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CAMBRIDGE | Electricity Policy
Research Group



Carbon tax *vs* low-carbon obligations

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EPRG Spring Research Seminar

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Outline

- The long-term challenge of climate change
 - more carbon underground than we should release
- Problems with the EU ETS
 - increased renewables and energy efficiency do not reduce CO₂ but do lower EUA price
- Solutions
 - need a credible rising EUA floor price
 - **Plan B: UK goes it alone: floors, taxes or obligations**

Climate change challenges

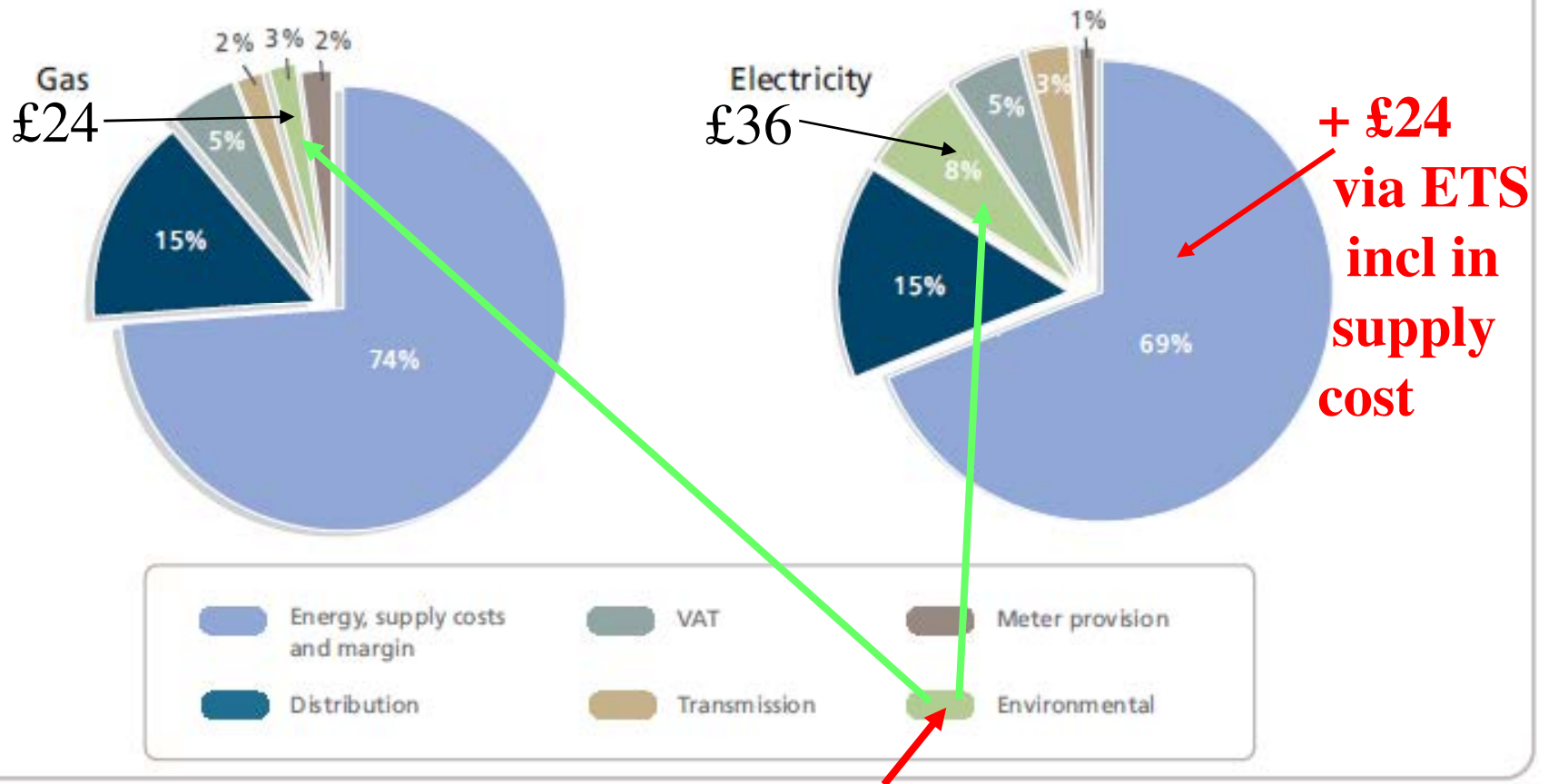
- World should not release all C from fossil fuels
- Climate policy risks depressing fossil fuel prices
 - unless CCS on major scale?
- How best to limit cumulative GHG release?
 - Limits on annual emissions **or scarcity GHG price related to remaining absorptive capacity?**
- EU CO₂ pricing depresses fossil fuel prices
 - rebound elsewhere?
- Strengthens case for border tax adjustment

Climate change instruments

- EU Instruments: ETS and 20-20-20 Directive
- UK obligation: 80% GHG reduction by 2050
 - **linear** pathway legally binding under CC Act
 - starts at low % reduction, accelerates later (when harder?)
- UK instruments
 - on producers: ETS (~50% coverage), ROCs
 - on consumers: CCL, CCA, CERT, CESP, Carbon Reduction Commitment (CRC) for large installations outside CCA, ETS - excludes domestic
 - but VAT still at 5% on domestic energy***

Domestic fuel bill breakdown 2009

Breakdown of gas and electricity bills. This reflects current gas and electricity prices in June 2009. The current average gas bill for a quarterly credit account is £800 and for electricity it is £445.

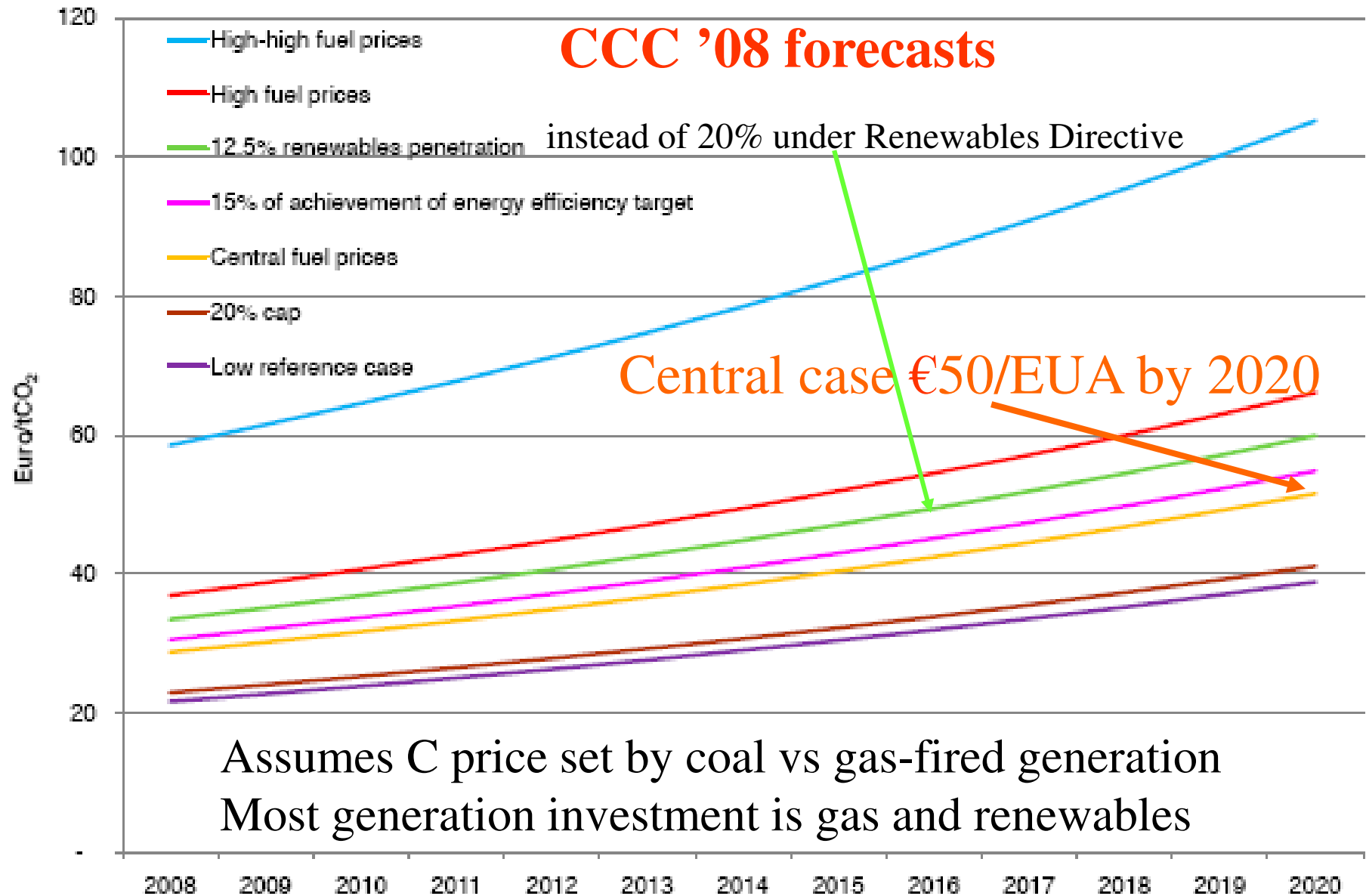


Proportionately nearly 3 times higher on elec than gas

Cost to households

- Current average domestic energy bill **£1245/yr**
- Main programmes
 - EU Emissions trading scheme **£24**
 - Carbon Emissions Reduction Target **£45**
 - Community Energy Savings Programme **£3**
 - Renewables Obligation **£12**
 - Total (annual cost) = **£84**
=7% of total bill
- Subsidy from reduced VAT **(£148)**

Figure 4.8 EU ETS allowance price projections 2008–2020



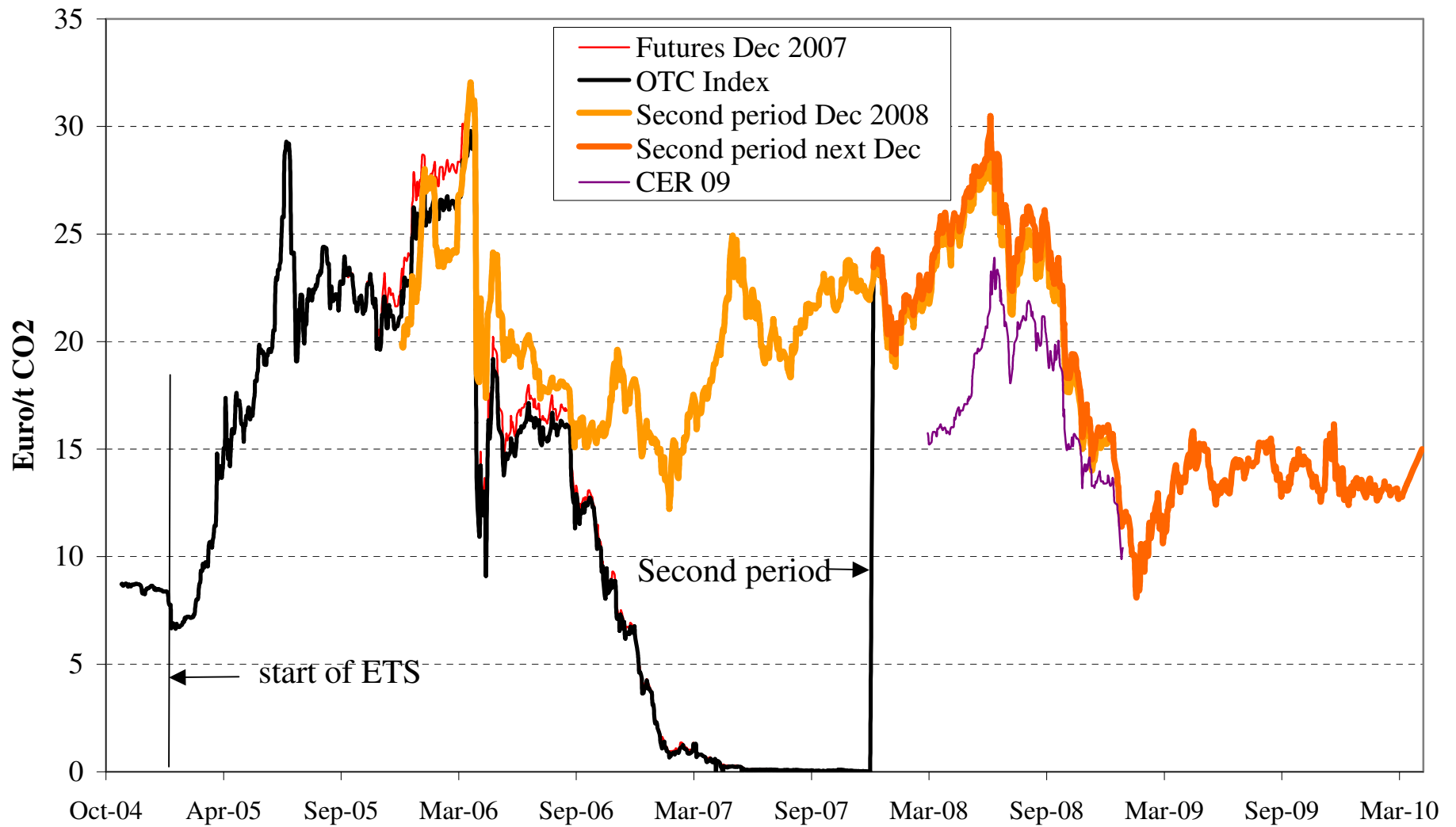
Source: Outputs from DECC EU ETS marginal abatement cost model, based on CCC scenarios
Note: All price projections are based on central fossil fuel price projections except where stated

Changes in CCC 2020 CO₂ forecast

- CCC '08 forecast central case €50/EUA 2020
- CCC '09 forecasts €20/EUA (recession)
 - too low for required low-C investment
- requires action to raise minimum price
 - CCC suggests tightening ETS cap, failing which
 - UK underpins C price, or intervenes in electricity market

ETS does not deliver adequate C price

EUA price October 2004-April 2010



CCC 2009 Report

- 2003-7 GHG emissions fall $< 1\%$ p.a.
- **need to fall 2-3% p.a. (depending on target)**
- recession is masking poor performance and undermining ETS Carbon price
- “significant chance” C price too low to incentivize low-C investment

need to underwrite C price or provide support

UK Energy policy instruments

- Climate Change Levy on consumers
 - is an **energy tax** not a climate levy
 - £1.64/MWh of gas consumed = £8.2/t CO₂
 - £4.7/MWh = £5-12/t CO₂ (**coal vs gas at margin**)
- ROCs: 2009/10 £48/MWh to on-shore wind *plus* elec price of £34 = **£82** (£106/MWh price off-shore)
= £ 3.6/MWh to consumers, £100/t CO₂ “saved” in 2008
2008/9 was £120/MWh onshore, £145/MWh offshore
- Carbon Reduction Commitment (CRC)
 - on non-ETS non-CCA **fuel** consumption
 - 2011 £12/t CO₂ gross; = **+/-£1.2/t CO₂ net**

UK ROC, EUA, and electricity prices, and gas cost

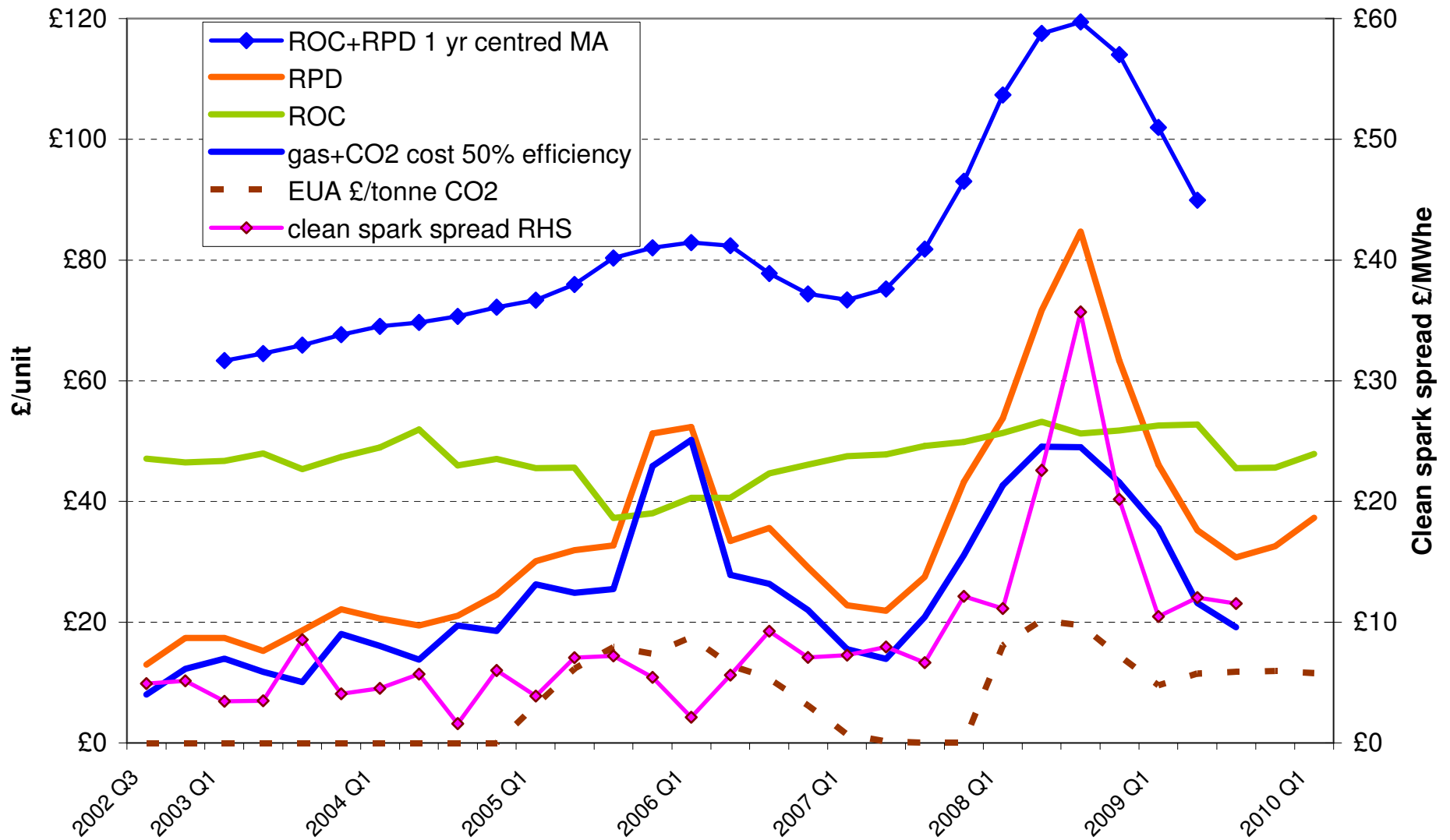
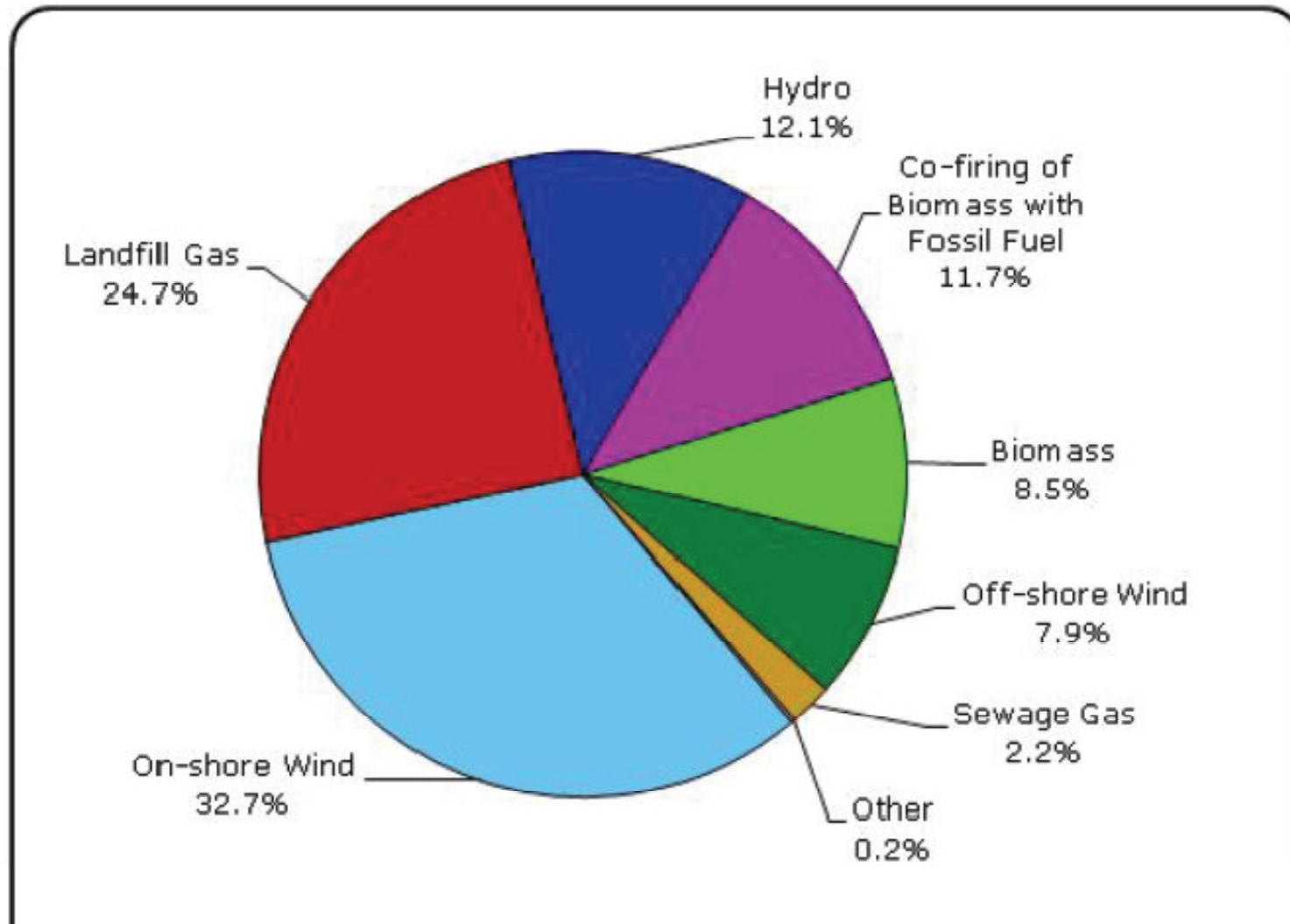


Figure 11: Breakdown of ROCs/SROCs/NIROCs issued in by generation technology^{21,22} 2008/9



Source: Ofgem

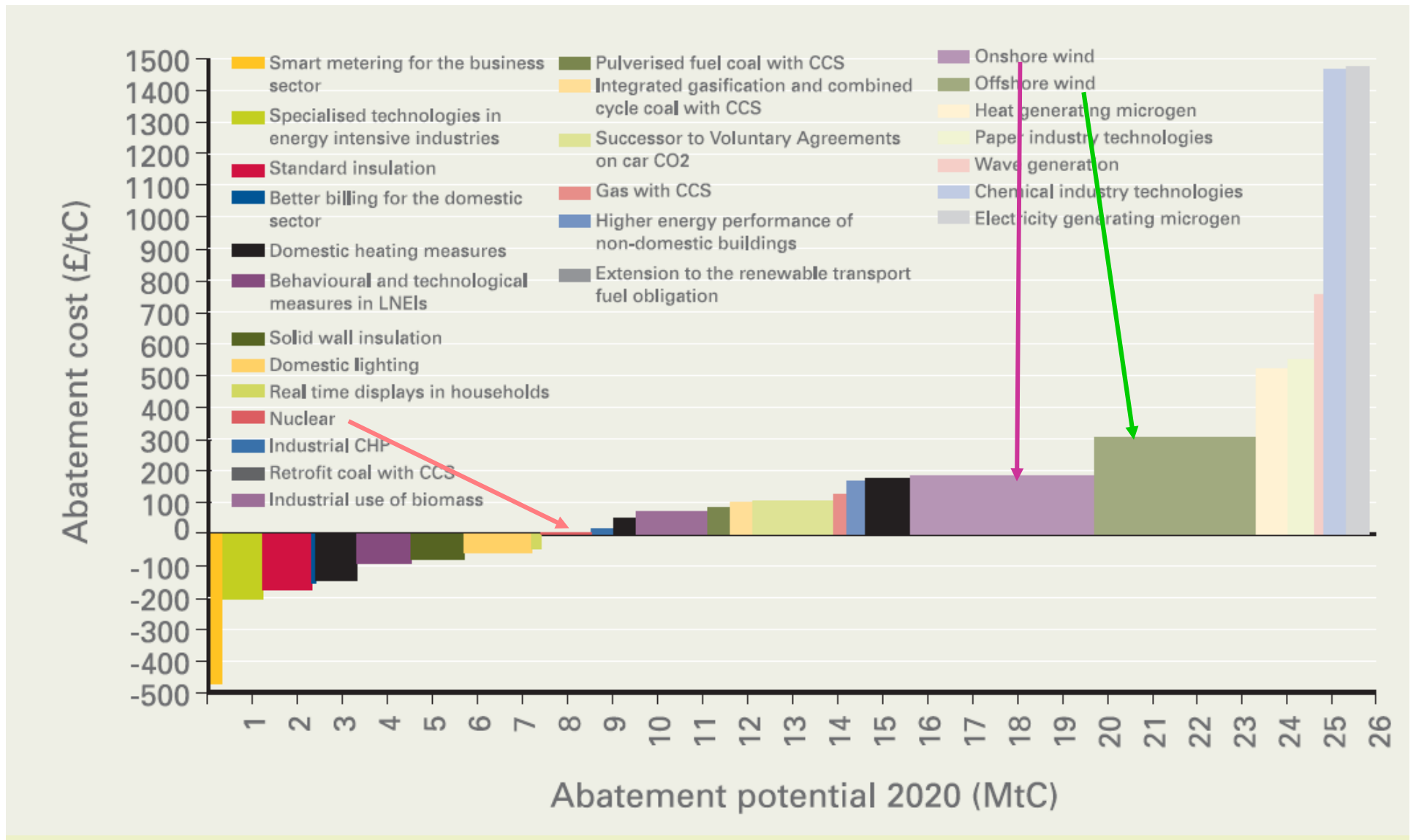
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Logic of CRC

- At £1.20/tonne **max** is small (but rising)
 - £0.65/MWhe, £0.22/Mwhgas
 - = **0.7 of 1% of elec price; 0.8 of 1% of gas price**
- But requires careful measuring of fuel use
 - 14 man-days/establishment
 - will direct attention to saving energy

Overcomes resistance to saving energy cheaply

Marginal abatement curve for 2020



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Source: Energy White Paper 2007 - **take with large pinch of salt**

Permits vs Taxes

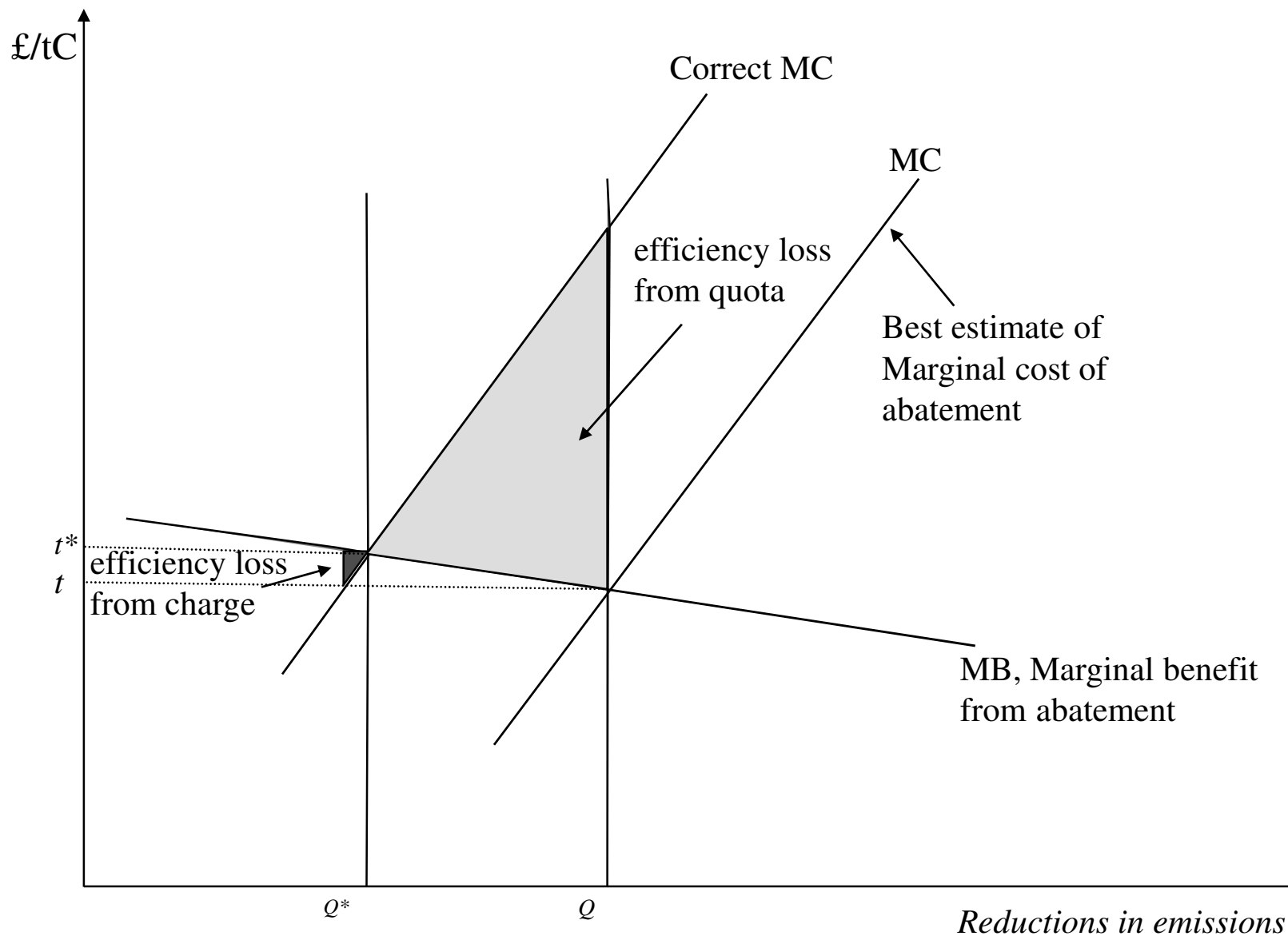
Weitzman: Taxes superior to permits unless MB of abatement **steeper** than MC

CO₂ is a *global persistent stock pollutant*

- CO₂ damage today effectively same as tomorrow
=> marginal benefit of abatement essentially flat
- marginal cost of abatement rises rapidly
- hazard of global warming very uncertain, as are the future abatement costs

***Carbon tax superior to tradable permits
but permits easier to introduce***

Costs of errors setting prices or quantities



Failures of ETS

- Current ETS sets quota of total EU emissions
- Renewables Directive increases RES
 - => increased RES does not reduce CO₂
 - => reduces price of EUA
 - => prejudices other low-C generation like nuclear
- Risks undermining support for RES

Solved by fixing EUA price instead of quota

Helped by proposed 30% reduction target

Reforming ETS

- Reform EU ETS to provide **rising price floor**
 - sufficient for nuclear *or on-shore wind if cheaper*
- Commitment to raise CO₂ price at 3% p.a. over life of plant may suffice
 - €25/EUA 2010 => €34 in 2020, €61 in 2040 ...
- Making it credible: write CfD on this path
 - offer CfD at €45/EUA for 20y from commissioning?

makes extra carbon savings additional

UK's Plan B if no ETS reform

- Underwrite UK CO₂ price
 - for power sector? **Cash negative**
- Change CCL into Carbon Correction Levy
 - a tax carbon content of fuel **Cash positive**
 - rebated by EUA price for covered sector
 - starts at current CCL rate say £12/t CO₂ and escalate at 6% above RPI => £22/t by 2020
 - underwritten by CfD on path for commitment

Coalition supports C floor and full ETS auctioning

Conclusions

- CO₂ price is too low
 - new coalition supports floor price
- RES Directive undermines ETS
 - and risks bringing ETS into disrepute
 - auctioning will not help, raising reduction to 30% will
- UK energy taxes lack logic
 - but offer simple scope for cash positive gains
- CRC interesting as a behavioural remedy
 - good topic to monitor impact



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Appendix

The next slide shows that arguably the cumulative stock of GHG (in Carbon equivalents) is the major determinant of global warming and that to remain below 2°C with a 50% probability (the white crosses) we should not emit more than about 1000 GtC (a trillion tonnes) of which we have already emitted half, and the remaining C in fossil fuels considerably exceeds the absorptive capacity of the atmosphere. Note reserves are proven, and resource includes coal reserves currently uneconomic at today's prices but which may become available - and the open box goes way off to the right.

Peak CO₂-warming vs cumulative emissions 1750–2500

Relative likelihood of peak warming versus cumulative emissions

