Electricity Policy Research Group

TSEC

UNIVERSITY OF CAMBRIDGE

Improving investment framework for low Carbon technologies

Cambridge, December 15, 2006

Karsten Neuhoff
Cambridge University

www.electricitypolicy.org.uk/tsec/2

Version 7.12.2006

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

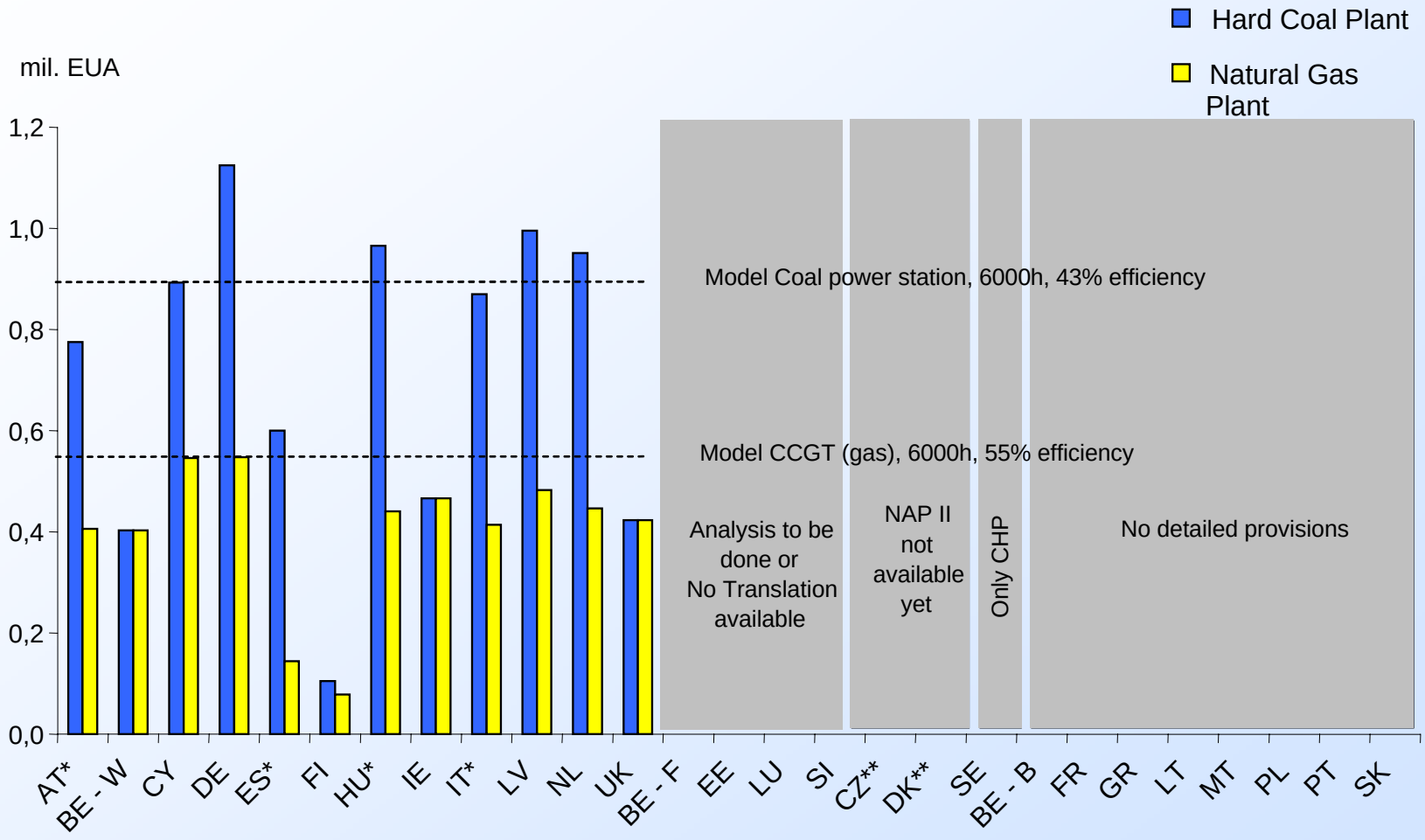
Outline

Actions to improve the current implementation of the ETS

- Reduce distortions from new entrant allocation
- Ensure strong price till 2012
- Create market confidence going forward
- Conclusion

Reduce distortions from allocation

New entrant allocation distorts fuel/technology choice

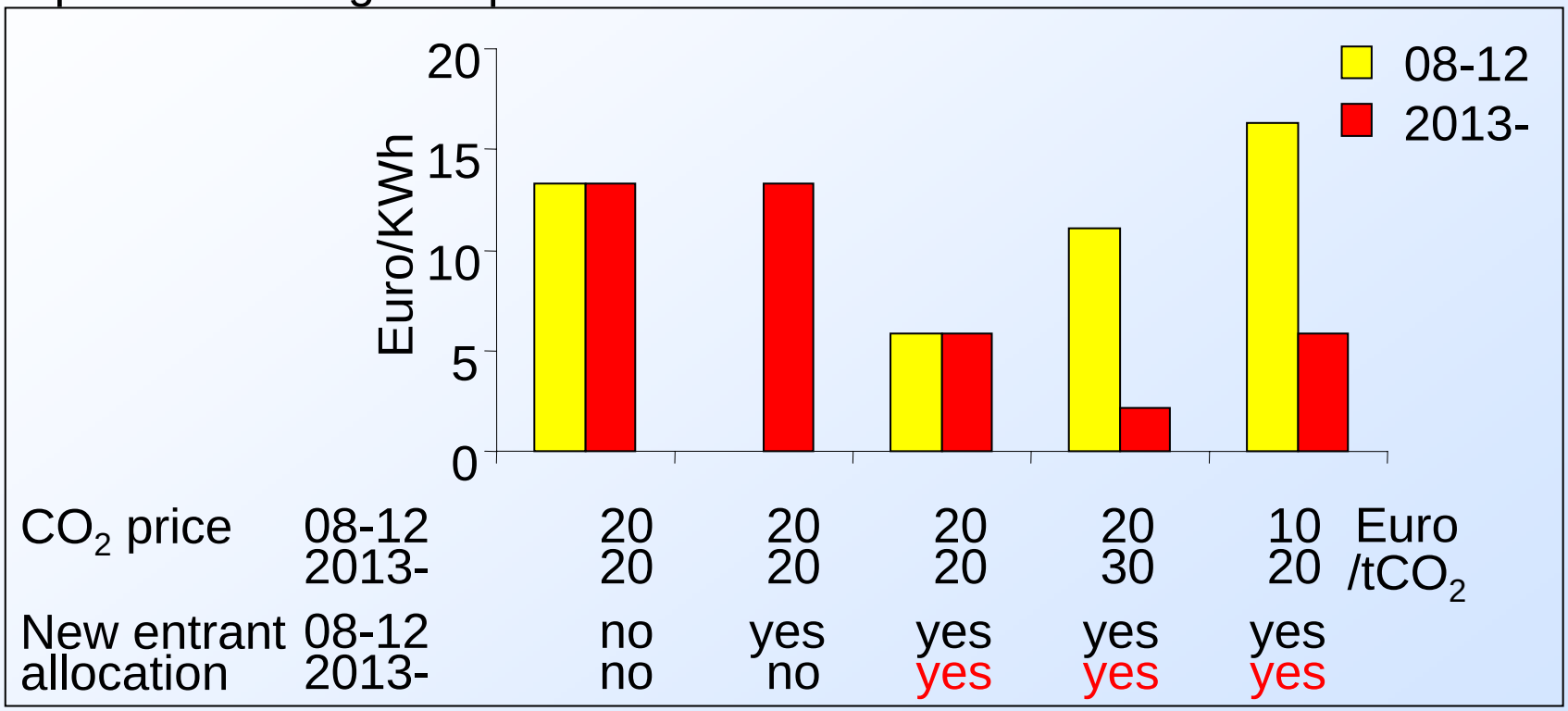


Comparison of National Allocation Plans for the Period 2008-2012, Karsten Neuhoff, Markus Åhman, Regina Betz, Johanna Cludius, Federico Ferrario, Kristina Holmgren, Gabriella Pal, Michael Grubb, Felix Matthes, Karoline Rogge, Misato Sato, Joachim Schleich, Jos Sijm, Andreas Tuerk, Claudia Kettner, Neil Walker

Reduce distortions from allocation

Future new entrant allocation can reduce investment

Equilibrium margin required to fund investment



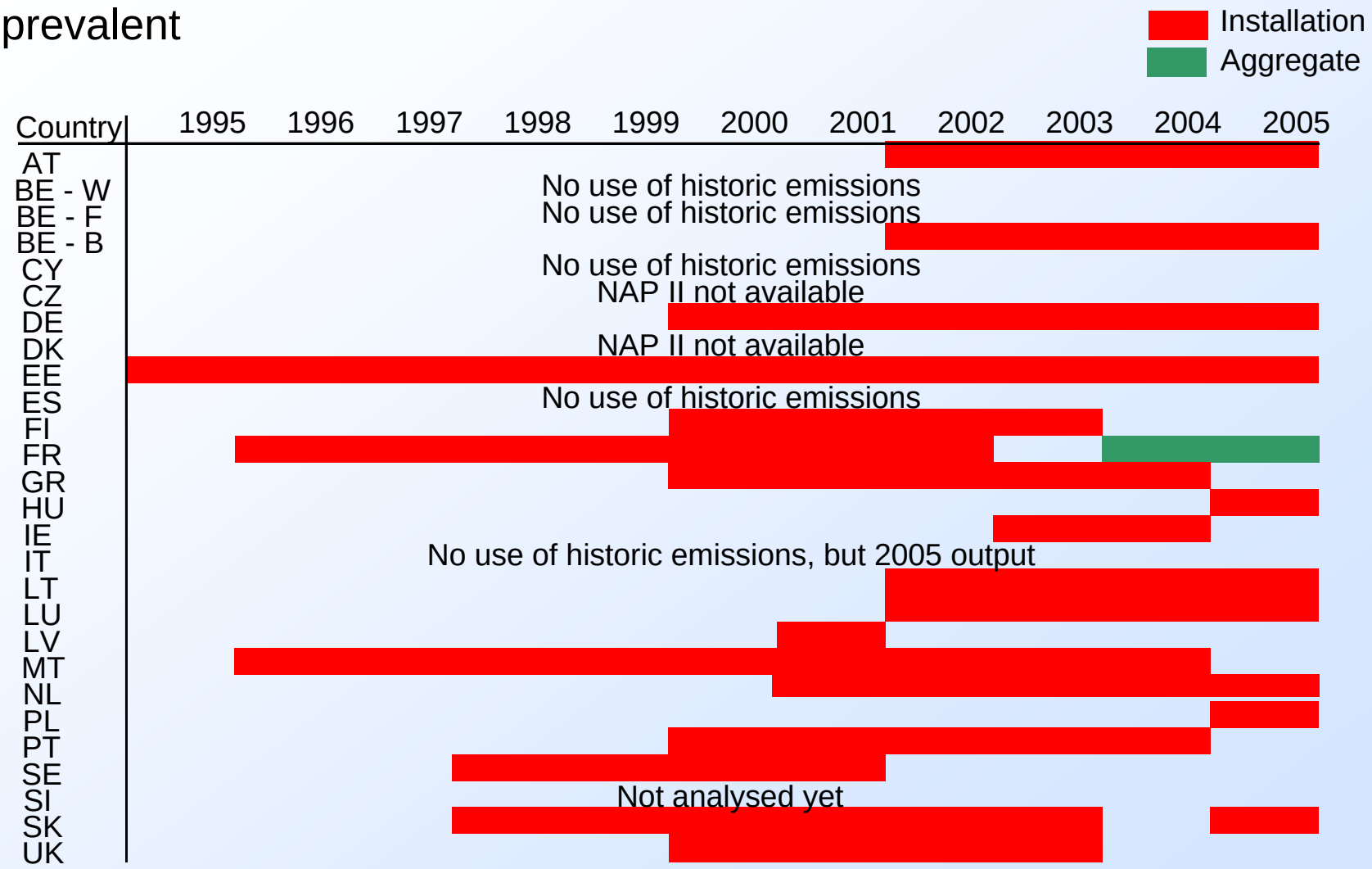
CO_2 price	08-12	20	20	20	20	10	Euro
	2013-	20	20	20	30	20	/tCO_2
New entrant allocation	08-12	no	yes	yes	yes	yes	
	2013-	no	no	yes	yes	yes	

Reduces future investment thresholds -> reduces revenue streams for today's investment -> increases today's investment threshold (and in addition distorts fuel/technology choices …)

Assumptions: Discount rate 10%, Overnight investment cost coal 1000Euro/KW (lowest cost of IEA 2005 survey), New entrant allocation for coal in Germany, 7500h operation per year

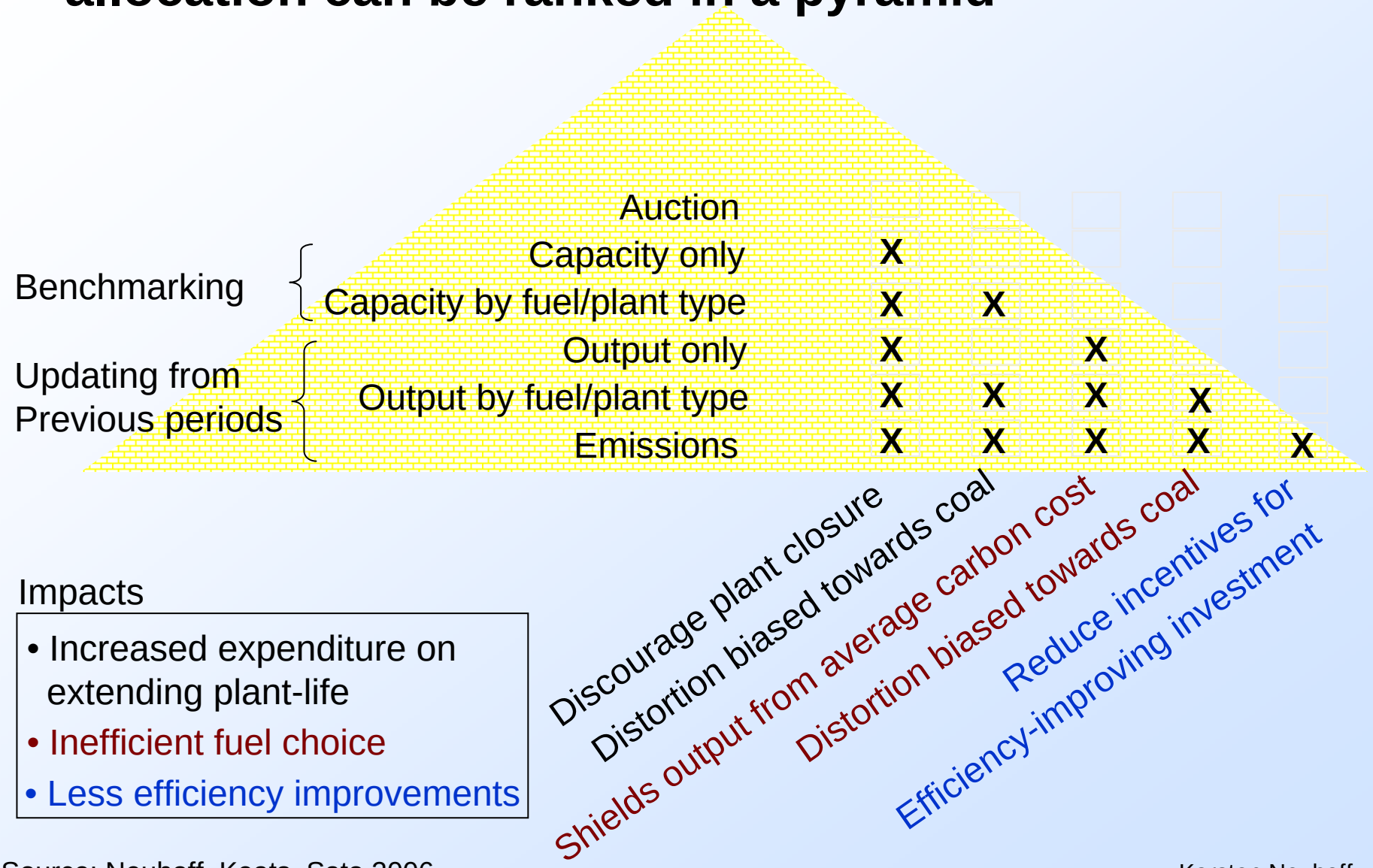
Reduce distortions from allocation

Recent data used for allocation to existing facilities – updating prevalent



Comparison of National Allocation Plans for the Period 2008-2012, Karsten Neuhoff, Markus Åhman, Regina Betz, Johanna Cludius, Federico Ferrario, Kristina Holmgren, Gabriella Pal, Michael Grubb, Felix Matthes, Karoline Rogge, Misato Sato, Joachim Schleich, Jos Sijm, Andreas Tuerk, Claudia Kettner, Neil Walker

These distortions from repeated free allowance allocation can be ranked in a pyramid



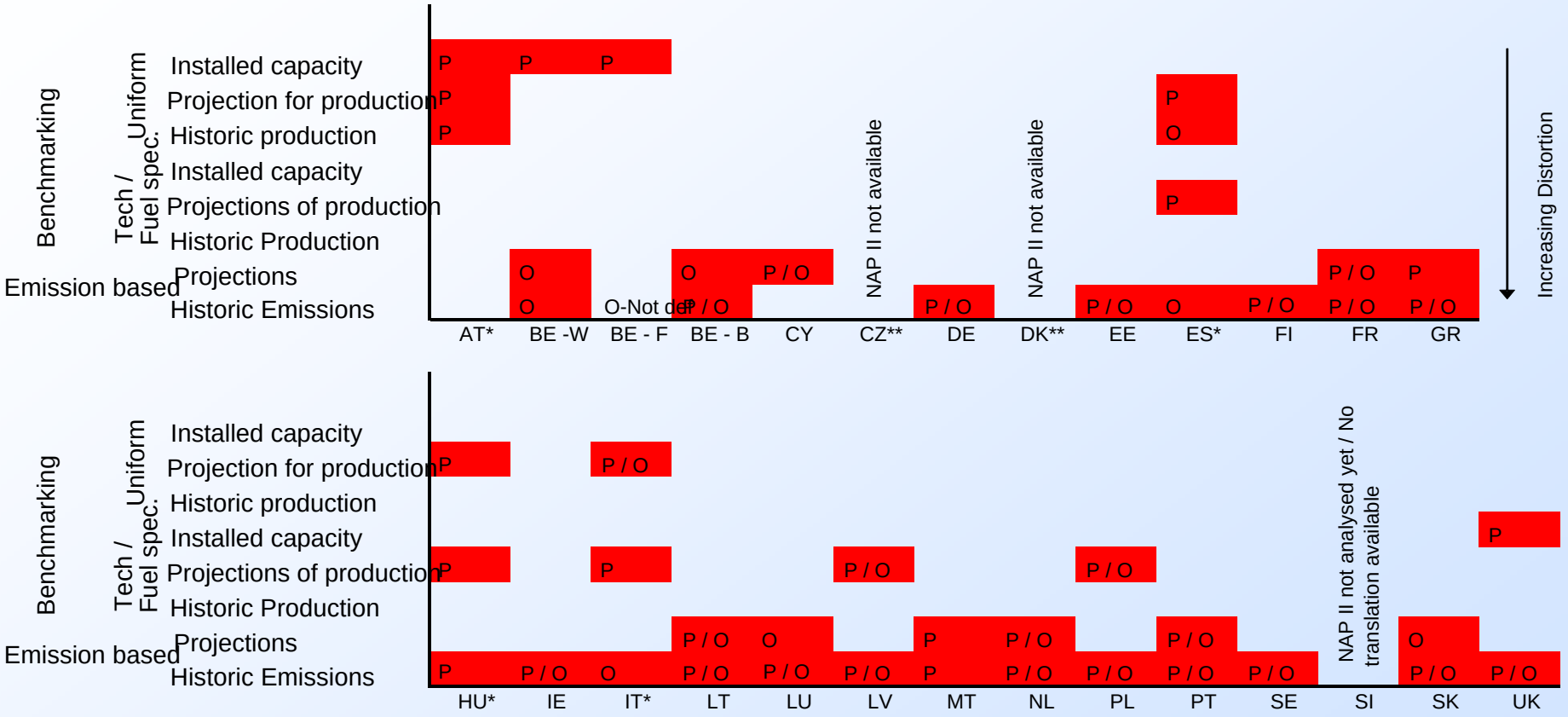
Impacts

- Increased expenditure on extending plant-life
- Inefficient fuel choice
- Less efficiency improvements

Source: Neuhoff, Keats, Sato 2006

Reduce distortions from allocation

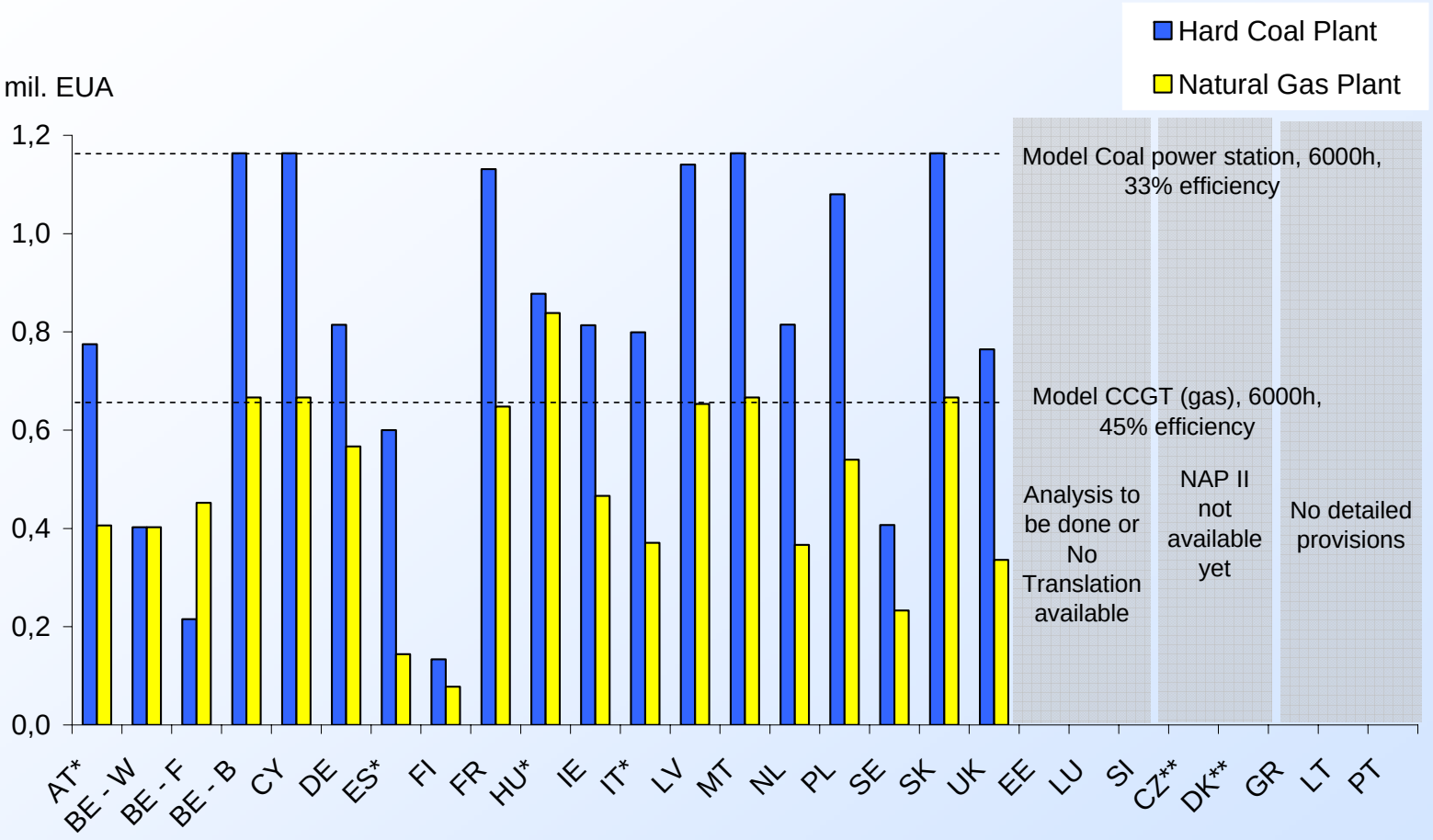
… and we seem to have made little progress moving up



Comparison of National Allocation Plans for the Period 2008-2012, Karsten Neuhoff, Markus Åhman, Regina Betz, Johanna Cludius, Federico Ferrario, Kristina Holmgren, Gabriella Pal, Michael Grubb, Felix Matthes, Karoline Rogge, Misato Sato, Joachim Schleich, Jos Sijm, Andreas Tuerk, Claudia Kettner, Neil Walker

Reduce distortions from allocation

And the level of allocation is not trivial



Comparison of National Allocation Plans for the Period 2008-2012, Karsten Neuhoff, Markus Åhman, Regina Betz, Johanna Cludius, Federico Ferrario, Kristina Holmgren, Gabriella Pal, Michael Grubb, Felix Matthes, Karoline Rogge, Misato Sato, Joachim Schleich, Jos Sijm, Andreas Tuerk, Claudia Kettner, Neil Walker

Conclusion on free allocation

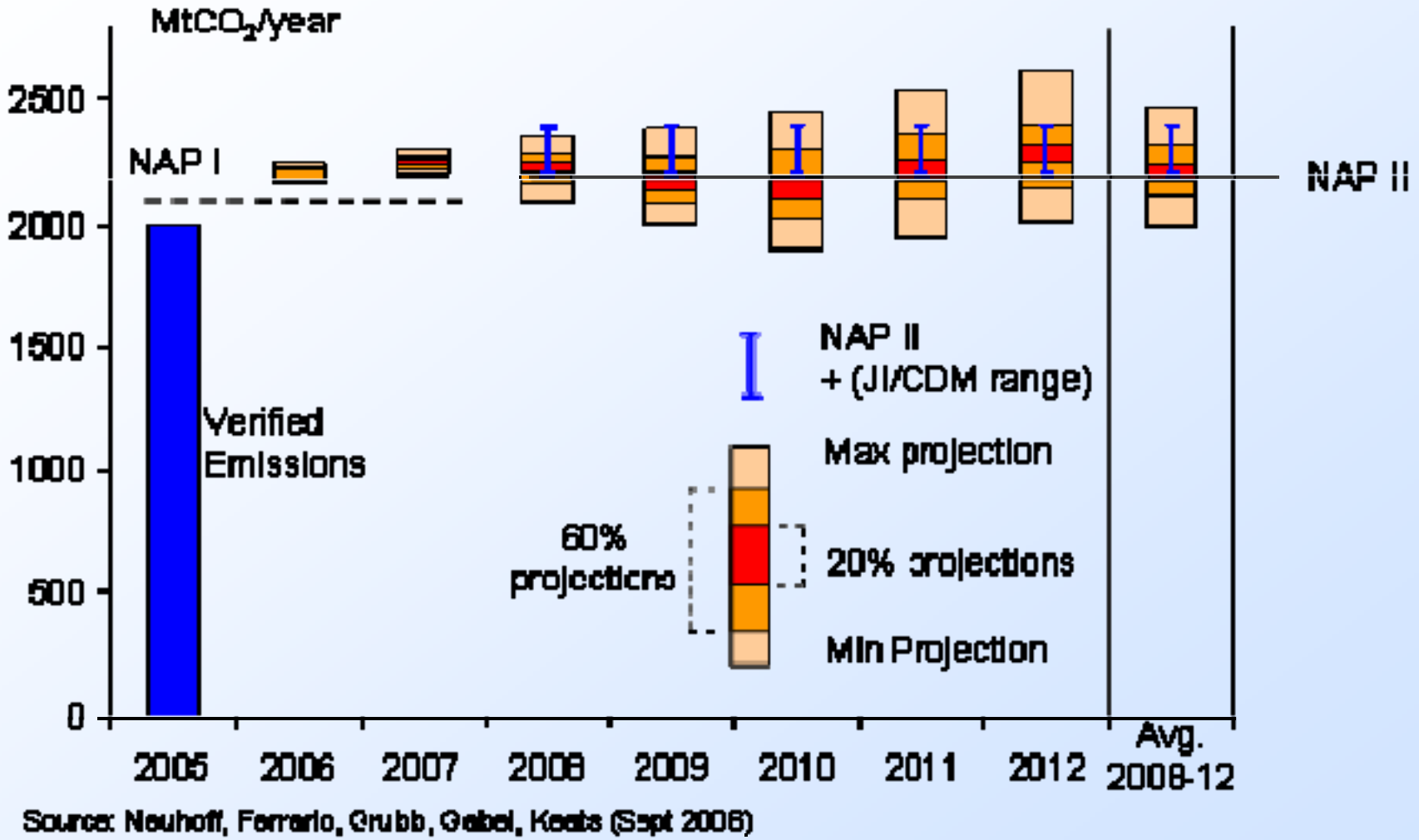
- Distortions from free allocation strong if there are expectations of continued high allocation post 2012
- Phase out free allocation post 2012
  - Potentially conditional on measures to address international competitiveness for certain sectors

-> Go through state aid assessment

- Free allowance allocation is state aid
- Some can be justified as proportional to cost of transition
- This would likely require committing to no further free allocation post 2012

-> PERFECT

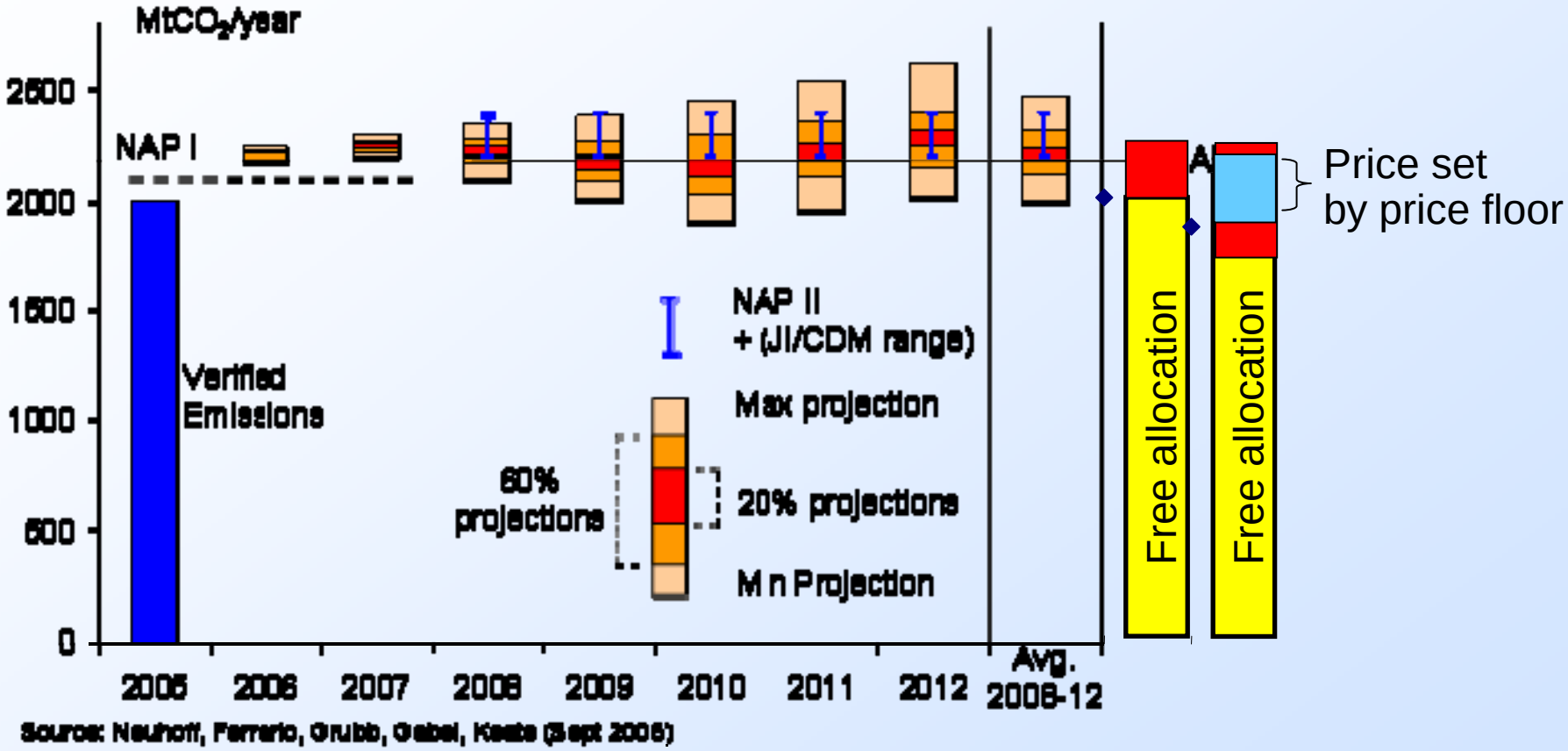
Numerical evidence – projection uncertainty Phase II



Source: Neuhoff, Ferrario, Grubb, Gabel, Keats (Sept 2006)

- Cap envisaged in NAPII too lax –> expected price low –> revisit NAPII
- Projections difficult – uncertainty about price likely to remain

Also viable in short-term: Auctions with price floor



Coordinated auction with price floor can set floor to allowance price

- Facilitates low carbon investment
- Reduces emissions and thus allowance price

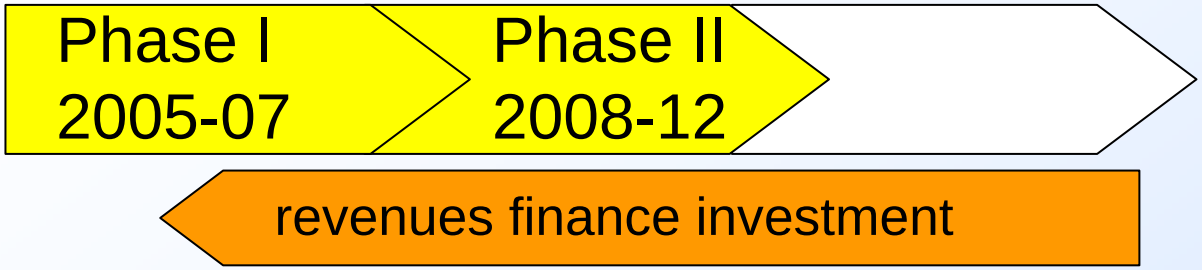
Detail – auctions with price floor

- Auctions are viable and simple option for allocation
- Directive allows for up to 10% auctions in 08-12
- We suggest to a coordinated auction with price floor
- Use supplementarity criteria to limit CER inflows
  - if their price too low relative to desired price floor
- Some allowances from auctions will be required
  - thus they determine a price floor
- Price ceiling – difficult to align with Directive
  - price spikes unlikely given current projections
  - flexibility from CERs likely to prevent price spikes

Source: Hepburn, C., Grubb, M., Neuhoff, K., Matthes, F. and Tse, M., 'Auctioning of EU ETS Phase II allowances: how and why?

Use economic instruments to create market confidence going forward

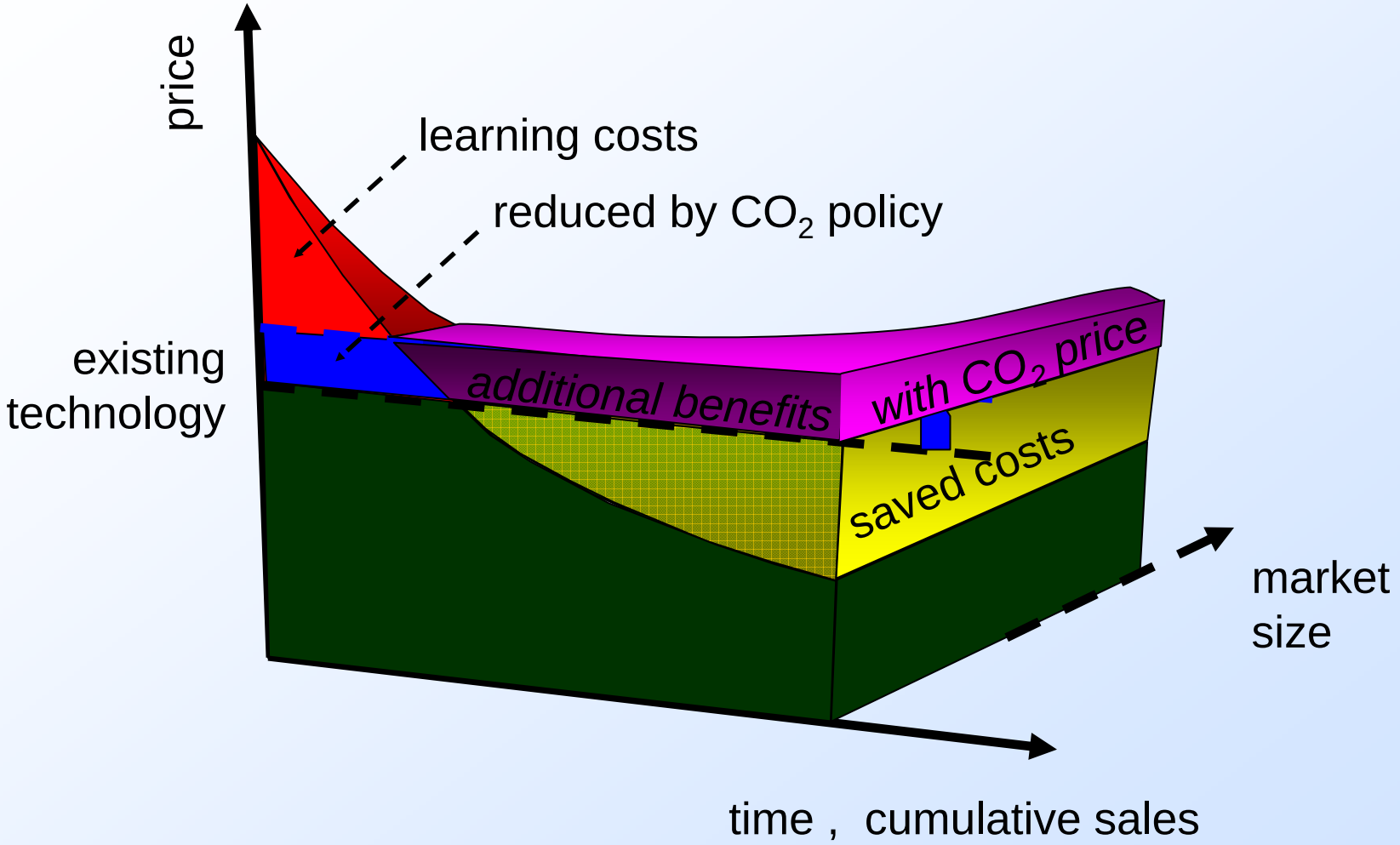
Why is commitment important?



- Investment decisions driven by mid term revenues
- Low Carbon investment often only viable with minimum CO_2 price

Use economic instruments to create market confidence going forward

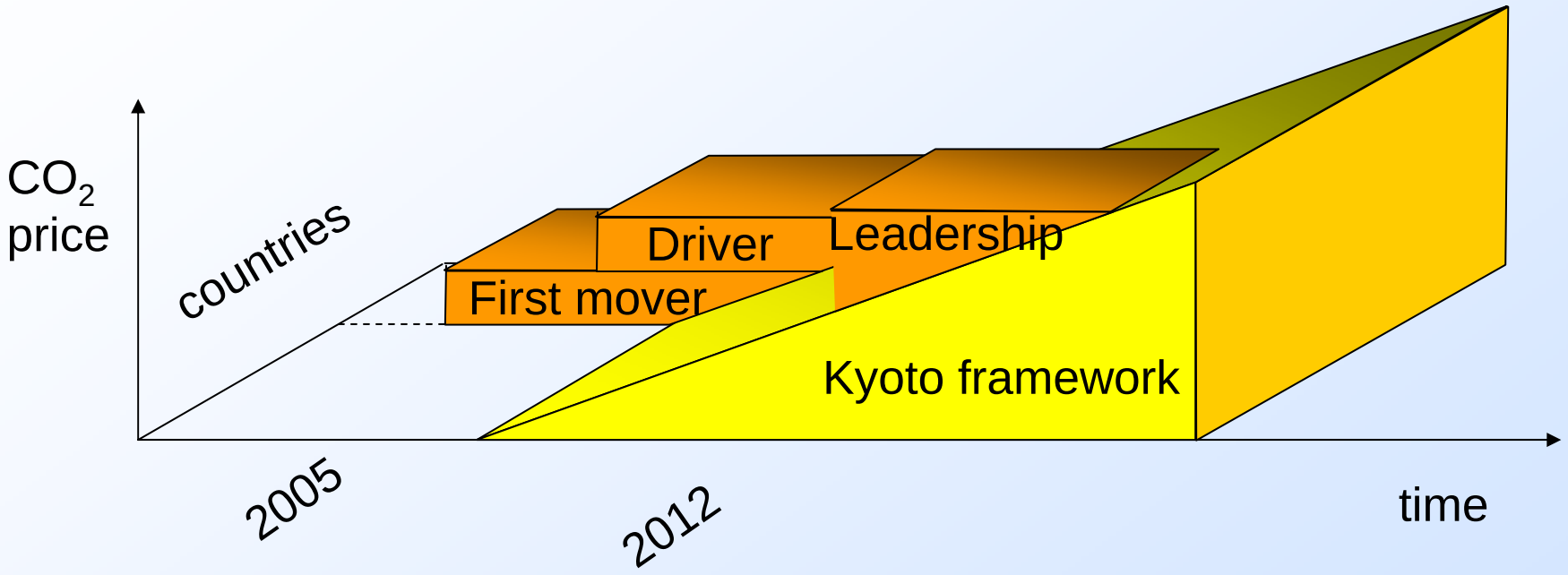
Various instruments complement each other
Example CO_2 price internalisation and technology policy



ETS is no substitute for technology policies (e.g. renewable support)

Use economic instruments to create market confidence going forward

Allow countries to take leadership



- Kyoto framework as basis and target for future convergence
- A country can take leadership with more stringent policies
  - Drives technology, behaviour and institutional change
  - Directly lowers emissions and shifts infrastructure investment
  - Demonstrates viability of policies and competes for leadership

Use economic instruments to create market confidence going forward

Benefit if countries take leadership

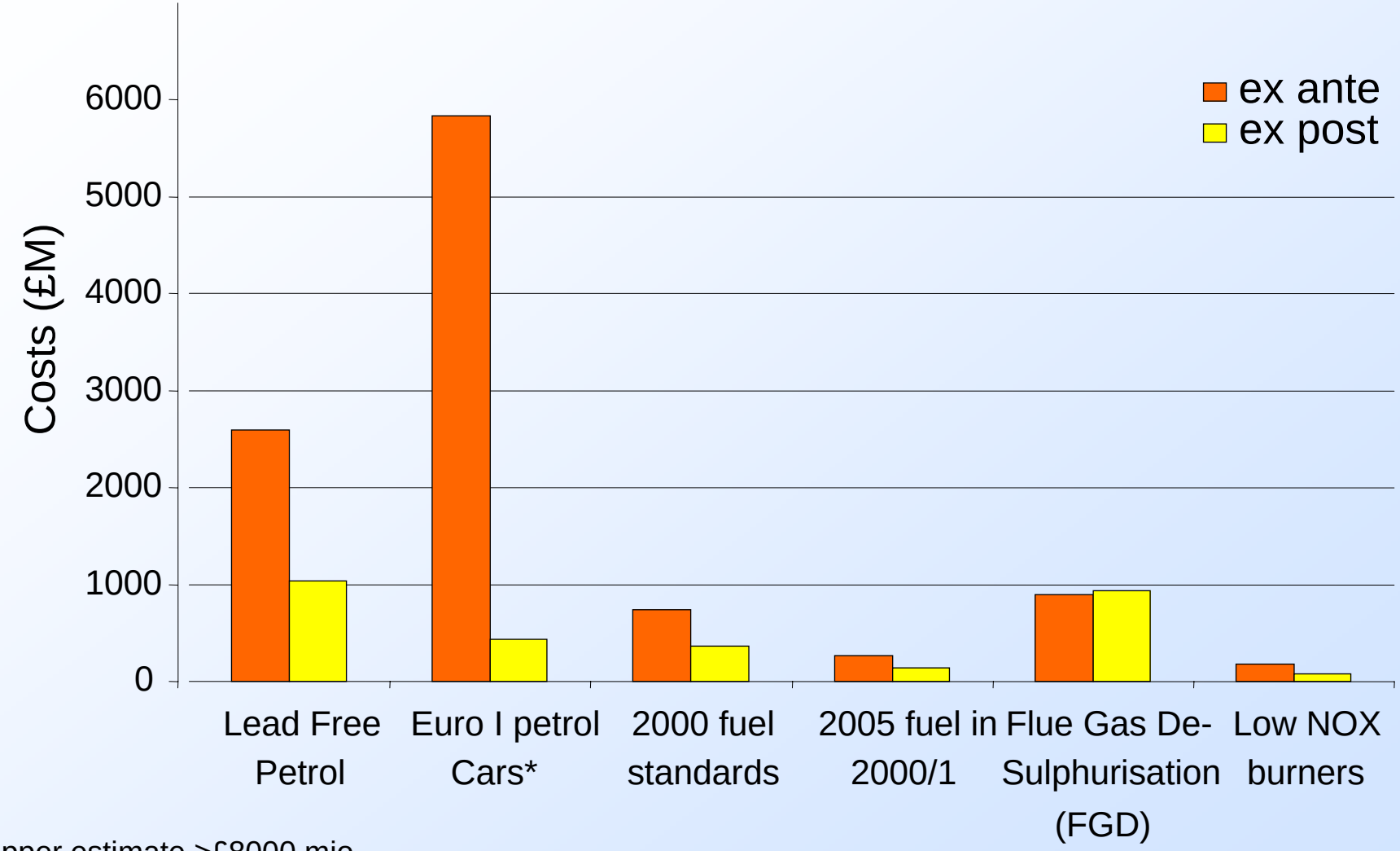
- Direct Carbon savings
  - Direct price effect on demand/input choices
  - Accelerated shift of behaviour
- Direct future Carbon savings
  - Investment in lower Carbon technologies
- Dynamic benefits
  - Accelerated development of technologies
  - Accelerated development of Low Carbon Culture
- Political benefits
  - Example of feasibility facilitates global agreement
  - Competition for leadership

Use economic instruments to create market confidence going forward

Do longer commitment periods facilitate investment?

- Create clarity about framework
- Will it be sufficiently stringent?
- Are we confident we have the right approach?
  - Addressing competitiveness
  - Linking/engaging developing countries
  - Allocation methodology
- Will it be credible?

Expected (Ex Ante) and Actual (Ex Post) Total Costs of some UK Policies during 1990-2001



* Upper estimate >£8000 mio.

Source: AEA Technology Environment, 2005, An Evaluation of the Air Quality Strategy, Report to DEFRA, available at: http://www.defra.gov.uk/

Use economic instruments to create market confidence going forward

Does increasing use of banking support price stability?

- Banking can translate short-term shocks into inter-temporal quantity transfers[1]
- We can fix price by defining long-term target price[1]
  - Requires opportunity to commit
  - Requires definition of target price level
- This seems difficult given current information:
  - 85$/t$CO_2$ Medium damage cost (Stern review)
  - 50?? $/t CO_2 Backstop low Carbon technology
  - 15-30$/t CO_2 Phase II allowance price
  - <5$/t CO_2 credits from avoided deforestation

Newell, R., W. Pizer and J. Zhang (2005) Managing Permit Markets to Stabilize Prices. Environmental and Resource Economics 31(2): P.133 - 157.

Use economic instruments to create market confidence going forward

Other options

- Open market intervention by government
- (Changing) reserve requirements on emitters
- Loans, perhaps with firms bidding interest rates
- Splitting allowances

Newell, R., W. Pizer and J. Zhang (2005) Managing Permit Markets to Stabilize Prices. Environmental and Resource Economics 31(2): P.133 - 157.

Use economic instruments to create market confidence going forward

Using option contracts to create a price floor

- Governments sell option contracts to private parties
- Creates property right, strong enforceability
- Length corresponds to desired commitment, e.g.15years
- Investors can call an option:
  - Hands in option + CO_2 allowance
  - receives strike price, e.g. 15 Euro/t CO_2
- Hedges investment, and also stabilises CO_2 price:
  - Investors will call options if p_{CO2}<15 Euro/tCO_2

    -> Reduce supply, pushes up price
  - Governments avoid buying back allowances

    -> Restrict issuing allowances to retain scarcity price

Ismer, R. and Neuhoff, K. (2006) 'Commitments through financial options: a way to facilitate compliance with climate change obligations'

Theory of collective action

- **Chang structure of incentives** – increase shared understanding, make links to wider range of benefits, side payments
- **Reciprocity** … repeated game structure helps
- **Frequency of interaction/contacts and transparency** increases cooperation in repeated games
- **Reputation** can play an important role – a leader can create a **positive dynamic** by demonstrating willingness to co-operate … and the actions of the leader have strong **influence on the beliefs** that others hold about the prospects of cooperation

Quoted from Stern review

Conclusions

- Avoid distortions from allocation
  - No more free allocation post 2012
- Ensure strong price till 2012
  - Stringent caps
  - Consistent JI/CDM limits
  - Allowance auctions with price floor
- Use economic instruments to create market confidence
  - Drives innovation
  - Banking / longer commitment periods difficult
  - Government issued financial option contracts
- More detail on www.electricitypolicy.org.uk/tsec/2