

UK Research Councils' Energy Programme and support for Clean Coal

Jacqui Williams
Energy Senior Portfolio Manager



The Engineering and Physical Sciences Research Council

- We are the main UK government agency for funding research and training in engineering and the physical sciences
- We invest around £800 million a year so the UK will be prepared for the next generation of technological change

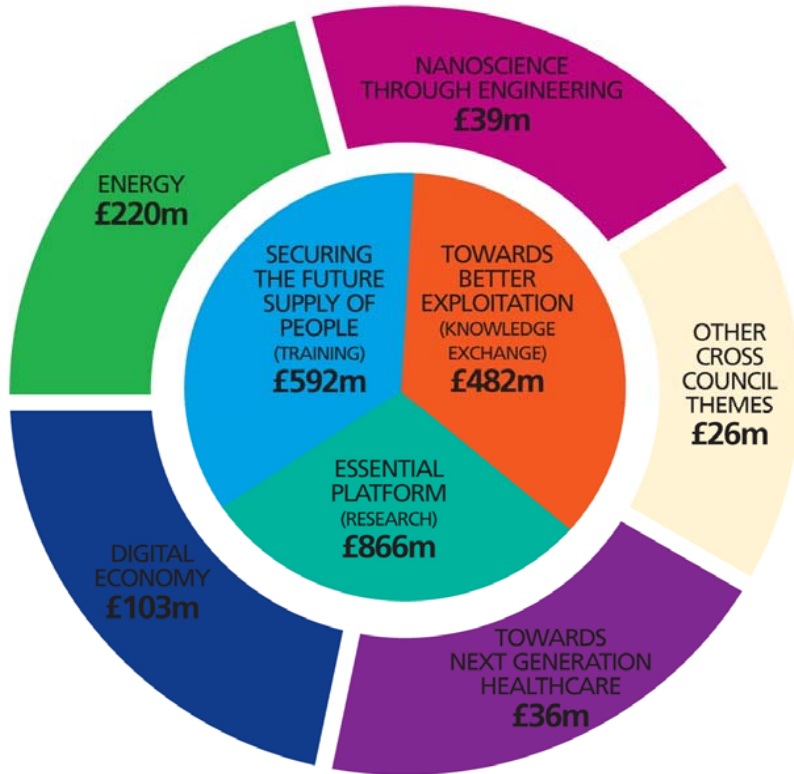
EPSRC

Engineering and Physical Sciences
Research Council

EPSRC Organisation Structure

Department for Innovation, Universities and Skills (DIUS)						
DIUS Science and Innovation Group						
Research Councils UK						
AHRC	BBSRC	EPSRC	ESRC	MRC	NERC	STFC
Council Chairman: Mr John Armitt						
Chief Executive: Professor David Delpy						
Business Innovation Directorate: Catherine Coates	Communications & Information Directorate: Atti Emecz	Corporate Services Directorate: Stuart Ward		Research Base Directorate: Lesley Thompson		

The Whole EPSRC Picture



Living with environmental change (£9m)
Global Uncertainties: security for all in a changing world (£6m)
Ageing: life-long health and wellbeing (£11m)

Values are commitment 2008-11



Responding to Global Challenges

ENERGY

EPSRC lead

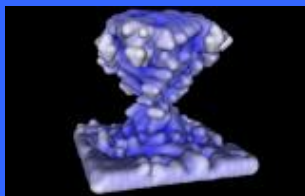
BBSRC
ESRC
NERC
STFC



NANOSCIENCE THROUGH ENGINEERING TO APPLICATION

EPSRC lead

BBSRC
ESRC
NERC
STFC
MRC



LIVING WITH ENVIRONMENTAL CHANGE

EPSRC
BBSRC
NERC lead

ESRC
STFC
MRC
AHRC



AGEING: LIFE LONG HEALTH & WELLBEING

EPSRC
BBSRC
ESRC
NERC
STFC
MRC lead
AHRC



DIGITAL ECONOMY

EPSRC lead

AHRC
ESRC
MRC



GLOBAL UNCERTAINTIES: security for all in a changing world

EPSRC
BBSRC
ESRC lead

NERC
STFC
MRC

AHRC



Mission

To position the UK to meet its energy and environmental targets and policy goals through high quality research and postgraduate training.



Drivers:

- Tackling climate change by reducing carbon dioxide emissions both within the UK and abroad.
- Ensuring energy security.
- Ensuring energy affordability.



Energy Programme Objectives

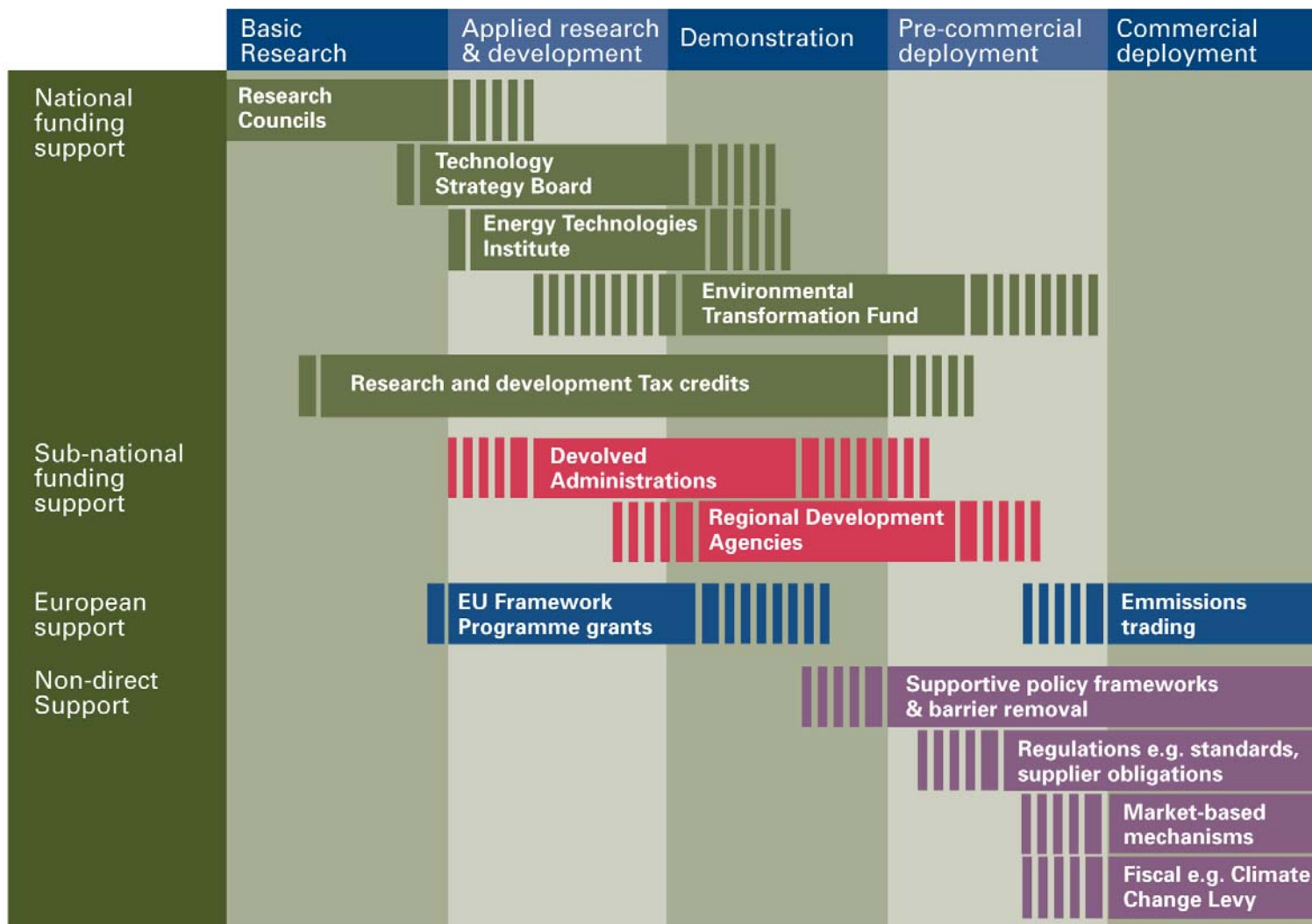
To support a **full spectrum of Energy research** to help the UK meet the objectives and targets set out in the 2007 Energy White Paper

To increase the **international visibility** and level of international collaboration within the UK energy research Portfolio.

To **work in partnership** to contribute to the research and postgraduate training needs of energy-related business and other key stakeholders

To expand the **UK research capacity** in energy-related areas.

The Energy Landscape: Public Sector Funding



Priorities 2008-11

£319m planned investment by the Research Councils

- A whole system approach to energy options, supply and usage.
- Rapid exploitation through collaboration with ETI.
- Growing portfolio in demand reduction and transport.
- Focused postgraduate training in energy themes.
- Continue research in sustainable power generation & supply/alternative sources.



International

- Working with RCUK priority countries.
- Two joint calls with China in renewable energies and cleaner fossil fuels - £10m.
- Joint call with South Africa.
- Joint £10m initiative in solar agreed with India.
- Scoping joint training programme with US on nuclear.

Key Achievements

- Research and postgraduate skills in nuclear energy: helping to 'keep the nuclear option open'.
- SUPERGEN programme - world leading research including wind and marine energy, photovoltaics, fuel cells, bioenergy, hydrogen – through large consortia between UK academics, 80+ industry and other key stakeholders.
- UK Energy Research Centre, (UKERC) - leading whole systems research and directly informing government policy.
- ETI project development in marine and wind energy.
- Strategic partnerships with industry, for example a £10M collaboration with E.ON.



Future activities this Spending Review



2009/10

- SUPERGEN Renewals
- Nuclear Materials (with STFC).
- Demand Reduction – Energy Efficiency in Buildings, IT in Demand Reduction Ideas Factory, Energy in Communities.
- CCS – Storage and Whole System.

2010/11

- International Review.
- SUPERGEN III.
- Geo-engineering Sandpit.
- Transport Challenge
- Generation / supply 'Challenge

Emerging Themes for 2011 Onwards



- Speculative research:
 - To define future energy options.

- Accelerated deployment of alternative energy technologies:
 - Ensuring physical, economic, social and natural sciences research and basic research challenges are addressed – working with TSB, ETI and others.

- Understanding future energy options:
 - Social, environmental and economic implications (working with LWEC).

- Reducing energy consumption and demand:
 - Development of behavioural, market and technological advances informed by a whole system understanding.

- Building capacity:
 - Providing the skilled people to deliver new energy futures through the training and development of new researchers, policy makers and business leaders.

Carbon Capture and Storage: Current Support



Current £15m CCS portfolio includes:

Capacity building

☛ UKCCS consortium

£2m jointly funded by NERC and EPSRC; led by Imperial College with 13 other organisations; engineering, technological, environmental, social and economic scientists. The Consortium was a way to rapidly expand UK research capacity.

Carbon Capture and Storage: Current Support

Capacity building

- **£1m Centre for Innovation in CCS at the University of Nottingham**

Challenging Engineering award to Professor Mercedes Maroto-Valer - interdisciplinary research and postgraduate training to bring ideas from basic science and develop them into new products, processes and services. To 2012.

- **£4.7m CO₂ capture from power plant and atmosphere**

Science and Innovation award - 6 new lectureships in CCS to Edinburgh and Heriot-Watt universities; just started. New technologies for CO₂ capture from power plant and biomass to capture CO₂ from the atmosphere. Partners include Doosan Babcock, Mott MacDonald, Air Liquide, C-Questor, Scottish Enterprise and WWF. To 2013.

Carbon Capture and Storage: Capacity Building

New CCS Centres for Doctoral Training (**£11m+ investment**)

- University of Nottingham with Birmingham and Loughborough: **Efficient Power from Fossil Energies and Carbon Capture Technologies Industrial Doctorate Centre.**

Developing engineering research leaders with considerable time spent in industry. Includes: Welsh Power, Alstom, Doosan Babcock, Corus, Air Products, Rolls-Royce, RWE, Corus, CPL, Innospec, E.ON.

- University of Leeds: **Technologies for a Low Carbon Future.**

Innovative technologies for a low carbon future. 20 project partners including Alstom, E.ON and Doosan Babcock.

9 other CDTs within energy portfolio.

Carbon Capture and Storage: Current Support

- **£2.9m CRIUS project** at Cambridge, Leeds, BGS and Manchester which seeks to evaluate the kinetics of fluid-rock interactions in reservoirs to model geological carbon storage. To 2013
- **£1.7m CO₂ Aquifer Storage Site Evaluation and Monitoring (CASSEM)** TSB/EPSRC project led by industry, and including research on public acceptance. Heriot-Watt, Edinburgh, BGS, Manchester with ScottishPower, AMEC, Marathon Oil, Schlumberger and Scottish and Southern Energy. To 2010
- **£2.8m Sussex Energy Group** includes work on CCS and policy e.g. report “UK policy on carbon capture and storage: Squaring coal use with climate change?” To 2010
- **£93k Carbon Capture and Storage Interactive: CCSI - Edinburgh** Public engagement project using an interactive demonstrator of CO₂ linked to climate change and CO₂ capture from power plant and from the atmosphere. To 2010

Carbon Capture and Storage: Planned activities

Planned activities over the next few months:

Projects

- ☛ Joint call with E.ON for consortia proposals in carbon capture and transport (proposals currently being announced) (£5m).
- ☛ Call for cleaner fossil fuels projects in collaboration with China (proposals currently being assessed) (£4m).
- ☛ Call being planned in carbon storage, environmental impact and CCS whole systems (£2.5m).

Coordination and networking

- ☛ Plans for a network to take forward the work of UKCCS and bring together the different activities in CCS (£1m).

Exploitation

- ☛ One of the public sector funders of ETI.

Carbon Capture and Transport

New projects being announced:

- Materials for Next Generation CO₂ Transport Systems: Newcastle led, £1.5m
- Oxyfuel Combustion: Leeds led, £1.7m
- Step Change Adsorbents and Processes for CO₂ capture: Nottingham led, £1.5m

Coal technology/Combustion

Projects include:

- Optimisation of biomass/coal co-firing processes through integrated measurement and computational modelling: Kent led, £860k
- Oxycoal UK: Imperial led, £630k
- A novel process for the combustion of coal using an oxygen carrier: Cambridge, £270k