

Trilemma

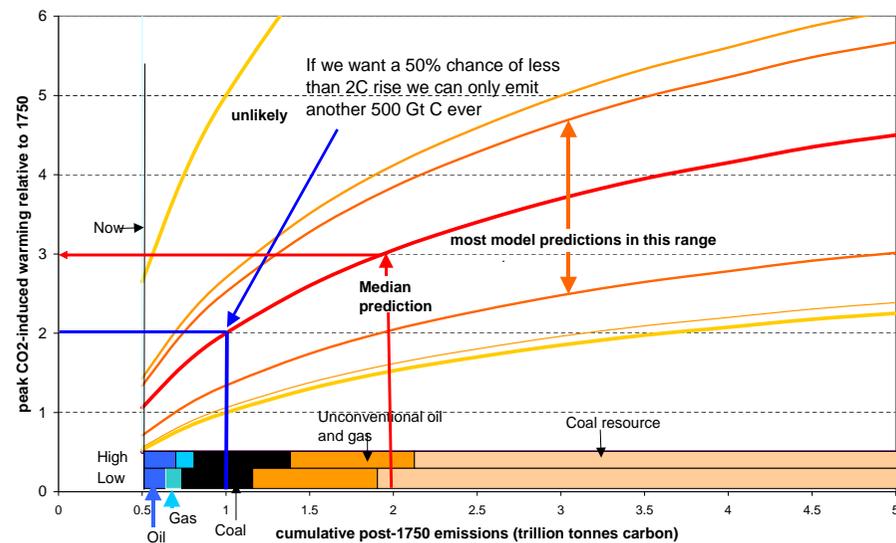
‘securing **cheap**, **reliable**, and **sustainable** sources of energy supply has long been a major concern for governments’ (Tony Blair, 2002)

choose any two of the three?

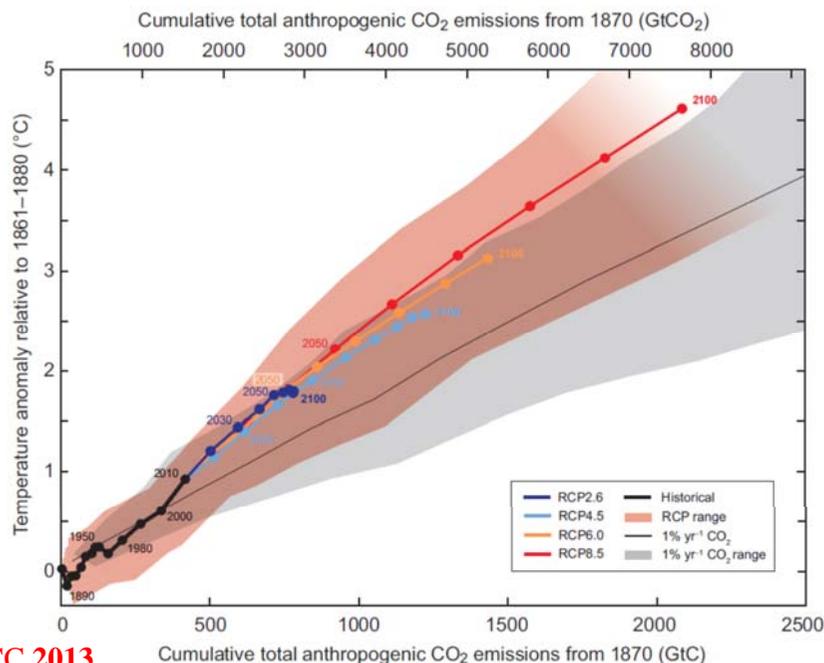
‘ensure our energy is **secure**, **affordable** and **efficient**’ and ‘bring about a transition to a **low-carbon** Britain’ (DECC web site, 2009)

No problem in choosing two – but at a cost
So how fast to decarbonise?

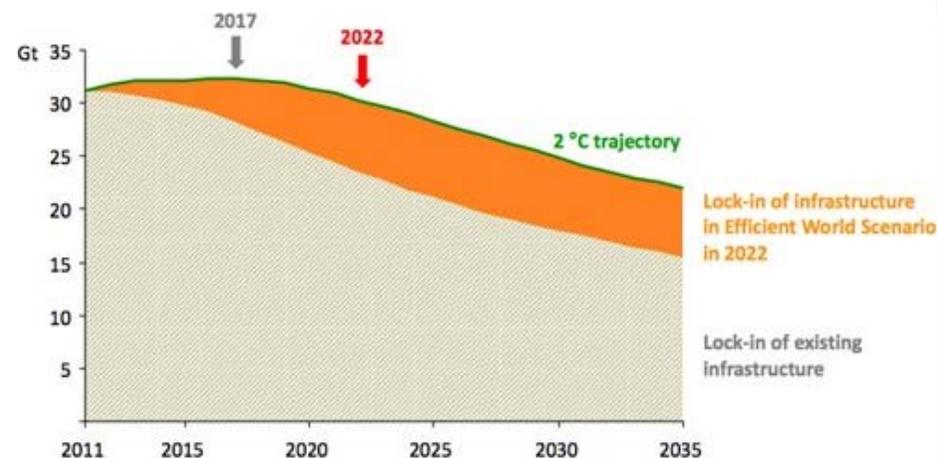
Peak CO₂-warming vs cumulative emissions 1750–2500



After MR Allen *et al. Nature* 458, 1163-1166 (2009) doi:10.1038/nature08019



We are already locked in to high carbon emissions from past fuel choices



Source: IEA <http://www.carbonbrief.org/blog/2012/11/favourite-graphs-from-iea>

- Electricity is the cheapest sector to decarbonise
- But low-C generation is mainly immature
 - or, for nuclear, designs are evolving, costs uncertain
- **carbon cost of support ignores learning benefits**
 - which should be secured more cheaply
- On-shore wind and nuclear look cost effective
 - provided they are sensibly supported

How to support and who pays?

- Energy-only market challenging
 - too many aspects incorrectly priced
- **lack of futures markets to hedge political risks**
 - => **capacity markets (CM)** probably needed
 - pay for flexibility etc via CM or ancillary services?
 - => SO needs to procure STOR, inertia, flexibility, frequency response etc efficiently
 - => and estimate **cost to attribute to new generation**

- Efficient support minimises **total system cost**
 - location, balancing, inertia, constraining
- Target support to desired **learning goal**
 - depends on state of maturity - demo or deployment
 - add C-price, learning=> **subsidise capex (& opex?)**
- Reduce unnecessary costs
 - SO to aggregate wind forecasts, balancing
 - **secure good sites and planning consents**
 - contracts to reduce diversifiable risk, lower WACC
- Move to **auctions** for contracts if competitive

- Reducing carbon, creating learning and knowledge are all **PUBLIC GOODS**
 - => finance out of public funds, **not levies** on electricity
- current policies exempt some industries in some countries from such levies
 - legally discriminatory, violates State aids, DG COMP cross
- => Solution = ALL industry should be exempt from distortionary taxes => fall on final consumers (VAT)

Make Energy policy consistent with good public finance