UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

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

Balancing regulation and liberalisation in electricity markets

David Newbery

IAEE European Conference

Vienna 9 September 2009

http://www.electricitypolicy.org.uk

UNIVERSITY OF CAMBRIDGE

Outline

- Can Europe have liberalised electricity markets ***and*** meet its renewables and carbon targets?
- Economics of low-C electricity
- Criteria for market design
  - interconnection and CBT
  - implications of substantial wind
- Market integration and balancing
- Single Buyer or competitive markets?

UNIVERSITY OF CAMBRIDGE

Economics of low-C electricity

- Depends on EUA price: too low
- depends on electricity price: too risky
  - without FIT or long-term CfD
- depends on future energy policy: uncertain
  - which might favour chosen technologies
- depends on interconnection: inadequate
  - to reduce local volatility

risks for market solutions

Table 7.6 Lifetime levelised costs of plant added by 2020 (£/MWh)

		2020 Renewable Scenarios		
Technology	Conventional	Lower	Middle	Higher
New coal	56.4	57.4	58.7	61.1
New CCGT	56.5	58.5	59.8	62.8
Nuclear	37.9	37.9	37.9	37.9
Onshore wind*	65.7	60.4	60.4	61.6
Offshore wind*	87.8	86.4	83.4	81.7
Biomass*	95.6	95.7	96.5	101.7

*Before any ROC subsidy, currently around £40-45/MWh

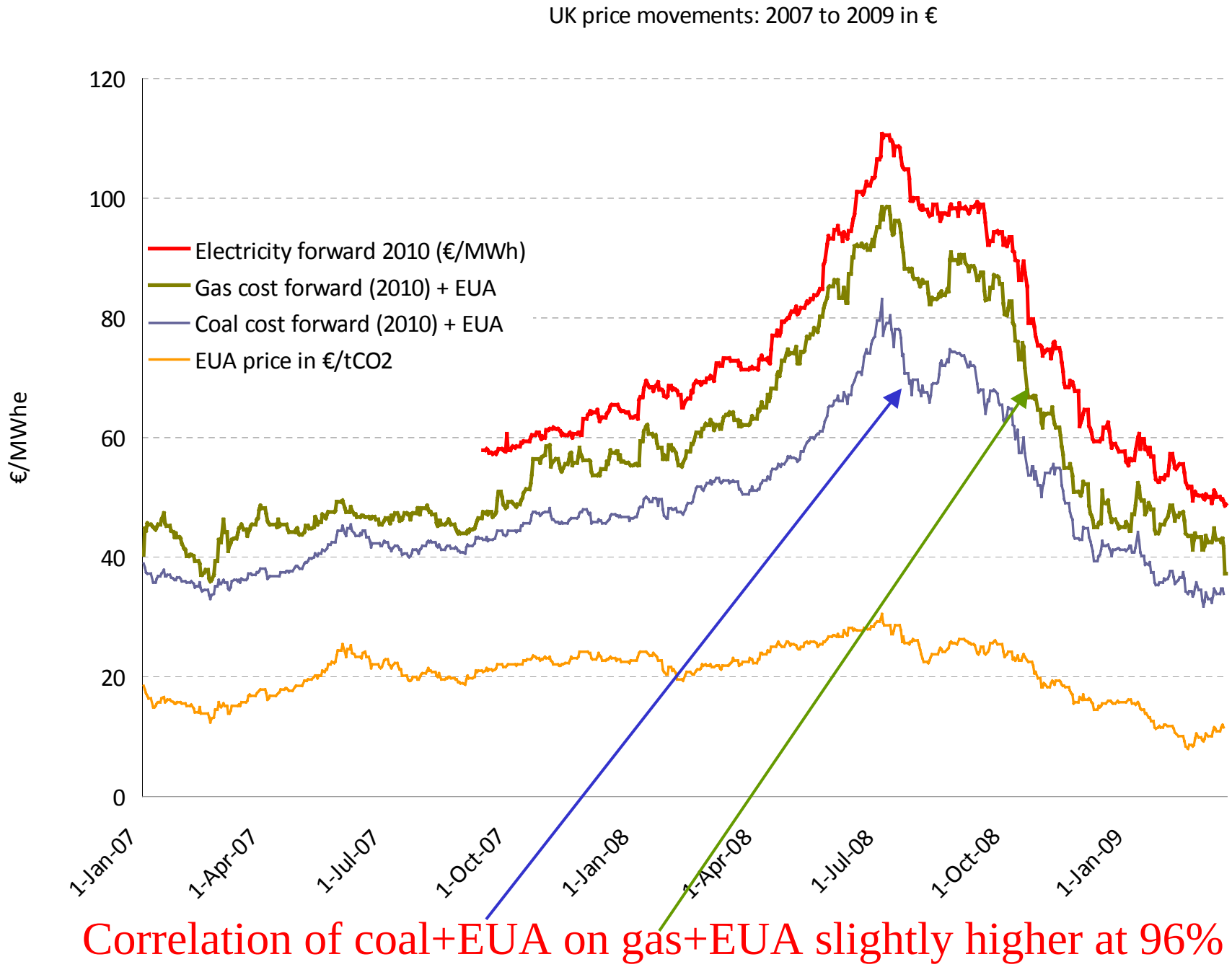
Source: SKM
BERR URN 08/1021

Optimistic?

Table 7.2 2020 Price assumptions

Type	Price
Gas (p/therm)	55
Coal ($/te)	110
Oil ($/barrel)	85
Biomass fuel (£/GJ)	3.6
Carbon permit (€/te CO2)	30

EUA price 25 October 2004-7 August 2009

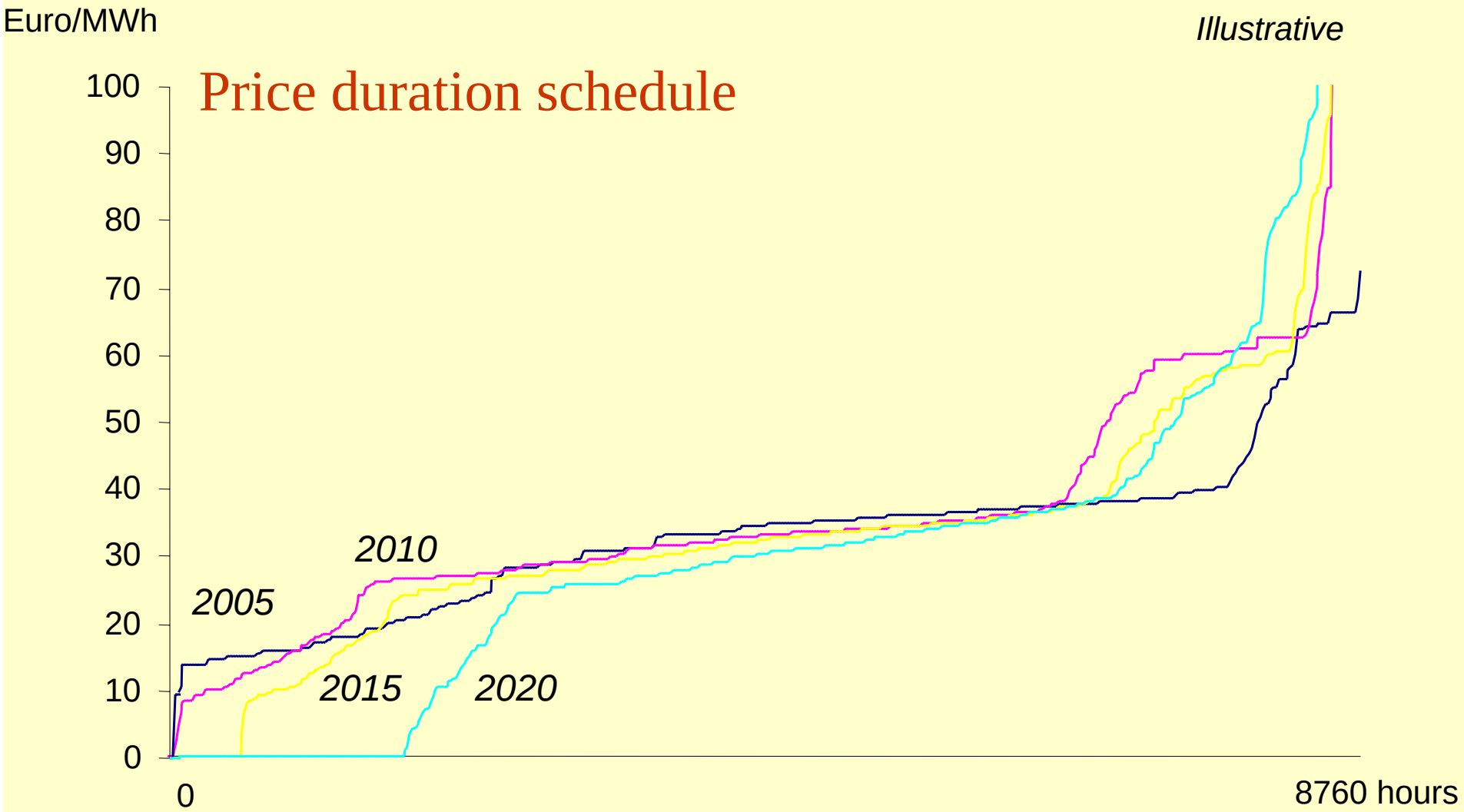


Correlation of coal+EUA on gas+EUA slightly higher at 96%

Implications of substantial wind

- Much greater price volatility
  - mitigated by nodal pricing => better dispatch
  - requires CfDs and nodal reference spot price
- Reserves (much larger) require remuneration
  - VOLL*LOLP capacity payment?
  - or contracted ahead by SO?
  - Or will spot price volatility induce contracts that cover availability costs?

Simulation – more volatility, harms baseload (nuclear)



UNIVERSITY OF CAMBRIDGE

Is nuclear viable in liberalised markets?

- Credit supply drying up
  - low risk free rate (indexed bonds)
  - but high cost of capital to most companies
- Low debt-equity needed for construction
- electricity price-cost margin very volatile
  - issue electricity indexed bonds?
  - or require long-term carbon price guarantee?

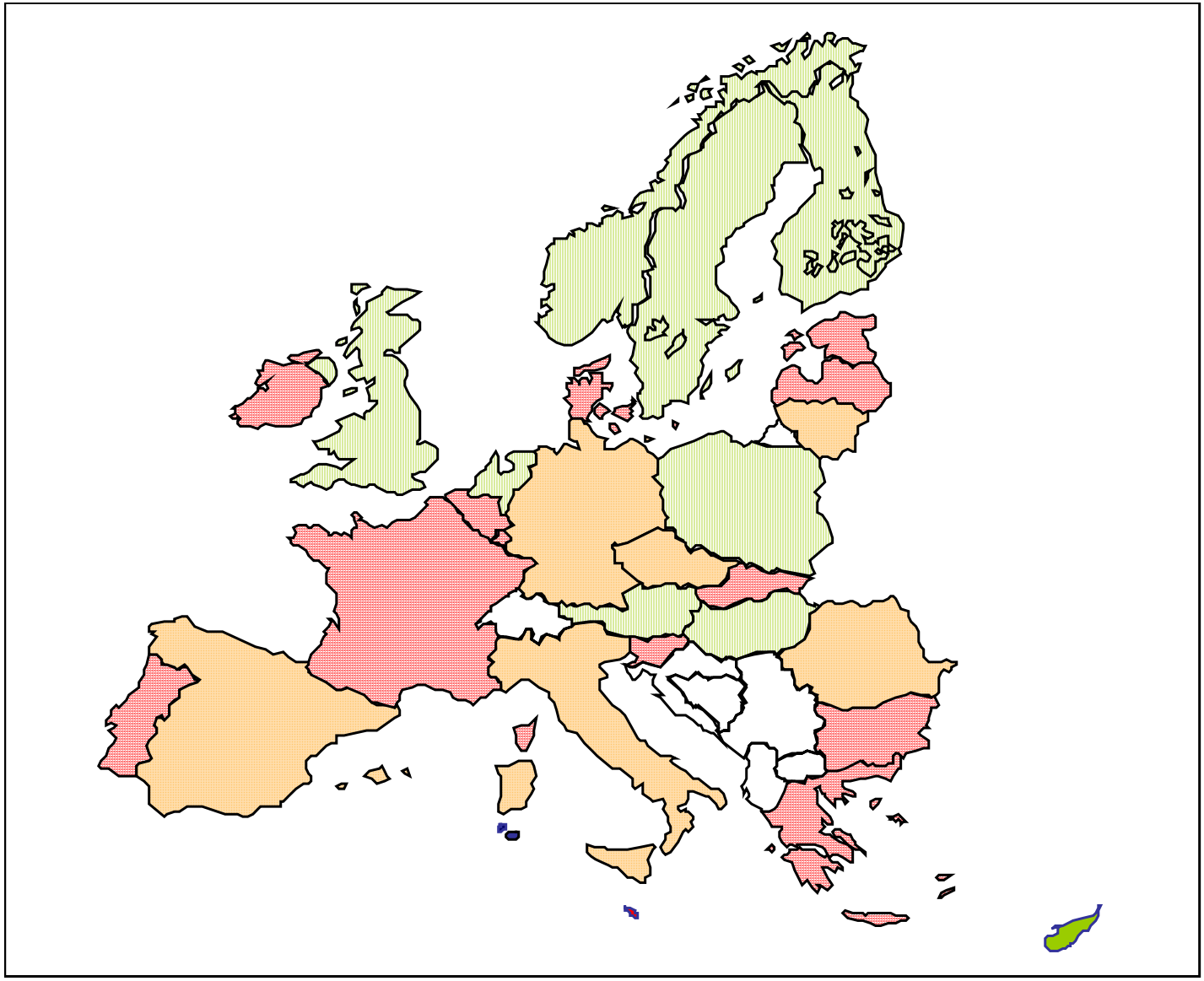
Is any electricity investment viable without an off-take contract?

UNIVERSITY OF CAMBRIDGE

Criteria for market design

- Foster competition and entry => efficiency
- Incentives for timely, efficient (location and type) and adequate investment in G and T
  - reflecting comparative advantage
- Reflect social cost of carbon
- allow RES/RD&D support without distortion
- deliver efficient dispatch
- at acceptable cost to final consumers

Many markets still concentrated



very highly concentrated – HHI above 5000

highly concentrated – HHI 1800-5000

moderately concentrated – HHI 750-1800

Implications for Europe

- European market operates as integrated whole
  - efficient Europe-wide dispatch
  - efficient SO/balancing across borders
- Renewables built where cheapest
  - but costs share equitably
- Cost-effective interconnection as needed
  - to reduce cost of intermittency

None of these currently guaranteed

UNIVERSITY OF CAMBRIDGE

Interconnection

- Under-investment in connecting markets
  - benefits of robustness, competition undervalued
- optimal transmission investment needs information on generation investment plans
  - when, where and what (wind or dispatchable?)
  - wind increases need for interconnection
- Hampered by vertical integration, opacity
- Who pays and how?

How well does cross-border tariffication work?

UNIVERSITY OF CAMBRIDGE

Inter-TSO compensation

- CBT for existing network is zero-sum game
  - unlikely to lead to efficient pricing
- New cross-border links should add value
  - issue: how to finance/build to deliver net gains

=> Leave agreed CBT for existing network?

- Design mechanism for new links
  - planning agency selects best projects
  - simulates gains, proposes charges to TOs
  - tenders for construction

Coupling and balancing

- Market coupling improves interconnection
  - Benelux as example
- Fight to run PX hinders co-operation?
  - APX and EEX cannot agree auction time
- Cross-border balancing reduces costs
  - supports liberalised competitive market
  - but inter-TSO rivalry thwarts?

Spatial and temporal optimisation

=> nodal pricing + central dispatch

- Nodal price reflects congestion & marginal losses
  - lower prices in export-constrained region
  - efficient investment location, guides grid expansion
- Central dispatch for efficient scheduling, balancing
- Market power monitoring – benchmark possible
- PJM demonstrates that it can work
  - Repeated in NY, New England, California (planned)

Towards a Single Buyer?

- RES problematic without contracts?
  - Most markets have FITs
  - Balancing market works overtime with wind
- Reserves need adequate revenue to stay on system
  - or a contract
- Nuclear problematic without a long-term contract?
  - But then need a Single Buyer?
- Does this also solve market power issues?

What models for a viable market design?

UNIVERSITY OF CAMBRIDGE

Underwriting liberalised markets

- Ensure liquid transparent spot markets
  - to guide contracts, remove entry barriers
- Allow high scarcity prices
  - to offset zero prices from wind, encourage contracts
- Nodal pricing

  => right location, S and D responses, contracting
- Interconnection, integration and C CfDs

Viable technologies compete in markets

Conclusions-1

- Renewables targets require *and currently lack*
  - adequate interconnection
  - efficient market design for dispatch and balancing

=> ideal: nodal pricing + pool/SO control

- transition arrangements
  - for new/old generation and for CBT

=> transition contracts to avoid excess rents

UNIVERSITY OF CAMBRIDGE

Conclusions-2

- Renewables and policy uncertainty undermine liberalised market

=> threatens ***all*** generation investment

=> Single Buyer +long-term contracting vs liquid markets and contracts for liberalised market

Nuclear power needs an attractive offering to compete politically with renewables:

Would a carbon floor price rescue the market?

UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

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

Balancing regulation and liberalisation in electricity markets

David Newbery

IAEE European Conference

Vienna 9 September 2009

http://www.electricitypolicy.org.uk