

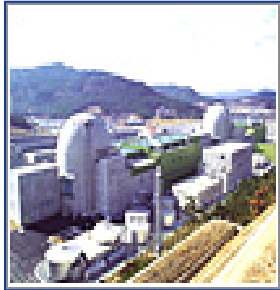
Recommendations (continued)

- 3) A managed programme is required to co-ordinate the UK's research, development and demonstration activities in CCS. This should include international outreach activities, particularly to promote UK-based technology abroad and support technology and knowledge transfer, especially in developing countries.
- 4) The Government and industry need to rise to the scale of the CCS challenge and they need to do this now.

DECC announcements 23 April 2009

- Additional support for up to 4 CCS projects in the UK
 - We have long argued that more than one demonstration is needed and that amine-scrubbing, Oxyfuel firing and pre-combustion capture should all be demonstrated.
- Announcement of the requirements that all new coal, gas, oil and biomass power plants must be capture-ready - i.e. suitable for subsequent adoption of CCS.
 - This, too, sets an important example to developers of power plant globally; providing a reminder that to meet CO2 targets CCS will be needed on gas as well as coal power plants.
- DECC proposes that the basis on which coal-fired power plant will be permitted in future: i.e. “no new coal without CCS demonstration from day one” and “full scale retrofit of CCS within five years of the technology being independently judged as technically and commercially proven”

Company update – Doosan Babcock



Nuclear



Thermal



Turbine &
Generator



Desalination



Casting & Forging



Construction

- Doosan Babcock Energy Limited is a subsidiary of Doosan Heavy Industries and Construction of South Korea, part of the Doosan Group, and a market leader in gas, coal, nuclear power generation and desalination
- The company will offer Pre, Post combustion and Oxyfuel carbon capture and advanced supercritical boilers
- Doosan Babcock Energy has been designated the Doosan global Centre of Excellence and R+D Centre for Boilers (including Clean coal and CCS)

PostCombustion

Doosan Babcock offers amine capture technology to its global customer base in the UK.

OxyCoal™ 2

40MW pilot
in UK



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