UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Eskom's performance in international perspective: governance, institutional and pricing reforms

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CDE Workshop on the SA electricity crisis

5 May 2008, Johannesburg

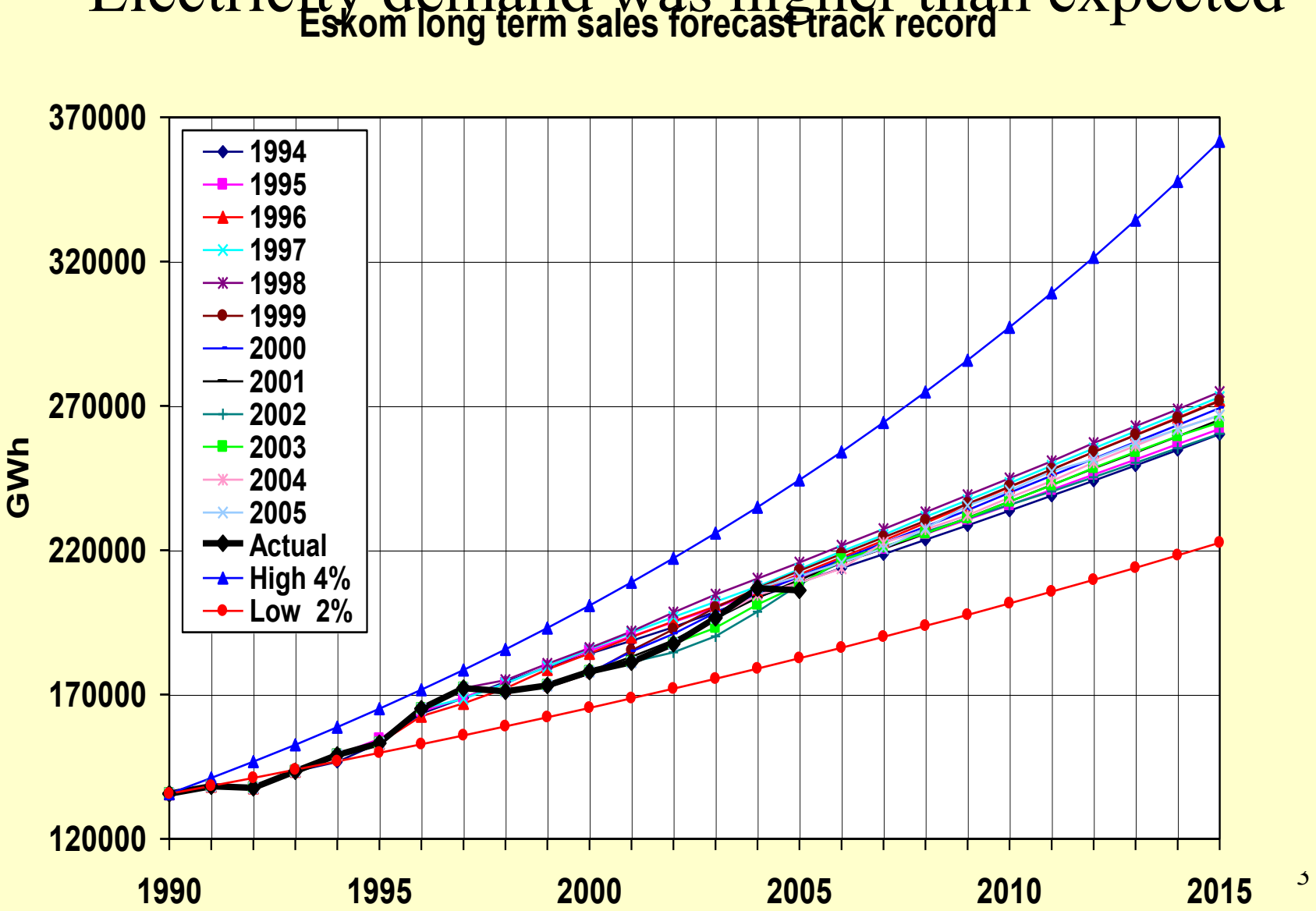
http://www.electricitypolicy.org.uk

The South African electricity crisis

- Energy White Paper 1996
  - presented 1998
  - forecast shortage 2007 unless new capacity ordered by 1999
- blackouts in 2007 winter
- major blackouts in (off-peak) summer 2008
  - large impact on mineral production, foreign confidence

Electricity blackouts: bogus arguments

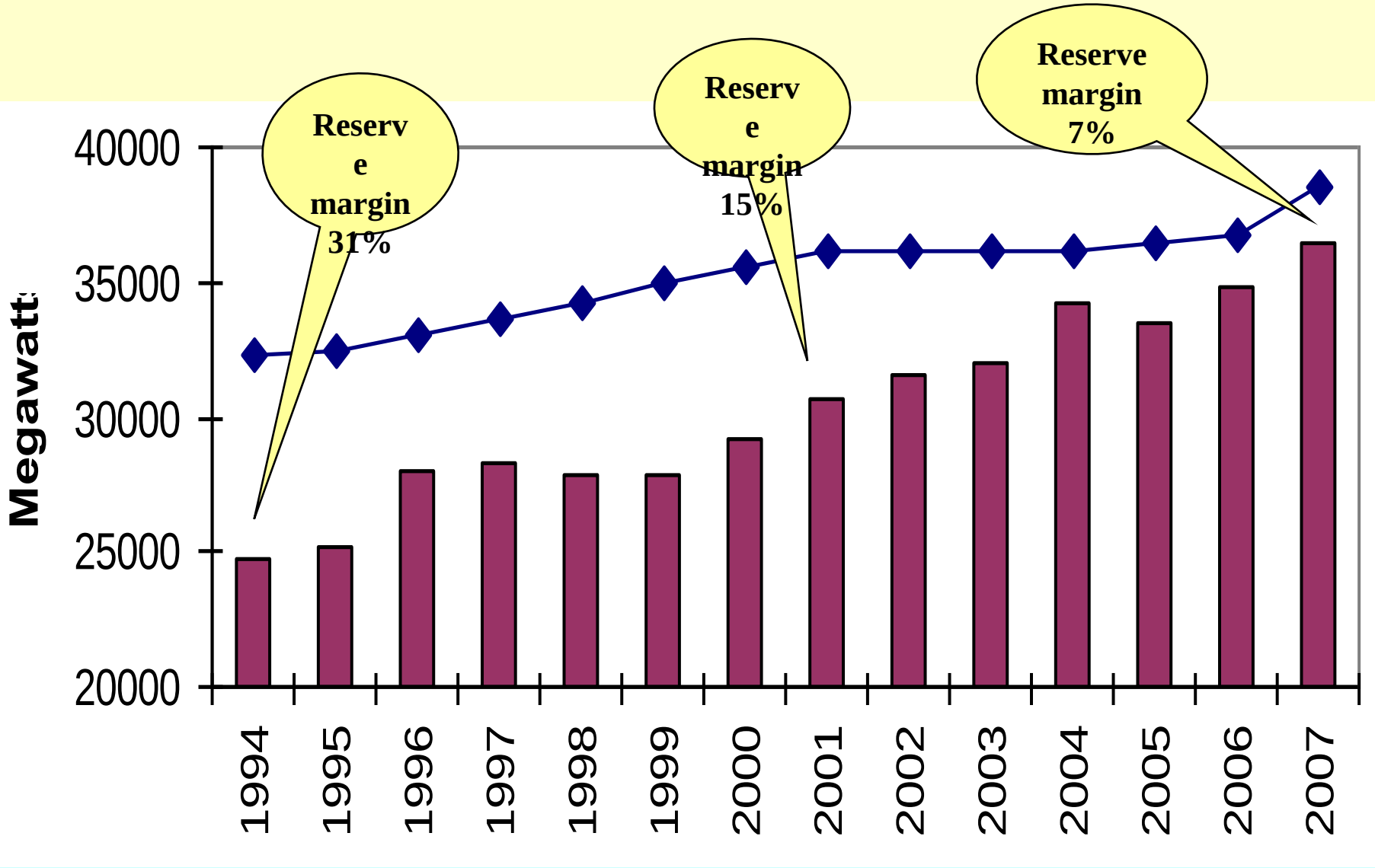
Electricity demand was higher than expected



Blackouts: ultimate causes (1)

Insufficient generating capacity

- Eskom's investment programme 4 years behind
  - Moratorium from 2001-2004
  - New build programme has slipped
- DME contracting of IPPs unsuccessful



Ideally need 20% reserve margin to cater for planned maintenance, unplanned outages and system stability

Blackouts: ultimate causes (2)

Eskom unable to keep its existing generators working adequately

90 : 7 : 3

plant availability : planned maintenance : unplanned outages

86 : 9 : 5

76 : 10 : 14

Negligence in coal contracting

Equipment and maintenance failures

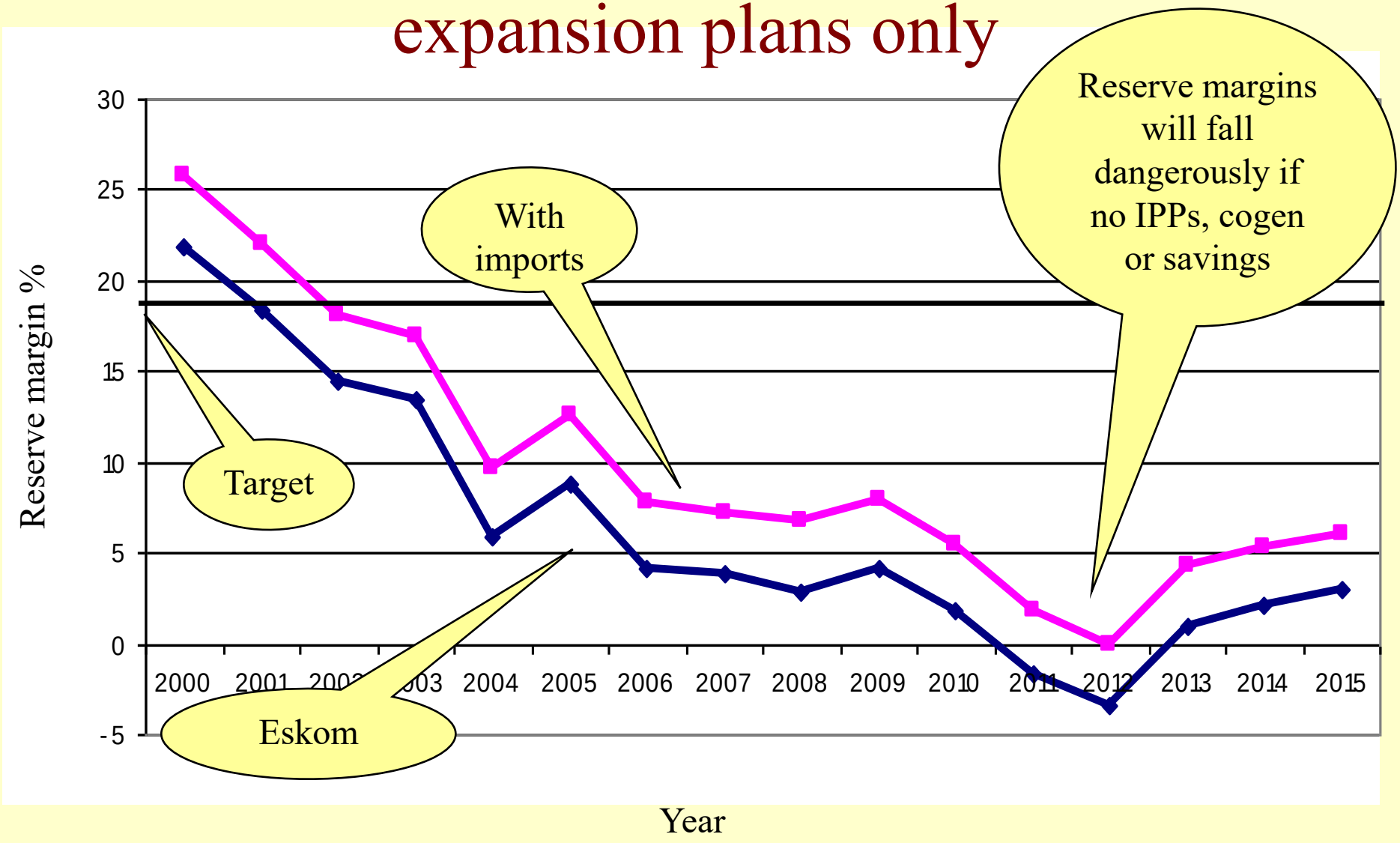
Example: 28 January 2008

	MW
Eskom capacity+imports	**39 855**
Operating reserves	1 800
Planned maintenance	3 715
Breakdowns (e.g boiler tube ruptures, etc)	4 235
Reduction in capacity (e.g. wet or insuff coal)	2 694
Total capacity available for supply	**27 411**
Expected demand	**32 000**

Consequence: massive load-shedding
diamond, gold and platinum mines shut down

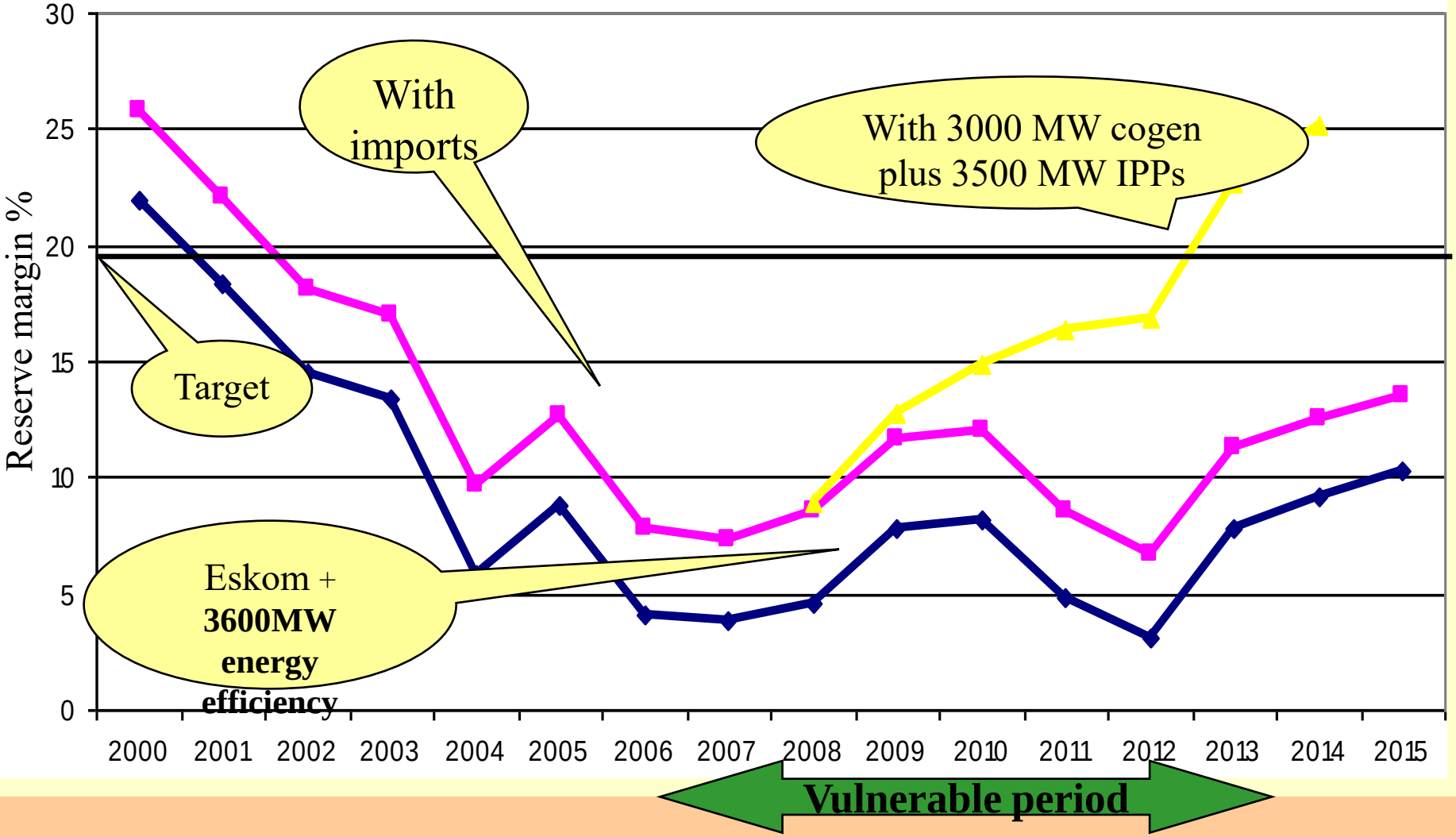
What are root causes?
Systemic management and governance failures?

Reserve margins based on Eskom capacity expansion plans only



Eskom's new build programme has slipped

Reserve margins: Eskom + energy efficiency + cogen + IPPs



Eskom investing as fast as it can, but now also needs imports, IPPs, Co-Gen and

The stalled reform discussion

- Reform discussions ignore pricing
- International experience
- Requirements for liberalisation
- costs and pricing
- reforms and governance

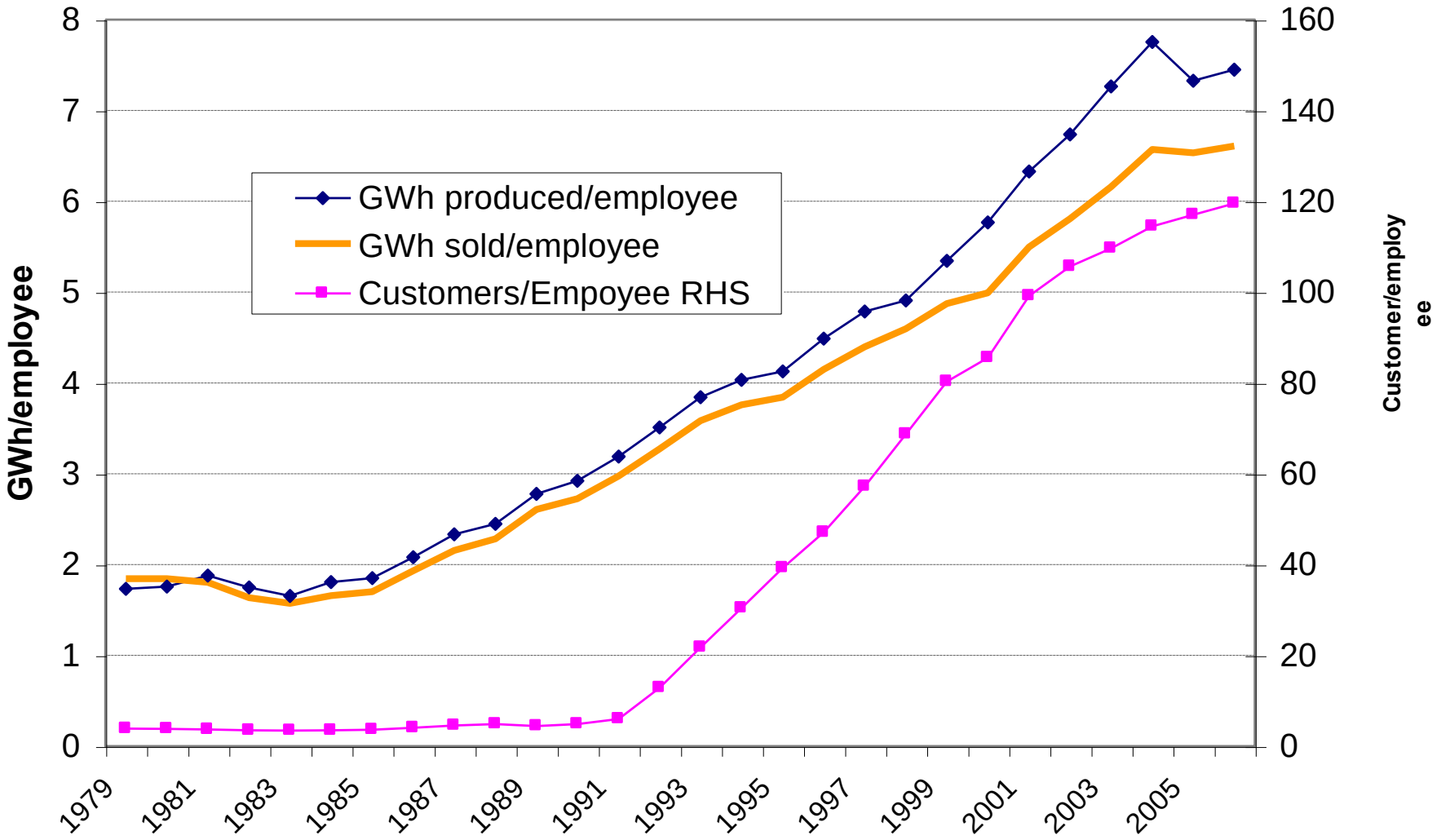
Reform discussions post 1994

- SOEs increasingly criticised for inefficiency
  - Particularly for investment
- SA Debate on reform starts – conferences, reports, models,…..
- Eskom Conference 3-5 April 2000
  - presents international experience

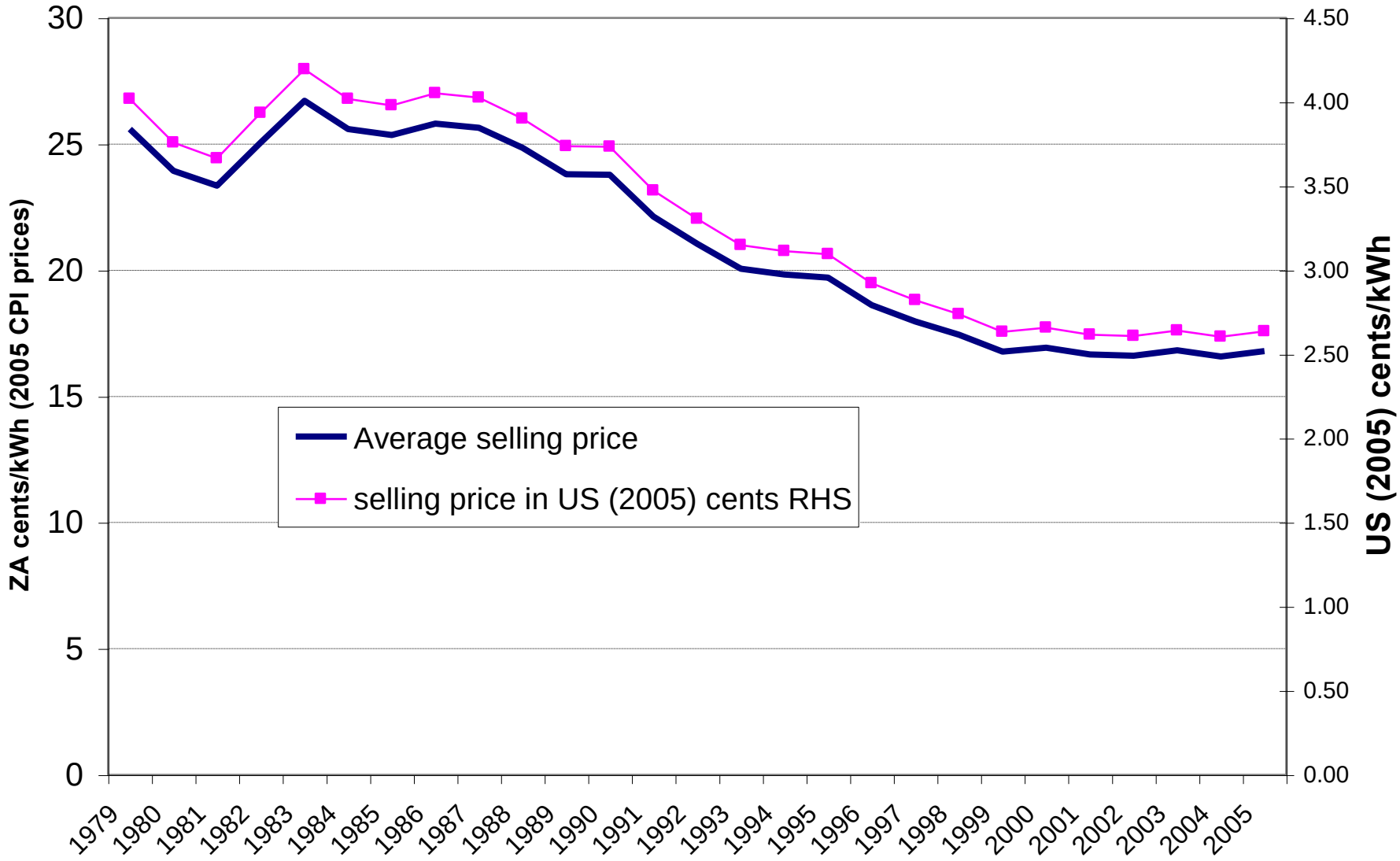
=> Consensus model – liberalise, unbundle, encourage new IPPs, privatise, regulate …

But pricing issue neglected

Eskom Productivity 1979-2006



Eskom's average selling price deflated by CPI



The UK experience

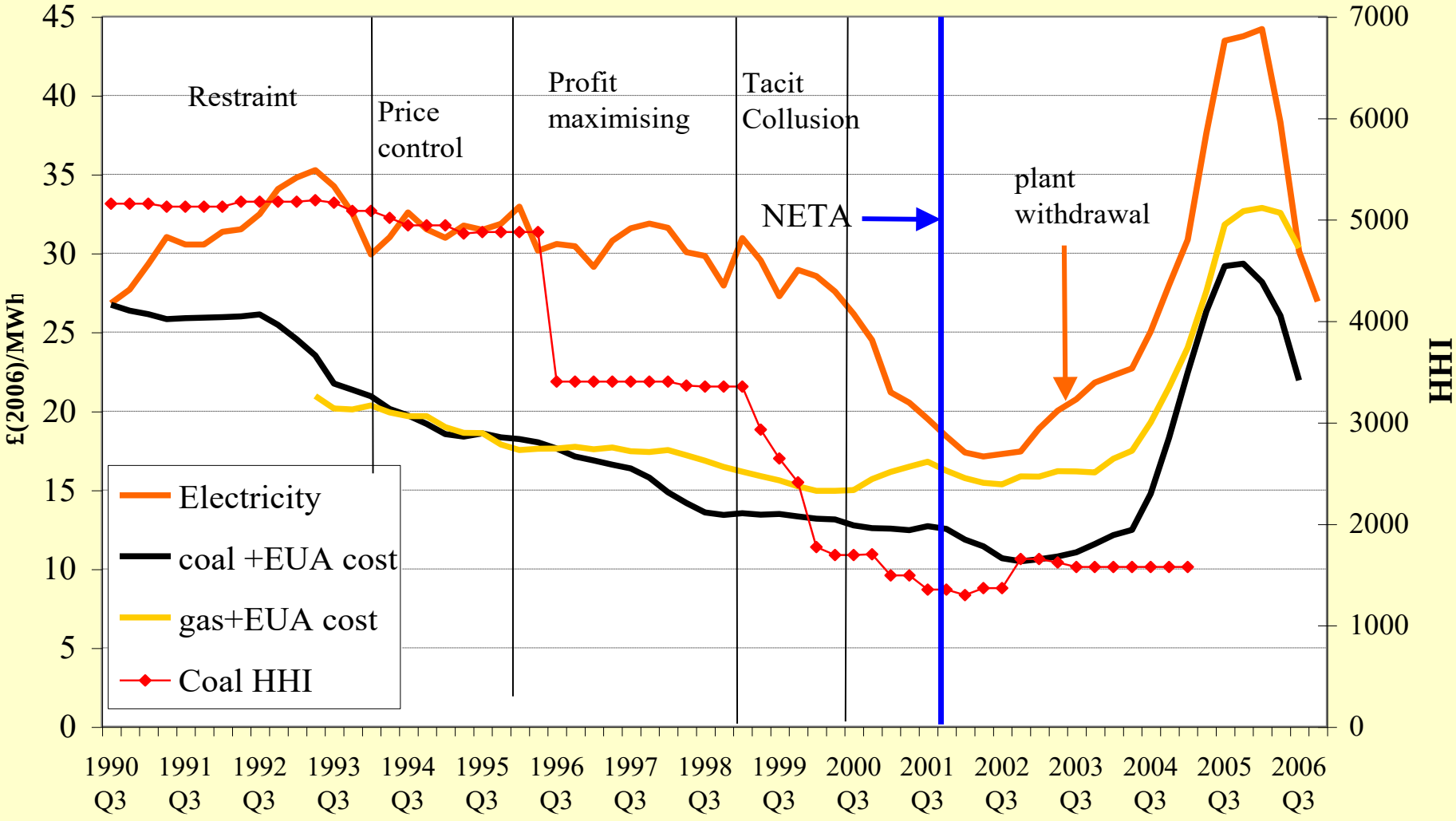
- Britain restructured from a position of high prices and spare capacity
- England (+Wales) unbundled: restructuring worth 6% permanent fall in cost

  = 100% on sale value; consumers lose, buyers gain

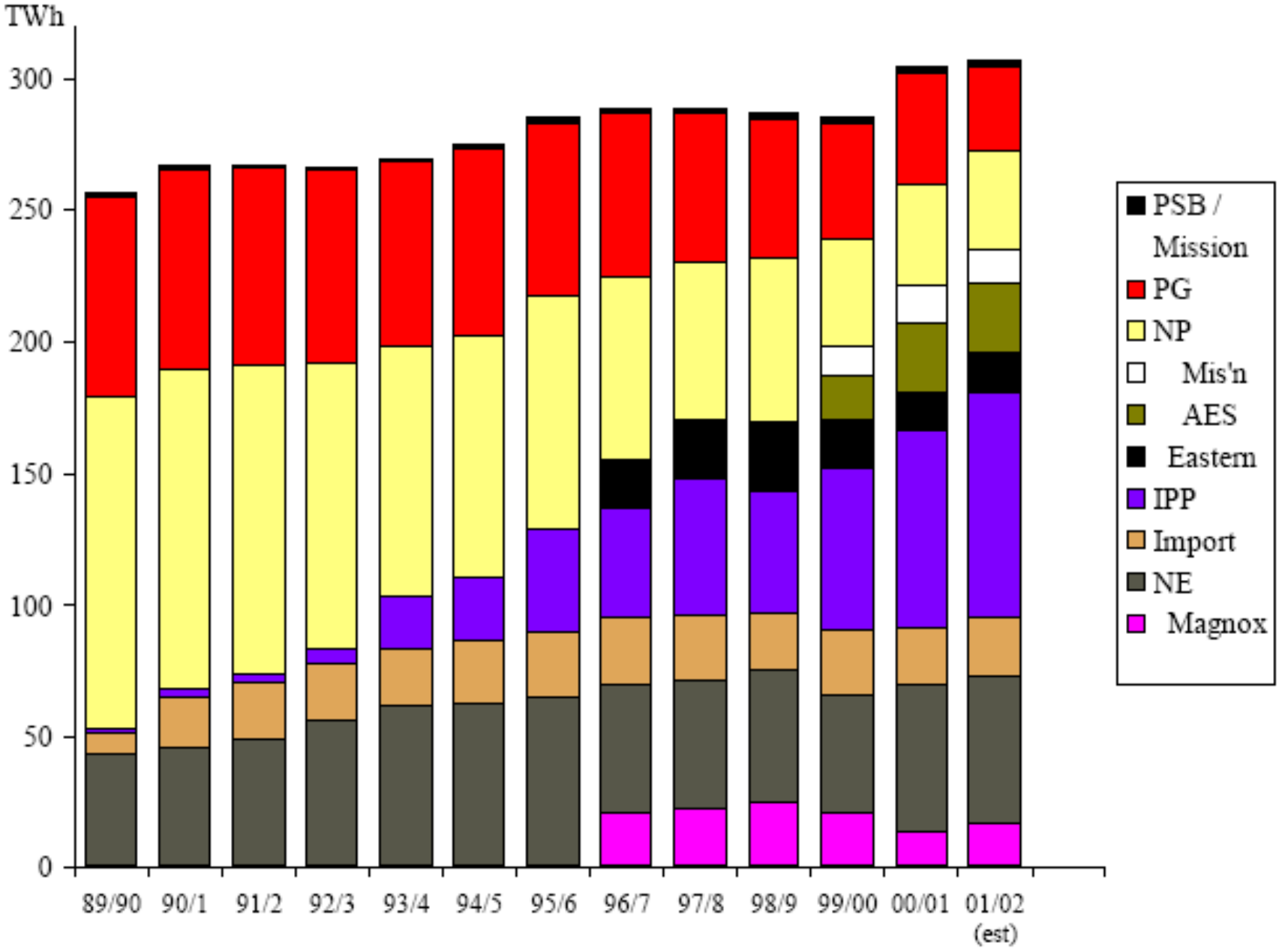
=> Large investment in new generation E&W

- Scotland - unrestructured, no net social gain

Real GB electricity and fuel costs 1990-2007



Generation in England and Wales



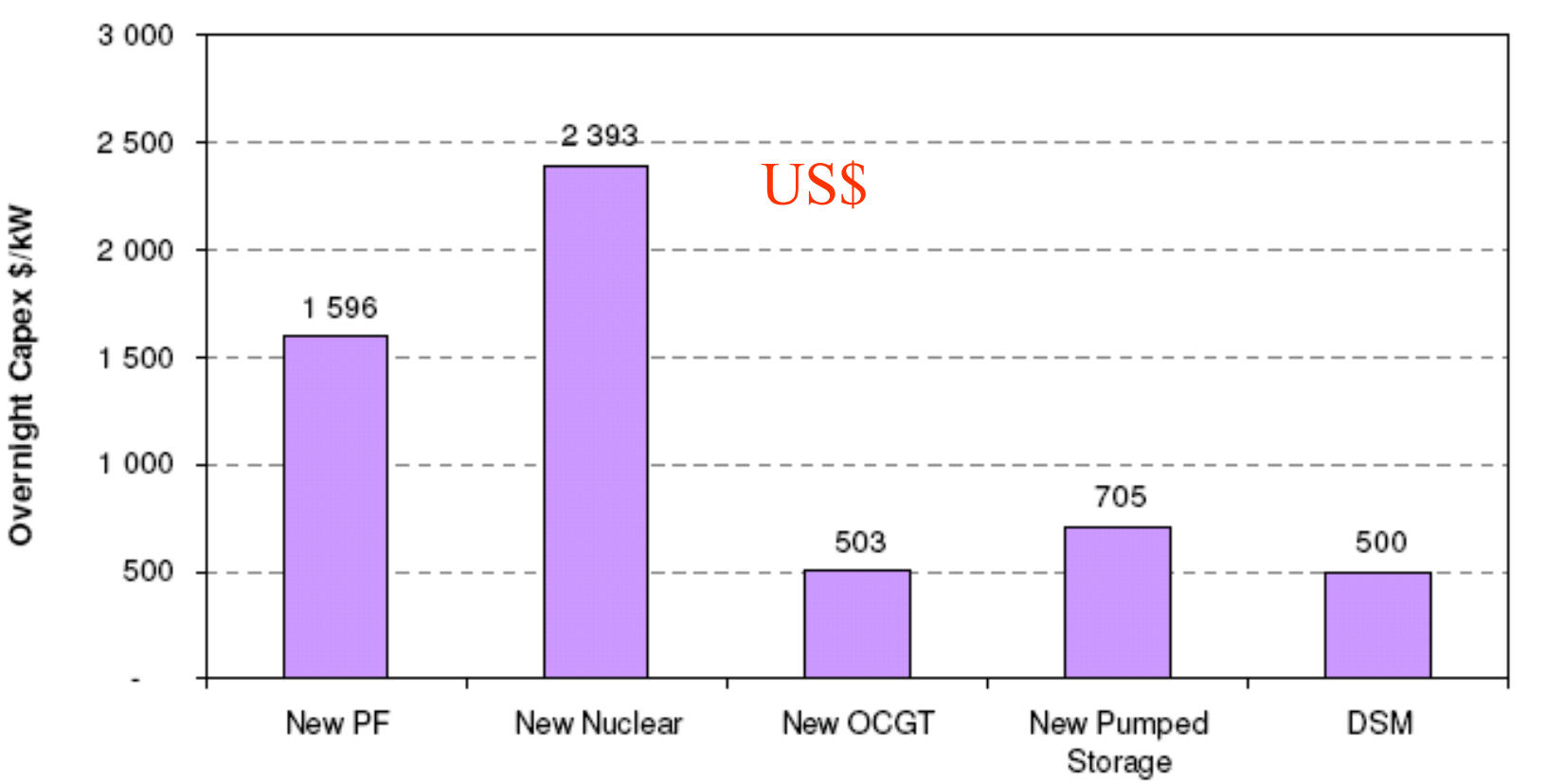
Requirements for liberalisation

- Enough generation stations for competition
- Investors need assurance that price = LRMC when new capacity needed
- confidence that markets allow scarcity pricing and control of market power is justified
  - challenging for regulators & competition authorities
- financially viable distribution companies
- credible regulation for wires, access

Requirements in South Africa

- remunerative pricing to reward investors
- timely, efficient procurement of generation
  - planning, contracting, dispute resolution
- efficient pricing to guide energy intensive investments (e.g. aluminium)
- incentives for availability and reliability
  - to hire the right staff
  - to ensure they work effectively
  - to deliver quality of service

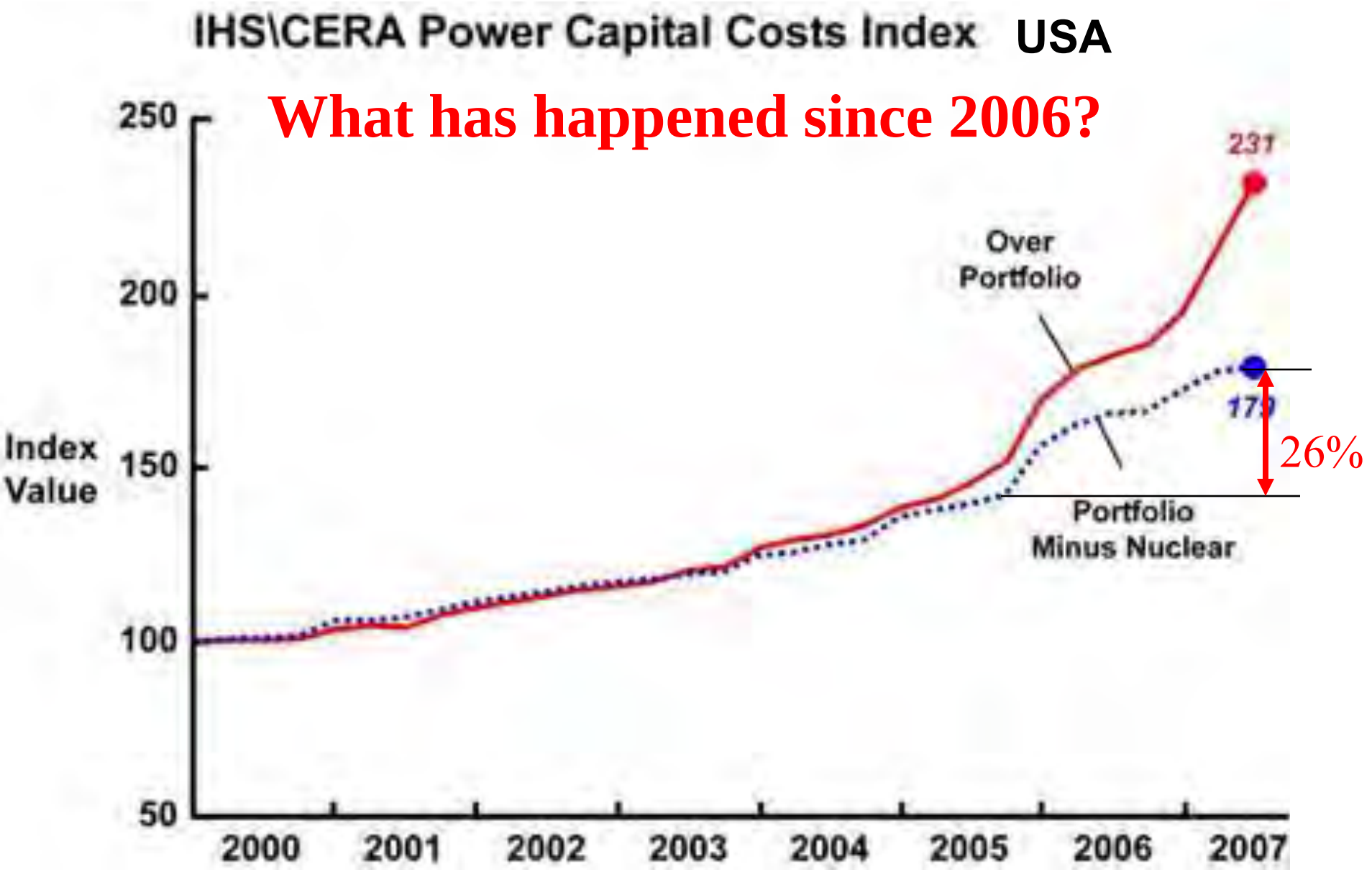
Energy and capital costs 2006



Variable costs: Coal US$1-5/MWhe

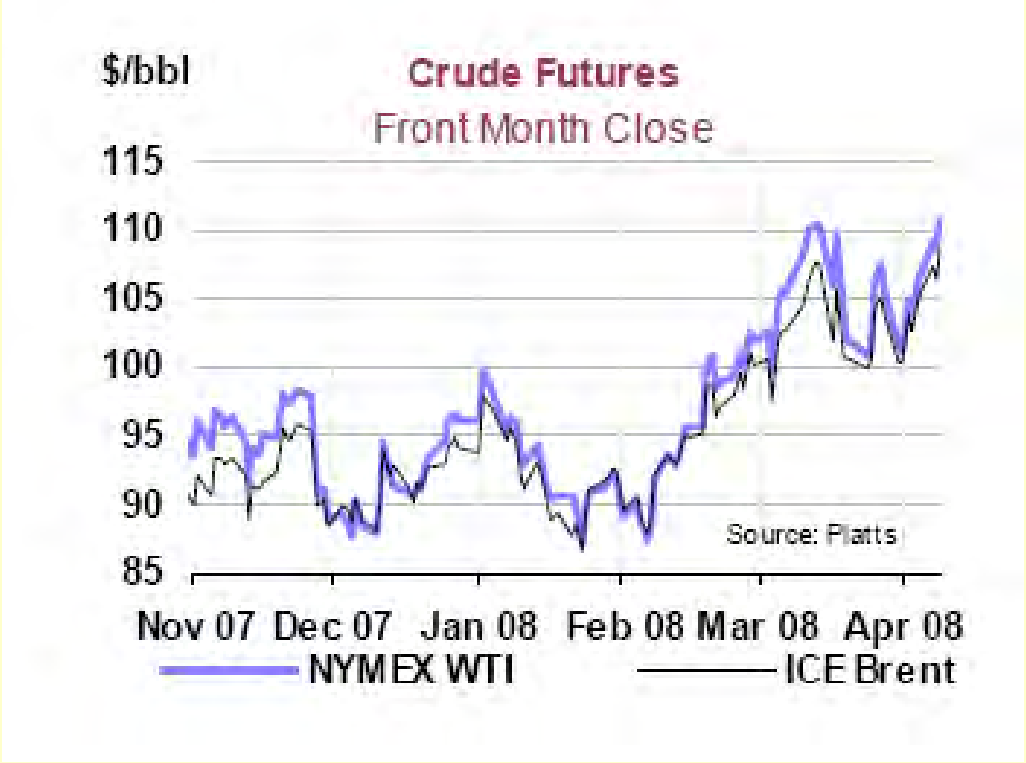
LNG: $56/MWhe, distillate in CCGT $77/MWhe, in OCGT = $130/MWhe (at $7/mmBTU for gas, oil $61/bbl)

Peak price (Megaflex) = $63/MWh



Source: IHS Inc. and Cambridge Energy Research Associates

Energy costs 2008



- Oil now $100+ /bbl
- LNG: $12-13/mmBTU?

= $100/MWhe

- distillate in CCGT $140/MWhe?
- distillate in OCGT = $230/MWhe
- T&D losses at peak amplify these

Eskom's asset values (2006)

= 60 ZAR bn historic cost

= 130 ZAR bn inflation adjusted

Optimal Deprival Value > 330 ZAR bn (?)

of which generation > 200+ ZAR bn (?)

Economic return < 2.3% on ODV

Suggests serious under-pricing

Approaches to pricing

- ODV value + WACC of 8% prices should increase 60% from 170 to 270 ZAR/MWh
  - Still 3rd cheapest of 14 countries at $40/MWh
  - and this excludes any CO_2 cost
- Generation LRMC > 250 ZAR/MWh (2006)
  + T&D = 320 ZAR/MWh ($48)
- Capacity price: VOLL x LOLP
- SRMC = marginal fuel cost + capacity price

Pricing

- Efficient pricing for marginal demand

  => PPA contracts new energy-intensive users

  – benchmark against IPP PPAs

  – High value exporters to face LRMC/SRMC

  – Other customers offered old contract to 80% of 2007 demand, above that at LRMC/SRMC

  – raise peak prices, energy prices relative to fixed charges, shift to locational pricing?

Eskom should be a cash cow, not a hungry dog

Reform priorities

- Under-pricing deters liberalisation
- Investment requires Eskom's full attention
  - the unbundled model would not work now
  - timely decisions about IPPs required
  - and improving availability, reliability
- Active efforts on cogen, DSM, etc needed
- Resolve uncertainties in distribution

Institutional reform options

- Create Single Buyer (SB) office in Eskom?
- Planning transferred to SB subject to scrutiny by stakeholders?
- Commercialise stations
  - with PPA and availability (capacity) payments?
- Medium term: Single Buyer separated
- SB tenders for new capacity, approval subject to transparency and scrutiny

Conclusions

- Eskom has been adept during the transition
  - in electrification, securing political support, improving performance
  - in setting challenging standards for Muni Discos
  - but performance now slipping
- Requirements: 1) raise (marginal) prices to LRMC

2) finance and deliver efficient investment and performance in all segments

3) Reduce demand, increase supply (e.g. cogen)

- Regulation & governance:
  - clarify responsibilities for investment, pricing, IPPs

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