Energy and the environment: what’s the challenge?

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Questions and answers

• What is the climate change challenge?
• What is the climate change challenge for energy?
  => decarbonise power sector first
• How do we meet future world energy demand sustainably?
  => RDD&D to drive down low-C costs
• The message on discount rates
  => Public funds to investment in low-C; general taxation to fund climate change policies
To meet the 2 degree target, most coal must be returned to the ground via CCS.
Total cumulative emissions determines global warming

- Delaying peak requires a faster subsequent decline
- Peak should be before 2020

Source: ENEP Emissions Gap Report 2010
Decarbonising power

- **Power sector** key to decarbonising economy
  - Large, easiest, and capital *highly durable*

- Coal-fired electricity has more than *twice* the GHG emissions of gas *and* far higher air pollutants
  - Gas as transition fuel to the low carbon future
  - But there is lots of coal ⇒ *CCS a long-run priority*

- Deployment has dramatically lowered cost of wind, PV
  - Justifies *support for R&D and deployment*

- **Nuclear power** has attractions for mass deployment
  - If we can make it safe, proliferation-proof and *cheaper*

- Adequate carbon pricing could *lower fossil fuel prices*
  ⇒ need agreements and/or border tax adjustments
  ⇒ and hard to set the “right” carbon price
How to de-carbonise UK

MacKay’s estimates indicate the large role of low-C electricity in any future low-C UK-sized Economy: figures per head per day

http://www.withouthotair.com/
Rapid decarbonisation of electricity is possible
- with nuclear power

CO2 emissions per kWh 1971-2000
Figure 3.2: Global energy-related GHG emissions reduction by policy measure in the Bridge Scenario relative to the INDC Scenario

- **INDC Scenario**
  - 15% Upstream methane reductions
  - 9% Reducing inefficient coal
  - 17% Renewables investment
  - 10% Fossil-fuel subsidy reform

- **Bridge Scenario**
  - 49% Energy efficiency

- **NOT zero**
By 2012 we had already locked in to high carbon emissions from past fuel choices

Hard to set the "right" carbon price

Breakeven CO2 price vs gas price

Low interest rates and lower cost wind help
The power of discounting

• £1 million in 100 years discounting at 10% = £72
  – at 5% worth £7,600, at 1.7% worth £185,000
• Unlikely but extreme future climate change events imply **low discount rates** – Stern assumed 1.7%
• High discount rates lower prices of exhaustible resources
  – oil, gas and coal favoured
• Low discount rates favour low-carbon investments
• The cost of public sector borrowing is low
  => private finance for low carbon too costly
  => public finance sensible
• **Public sector financed** massive past power investment
• France decarbonised its electricity sector in 10 years by a mass drive to nuclear power
• NASA spent $$$ to get to the moon. Saving this planet deserves more **massive R&D**
  
  = Public good => should be funded from general taxes
• Public sector borrowing rates have never been lower

Public investment to decarbonise energy => public assets balancing public debt **AND** climate benefits
OECD Baseline GHG emissions by region

30 GT Energy related in 2010

95% increase in developing world

35% increase in developed world
Conclusions

• The first priority is to **decarbonise electricity**
  – To avoid long-term lock-in
  – Existing technology can do this **at modest cost**

• Setting a **carbon price** may not be enough
  – Decarbonising will **lower the price of fossil fuels**

• Developing countries need cheaper low-C options
  ⇒ RDD&D by rich countries critical to drive down costs
  ⇒ Need to avoid exporting C-intensive production

• Fund climate change policies from **general taxation**
  – Not levy charges on fuel used by poor
  – **Public funding** for low-cost finance of investment
Acronyms

CCS  Carbon Capture and Storage
GHG  Greenhouse gases
GT   Gigatonnes (billion tonnes)
INDC Indicative national
R&D  Research & Development
RDD&D Research, Development Demonstration and Deployment
WEO  World Energy Outlook

Reference
Growth not sacrificed by decarbonisation

**Figure 3.17** Average annual GDP growth by scenario by selected region, 2013-2030

Source: OECD ENV-Linkages model. Growth rates are calculated on a PPP-basis.

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Bridge scenario improves access modestly

Figure 3.21  ▶  Global population with and without access to electricity and clean cooking in the Bridge Scenario

- Without electricity access
- With electricity access
- Without clean cooking access
- With clean cooking access

**Up 1.7 bn**

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