

**British Institute of Energy Economics**  
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***Energy White Paper 2007***  
***Meeting the Energy Challenge***

**Vicky Pryce**

**Director General, Economics, BERR**

**Joint Head of the Government Economic Service**

# Our key long term challenges

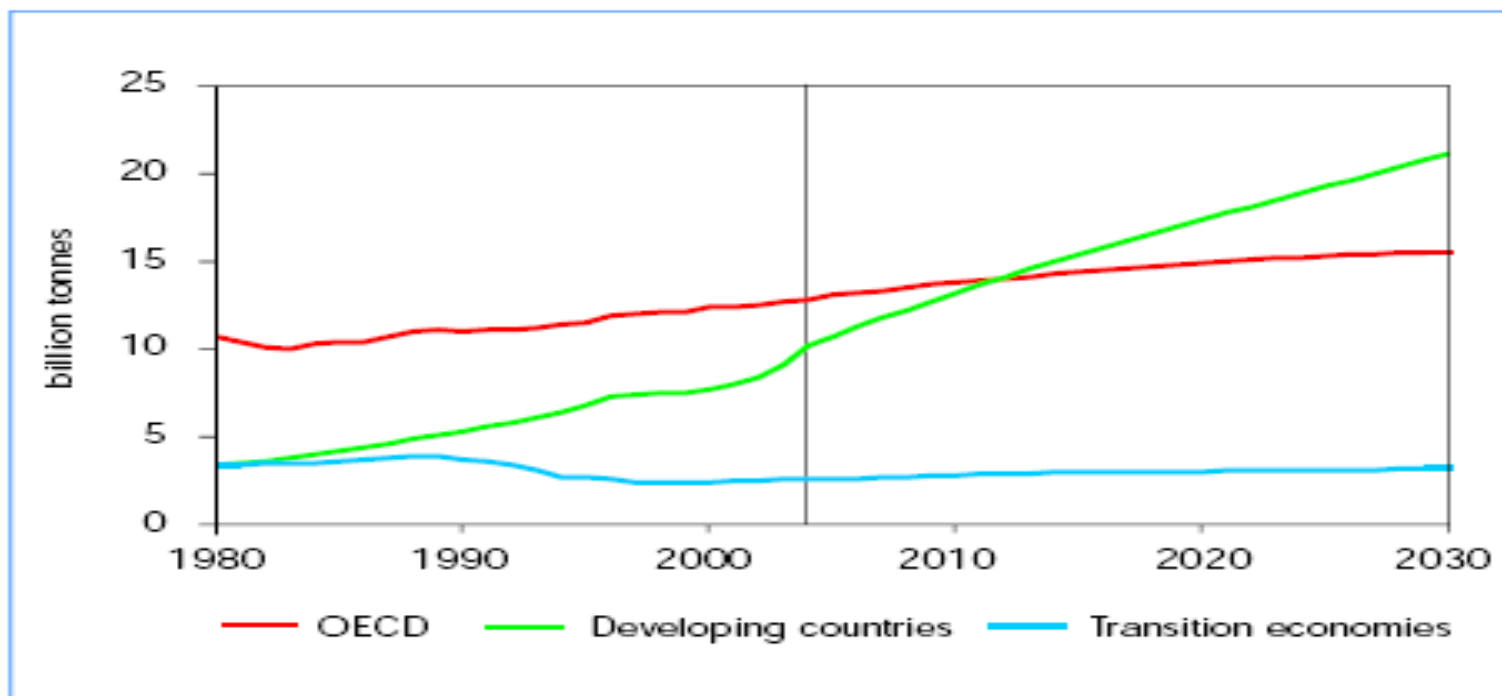
- Tackling climate change
- Ensuring secure, clean and affordable energy

## Stern Review conclusions: taking action now is good economics

- As a result of climate change the loss to world GDP could be at least 5% and up to 20% in the worst case scenarios
- Expected cost of cutting emissions consistent with 550ppm CO<sub>2</sub>e stabilisation trajectory averages 1% of GDP per year
  - Macroeconomic models: 1% of GDP in 2050, range +/- 3%
  - Resource cost: 1% of GDP in 2050, range -1% to +3.5%

# The climate change challenge I

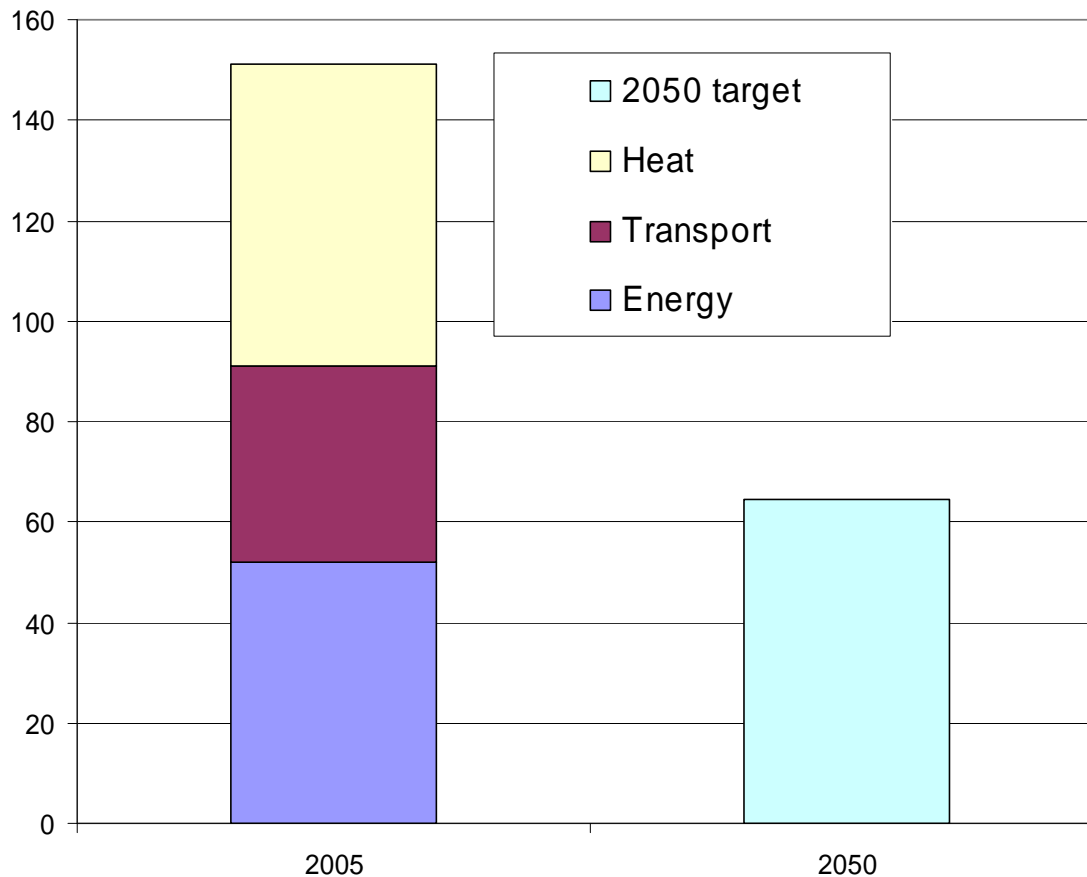
Energy-Related CO<sub>2</sub> Emissions by Region in the Reference Scenario (IEA, WEO 2006)



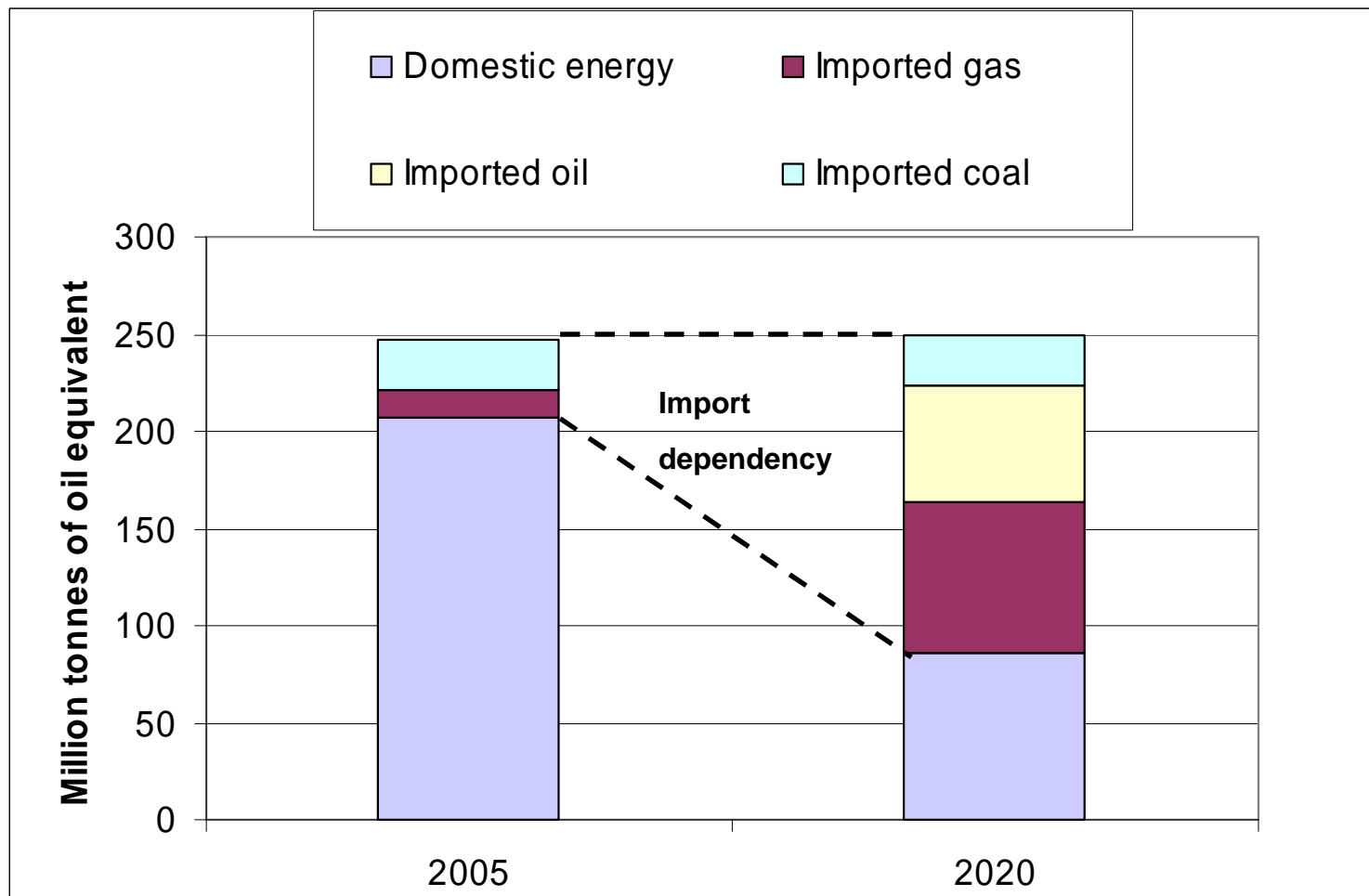
Note: Excludes emissions from international marine bunkers.

# The climate change challenge II

Our goal is to put the UK on a path to cutting carbon dioxide emissions by at least 60% by about 2050



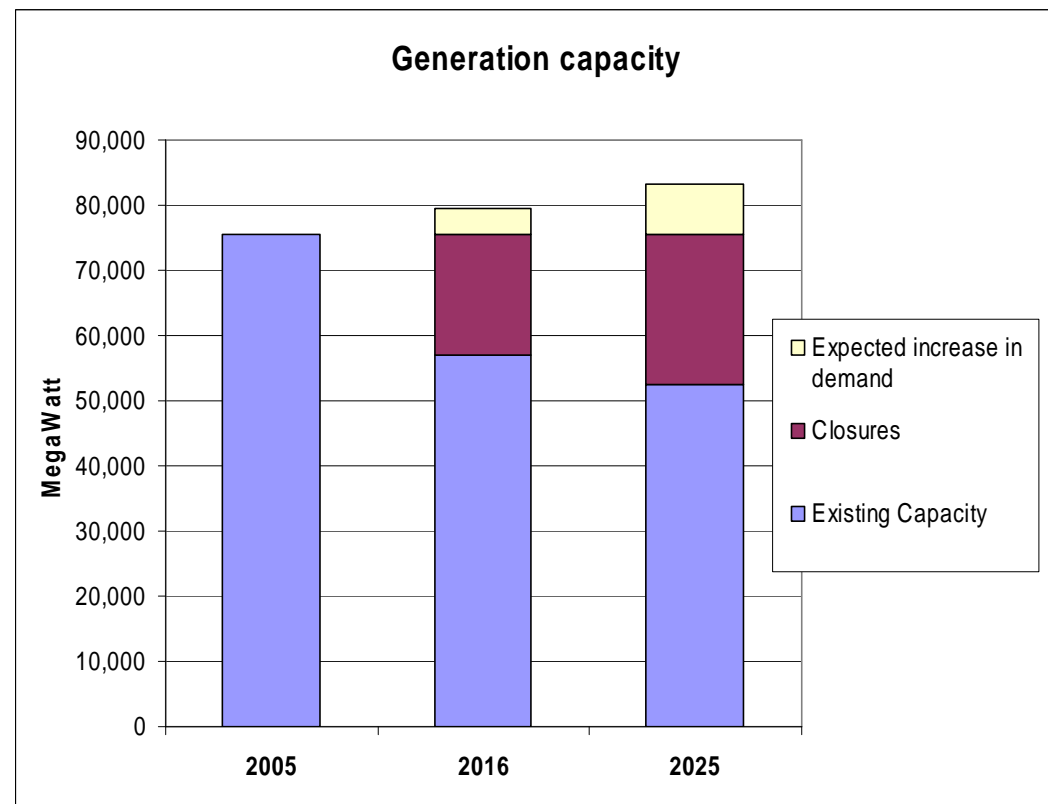
# The security of supply challenge I



# The security of supply challenge II

Substantial investment needed in:

- **Electricity power stations and networks**
- **Gas import and storage infrastructure**



## Analytical process for appraisal of White Paper policy options

- Clear definition of counterfactuals
- Consideration of alternative policy options
- Cost-benefit analysis of all options, including carbon cost-effectiveness
- Inter-Departmental peer review of analysis, including panel of Government Chief Economists
- External peer review of key analysis, including expert academics and consultants



# Analytical evidence base for the White Paper: examples

- Evaluation of supplier obligation policy options: report for DTI and Defra
- Review of distributed generation: report
- Impact of banding the renewables obligation: costs of electricity production
- Reform of the renewables obligation. What is the likely impact of changes?
- Nuclear power generation cost-benefit analysis
- Review of UK oil refining capacity for Department of Trade and Industry
- Dynamics of GB electricity generation investment: prices, security of supply, CO2 emissions and policy options
- An assessment of the potential measures to improve gas security of supply
- Updated energy and carbon emissions projections: the energy white paper
- The UK MARKAL energy model in the 2007 energy white paper
- Report on modelling the macroeconomic impacts of achieving the UK's carbon emission reduction goal

# The framework

## Principles

- Climate change and energy security are international issues, requiring international action as well as in the UK
- Independently regulated competitive markets are the most cost-effective and efficient way to deliver our goals
- But we need to correct market failures to align the objectives of market participants with our energy policy goals, e.g. through a carbon price

# The framework

## Action

- An international framework to tackle climate change
- Legally binding carbon targets for whole UK economy
- More progress in achieving competitive and transparent international markets
- More energy saving
- More support for low carbon technologies
- Right conditions for investment

## International energy and climate strategy

- Our international energy and climate change strategy is designed to ensure security of energy supply and accelerate the transition to a low-carbon economy.
- Our international strategy is built around four main elements
  - Promote open, competitive markets
  - Take action to put a value on carbon emissions
  - Drive investment to accelerate the deployment of low carbon technologies
  - Promote policies to improve energy efficiency

# Putting a value on CO<sub>2</sub> emissions – strengthening the EU ETS

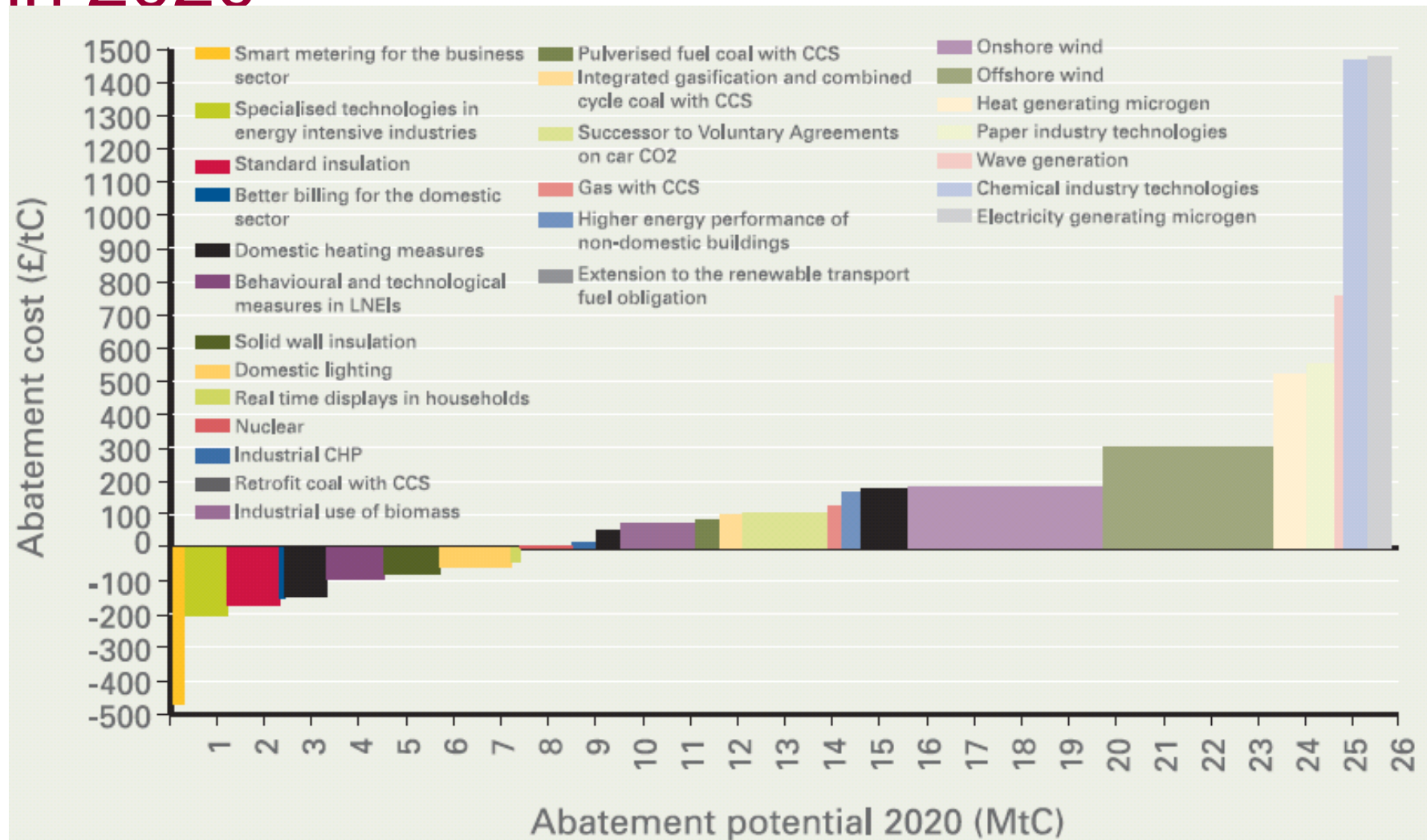
## We want:

- **Early decisions** on emissions caps
- **Caps consistent** with 2020 commitments
- Increased **auctioning** in future phases
- **Inclusion of CCS** within EU ETS scope
- Inclusion of **aviation** within EU ETS
- Consider expansion to **surface transport**
- Consider scope for **harmonisation**
- Effective **international linking** in the future

## At home , we need to:

- Save energy
- Develop cleaner energy supplies
- Secure reliable energy supplies at prices set in competitive markets

# UK marginal CO<sub>2</sub> abatement cost curve in 2020



# Saving energy

## Improving information and advice

- Better billing
- Smart meters and real time displays
- CO<sub>2</sub> calculator

## Regulation

- Zero carbon new homes
- More energy efficient appliances
- Doubling of suppliers' obligation to reduce carbon emissions
- Energy Performance Certificates
- Carbon Reduction Commitment

## Transport

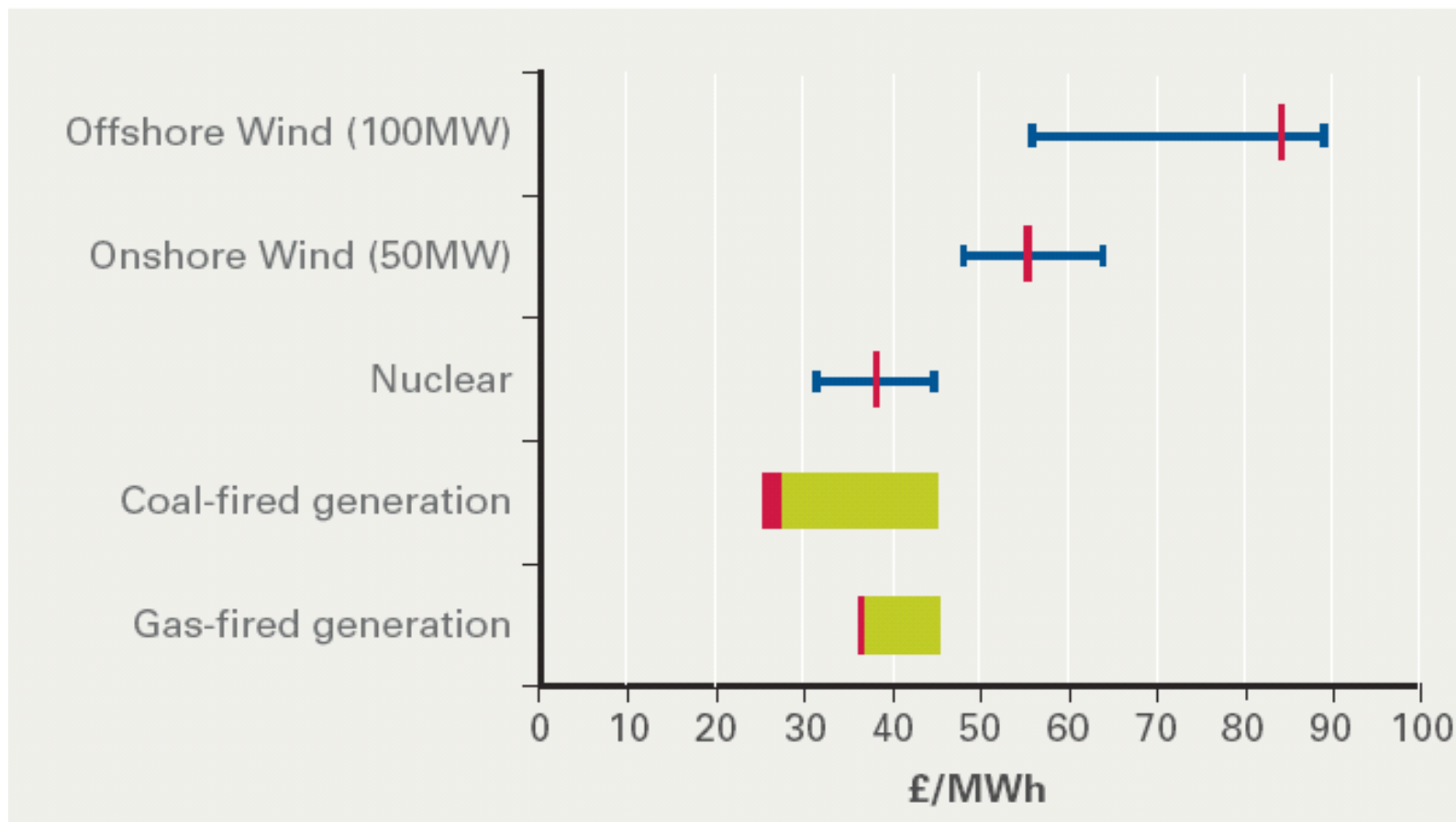
- EU mandatory targets to improve car fuel efficiency
- Inclusion of aviation in the EU ETS



# Cleaner energy: heat and distributed energy

- Distributed Generation package
- Biomass strategy
- Further work on heat options

# Levelised cost of electricity generation\*



\* Based on November 2006 fuel price projections and a CO<sub>2</sub> price of €25/tCO<sub>2</sub>

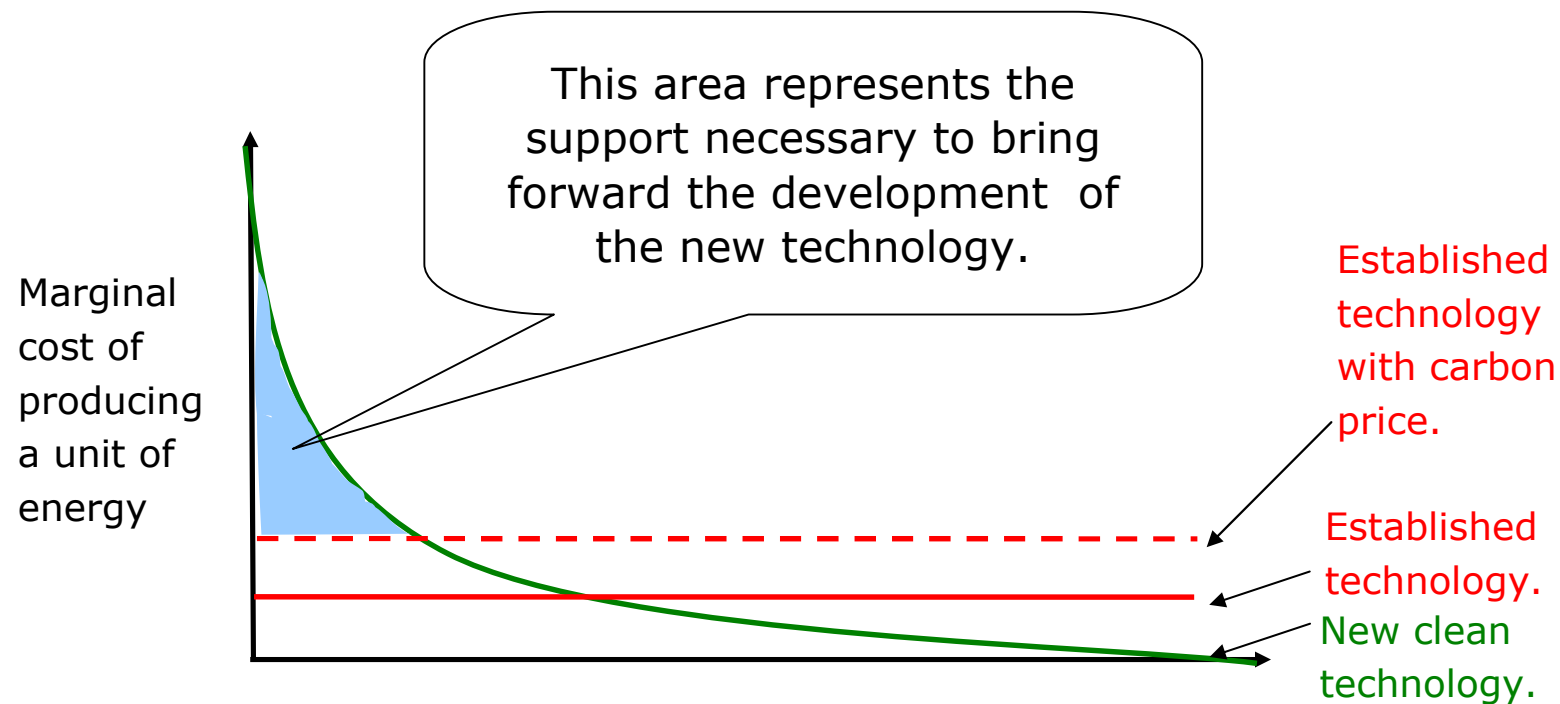
# Cleaner energy: electricity generation

## Policy

- Strengthened EU ETS to provide price signals
- Strengthening of the RO and banding
- Demonstration of CCS operational by 2011-2014
- Consultation on the option to build new nuclear power stations
- Energy technology support and skills

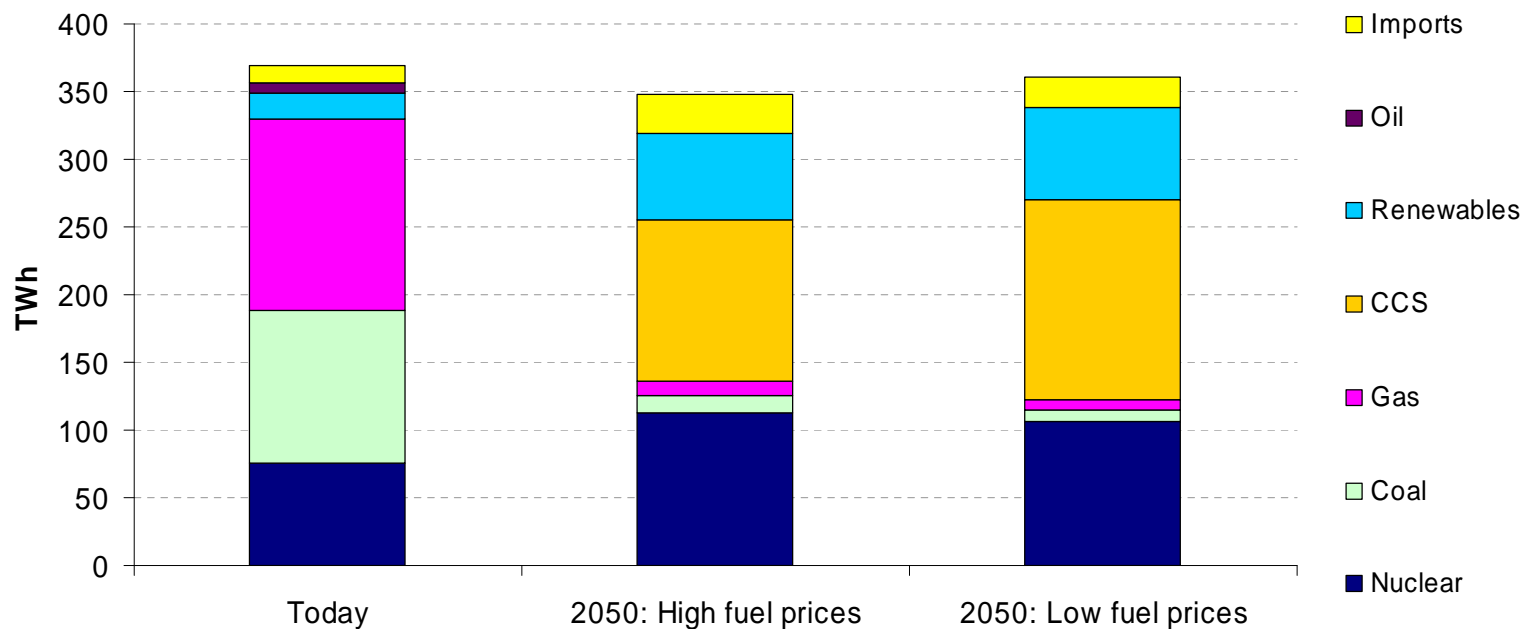
# Rationale for supporting clean technologies

## Illustrative experience curve for a new technology



# Cleaner energy: electricity in 2050

**2050: Generation mix consistent with achieving a 60% reduction in total UK carbon emissions**



**Note: For illustrative purposes, in the modelling scenarios presented, companies are allowed nuclear power as an investment option**

# Cleaner energy - transport

## Transport

- Low Carbon Transport Innovation Strategy
- Renewable Transport Fuel Obligation
  - 5% by 2010-11
  - Potential for higher Obligation later if sustainable

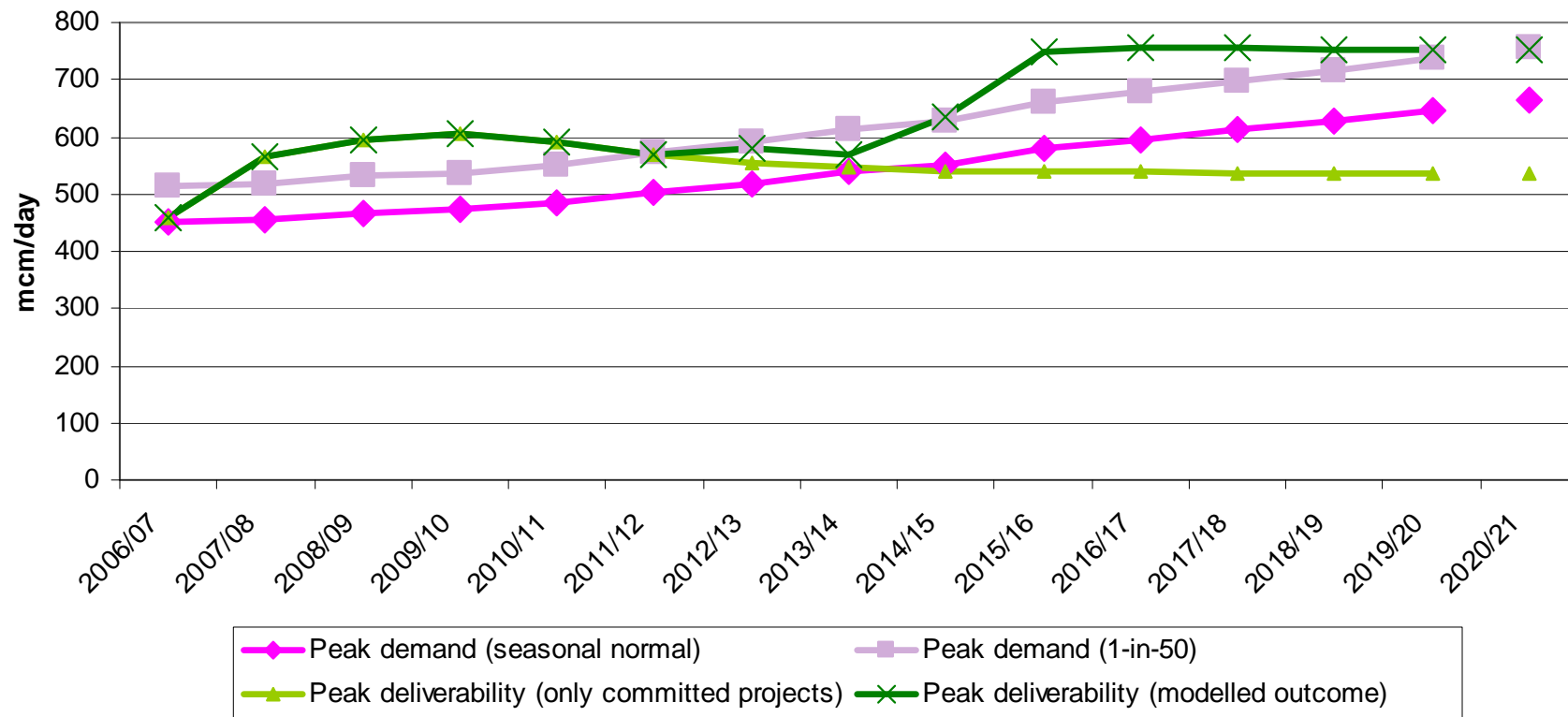
## Technology

- **Energy Technologies Institute** for R&D into low carbon energy - minimum budget of around £600m
- The **Environmental Transformation Fund** will be established from April 2008 for UK and international demonstration and deployment of new energy technologies and energy efficiency

# Security of supply: oil and gas

- Energy saving
- Open and competitive markets
- Maximise UKCS production
- Lower carbon electricity mix
- Planning reforms to facilitate gas imports and storage
- Oil stocking and effective emergency arrangements

# Projected supply/demand balance in UK gas market



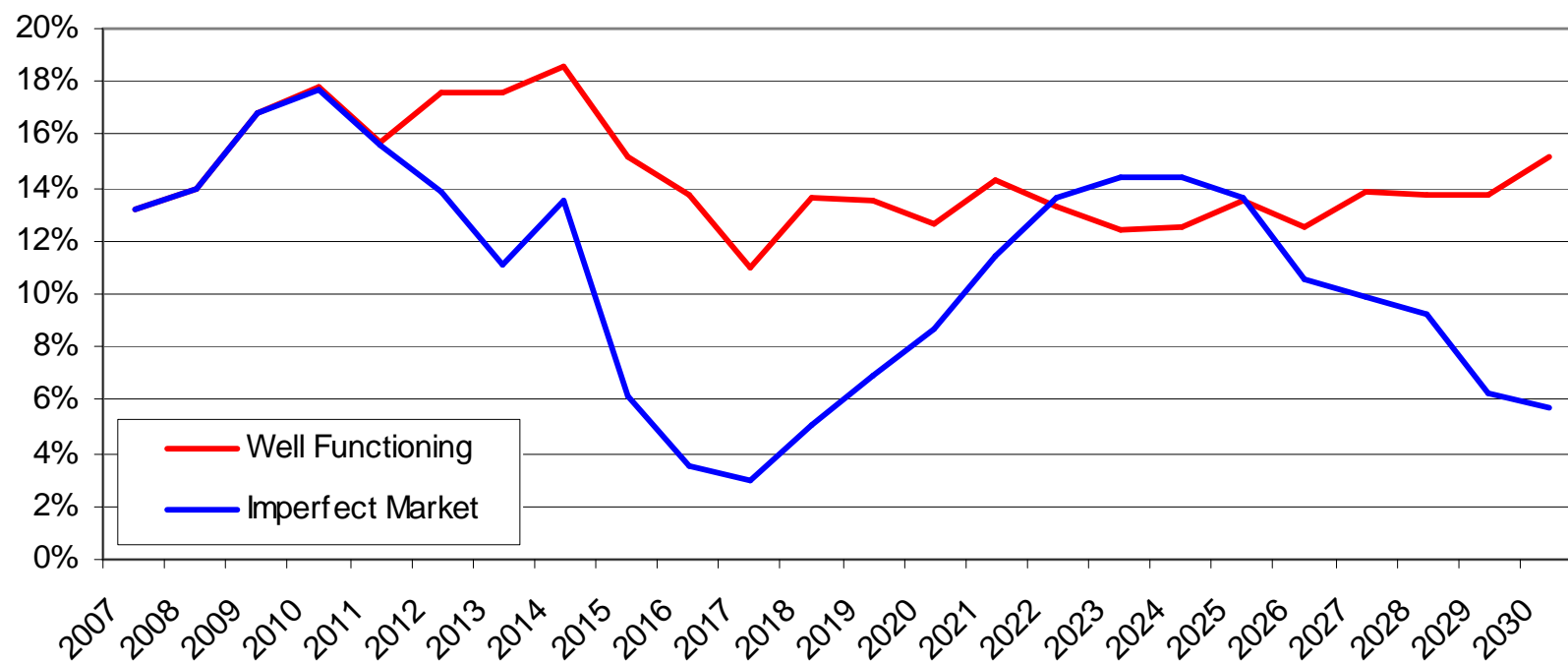


# Security of supply: electricity

- Strengthened EU ETS for more regulatory clarity
- Planning reforms
- Improved market information
- Strengthened Renewables Obligation
- Demonstration of carbon capture and storage
- Decision on new nuclear this year after consultation

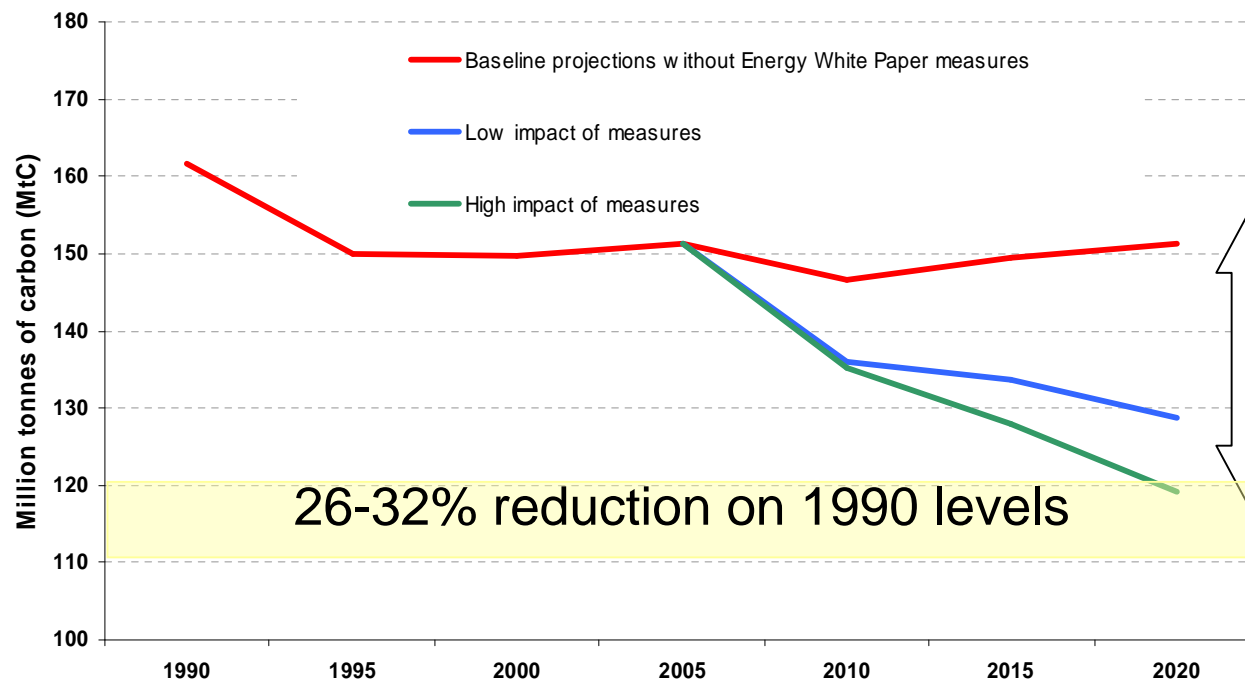
# Projected supply/demand balance in the power generation sector

## Derated Peak Capacity Margin - Base Case



# Impact of our measures on CO<sub>2</sub> emissions

Projected carbon emissions and carbon impact of our proposals



Together with the EU ETS, we estimate our measures will save 23-33 million tonnes of carbon in 2020

# Implementation

- Consultations (nuclear, renewables, gas)
- Legislation
  - UK (climate change bill, energy bill, planning)
  - EU (EU ETS, emissions reduction, renewables)
- International negotiation: post 2012 carbon regime
- Implementation of measures