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CAMBRIDGE | **Electricity Policy  
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# The impact of risk in electricity markets on nuclear new build

David Newbery

**Nuclear Industry Forum**

London 24 June 2008

<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

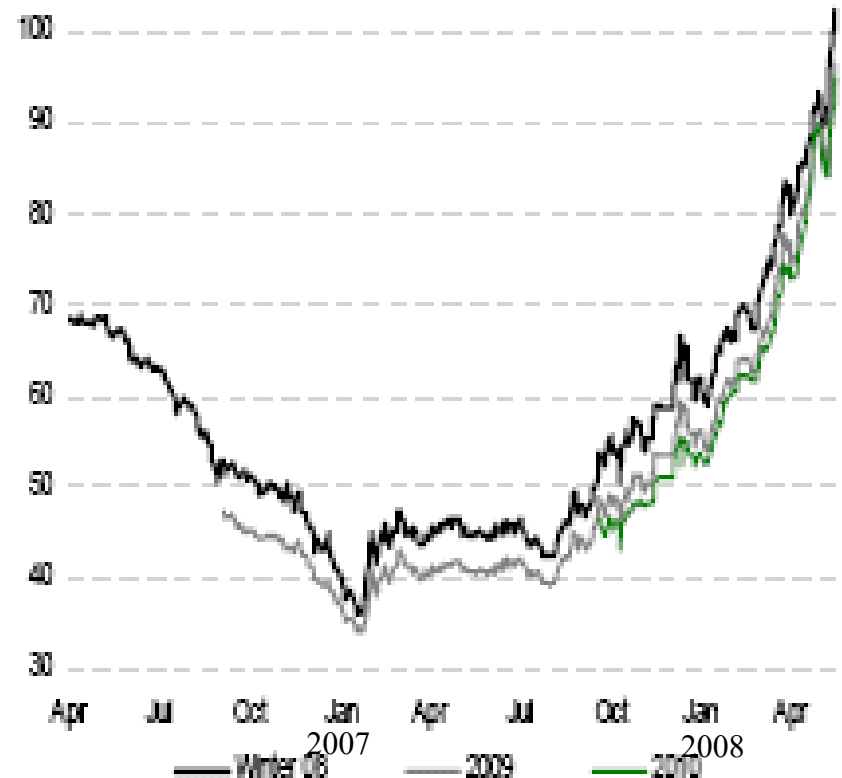
- Under ETS gas prices drive electricity prices
- higher gas prices raise demand for coal, raises EUA price to equilibrate gas/coal costs
  - EUA price driven by gas/coal difference
- gas prices depend on oil prices
- oil prices are volatile and rising

# UK forward electricity prices track forward gas prices

UK ELECTRICITY FORWARD PRICES (£/MWh)

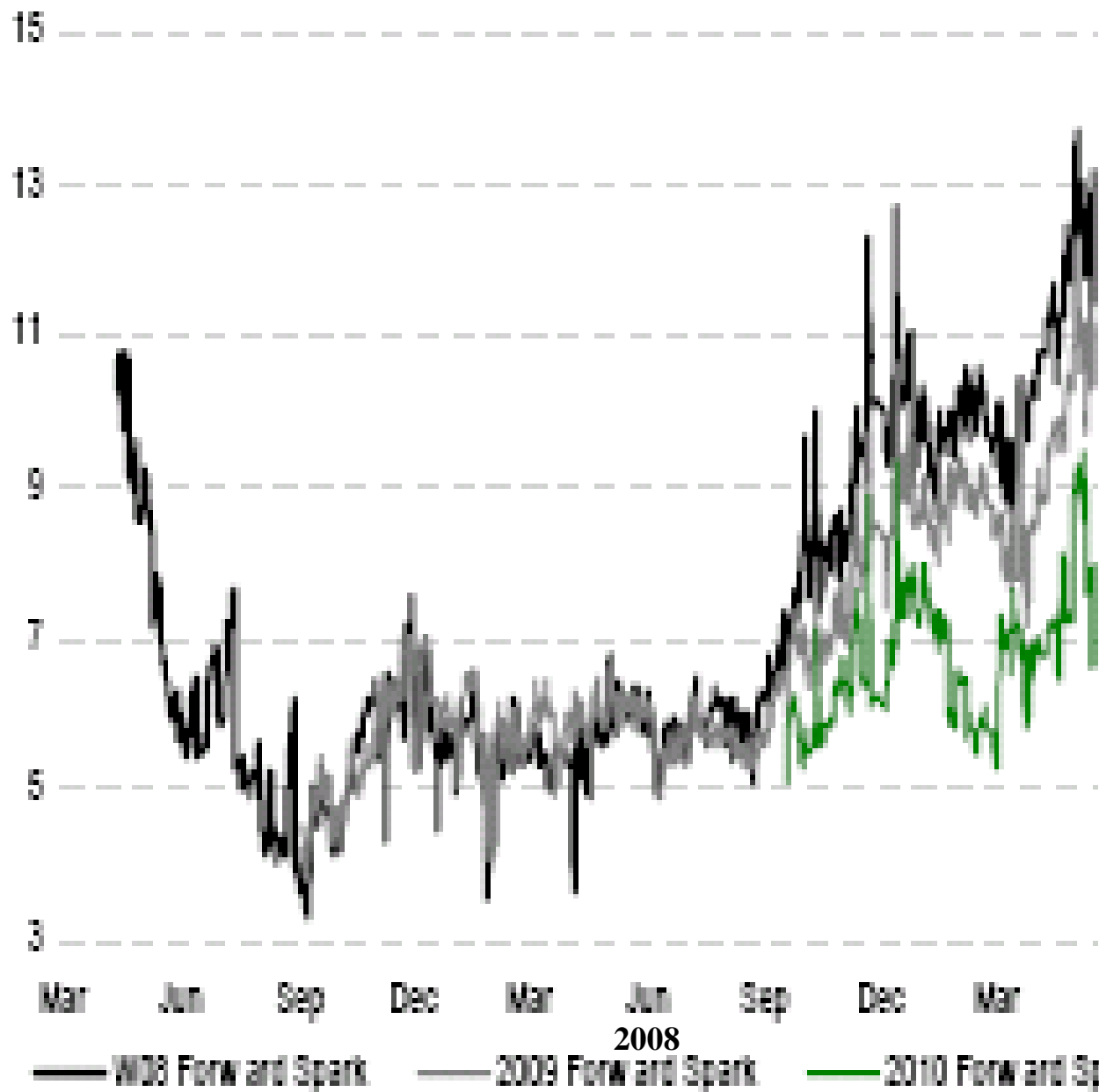


UK GAS FORWARD PRICES (p/therm)



Source: Reuters, NEMMCO, OMB, ToFato Pooler

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

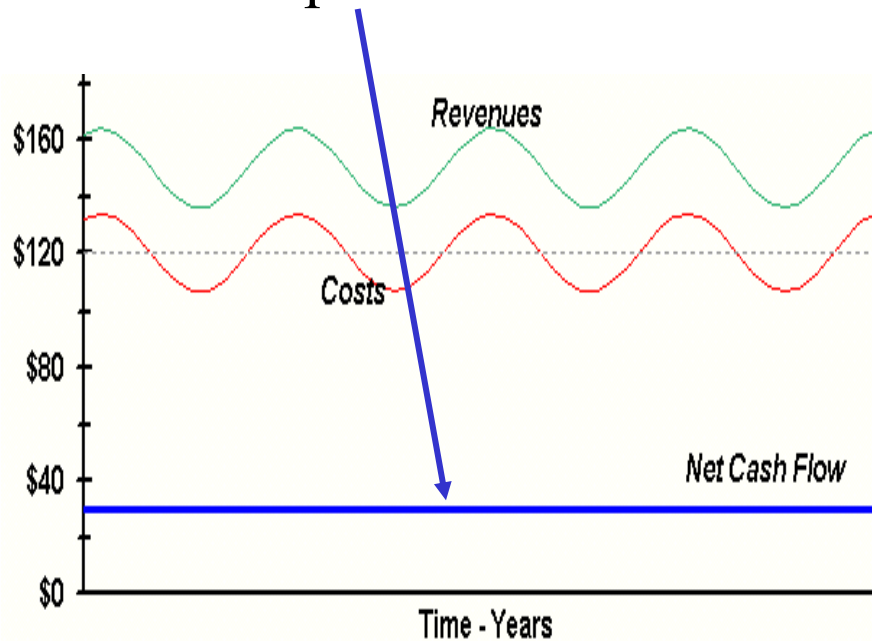


Source:  
Lehman  
Brothers  
Powerpack  
5

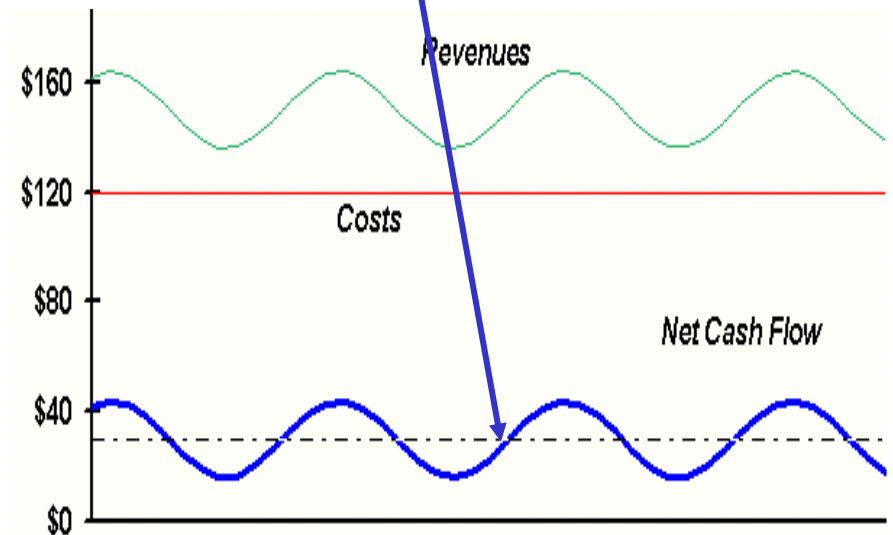
# Impact of Gas and Electricity Price Correlation

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

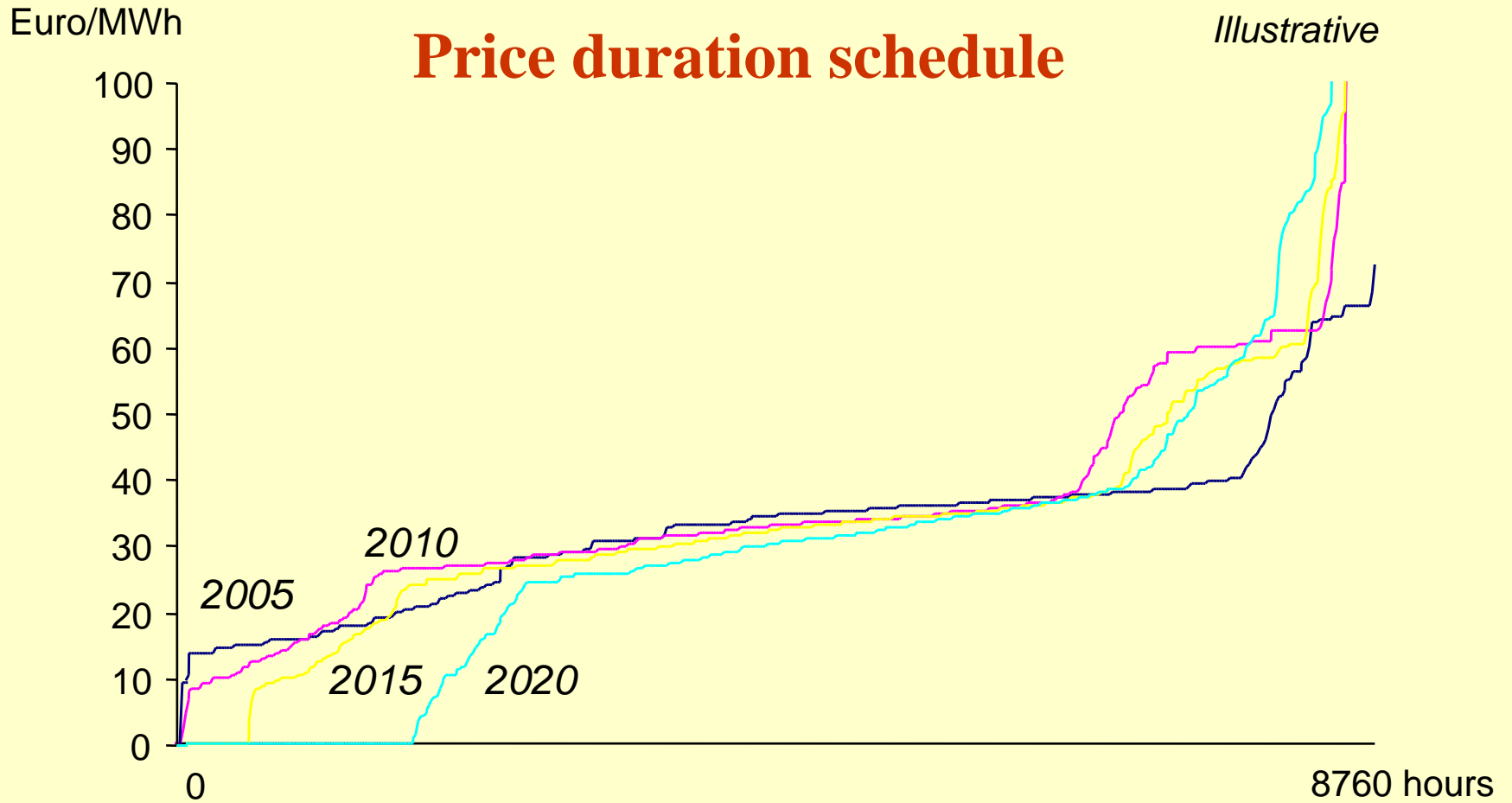
*Seek hedging value elsewhere*

# 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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