UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

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

EMR: carbon price floor, capacity mechanisms, EPS

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Meeting with Energy and Climate Change Select Committee

House of Commons 12 January 2011

http://www.eprg.group.cam.ac. uk

Electricity Market Review

- To de-risk and incentivise low-C investment

=> CfD for contractual assurance

=> C-price floor to underwrite wholesale price

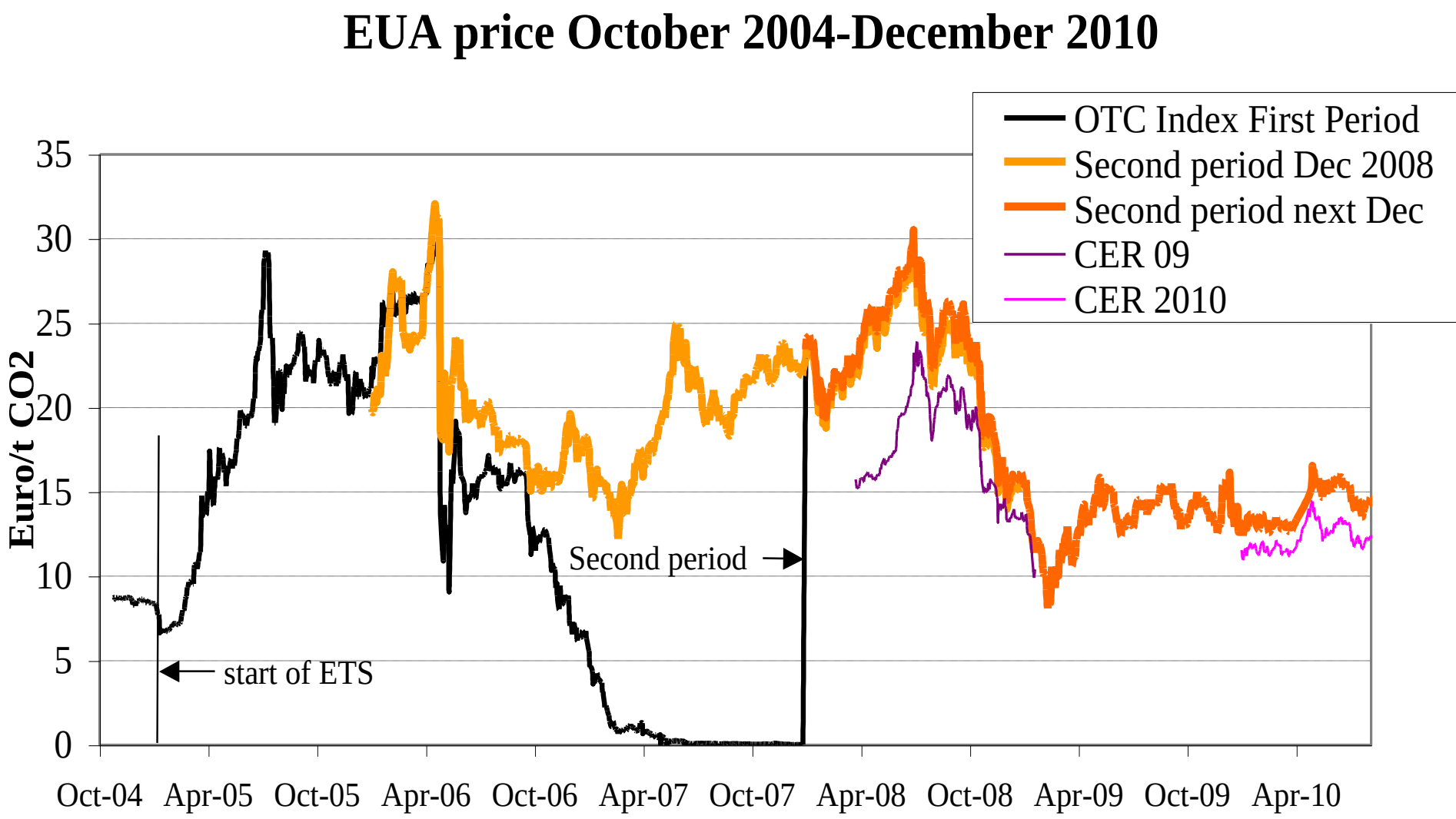
  - ensures nuclear is not "subsidized"

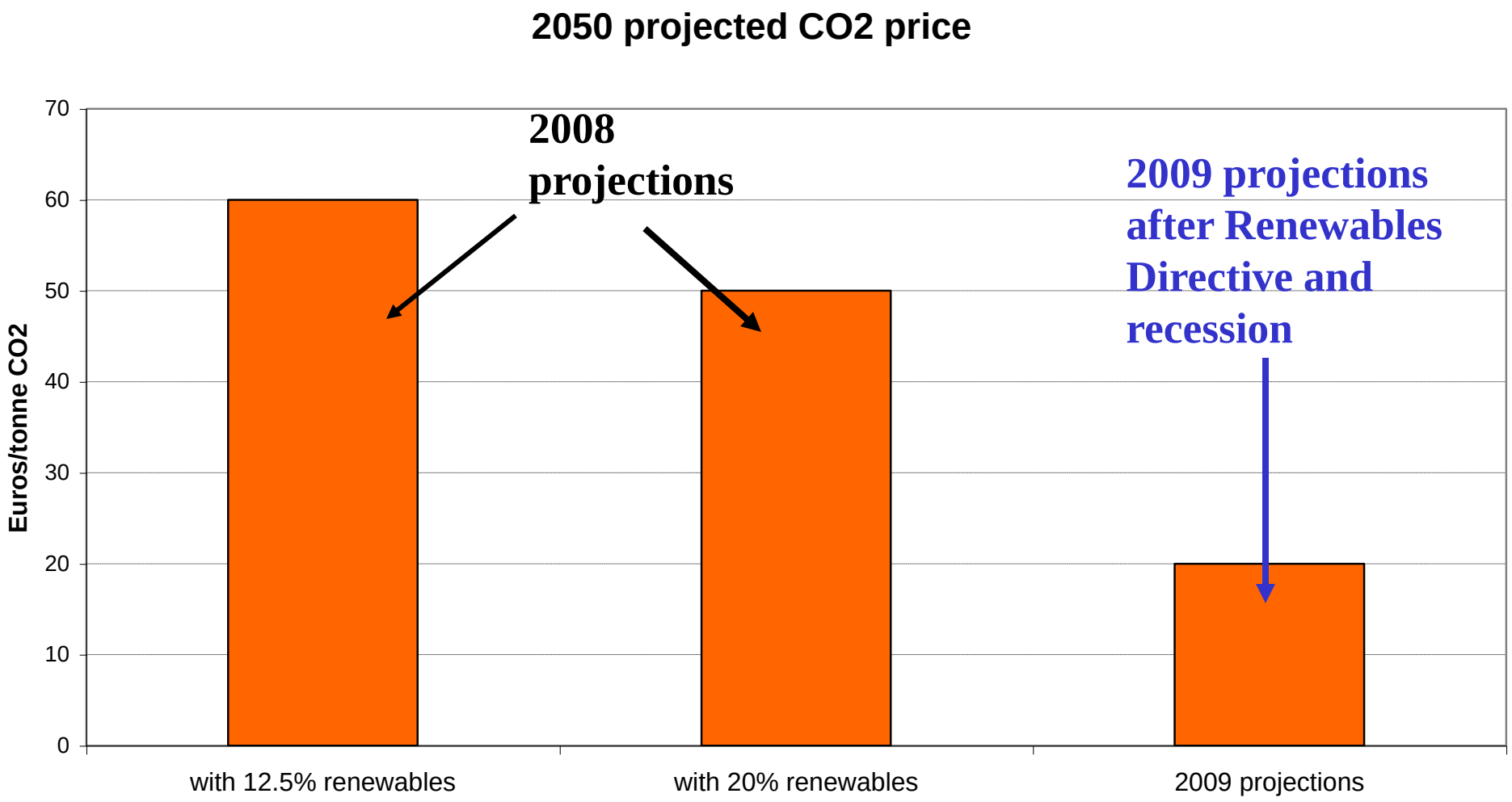
=> capacity payments - for peaking plant?

=> EPS to deter unabated coal

To support £200 billion of investment by 2020

CO_2 prices are volatile and now too low





Source: Committee on Climate Change, 2008 and 2009

Carbon price floor

- Needed because EUA price is volatile, too low and lacks longer-run credibility
  - undermined by 20-20-20 Directive and recession
- to bring C-price up to sensible level

=> ensures wholesale electricity price adequate to support mature low-C investment aka nuclear

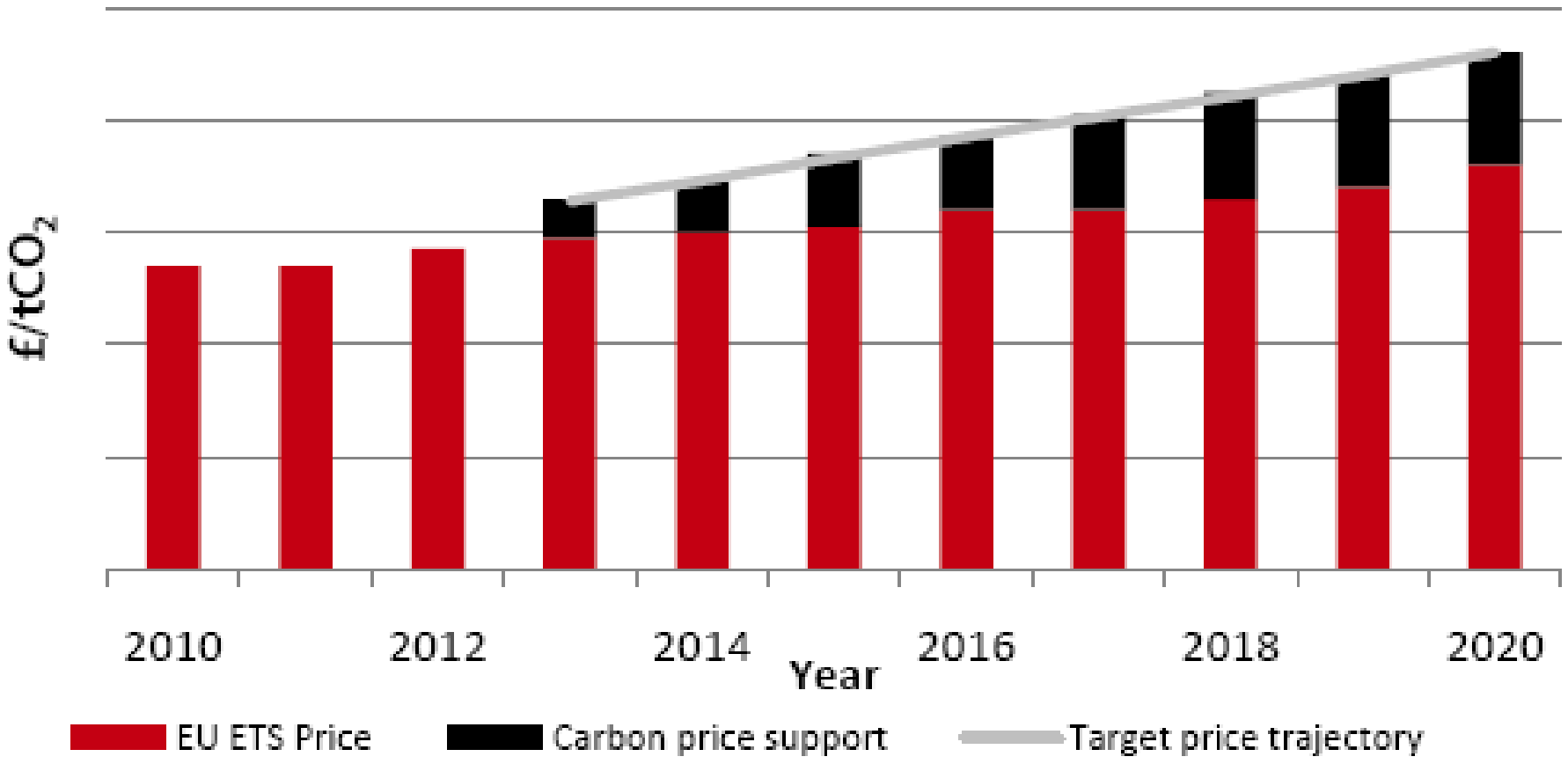
- GB wholesale price set by coal or gas + carbon

=> nuclear power will not then be subsidized

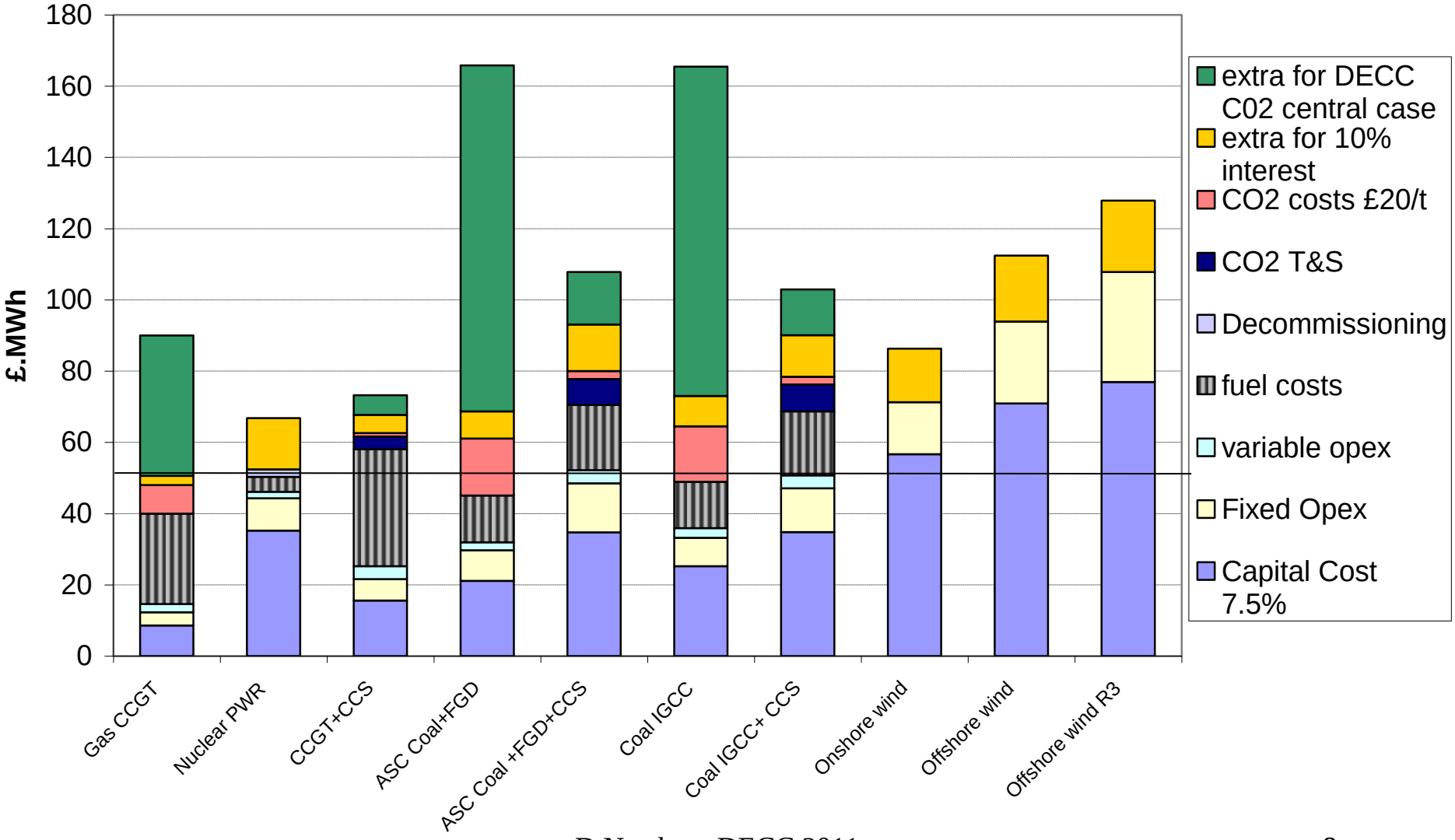
Design of Carbon floor

- ***Ideally*** reform ETS to ensure adequate rising C price applying to all member states
- Plan B: HMT's modified CCL from 1 Apr 2013
  - the proposal would levy CCL on carbon content to bring the ETS price up to a target level
- Objective is to ensure nuclear power (& on-shore wind?) is viable without extra support
  - other than the CfD to derisk and assure investment

Illustration of CCL rates over time to meet target CO_2 level



Projected levelised generation costs 2017 NOAK



Source: Mott MacDonald 2010

Capacity mechanisms

- Capacity payment, obligation, auction or tender
  - or financial: reliability option

Issues:

- set centrally or decentralised bilateral market?
- For price (VOLL) or quantity (reserve margin)?
- market wide or targeted?

Aim is the assure security of supply, especially for peaking plant - peak spot prices hard to predict

Emissions performance standards

- Belt and braces to prevent unabated coal
- annual limit on CO_2 per kW ***installed capacity***
- grandfathered for (financial) life of plant
- 600gm/kWh - consistent with supercritical CCS on 25% capacity
- or 450gm/kWh with CCS exemptions

already examined by Committee

Conclusions

- Carbon floor price: **necessary to support wholesale market and underwrite CfDs**
  - better to argue for EU carbon tax or equivalent
- Capacity mechanism **for security of supply**
  - needed for peaking plant?
- EPS - **to prevent unabated coal**

CfDs + carbon floor critical, others less so

Problems with C floor

- Imported electricity does not pay this C-tax
- Exported electricity does pay C tax

  => distorts electricity trade at loss of HMT revenue

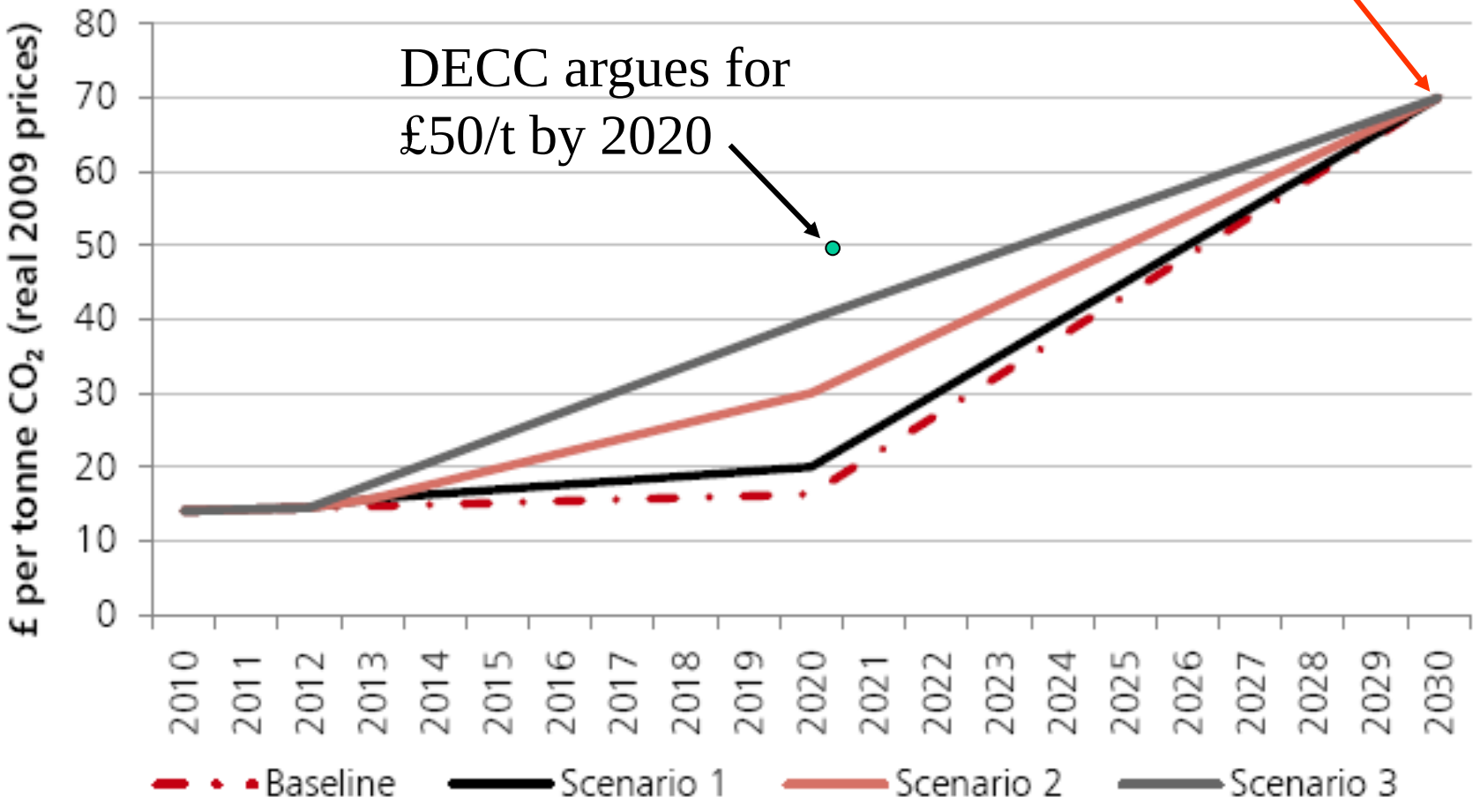
  => not really a carbon correction tax but a support scheme for low-C generation investment in UK
- more complicated to levy than uniform C tax
- favour CHP and CCS? - ***not*** if correcting C price, ***perhaps*** if supporting investment

targeting complicates design

existing CCL on electricity will be retained along with 5% VAT - messy!

2030 target of £70/t "consistent with global target of 2º C" - would this underpin CfD?

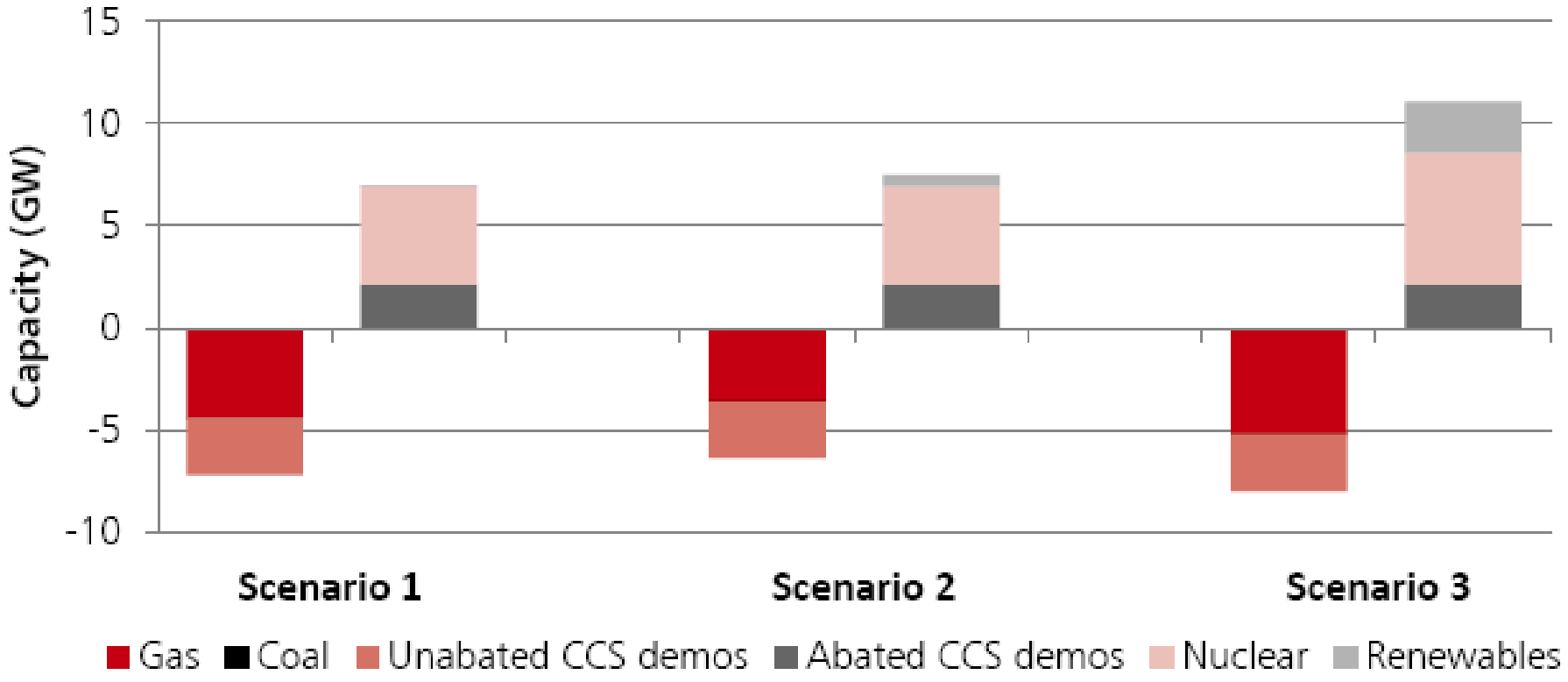
Chart 5.A: Indicative carbon price support scenarios and baseline



Source: Department of Energy and Climate Change, 2010

Little difference across scenarios

Chart 5.C: Change in capacity mix compared with the baseline in 2030



Cost benefit analysis

Scenarios	Cost	Benefit	NPV £ bn (@3.5%)
1	£2.1	£4.4	£3.2
2	£6.2	£8.1	£1.9
3	£16.4	£14.6	**-£1.7**

Assumes all other policies unchanged

(post 2030 C price at £70/t?)

Ignores climate change benefits

Capacity mechanisms: Flaws in market design

- Bilateral, thin illiquid markets that stimulated extensive vertical integration
- current design rules out pool & VOLL+LOLP
  - does it rule out PJM capacity auctions?
  - suggests centrally determined Ireland SEM model?
  - **Or reintroduce pool model: good idea anyway?**
- DECC recognises possible adverse impacts
  - prefers targeted tender for last resort dispatch

=> negative NPV without higher VOLL

Questions for Committee

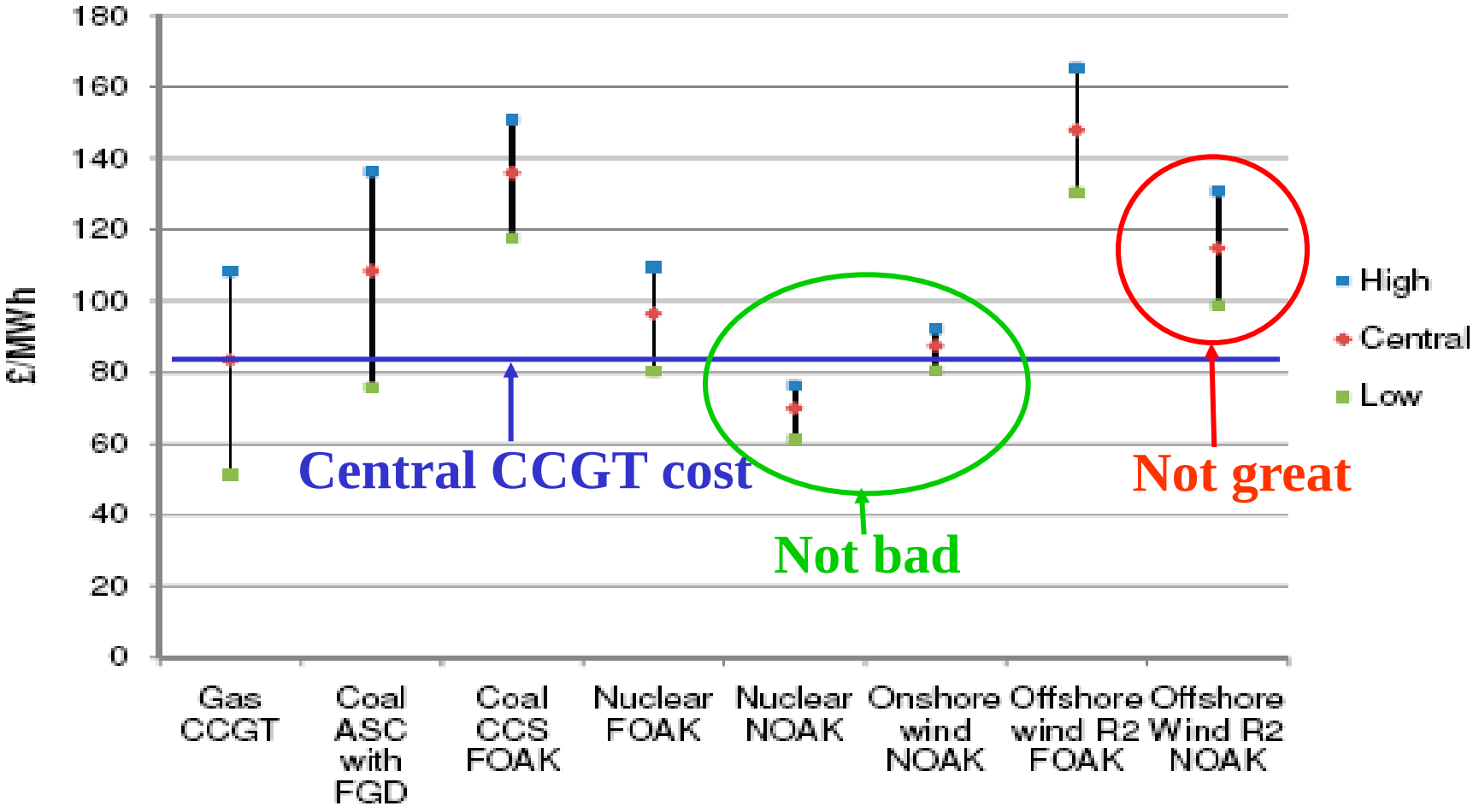
- What will be the relationship between the time profile of the CfD strike price and the C floor?
- Why keep CCL on electricity? Argue for a derogation from EPD as CCL is an input tax?
- Why not adopt the US standard (wholesale) market design which gives liquidity, clear spot prices for CfDs, and better capacity options?

Make the strongest case to EU to reform ETS

Acronyms

CBA	Cost benefit analysis
FOAK	first of a kind (in UK??)
LOLP	Loss of Load Probability
NOAK	n^{th} of a kind
NPV	net present value (discounted at 3.5% real)
PJM	Pennsylvania New Jersey Maryland (+) region
ROC	Renewable Obligation Certificate
SMD	Standard Market Design (as mandated for US markets)
VOLL	Value of Lost Load (£9,999/MWh in balancing mech.)

Estimated levelised costs



Notes: Estimated levelised costs, assumes 2010 project start, 10% discount rate for all technologies. Ranges reflect high, central and low scenarios for fossil fuel and carbon prices and construction costs. FOAK is first of kind technology and NOAK is Nth of Kind. Coal ASC with FGD refers to advanced super critical coal plants with flue gas desulphurisation. Coal CCS refers to coal plants with carbon capture and storage.

Domestic electricity charges

- 2009 average domestic electricity bill £445/yr
- Main environmental charge
  - EU Emissions trading scheme £24
  - Carbon Emissions Reduction Target £15
  - Community Energy Savings Programme £1
  - Renewables Obligation £12
  - Total (annual cost) = £52

=11% of total bill

  - Subsidy from VAT (5% not 20%) (£63)