The impact of risk in electricity markets on nuclear new build

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

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

Price duration schedule

Illustrative
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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