CCS vs Wind Turbines

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www.energypolicy.co.uk

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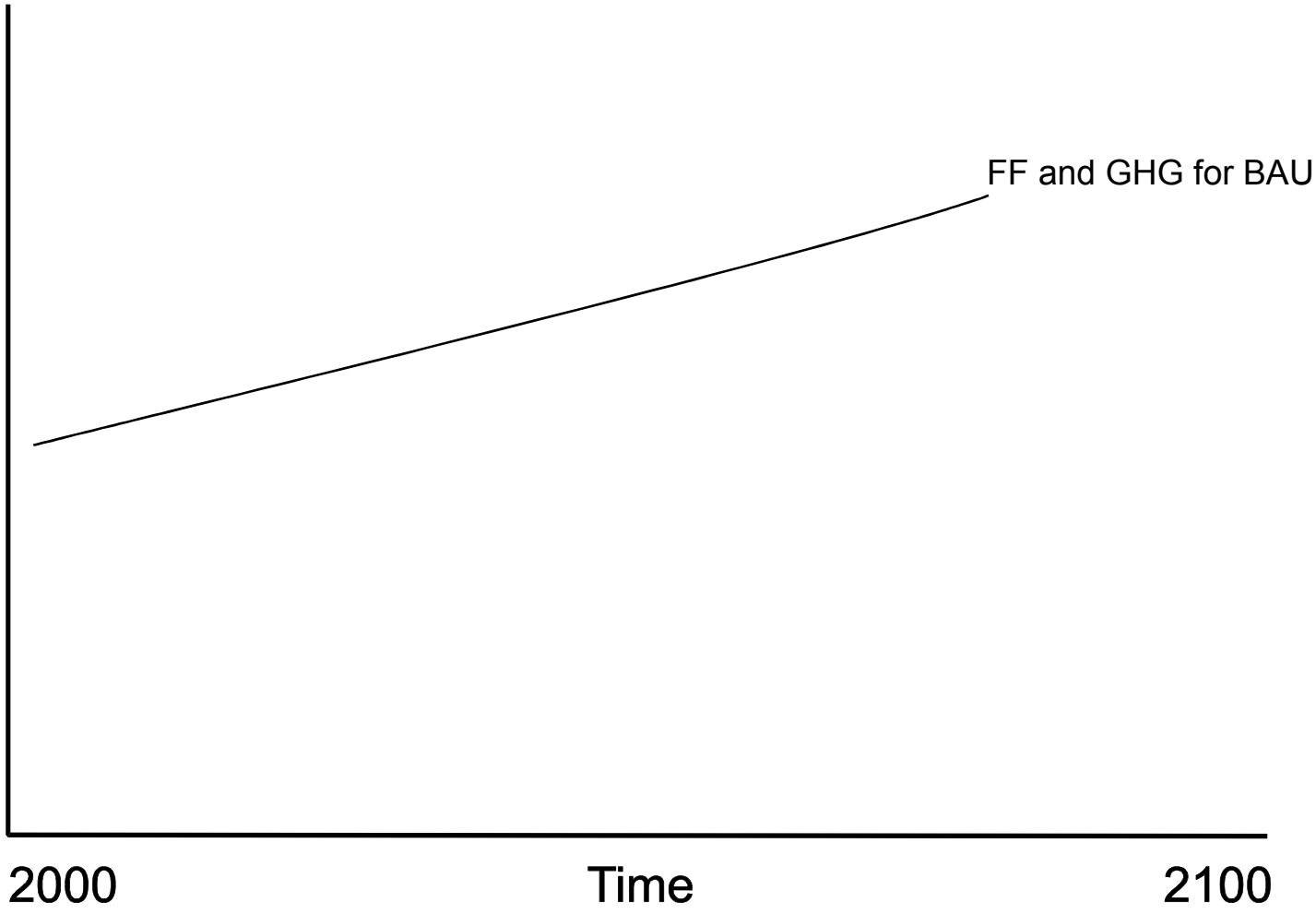
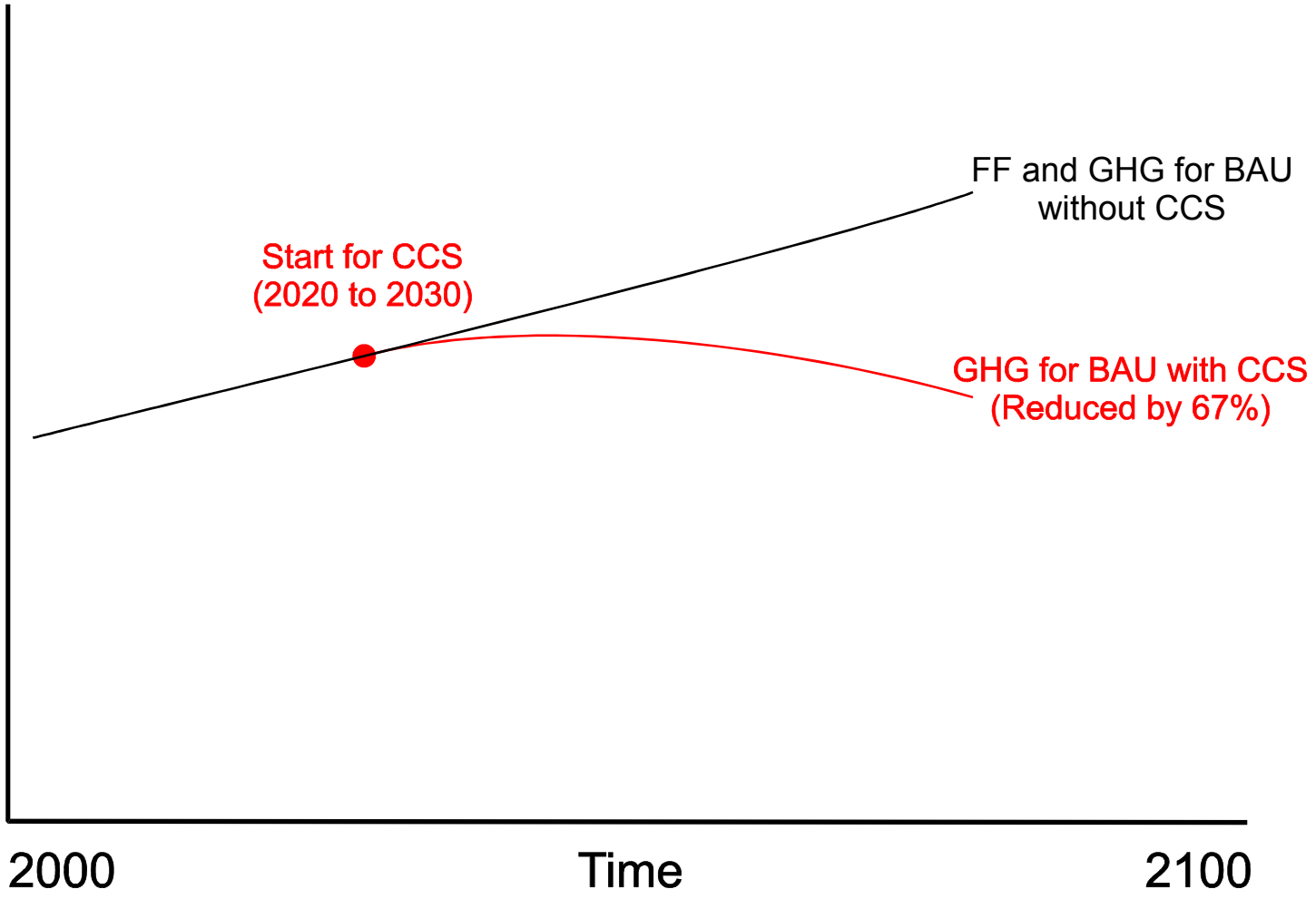
An Unsustainable Future



Problems and Options

- This shows the present position, with fossil fuel use and GHG emissions both increasing
- Nuclear would be far too slow and expensive
- So the main electricity supply options are fossil fuel plants with CCS and wind turbines
- Of the several types of CCS, the nearest option is to retrofit existing power plants
- This allows only Post-Combustion CCS

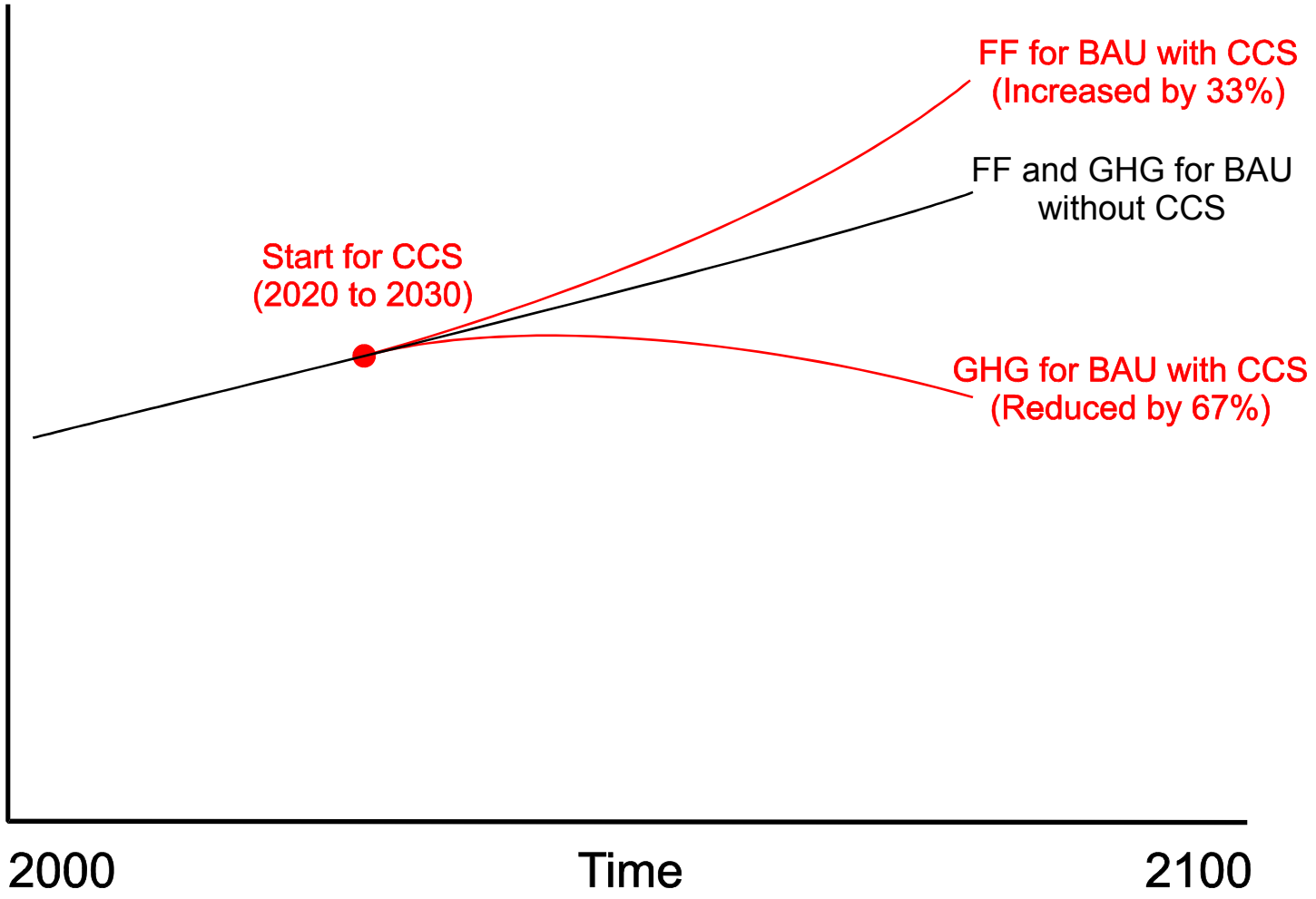
Reduced GHG Emissions



Cost and Effectiveness

- The power companies want major Government funding for development and deployment of CCS
- The start of volume deployment of CCS has been put at 2020 to 2030, but is uncertain
- The GHG reduction is often put at ~ 88%, but after accounting for embedded energy, is ~ 67%
- The embedded energy - and hence the capital cost - would also slow the rate of deployment

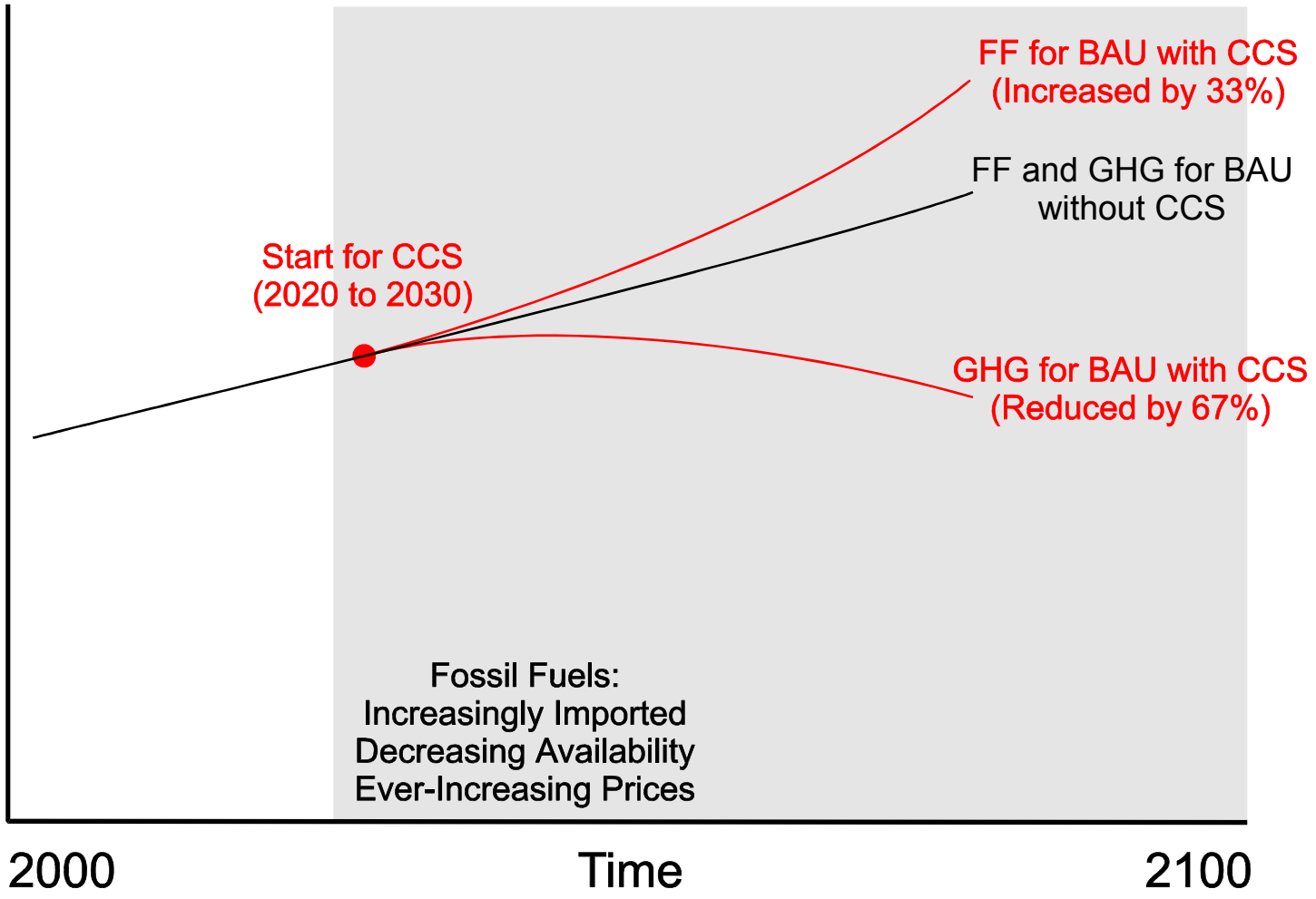
Increasing Fuel Required



Power, Fuel and Water

- Post-Combustion CCS would reduce the net power output by about 25% or more
- Hence the fossil fuel consumption for equal output would be increased by 33% or more
- The cooling water - already half the UK total - would also be increased by 33% or more
- New generating capacity of some kind would be required

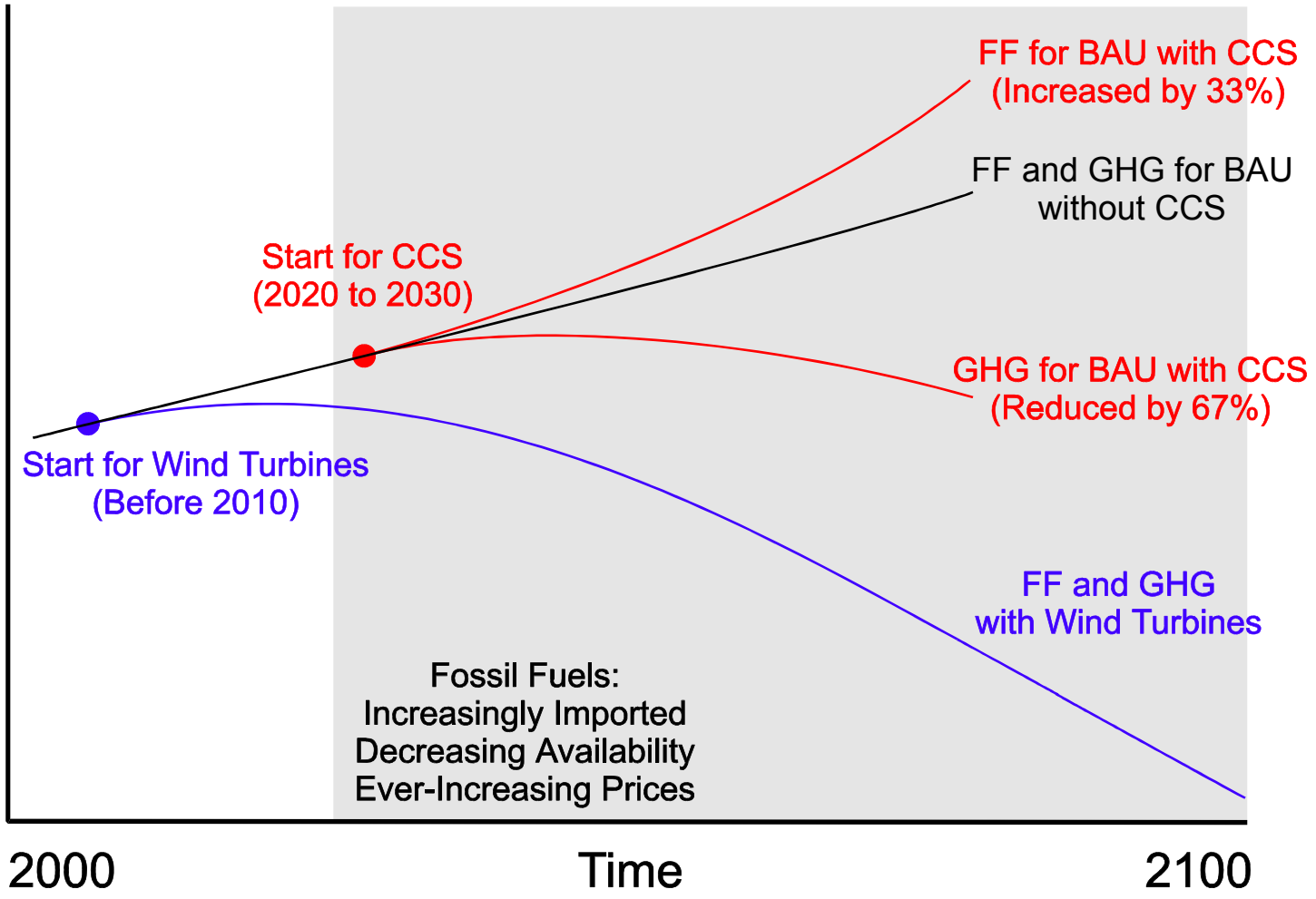
Decreasing Fuels Available



Peak Coal, Peak Gas

- Coal reserves have recently been revised down, with world Peak Coal put as soon as 2011
- UK gas peaked in 2000, Norway will in 2015, and world Peak Gas is likely from 2025
- For the UK in 2020, coal will be almost 100% imported and gas over 66% imported
- This will increase foreign exchange costs and reduce energy security
- Much of the CCS plant would be imported, costing yet more foreign exchange

With Wind Turbines



System Management

- Wind power for a region is predictable a day ahead to 5-7% RMS of the installed capacity
- The variable load and wind output would be balanced by existing fossil fuel plant
- Reducing the running time of fossil plant would reduce fuel use and GHG emissions
- When wind output exceeds the load, the surplus could be used to synthesise methane
- This could be stored and progressively replace imported coal and natural gas

Capability and Cost

- The world wind turbine market is worth $ 70 billion and employs over half a million people
- It added 38 GW in 2009, an increase of 31%, with nearly 10 GW in the US, 39% of the new capacity
- The UK wind resource is ~ 2000 GW average, where the final energy use in 2009 was 203 GW
- The UK had wind turbines of 4.3 GW by the end of 2009, and could have 37 GW by 2020
- No UK Government funding would be required, only the decisive rejection of nuclear and CCS

Risk, Cost and Security

- Where CCS would reduce generating capacity, wind turbines would increase it
- CCS would become a ‘stranded asset’ when fossil fuels become unaffordable
- The cost of carbon avoided might be $103/tCO2 for CCS, but only $77/tCO2 for wind turbines
- CCS might stabilise UK GHG emissions, but wind turbines could reduce them by nearly 100%
- Wind turbines - and synthetic storable fuels - could increase UK energy security to nearly 100%

A Sustainable Future

- By investing strongly in wind turbines, the UK could become a significant world supplier
- This would increase UK employment and earn foreign exchange
- Synthetic fuel would require capture of CO2 from the air, much as is proposed for flue gas
- ‘Air capture’ could also be used to reduce the atmospheric concentration (geo-engineering)
- The potential for storing CO2 beneath the North Sea should be reserved for this purpose

Thank you for your attention

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Other presentations and studies on energy are at:
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