



UNIVERSITY OF
CAMBRIDGE | **Electricity Policy
Research Group**



The impact of risk in electricity markets on nuclear new build

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Nuclear Industry Forum

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<http://www.electricitypolicy.org.uk>

Outline

- what drives electricity prices?
 - Gas prices? Carbon prices?
 - Renewables?
- What is the nature of market risk?
 - level or volatility
- How can risk be mitigated?

Electricity price determination

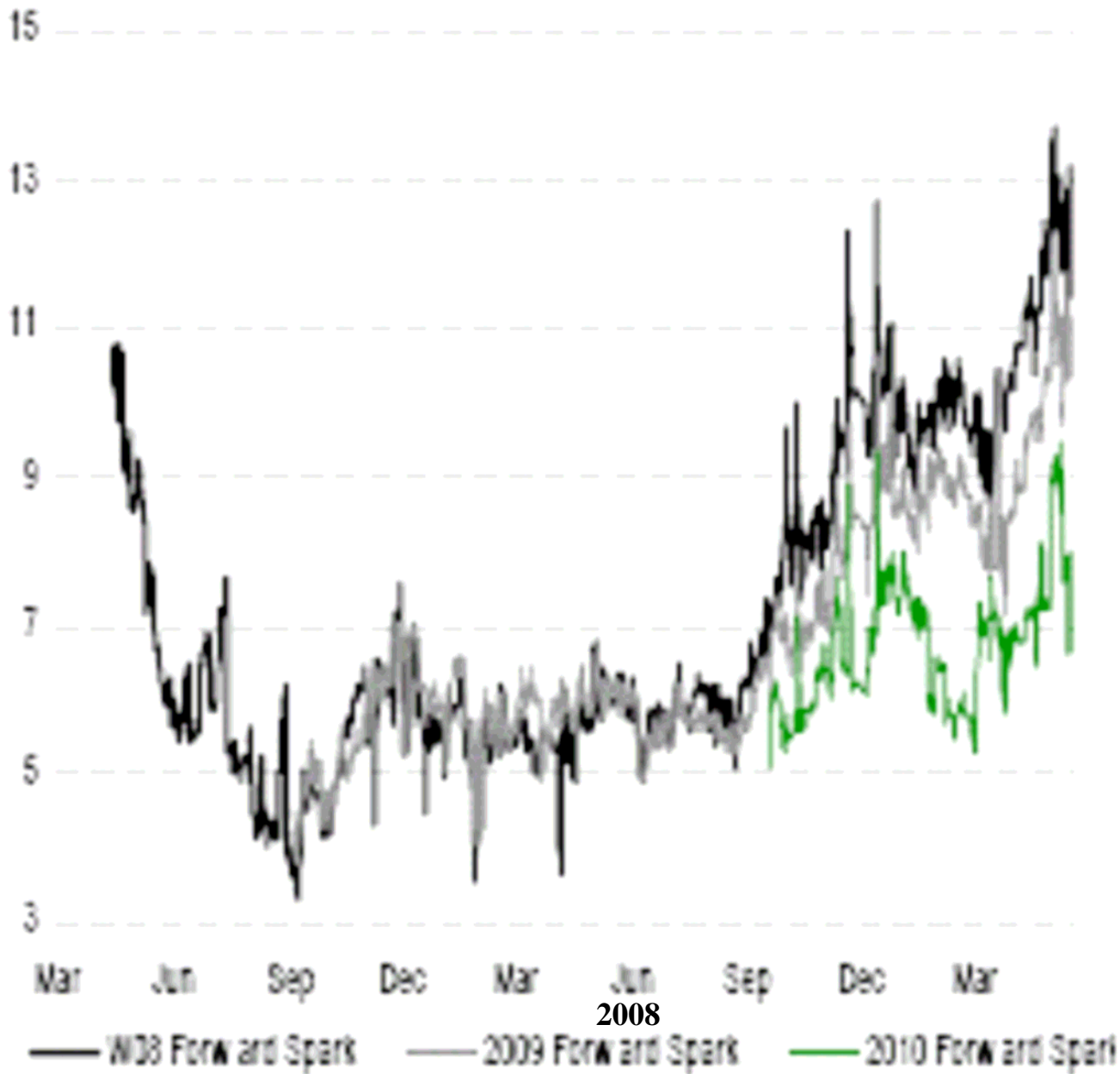
- Under ETS gas prices drive electricity prices
- higher gas prices raise demand for coal, raises EUA price to equilibrate gas/coal costs
 - EUA price driven by gas/coal difference
- gas prices depend on oil prices
- oil prices are volatile and rising

UK forward electricity prices track forward gas prices



Source: Reuters, NEMMCO, OMEI, ToFato Poefler

UK FWD CLEAN SPARK SPREAD (£/MWh) - 50% off

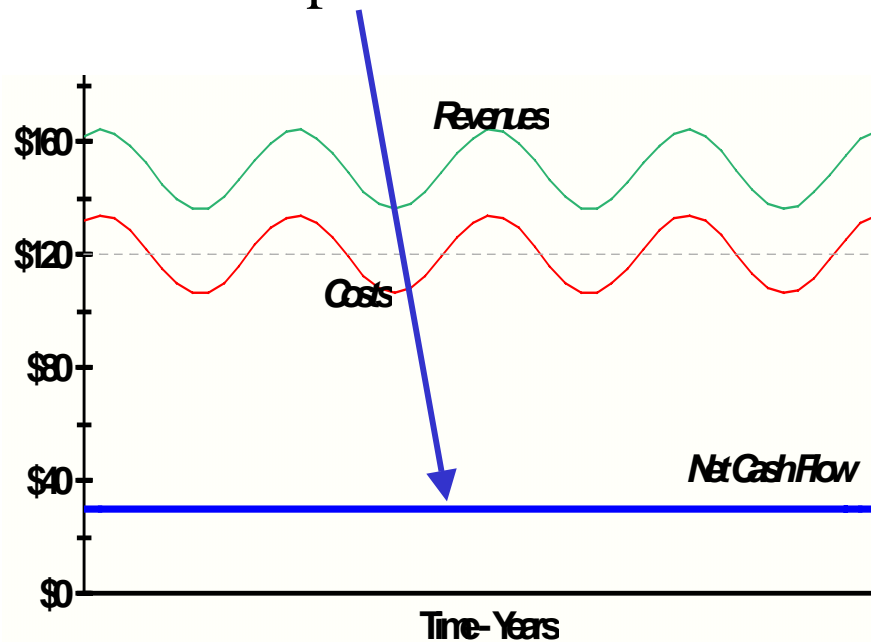


Source:
Lehman
Brothers
Powerpack

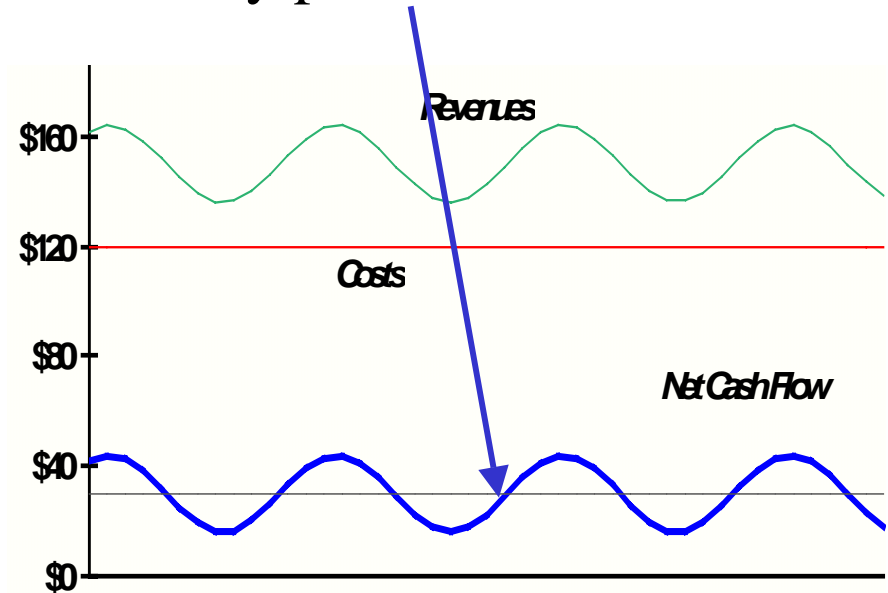
Impact of Gas and Electricity Price Correlation

Electricity and gas cost correlated

=> stable profit stream



Electricity price volatile,
nuclear costs stable =>
risky profit stream



Does nuclear power hedge risk?

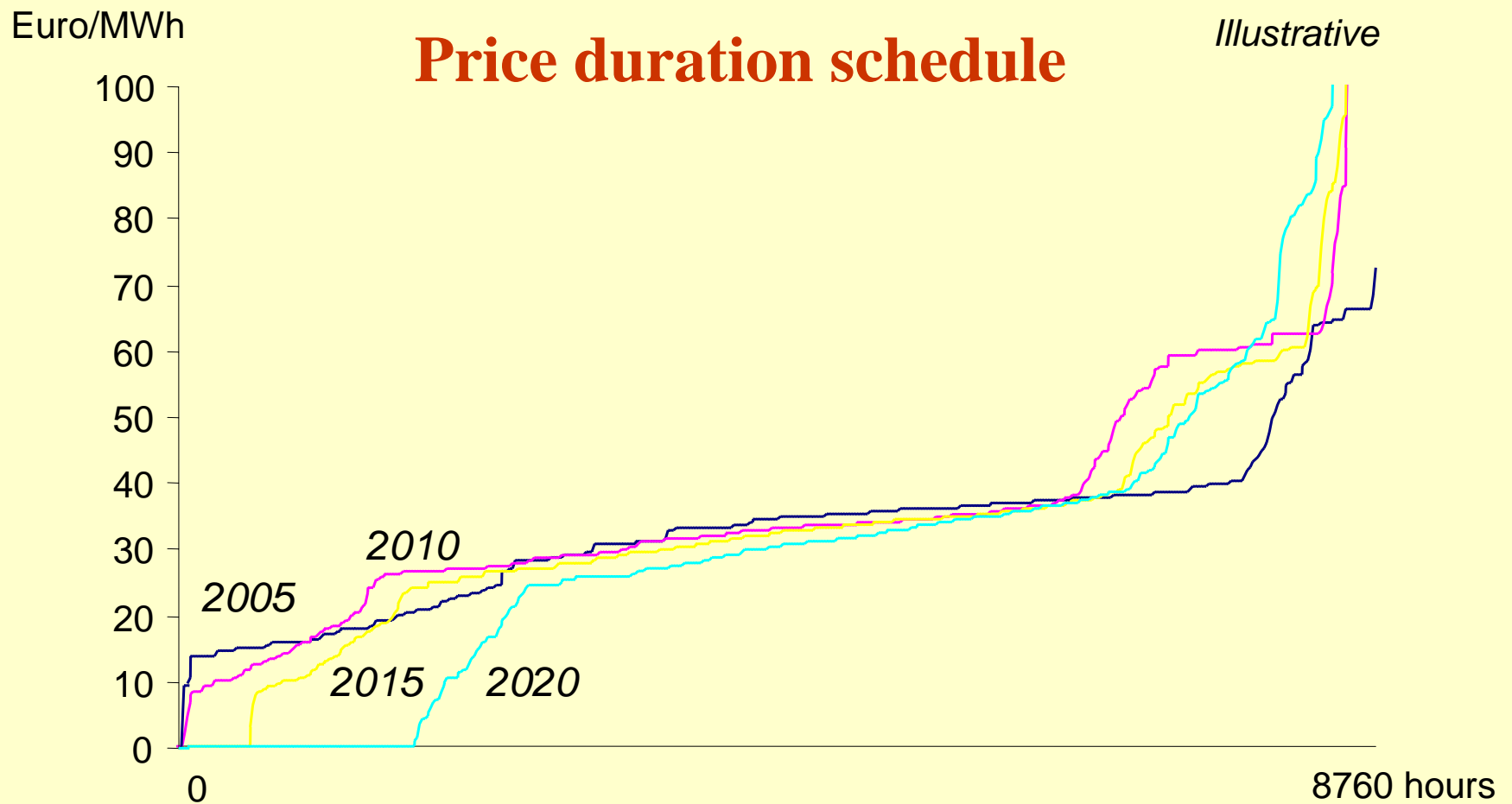
- In 2004 gas had higher expected return
- Ignoring correlations of gas and electricity price, nuclear reduces downside risk of portfolio of power plants
 - nuclear reduces company/portfolio risk
- If gas and electricity prices correlated nuclear no longer reduces risk

Seek hedging value elsewhere

The challenge of renewables

- 20% EU renewables target by 2020 agreed
=15% renewable **ENERGY** for UK
=30-40% renewable **ELECTRICITY**
 - likely to be large shares of wind
 - Much in Scotland: queue of 11 GW, 9GW Wales
 - At 25% capacity factor, 25% wind
= 100% peak demand
- => volatile supplies, prices, congestion,

Simulation – more volatility, adequate reward for CCGT



Implications of volatility

- EUA price - set in expectation of renewables?
 - Harder to predict?
- Coal and OCGT for peaking/balancing?
- Base-load plant margins fall to CCGT level
 - => discourages capital intensive nuclear, CCS
 - => increased need for contracting (good)
 - => further stimulus to integration? (not so good)

Attractive features of nuclear

- Profitable at low real interest rates
- Competitive against other low-C technologies
- provides a hedge against gas, carbon prices
- could offer long-term fixed price electricity
- ought to be attractive to consumers

Challenge - to link to consumer demand

Consumer demand

- current suppliers make out like bandits
 - expose consumers to fuel price risk
- => why not offer consumers long-term fixed real price contract in nuclear power?
- Consumers don't like long-term contracts
 - entry into domestic supply very hard
 - Some industrial consumers might buy? (as in France, Finland)

Indexed debt

- current indexed gilts yield $<1\%$ real
- NGC has financed 25% of debt with indexed bonds
 - ideal for RPI-X regulated utility
- Solution: issue electricity-indexed bonds
 - pays cost of 3,300 kWh av. London dom. bill
 - excluding all taxes and payments for renewables etc
 - moves partly with electricity wholesale price, partly with RPI-X, insulated from tax changes

Indexed bonds - 2

- Issue various maturities: 5-20 years
- attractive for consumers
 - hedges electricity price (better than indexed gilts?)
 - tax paid on real, not nominal, interest
 - reduces effective interest rate by 1%
- attractive for Genco
 - hedges risk for capital intensive low-C plant
 - more liquid than long-term contracts

Conclusions

- nuclear is capital intensive
 - attractive at low real interest rates
- exposed to electricity price risk
 - driven by volatile oil and gas prices
 - but gas is naturally hedged
- renewables target threatens nuclear economics
- consumers value electricity price stability

Solution: indexed electricity bonds



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