

FST

**Economics of decarbonisation of
the UK electricity supply**

Can radical innovation reduce the cost?

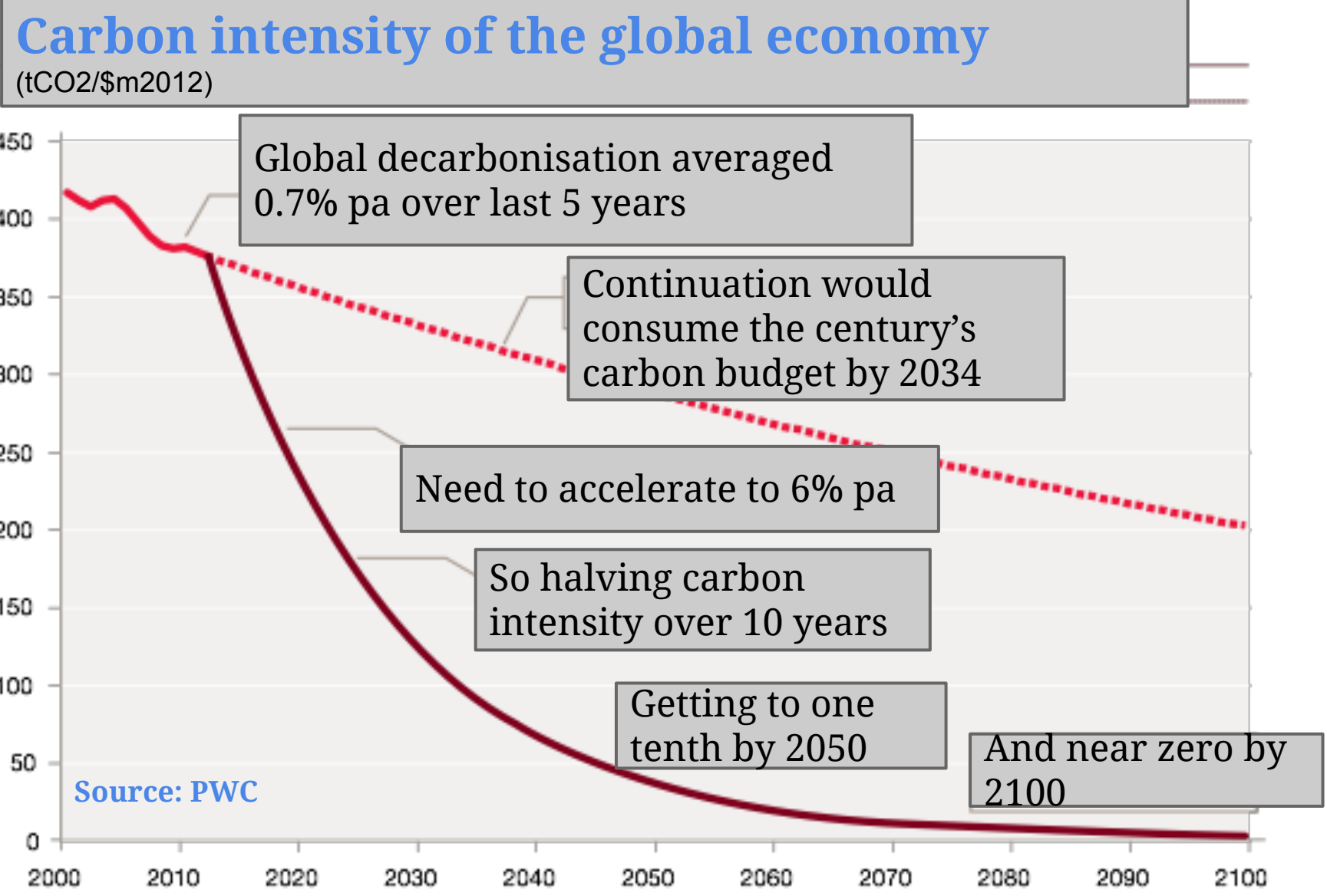
27th November 2013

James Smith

Chair, Carbon Trust

This is a time critical problem

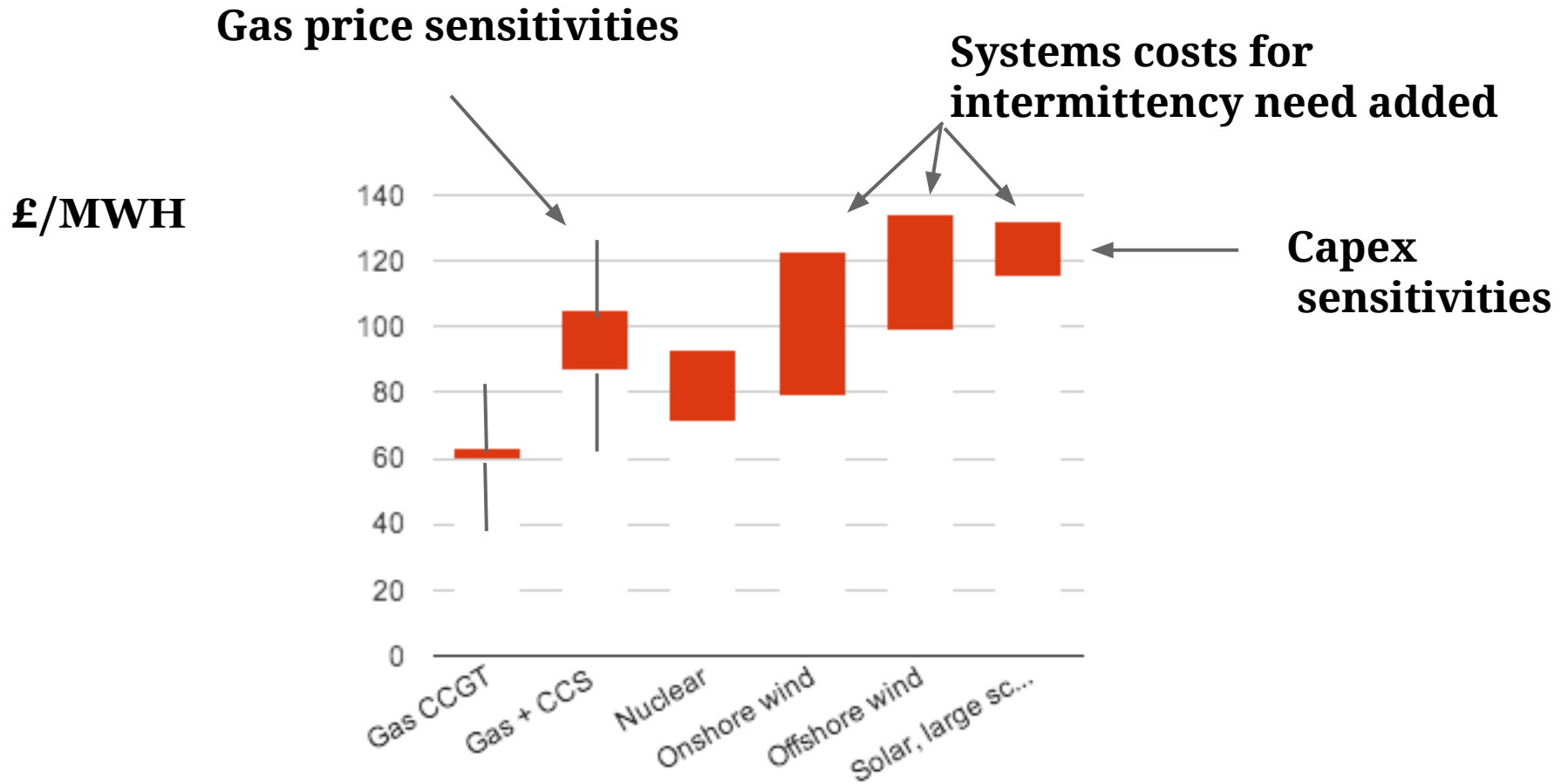
Rate of decarbonisation needs to increase significantly



Important realities on delivering least cost, low carbon energy:

- Basing decisions on total systems costs
- Dealing with inertial forces in the energy system
- Taking a phased, 'option management', approach to technology demonstration and deployment

UK - unit levelised electricity generating costs - with sensitivities



Source: DECC July 2013, projects starting preconstruction work, 2019
Gas CCGT excludes carbon costs

Systems costs versus levelised costs

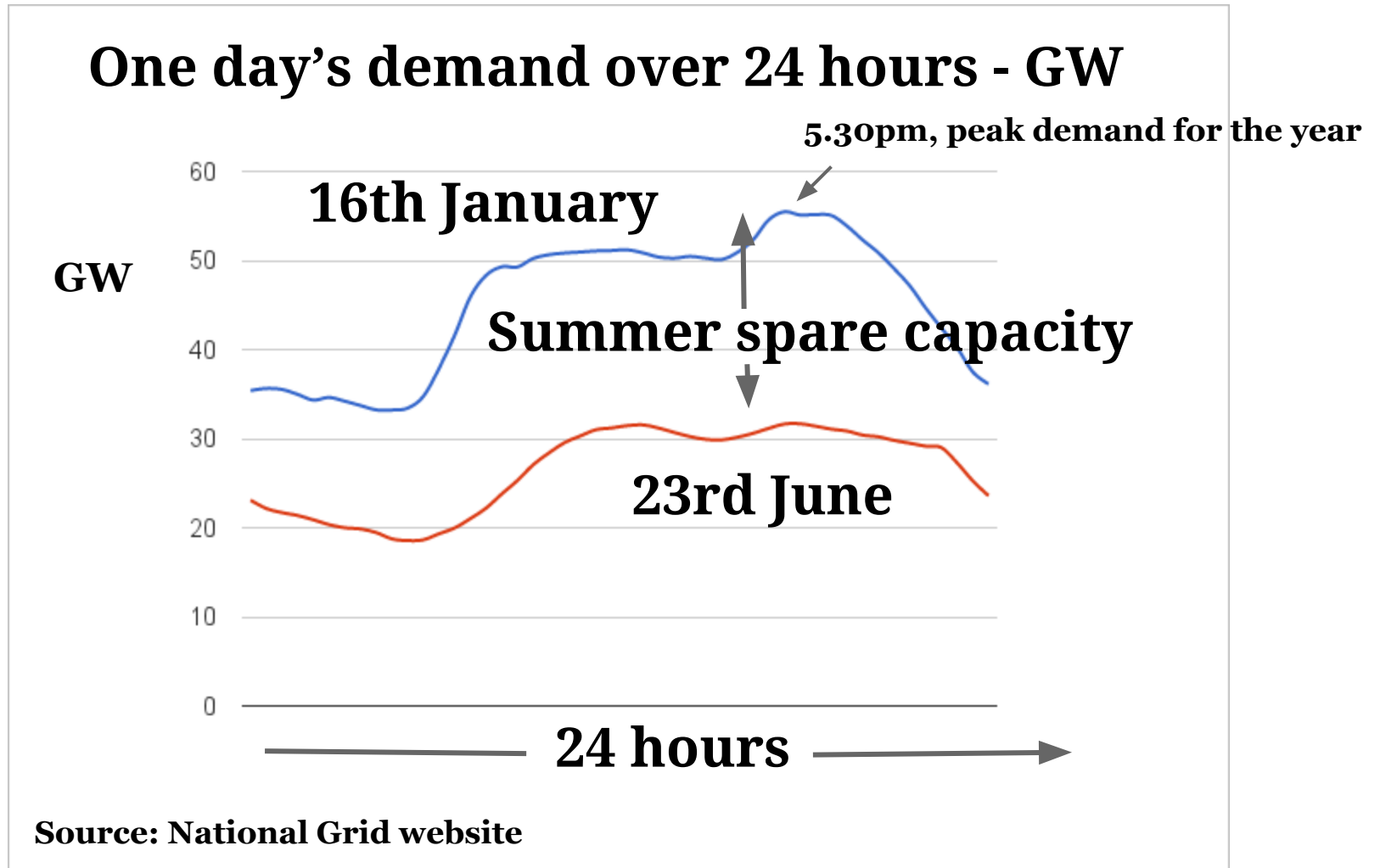
Levelised, 'factory gate' costs are interesting

Systems costs are what matter - the 'rush hour' problem for infrastructure design

Where levelised and system costs differ, eg:

- Fossil: environmental, especially CO₂
- Nuclear: independent power source for safety
- Renewables: backup power etc for low wind and after dark; grid costs for connection and strengthening

Electricity - 80% spare capacity during summer days - how does solar PV fit in?



How to evaluate systems costs:

Need to run systems optimisation models - setting low cost and low carbon goals, perhaps others

Each country/region has its own starting conditions - data are uncertain and modelling is complex - diversification is a wise hedge

Technologies assessed by 'option value' 'How much cheaper will the whole system be over a year if we use this technology?'

Who decides and implements?

Important realities on delivering least cost low carbon energy:

- Basing decisions on total systems costs
- Dealing with inertial forces in the energy system (aka kicking the fossil habit)
- Taking a phased, option management, approach to technology development and deployment

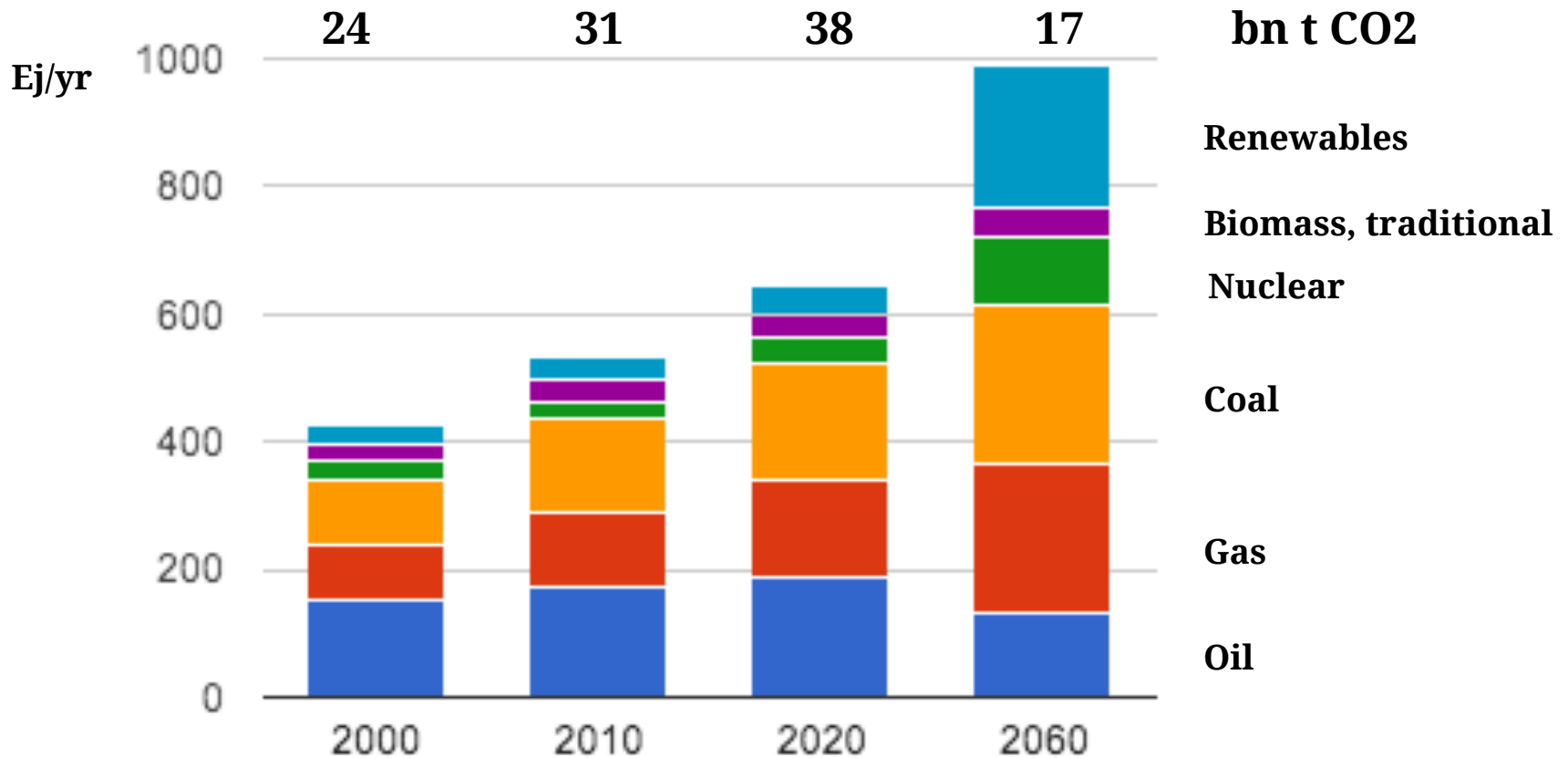
Global primary energy - one scenario

2000 to 2020 - wind + solar growth is 22 times

- fossil growth is 7.5 times renewables growth

2000 to 2060 - wind + solar grow 280 times

- fossil growth is about 1.4 times renewables growth



Source: Shell scenarios

Important realities on delivering least cost low carbon energy:

- Basing decisions on total systems costs
- Dealing with inertial forces in the energy system
- Taking a phased, option management, approach to technology development and deployment

Four phases of UK electricity market reform - and technology maturation, per the Energy Bill

<u>Phase</u>	<u>Technology maturity and market instruments</u>
To 2017	Technology demonstration - renewables obligations and 'administrative' price setting
2017-2020s	Technologies maturing - some technology specific auctions
2020s	Growing technology maturity - technology neutral auctions
Late 2020s+	Technologies mature enough and carbon price high enough to enable competition without intervention

Source: DECC policy overview, December 2012

What government should do:

- **Articulate more fully the phasing, option management and diversification strategy in the Energy Bill**
- **Ensure decisions reflect a systems cost approach - create a systems architect**
- **Consider simplifying the commercial incentives - eg ROI (return on investment)**
- **Keep the DECC team together to support the SoS with his/her considerable discretion, long term, under the Energy Bill**