World Coal and the Imperative for CCS

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Nigel Yaxley
Royal Society of Chemistry
24th March 2010

World Coal and the Imperative for CCS

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- World coal demand and supply growth
- Reserves and resources
- Coking demand and steel production
- World traded market
- IEA world energy outlook
- Policy developments Europe and UK
- Conclusions

Coal – the world's fastest growing energy source

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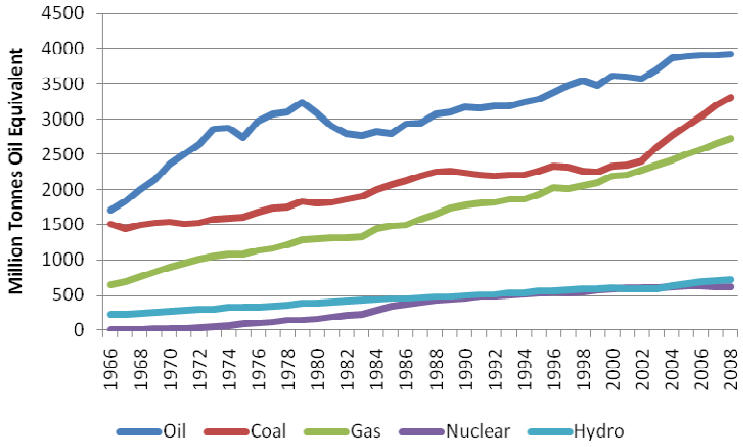

Source: BP Statistical Review

Coal production growth even continued in 2009

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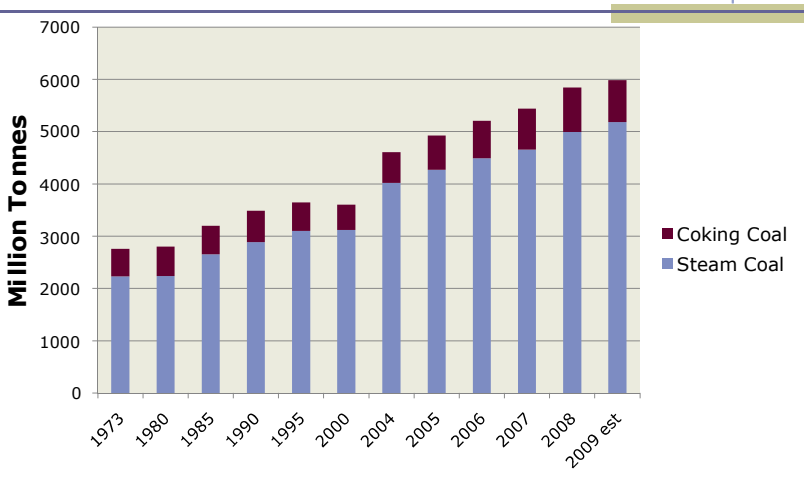

Source: IEA Coal Information 2009

China dwarfs other producers…

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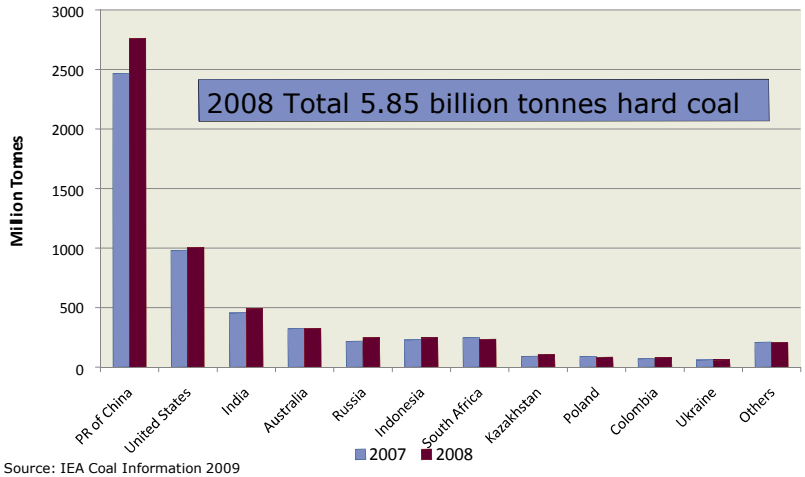

Source: IEA Coal Information 2009

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…and drives hard coal production growth…

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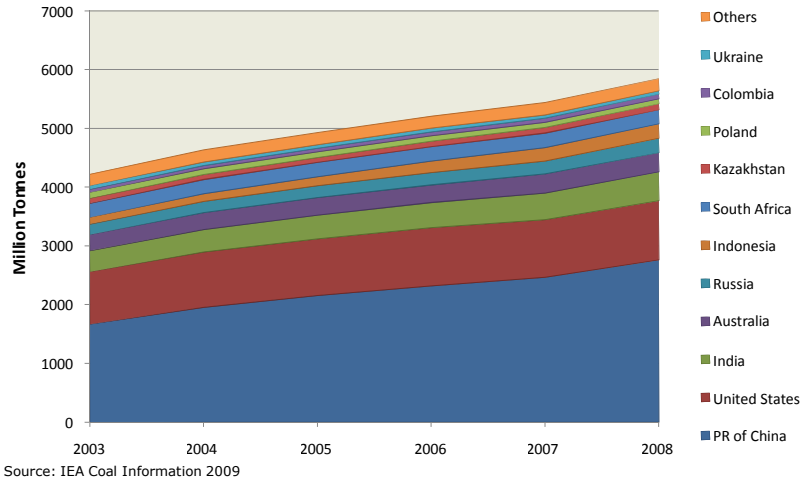

Source: IEA Coal Information 2009

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…but second tier producers also show interesting trends

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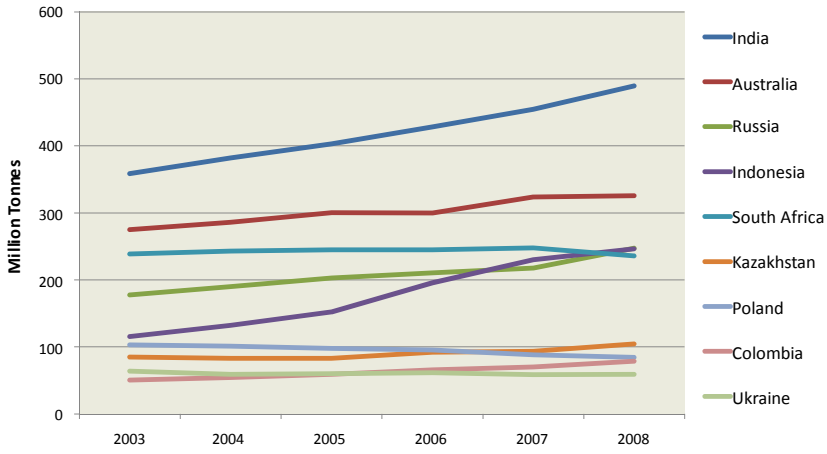

Source: IEA Coal Information 2009

EU remains world's 3rd largest coal consumer…

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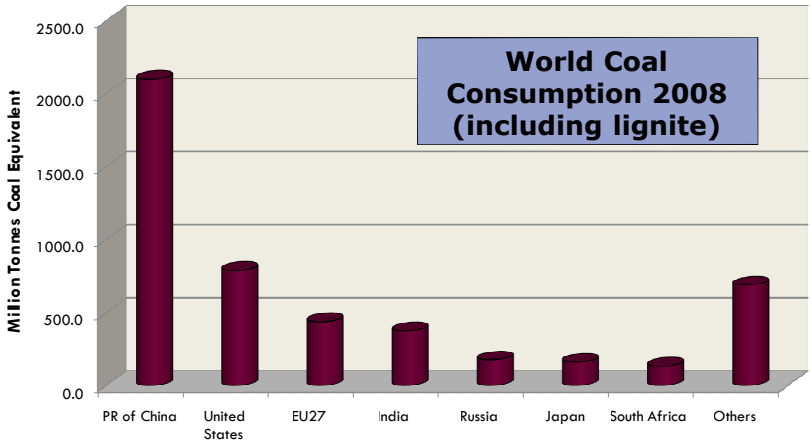

Source: IEA Coal Information 2009

Almost 60% of EU's coal supply is indigenous

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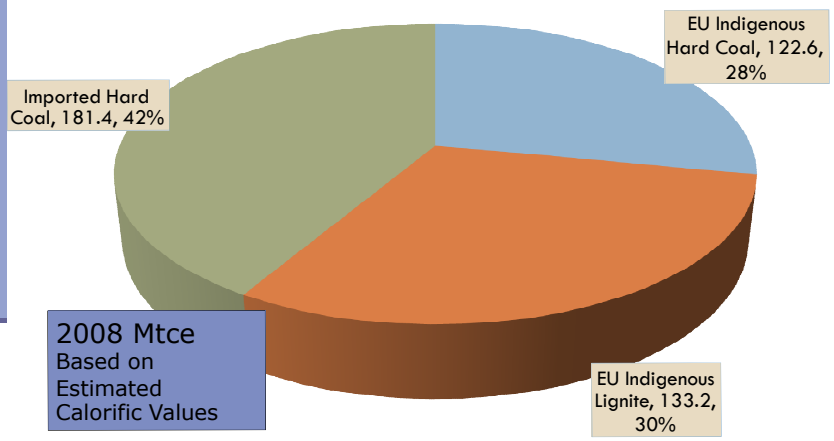

2008 Mtce
Based on Estimated Calorific Values

Source: EURACOAL

Reserves and Resources

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- Reserves – proven and can be recovered at current prices with current technology
  - Different sources and methodologies
    - WEC/BP/BGR
  - Assessment of 'economically recoverable' is difficult
  - 728 billion tonnes hard coal (+269 Bn t lignite)
- Resources – demonstrated quantities that might be recoverable in the future plus geologically possible but not demonstrated
  - Over 15 trillion tonnes hard coal (+4 Tn t lignite)
- "Resources" are particularly relevant for underground coal gasification

Reserves of coal are evenly distributed around the globe

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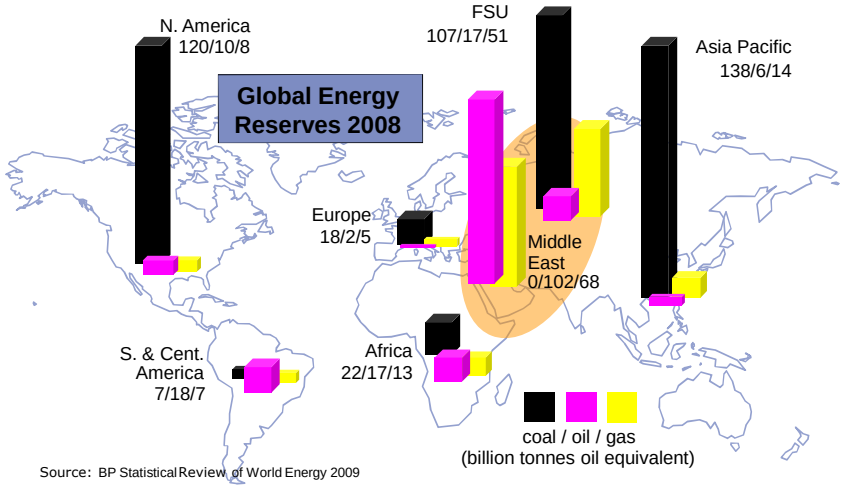

Source: BP Statistical Review of World Energy 2009

The top five countries have 80% of proven reserves…

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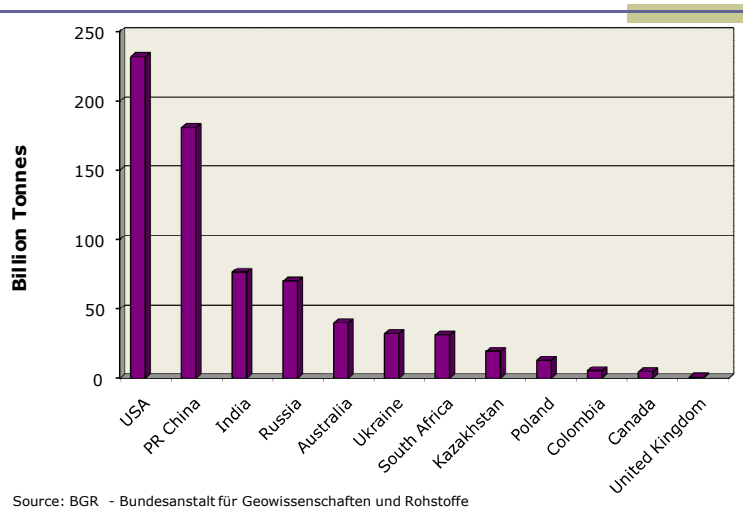

Source: BGR - Bundesanstalt für Geowissenschaften und Rohstoffe

…and USA, China and Russia have 90% of resources…

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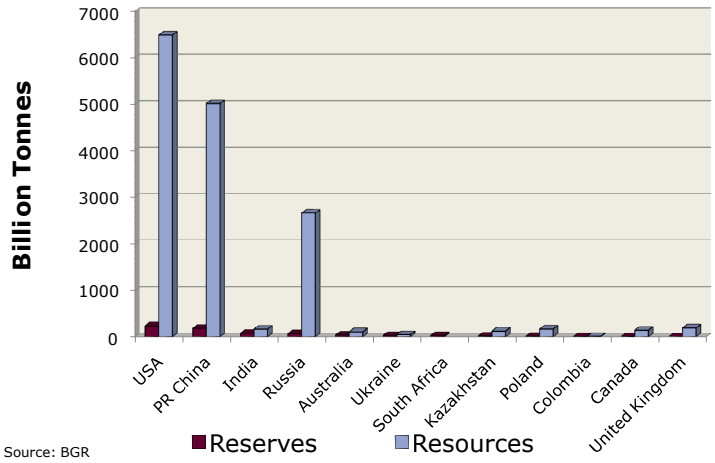

Source: BGR

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Changing the axis highlights large resources in the UK

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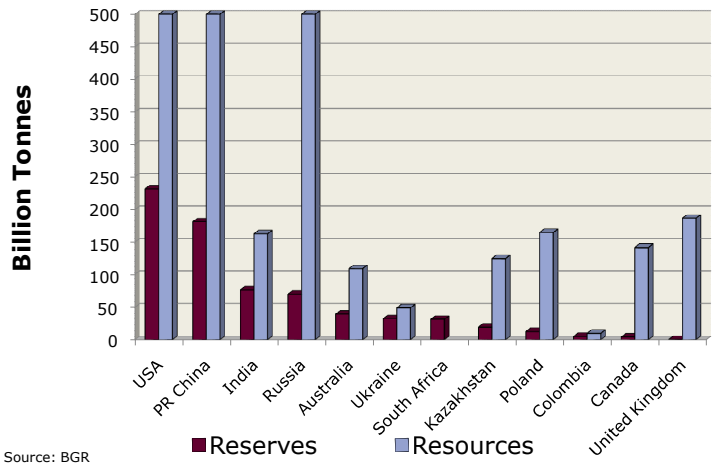

Source: BGR

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Coking Demand and Steel Production

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- Remember coal is not just for electricity production!
- Coking coal demand in 2009 was around 800 million tonnes
- Essential component in steel-making
- Use is concentrated in rapidly growing economies
- Must not be forgotten in climate change mitigation
- Measures in old economies may simply drive production elsewhere – "carbon leakage"

Coal in China powers more than just electricity…

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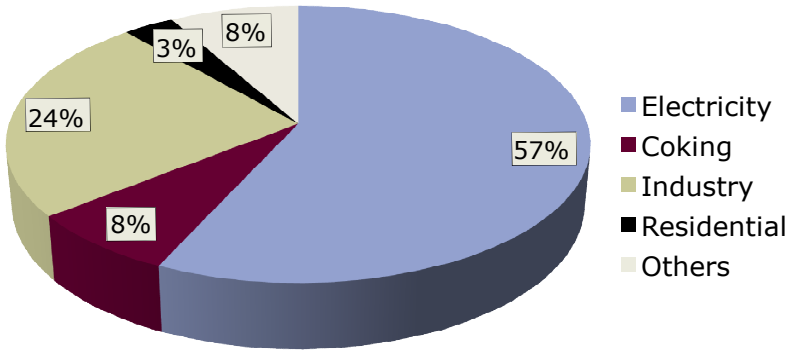

Source: IEA Coal Information 2009

…with China also dominant in world steel production

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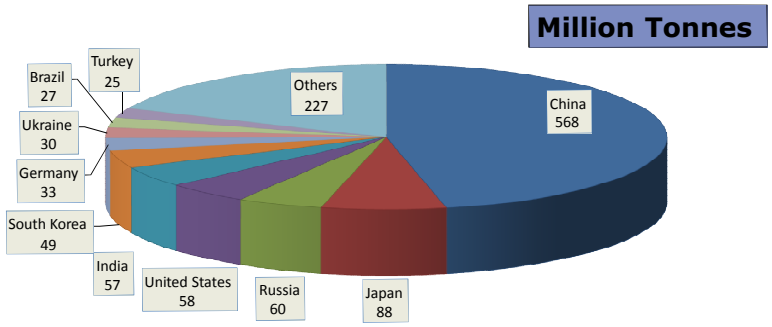

Source: World Steel Association

Chinese steel production withstood the recession

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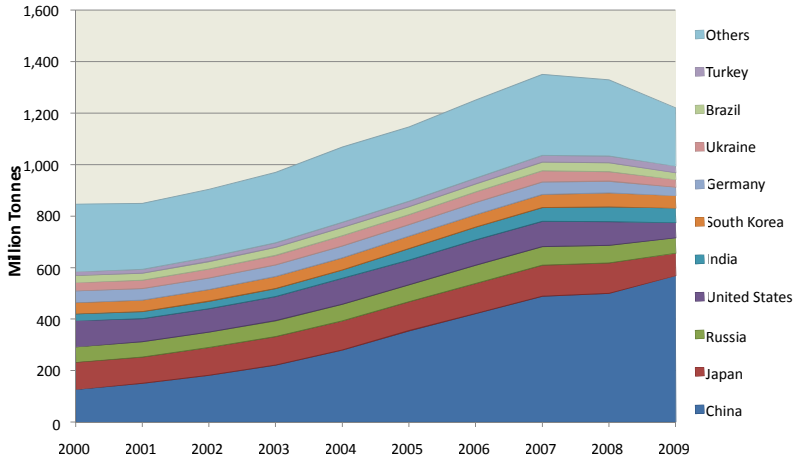

Source: World Steel Association

World Traded Market

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- Most coal demand in the world is met from indigenous supply
- Around 15% is traded
- Different players have dominated the international coal market
- But this is changing
- World markets in 2009 saw a net increase of 100 million tonnes in Chinese demand

World seaborne hard coal trade stalled in 2009

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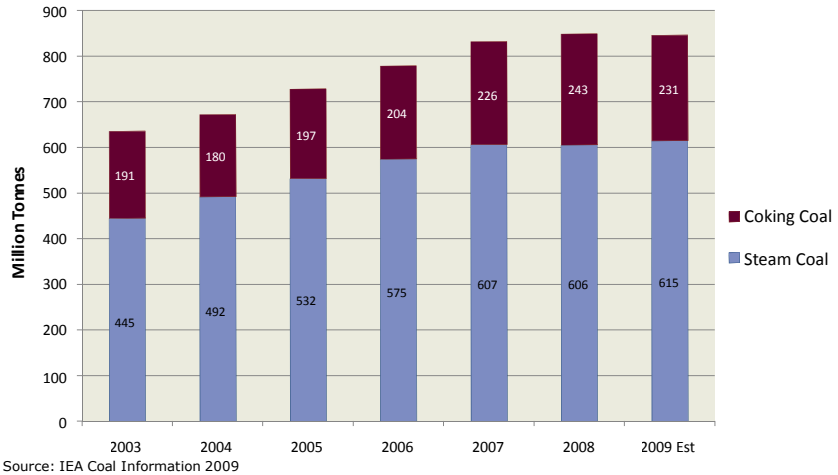

Source: IEA Coal Information 2009

…but Asia/Pacific trade continued to grow

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Source: Verein der Kohlen Importeure

UK has become a major coal importer…

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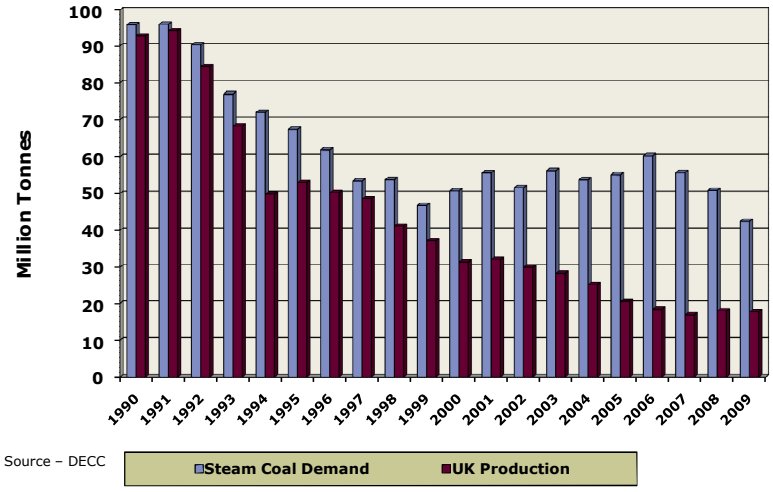

Source – DECC

… but was overtaken by India and China in 2008

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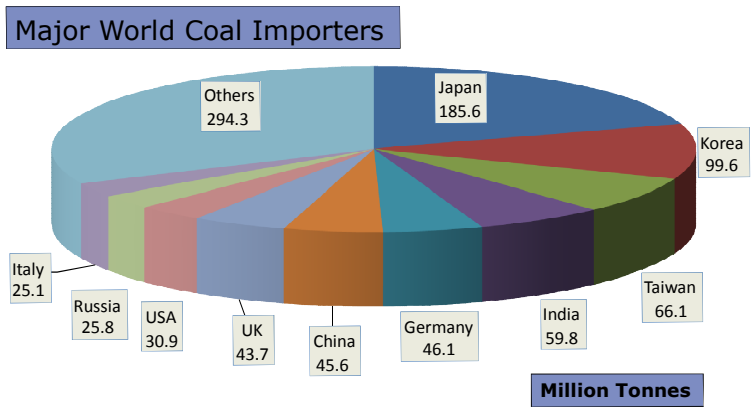

Source: IEA Coal Information 2009

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Australia and Indonesia account for 48.5% of exports

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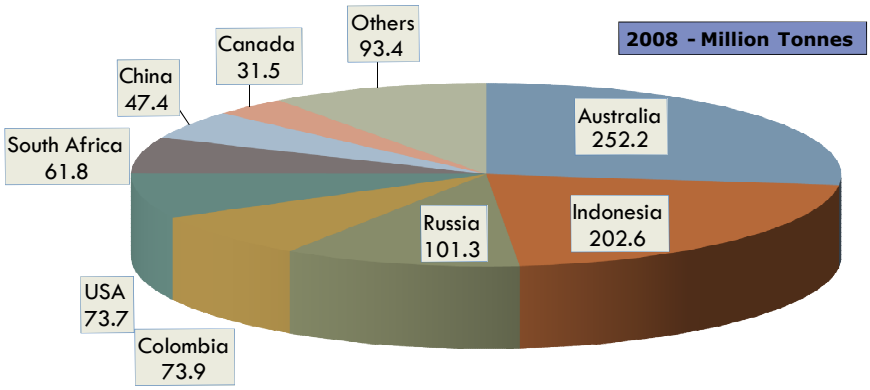

Source: IEA Coal Information 2009

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Slide 24

Asian demand is distorting world price differentials

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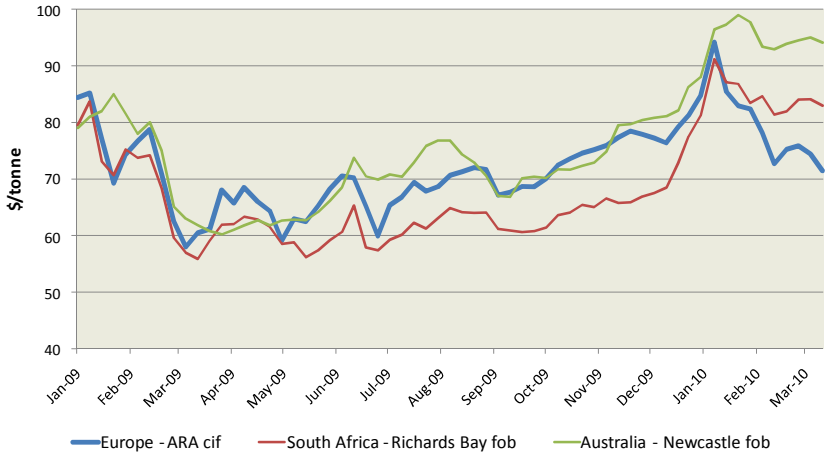

Source: MCIS

IEA World Energy Outlook

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- World Energy Outlook deals in scenarios – not forecasts
- Reference scenario is based on 'business as usual' and only reflects climate change measures currently in place
- Over 50% growth in coal demand 2007 to 2030
- Highlights the potential for massive growth in coal use to fuel growth in China/India etc
- Demonstrates the imperative for CCS

IEA Reference Scenario shows continued growth

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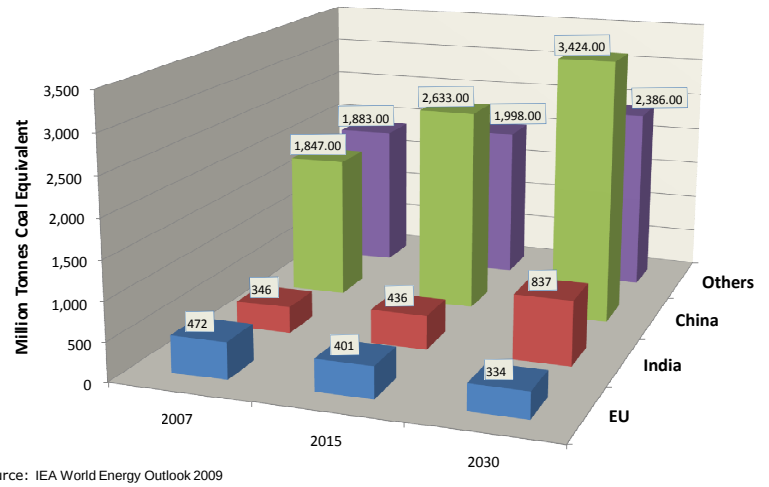

Source: IEA World Energy Outlook 2009

Policy Developments

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IEA CCS roadmap sets the challenge

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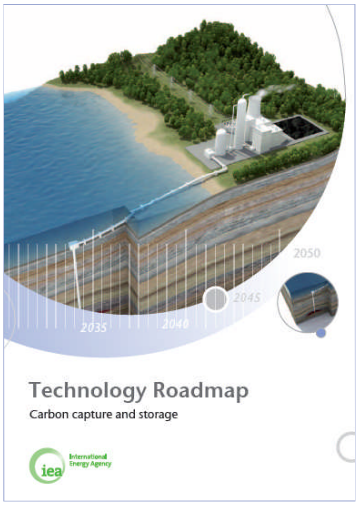

- Without CCS overall costs to reduce emissions to 2005 levels by 2050increase by 70%
- Roadmap envisions 100 projects globally by 2020 and over 3000 projects by 2050

EU attempts to kick-start CCS funding

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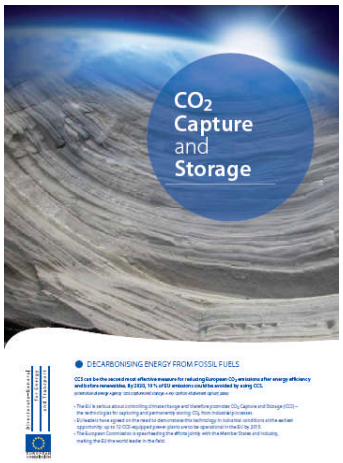

- EU Council has agreed 12 CCS demonstrations by 2015
- Economic Recovery package
  - €1 billion for 6 projects (including Hatfield)
- Funding from EUETS
  - 300 Million EUAs from New Entrant Reserve
- Further funding needed from members states

UK policy emerges

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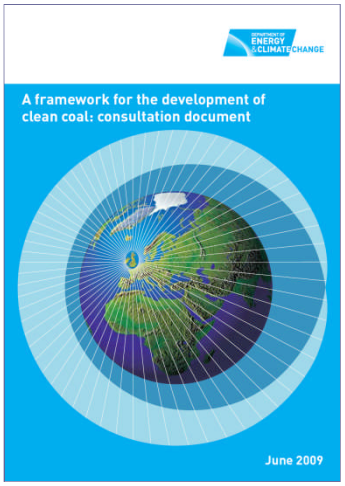

- Financial support for up to four commercial-scale CCS demonstrations
- No new coal without CCS on a defined part of its capacity
- Requirement to retrofit CCS to full capacity within five years of CCS being judged technically and economically proven - planned on the basis that CCS will be proven by 2020

…but progress is slow

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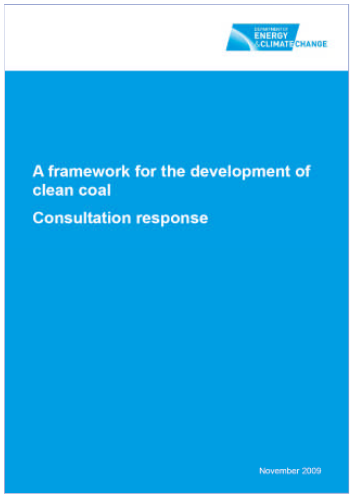

- Five months on…
- And little new emerges
- "CCS incentive able to support full retrofit by 2025"
- Funding for ~~up to~~ four projects subsequently confirmed
- Energy bill passes through parliament
- But the competition runs on

CCS Industrial Strategy was launched last week

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- CCS – a massive industrial growth opportunity for the UK
- Coal is the most abundant worldwide energy resource but it is also the most polluting, so there is no solution to climate change without CCS
- Yorkshire and Humber is well placed to see the benefits from the jobs that investment in CCS can bring, other regions will too
- For the UK economy as a whole these benefits could be worth up to £6.5 billion a year, sustaining jobs for up to 100,000 people, by 2030

…and the Conservatives launched their policy

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- A Conservative Government will put UK CCS back on track:
  - Bring the current CCS competition to a rapid conclusion
  - Expand the demonstration programme to at least four facilities
  - We will ensure that CCS pipelines are planned and located where the greatest capacity for growth can be provided
  - Preference to fund the CCS demonstrations from EU Emissions Trading System receipts, but would adopt the CCS levy in the current Energy Bill to avoid further delays

Conclusions

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- Coal is the world's fastest growing energy source
- Reserves are widespread and resources are massive – long term potential for UCG
- Coal is also required for steel production – key for rapidly developing economies
- IEA 'business as usual' scenario shows 50% growth in coal by 2030
- Highlights the imperative for CCS
- EU/UK policy is enthusiastic about CCS -but progress is slow
- "Global leadership" from Europe and USA is surely needed before China and India will come on board

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Thank You

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