Electricity Policy Research Group

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UK energy policy

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SWCHS A-level economics conference

Saffron Walden 1 December 2010

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Why intervene in energy markets?

- Market failures
  - Externalities
  - infrastructures often natural monopolies
- to ensure energy security
- for distributional reasons

The question is how best to intervene

Summary

- Externalities need a systematic approach
  - standards or prices?
  - climate change – carbon tax or cap-and-trade?
  - Who should pay?
- Infrastructure – regulate!
- Security of supply
  - no obvious market failures in supply
  - but politicians may require additional resilience
- Distribution best left to public expenditure

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Energy Policy 1982-93

'Our task is rather to set a framework which will ensure that the market operates in the energy sector with a minimum of distortion ..'

(Lawson, speech to IAEE, 1982)

'Competitive markets provide the best means of ensuring that the nation has access to secure, diverse and sustainable supplies of energy in the forms that people and businesses want, and at competitive prices.'

(DTI, 1993, *Prospects for Coal*)

Conservative energy policy

- Liberalise and privatise: oil, gas, electricity
- Market-based instruments for externalities
  - Fossil Fuel Levy
- 1990 *This Common Inheritance*
  - reduce CO_2 to 1990 levels by 2005
  - road fuel excises increase by 5% real p.a.

'Dash for gas' assists CO_2 target

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Energy Policy post-1997
More objectives, less coherence

- Protect the environment *and* equity
- Protect coal *and* reduce CO_2 emissions
- Avoid explicit tax increases *but* pass on environmental costs (e.g. for renewables)
- Allow road pricing *but* keep road taxes
- Retain independent regulators *but* increase ministerial 'guidance' - *Utilities Act* 2000

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Labour energy policy

- VAT cut from 8% to 5% despite Rio/Kyoto
- Petrol tax escalator retained at 5% real because of Kyoto
  - abandoned after 2000 oil price protests
- Carbon tax rejected in favour of Climate Change Levy
  - to exempt domestic consumers, protect coal

Contradictions ⇒ Royal Commission ⇒ *Energy Review*

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UK Energy policy

'securing cheap, reliable, and sustainable sources of energy supply has long been a major concern for governments' (Tony Blair, 2002)

choose any two of the three?

'ensure our energy is secure, affordable and efficient' and 'bring about a transition to a low-carbon Britain' (DECC web site, 2009)

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Evolving energy policy

Energy White Paper 2003

- Dodged the nuclear question
- little sense of urgency or direction

Meeting the Energy Challenge 2008

  – accepts case for nuclear power

Committee on Climate Change 2008

  – legally binding carbon targets

- DECC *UK Low carbon transition plan 2009*

DECC's energy policy

- to cut the UK's CO_2 emissions by 80% by 2050
- to maintain reliability of energy supplies
- to promote competitive markets at home and abroad to raise growth rate
- to ensure every home is adequately and affordably heated

2020 Targets: 30+% renewable electricity, smart meters, 4 demo CCS plants,...

Sustainability and externalities

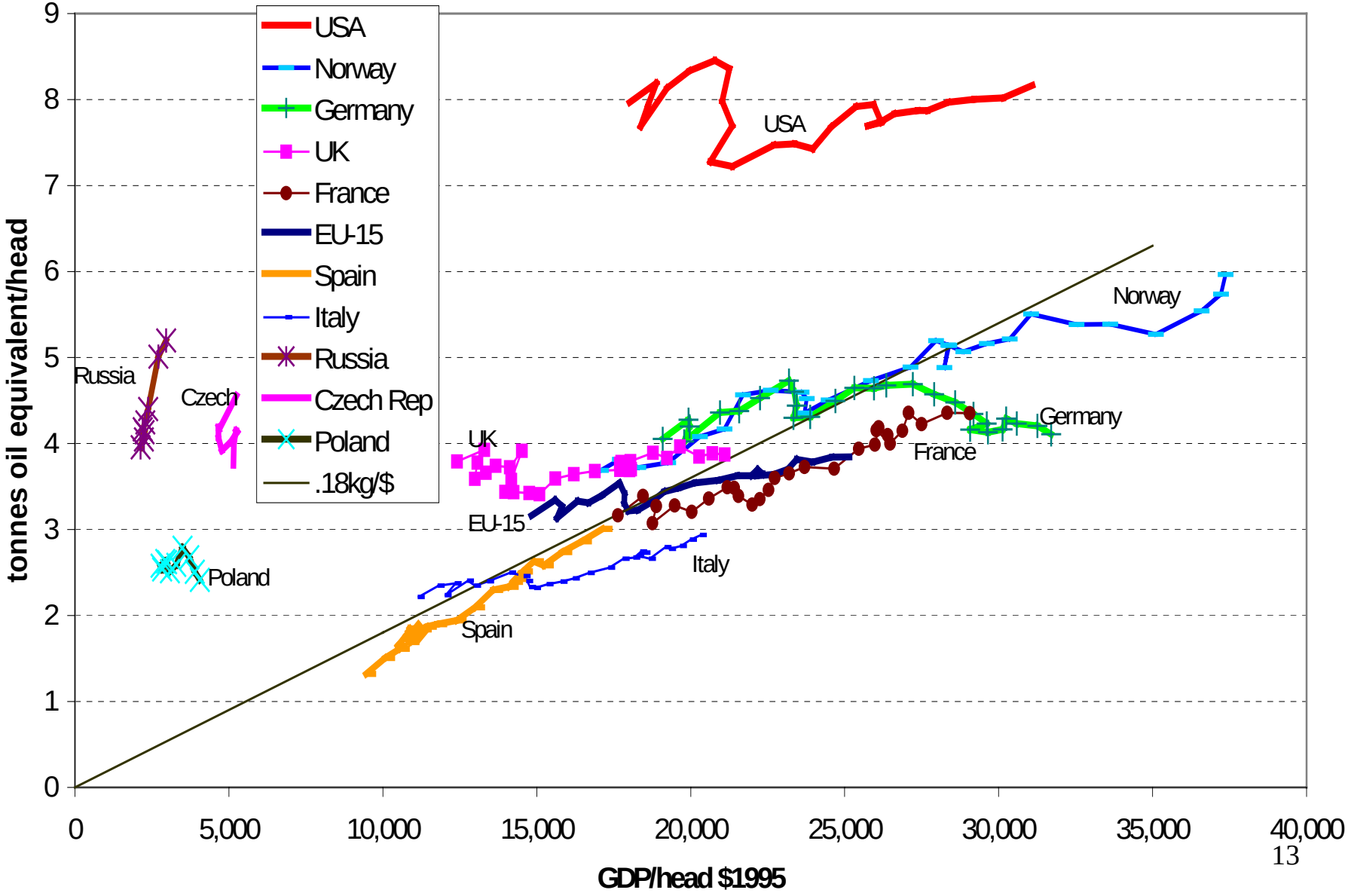
"***users pay the full social and environmental cost*** of their transport decisions, so improving the overall efficiency ... and bringing environmental benefits"
Sustainable Development: the UK Strategy (1994)

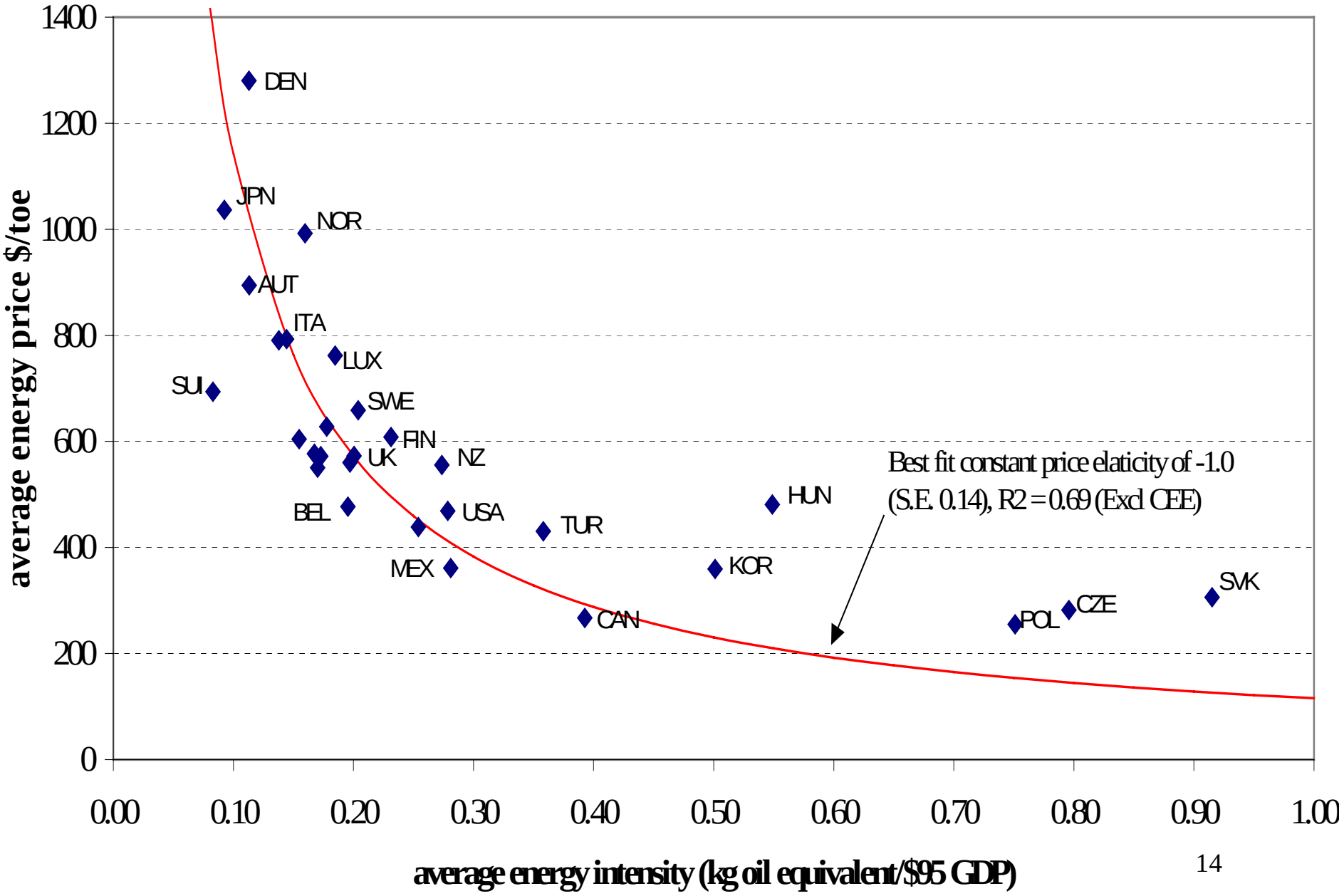
Charging full social and environmental costs

- Can the damage be quantified?
  - easier for flow than stock pollutants (like CO_2)
- Can it be monitored and charged?
  - easier for large sources
- How responsive is pollution to price?
  - the more responsive the less the conflict between equity and efficiency

Energy demand responds to income and price

Energy use/hd vs GDP/hd 1972-99




1400
1200
1000
800
600
400
200
0
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
average energy price $/toe
average energy intensity (kg oil equivalent/$95 GDP)
DEN
JPN
NOR
AUT
ITA
LUX
SUI
SWE
FIN
UK
NZ
BEL
USA
TUR
HUN
MEX
KOR
CAN
SVK
CZE
POL
Best fit constant price elaticity of -1.0
(S.E. 0.14), R2 = 0.69 (Excl CEE)

Policy towards energy externalities

- EU LCP Directive for SO_2 and NO_x

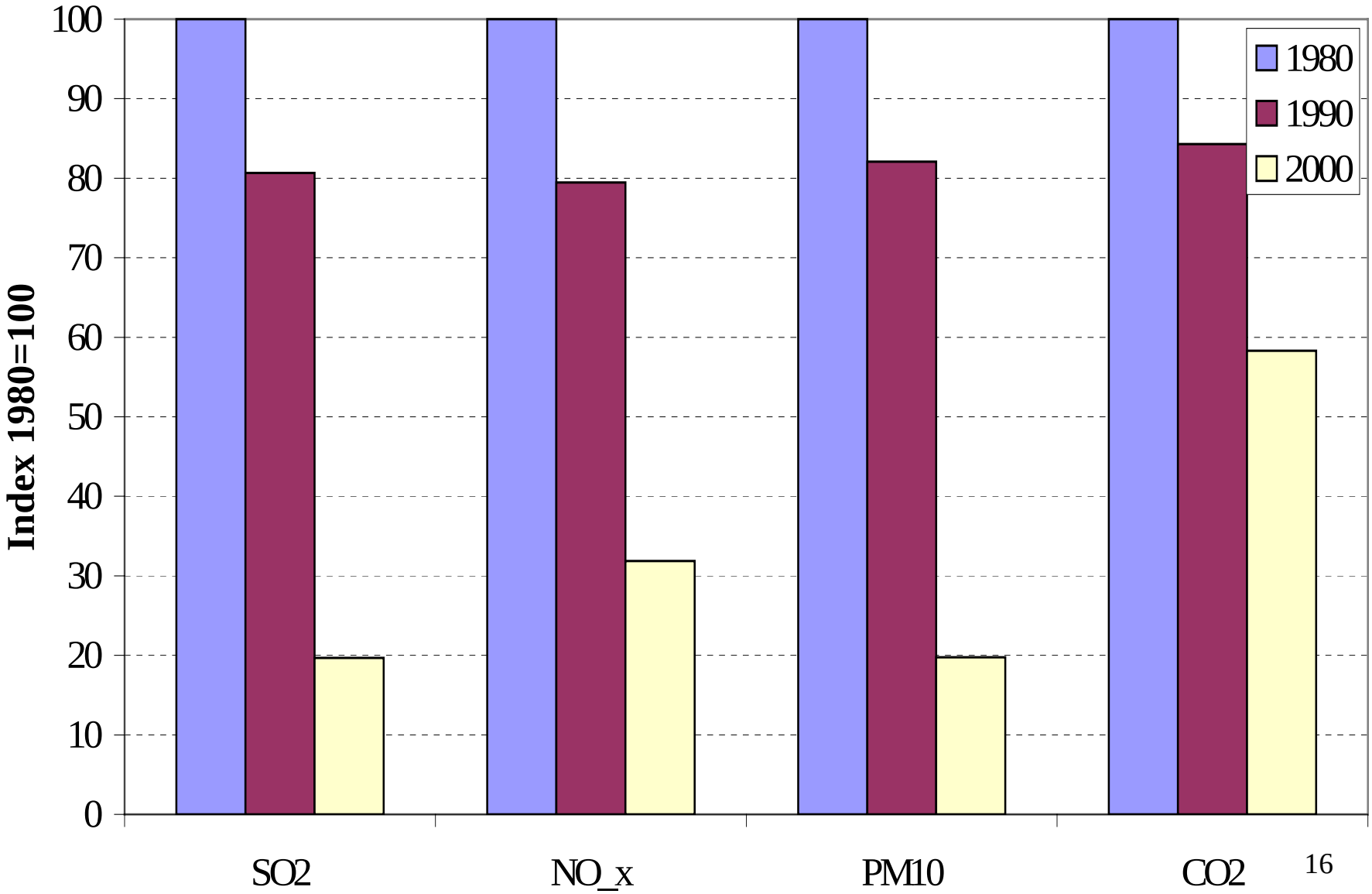
$\Rightarrow$ dramatic reductions driven by standards

$\Rightarrow$ driven by ecologists, helped by gas

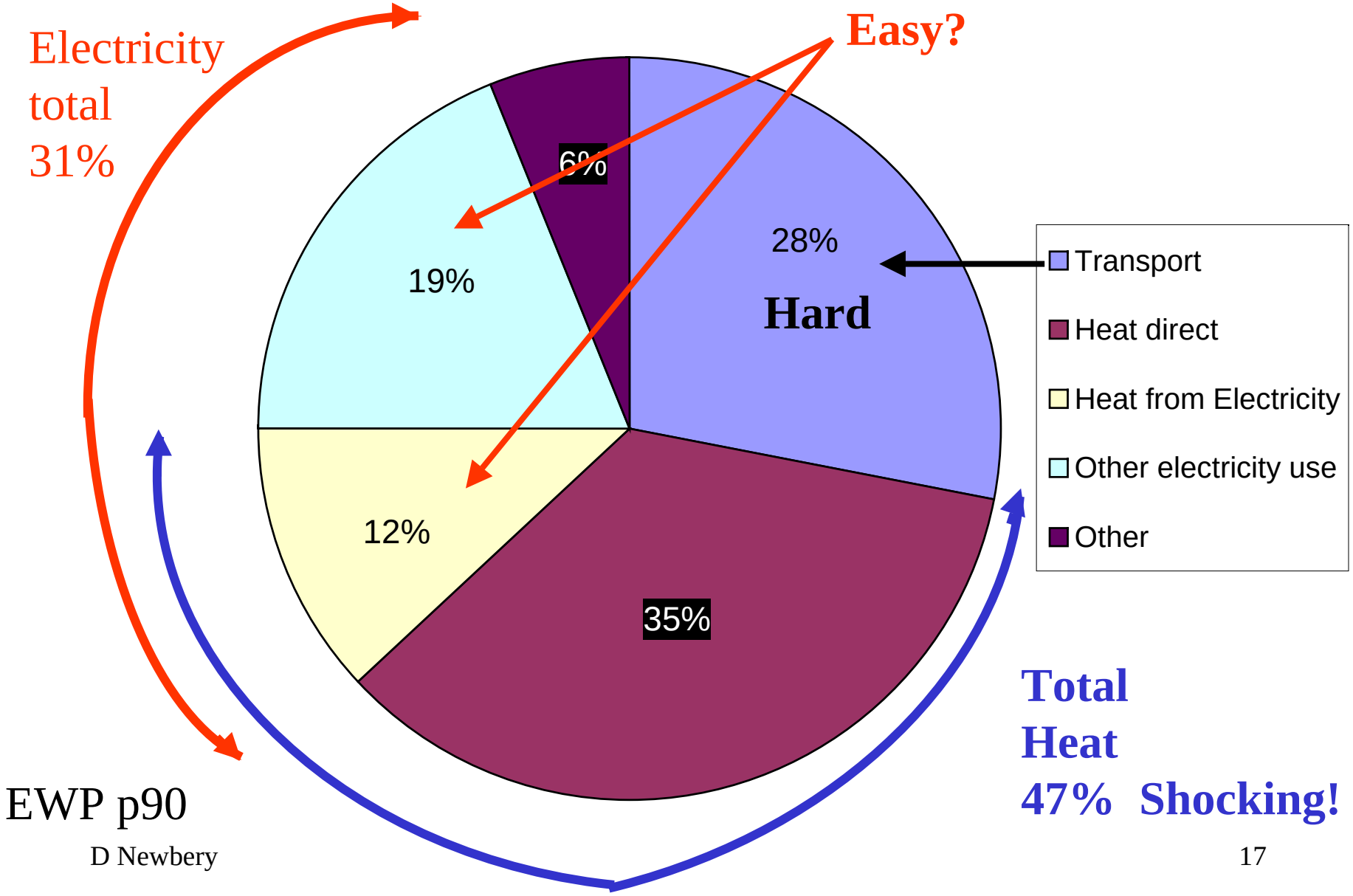
- CO_2 reductions
  - in electricity driven by gas
  - in transport by more efficient cars, higher fuel taxes

Taxes and standards have significant effects

Pollutants per kWh UK 1980-2000

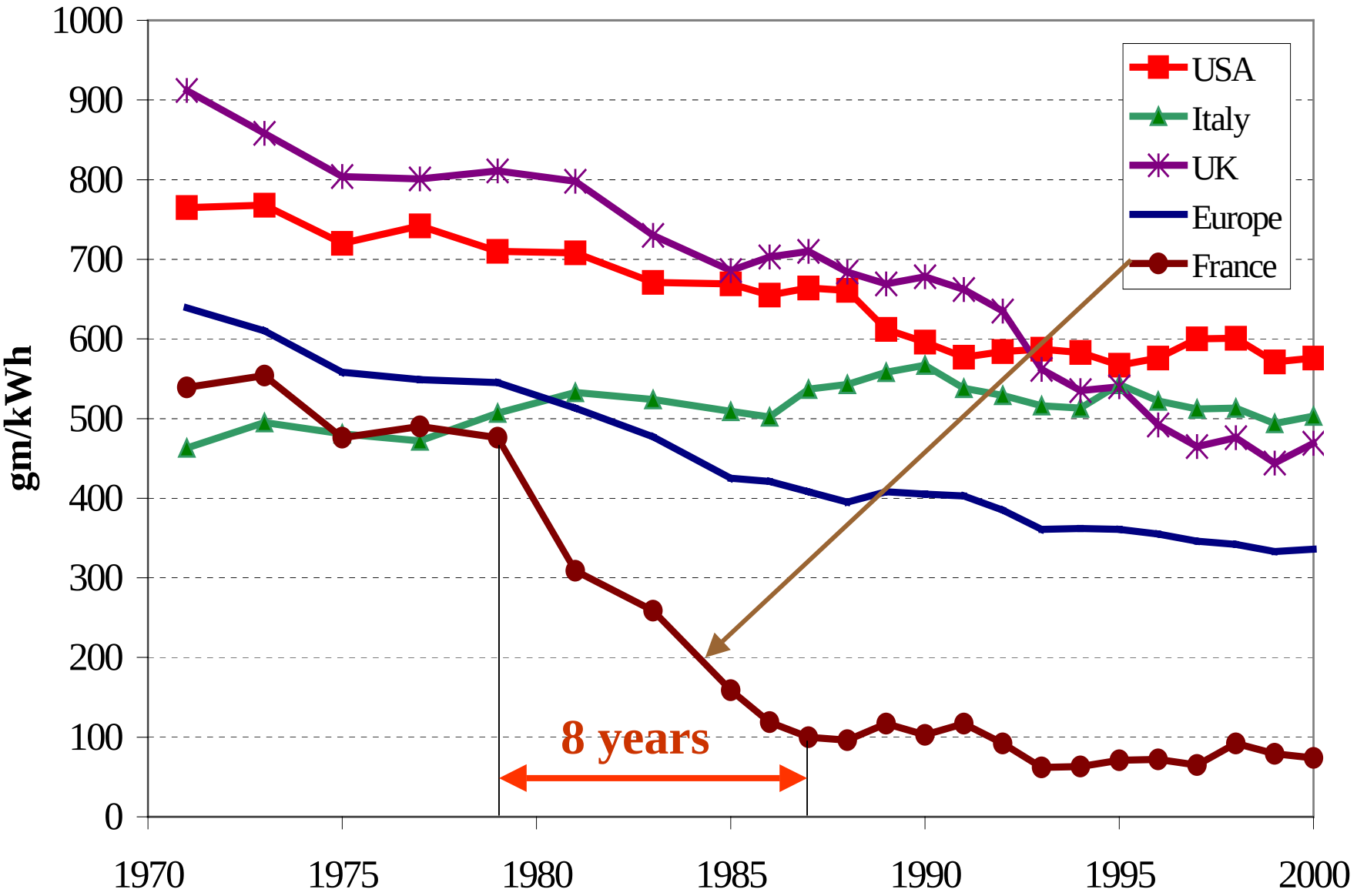


CO2 emissions by sector 2005



EWP p90

CO2 emissions per kWh 1971-2000



Pricing externalities

- US introduces cap-and-trade for SO_2
  - issue permits, set cap - decreasing each year

$\Rightarrow$ permit market sets price for SO_2

$\Rightarrow$ encourages least cost solution

$\Rightarrow$ cheaper options: low-S coal, price of FGD falls

- EU persuaded to limit CO_2 by emissions trading

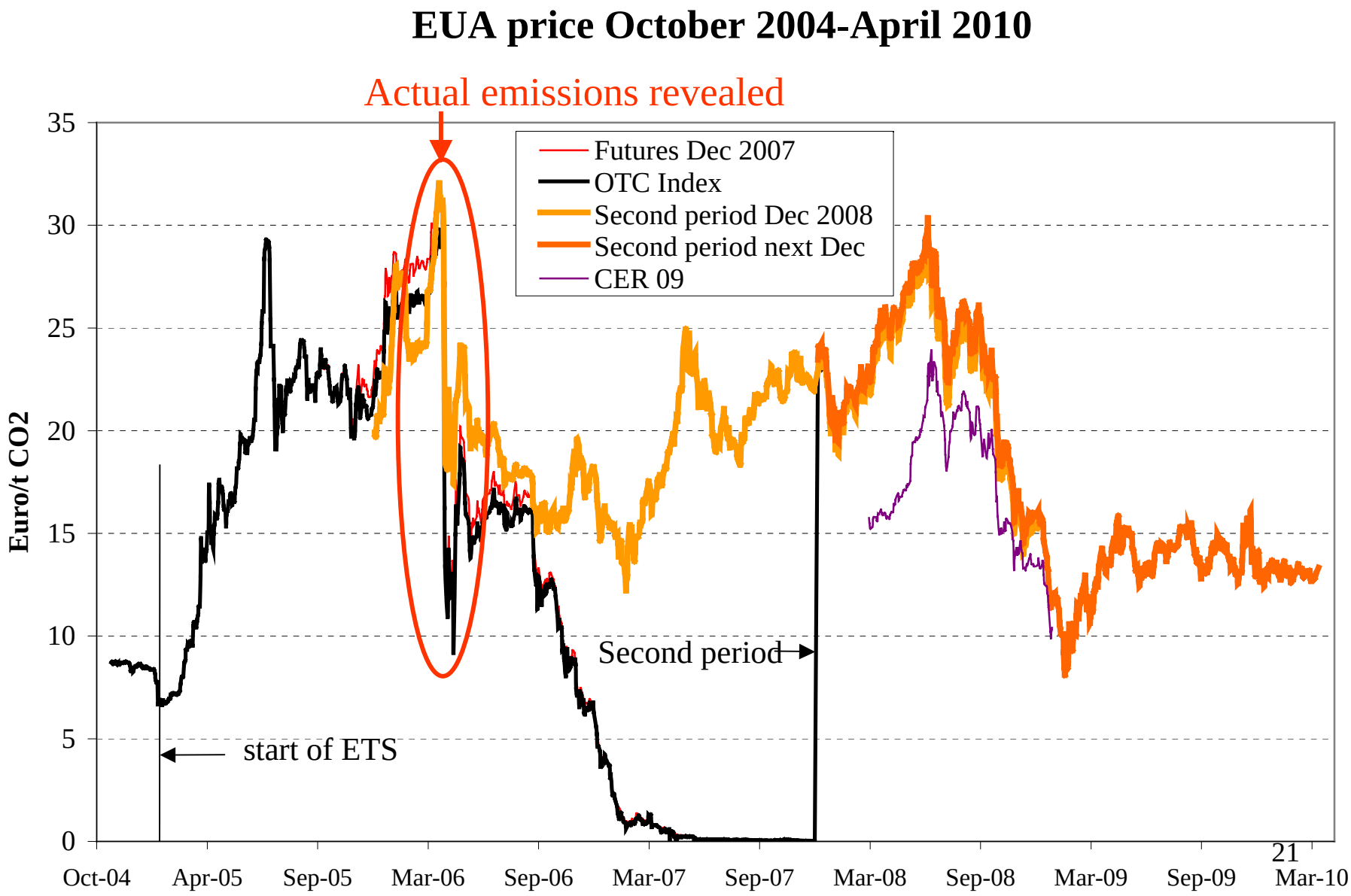
Prices cheaper than standards

Table 1 **Emissions per MWh and costs**

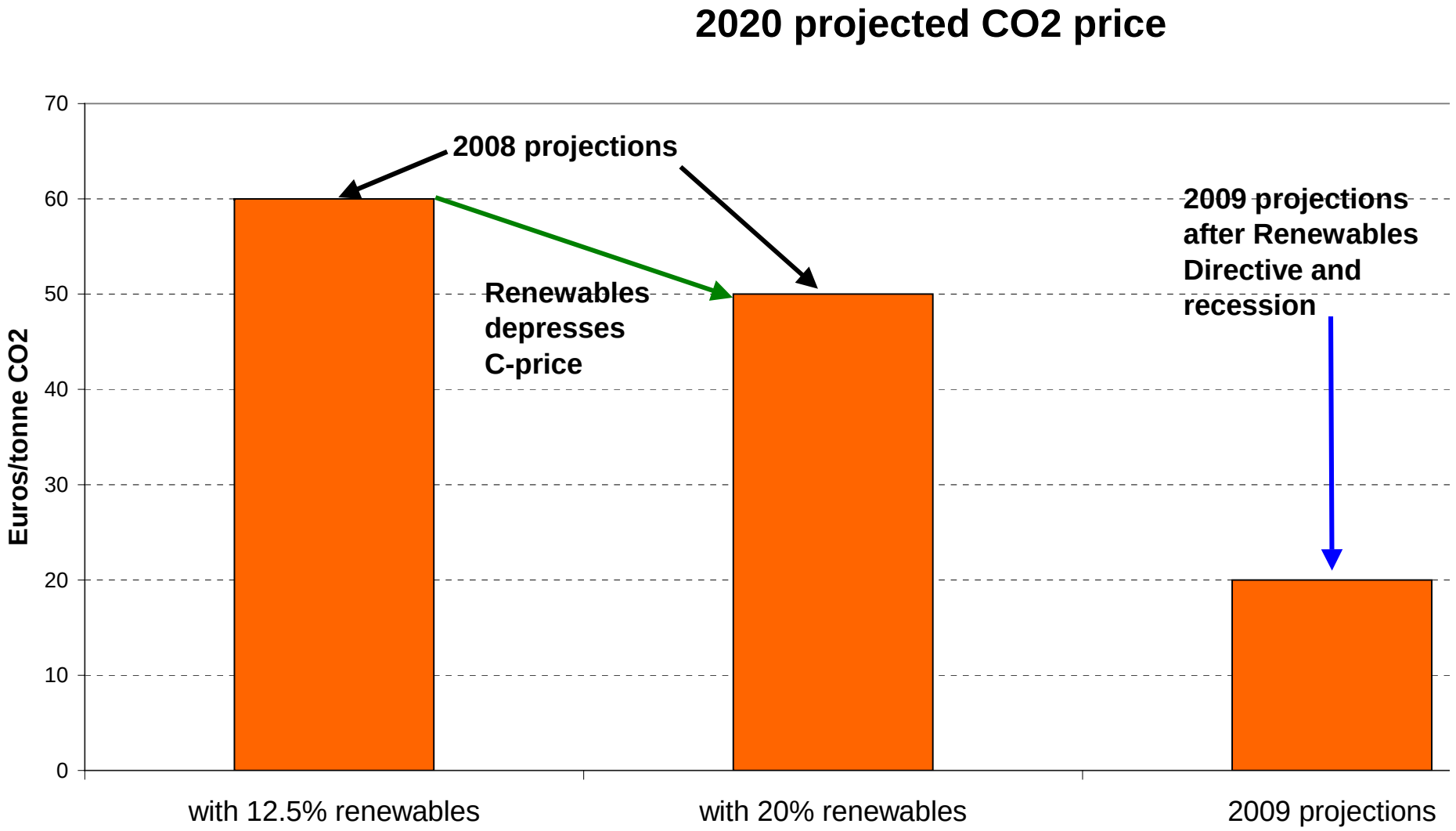
		coal	coal FGD	oil	CCGT
C	*kg/MWh*	250	230	285	85
S	*kg/MWh*	2.6	0.7	3.2	0
NOx	*kg/MWh*	3.5	2.6	3.7	0.3
PM10	*kg/MWh*	0.1	0.05	0.05	0
	$/kg				*$/MWh*
C	0.05	12.5	11.5	14.25	4.25
S	4	10.4	2.8	12.8	0
NOx	4	14	10.4	14.8	1.2
PM10	6	0.6	0.3	0.3	0
Total		37.5	25.0	42.2	5.5

= $50/tC = € 12/EUA of 1 tonne CO_2

CO_2 prices are volatile and now too low



Renewables directive lowers C price



Source: Committee on Climate Change, 2008 and 2009

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Failures of ETS

- Current ETS sets quota of total EU emissions
- Renewables Directive increases RES

  => increased RES does not reduce CO_2

  => reduces price of EUA

  => prejudices other low-C generation like nuclear
- Risks undermining support for RES

Solved by fixing EUA price instead of quota

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Natural monopolies

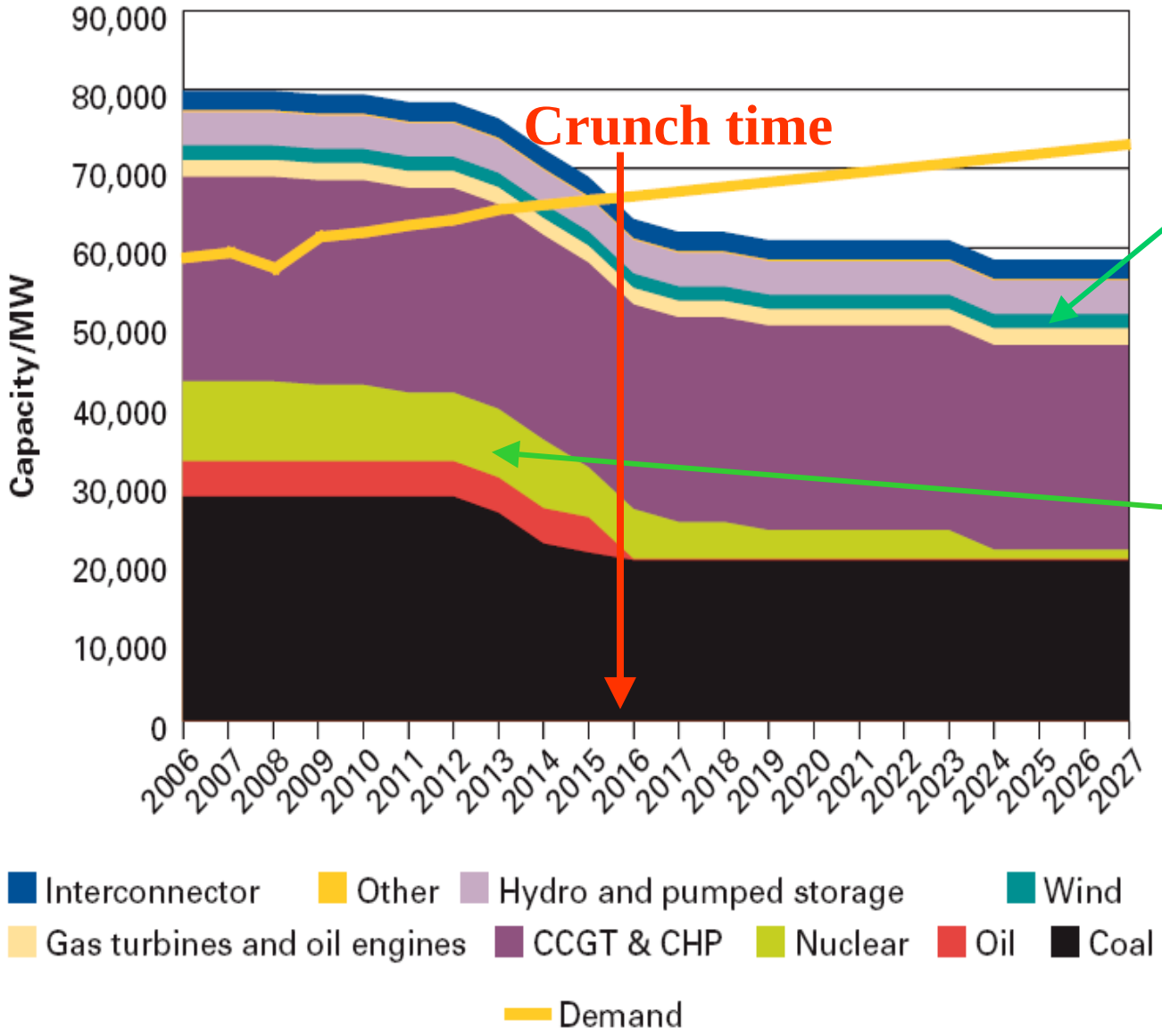
- National Grid and Distribution companies are natural monopolies
  - have huge market power => risks market failure
- regulator sets price caps
  - monopolies cannot exercise market power
- Need huge investment in wires

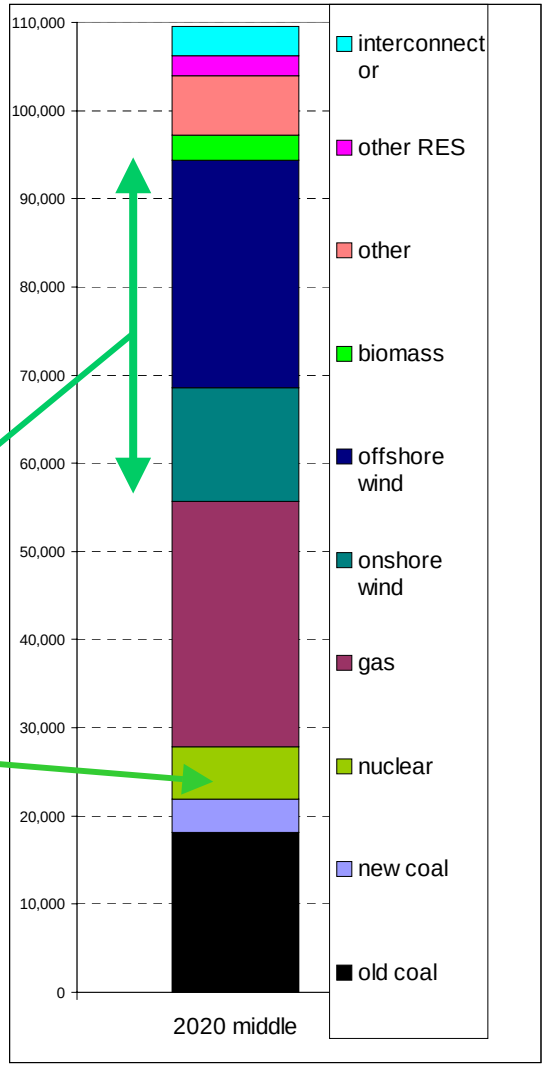
=> regulator approves investment

=> utilities invest and charge consumers

Good regulation solves market failure

Development of GB generating capacity





SKM (2008) mid-scenario 2020 projection

Source: Digest of UK Energy Statistics/DECC

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Security

- Will the lights stay on?

=> will there be timely investment?

- Investment will be delayed if policy is uncertain

=> clarify energy policy as soon as possible

=> reduce unnecessary risk

=> underpin and guarantee the carbon price

Problem is political not market failure

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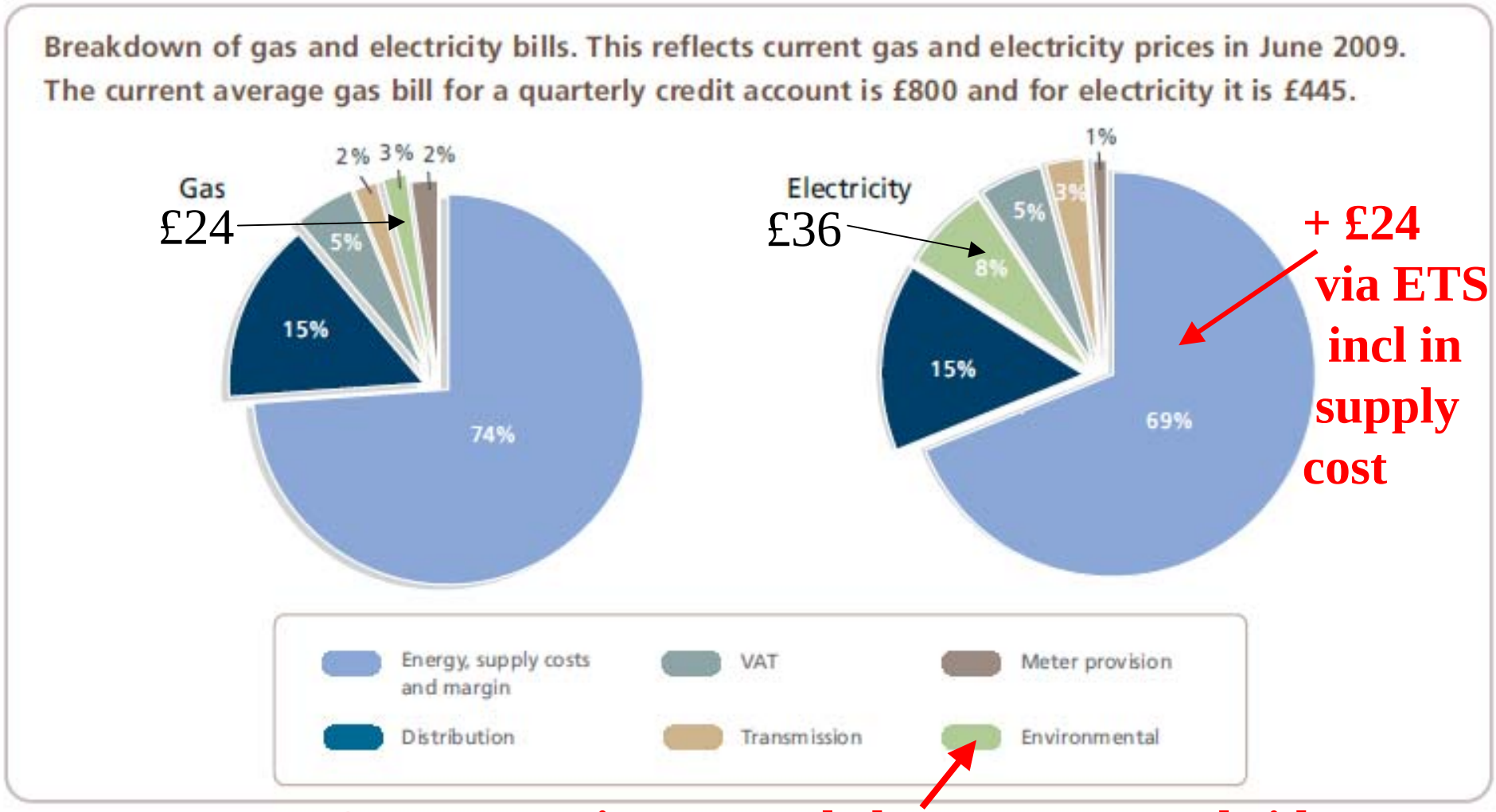
Distributional issues

- Domestic energy pricing is a mess
  - we subsidise domestic fuel by lower VAT

  => inefficient way of alleviating poverty
    - rich benefit more from lower VAT
- Renewables charged to electricity but not gas
  - inefficient tax on business (unlike VAT)
  - mainly justified by public good of saving planet
  - should be financed out of general revenue

removing equity objective simplifies policy

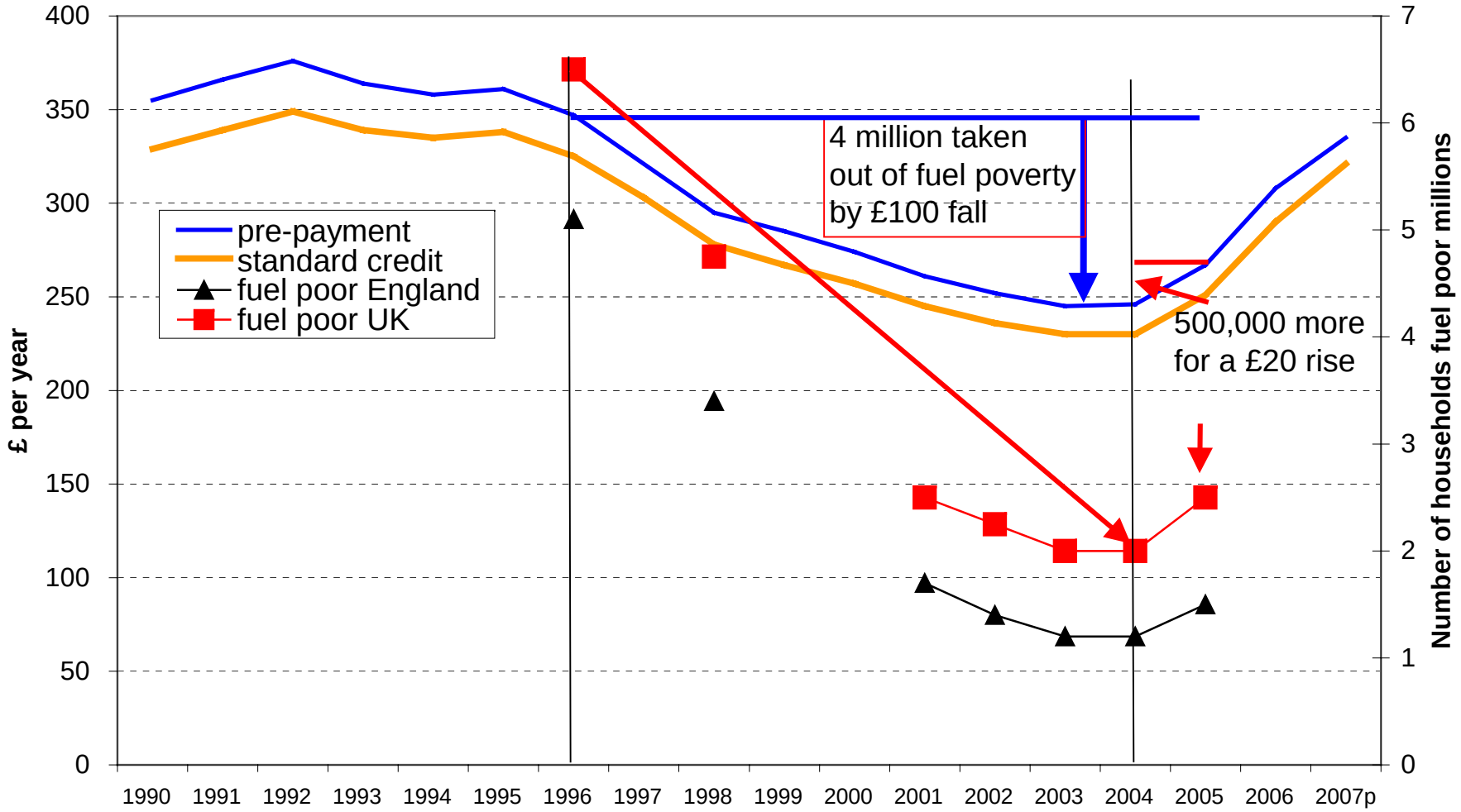
Domestic fuel bill breakdown 2009



Source: Ofgem

Fuel poverty

Annual average domestic standard electricity bill



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Conclusions

- Externalities need systematic approach
  - pollutants: taxes better than standards
  - climate change requires carbon pricing
- Infrastructure requires good regulation
- Security of supply
  - political not market failures
- Address equity via public expenditure
  - concept of fuel poverty not helpful

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Acronyms

CCS	Carbon capture and storage
EC	European Community
ETS	Emission Trading System
EUA	European Union Allowance = 1 tonne CO_2
FGD	Flue gas desulphurisation - removes SO_2
LCP	Large Combustion Plant
RES	Renewable Electricity/energy Supply