

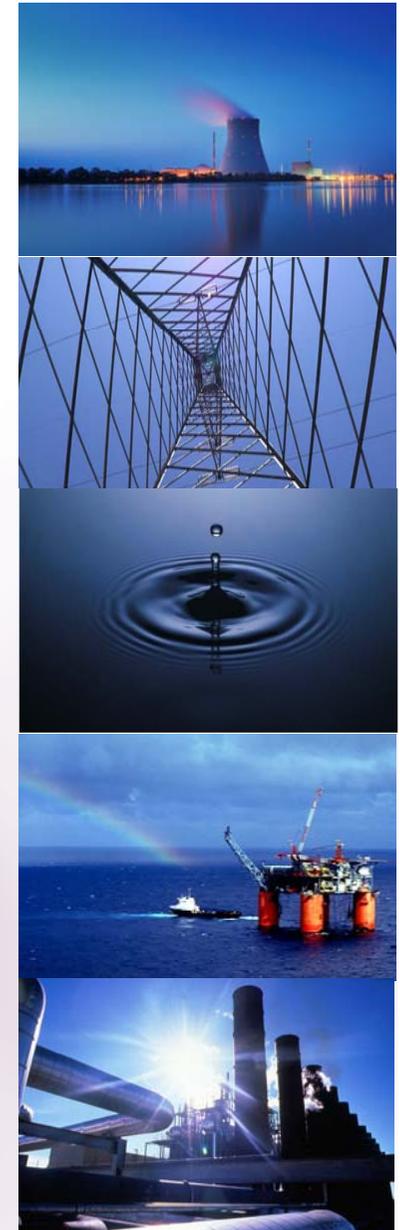
UK-US Workshop Carbon Capture & Storage Technologies

UK Perspective

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Technology Strategy Board



Scope

- Technology Strategy Board
- UK CCS position
- R&D Funding landscape
- TSB activities in scope for potential collaboration

Technology Strategy Board

Remit

- Non-Departmental Public Body guided by a business-led Governing Board-largest funder of business innovation
- Delivering UK's innovation R&D strategy
- Supporting and investing in business led innovation across a number of technology areas
- Budget – ~£1bn between 2008-11

Key Investment Areas include:

Energy, Transport, Sustainability,
Healthcare, Built Environment, Creative Industries



Criteria for support

- Is technology at right stage?
- Is there a market?
- Does UK have capacity?
- Does TSB add value?

Tend to operate in TRL 3-6 space



How we deliver

- **Primarily through grants for collaborative R&D**
- **Typically 3 year duration**
- **Minimum 2 partners (1 industrialist)**
- **Typical 50% funding (25% for demo)**
- **Typical Grants £250k- £2.5m (larger possible)**
- **International partners allowable- but not funded**

Key Technology Areas

- High value-added manufacturing processes.
- Advanced materials.
- Nanotechnology.
- Bioscience.
- Electronics, photonics and electrical systems.
- Information and communication technologies.

Key Application Areas

- Environmental sustainability.
- Energy generation and supply.
- Healthcare.
- Transport.
- Creative industries. (eg Media, design,)
- High-value services. (eg finance, retail, leisure)
- Built environment.

UK Position on CCS

Recent UK Policies and Measures

Policy

- No new coal generation without CCS
- Demonstrations of at least 400MW
- Regulated via planning (Electricity Act, Infrastructure Planning Commission) and operation (Environment Agency)

Demonstration Programme

- Funding of 4 demonstrations via CCS incentive
- Provision to fund retrofit
- Presumption that all coal plant built from now on will be 100% retrofitted with CCS by 2025.

CCS Pilot projects (CO2 capture)

Project	Size & technology	Operational dates
Longannet (Scottish Power, E.On)	1 MWe Post-combustion capture only	Yes, since 2009
Aberthaw (RWE)	3 MWe Post-combustion capture only	No, planned delivery by 2011
Didcot testing facility (RWE)	0.5 MWt Oxy-fuel and amine capture only	Yes, since 2008
Renfrew (Doosan Babcock)	40 MWt Oxy-fuel combustion	Yes, since 2009.
Ferrybridge (Scottish and Southern Electricity)	15 MWt Post-combustion capture	No, construction due to start in 2010

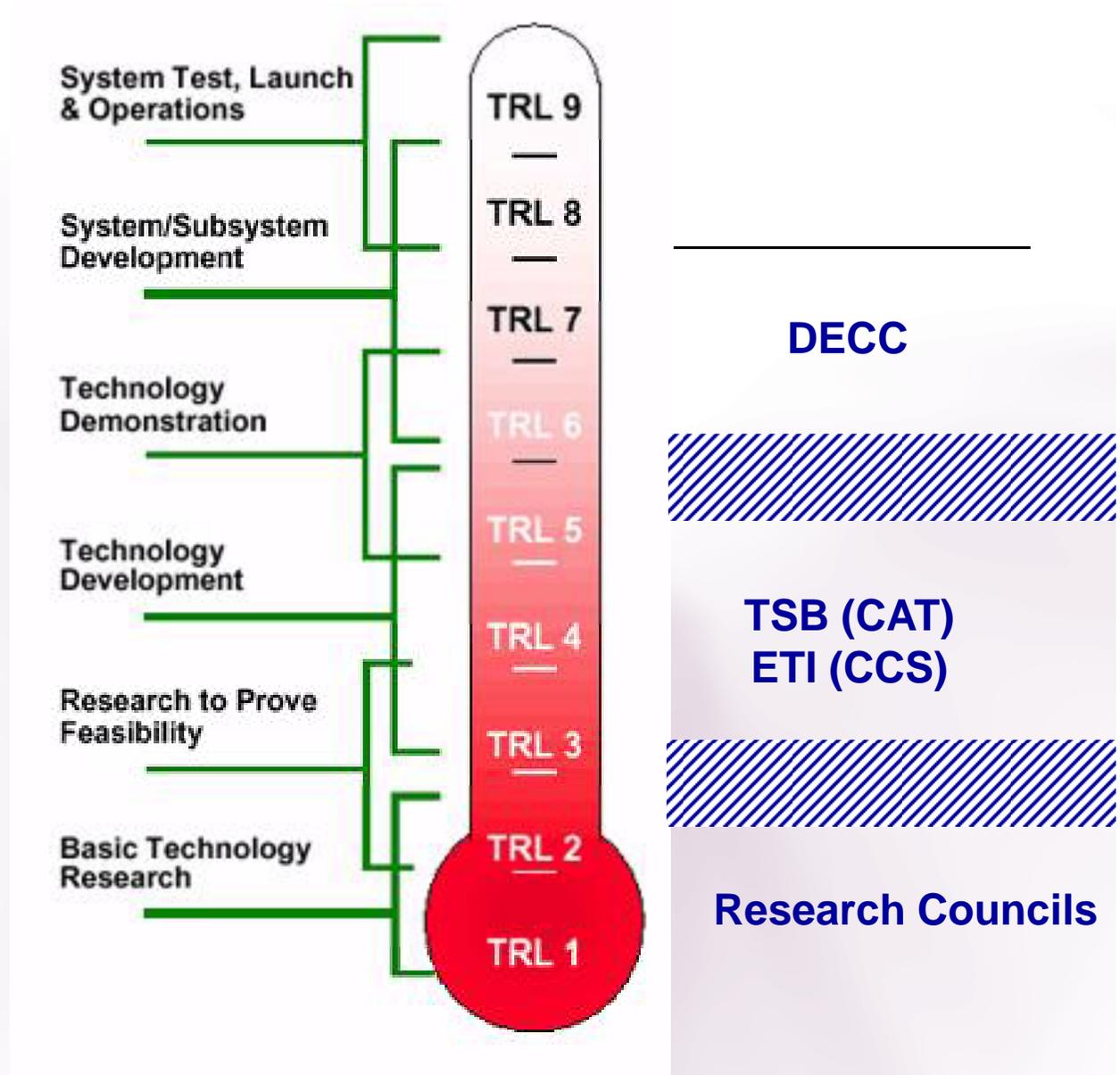
Planned CCS demonstration projects

Project	Size & technology	Public funding	Operational dates
Longannet (Scottish Power)	300-400 MWe Post-combustion capture, transport and storage	Bidder in UK post-combustion competition	Planned delivery by 2014
Kingsnorth (EON)	300-400 MWe Post-combustion capture, transport and storage	Bidder in UK post-combustion competition	Investment decision to be reviewed in 2016
Hatfield (Power Fuel)	450 MWe IGCC capture, transport and storage	EUR180m Grant from EC under the EU Economic Plan for Recovery for stage 1	Planned delivery by 2015

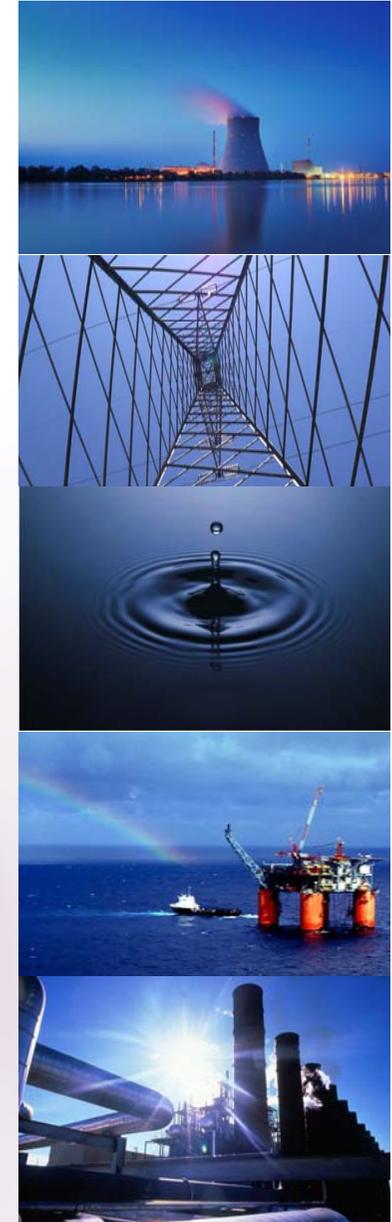
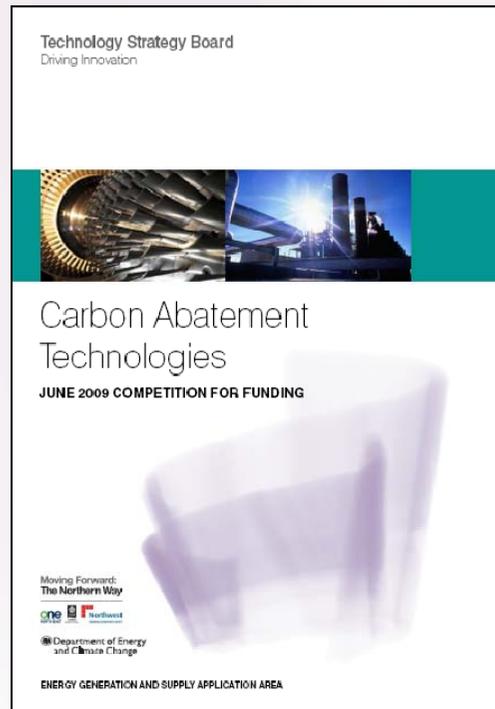
UK support for R,D&D

- **Research Councils**
 - To date £15m on CCS for basic research and capacity building
- **Technology Strategy Board**
 - Portfolio of £7m for industry led CAT projects
 - **New £15m call in 2009 jointly with DECC**
- **Energy Technologies Institute**
 - CO₂ storage study, mineralisation, next generation capture technology, MMV (budget ~£40m over 3 yrs)
- **Environmental Transformation Fund (ETF)-DECC**
 - 40 MW oxy-fuel CO₂ capture (Renfrewshire, Scotland)
 - 5MW post-combustion CO₂ capture (Ferrybridge)

Technology Readiness Levels and Players in CATs/ CCS



Technology Strategy Boards Carbon Abatement Technology Competition 2009 *(up to £15m)*



CATs and TSB/DECC criteria

Fits TSB criteria to invest through R&D programme

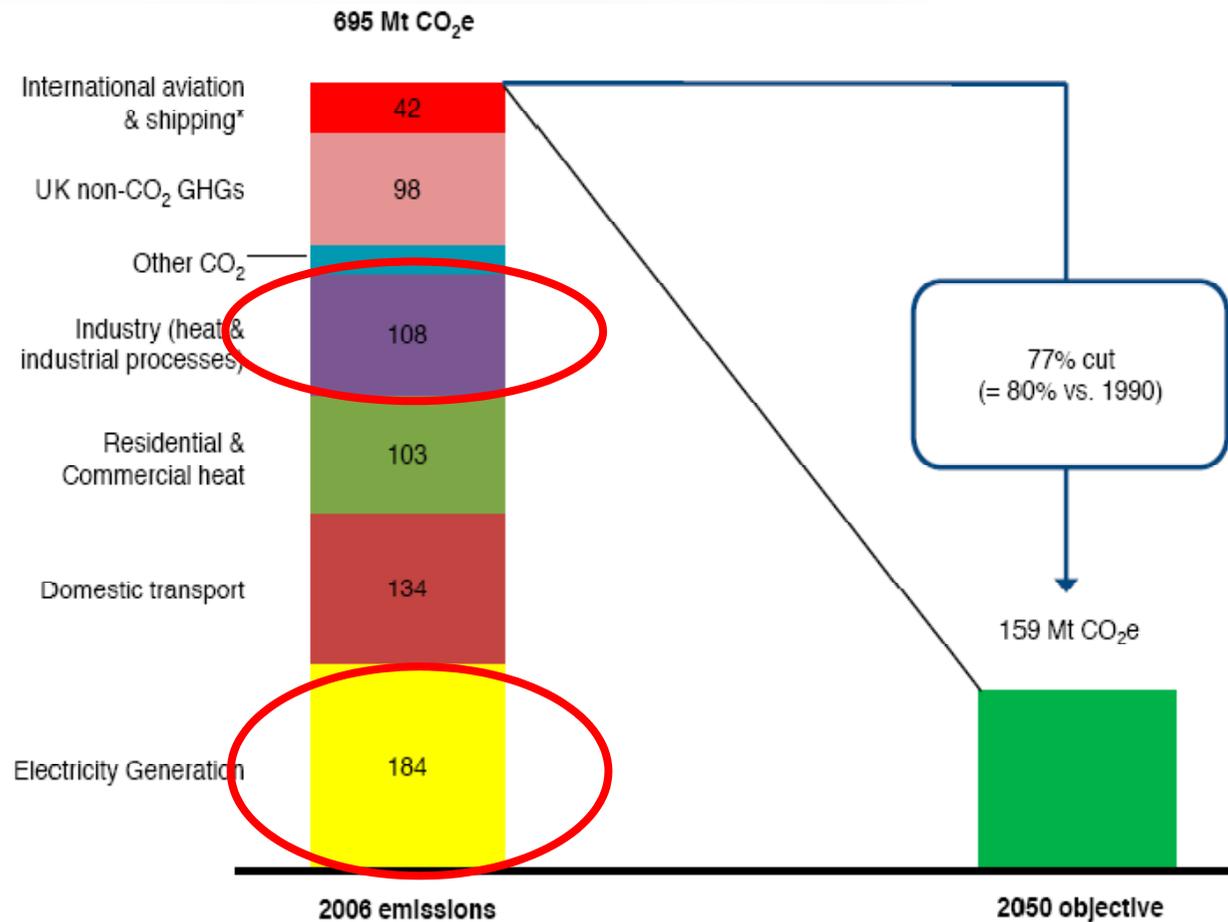
UK (& regional) capacity	Global opportunities (market)	Timeliness & impact	Added value
High	High	High	High



In addition helps fulfils Energy Policy targets

- Reduced CO₂
- Security of Supply

The Challenge



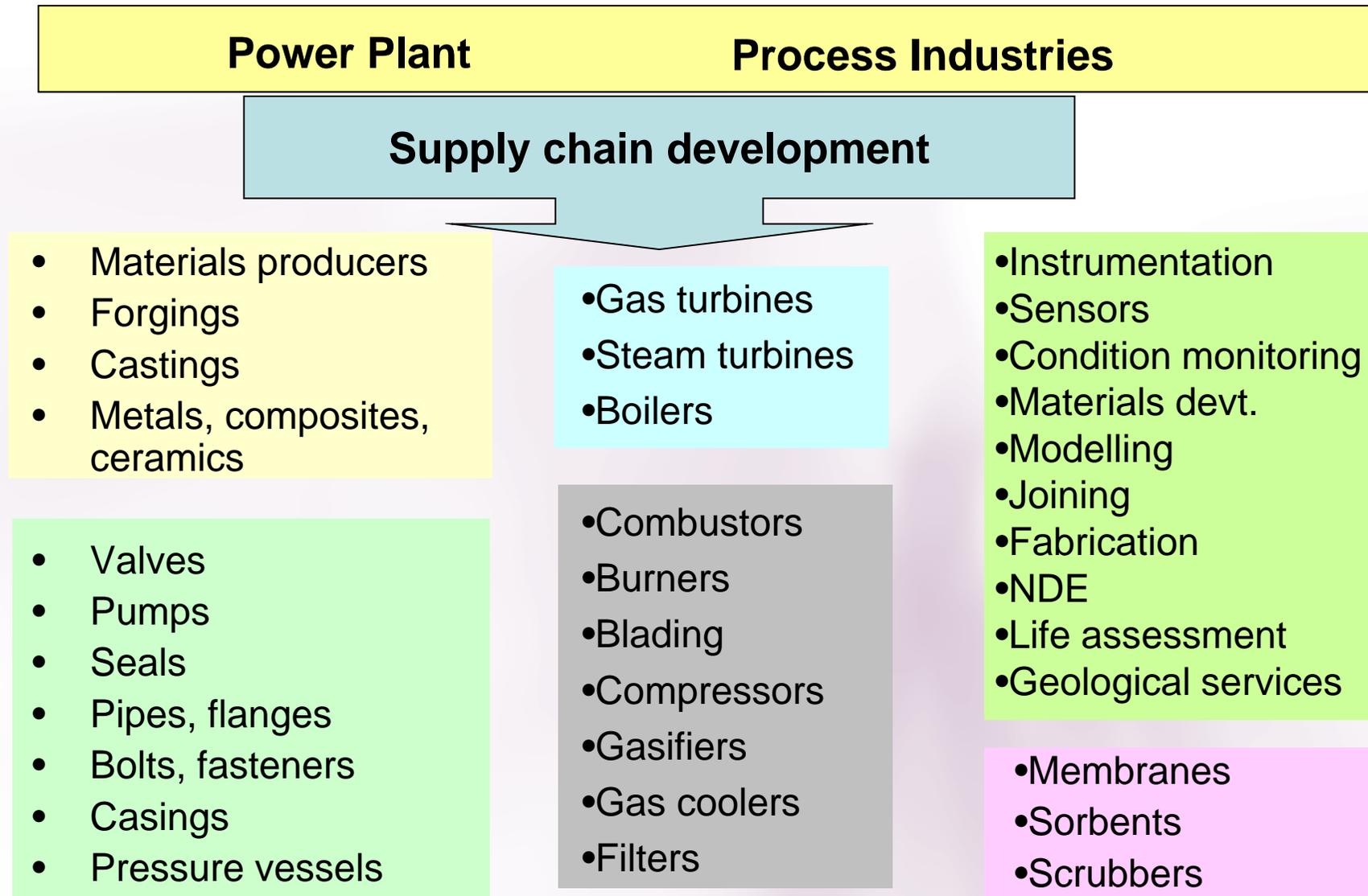
Source: UK National Atmospheric Emissions Inventory (2008).

Focus of competition

- Large single point sources of CO₂ emission
 - Fossil power plant
 - Process industries (eg metals, cement, petrochem)
- Cost effective, energy efficient solutions with high reliability & durability
- Acceleration to market



Who to engage?



The Scope

- Efficiency conversion processes to reduce the amount of fuel consumed and the associated CO₂ emissions.
- Fuel switching to lower carbon alternatives such as co-firing with biomass or waste.
- Carbon capture technologies for large single point sources, CO₂ transport , storage and use.
- Development of underpinning technologies in support of CATs such as; materials, NDE, inspection, joining, instrumentation, modeling and condition monitoring



Funded projects

- 10 CRD projects
 - 4 materials
 - 3 sensors/monitoring
 - 3 CO₂ capture
- 21 feasibility studies
- Portfolio size ~£50m



TSB funded projects for discussion (9 of 10)

MATERIALS	9-12 Cr Steam plant materials	TWI
	9-12 Cr Steam plant materials	EON
	GT blade coatings	SIEMENS
	GT Disc corrosion fatigue lifing	RR
SENSORS	Gravity CO ₂ sensors	BP
	GT high T sensors	OXENSIS
CO2 CAPTURE	Algae	CPI
	Water Gas shift	BP
	CC100Pilot+	Doosan

TSB position

- Currently developing an international strategy
- Welcome DECC/DoE support for brokering the workshop and potential collaboration opportunity
- Consortium (not TSB) has to buy into collaboration benefits – can make costs eligible from within existing project budget. At this point, no additional funding.

www.innovateuk.org

