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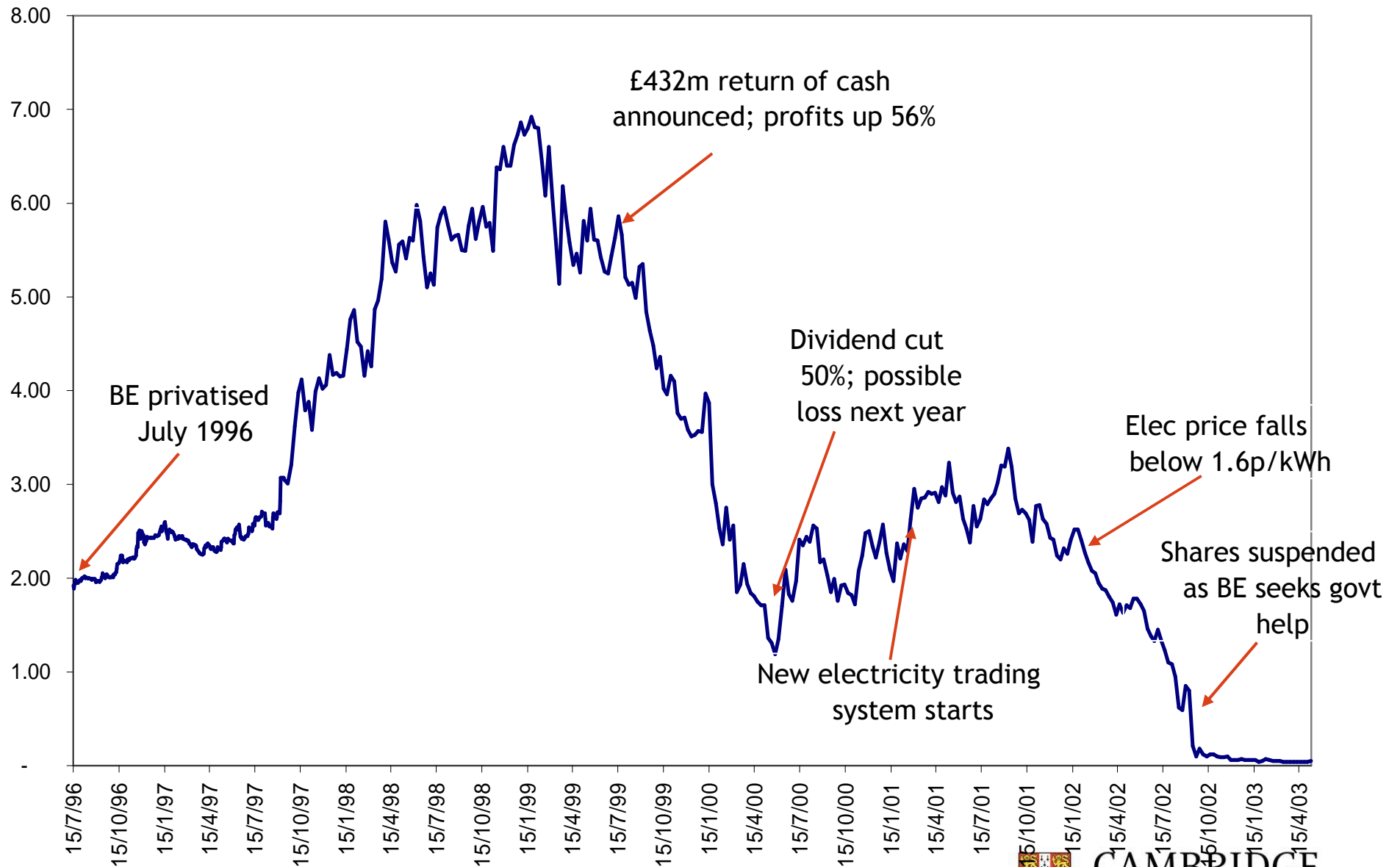
**Nuclear power and deregulated electricity
markets: lessons from British Energy**

Simon Taylor

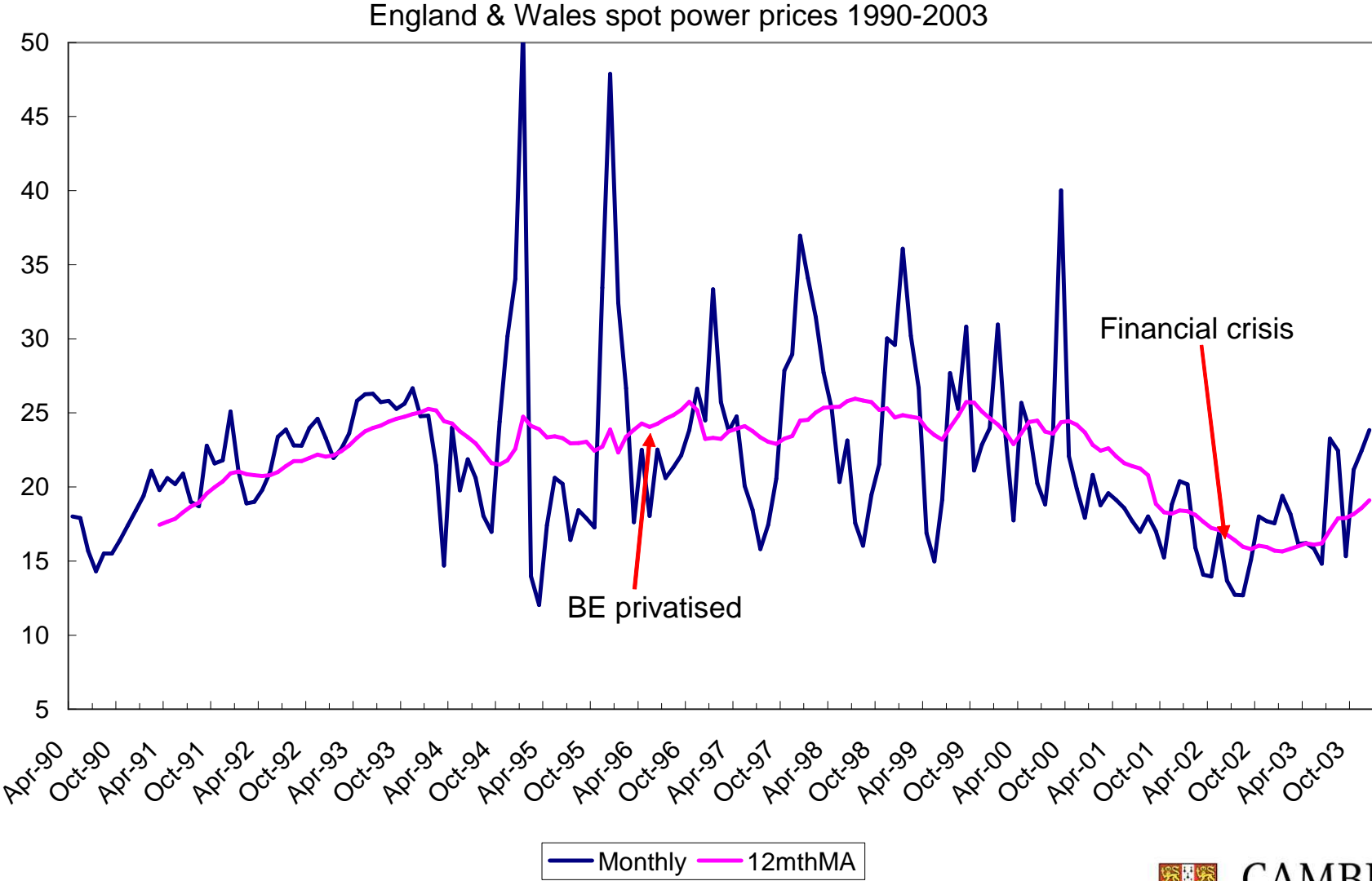


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British Energy shareprice (£)



It's all about power prices..?



Apparent conclusions

- Nuclear company can't live in deregulated power market
- Britain just can't get nuclear right, either in public sector or private sector
- Privatisation was wrong
- ALL QUESTIONABLE CONCLUSIONS



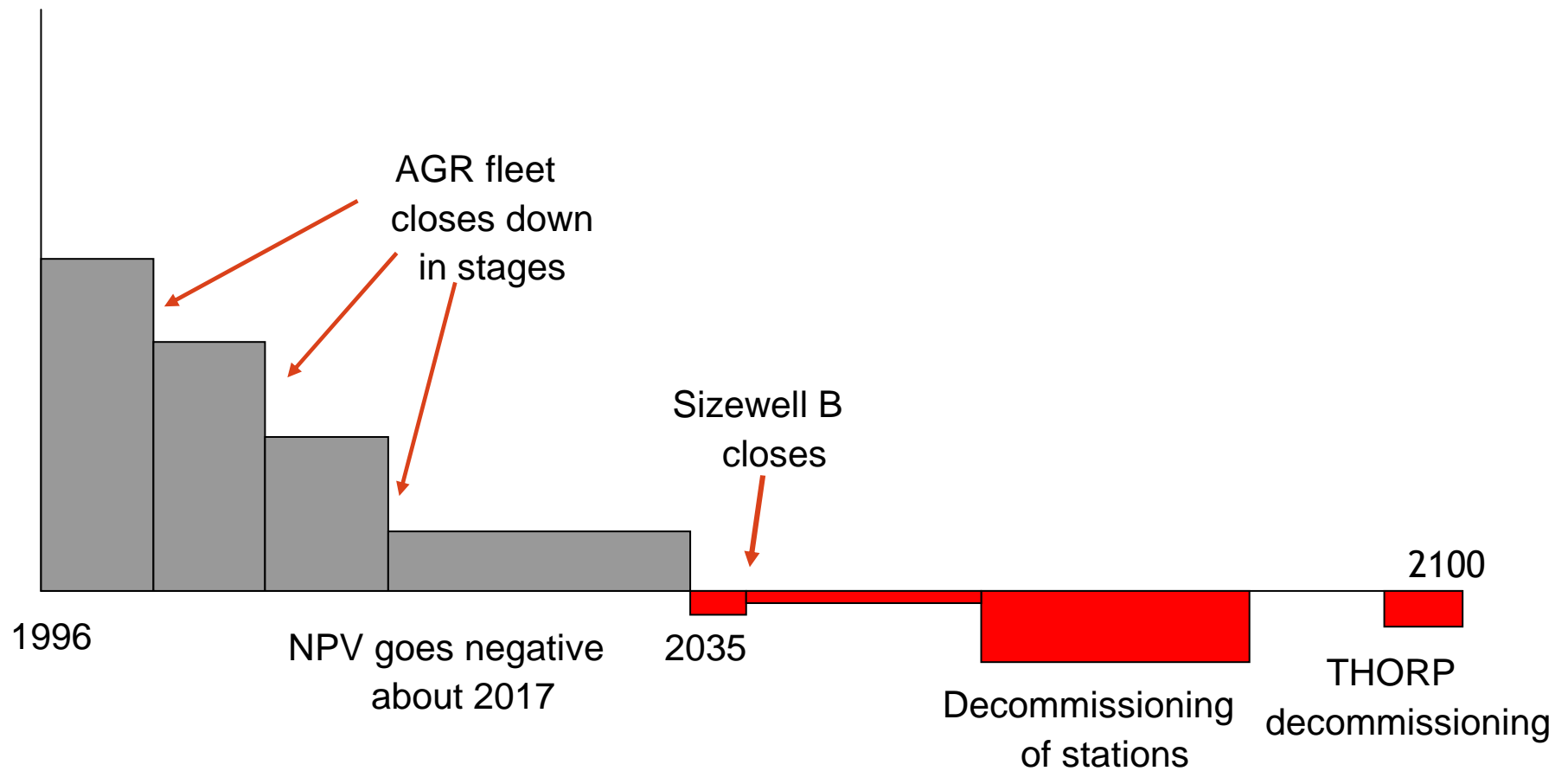
What's distinctive about nuclear?

- Low marginal, high fixed costs
 - high **operating leverage**: small changes in revenue lead to large changes in profits
 - greater need for **risk management** than non-nuclear generation
- Large back end costs (decommissioning, waste treatment & disposal, reprocessing)
 - complex cashflows and accounting issues
 - need for transparent & credible costs, provisions
- Inflexibility
 - baseload supplier
- All true of BE and most other nuclear operators



British Energy's cashflow profile

Indicative UK net cashflows of British Energy 1996-2100



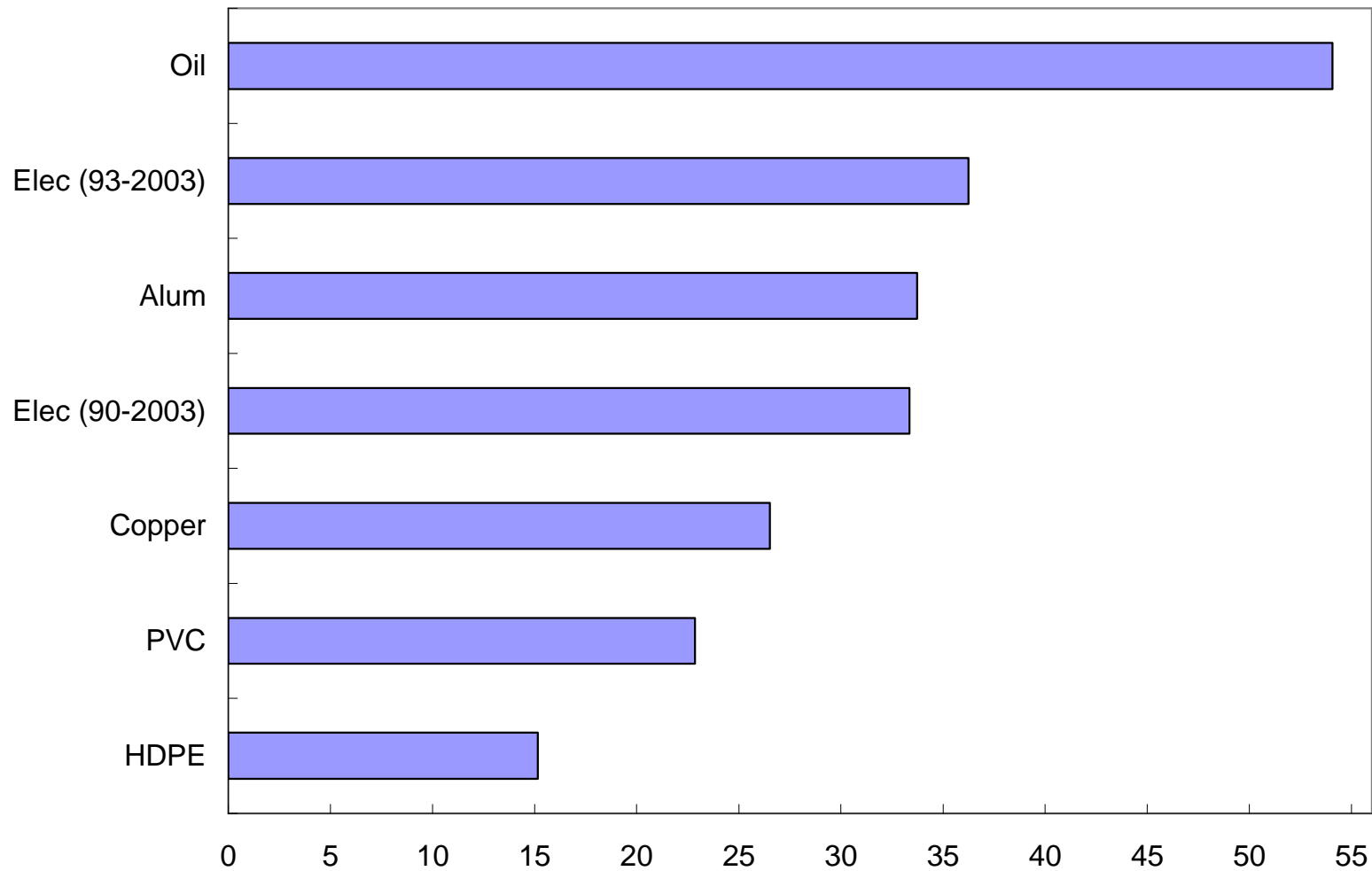
What does deregulated electricity mean?

- Wholesale electricity is another commodity market
 - short term volatility (so sell power on contracts)
 - boom/bust “cycle” like other commodities
 - completely different from the traditional “utility”



Electricity is another volatile commodity

Std deviation of commodity indices 1991-2007



Capital markets can deal with nuclear risks

Risk type	Industries dealing with it
Commodity price	Steel, petrochemicals, oil, banks
Operations	Manufacturing
L/t liabilities	Extractive industries
Accident risk	Chemicals
Political risk	Oil, banks



Implications for nuclear power in a deregulated power market

- **Corporate** strategy
 - vertical integration: assuming downstream is oligopoly
 - diversified generation? Questionable: investors can diversify the risk themselves
- **Commercial** strategy
 - sell power on long term contracts
 - sell options to raise value of commodity power
 - maximise reliability of stations, back up power sources or contractual equivalents
- **Financial** strategy
 - strong balance sheet
 - variable dividend policy or share buybacks (like steel)
 - long term debt to avoid liquidity crunches



British Energy's approach

- **Corporate** strategy
 - vertical integration **tried and failed**
 - diversified generation? **bought coal at top of the market**
- **Commercial** strategy
 - sell power on long term contracts **tried and failed (market lacking)**
 - sell options to raise value of commodity power **ditto**
 - maximise reliability of stations, back up power sources or contractual equivalents **under-invested and bought coal instead**
- **Financial** strategy (**as approved by shareholders**)
 - strong balance sheet **leveraged up just before power price fall**
 - variable dividend policy or share buybacks (like steel) **no**
 - long term debt to avoid liquidity crunches **no**

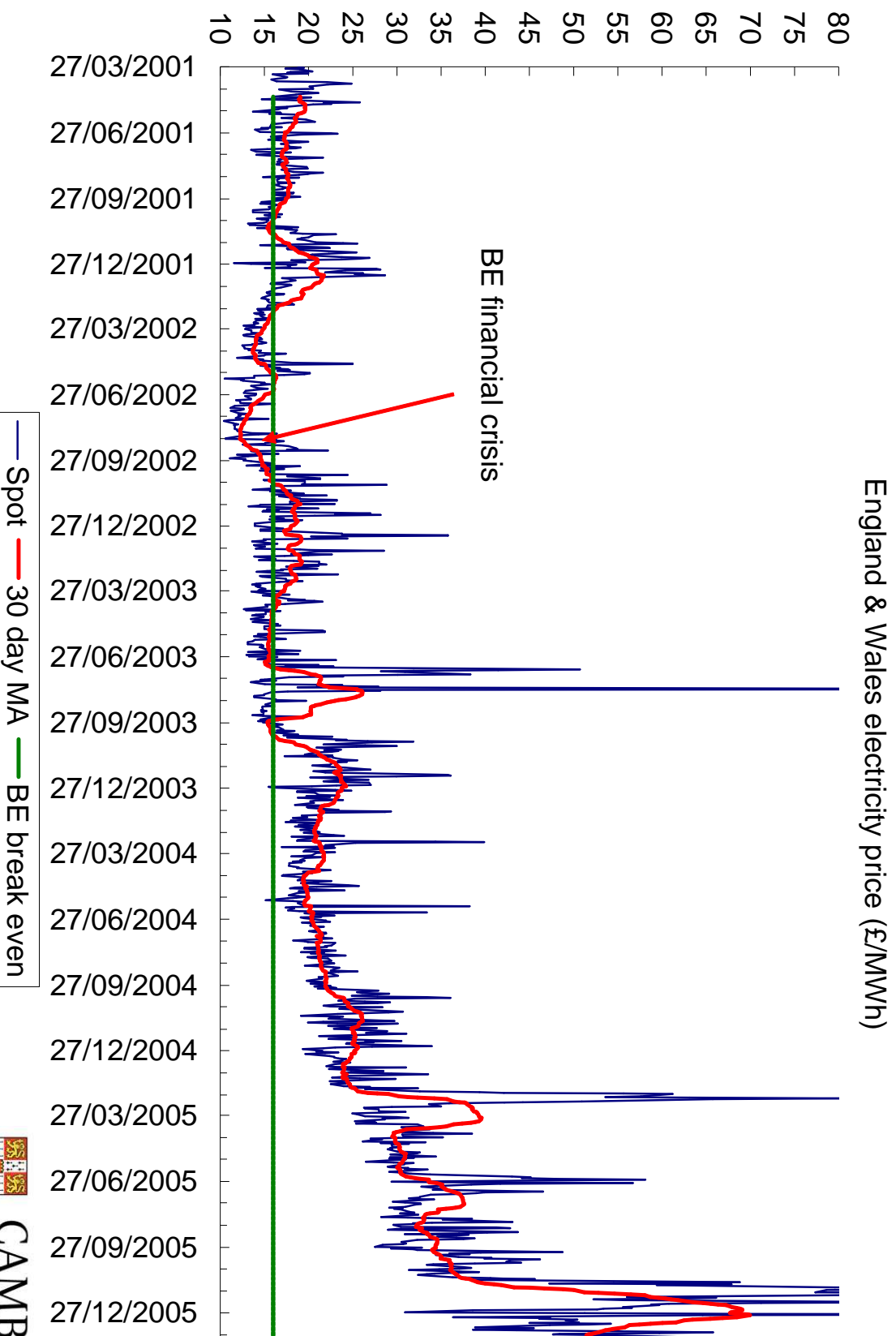


Bad luck and history made it worse

- **History:**
 - Wretched AGR technology – unreliability of plant
 - BNFL reprocessing contracts: made costs higher and more inflexible
 - Government distrust of nuclear: lack of support on unfair costs (property taxes, reprocessing)
- **Sheer bad luck:**
 - Enron bankruptcy Dec 2001:
 - wrecked the market for electricity borrowing just before BE tried to refinance
 - made directors very risk averse in considering further borrowing
 - Lost purchase of London Electricity to EDF in 1999
 - North American operations not quite profitable enough yet to offset UK losses



BE nearly survived



Conclusions

- No reason why private nuclear power shouldn't survive in deregulated power markets
- Big need for appropriate financial policy and use of derivative markets if they exist
- BE story shows several specific factors that won't recur
- Financial markets may be better prepared now.

