



UNIVERSITY OF
CAMBRIDGE | **Electricity Policy
Research Group**



European policy targets

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CEEPR-EPRG European Electricity Workshop

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

Outline

- The logic of EU targets
- Challenges prompting targets
 - climate change
 - more carbon underground than we should release
 - support required for RD&D
- EU **20-20-20 Directive and renewables**
- R&D and **EU SET Plan**
- GHG targets and the **EU ETS**

The logic of EU targets

- easy to determine “fair” allocation
 - and can buy off opponents with free allocations
- does not impinge on sovereign tax powers
 - EU carbon tax failed
- easier to give impression of leadership/action
 - without spelling out costs
 - ETS => electricity prices ↑↑ unanticipated by voters

Targets should be translated into sensible policy

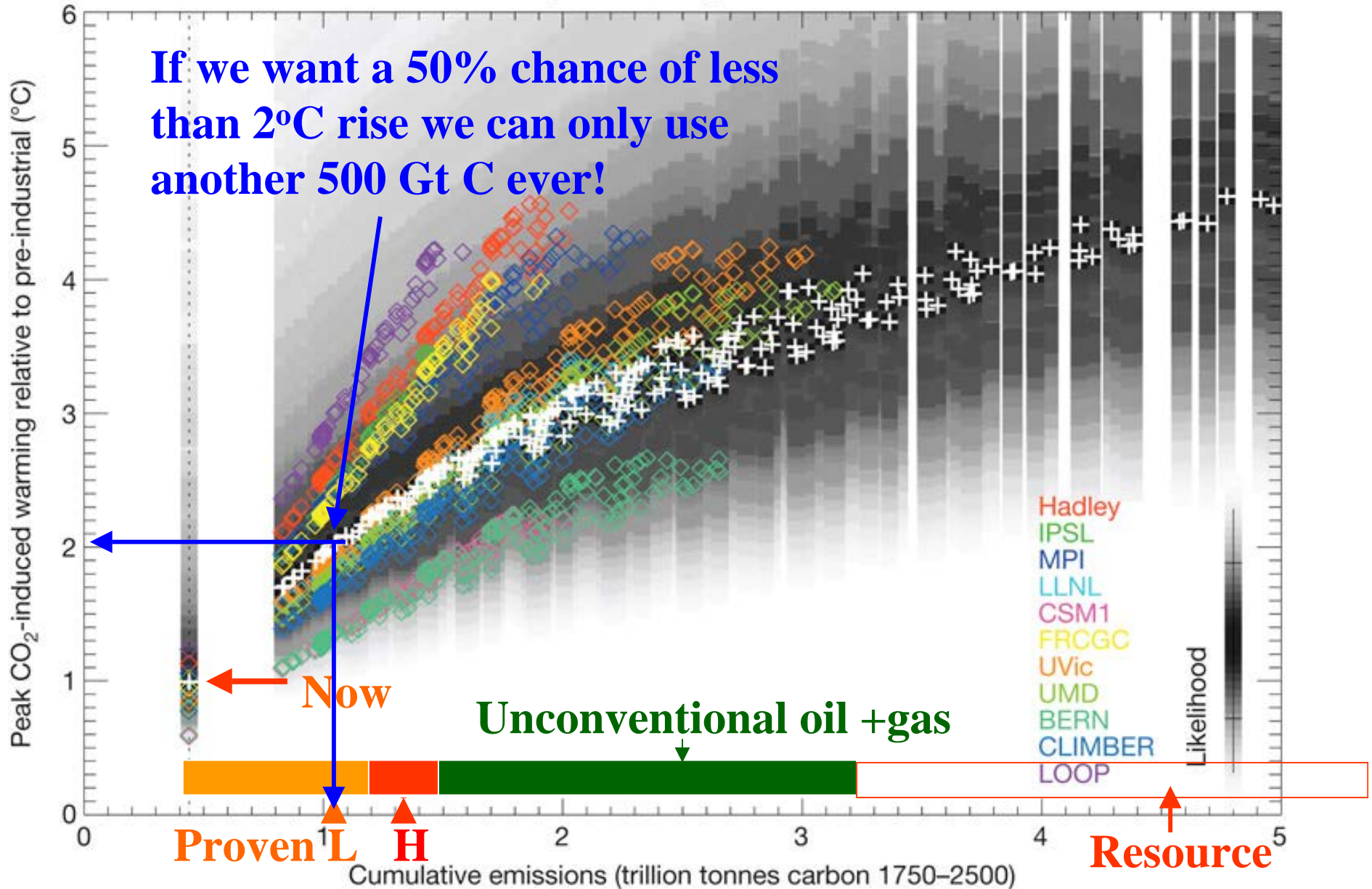
Climate change challenges

- 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

Peak CO₂-warming vs cumulative emissions 1750–2500

Relative likelihood of peak warming versus cumulative emissions



Supporting RD&D

- 80% GHG reduction => decarbonising electricity
- Zero-C electricity requires renewables
 - and CCS + nuclear
- RES is not yet commercial (except in niches)
 - requires support now to drive down future costs
- R&D + deployment drives innovation and learning
- But RD&D is a public good benefiting the whole world

So how to gain collective support for RD&D?

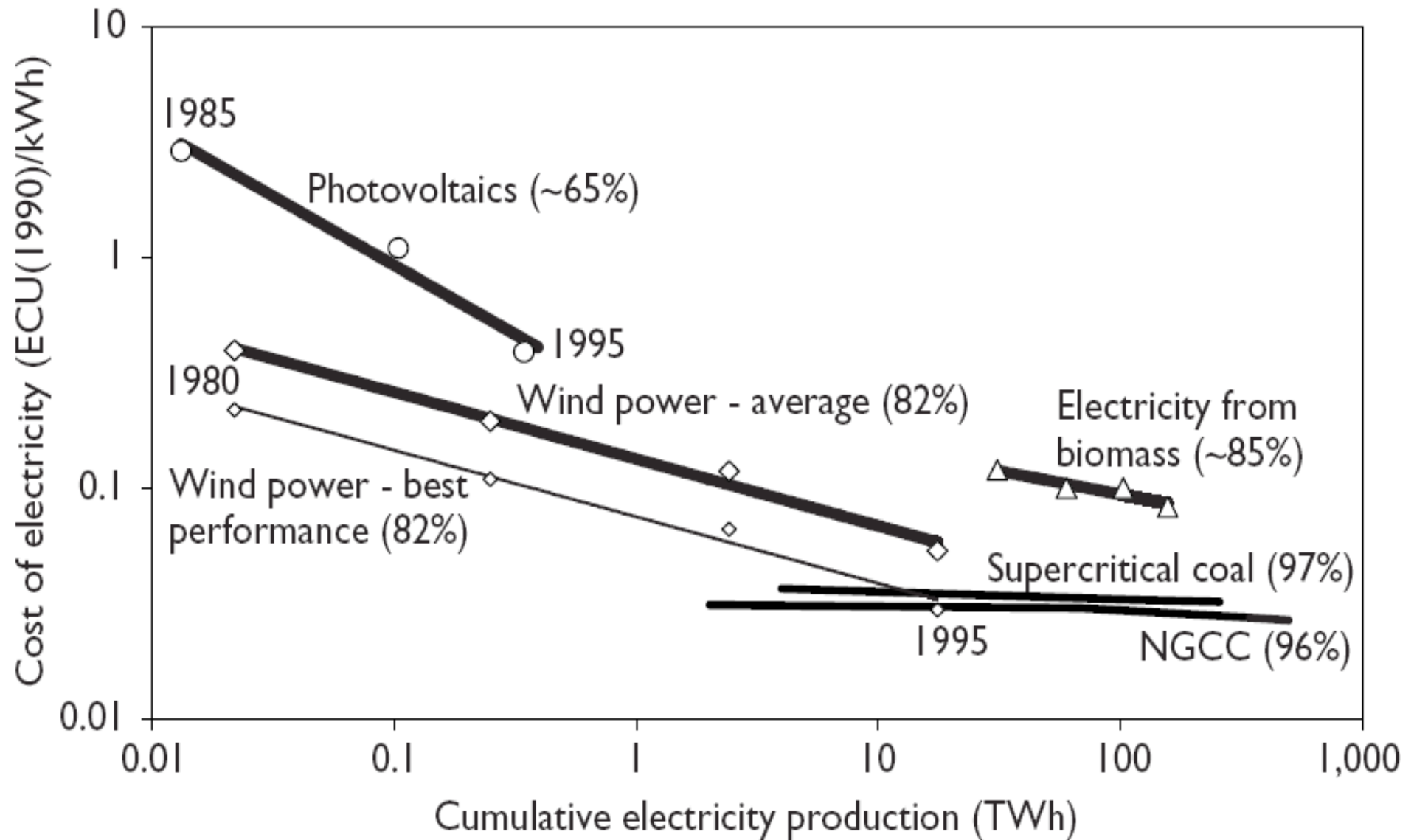


Designing collective RD&D support

- Aim: to deliver low-C solutions for developing countries
 - But often sold as EU/MS industrial policy
- Need to explore a portfolio of possible solutions
 - Then select those which show most promise
- Danger with RES target – choose cheapest
 - Fortunately MS have differing resources to explore
 - And differing aspirations to industrial leadership

RES Directive as least bad feasible solution?

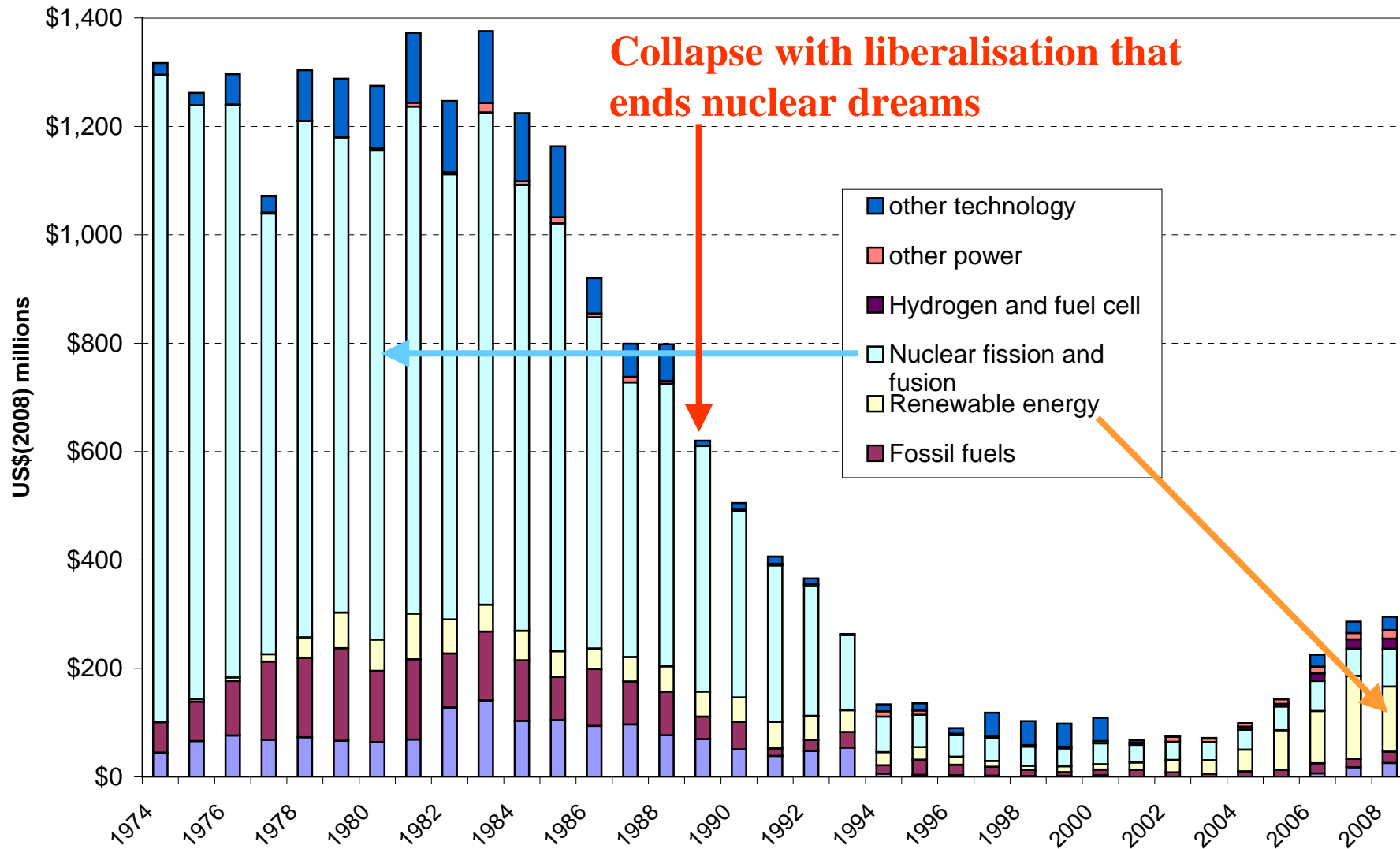
Experience curves justify deployment support



Source: IEA

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UK Energy R&D expenditure



Source: IEA

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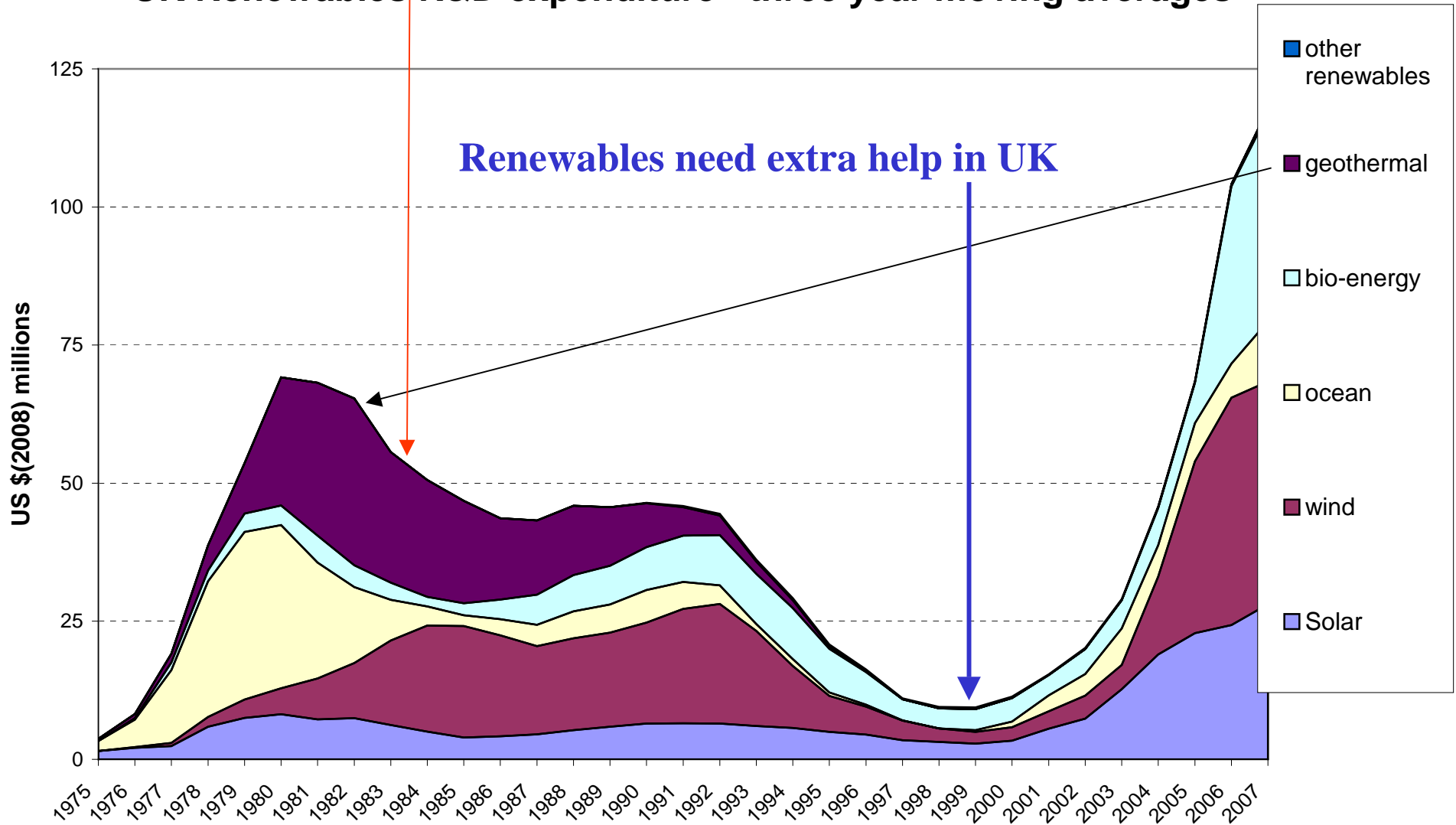
Logic of 2020 Directive

- Not to reduce CO₂ - ETS ensures no impact
 - ETS intended to price CO₂
 - **but fails miserably to give credible signals**
 - not to support low-C generation, only RES
- => support to RD&D to drive down costs of RES**
- How? Support investment or generation?
 - Learning comes from:
 - design (cost, reliability, controllability, etc)
 - production, installation, siting/planning, grid integration

but not from operation (provided reliable)

Less than 5% of total UK energy R&D

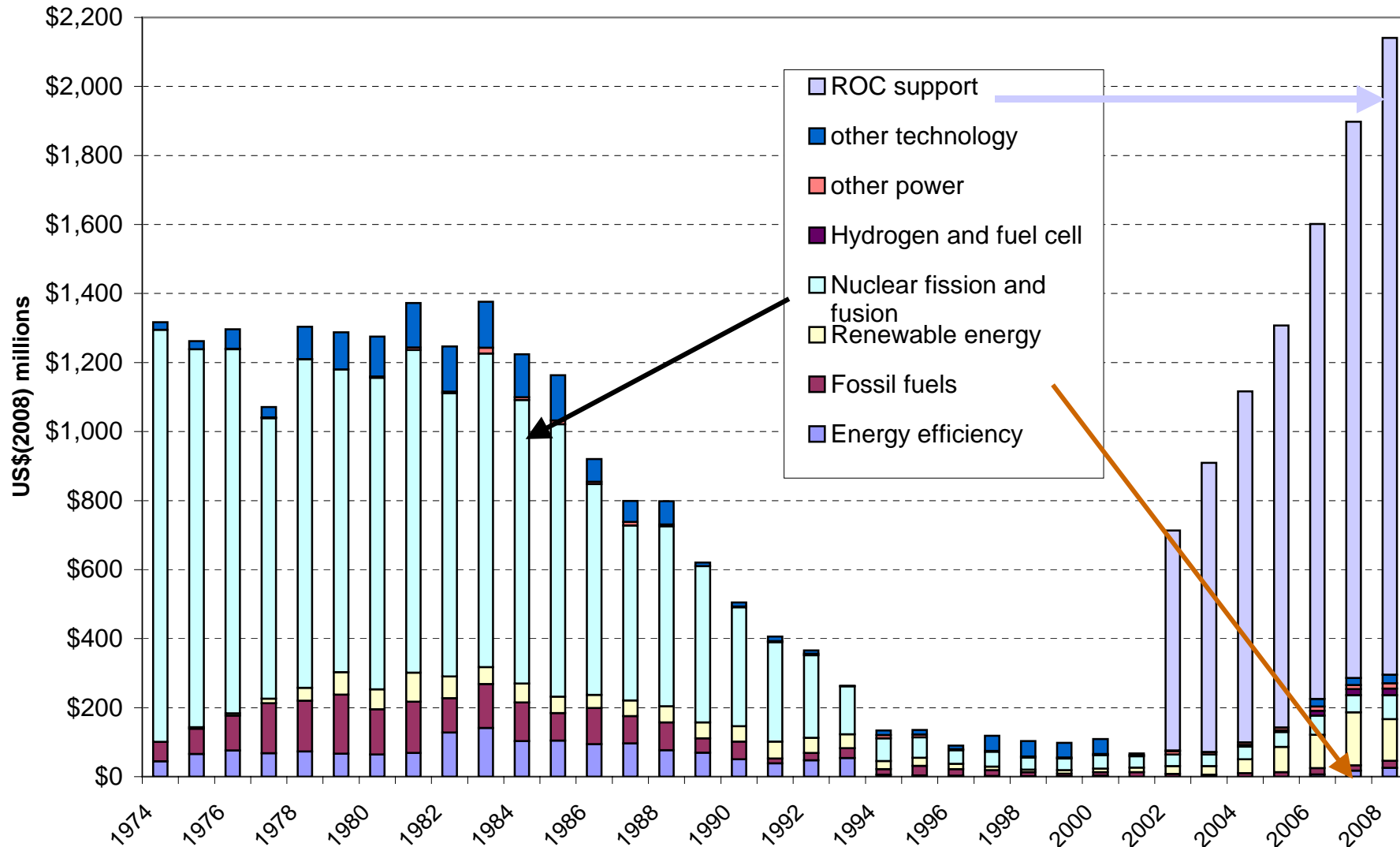
UK Renewables R&D expenditure - three year moving averages



Renewables need extra help in UK

Expenditure shifts to deployment support

UK Energy R&D expenditure



Source: IEA and Ofgem



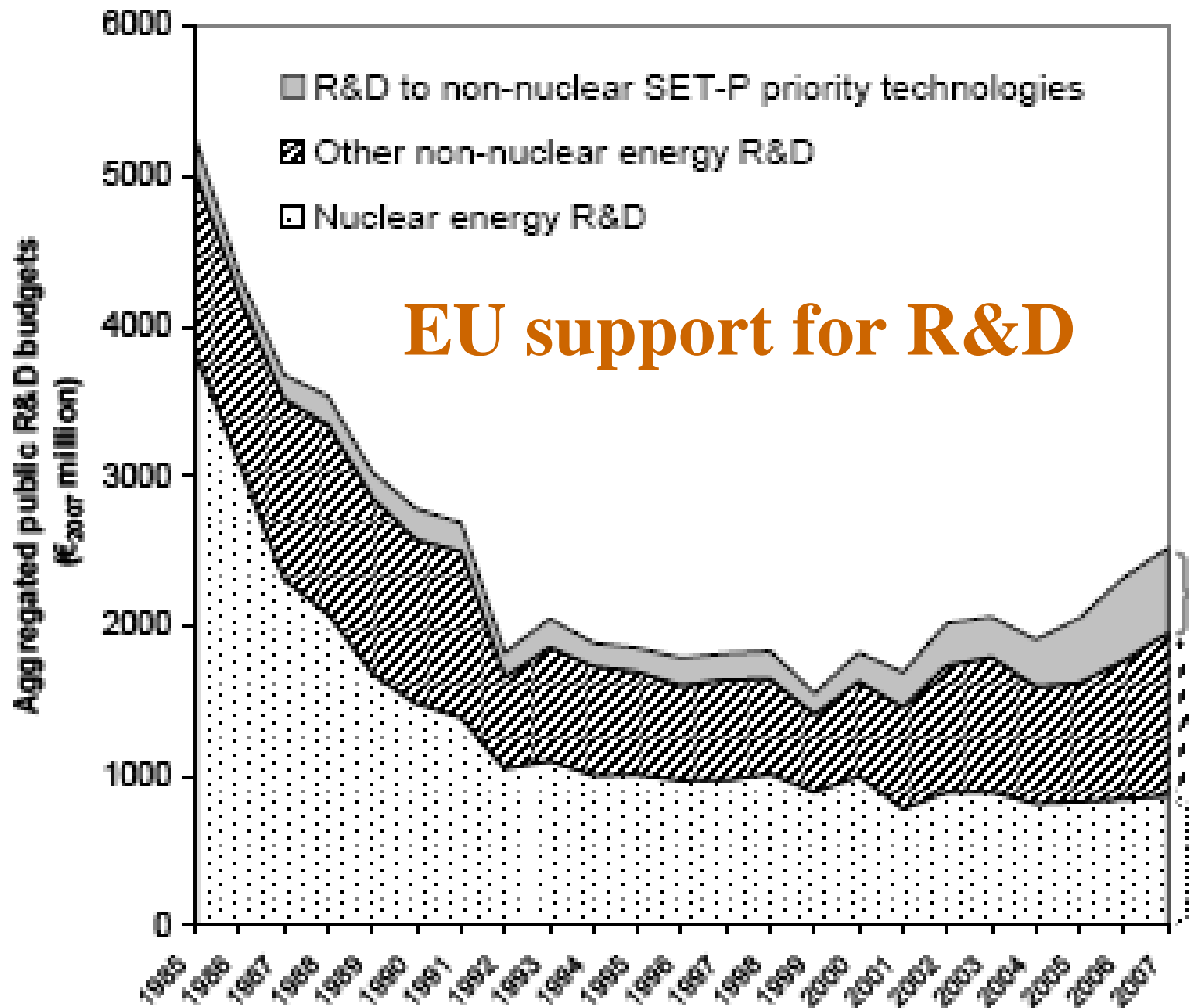
Implications for RES support

- No RES should bid below SRMC
 - Given that it can rapidly reduce output
 - => **support should be for availability, not output**
 - RES should not have automatic priority
 - merit order should be based on avoided costs
- => if RES is more costly than alternatives (including balancing, redispatch), **back it off**
- => foregone RES generation should count to RES target (as it has no CO₂ credit)
- ***unless ETS reformed to support CO₂ price***

SET Low-C Plan

- **Strategic Energy Technology (SET) Plan**
- Promising technology benefits from LbD
 - Supported by 20-20-20 Directive and national deployment
- But many obstacles require R&D and perhaps pilots
 - ⇒ need efficient collective action to increase low-C R&D
 - ⇒ IPR benefits made widely available, contrary to MS interests
- But R&D collapsed at end of 1980s
 - liberalisation and resulting pessimism over nuclear future?
- SET plan to leverage MS's R&D, steer choices

Ensure adequate size and diversity of portfolio

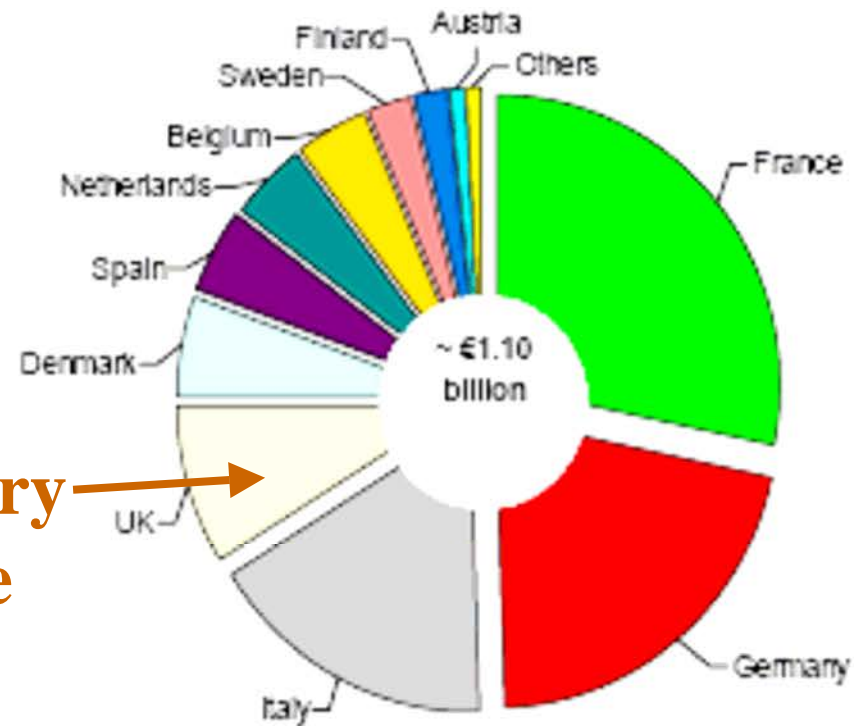
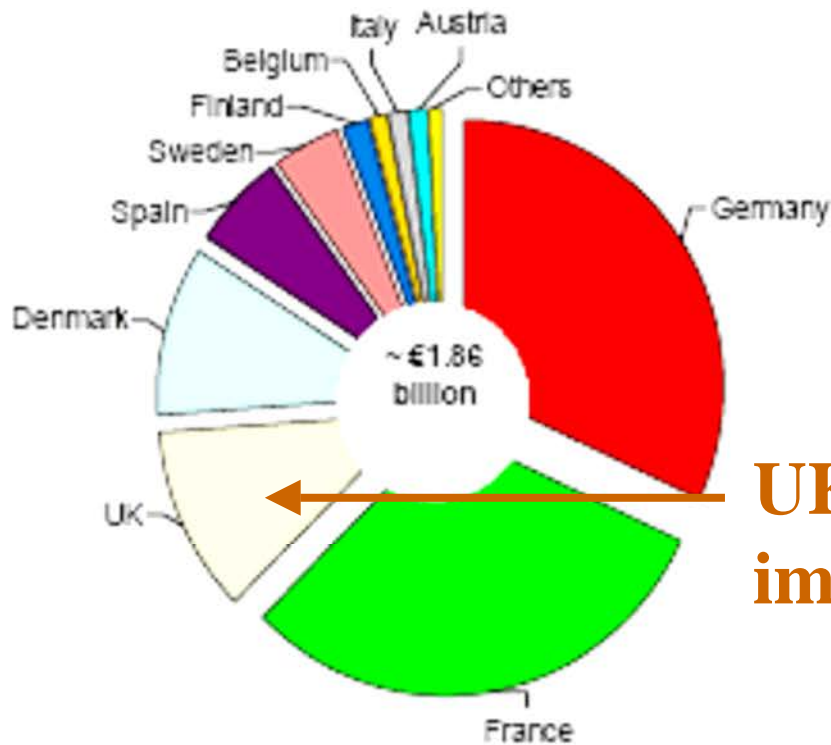


Non-nuclear SET R&D

Corporate

Public

Total = € 3.3 bn



UK not very impressive

Source: COM (2009) 519

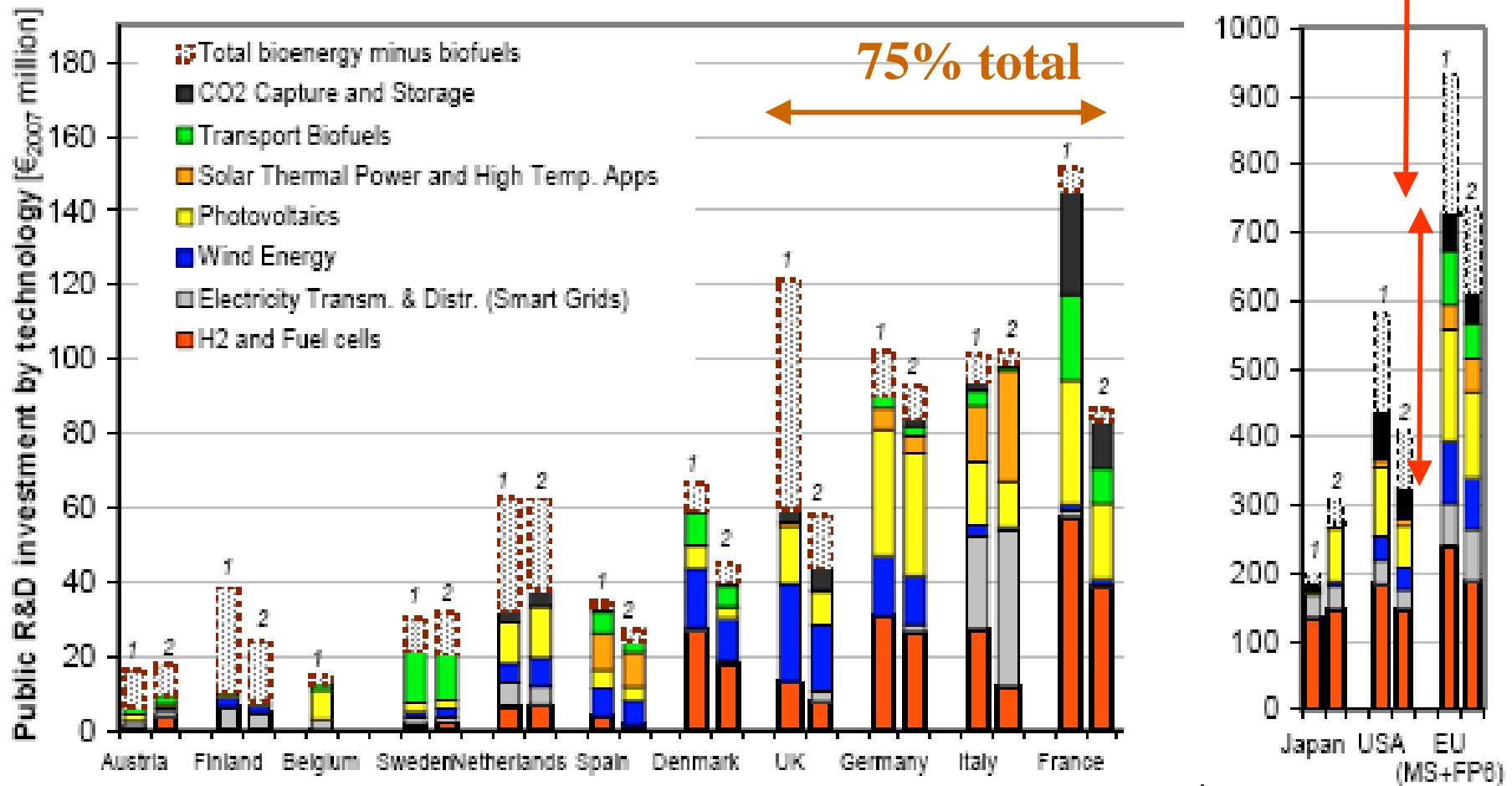
R&D concentrated in few MS

EU double US

Public R&D spending in non-nuclear SET-P priority technologies

1- 2007 data (gap filled)

2- Annual average over the period 2002-2007



Source: COM (2009) 519

SET support schemes

- 2007 SET R&D non-nuclear ~ **€2.4bn** (Nuclear **€0.94**)
 - 70:30 private:public; 80:20 MS:EC
- SET plan to 2020 total **€70 bn** or double current rate
 - Grid: €2bn; fuel cells + H₂: €5bn; Wind: €6bn;
 - **nuclear fission €7bn**; bio-energy € 9bn;
 - smart cities €11 bn; CCS €13 bn; **Solar: €16bn**;
- Joint programming to amplify MS R&D
 - CCS as an example

ETS auction revenues as funding source?

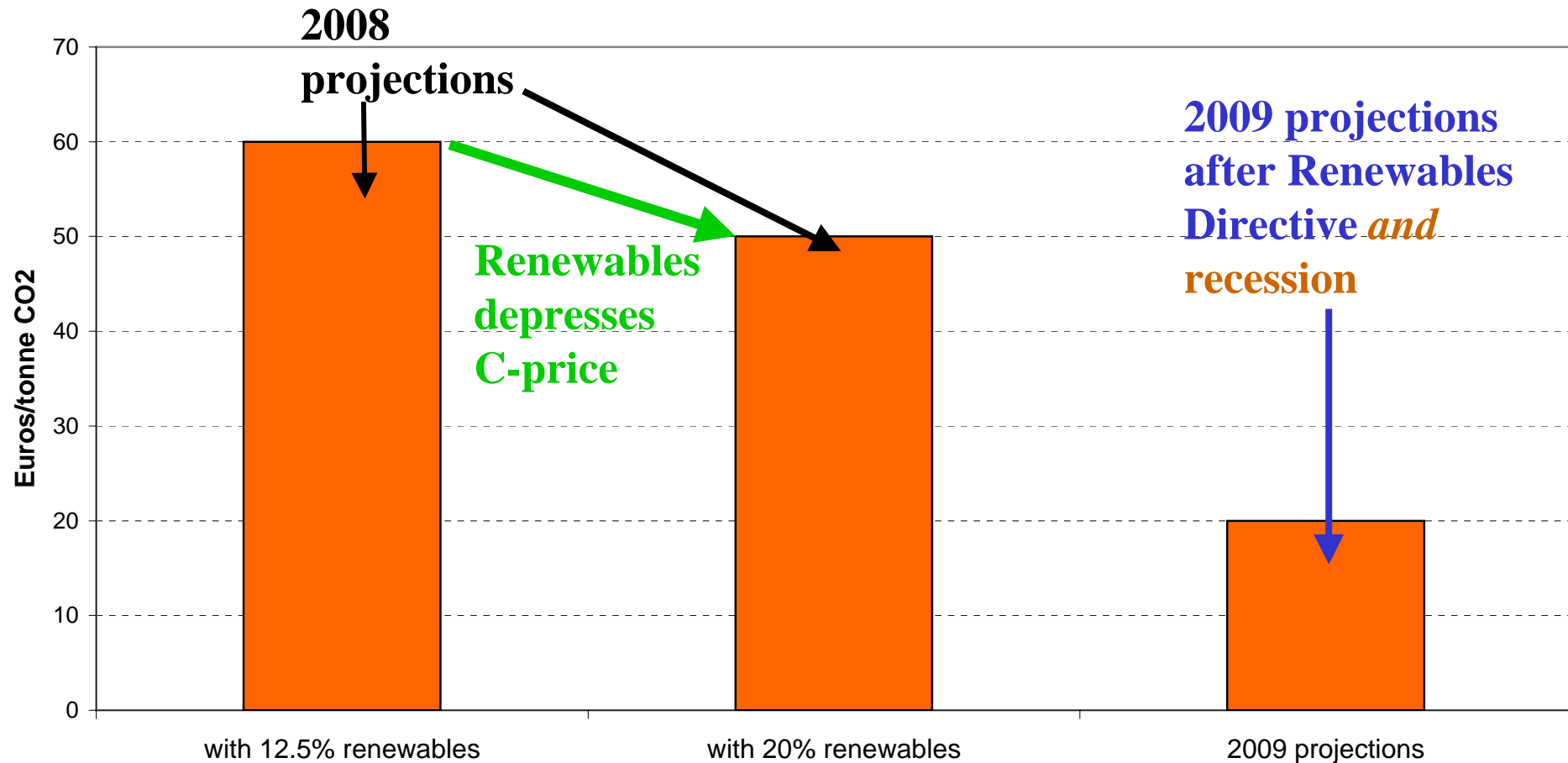
Failures of ETS

- Current ETS sets quota of total EU emissions
- Renewables Directive increases RES
 - => increased RES does not reduce CO₂
 - => reduces price of EUA (perhaps by €10/tonne)
 - => 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

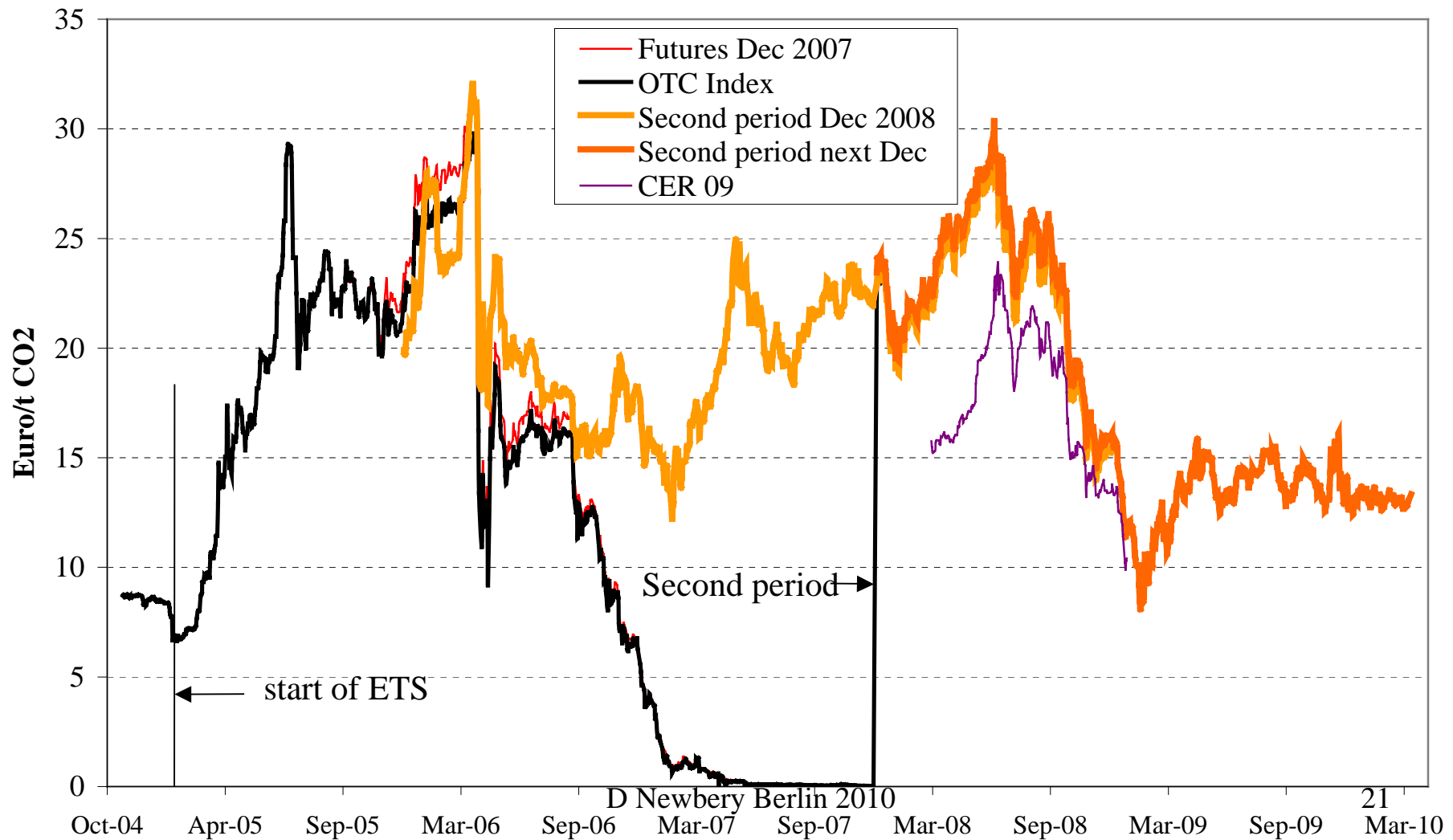
2050 projected CO2 price



Source: Committee on Climate Change, 2008 and 2009

CO₂ prices are volatile and now too low

EUA price October 2004-April 2010



Permits vs Taxes

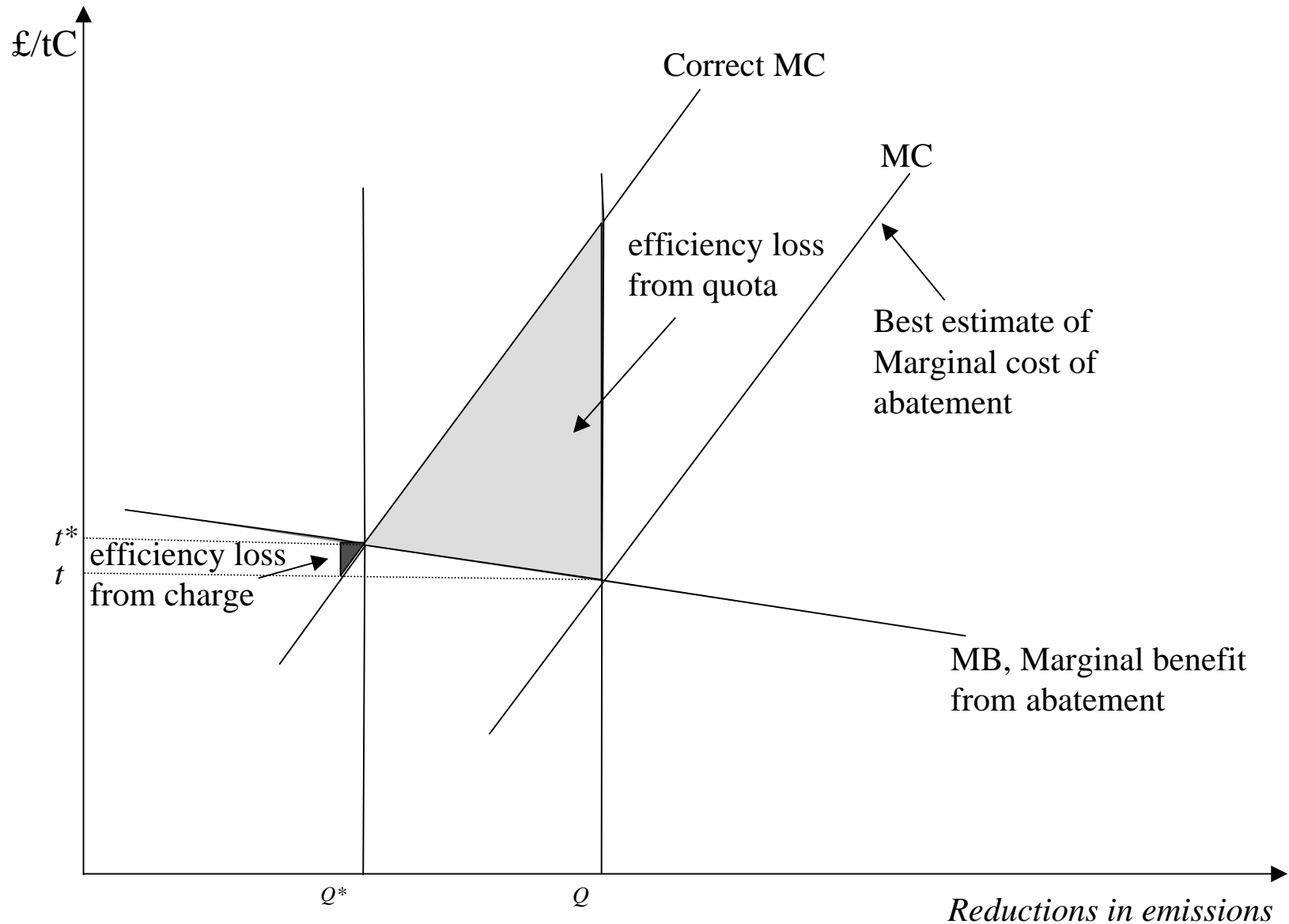
Weitzman: Taxes superior to permits unless MB of abatement **steeper** than MC

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



Reforming ETS

- Reform EU ETS to provide **rising price floor**
 - sufficient for nuclear *or on-shore wind or CCS*
- 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



Conclusions

- **RES Directive** to support deployment and learning
 - Well defined MS funding in place through obligations
 - **SET-Plan** to double R&D
 - inducements rather than obligations
 - **ETS** to price CO₂
 - But RES Directive undermines ETS
 - risks bringing ETS into disrepute
- ⇒ Reform ETS – provide floor price
- Auction 100% to deliver income for RD&D
 - Failing which encourage MS to impose C tax
 - With rebates for EUA's surrendered
 - Combine with border taxes
 - With rebates for countries with viable C price?



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