Decarbonising energy: challenges ahead

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The good news: emissions are down...

Note: sources for all figures in this presentation can be found in the full Progress Report. Go to: www.theccc.org.uk
...UK is approaching global average


Notes: All paths to 1.5°C and 2°C assume further reductions to net zero emissions or below by 2100. The range for 1.5°C pathways consists of fewer model runs than for 2°C, which is why some of the range for 2°C includes lower emissions before 2040. Individual models consistently show swifter reductions to meet 1.5°C than to meet 2°C.

The power sector is leading
...through coal reduction

- Reduced coal in generation: 75% of all CO₂ reductions since 2012
- Intention: no coal beyond 2025
- Only 16Mt more: less than 2 years of progress to 2050
Bad news: current policies won’t deliver

the challenge to 2030...

- **Power**: 79Mt in 2016, 62% reduction
- **Buildings**: 89Mt in 2016, 20% reduction
- **Transport**: 121Mt in 2016, 44% reduction
- **Industry**: 100Mt in 2016, 20% reduction
...and the challenge to 2050

![Graph showing GHG emissions from 2000 to 2050.]

- Power: 79 Mt in 2016, 62% reduction
- Buildings: 89 Mt in 2016, 20% reduction
- Transport: 121 Mt in 2016, 44% reduction
- Industry: 100 Mt in 2016, 20% reduction

and the Paris challenge...

- Net zero emissions between 2050 and 2100
- Focus on hard to treat sectors:
  - Industry
  - Aviation
  - Agriculture
- Zero emissions:
  - Power
  - Land transport
  - Buildings
- Negative emissions technologies essential:
  - CCS with bioenergy?
  - Wood in construction?
  - Air capture with CCS?
  - ...

Notes: GHG emissions are shown on a total (gross) basis, while carbon budgets represent the emissions under the net carbon account; IAS stands for International Aviation and Shipping.
Power

Preparing for deeper emissions cuts

- Growing demand: 7% by 2030
- CCS
- Interconnection
- Storage
- Flexibility
- Demand-side response
- Nuclear (fusion?), tidal, wind, solar, bioenergy...
- No time for gas?
- Cost reduction

Buildings

Making energy efficiency a reality

- Insulation
- Building standards
- Low carbon heat:
  - Heat pumps
  - Hydrogen
  - Heat networks
  - ...
- Behaviour
Transport

Ultra-low carbon transport

- Electric cars and vans
  - Range
  - Charging
  - Cost
- HGVs
- Behaviour: travel demand, virtual reality, shopping habits, supply chains, local vs global...
- Aviation
- Role of biofuels
- Role of hydrogen
- Elon Musk’s interplanetary ambitions

Industry

Energy efficiency and new processes

- CCS
- Low carbon heat
- New processes
  - Steelmaking via electrolysis
  - Zero carbon cement
  - ...

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Cross-cutting issues

- Hard to treat sectors
  - Aviation, industry, agriculture
- GHG removal: negative emissions
  - Carbon storing materials; bioenergy with CCS; direct air capture...
- Bioenergy
  - Sustainability
  - Best use
- CCS
- Low carbon hydrogen
- Storage – especially long term
- Grid flexibility
- Risk reduction and cost reduction
- Systems thinking
- Behaviour change

What has worked?

Offshore wind

- Latest CfD auctions £50 - £70 per MWhr
- Compared with £120 per MWhr in 2015
- CfD policy – long term support
- Green Investment Bank – investor confidence
- Offshore Renewable Energy Catapult – UK technology opportunities
- Inward investment: Siemens in Hull
What has worked?

Low carbon automotive

- EU mandatory emissions targets
- King Review 2007
- Innovation support
  - TSB Low carbon Vehicle Innovation Platform
  - EV demonstrator
- Consistent UK policy
  - OLEV
  - support for EV purchase
  - Plugged in Places...
- Industrial strategy: Automotive Council research agenda
- Inward investment – Tata, Toyota, Nissan...

Common factors

- Framework: Climate Change Act and Budgets
- Common European legislation
- Relatively consistent support over significant periods: 10+ years
- Policy interventions on a range of fronts (integrated?):
  - Research
  - Industry support
  - Innovation support
  - Investment: UK Government and inward
  - Risk reduction: demonstration
Actions also help wider policy objectives

- Reducing household energy bills
- Improving health
- Economic opportunities
- Reducing waste
- Building 21st century infrastructure

These actions may require upfront investment and further action to change behaviours.

The actions need to focus on areas of high priority for emission reduction...

Action required across all sectors, notably:

- Car and van fuel efficiency targets post-2020
- Strategy for energy efficiency and low carbon heat in buildings
- Approach to procure new low carbon electricity in 2020s
- Re-start CCS for industry, power and (if needed) hydrogen
- Strategy on soils, forestry and agriculture to reduce emissions and capture GHGs
Monitoring, assessment, adjustment and research are critical to government’s plans...

- **The Clean Growth Plan**: needs actions in key areas. Where action is yet to be determined, include: clear steps, decision points and criteria for decisions

- **National Infrastructure Assessment & spending decisions**: need to incorporate emissions reduction & climate risks across all infrastructure

- **UKRI programmes**: addressing longer term decarbonisation and GHG removal needs and low carbon innovation to support UK requirements and significant global market opportunities

...alongside links with the private sector, other governments & public institutions

- **Investors**: to promote meaningful disclosure, new financing instruments (green bonds) & flows of funds

- **Regulators**: Ofgem, Pensions Regulator, Prudential Regulatory Authority all have crucial roles to play

- **Cities & regions**: core cities and new elected mayors to promote emissions reduction and adaptation within regional economic strategies

- **Devolved administrations**: in process of putting new ambitions around climate action into law