Global Energy Trends

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Topics

- What's happening worldwide?
- How much energy do we have or need?
- Where will this be found?
- What sources will be used?
- What will be done with carbon emissions?
- How will global trends affect the UK?

Recent important energy events

- Discovery of unconventional gas sources has greatly increased the global gas reserve position. Over 250 years of gas production at current levels of consumption
- Earthquake in Japan and Fukushima has damaged the "nuclear renaissance" leading to many countries re-evaluating the role of existing and new nuclear plant
- Oil prices and most energy prices high and moving higher as recession ends and demand grows
- Growing impact of "financialisation" on commodities
- No global agreement on how to tackle climate change and emissions

The ages of gas – (1)

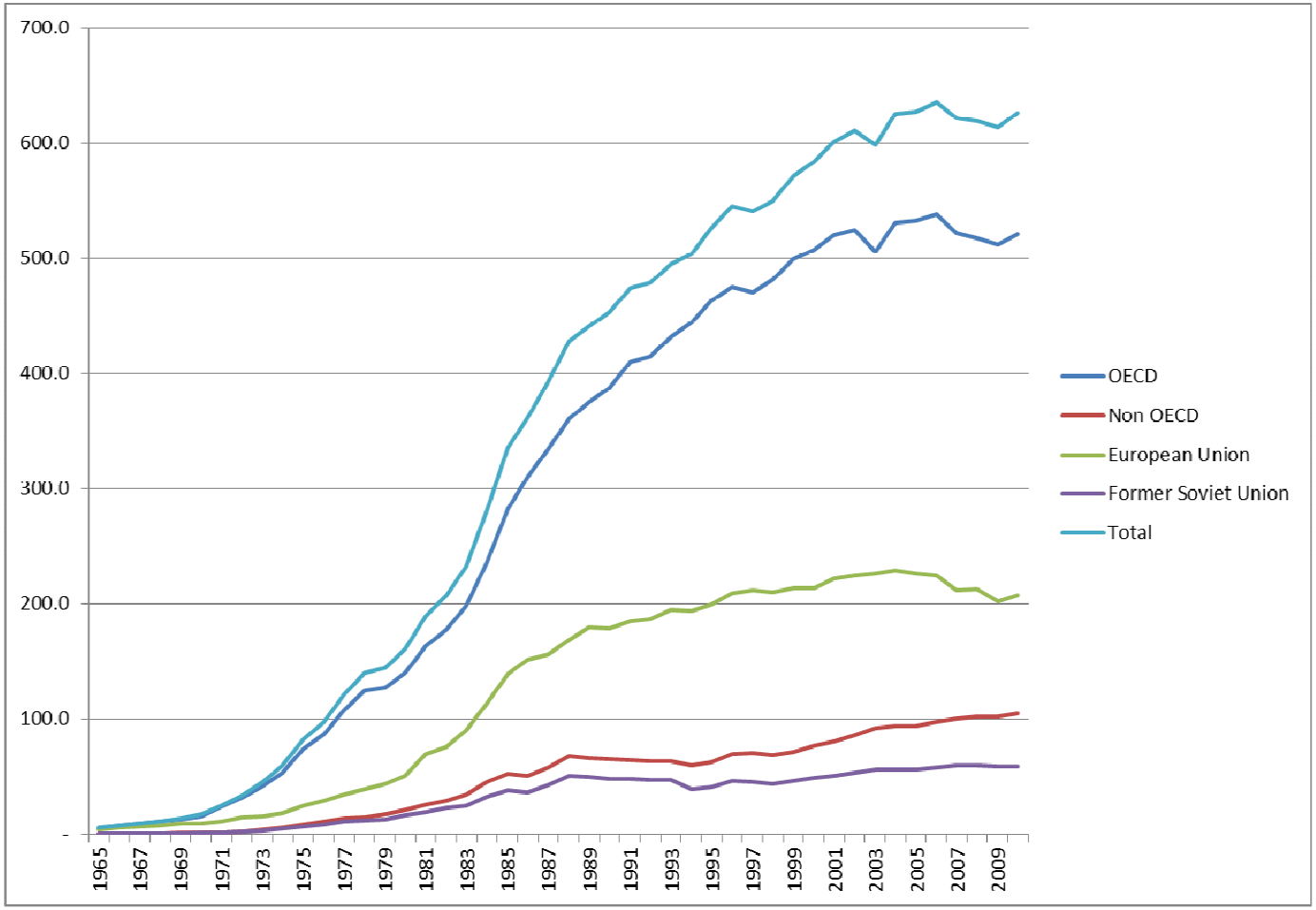
- 1970's – gas is a premium fuel too precious to burn in power stations
- 1990's – dash for gas with use in first wave of CCGTs
- Early 2000's – gas demand growing
- Late 2000's – gas demand declines with impact of recession and displacement by coal/renewables
  - Gas becomes a "transition fuel" to help move us to a low carbon future around 2050 and will then die
- Latest age
  - Gas is the "destination fossil fuel" which allows earlier and cheaper carbon reductions than many other routes to a low carbon world
  - Gas – with CCS – allows large amounts of low carbon electricity production which can also back up intermittent renewables and replace oil in transport sector and maintain its position (via electricity) in space heat/hot water/cooking sectors

The ages of gas – (2)

- The Golden Age of Gas? – IEA Report
  - Global demand for gas grows dramatically to 5.1 tcm by 2035
  - Overtakes coal by 2030
  - China demand equals European demand
  - But gas price assumptions are lower than previous scenarios
  - Assumes unconventional gas production costs in range $3 to $7 per MMBTU
  - Are these achievable costs when full environmental and regulatory scrutiny is applied to unconventional gas production?
- EU 2050 Energy Road Map
  - Are we in danger of giving mixed messages to gas suppliers to Europe?
  - Wide range of uncertainty for gas demand in EU by 2050 if power sector decarbonised

Nuclear power – past growth but where next?

Million tonnes oil equivalent



Source: BP Statistical Review of World Energy June 2011

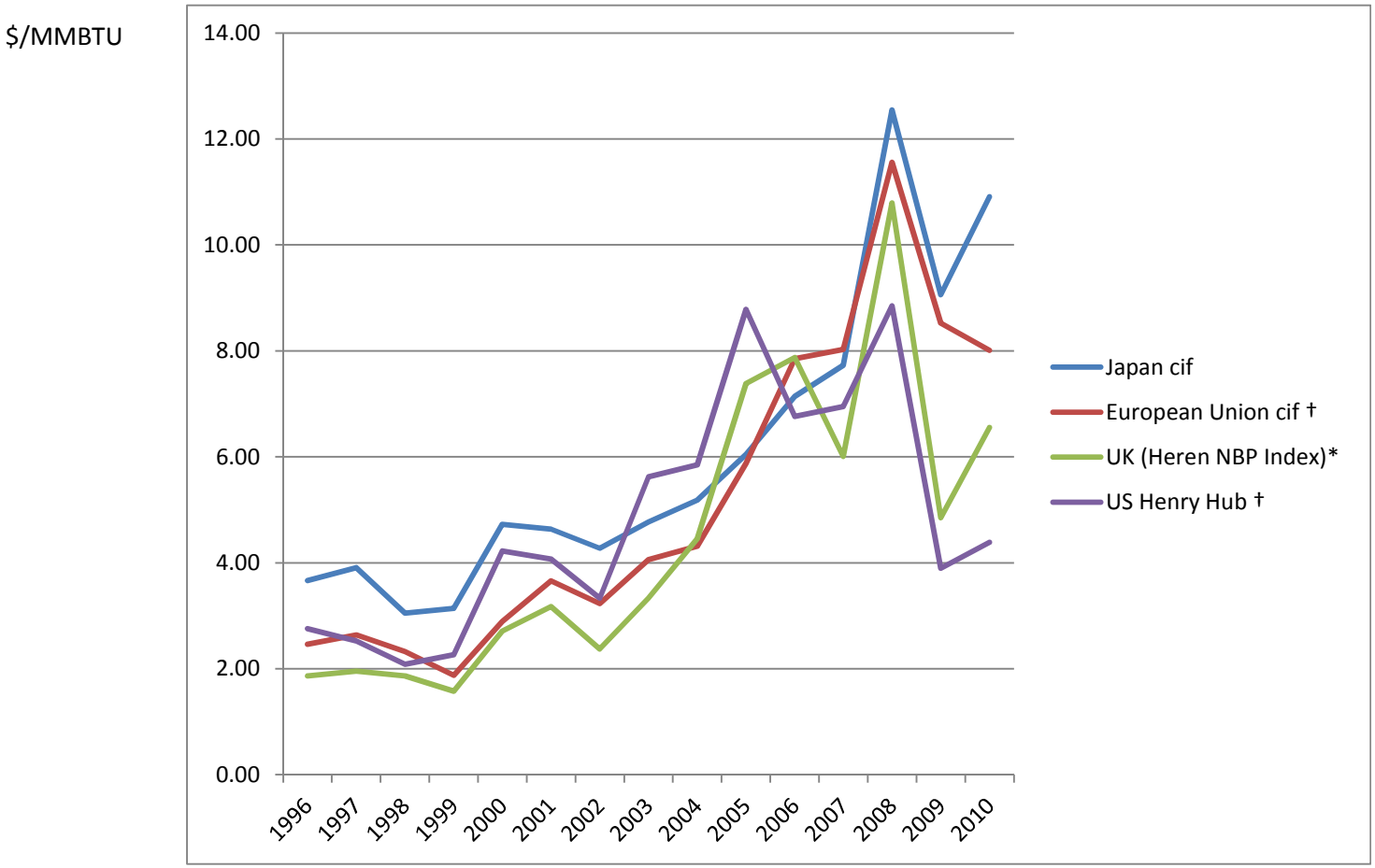
Nuclear ages

- 1950's and 1960's– first reactors – promise of electricity "too cheap to meter"
- 1970's and 1980's – rapid expansion but the accidents at Three Mile Island (1979, USA) and Chernobyl (1986, Ukraine, USSR) lead to a slowing down
- 1990's – steady growth with most new builds in Asia
- 2000s – a worldwide "nuclear renaissance" is discussed as a vital tool to help us move to a low carbon future
- Currently nuclear produces around 15% of world's electricity from 440 reactors – with 60 new builds in progress
- 2011 – Fukushima
  - Extent of disaster still unclear
  - Impact on renaissance immediate with many countries re-evaluating their safety measures and plans for new build
  - Italy referendum votes against nuclear power
  - Germany shut older reactors and plan to shut all reactors by 2022
  - What will be the short and long term impact on European gas demand – Germany alone could be an additional 1 bcm over next 6 months?
- Is this the end for nuclear generation in the developed world?
- If not - How do governments persuade their electorates to support and help fund new nuclear build?

Energy prices

- Oil remains the most important driver of energy prices
- Oil and gas and coal prices are highly correlated and likely to remain so
- Oil prices along with other commodities including non-energy commodities now influenced by “financialisation” or speculation in the financial markets via investment in commodity index funds
- Huge quantities of money ($15b in 2003 up to $200b in 2008) now invested in commodities by banks/traders/pension funds looking for investments which are intended to reduce portfolio risk eg commodities, prior to 2000, had little price co-movement with stocks
- Commodity index investors are now linking different commodity markets with each other and with other financial markets
- Impact difficult to quantify but estimated that this surge in commodity index investments could drive prices up above the “true” fundamental value – the impact on food prices is causing great concern amongst NGOs and UN
- Commodity prices, including energy commodities, are no longer simply determined by supply and demand alone but by a set of financial factors including aggregate risk appetite for assets and the investment behaviour of a diversified set of commodity index investors

Gas Prices – Moving towards a global gas market?



Source: BP Statistical Review of World Energy June 2011

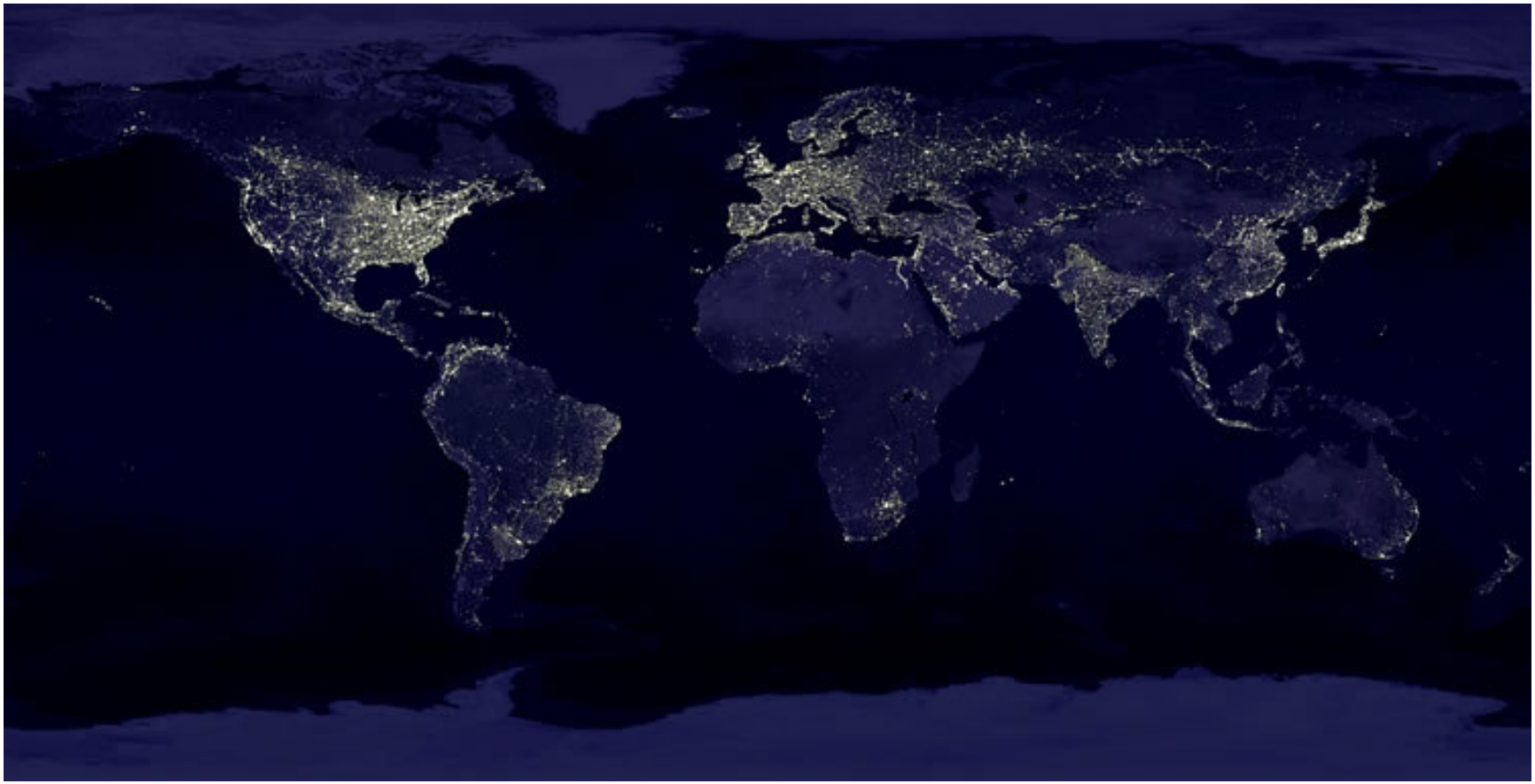
Global gas prices

- Three main regional gas markets with little sign of price convergence and likely to stay this way
  - US – lowest prices caused by over supplied market as a result of unconventional gas discoveries. Plans to export some gas via LNG but this will probably result in higher US prices and have a marginal impact on other regional prices. Oversupply has resulted in a weakening of the long term correlation of oil and gas prices and providing new opportunities for gas in US
  - Europe – mid-range prices still mainly linked to oil/oil products (but at discount to parity). Hub trading and pricing becoming more important but gap between hub and oil indexed prices closing up after a period where hub prices were at a significant discount
  - Asia – highest prices – oil parity. Balance between increase regional supply (from CBM and other LNG) and burgeoning demand in the region (eg China) will decide how gas prices move

Energy consumption in 2010

- Overall energy consumption – up by 5.6%
- Oil – up by 3.1%
- Gas – up by 7.4% - strongest growth since 1984
- Coal – up by 7.6% (China's coal consumption up over 10%) to nearly 30% of global energy consumption – the highest share since 1970
- Nuclear – up by 2%
- Renewables – Still only 1.8% of global consumption

A reminder of the role of energy in economic progress – and carbon emissions



Source: NASA

Topics

- What's happening worldwide?
  - Growing demand
- How much energy do we have or need?
  - Plenty available but need to do more re energy efficiency
- Where will this be found?
  - Increasingly difficult environments for oil/gas means higher costs
  - Current high costs of renewable energy need to be reduced by technological improvements
- What sources will be used?
  - Fossil fuels with CCS?, nuclear stalled?, renewables grow dramatically
  - Why are the gas/coal industries not investing to help "prove" that CCS works in order to protect their future markets?
- What will be done with carbon emissions?
  - Little hope for a global agreement but each country will aim to reduce emissions although economic growth will take priority
- How will global trends affect the UK?
  - We have declining fossil fuel reserves in the UK although unconventional gas reserves may be important
  - Increasing dependence on imported gas although LNG provides secure supplies
  - UK sources of renewable energy, in particular wind, can help significantly
  - Need to invest wisely in new energy infrastructure both within UK and via interconnection to facilitate new energy sources and improve operational flexibility

Concluding Remarks

- Demand for energy growing driven by progress in developing world – this will continue even if developed countries enter a another recession/stagnation
- Energy prices will stay “firm” with little hope of significant falls in oil and other energy prices
- Good news
  - We have plenty of energy to meet these demands from traditional fossil fuels, nuclear and as yet vastly untapped renewable sources
  - Technological discoveries are reducing costs and will provide options for decarbonisation
- Bad news
  - Oil/gas future discoveries will be in more difficult and sensitive environments
  - No sign of progress with global agreements on carbon emission targets

Thank you