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Risk managing power sector decarbonisation in the UK

KEY FIGURES

October, 2012

This project is funded by the European Climate Foundation

An E3G study following modelling by:



a business of



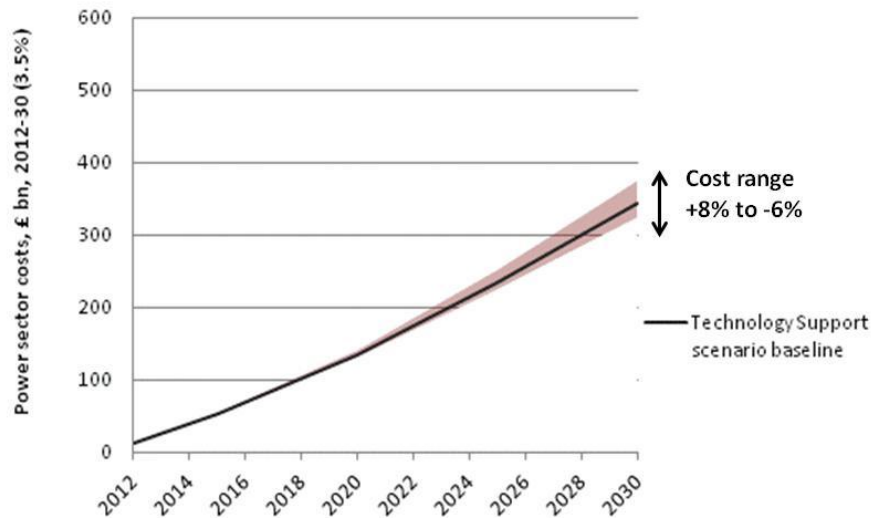
Total power sector costs under the 'gas-heavy' Carbon Price Scenario are more unpredictable and can be much higher



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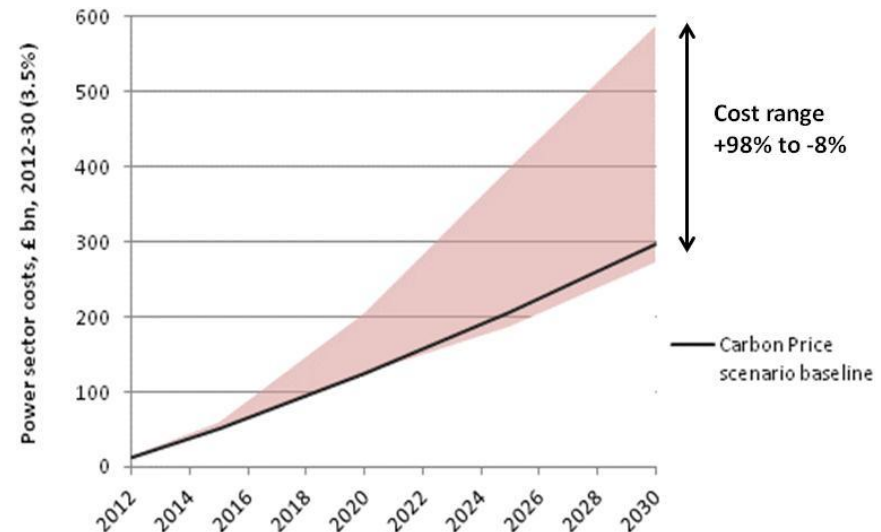
Technology Support Scenario

Power sector costs, £ bn 2012-30 cumulative



Carbon Price Scenario

Power sector costs, £ bn 2012-30 cumulative



Technology specific support mechanisms remain critical to decarbonisation in GB alongside a lower carbon price

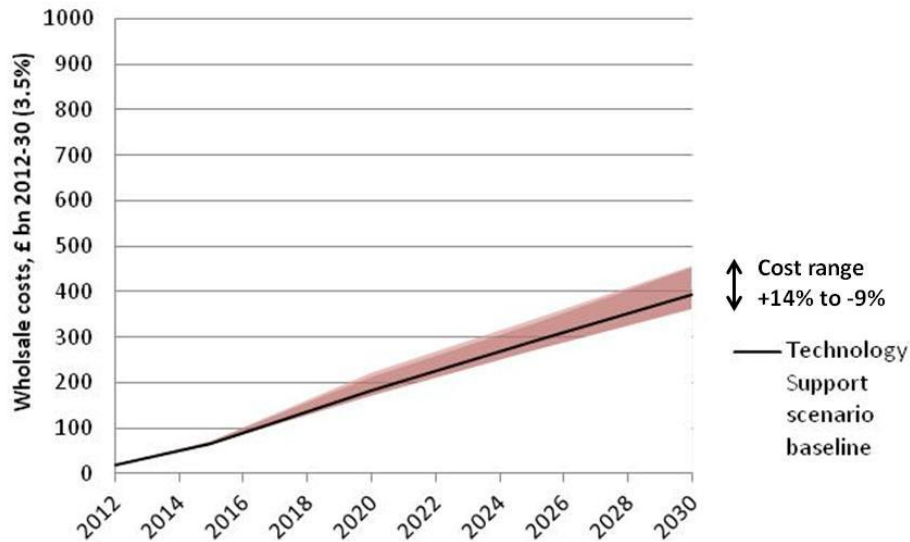
Similarly, wholesale cost risks are higher in Carbon Price scenario



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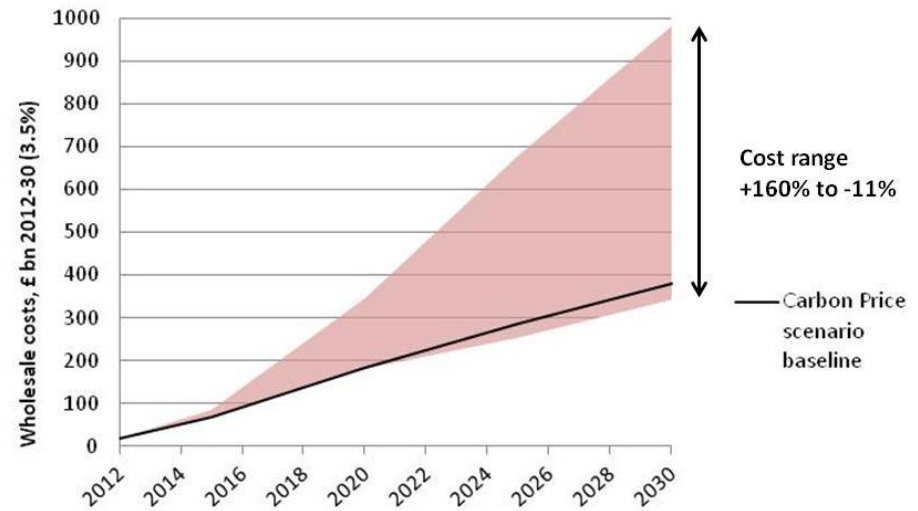
Technology Support Scenario

Wholesale costs, £ bn 2012-30 cumulative



Carbon Price Scenario

Wholesale costs, £ bn 2012-30 cumulative



Carbon Price Scenario creates significant rents for low carbon generators as the carbon price pushes up the cost of gas generation, which, in turn, sets the wholesale prices

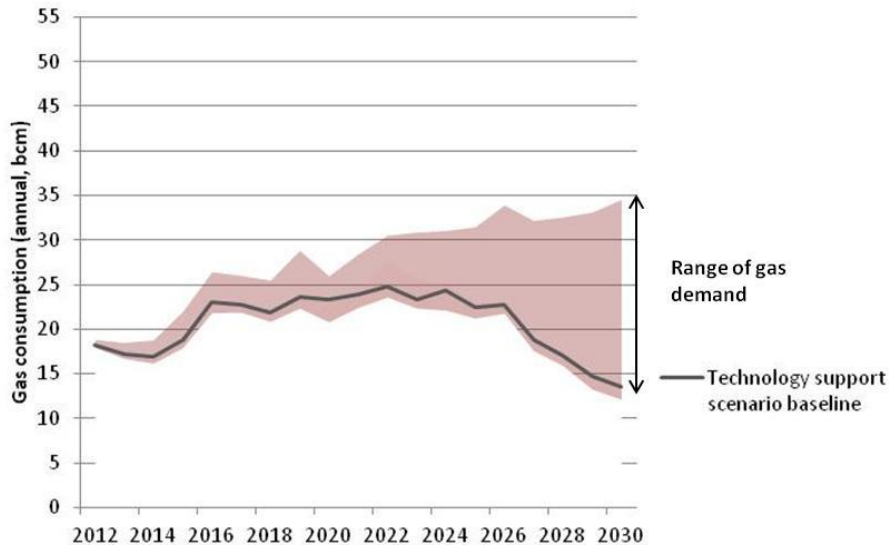
Large gas demand uncertainties, in particular in a gas-heavy pathway, raise questions as to the level of new investment required in gas infrastructure



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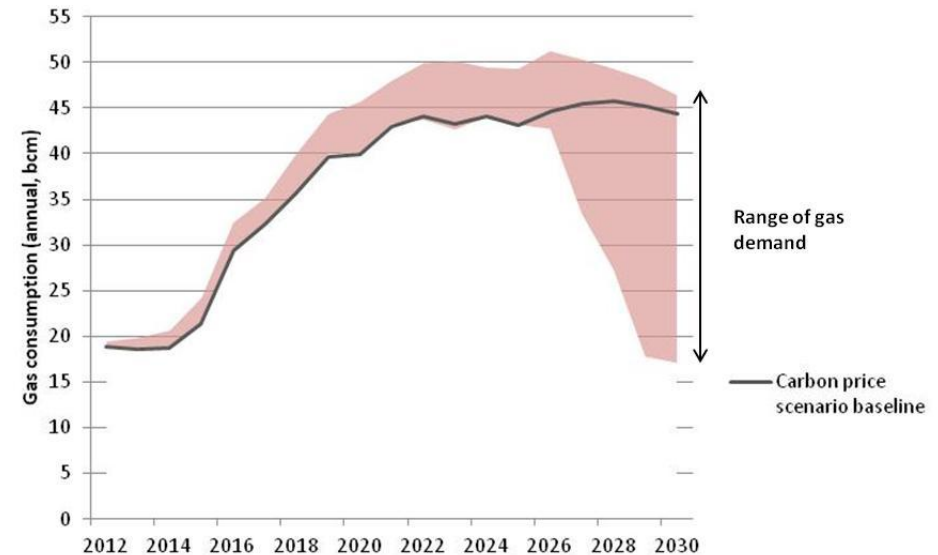
Technology Support Scenario

Power sector gas consumption (bcm)



Carbon Price Scenario

Power sector gas consumption (bcm)

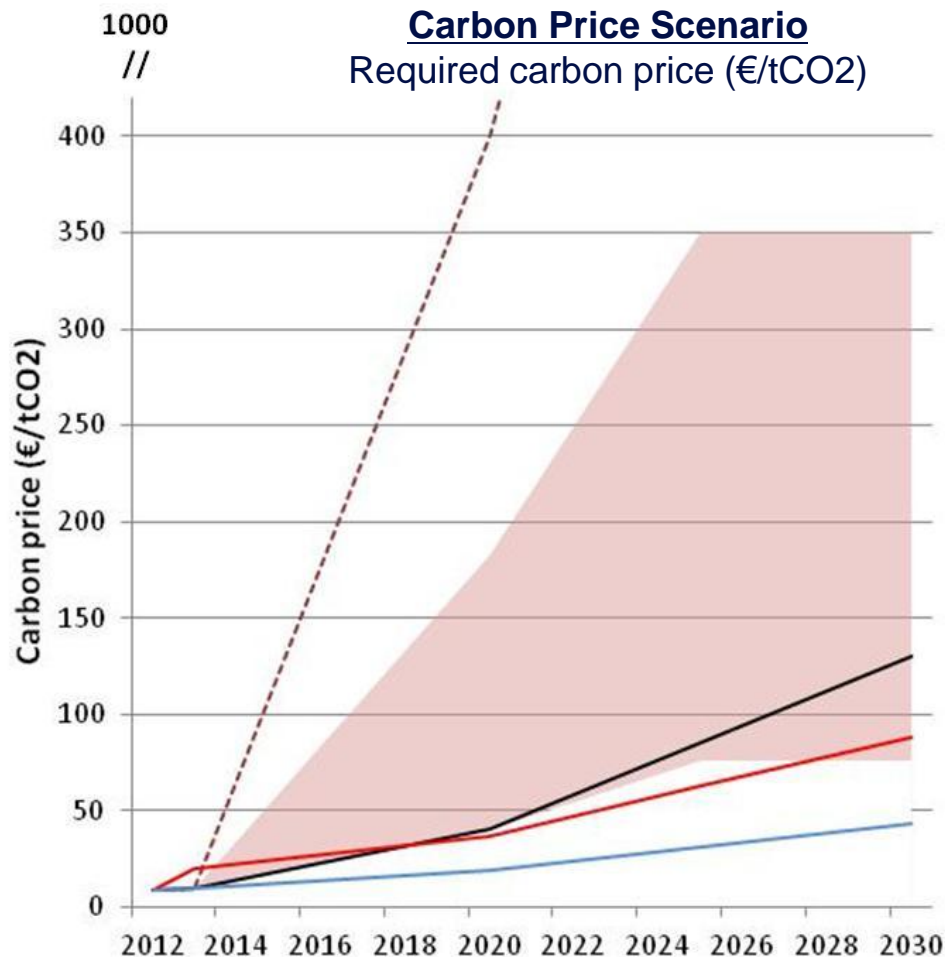


Continued use of high volumes of gas depends on both the successful commercialisation of CCS technology and gas generation being cheaper than coal

Relying solely on carbon pricing is an unattractive approach to incentivising investment



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Low CCS deployment means very high carbon prices will be needed to drive rapid deployment in offshore wind

- Ranges of carbon prices
(€130 to €350t/CO₂ and above max.; €76t/CO₂ min.)
- Low efficiency + No new nuclear
 - Carbon Price Scenario baseline
 - UK carbon price floor
 - EUA (€)

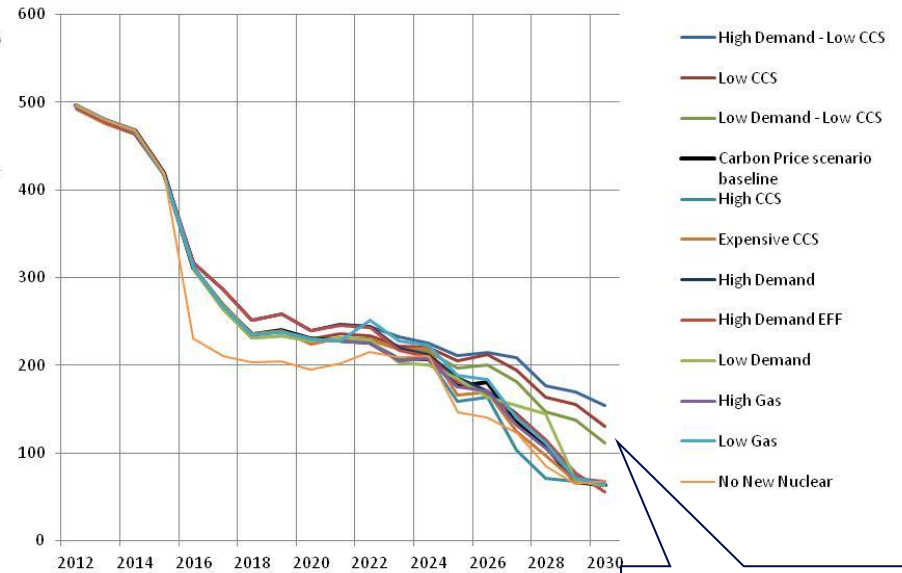
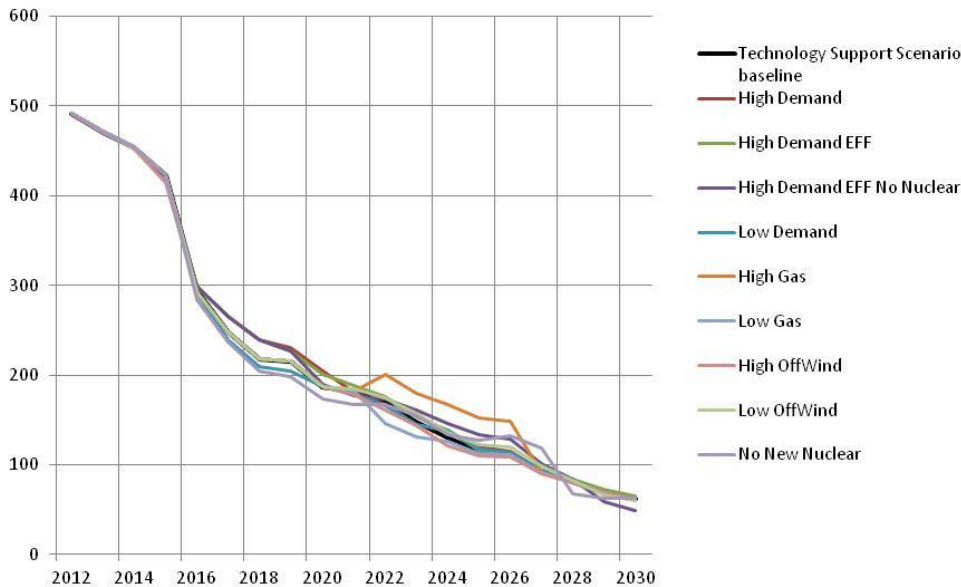
Continued deployment of renewables produces steady reductions in emissions intensity with more predictable delivery



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Technology Support Scenario
Emission intensity (g/KWh)

Carbon Price Scenario
Emission intensity (g/KWh)



Policy failure in the case of Low CCS deployment; High demand and low demand combined with low CCS deployment

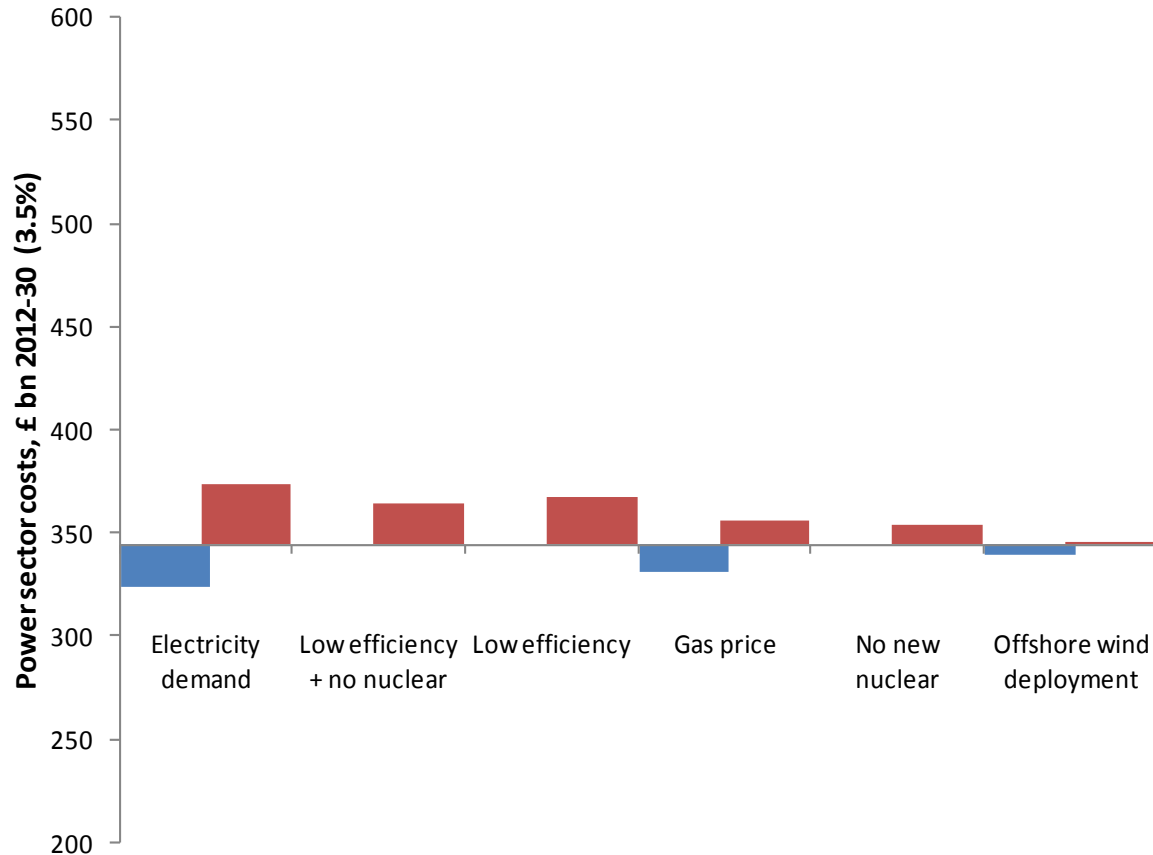
Impact of sensitivities on power sector costs in Technology Support Scenario



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Technology Support Scenario

Power sector costs, £ bn 2012-30 cumulative



Min
Max

Delivering the target in the Technology Support Scenario baseline costs **£344bn** in total between 2012 and 2030

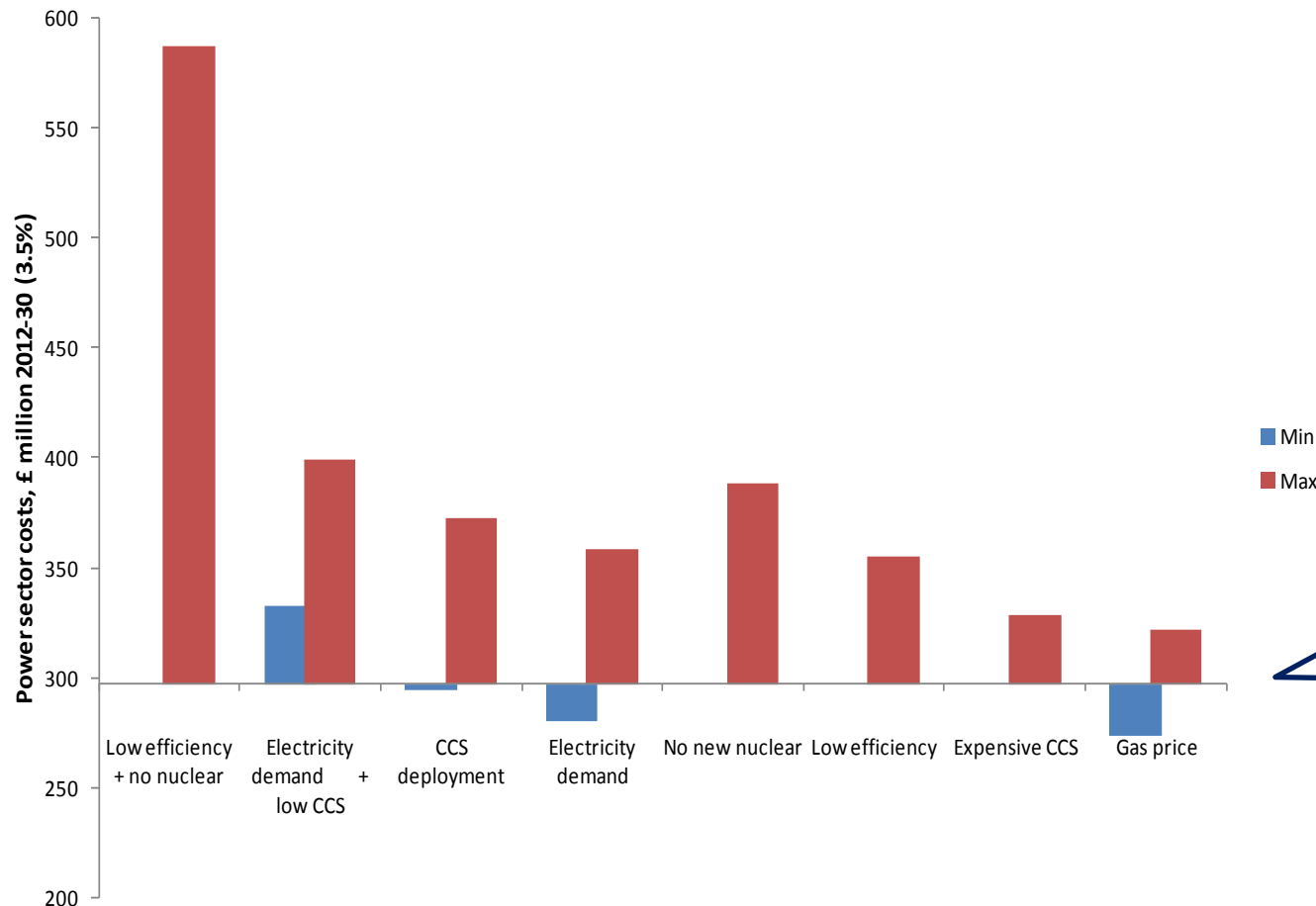
Impact of sensitivities on power sector costs in Carbon Price Scenario



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Carbon Price Scenario

Power sector costs, £ bn 2012-30 cumulative



Delivering the target in the Carbon Price Scenario baseline costs **£297bn in total between 2012 and 2030**

Technology Support and Carbon Price baseline scenarios were stress-tested against a range of uncertainties. These are not foreseen by investors.



SENSITIVITY	DESCRIPTION	TESTED BASELINE SCENARIO ¹
Electricity demand (High vs Low demand)	High demand: Only half of electrical efficiency assumed under baseline delivered and higher electrification of heat and transport (483TWh instead of 434TWh) Low demand: Less electrification (395TWh instead of 434TWh)	Carbon Price Scenario Technology Support Scenario
Low electrical efficiency (High Demand EFF)	Only half of electrical efficiency assumed under baseline is delivered (468 TWh instead of 434TWh)	Carbon Price Scenario Technology Support Scenario
No new nuclear build	No new capacity as opposed to 12.8GW new capacity fixed in both baselines	Carbon Price Scenario Technology Support Scenario
CCS deployment (High vs Low)	High CCS: 21.6 GW deployed earlier Low CCS: only 1.2 GW	Carbon Price Scenario
Offshore wind deployment (High vs Low)	High offshore: 41GW deployed earlier Low offshore: 35 GW deployed	Technology Support Scenario
High/Low electricity demand combined with Low CCS	Combination of above	Carbon Price Scenario
Low electrical efficiency combined with no new nuclear build	Combination of above	Carbon Price Scenario Technology Support Scenario
Gas price (High vs Low)	75% higher or lower than baseline gas price assumption (60p/therm ²) – introduced with no foresight and lasted for five years	Carbon Price Scenario Technology Support Scenario
Expensive CCS	CCS costs double	Carbon Price Scenario

¹ CCS and offshore wind deployment related sensitivities were tested only for one of the baseline scenarios. This was due to the fact that sensitivity runs were decided on the basis of baseline results and different baselines had different technology mixes.

² In line with IEA World Energy Outlook 2011 projections