



# The end of UK electricity liberalisation

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# Preamble: *The Dynamics of Power* (2006)

- Generation investment in liberalised power markets will be problematic for governments
- It will be lumpy, undiverse and driven by perceptions of risk
- Security has attracted most attention but is manageable; environmental protection (in the OECD) and electrification (in developing countries) are still problems.
- Unless governments develop market-friendly instruments, liberalisation is at risk





# The fundamental problem – many targets but no way of meeting them

- Government has too many targets but no effective policies for a liberalised market
- The likely short term outcome is continuing incremental intervention, which will discourage investment
- But meeting the targets depends on investment
- So in the medium term they will have to abandon liberalisation (or their environmental targets).
- They seem to prefer the targets



# No fundamental conflict: markets and environmental improvement

- Encourage resource efficiency and reduce waste
- Better at finding and exploiting new techniques
- More responsive to consumer needs

At first (1990s) liberalisation and environmental improvement (and price reduction, new investment etc) went hand in hand.



# Markets can incorporate environmental externalities

But instruments used need to be:

- Market friendly
- Based on simple, transparent, groundrules
- Predictable, consistent and credible
- Minimally prescriptive on means (not picking winners)
- Economic instruments (taxes or trading) preferred





## Instead we have

- Multiple targets (EU, UK, ghgs, renewables, energy efficiency etc)
- Policy volatility (4 White Papers; U-turns on coal, gas, nuclear; changes in support schemes)
- Multiple instruments (ETS, CCAs, UKETS, CRC, IPPC, LCPD, RO, CHP, nuclear, SEA, SSA, S36, CC Act)
- Low credibility – most targets have been missed. In other sectors they are being dropped.



# Despite this experience, targets are getting tighter: the Climate Change Act

- 80% reduction in ghg emissions by 2050
- 34% reductions on 1990 levels by 2020
- Targets legally binding – but no plan until summer
- SoS has a duty to introduce policies to meet the targets; no duty to balance this against liberalisation



# But there are no effective policies to meet climate change targets

- Government track record on climate change targets poor – UK CO<sub>2</sub> emissions fell over 20% from 1970 - 1997 but have since stabilised, despite Labour's 20% target
- Favourable trends of past have run their course – dash to gas in homes and power; nuclear expansion; de-industrialisation; reduction in non CO<sub>2</sub> gases.
- To meet Climate Change Act targets, very aggressive - and effective - measures will be needed. But government is reinforcing failure.





# Electricity is the most practical technical and political route to reductions

- Electricity can be made from any energy source (often only effective route eg for many renewables, nuclear)
- Electricity can substitute for any energy source (in the long run, even personal transport)
- Changes can be made upstream (c 30 sites account for 30% of UK emissions); behaviour changes not needed
- Limited trade – “competitiveness” lobbying less acute
- Low price elasticity – limits distortions and substitution



## Electricity offers “low hanging fruit” - swift and substantial emissions reductions

- 1990 – 1999: UK – down c 50 MtCO<sub>2</sub> (10% of UK total)
- 1979 – 1987: France – down c 100 MtCO<sub>2</sub> (20% of French total)
- 1979 – 1983: Sweden – down c 20 Mt CO<sub>2</sub> (25% of Swedish total)

Only comparable reductions due to industrial collapse – eg FSU – or war (Source: IEA CO<sub>2</sub> Emissions from Fuel Combustion 2008).



# Electricity can lead to a genuine low emissions economy

(Source: IEA CO<sub>2</sub> Emissions from Fuel Combustion 2008)



| Country     | tCO <sub>2</sub> /head | tCO <sub>2</sub> /head electricity | tCO <sub>2</sub> /head transport | tCO <sub>2</sub> /head residential |
|-------------|------------------------|------------------------------------|----------------------------------|------------------------------------|
| Denmark     | 10.2                   | 5.1                                | 2.4                              | 0.6                                |
| France      | 6.0                    | 0.8                                | 2.1                              | 1.0                                |
| Germany     | 10.0                   | 4.2                                | 1.9                              | 1.5                                |
| Netherlands | 10.9                   | 3.3                                | 2.2                              | 1.1                                |
| Sweden      | 5.3                    | 1.0                                | 2.5                              | 0.1                                |
| UK          | 8.9                    | 3.4                                | 2.2                              | 1.2                                |
| <b>US</b>   | <b>19.0</b>            | <b>8.1</b>                         | <b>5.1</b>                       | <b>1.0</b>                         |



# We know what we need to do

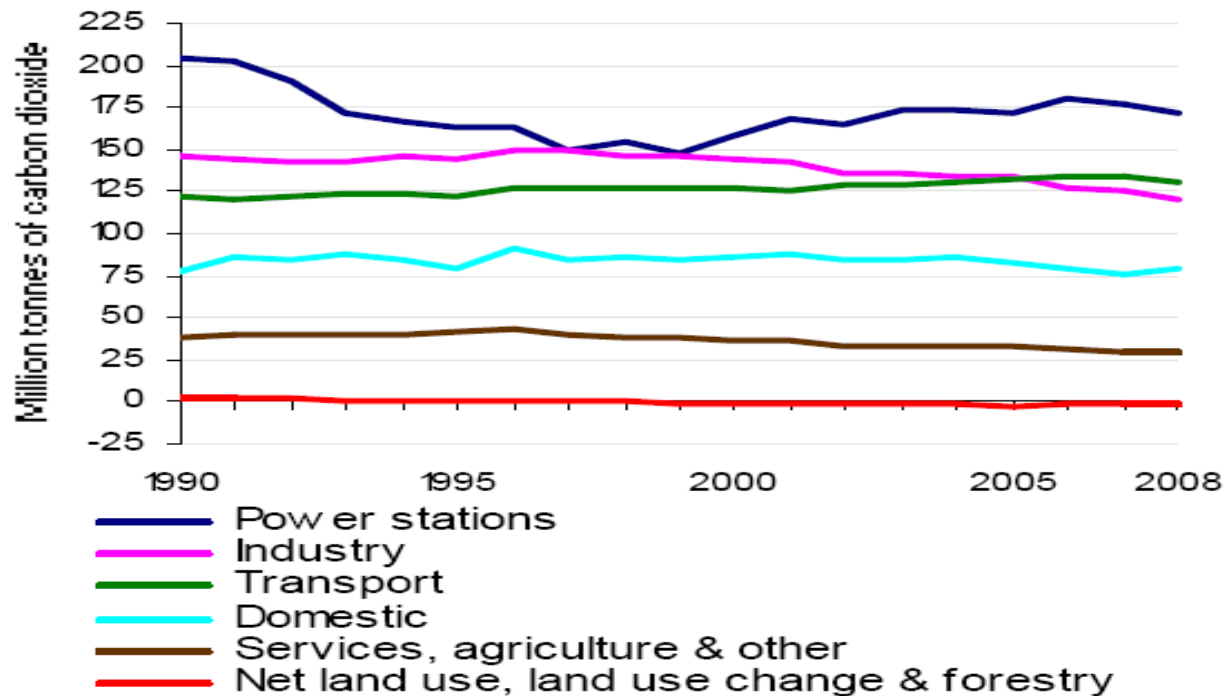
“Any feasible path to a 80% reduction by 2050 will require the almost total decarbonisation of electricity generation by 2030”

(Climate Change Committee *Building a Low Carbon Economy* 2008)



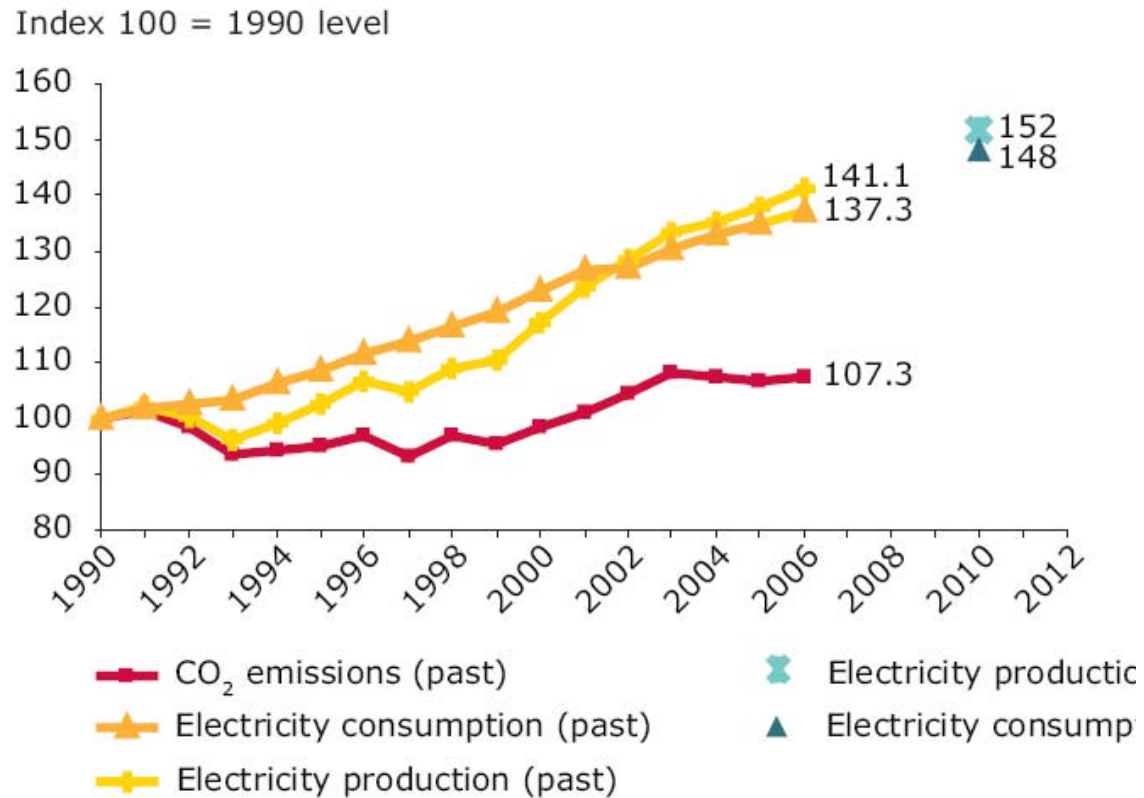
# But we are not doing it in the UK

### Chart 3: CO<sub>2</sub> emissions by source





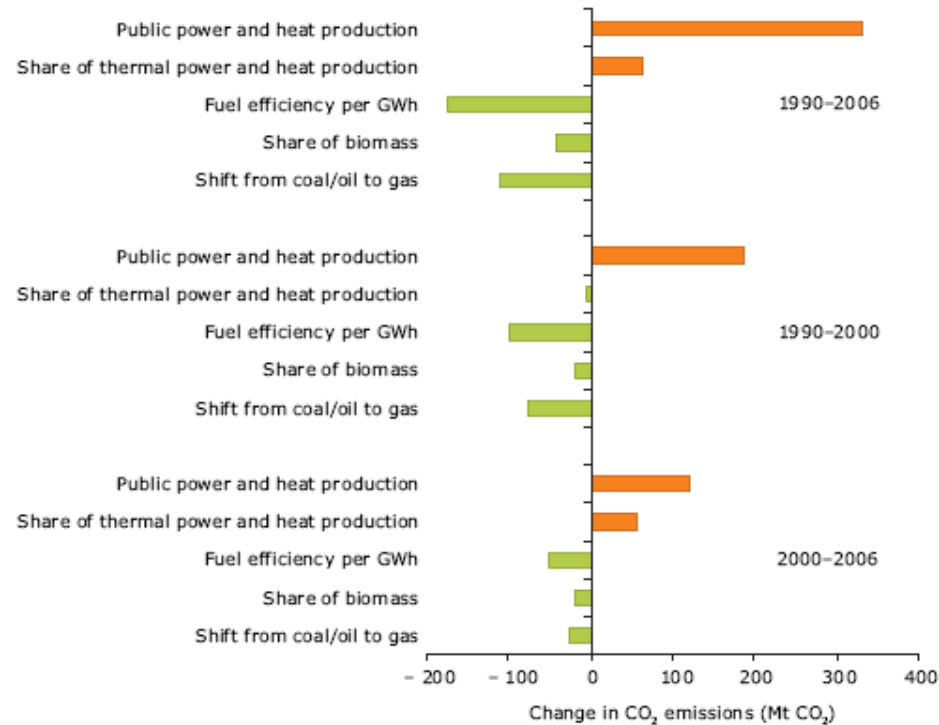
# .... or in Europe





# There has been a slight shift to fossil fuels in Europe

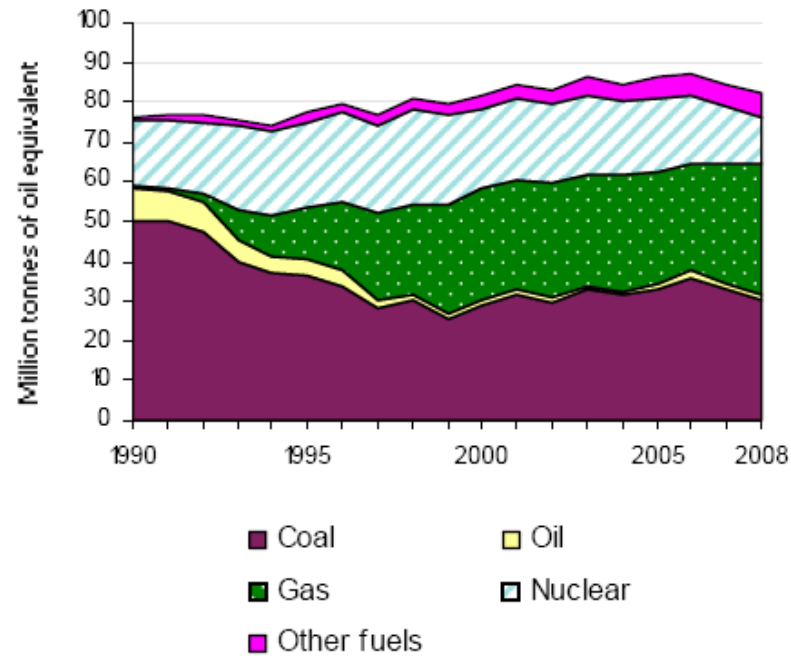
Figure 4.5 Decomposition analysis of the main factors influencing the CO<sub>2</sub> emissions from public electricity and heat production (1990–2006)





# ...and in the UK

Chart 4: Fuel used in electricity generation







# Why? Policies that do not reflect market dynamics

- Other things are **not** equal following an intervention
- Risk shift to producers changes behaviour – investment is about risk reduction in competitive context
- Uncertainty (particularly over environmental regulation) gives waiting an option value
- So interventions do not produce the expected results





# What policies has the government got?

- Carbon prices
- Renewables support
- CCS support
- Energy efficiency
- Nuclear (wanted but not – yet – supported)



# Carbon prices – general issues

- ETS price signals too volatile, too political, too short-lived to drive investment.
- No way of making a long term cap or price guarantee credible
- ETS in tension with other targets – eg renewables, energy efficiency.





# Can prices drive the necessary investment?

- €40 or higher common estimate of price needed on a stable basis for nuclear; first CCS plant probably higher
- But “nuclear will not go ahead” if it is left to price signals - of c €40 in 2020 (Climate Change Committee)
- Government estimate (at higher fossil fuel prices) €25 - now equivalent to around €40 - needed
- Current price: <€20 - and prospect of continuing uncertainty



# European Climate Package – December 2008

- Restrictions on tradability
- Less auctioning
- More imports of CDMs
- Banking over whole period
- Free offsets for “carbon leakage”
- Restrictions on renewables trading
- Generally anti-efficiency – leads to volatility and uncertainty





# Renewables target

- Previous targets all missed
- Original 20% target over-ambitious
- New EU target implies c 35% renewables in electricity
- It will be missed – but what distortions will be caused en route?
- New instruments needed; more support given
- Electricity pricing, investment and system integration issues



# The (theoretical) impact of the renewables target: generation investment (£bn) <sup>(\$KM)</sup>

| Plant type      | BAU         | Renewables scenario |
|-----------------|-------------|---------------------|
| Coal            | 3.9         | 3.9                 |
| CCGT            | 7.5         | 4.5                 |
| Nuclear         | 3.5         | 3.9                 |
| <b>Subtotal</b> | <b>14.9</b> | <b>12.3</b>         |
|                 |             |                     |
| Onshore wind    | 0.4         | 8.5                 |
| Offshore wind   | 0.9         | 45.8                |
| Biomass         | 0.0         | 4.9                 |
| Other           | 1.0         | 1.0                 |
| <b>Subtotal</b> | <b>2.3</b>  | <b>60.2</b>         |
|                 |             |                     |
| <b>TOTAL</b>    | <b>17.2</b> | <b>72.5</b>         |



# Total system costs

(SKM)

| Cost category                       | BAU         | Renewables scenario |
|-------------------------------------|-------------|---------------------|
| Generation investment (£bn)         | 17.2        | 72.5                |
| Network reinforcement (£bn)         | 0.9         | 12.6                |
|                                     |             |                     |
| Marginal cost of generation (£/MWh) | 35.9        | 22.6                |
| Total cost of generation            | 46.8        | 52.6                |
| Grid and balancing                  | 1.8         | 11.3                |
|                                     |             |                     |
| <b>TOTAL (£/Mwh)</b>                | <b>48.6</b> | <b>63.9</b>         |
|                                     |             |                     |





| Plant type        | 2008 GW     | 2008<br>% generation | 2020 GW      | 2020<br>% generation |
|-------------------|-------------|----------------------|--------------|----------------------|
| Coal              | 29.4        | 34                   | 21.9         | 16.8                 |
| Gas               | 29.4        | 42                   | 27.8         | 23.2                 |
| Nuclear           | 10.6        | 15                   | 6.0          | 11.4                 |
| Inter-connector   | 2.0         | 2                    | 3.3          | 6.4                  |
| Other             | 9.6         | 2                    | 6.8          | 1.5                  |
| <b>Subtotal</b>   | <b>80.9</b> | <b>95</b>            | <b>65.8</b>  | <b>59</b>            |
| Onshore wind      | 3.5         | 2.5                  | 12.9         | 8.4                  |
| Offshore wind     | 0.2         | 0.05                 | 25.7         | 24.2                 |
| Biomass           | 0.2         | 0.08                 | 2.9          | 7.0                  |
| Other             | 2.2         | 2.4                  | 2.3          | 0.9                  |
| <b>Renewables</b> | <b>6.1</b>  | <b>5</b>             | <b>43.8</b>  | <b>41</b>            |
| <b>TOTAL</b>      | <b>87.1</b> |                      | <b>109.6</b> |                      |



# Nuclear vs renewables



“It is very unlikely that current electricity market arrangements would result in planned investment both in renewables at the levels envisaged.... and in new nuclear before 2020....If it becomes apparent that renewables investment ... is not feasible ....the result would be more investment in gas-fired plant.”

(Climate Change Committee)



# Carbon capture

- CCS needed for new coal (but only 25%)
- Support – via levy?
- Details in the summer
- Once it is viable (by 2020?) all plants will have to retrofit. What about gas?
- CCS would compete with nuclear if viable – more publicly acceptable, more flexible, quicker, may be cheaper



# Nuclear: the timing problem

- Government has renewables targets for 2020
- CCS “expected” to be retrofitted in five years from 2020
- 20% energy efficiency target for 2020
- Climate Change Act targets probably enforceable; duty on SoS to introduce policies to meet them
- How does nuclear fit in to this timetable?




# Interventions vs market dynamics

- Renewables: expensive, implausible and distorting – add to risk
- Nuclear: in public interest – but no subsidies and highly risky
- Taxes/trading: volatility and uncertainty discourage clean investment
- CCS: creates uncertainty over future requirements and viability of fossil plant
- Energy efficiency: no evidence of effective policy-making



# Commitment to liberalisation




Ed Miliband: “Sustainability, security and affordability are all challenges which the market alone cannot be guaranteed to solve”

Harriet Harman: “The energy companies must pass on the price cuts to consumers ....And, if they don't .... we will change the law to force them to do it.”

Climate Change Act targets probably enforceable; duty on SoS to introduce policies to meet them not overridden by commitment to markets



# Death by a thousand regulations

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- Government legally constrained by climate change targets.
  - Its main instrument will have to be changes in electricity generation.
  - Government is throwing a battery of measures at a complex system without much idea of the result. But it needs one.
  - Liberalisation will end – not with a bang but a whimper, as new measures are added.