Consumption Accounting and Trade Policy

Consumption-based accounting workshop - Implications for Policy

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Imperial College London

Consumption accounting and trade policy

- Quantifying embodied carbon in international trade
  - Global flows
  - Country-level impact of consumption accounting

- Impact of embodied carbon flows in UK emissions
  - Consumption emissions by sector
  - Forecasting future UK consumption emissions

- Embodied carbon and EU ETS coverage
  - Production v consumption
  - Aluminium emissions

- Trade policy implications
  - Mechanisms
  - Measurement

Top 10 regional flows of CO_2 embedded in goods and commodities

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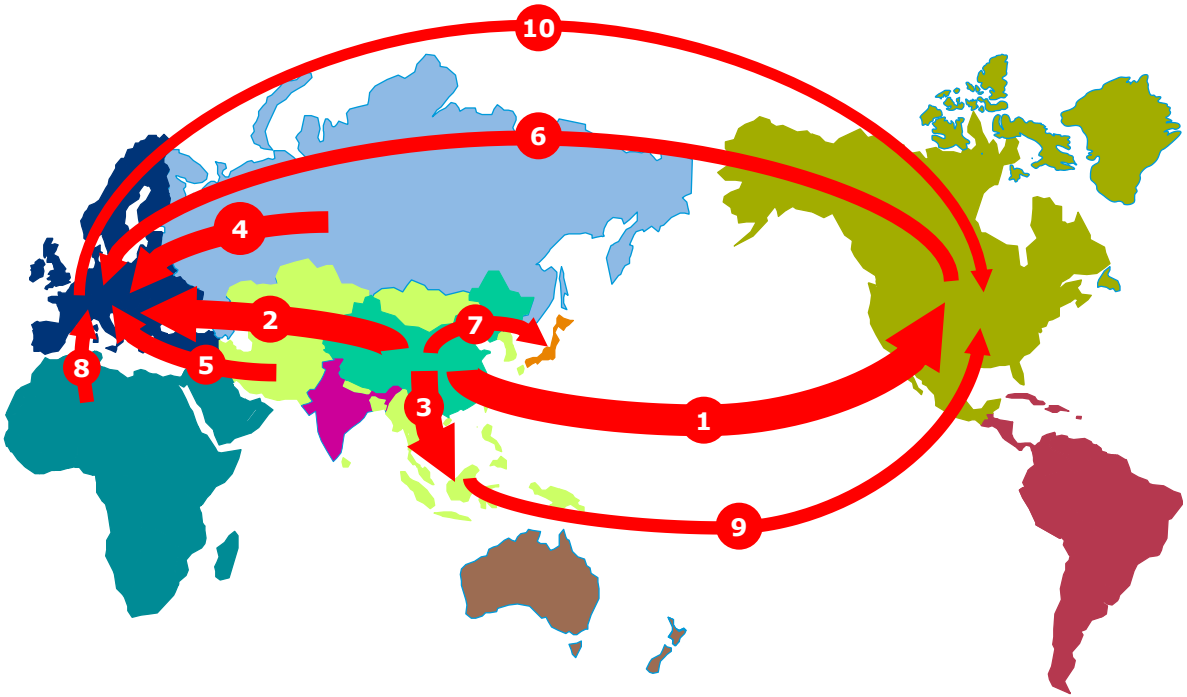
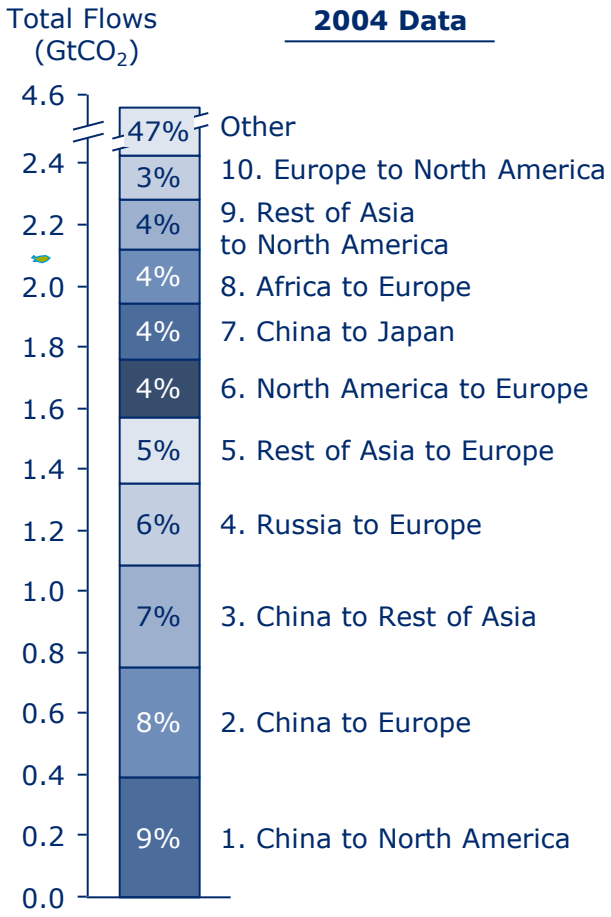
2004 Data





Note: Rest of Asia excludes China, Japan and India
Data includes flow of Scope 1-3 (direct, indirect and upstream) emissions arising in region of export that are embodied in trade flows to the region of import
Source: Carbon Trust Analysis; CICERO / SEI / CMU GTAP7 EEBT Model

A consumption perspective alters the distribution of emissions between countries

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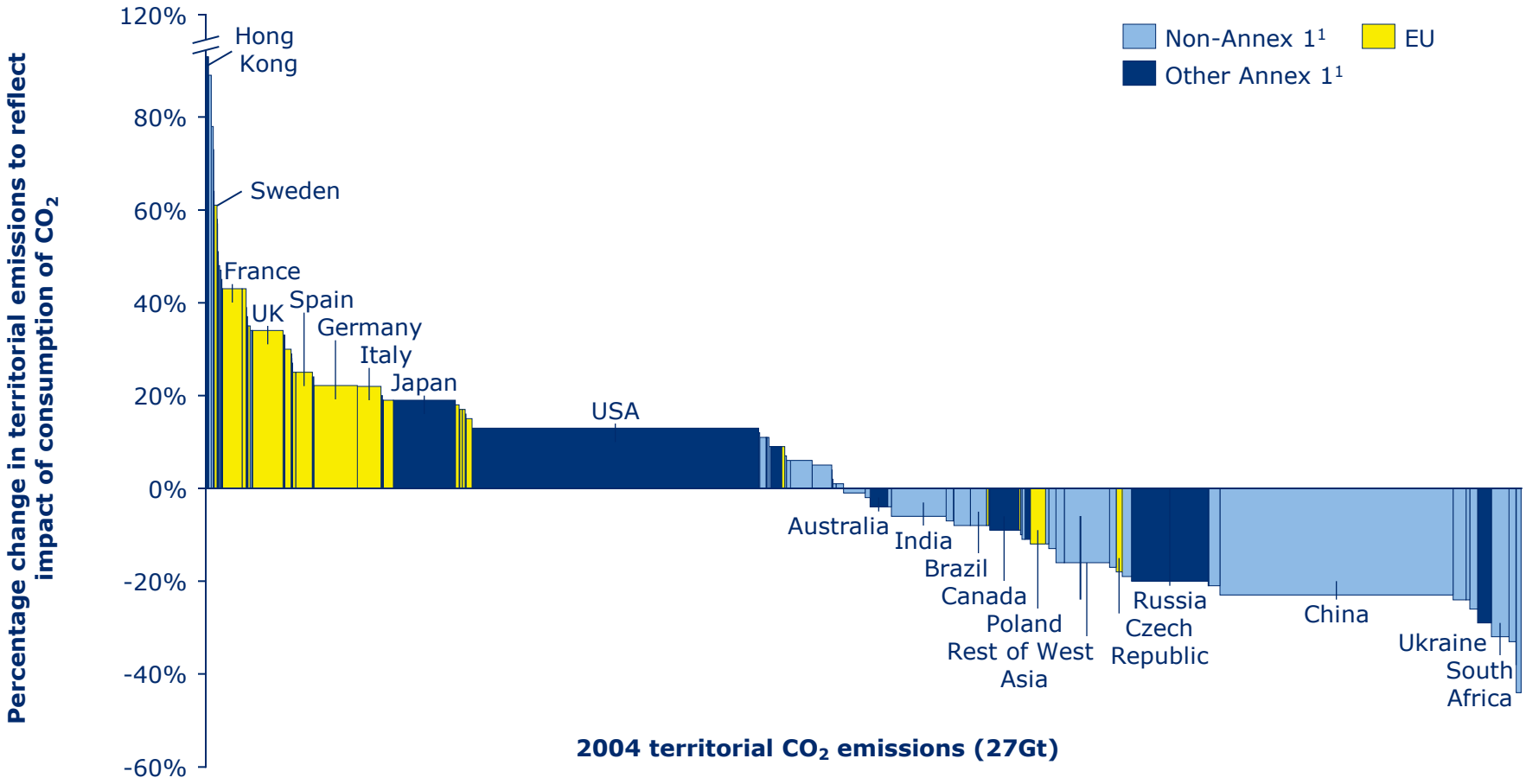

1. Annex 1 to UNFCCC

Note 1: Includes CO_2 emissions from production, process, transport and household sources only (27Gt in 2004); excludes non-CO2 emissions, and emissions due to land-use-change

Note 2: Based on an MRIO (multi region input/output) model allocating emissions to regions of consumption

Source: Carbon Trust Analysis; CICERO / SEI / CMU GTAP7 MRIO Model (2004)

Flows are evenly split between goods and commodities

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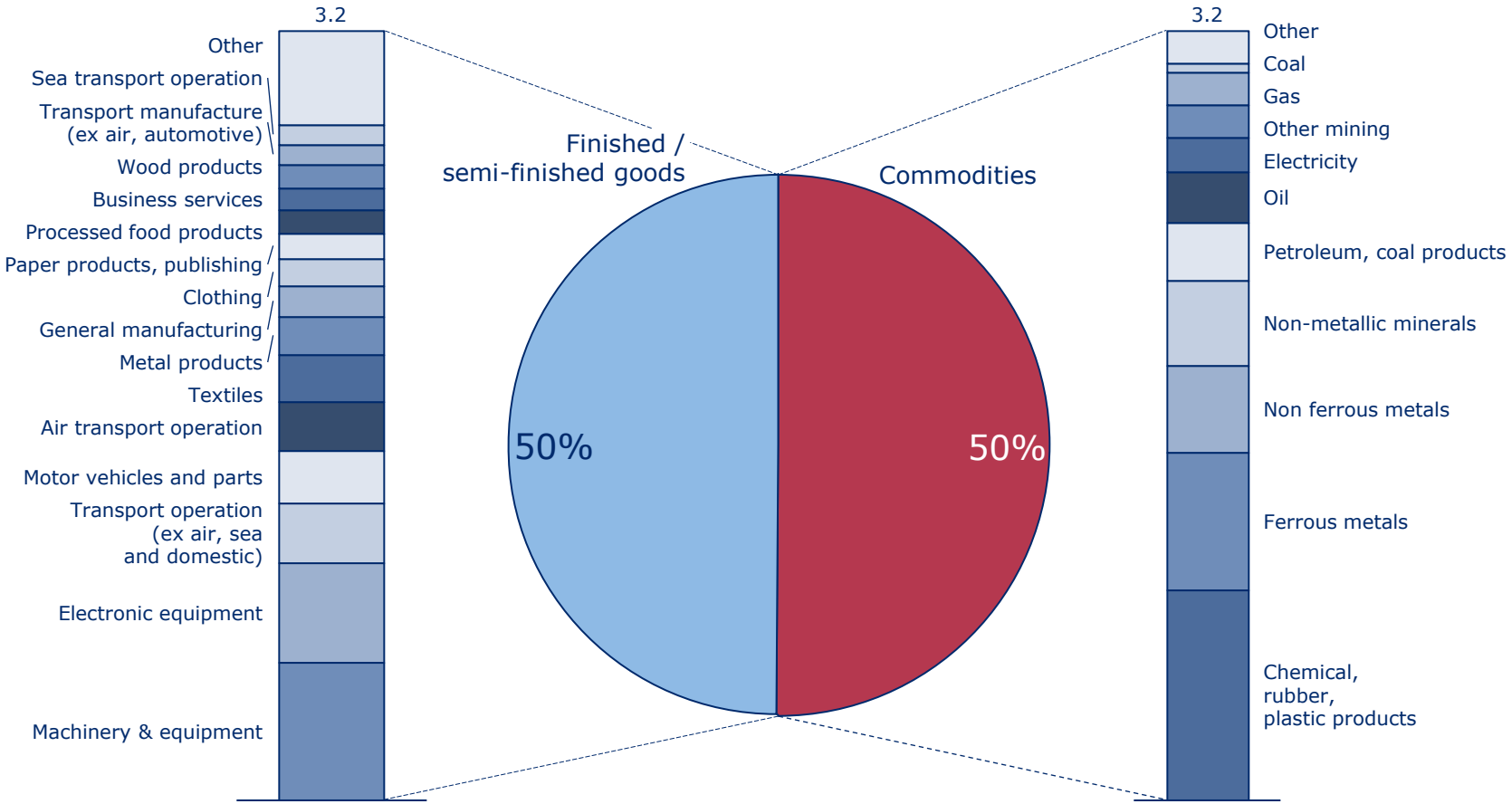
2004 Data

Global flows between countries, $GtCO_2$



Source: Carbon Trust Analysis; CICERO / SEI / CMU GTAP7 EEBT Model (2004)

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Majority of UK non-household emissions arise outside the UK

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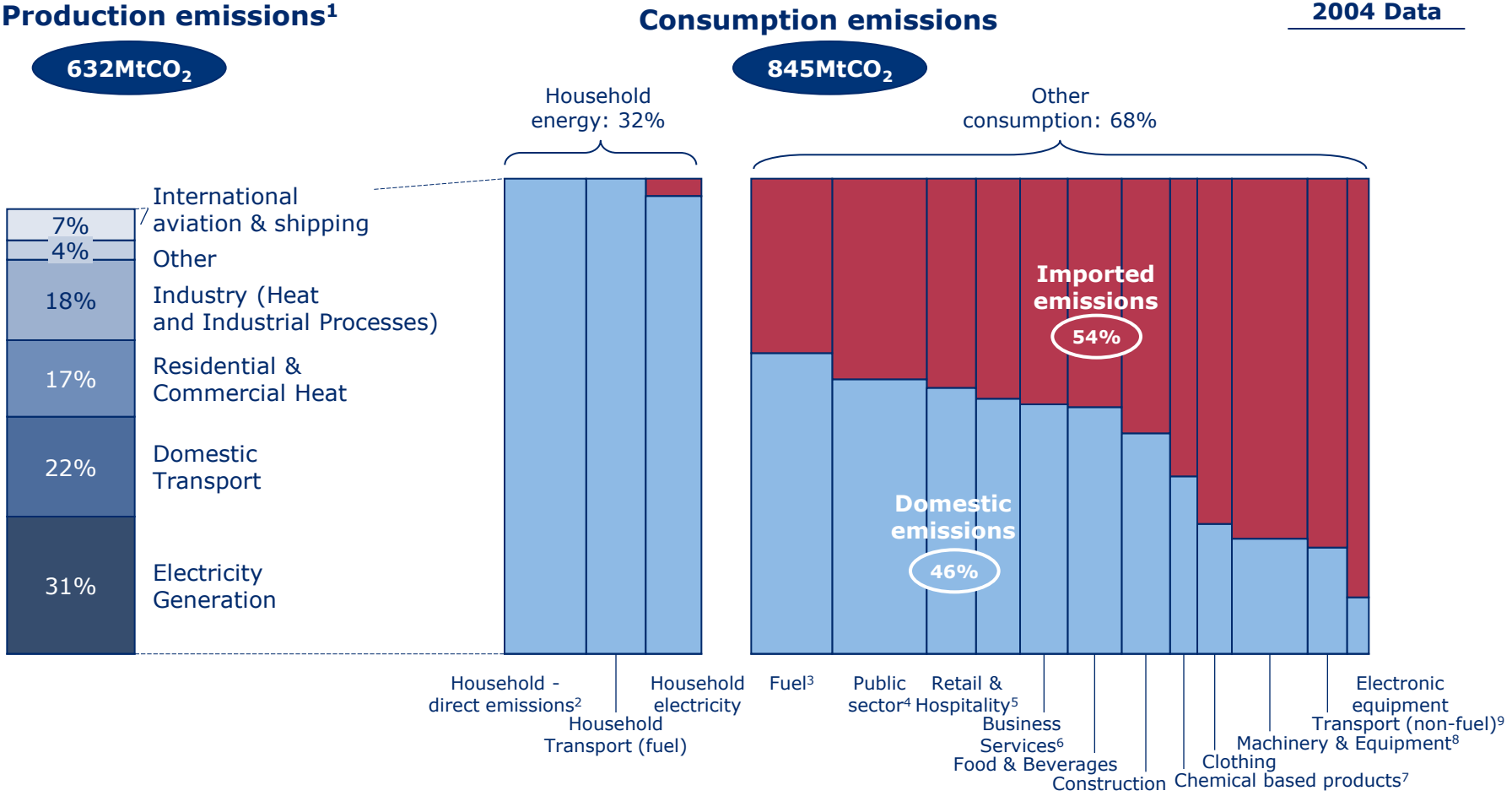
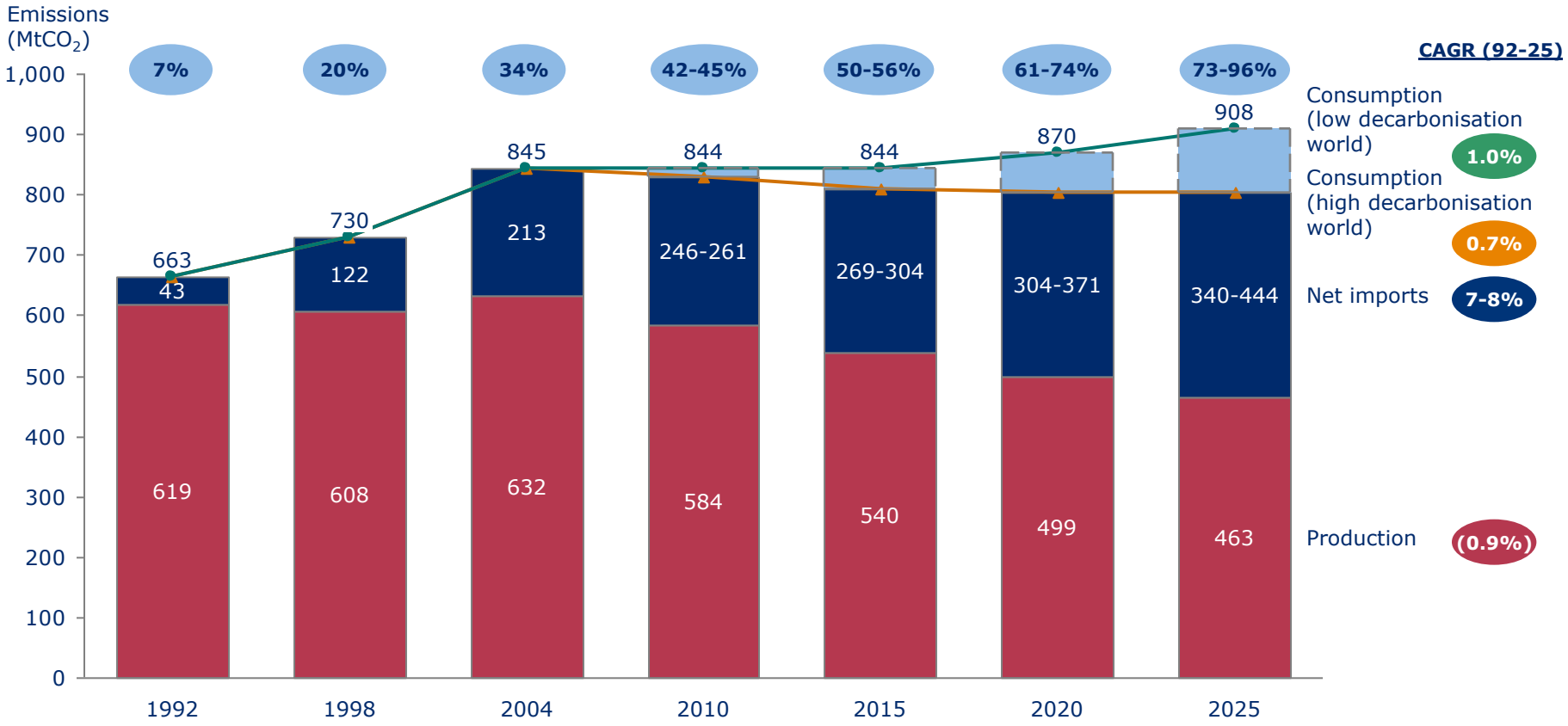


Note 1: CO_2 only – excluding non CO_2 emissions and land use change

1. Based on split of emissions from Committee on Climate Change (CCC) 2. All direct combustion of fuel in households for heating, cooking, etc 3. Includes all non-domestic Air, Rail, Sea & Road transport operation 4. Includes Defence, Health & Public Administration 5. Includes Retail, Hotels, Restaurants 6. Includes Financial Services, Communication Services and other business services 7. Includes household chemicals, cosmetics, pharmaceuticals 8. Includes domestic appliances and industrial machinery 9. Includes automotive, aviation, rail, road and marine

Source: CT Analysis; CICERO / SEI / CMU GTAP7 MRIO Model (2004); CCC

By 2025, the UK's imports could have as much carbon embodied as its domestic production



Note 1: Declining UK production emissions based on CO_2 reduction involved in UK achieving 2020 carbon budget for CO_2e reduction of 34% vs 1990 levels (Committee on Climate Change)
Note 2: Growth in imported emissions based on continuation of historic growth in UK trade balance, and varying degrees of decarbonisation in the exporting countries. In the "high world decarbonisation" scenario it is assumed that the emissions intensity of exports from Brazil, Russia, India and China (BRIC nations) decline in line with the targets noted in the Copenhagen Accord (2009), that exports from the EU and other Annex I nations decline in line with the EU's target to reduce emissions by 20% from 1990-2020, and that exports from the rest of the world achieve decarbonisation of the order of half that achieve in the BRIC countries. In the "low decarbonisation" scenario is assumed that the EU hits its targets as stated in the "high decarbonisation scenario", that all other Annex I nations and the BRIC nations achieve half the level of decarbonisation as in the "high decarbonisation" scenario, and that the rest of the world does not decarbonise at all
Source: Carbon Trust Analysis

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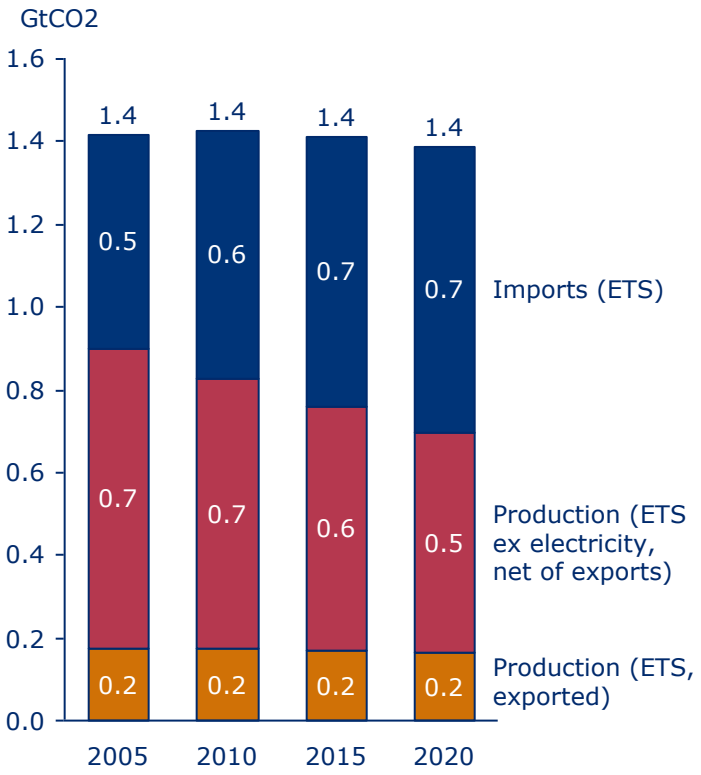
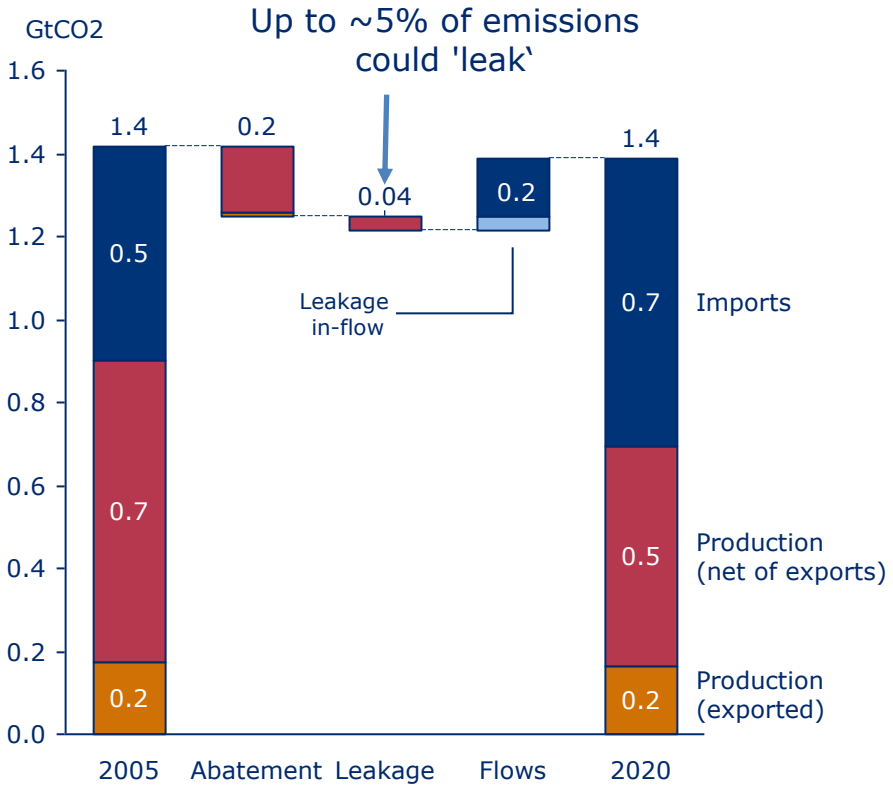
Within the EU ETS, growth in embodied carbon imports are 5 times larger than estimates of unmitigated 'carbon leakage'

Evolution of EU ETS Production & Consumption emissions for those sectors covered by the EU ETS – excluding electricity



Drivers of change between 2005 and 2020 emissions



Note 1: Declining production emissions based on expected contribution from non-electricity sectors to declining ETS cap (CASE II Model)
Note 2: Growth in imported emissions based on continuation of historic growth in gross imports, and varying degrees of decarbonisation in the exporting countries. In the displayed scenario, it is assumed that the emissions intensity of exports from Brazil, Russia, India and China (BRIC nations) decline in line with 50% of the targets noted in the Copenhagen Accord (2009), that exports from the EU and other Annex I nations decline in line with the EU's target to reduce emissions by 20% from 1990-2020, and that exports from the rest of the world achieve decarbonisation of the order of half that achieved in the BRIC countries.
Source: Carbon Trust Analysis based on data from: Addressing leakage in the EU ETS: Results from the Case II Model (Climate Strategies, 2009); CICERO / CMU / SEI GTAP 7 MRIO/ EEBT Model (2004); Cutting Carbon in Europe: The 2020 plan and the future of the EU ETS, Carbon Trust (CTC734, 2008)

Only ~35% of all aluminium consumed in Europe includes a price of carbon via the ETS

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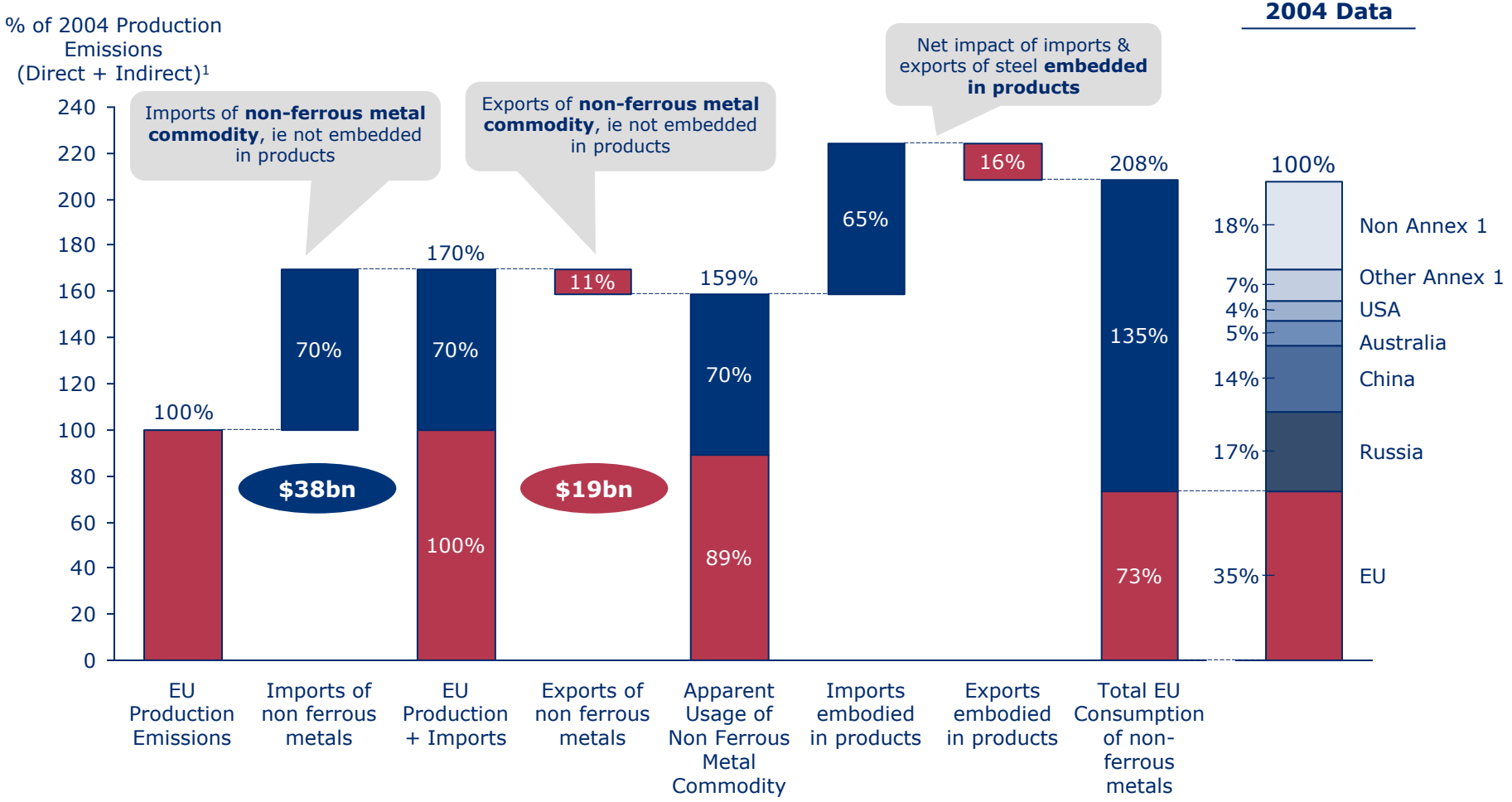

1. Includes Scope 1 (direct) emissions and Scope 2 (allocated electricity) emissions. Indirect emissions allocated on the basis of average ratio Scope 1 to Scope 2 emissions in non-ferrous metal production in a given region

Source: Carbon Trust Analysis; CICERO / SEI / CMU GTAP7 MRIO/EEBT Model (2004)

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Four key themes are highlighted from consumption based approach

Measures to address consumption emissions

Mechanisms

- Potential need to develop a consumption-based approach to Emission Trading Systems
  - In parallel to seeking a 'Global Deal' on climate change

Consumers

- Stimulating green demand for low carbon products using product carbon footprinting
  - Scale roll out of product carbon footprinting across the majority of products with material carbon footprints would help tackle the remaining ~50% of emissions associated with trade in complex products

Supporting actions to achieve lower carbon consumption

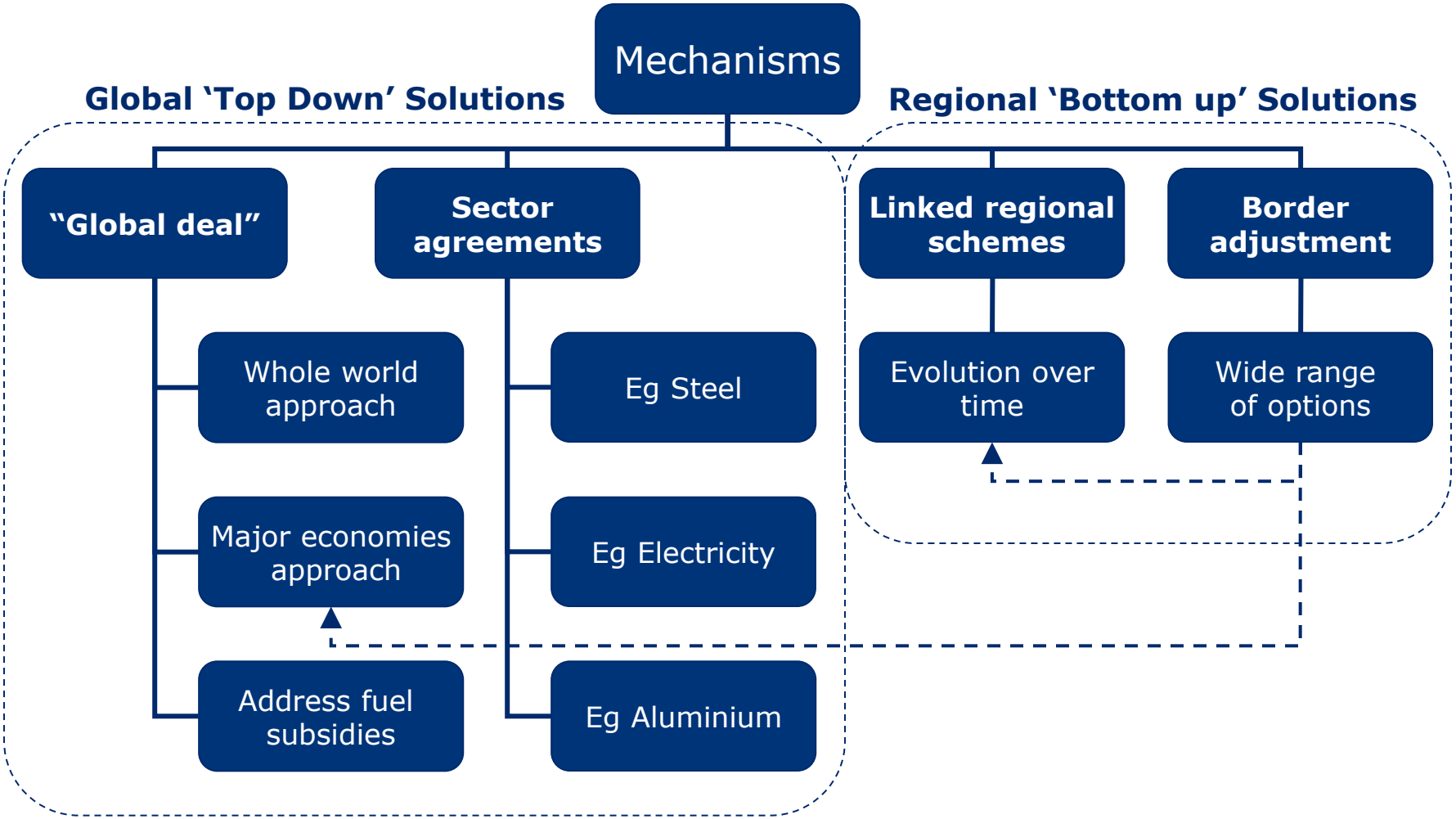
Measurement

- Need to improve monitoring and reporting of embodied carbon, both in trade and in supply chains
  - Latest global data that can be analysed is 2004

Innovation

- Need for increased global RDD&D
  - Radical breakthroughs are required in key carbon intensive sectors to ensure that global consumption can continue

There are a wide range of mechanisms that policymakers could pursue



Considering border adjustment mechanisms as a potential option

- Whether to take action to address embodied carbon flows (through border adjustments or other approaches) is a policymaker decision.

- When considering border adjustment mechanisms, some key features emerge
  - **Non-discriminatory**: BAMs must be applied to all (qualifying) imports, not selectively based on country of production
  - **Limited sectors**: application of BAMs is limited to products from those sectors exposed to a cost of carbon within the ETS zone
  - **Mutual recognition**: the application of BAMs must fully recognise the carbon cost already paid by producers of products in the region of export

- There are two very different outcomes of border adjustment mechanisms, depending on approach
  - **Guaranteed environmental outcome**: the only BAM approach that guarantees an environmental outcome (for the carbon-priced region) is a consumption-based ETS cap
  - **Improved environmental outcome**: all BAM options that operate in parallel to the existing (production-based) ETS will affect overall emissions via price signals, but they do not establish a specific environmental goal

Border adjustment approaches: different options for policymakers, different impacts for business

There is no single approach to border pricing: policymakers could consider a range of Mechanisms, together with a range of Measurement options.

Each Mechanism and Measurement option has pro's and con's, which would need to be considered against the policy objectives sought: the impact on business would of these different options would also vary.

Example mechanisms

Consumption based ETS	Convert EU ETS into a consumption based cap, require importers to purchase from pool.
Direct border pricing	Impose a price on imports reflecting carbon intensity and prevailing carbon cost in import zone
Certificate retirement	Require importers to surrender CDM certificates (or EUAs, if cheaper) at the border, proportional to embodied carbon in imports

Measurement options

Measure	Establish requirements for MRV equivalent to ETS approaches
Baseline: Global average	Establish global average carbon intensity for commodity Allow demonstration of better improvement
Baseline: Rising global average	As above, but correct "global average" carbon intensity for known data
Baseline: BAT	As above, but benchmark is at best available technology
Baseline: WAT	As above, but benchmark is at worst available technology

Summary of key messages

Findings

- **International Carbon Flows are large and growing and require policy focus**
  - ~25% of all carbon produced is traded as 'carbon flows'
    - A globally even split between emissions embodied in commodities and final goods
  - Developed countries are net importers (e.g. UK 34%), developing are net exporters
    - UK's overall consumption of carbon has not fallen
  - UK (and other developed countries) could import more carbon than it produces by 2025
  - EU's consumption of carbon embodied in commodities may remain flat, despite good work of EU ETS
  - Growth in imported carbon into EU via commodities is ~5x larger than effect of carbon leakage

- **'Embodied carbon' could overtake 'in-use carbon' in energy intensive product categories**
  - Could apply to auto, clothes, electronic goods

- **Major breakthroughs in industrial process RD&D required to meet CO_2 targets**
  - E.g. need 75% reduction in carbon intensity of steel production by 2030, or 90% reduction for Aluminium

Potential Implications

- **Mechanisms**
  - Wide range of options to address consumption emissions are possible
    - Potential initially focus on commodities
  - Border adjustment mechanisms are one way
    - Other options available

- **Consumers**
  - Low carbon procurement, supply chain management and product carbon footprinting all support low carbon production.
  - Depending on business/ consumer response, this may need regulatory support

- **Measurement**
  - Need much better consumption metrics
    - Especially if we are to set targets for consumption emissions, nationally and regionally
  - Measurement fundamental to all options

- **Technology**
  - Significant increases in investment in industrial RD&D are required to reach required level of decarbonisation – perhaps by a factor of 10
  - Collaborative public/ private industry accelerators may be best model

Further information:

International Carbon Flows
www.carbontrust.co.uk/icf

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