Financing new electricity supply in the UK market with carbon abatement constraints

Keith Palmer

ROTHSCHILD

08 March 2006

CF17833JW

Objectives

- Lowest cost energy supply consistent with other objectives
- Deliver environmental goals – carbon and other
- Acceptable risk – security of supply and other risks
- Timelines – supply increases to match rising demand and meet government carbon reduction targets

CF17833JW

Electricity supply investment decisions

What we need to know…

- Future electricity demand (UK, connected markets)

Fuel costs

- What will oil and gas prices be over next 30-40 years?
- How will coal prices change as oil/gas prices change?

Conversion costs

- What productivity 'progress' is likely for 'old' and 'new' technologies?
- What is the cost of capital for different technologies?

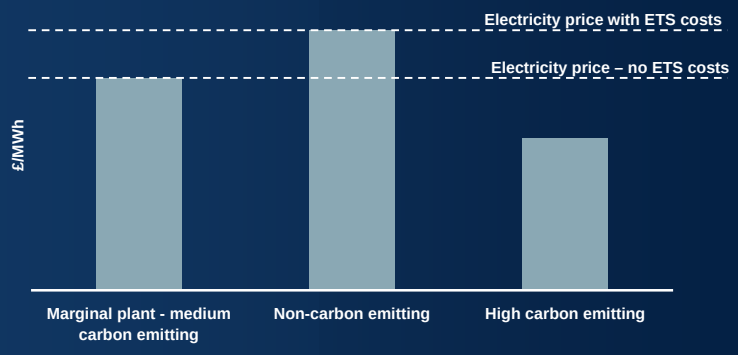
Carbon costs

- What will be the cost to generators of emitting carbon over next 30-40 years?

CF17833JW

Impact of carbon abatement policies on investment decisions

EU Emissions Trading Scheme (ETS)

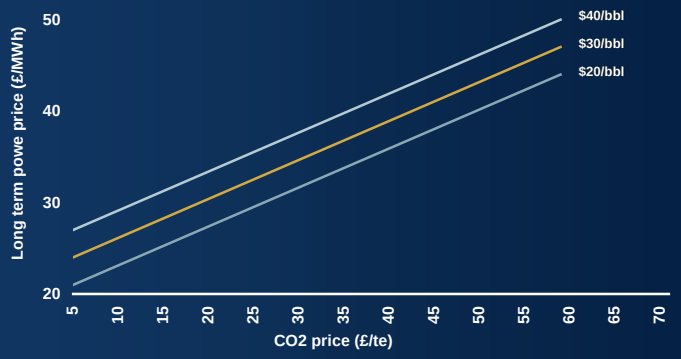


- Carbon 'premium' determined by carbon abatement costs of marginal plant
- Non-carbon emitting technologies capture carbon premium

CF17833JW

Expected cost of new electricity supply

CCGT

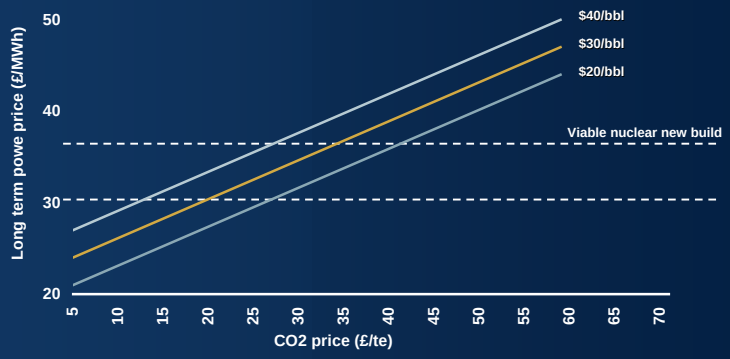


- Gas fired CCGT is the least cost fossil fuel plant before accounting for carbon abatement costs

CF17833JW

Expected cost of new energy supply

Nuclear

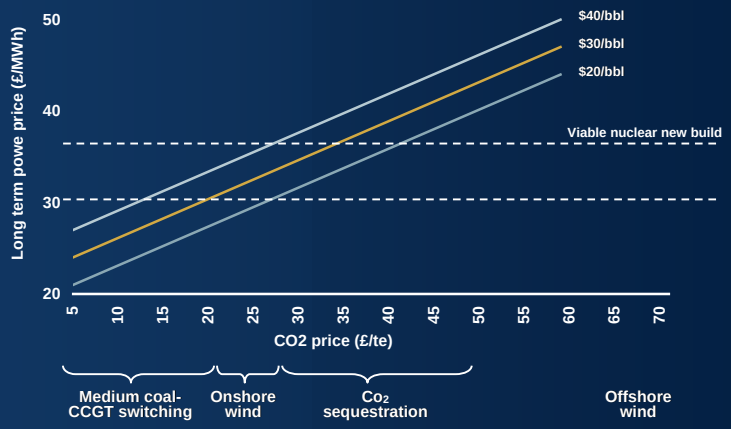


- Key determinant of nuclear cost is cost of capital
- Cost of capital is function of ability to manage market risk

CF17833JW

Expected cost of new electricity supply

Other carbon abatement technologies



- Offshore wind and marine renewables very expensive way of abating carbon

CF17833JW

Acceptable risk for public

- Many dimensions of risk
  - Security of supply risk (physical availability, price volatility)
  - Nuclear accident risk
  - Economic risk (uncompetitive energy users, energy poverty etc.)
  - Climate change risk
- Need to adopt a portfolio approach to risk management and define 'acceptable risk' – as has always been done in electricity industry
- Mostly to do with resilience and flexibility of supply side and retention of adequate 'planning margins'
- Issue is whether market rules are compatible with retention of desired resilience and flexibility

CF17833JW

Gas dependence and security of supply

- Gas remains at margin in all plausible energy futures
- Electricity price dependent on international gas price
- More coal/nuclear/wind will not reduce much the link between electricity and gas prices
- Physical gas availability risks are low
- Reducing dependence on CCGT by increasing supply of expensive energy sources will raise cost of energy for consumers

CF17833JW

Timing issues

- New nuclear capacity
  - Even if 'go' in 2006 first output unlikely before 2015
  - Aggregate new nuclear capacity of 5000 MW very challenging before 2016
- Before 2013 key to CO_2 reduction is more coal to gas switching. Coal is 2.3x more carbon polluting than gas. Switching 60TWh coal to gas would reduce CO_2 emissions by 35mte CO_2 (=predicted 2010 target shortfall)
- Many proposed carbon abatement 'solutions' either still in development phase and/or uneconomic (carbon sequestration, marine renewables). Reliance on these solutions is very high risk for carbon abatement targets

CF17833JW

Delivering the desired energy future

Can the new supply be financed?

- 'Shortage' of capital is not an issue
- The issue is whether the energy and carbon markets (net of government policy interventions) offer investors an expected return commensurate with the risks (after risk management strategies)
- Cost and performance risks can and should remain entirely with the private sector
- Two areas of concern:
  - Whether NETA will deliver timely adequate new capacity
  - Whether the carbon market risks are manageable

CF17833JW

Is electricity market fit for purpose?

- Absence of buyers offering long term contracts increases investor risk and therefore the cost of capital
- Will NETA give price signals to deliver sufficient timely new capacity? Is absence of capacity price a problem?
- Integrated generation / supply companies best placed to manage the market risks
- Renewable obligation mechanism further complicates the picture. If RO capacity not delivered is there sufficient conventional capacity to meet peak demand?
- All these issues favour new CCGT because it can be installed quickly in 'small lumps' and at low capital cost per MW
- Same issues increase risk and cost of capital of capital intensive technologies such as nuclear

CF17833JW

Is the carbon market fit for purpose?

- Viability of almost all low carbon emitting technologies depend on a minimum 'carbon premium' over whole asset life
- But carbon premium is:
  - Determined by governments
  - Known for only a short period ahead
- No mechanism currently exists to manage carbon price risk over medium and longer term:
  - ETS
  - RO obligation
- Investors in low carbon emitting technologies will be very slow to invest where viability can be destroyed after capital is 'sunk' by changes in government policy
  - Major impediment to investment in all carbon abatement technologies
  - Important reason why offshore wind is developing slowly

Key policy challenge is to reduce risk around future carbon price

CF17833JW

Some propositions and questions for discussion

1. New nuclear is the lowest cost of the low carbon emitting technologies. Offshore wind is very much more expensive and has high security of supply risks
2. New coal-fired plant has no (significant) place in a low carbon energy future
3. Will the electricity market as currently designed deliver the 'right' amount of new capacity on a timely basis??
4. Unless the 'carbon price risk' issue is addressed, the default outcome will be lots more gas-fired CCGTs and failure to meet the carbon reduction targets
5. Unless 'new' nuclear sufficient to replace closing 'old' nuclear is built, it is very unlikely that the long term carbon reduction targets can be met

Financing new electricity supply in the UK market with carbon abatement constrains

ROTHSCHILD

08 March 2006