Electricity Policy Research Group

UNIVERSITY OF CAMBRIDGE

Capacity markets and capacity prices

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The Economics of Electricity Markets

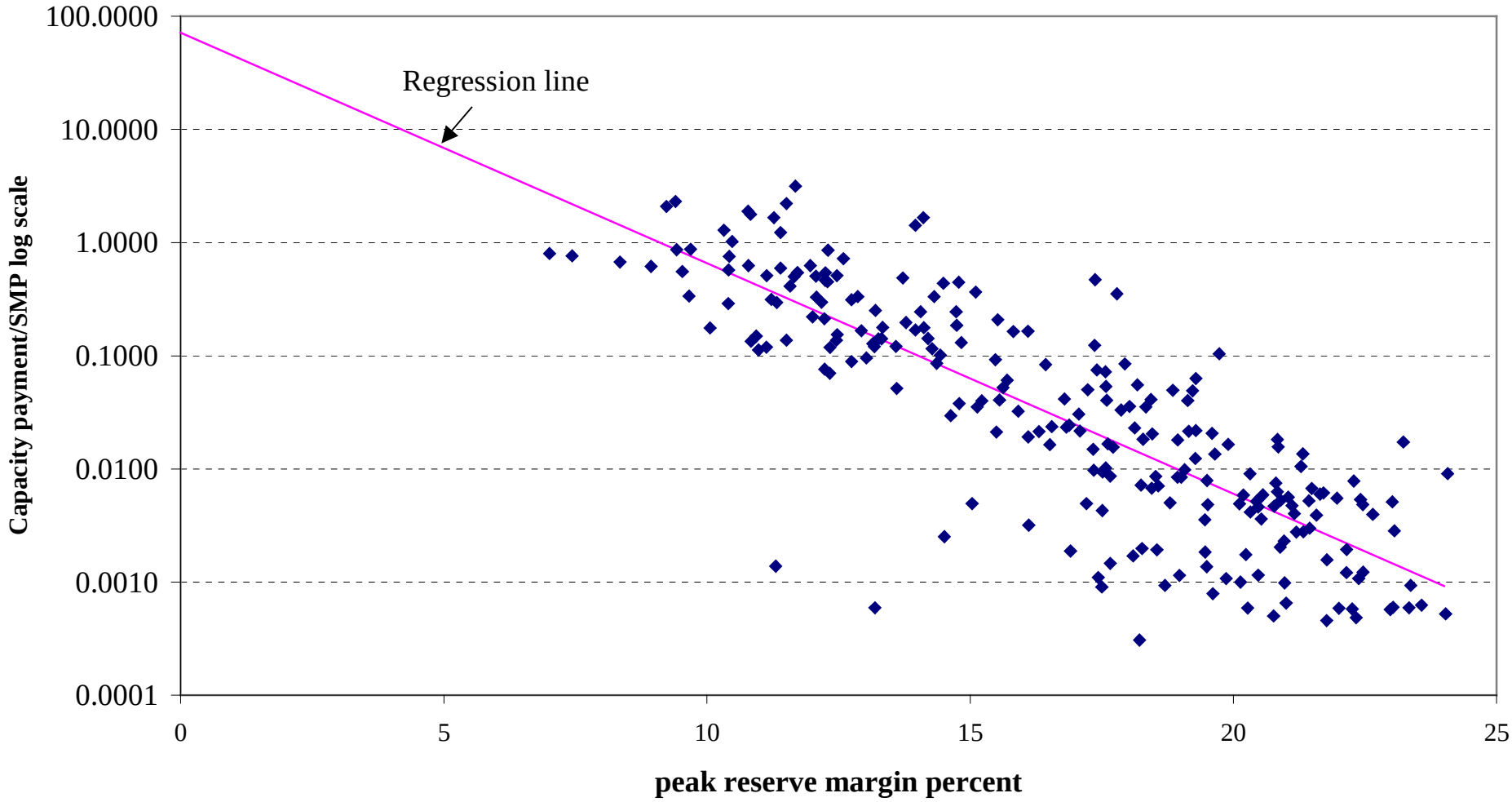
Toulouse, 3 June 2005

http://www.econ.cam.ac.uk/electricity

From Pool to NETA

- Pool: compulsory day-ahead marginal priced centrally dispatched market
  - with capacity payments
  - overlaid by contracts-for differences
- NETA: voluntary self-dispatched
  - no capacity payments; all contracted ahead
  - submit balanced Final Physical Notification *h*-1
  - TSO balancing mechanism
    - pay-as-bid plus system average price

Capacity Payment English Pool 1994-5



Issues

- quality and security depend on capacity margin
- scarcity price highly non-linear
  - English pool: Cap pay = SMP*exp{α-β(1-D/K)} where D is peak demand, K is capacity
  - capacity revenue: 50% in 14 days, 75% in 30 days
  - 20% of total Pool revenue

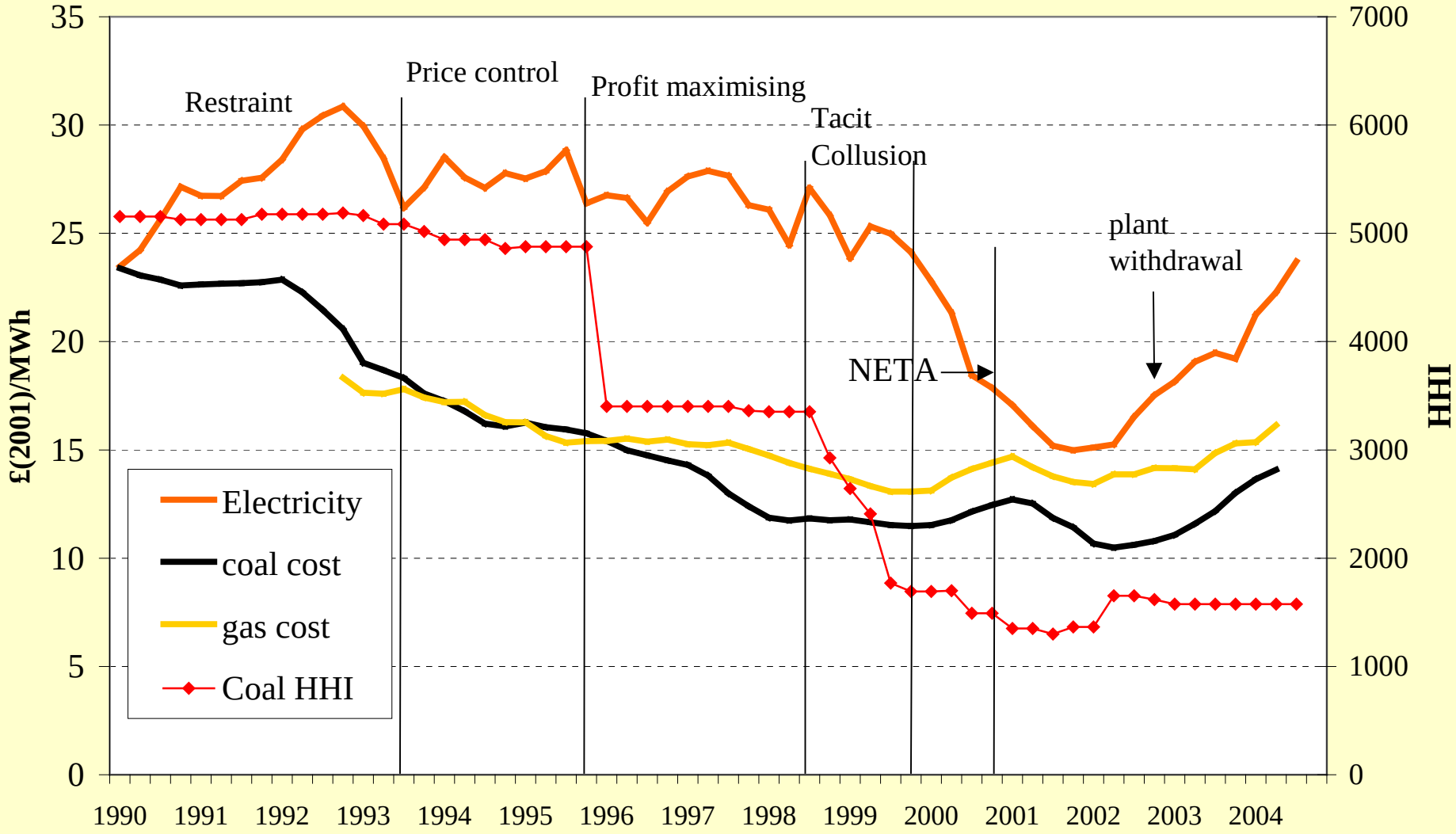
How best to collect capacity costs?

Balancing Mechanism vs Pool

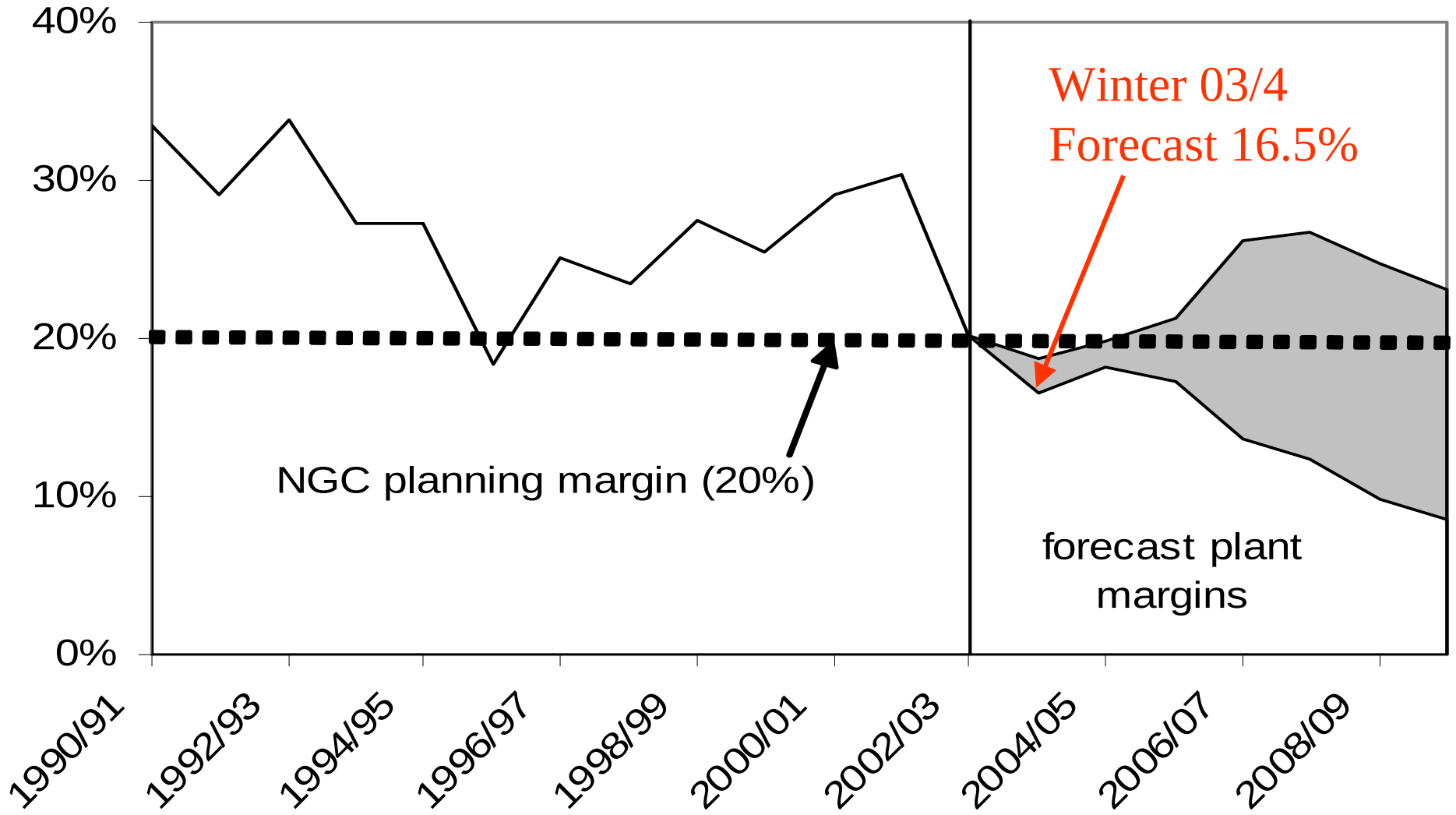
- Pool offered SO balancing at SMP
- NETA - BM volatile and risky
- pay-as-bid, charged at system average price
- SSP low, moderately predictable
- SBP unpredictable, can be very high
- marginal scarcity price not revealed

=> deters entry, distorts peaking investment?

Real GB electricity prices and costs

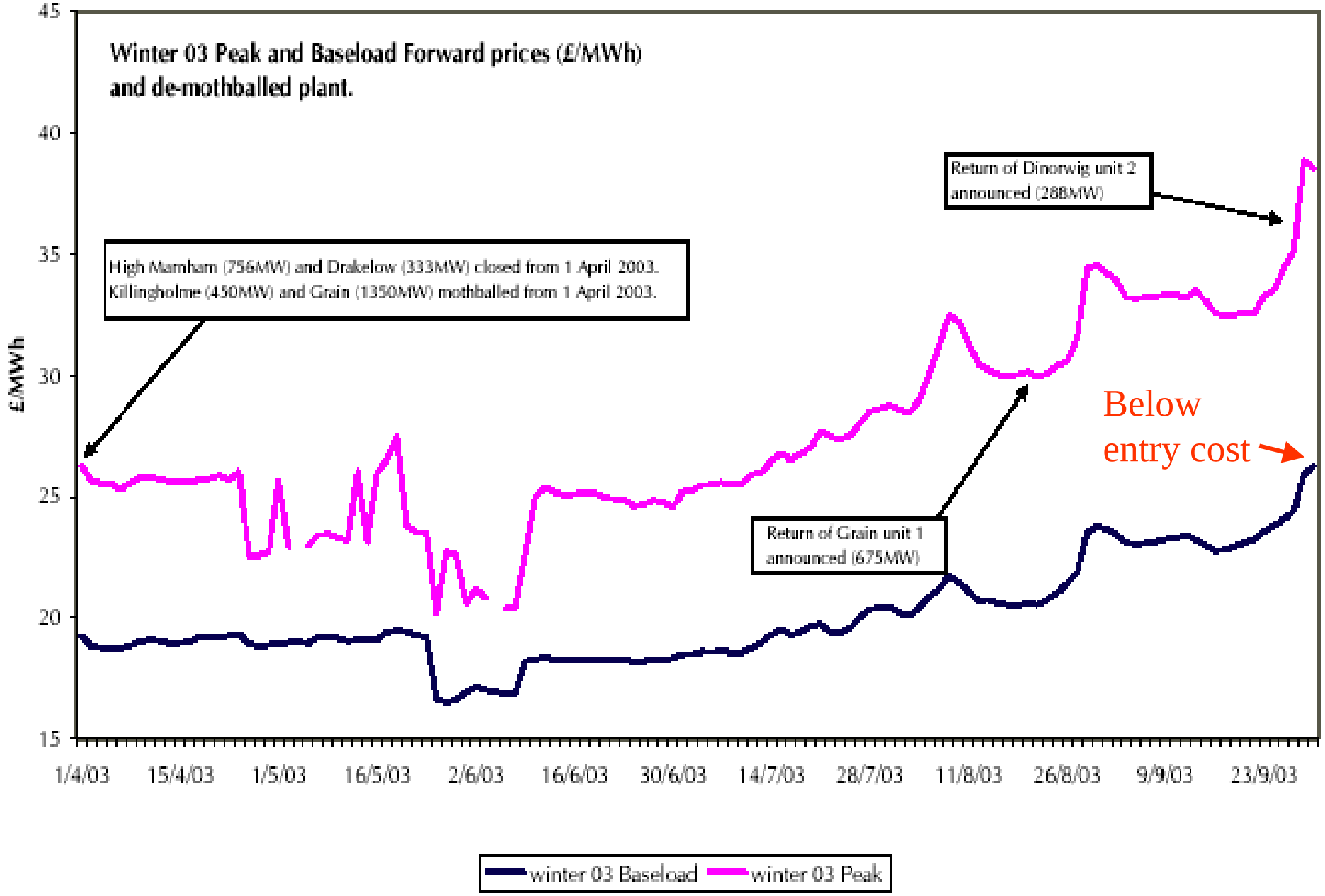


Electricity plant margins in England and Wales

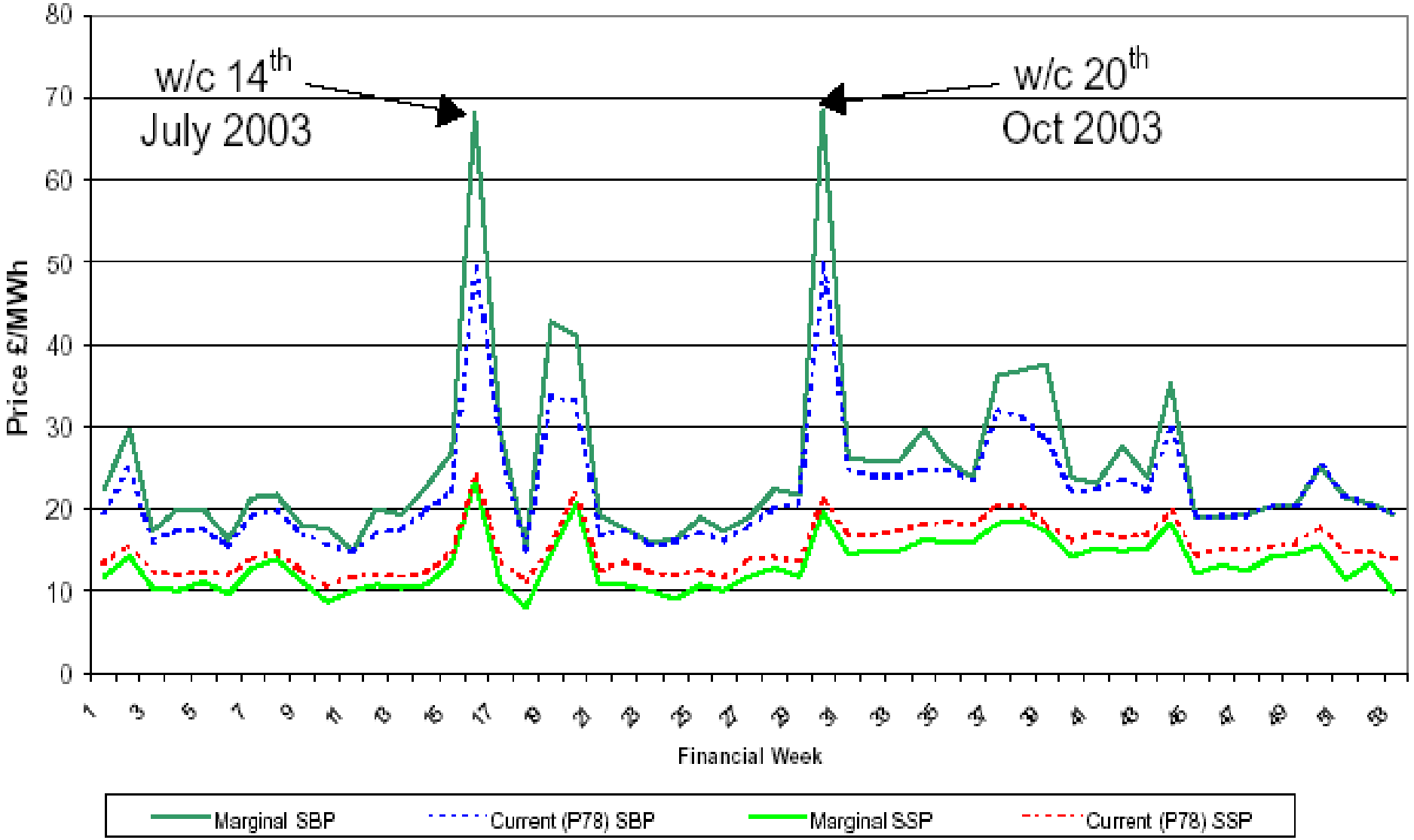


Source: NGC

Figure 9: Correlation of prices and plant response - since the end of May.

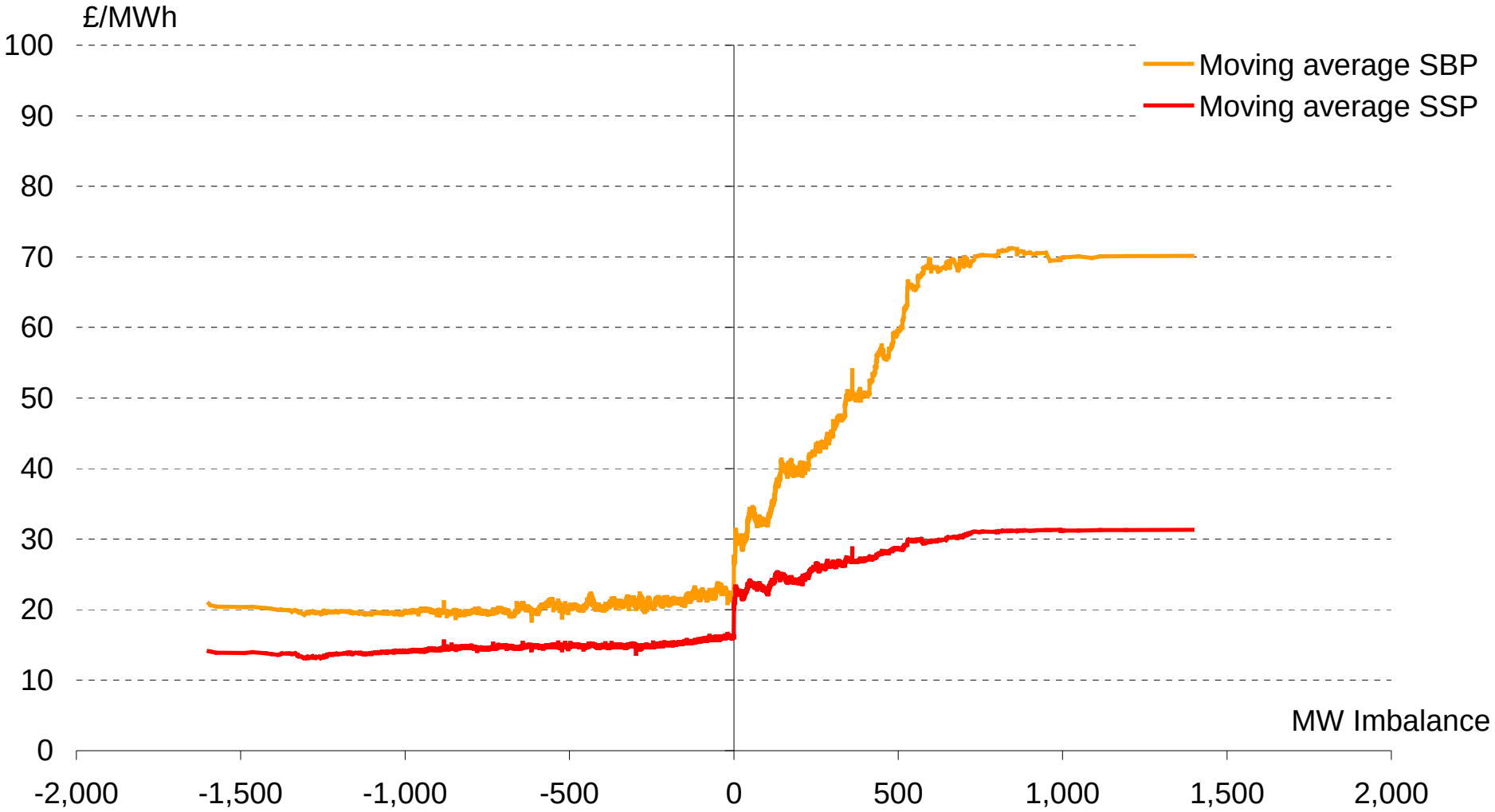


Comparison of Average and Marginal BM Pricing Methodologies 2003/04

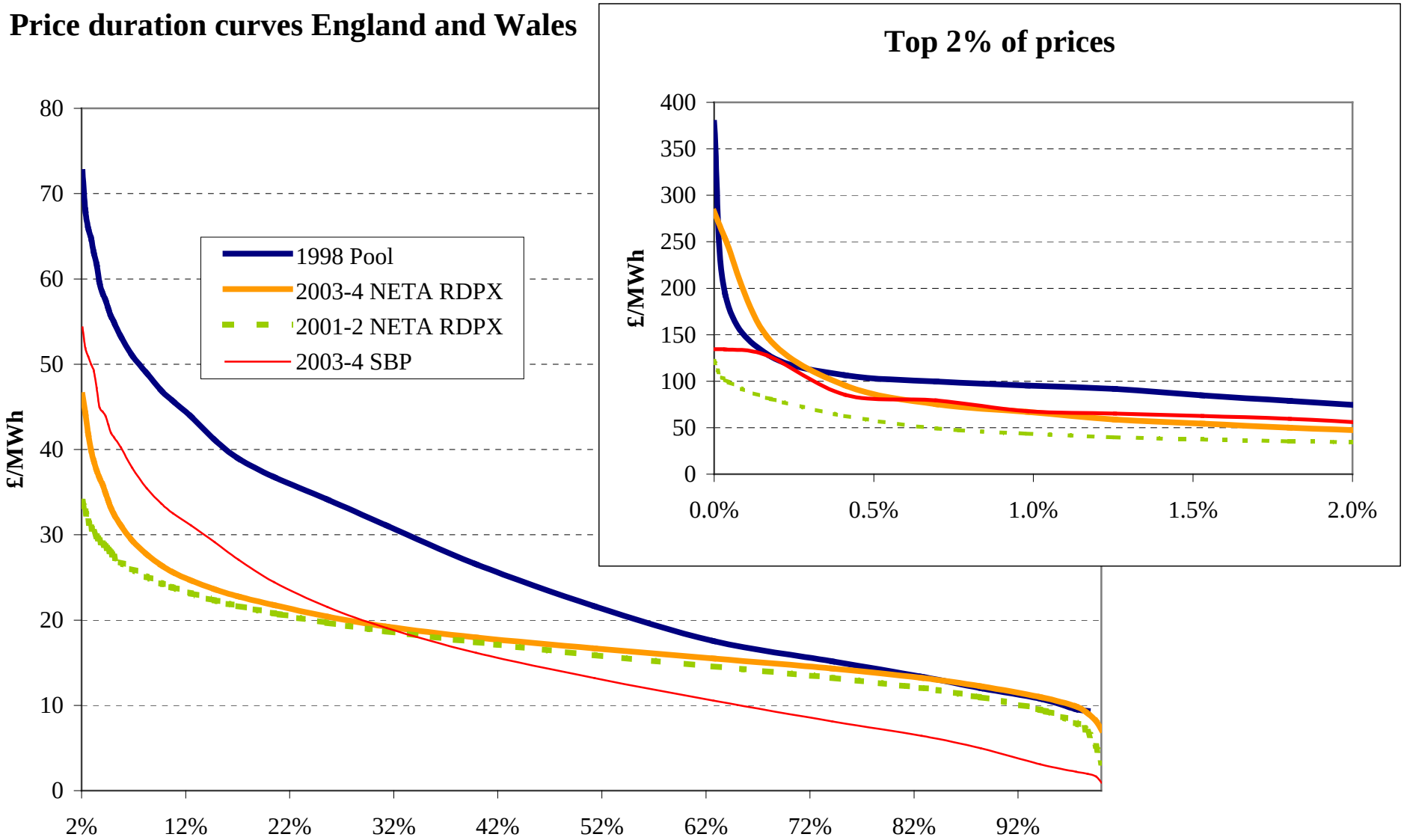


Source: NGT 2004

Balancing prices and volumes Britain April-December 2004



Would prices remunerate peakers?



Options

- Capacity payments need a Pool?
  - ex ante: GB Pool
  - ex post: VOLL in Australia
- TSO responsible for LOLP < p
  - contracts reserves, operates BM
  - leave it to contracts? What of households?
- Responsibility placed on LSEs
  - to overcome fear of price caps?

Market power and capacity payments

- When do capacity payments amplify market power?
  - VOLL LOLP can be gamed with share > 25%
  - competitive Pool: to encourage options &/or contracts?
- Does a tender auction displace entry?
  - What difference to TSO contracting ahead?

Conclusions

- Pools + capacity payments attractive for competitive structures
- Pools vulnerable to market power
- Solutions:
  - "manage" the pools as in PJM, require capacity requirements or options
  - energy only market+contracts, TSO runs BM

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Acronyms

BM: Balancing Market or Mechanism

HHI: Herfindahl Hirshman Index of concentration

LOLP Loss of Load Probability

LSE: Load Serving Entity

NETA: New Electricity Trading Arrangements

NGC: National Grid Co, = TSO

RPD: Reference Price Data = spot price on UKPX

SBP: System Buy Price (in balancing mechanism)

SSP: System Sell Price

SMP: System Marginal Price

TSO, SO: (Transmission) System Operator

UKPX: day ahead spot market (price)

VOLL: value of lost load