Three pillars
Three levels
Three timescales

- some observations for structuring analysis of international negotiations

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The Stern Triad & other triads

- Three pillars
  - Carbon pricing/cap & trade
  - Regulation & behaviour
  - Investment & innovation
- Three levels
  - Global governance
  - Negotiating entities (‘nation states’)
  - Implementing entities (jurisdiction on price, regulation, etc)
- Three timescales
  - ‘Energy efficiency & fuel switching’ timescales – 2-5 year paybacks & operational emissions
  - Technology purchase decisions – 5-15 years
  - Innovation and infrastructure – 15-50 years+
  - The paradox of Stern economics – power sector economics

Empirical foundations: what systems?

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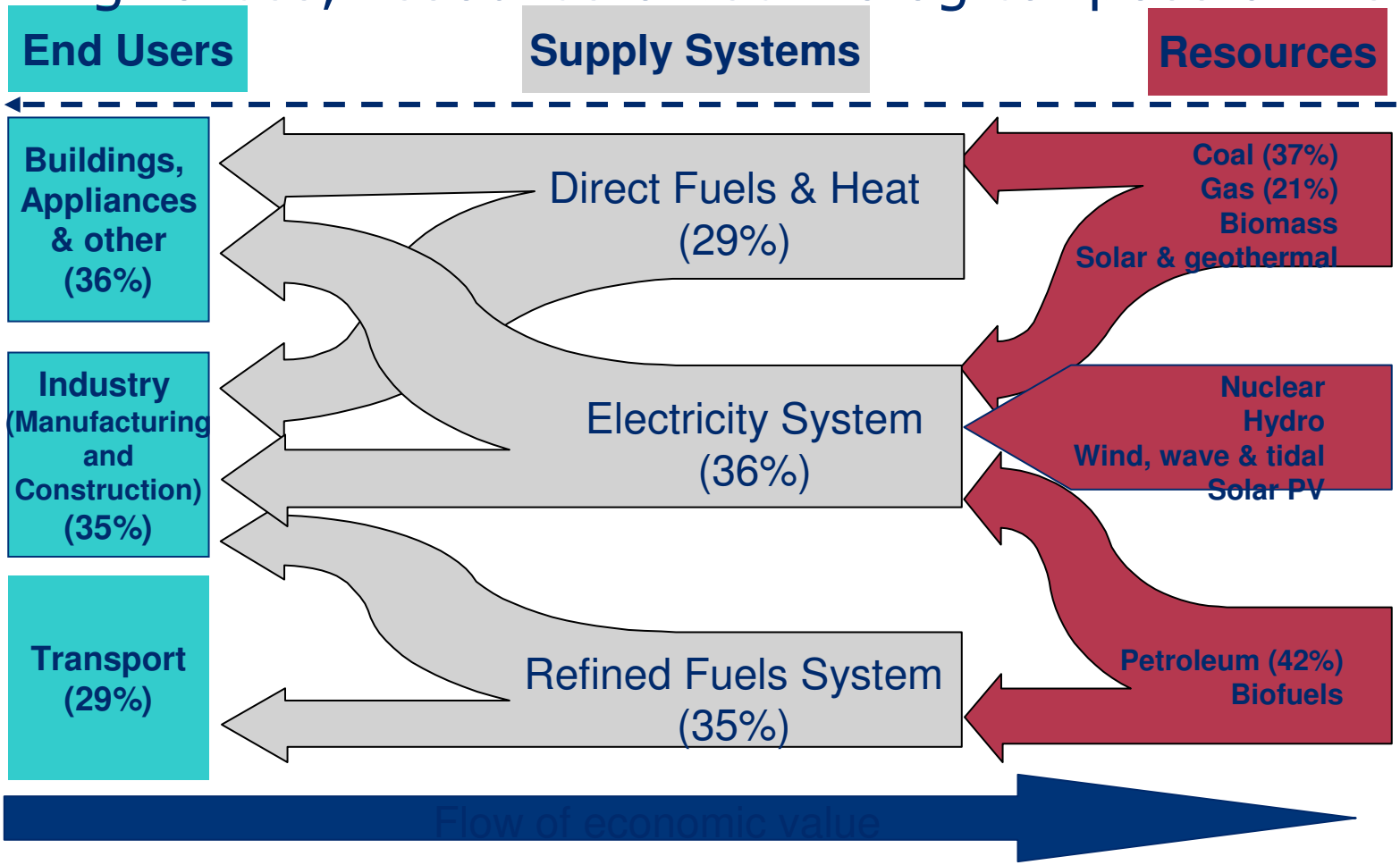
Energy-CO2 emissions arise from six main components that are diverse in structural & economic characteristics, driving forces, resource & technological possibilities …



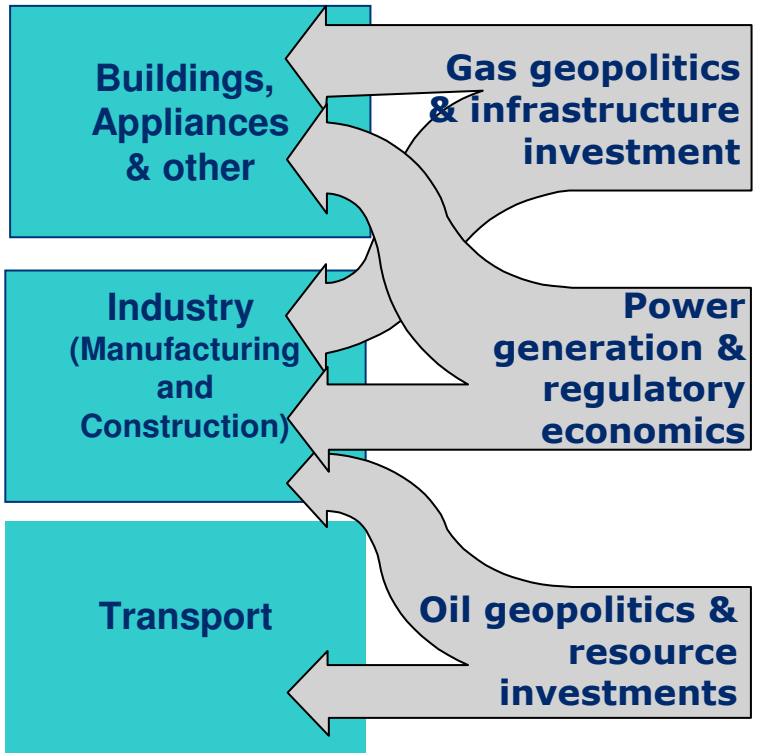
The data show the % of global energy-related CO2 emissions associated with the different parts of the energy system (including emissions embodied in fuels and electricity). Note that patterns vary between regions (eg. industry is lower and transport higher in developed economies), and the sectors are growing at different rates (over past 30 years, energy demand for buildings:industry:transport has grown at 2.6%:1.7%:2.5% annual average (LBNL ref)

Note: Some small flows that comprise under 1% of global energy flows (eg. electricity and natural gas contributions to transport) are not shown **End Users:** Source: IEA. 'Non-electric energy industries' (emissions from refineries, gas etc) allocated 4:1:2 to transport:industry:buildings etc

Supply Systems: Electricity System data IEA; Refined Fuels %CO2 assumed equal to Petroleum % CO2; direct fuels and heat is the residual.

Resources: Source EIA

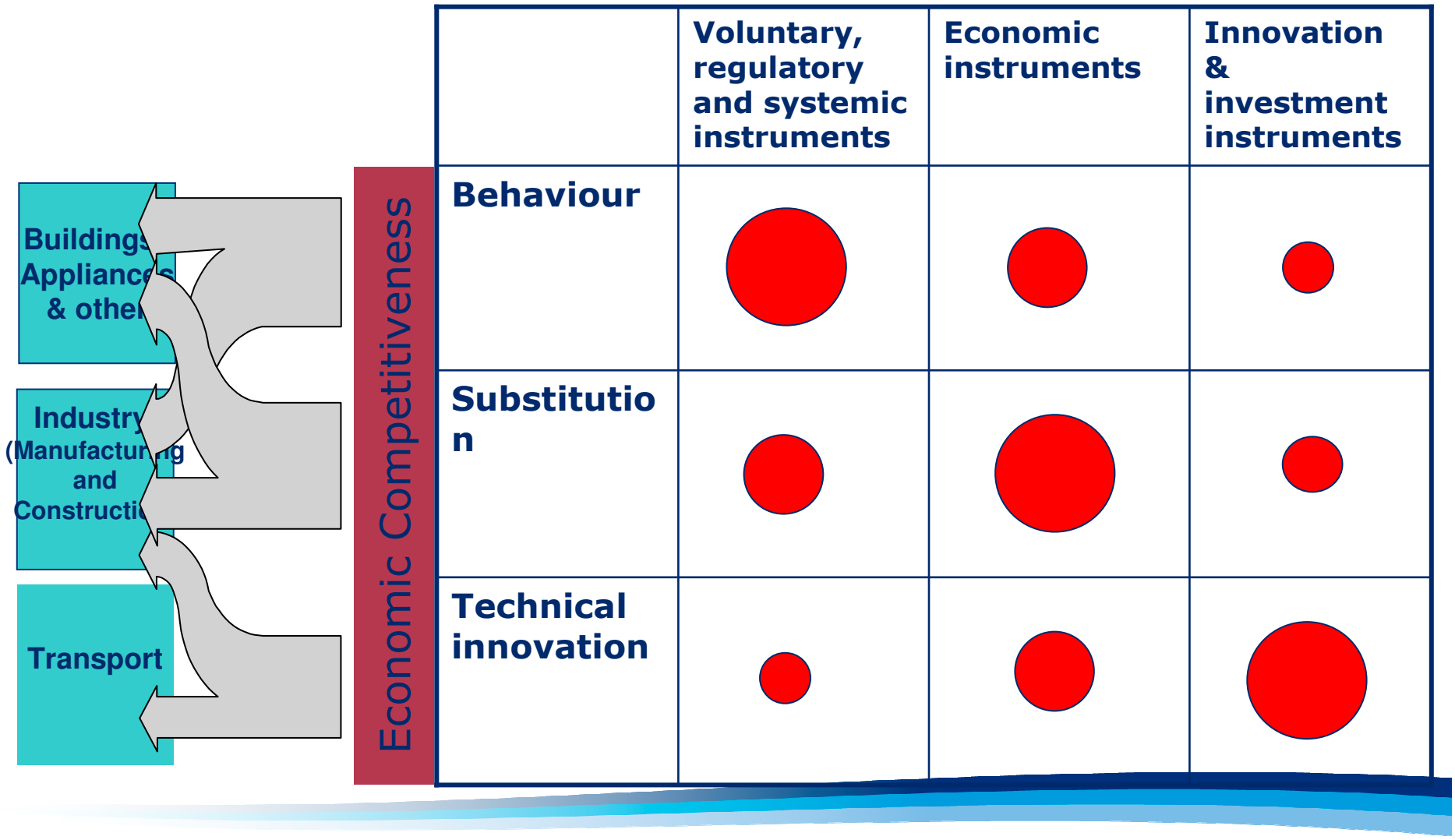
Differing structural characteristics are reflected in different behavioral drivers and concerns that policy must address



Sector	**Dominant issues for energy-carbon management**
Direct fuels and buildings (50%)	Consumer & organisational behaviour, barriers, co-benefits, infrastructure
Power generation and heavy industry (50%)	Prices, regulatory structure, competitiveness and industrial innovation
Oil and transport (30%)	Consumer behaviour, vehicle innovation, infrastructure, resource investment trajectory

Different drivers and concerns imply different instruments

- mitigation not delivered by one policy any more than one technology
- costs and competitiveness reflect the range of +ve & -ve impacts



International implications of complexity

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Faced with such complexity,
sovereignty of instrument choice is fundamental

- Political systems arrive at different instrument choices and at different timescales
- Minimise the number of specifics on which countries need to agree
- All precedents suggest that 'harmonising policies and measures' (including taxation) is a road to nowhere
- Remember the EU Carbon Tax?
  - Even in relatively small homogenous regions such as carbon taxes introduced across **Scandinavia** from 1990-1992:
  - 'The taxes differ considerably regarding rates, tax base and exemptions .... nominal rates are currently the highest for Danish Households. Sweden and Norway have the highest rates for industry, however, Norway applies the high rate to offshore oil and gas .. all four countries have [differing] special arrangements for energy-intensive companies ...'

- Mikael Skou Anderson (2004), 'Vikings and Virtues: a decade of CO2 taxation', Climate Policy Vol.4(1):13-24

At national level, quantified targets give the greatest *scope* and most broad-ranging *incentives* to limit emissions

- National caps on total GHG emissions incentivise action *across the full range of sectors, processes and instruments*
- Retain maximum flexibility, sovereignty and potential efficiency of domestic implementation choices
- No other credible proposals have emerged in the international negotiations
- It provide a platform for a range of other existing instruments of global importance including for international transfers:
  - CDM and variants (such as sectoral CDM)
  - Dual and one-way commitment proposals for developing countries

There are many options for target-based agreements – *a classification*

Type of quantification	**Fixed for period**	**Dynamic indexed**
Usual reference point	Define relative to base-year emissions (would be updated)	Indexed on GDP growth (intensity change)
Other possible reference points	Define relative to: •base-year population •base-year GDP •decomposition hybrid (mix by sector, as in the Triptych approach) •cumulative basis (e.g., Brazilian)	Indexed on: •population growth (per-capita change); Emissions relative to: •population (absolute per-capita) •GDP (absolute intensity) With transitional variants (e.g., per-capita convergence)

Options for target legal status according to different circumstances:
Trading-compatible: unconditional binding; price-cap;
Developing country options rel. binding core: 'dual'; one-way

Also various options for non-target-based agreements

- but still weak in terms of innovation & infrastructure

Nature and coverage	**Sector absolute emissions**	**Sector-indexed emissions**	**Project crediting**	**Domestic action agreements**	**Cooperation and funding agreements**
Options for reference point	•Relative to historical emissions •Relative to model-based projections	• Indexed to physical production • Benchmarked to best practice	Various baseline projection methods	E.g., • Subsidy reduction • Technology standards • Carbon taxation	
Examples	EUETS "Sector CDM" proposals (absolute, one-way)	"Sector CDM" proposals (indexed, one-way)	Kyoto project mechanisms (JI, CDM)	•WTO tariff agreements and subsidies code •Kyoto Protocol, Article 2, (PAMs).	•GEF and other funds •UNFCCC and Kyoto technology transfer and capacity building agreements •IEA CTI

Carbon pricing & trade: sector focusing

(re Barroso / Commission package)

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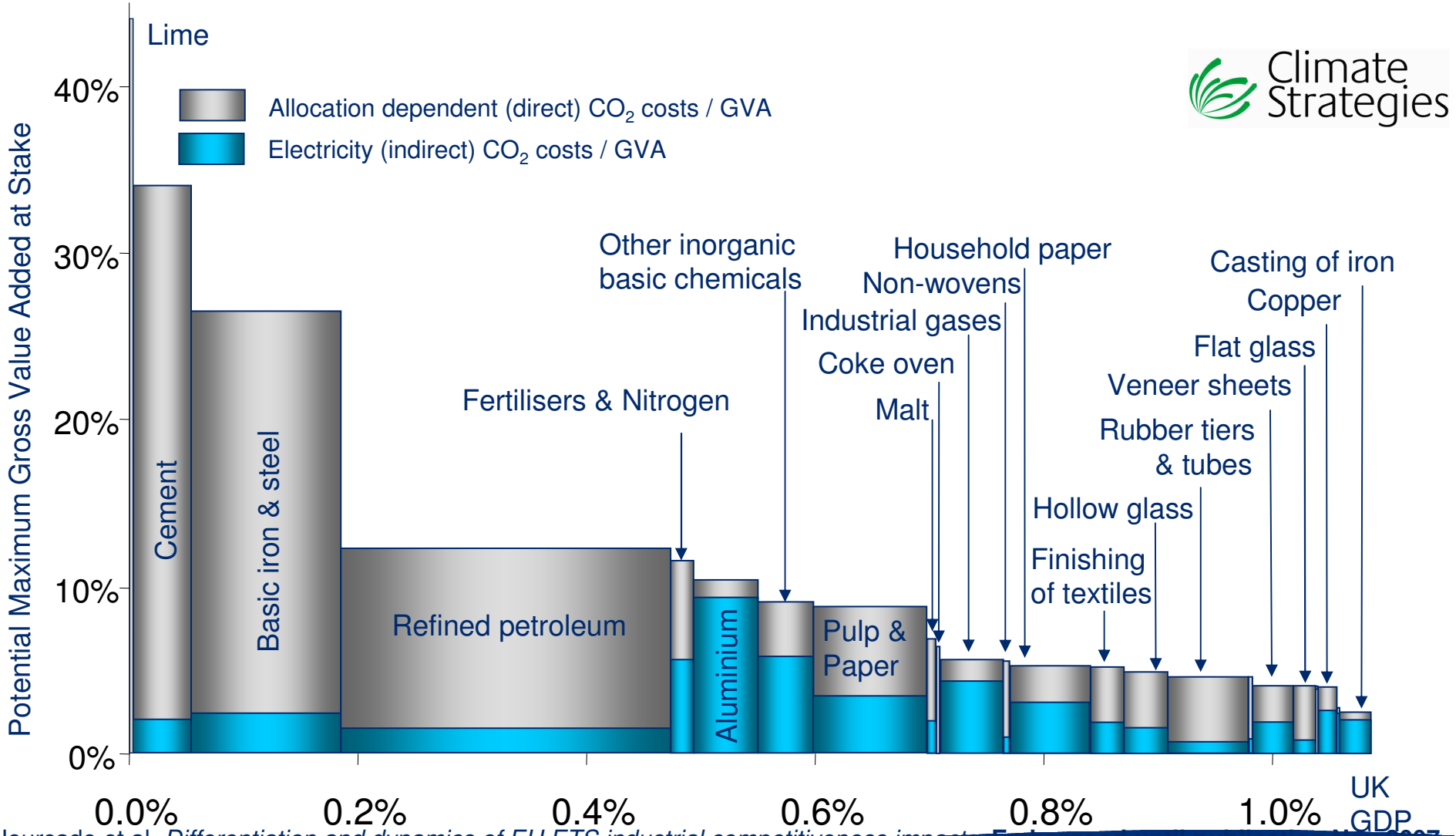
Project convened by:

Competitiveness impacts in a world of unequal action are not macroeconomic, but sectoral for a few specific cases



Hourcade et.al. *Differentiation and dynamics of EU ETS industrial competitiveness impacts* [illegible] until publication Nov 2007

CO_2 = €20/t CO_2; Electricity = €10/MWh

Out of 159 UK manufacturing activities studied, only a few are potentially exposed: classification & responses

Significantly: cement/clinker; steel from blast oxygen furnaces; aluminium.	EU cement and steel producers could lose up to 8% market share to overseas production in central price cases with highest trade sensitivities. Sufficient free allocation to maintain their profits can buy time to negotiate a multilateral response to trade exposure.
Plausibly : fertilisers & nitrogen compounds; 'other' inorganic basic chemicals; pulp and paper	Should be in the EU ETS with a compensating rate of free allocation, combined with others measures to help them tackle their exposure to carbon and electricity costs.
Potentially at higher C prices: some refineries; manufacture of glass; household paper; tyres; copper; possibly 1-2 other basic chemicals	At higher carbon prices some products from some refineries and from a few other big activities could face trade impacts. Should be in the EU ETS; modest free allocation in Phase III, particularly for new sectors. would protect profits and give time to invest in lower carbon solutions, but should not extend beyond that.
Exposed, but very small: Notably lime production	Loss of market share to overseas production would involve tiny absolute carbon leakage. A political decision as to whether to ignore, offer protection, or exempt.

The resurrected stage for international negotiations:

The Bali Action Plan

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Bali Action Plan (i)

Recognizing that deep cuts in global emissions will be required to achieve the ultimate objective of the Convention and emphasizing the urgency1 to address climate change as indicated in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,

1. *Decides* to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia:

(a) A shared vision for long-term cooperative action, including a long-term global goal for emission reductions, to achieve the ultimate objective of the Convention, in accordance with the provisions and principles of the Convention, in particular the principle of common but differentiated responsibilities and respective capabilities, and taking into account social and economic conditions and other relevant factors;

Bali Action Plan (ii)

(b) Enhanced national and international action on mitigation of climate change, including, inter alia, consideration of:

(i) Nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances, in measurable, reportable and verifiable way

(ii) Measurable, reportable and verifiable nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported by technology and enabled by financing and capacity-building;

(iii) Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries;

Bali Action Plan (iii)

(c) Enhanced action on adaptation, including, inter alia, consideration of:

(i) International cooperation to support urgent implementation of adaptation actions …

(ii) Risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance;

(iii) Disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change;

(iv) Economic diversification to build resilience;

(v) Ways to strengthen the catalytic role of the Convention in encouraging multilateral bodies, the public and private sectors and civil society, building on synergies among activities and processes, as a means to support adaptation in a coherent and integrated manner;

Bali Action Plan (iv)

(d) Enhanced action on technology development and transfer to support action on mitigation and adaptation, including, inter alia, consideration of:

(i) Effective mechanisms and enhanced means for the removal of obstacles to, and provision of financial and other incentives for, scaling up of the development and transfer of technology to developing country Parties in order to promote access to affordable environmentally sound technologies;

(ii) Ways to accelerate deployment, diffusion and transfer of affordable environmentally sound technologies;

(iii) Cooperation on research and development of current, new and innovative technology, including win-win solutions;

Bali Action Plan (v)

(e) Enhanced action on the provision of **financial resources and investment** to support action on mitigation and adaptation and technology cooperation, including, inter alia, consideration of:

(i) Improved access to adequate, predictable and sustainable financial resources and financial and technical support, and the provision of new and additional resources, including official and concessional funding for developing country Parties;

(ii) Positive incentives for developing country Parties for the enhanced implementation of national mitigation strategies and adaptation action;

(iii) Innovative means of funding to assist developing country Parties that are particularly vulnerable to the adverse impacts of climate change in meeting the cost of adaptation;

(iv) Means to incentivize the implementation of adaptation actions on the basis of sustainable development policies;

(v) Mobilization of public- and private-sector funding and investment, including facilitation of carbon-friendly investment choices;

(vi) Financial and technical support for capacity-building in the assessment of the costs of adaptation in developing countries, in particular the most vulnerable ones, to aid in determining their financial needs;

… to complete by Dec 2009 !

Combination of allocation and cost pass-through decisions drive profit or loss, but latter drives impact on consumption, leakage and hence production - Example of EU Cement Sector

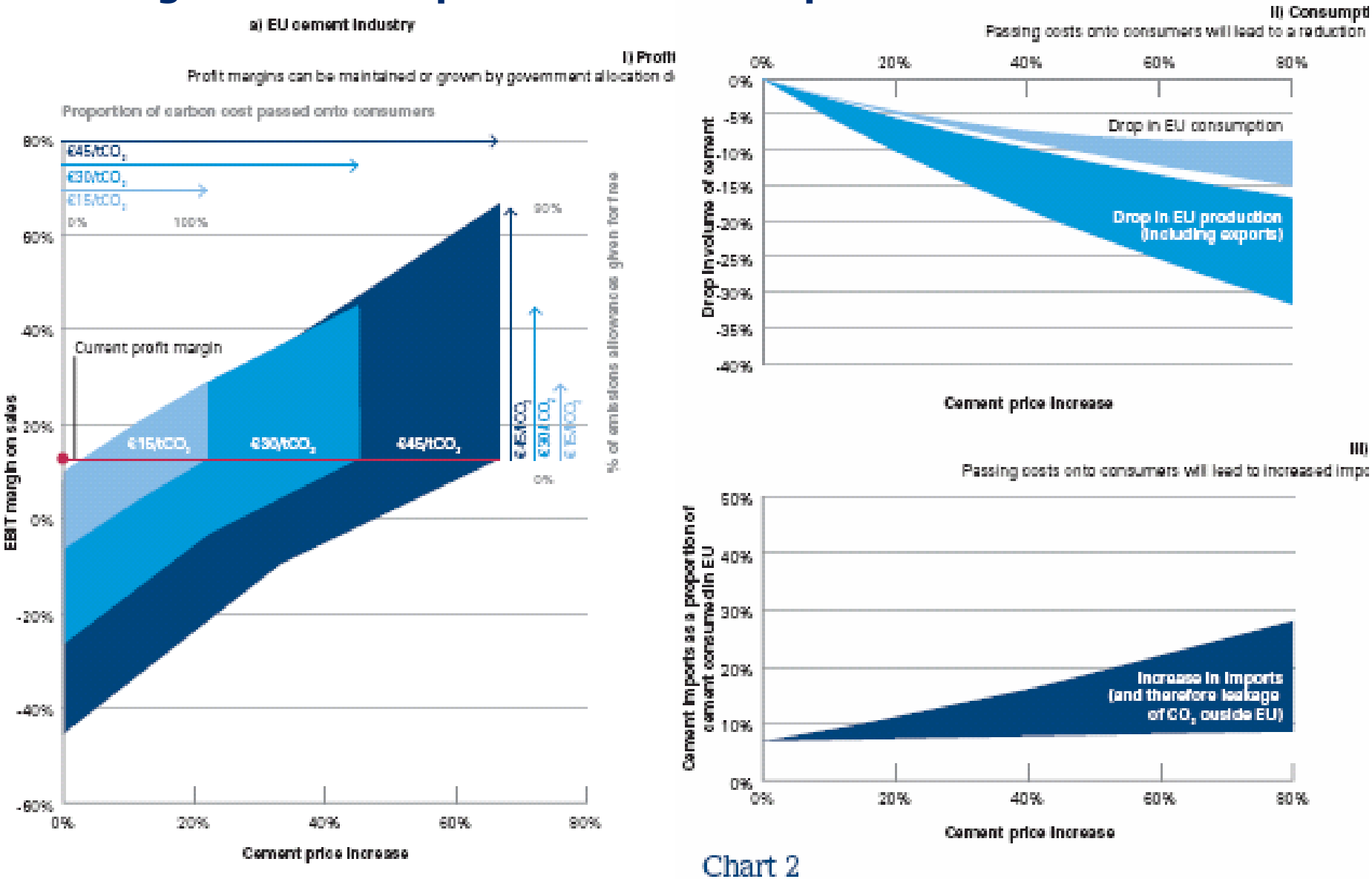

Chart 2