

Influence of Price Risks on Policy Design & Investment

Dr William Blyth
Oxford Energy Associates

Global Energy Systems Conference
Edinburgh 28 June 2013

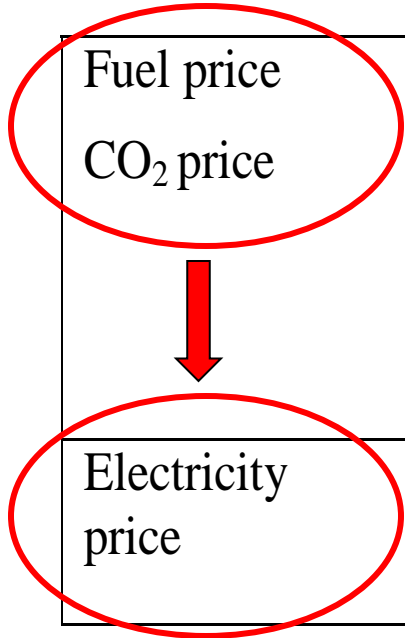
Power generation is a mature sector- why are we talking about risk?

- Investment case increasingly driven by new policy instruments with their own risk profile
 - Carbon price floor
 - Contracts for difference feed-in tariffs
 - Capacity mechanisms
- Changing technology mix
 - 30% or more from renewables
 - Technology risk (incl. RE, nuclear, CCS)
 - Changing the price formation process
- Fuel price risk
 - Not a new risk, but affects investment case for low-carbon technologies, and therefore the policy case for support

Investment case depends on risk and returns

Affected by **both Costs and Revenues**

	Price Risks	Technical Risks	Financial Risks
Costs	Fuel price CO ₂ price	Capital cost Operating and maintenance cost Decommissioning and waste	Weighted cost of capital Credit risk
Revenues	Electricity price	Utilisation levels Build time	Contractual risk



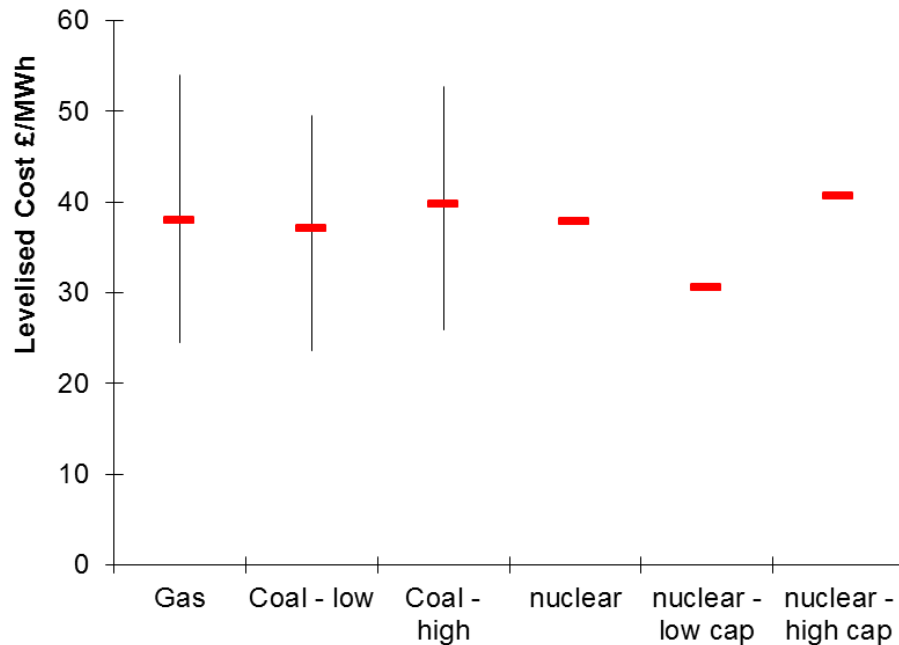
Revenue Risks as Important to Returns as Costs & Cost Risks

- Returns are affected by *price risks* as well as cost risks
- Price risks may bear upon *all technologies*
- Fossil plant are *price makers* and have a natural hedge
- Nuclear and RE are *price takers* and exposed to price risks created by fossil fuel price volatility *and* CO₂ price risk

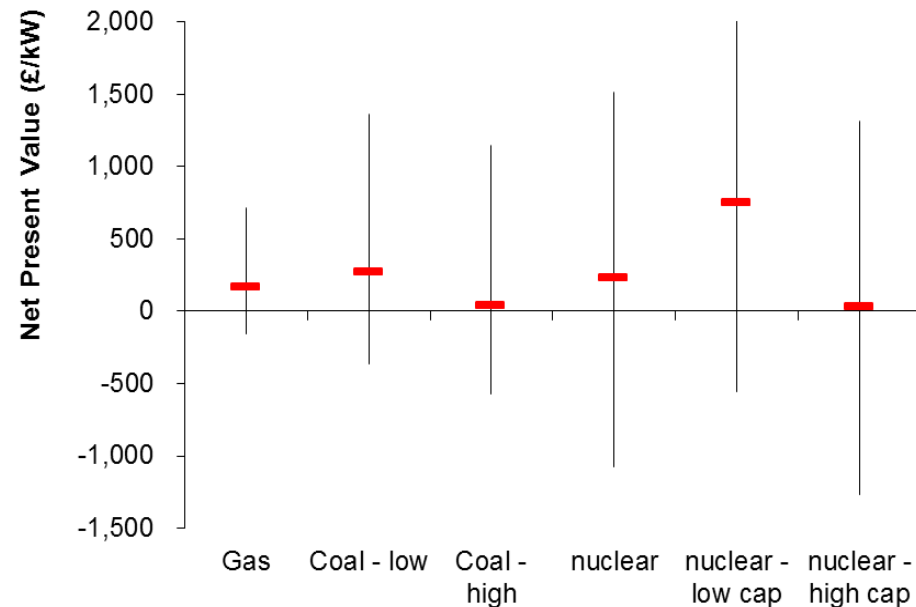
Effect of Electricity Price Risk for Different Technologies

Optimisation based on least cost is fine for a central planner
But what costs don't tell you is vital to investors

Spread in levelised costs arising from different CO2 and fuel price scenarios (taken from UK Energy Review) (Working Paper by Will Blyth 2006)



Net present value representation of the spread of returns arising from different CO2 and fuel price scenarios (taken from UK Energy Review) (Working Paper by Will Blyth for UKERC 2006)

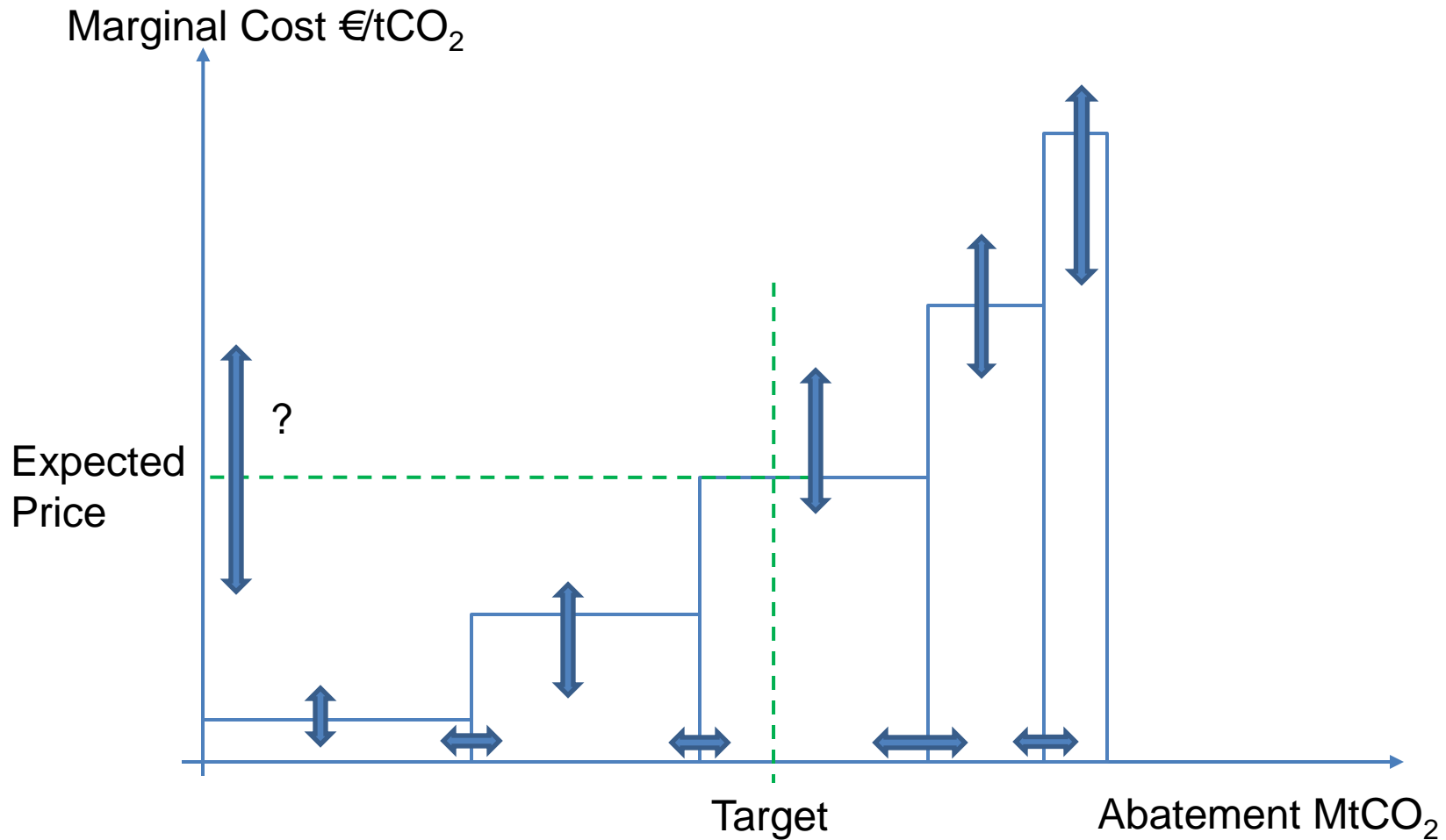


Risks play out over different timescales

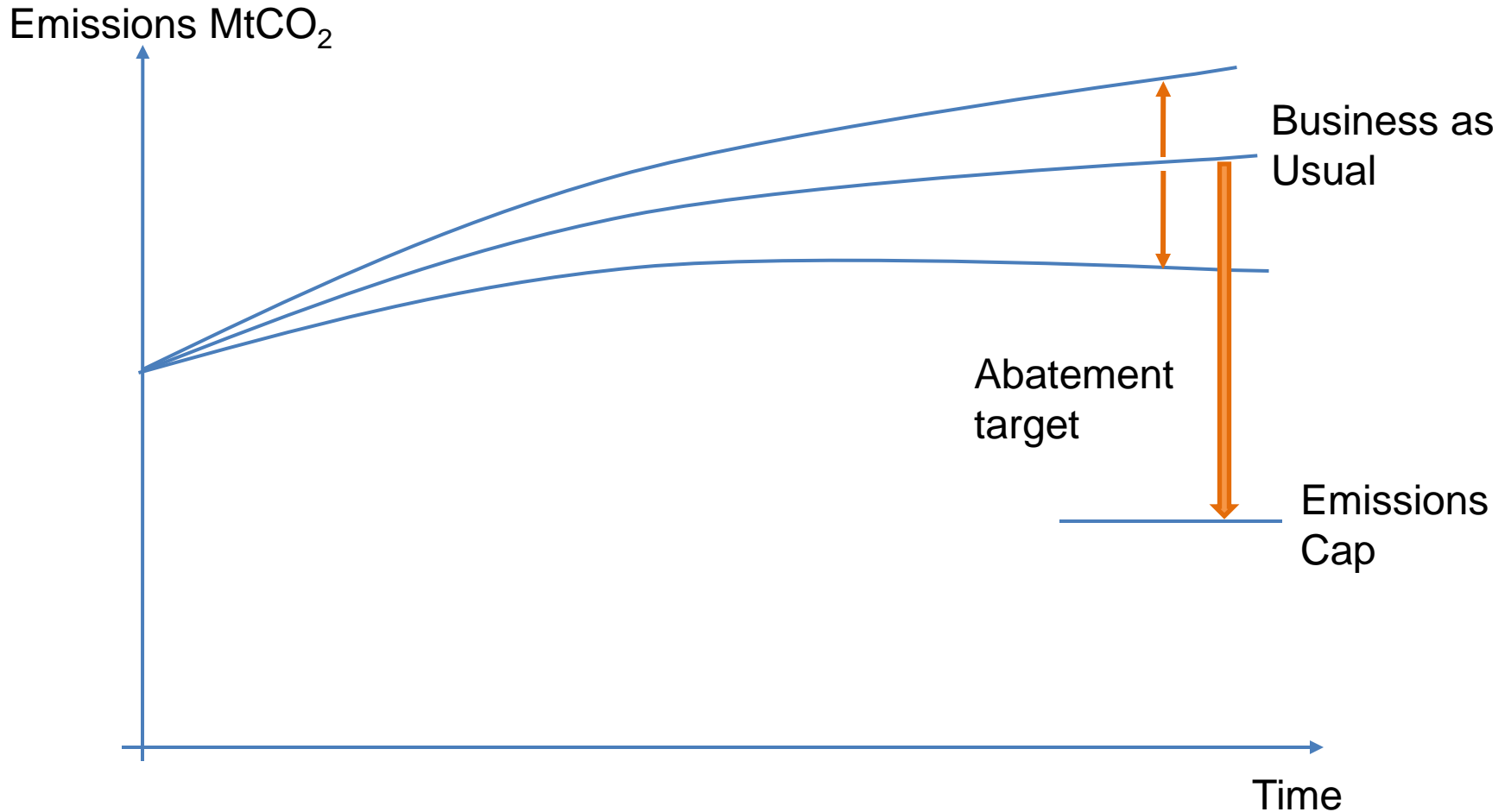
- Long-term risks affect choice of investment and long-run evolution of the sector – e.g.
 - CO₂ prices
 - Long-run fuel price uncertainty
 - Technology costs
- Short-term risks affect input costs, electricity prices and financial performance – e.g.
 - Short-run fuel price volatility
 - Wind power availability

**EXAMPLE OF LONG-RUN RISKS:
CARBON PRICING**

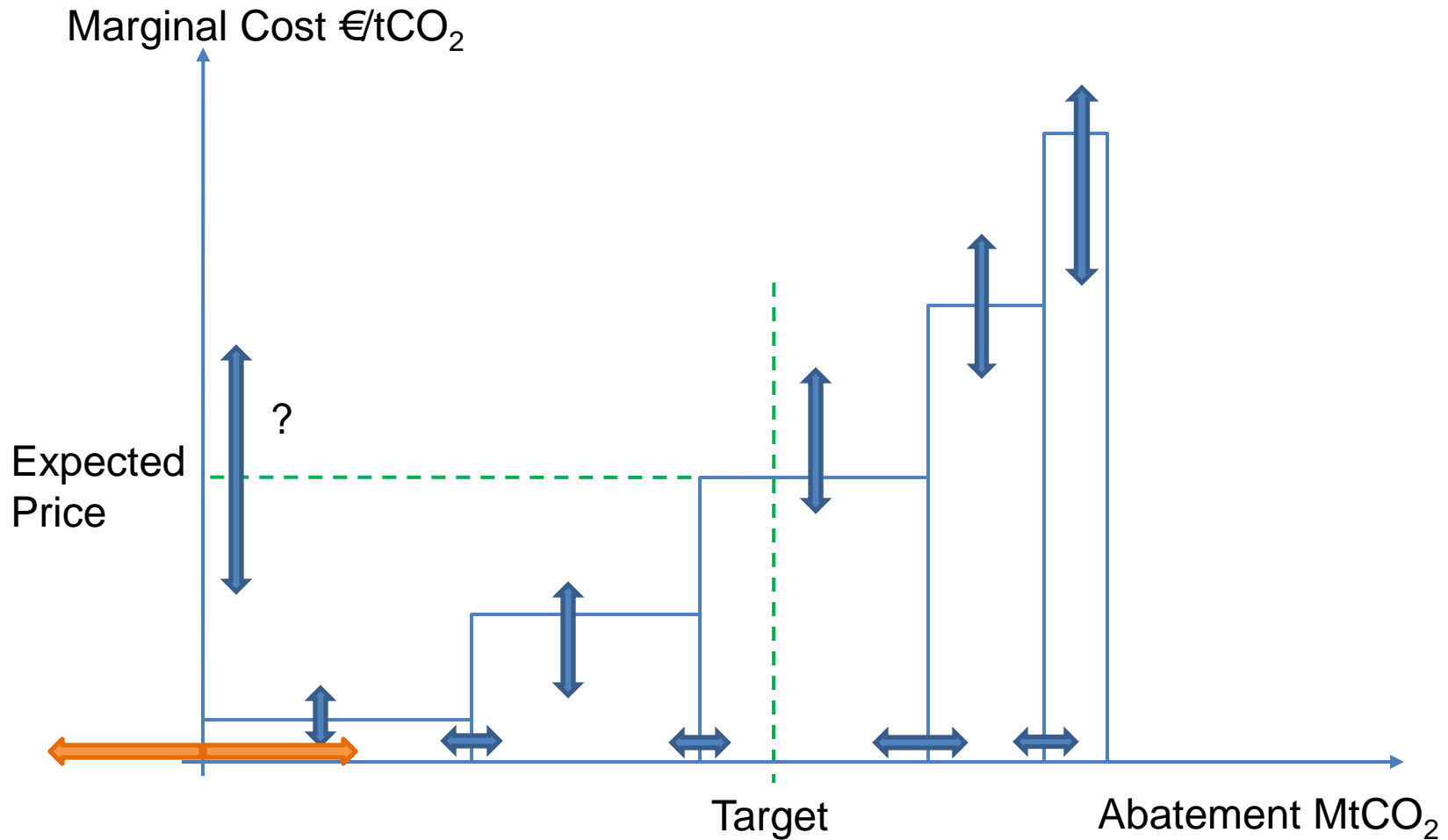
Conceptualising Uncertainty in Carbon Price Formation



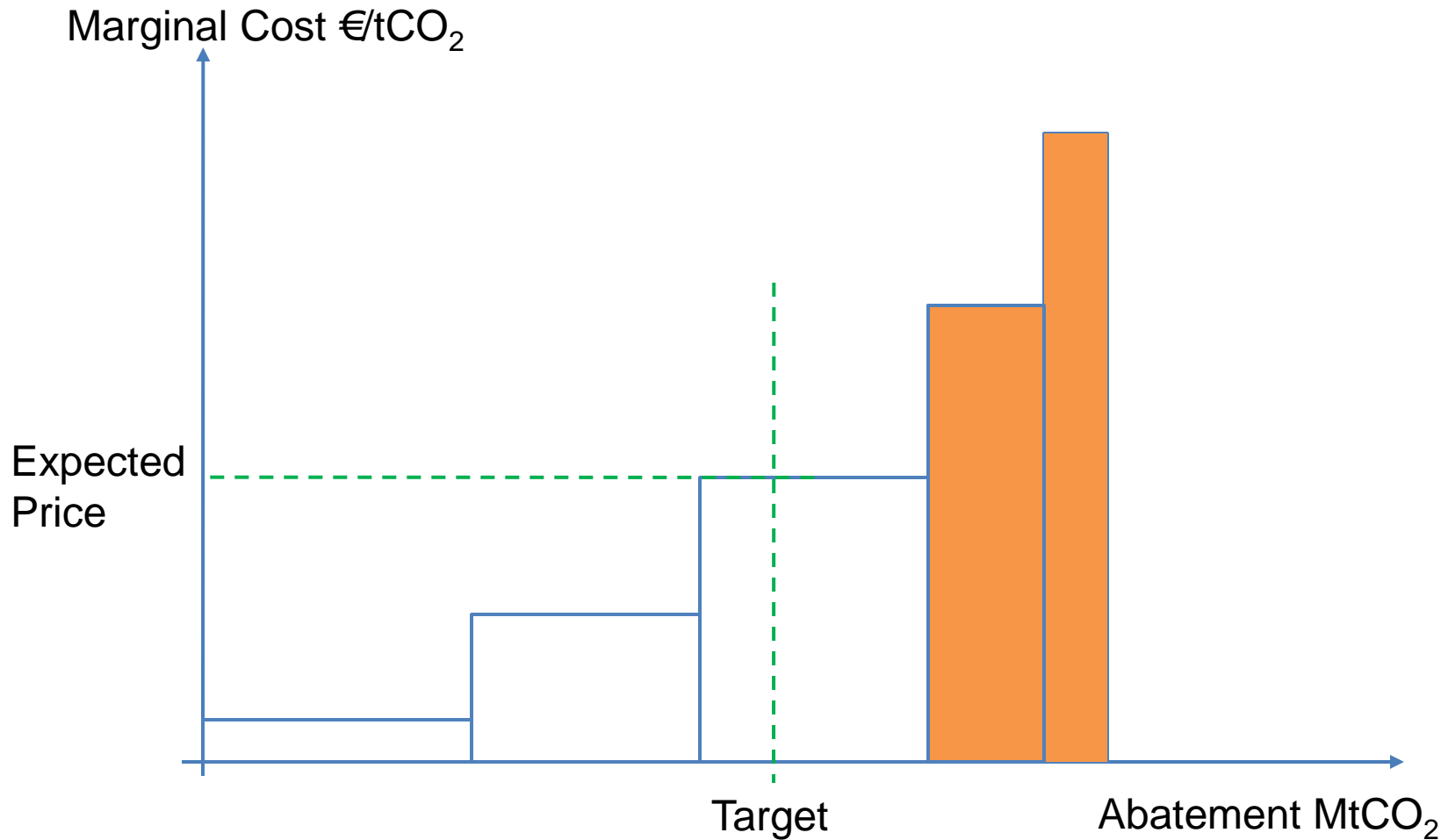
Measuring abatement against a baseline



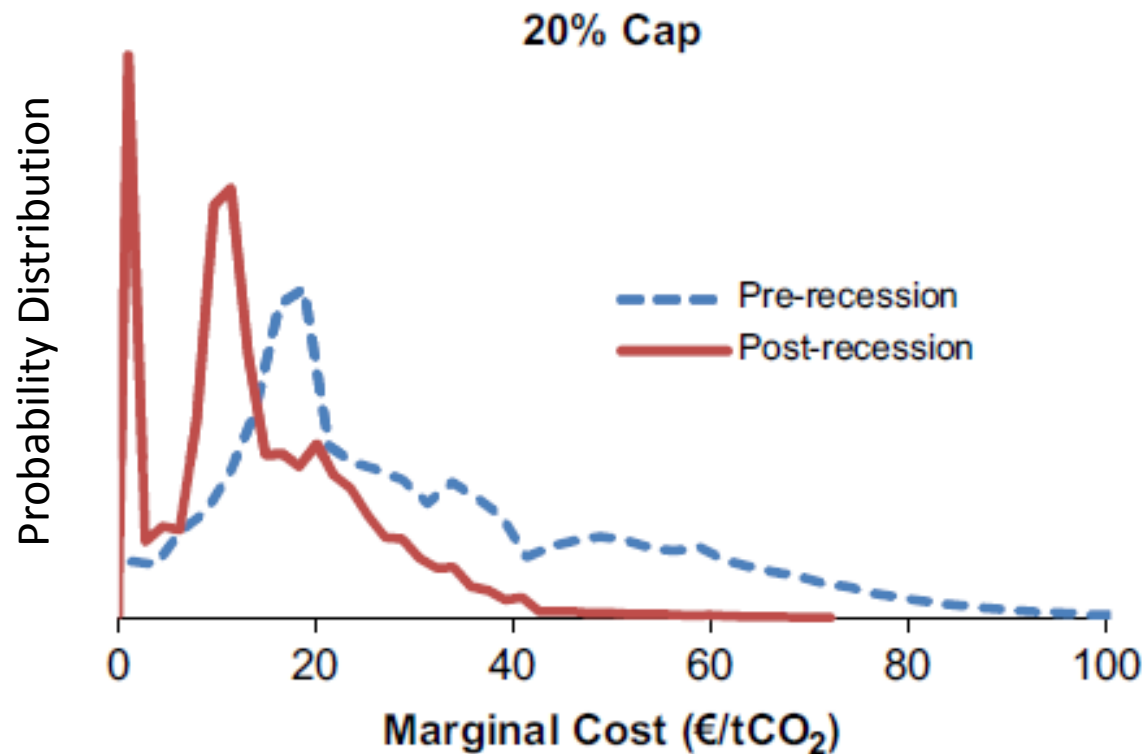
Conceptualising Uncertainty in Price Formation



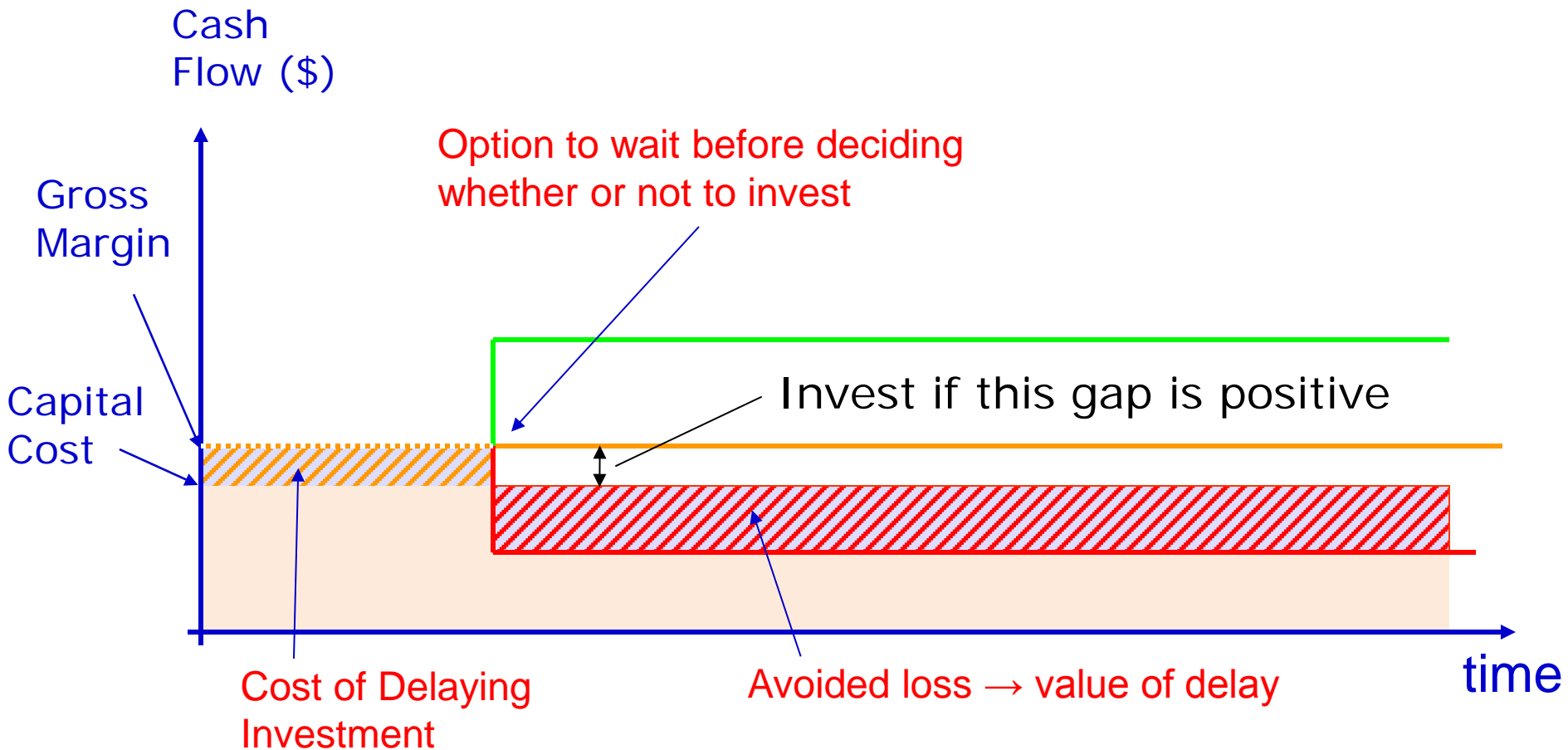
Conceptualising Policy Interactions



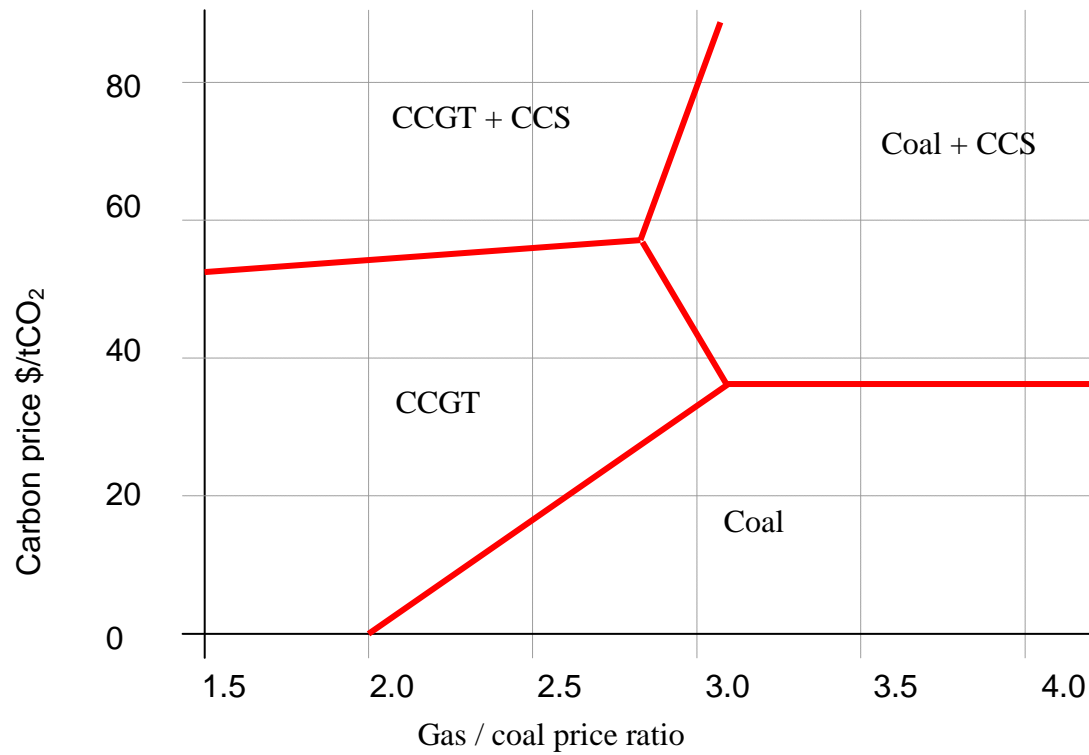
Effect of recession on EU-ETS price



Quantifying Risk: Option Value & Risk Premiums

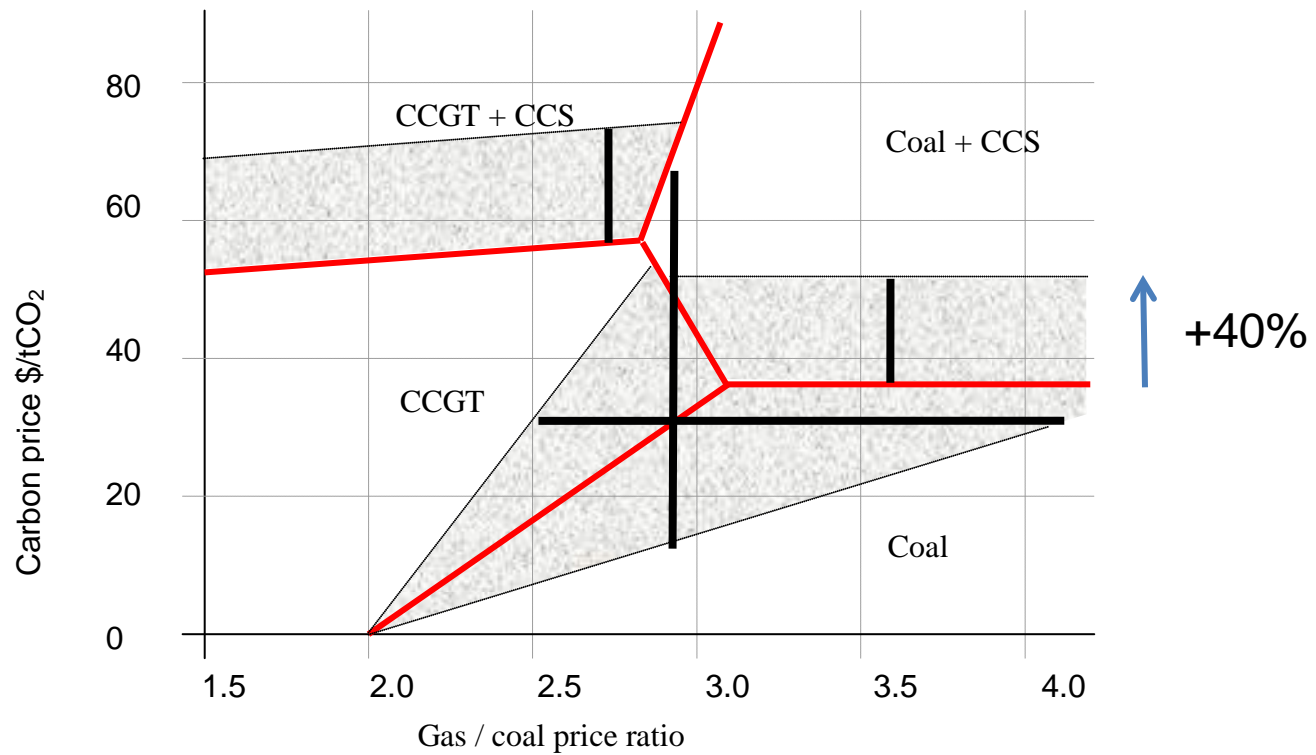


Carbon Capture and Storage



© OECD/IEA 2006

Effect of carbon price uncertainty

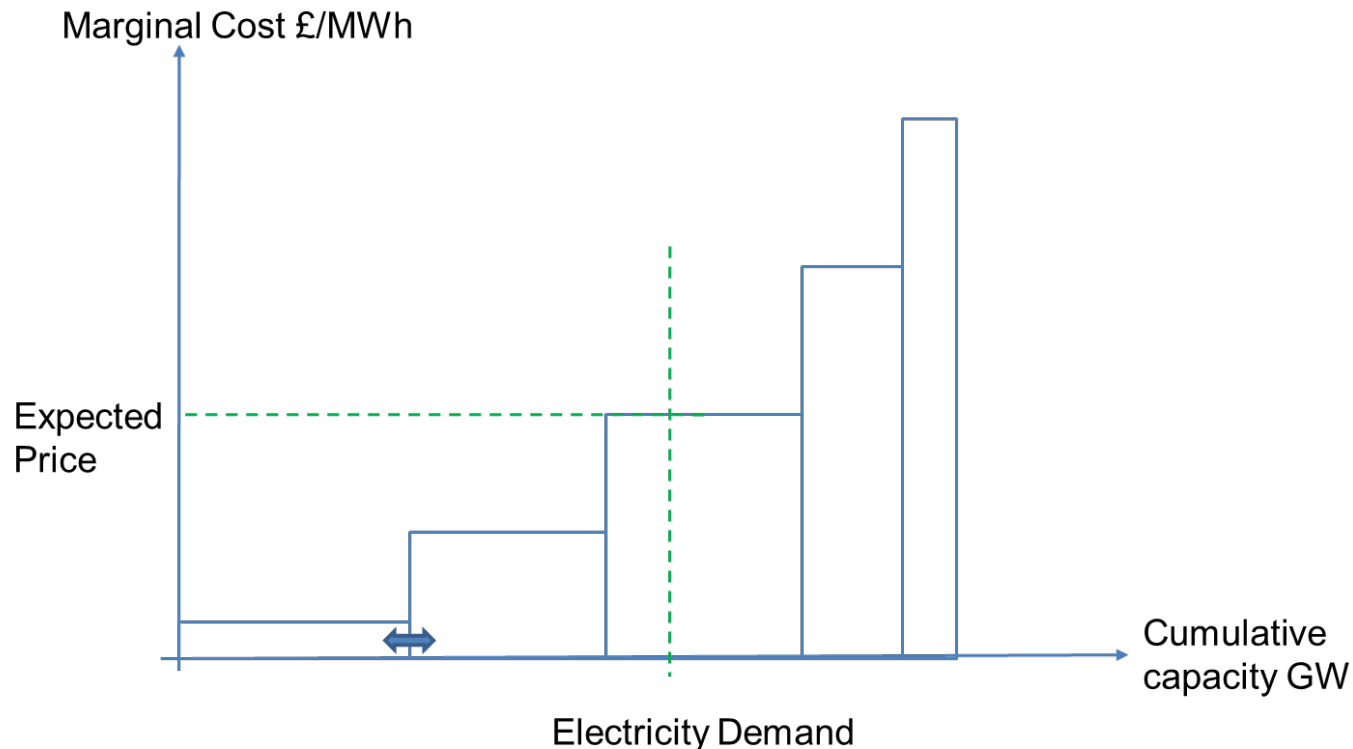


© OECD/IEA 2006

**EXAMPLE OF SHORT-RUN RISKS:
ELECTRICITY PRICE FORMATION**

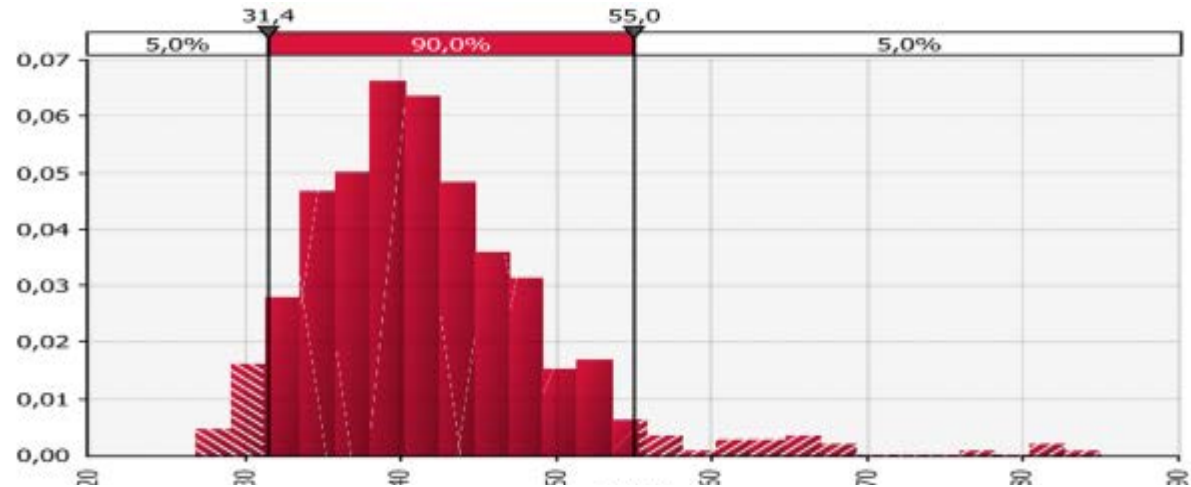
But electricity price risk profile is changing...

A high penetration of low marginal-cost plant on the system creates downward pressure on market prices, changing the risk profile for investment

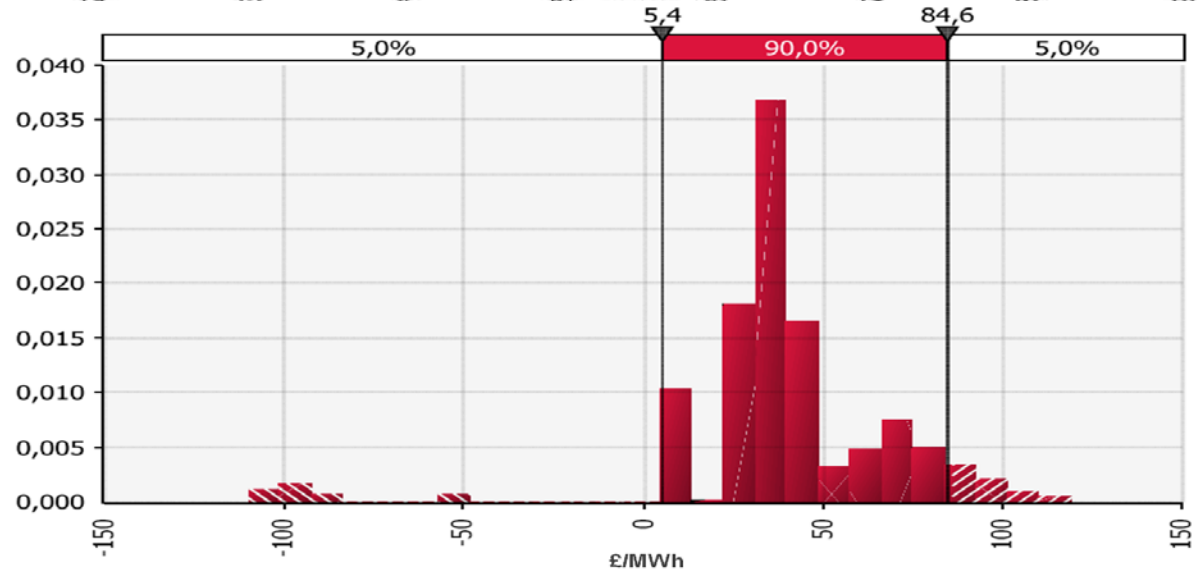


Price risk distributions

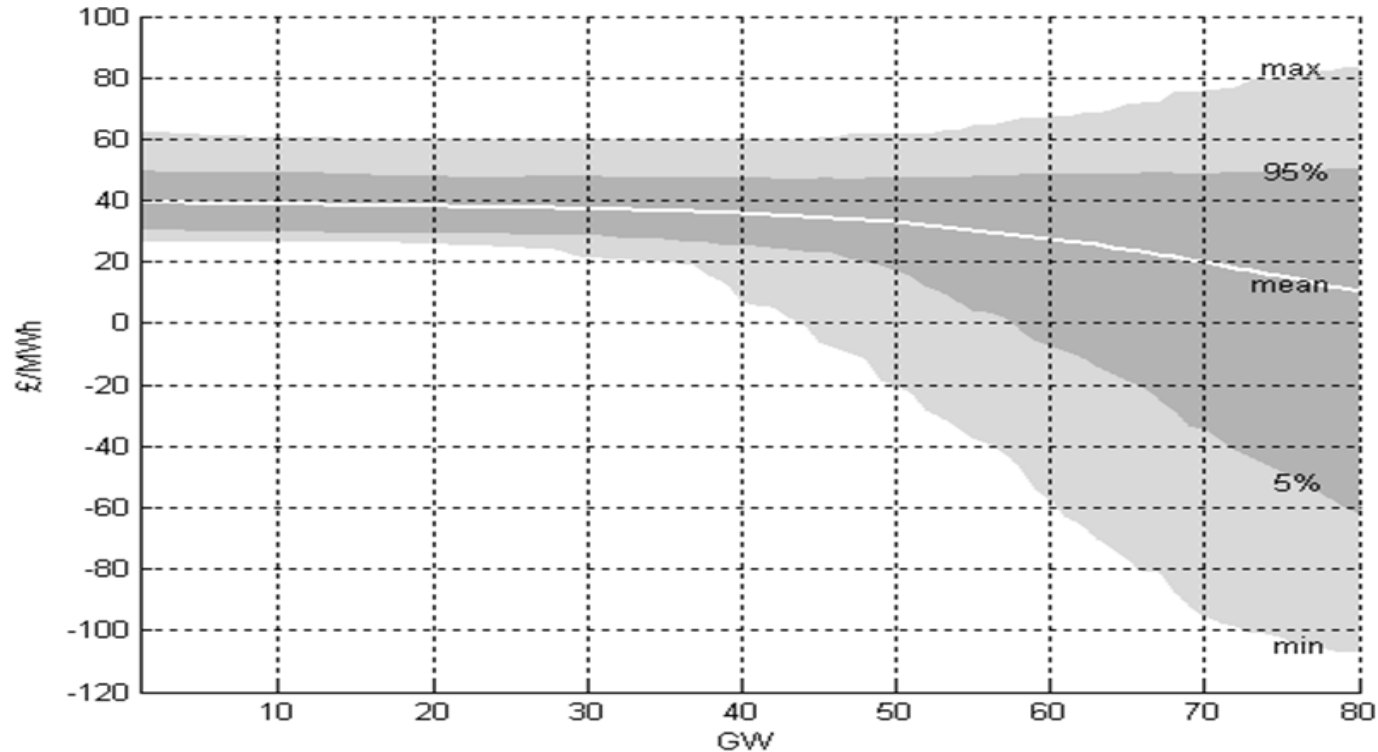
Winter peak - baseline



Winter peak – 26 GW
wind replacing coal

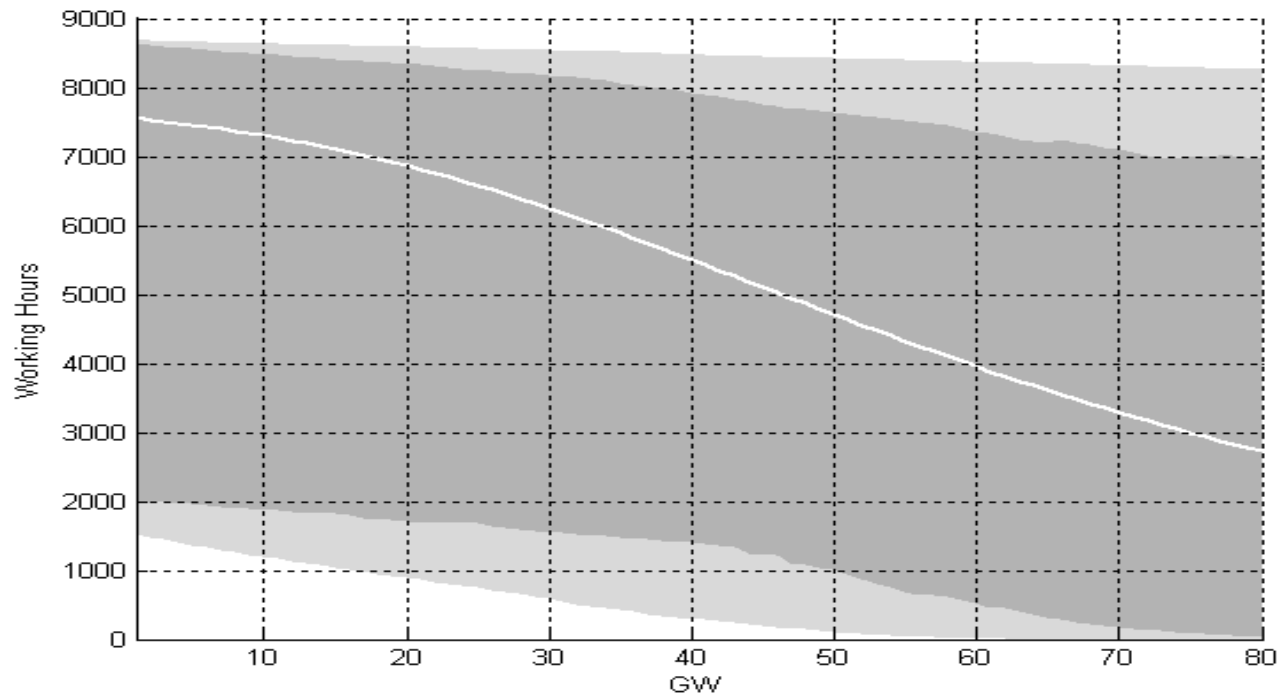


Impact of wind on electricity prices: static decarbonisation scenario



Successive GW of coal replaced with wind on an energy like-for-like basis

Reduced working hours for CCGT



Successive GW of coal replaced with wind on an energy like-for-like basis

**CONCLUSIONS:
IMPLICATIONS FOR THE INDUSTRY
AND POLICY-MAKERS**

Policy Responses – electricity market reform

- Long-run risks:
 - Carbon price floor
 - Fixed feed-in tariff for low carbon generation
- Short-run risks:
 - Capacity mechanism guarantees payments irrespective of deployment levels

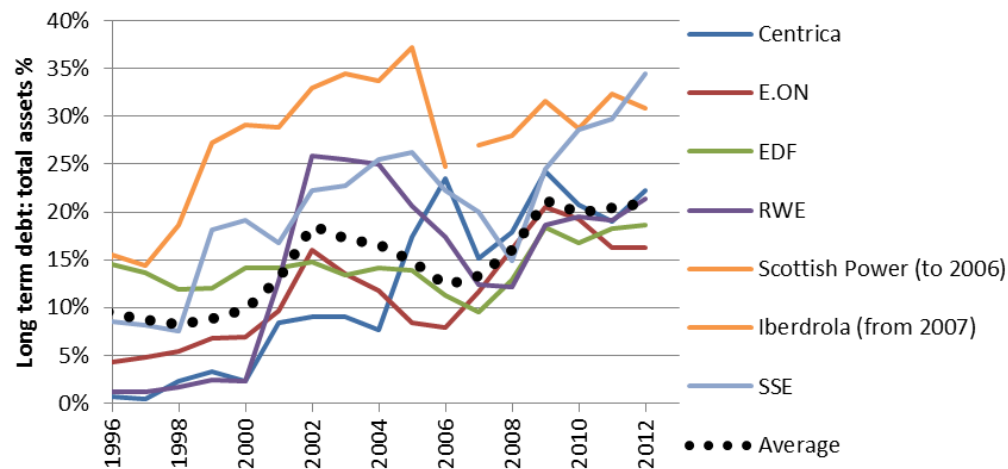
Implications for industry structure

- EITHER
- Market concentration allows companies to maintain profit margins, despite deteriorating fundamentals
- OR
- Industry could run with tighter reserve margins, implying higher plant utilisation rates and higher prices
- NEITHER of these options are politically palatable

Financial Status of Utilities

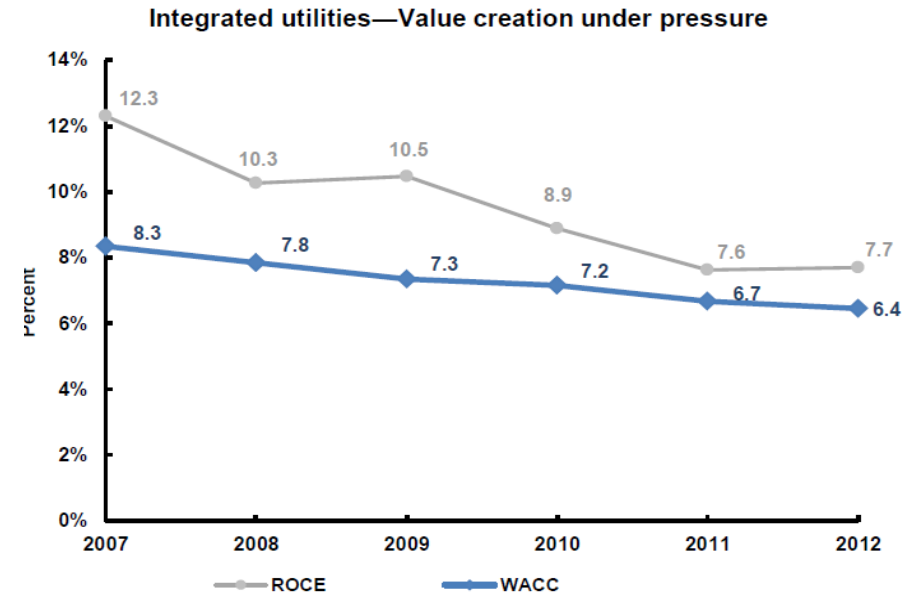
In theory, large diversified generators should be in a better position to manage the risks. But the utilities business model is under severe financial pressure across Europe

Debt levels of UK 'big 6'



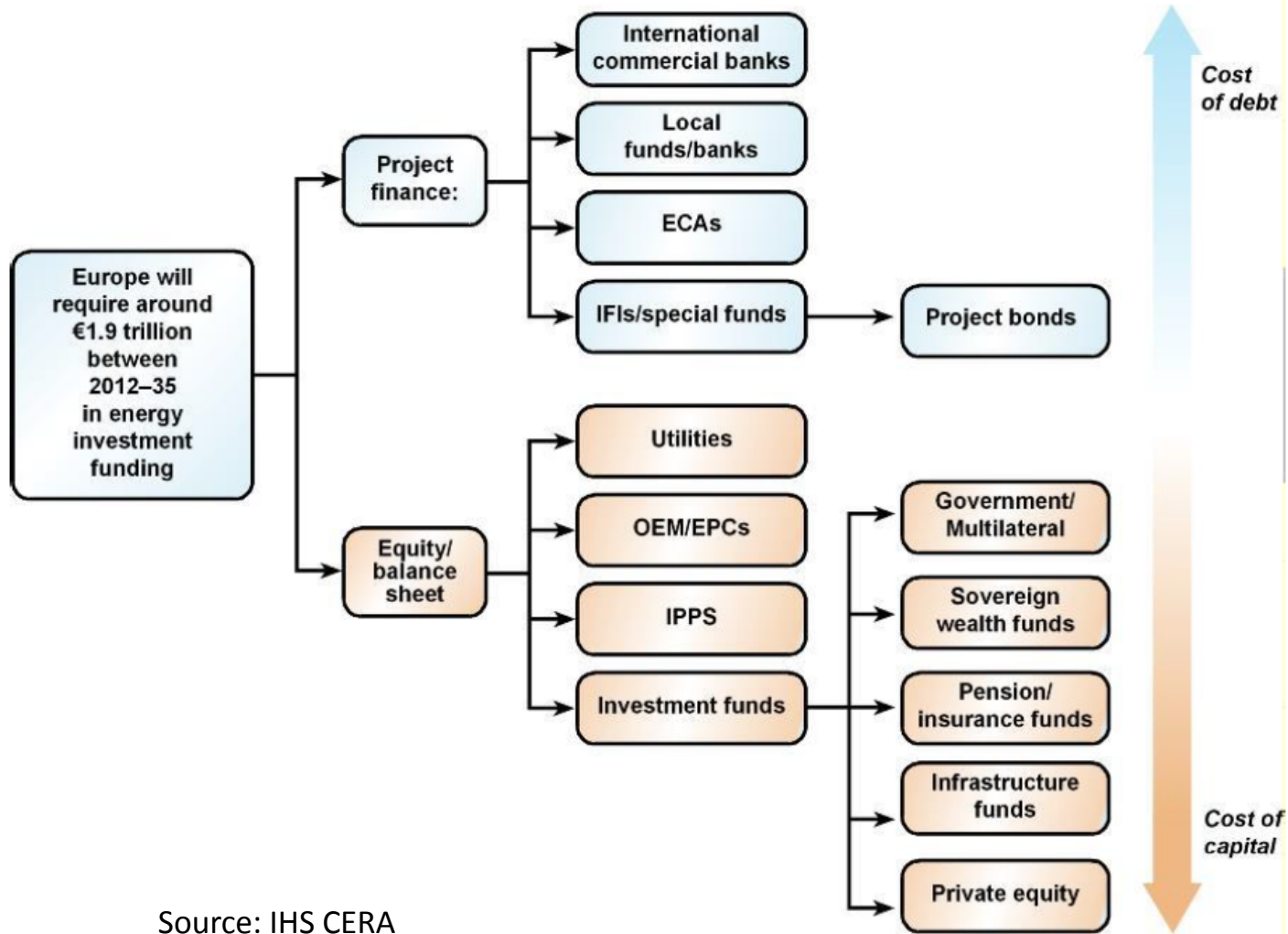
Source: (Thomson Reuters Datastream 2013)

Return on Capital Employed (ROCE) for selected European utilities



Source: IHS CERA 2013 "The energy investment imperative"

If not utilities, then who?



Source: IHS CERA

Conclusions

- Systemic risk factors appear to be increasing
- Generation capacity is currently high, demand is low, leading to weak price signals
- Significant capacity coming off the system (IED, nuclear retirements etc.).
- Will the industry anticipate the need for new investment?
- Government appears to have ‘blinked first’
 - Fixed price tariffs
 - Capacity payments
 - De-risking of projects
- Risks don’t necessarily disappear – they just get transferred. Only efficient to do so if they are transferred to those better able to manage them

THANK-YOU!

Dr William Blyth
william.blyth@oxfordenergy.com