



The Game of Trading Jobs for Emissions

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Workshop "The Wealth of Nations in a Globalizing World" (E-Frame FP7 Project)
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Agenda

- *Introduction*
- *Motivation*
- *Methodology*
- *GHG emissions*
- *Employment*
- *The link between GHG and employment*
- *Conclusions*





Introduction

- *We live in a globalized world, where countries produce commodities with **different emission and employment intensities***
- ***International trade** increasingly links supply and demand of commodities on a global scale leading to different employment levels and different GHG emissions across countries*
- *For the first time, a single consistent database allows for analysing the evolution of the links between **trade, employment and environment** for the 27 Member States and their main non-EU trade partners*





Motivation

- *How many jobs/GHG emissions in the world are linked to international trade?*
- *To what extent changes in employment/GHG emissions from 1995-2008 across countries can be attributed to international trade?*
- ***Key issue:*** *it is true that the current international trade leads developed countries to transfer GHG emissions to other less developed or developing countries; but isn't it true also that they indeed benefit from employment growth? And to what extent this is relevant for policy making?*





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Methodology





Methodology

- *Structural decomposition analysis (**SDA**), following Dietzenbacher and Los (1998), average of polar decompositions*
- *Main features of the SDA: (1) consideration of variations in **intermediate and final** uses rather than on final demand only; (2) introduction of a new decomposing factor corresponding to variations in the **international trade structures** across countries (see also Xu and Dietzenbacher, 2012)*





Methodology

- *We account for changes in GHG emissions and changes in employment using the WIOD database for 1995-2008.*
- *We use the Leontief quantity model within a Multi-Regional framework for the calculation of embodied GHG emissions and embodied employment, both in exports and imports separately*





Factors driving changes in GHG emissions and changes in employment

- **Technological change:**
 - Changes in the domestic technology
 - Changes in emission coefficients
- **Domestic final demand**
- **International trade:**
 - Changes in foreign technology
 - Changes in foreign final demand
 - Changes in the trade structures





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GHG Emissions





Main drivers of the change in GHG emissions

Some preliminary facts in 2008

- *World GHG emissions amounted to 39.3 GtCO₂e (29% increase from 1995); of which:*

CHN - 21% ()*

US - 16% ()*

EU - 13% (-)

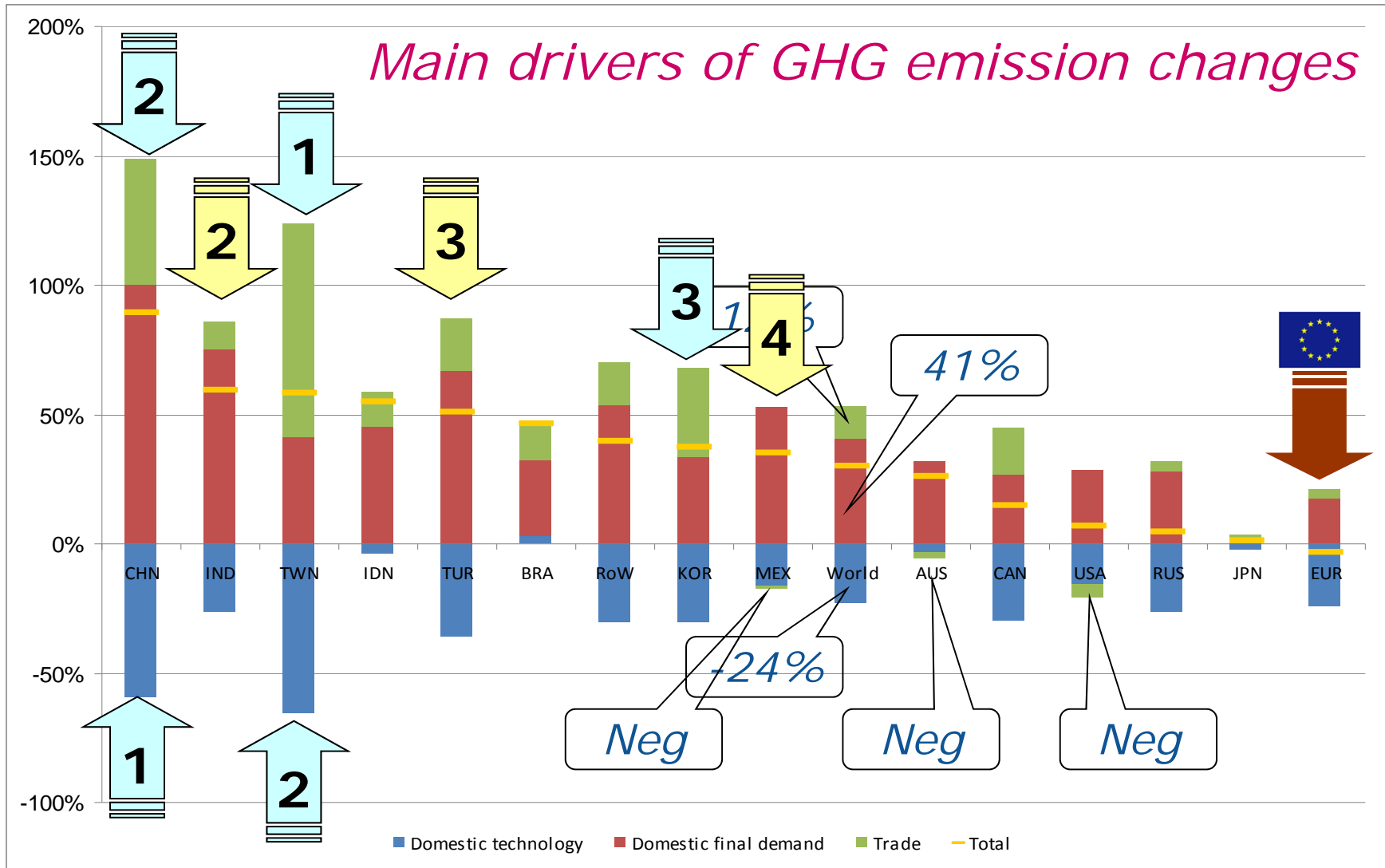
RUS - 6%

IND - 6% ()*

> 60% of world's emissions

NOTE: (*) = contributed most to GHG emission growth; (-) = decrease







GHG emissions embodied in exports

Some preliminary facts 1995-2008

- *World GHG emissions linked to trade amounted up to 9.6 GtCO₂e (100% increase from 1995); of which in 2008:*

CHN -> 30.0%

RUS -> 8.1%

RoW -> 26.0%

US -> 7.7%

EU -> 8.4%

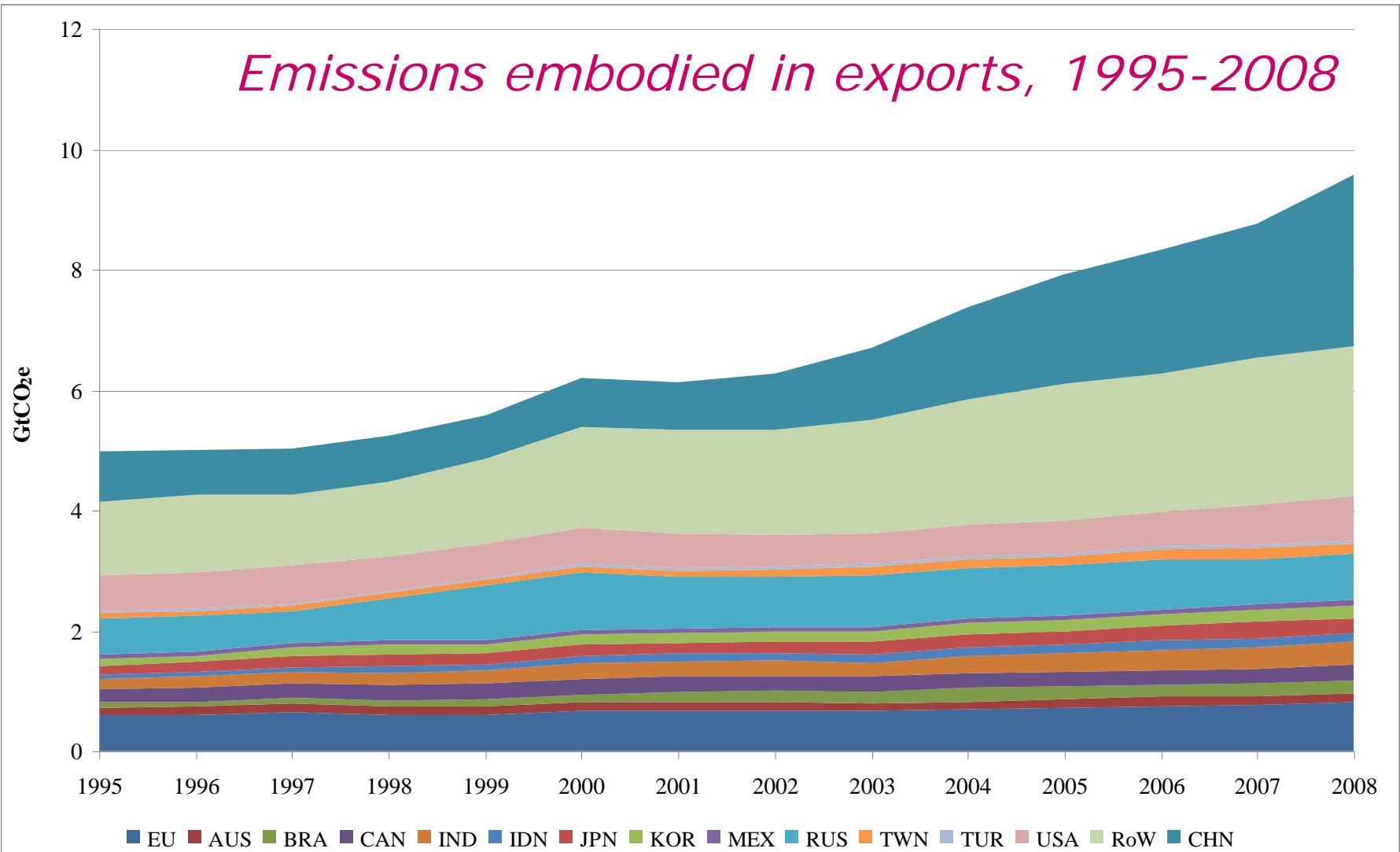
- *Largest shares of embodied GHG emissions in exports out of total GHG national emissions: TW (50%); CAN (38%); KOR (35%)...*





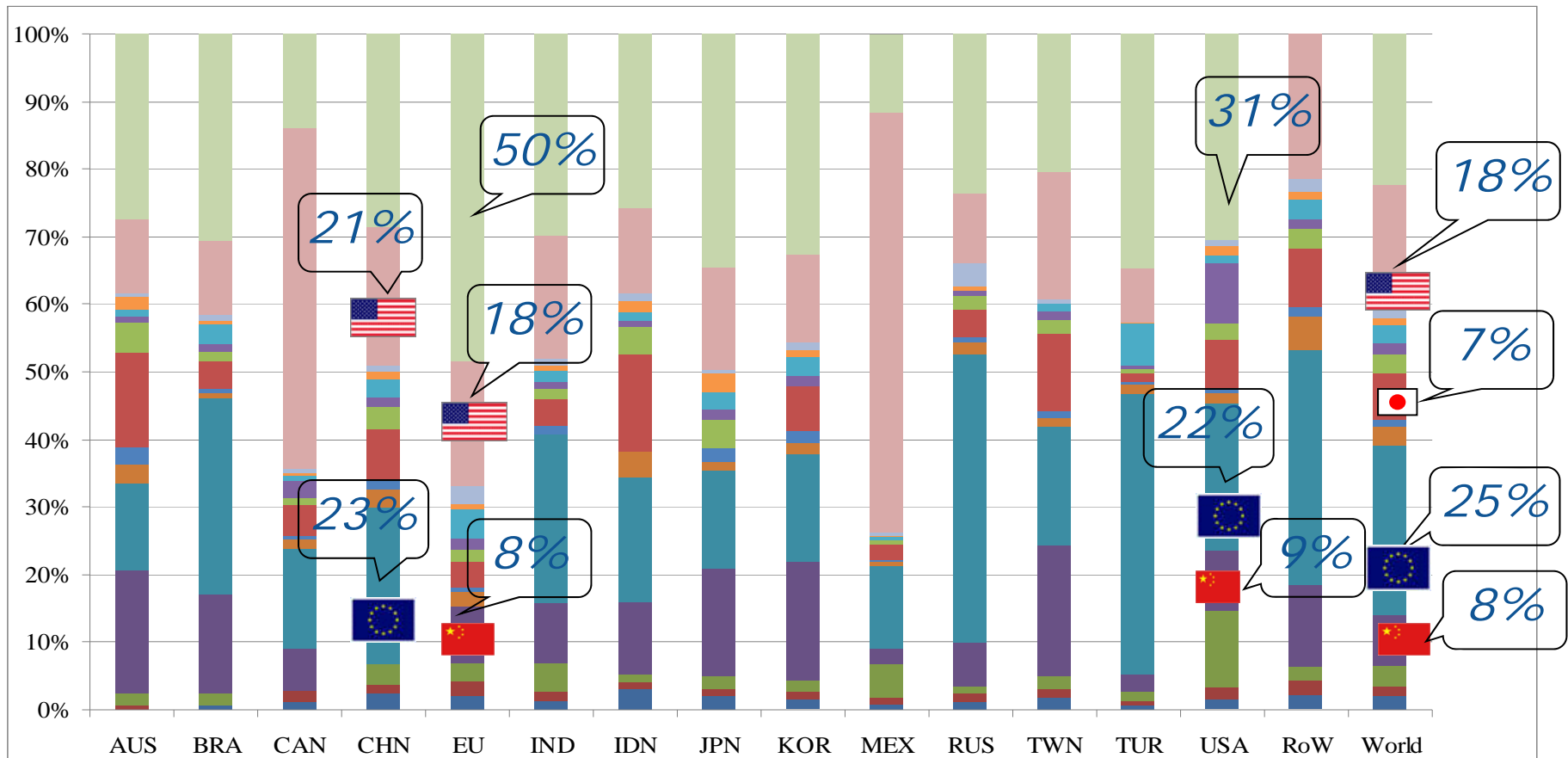
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Emissions embodied in exports, 1995-2008





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Emissions embodied in exports, by destination 2008

AUS BRA CAN CHN EU IND IDN JPN KOR MEX RUS TWN TUR USA RoW





Trade balance on GHG emissions

- ✓ Production based approach: emissions generated by residents to satisfy domestic and foreign demand. E.g. emissions generated by Portuguese resident firms for their domestic production and exports

Emissions = Domestic demand + Foreign demand (exp)

- ✓ Consumption based approach: emissions caused by the resident's demand of domestically produced commodities and imports.

Carbon footprint = Dom. demand + Foreign demand (imp)

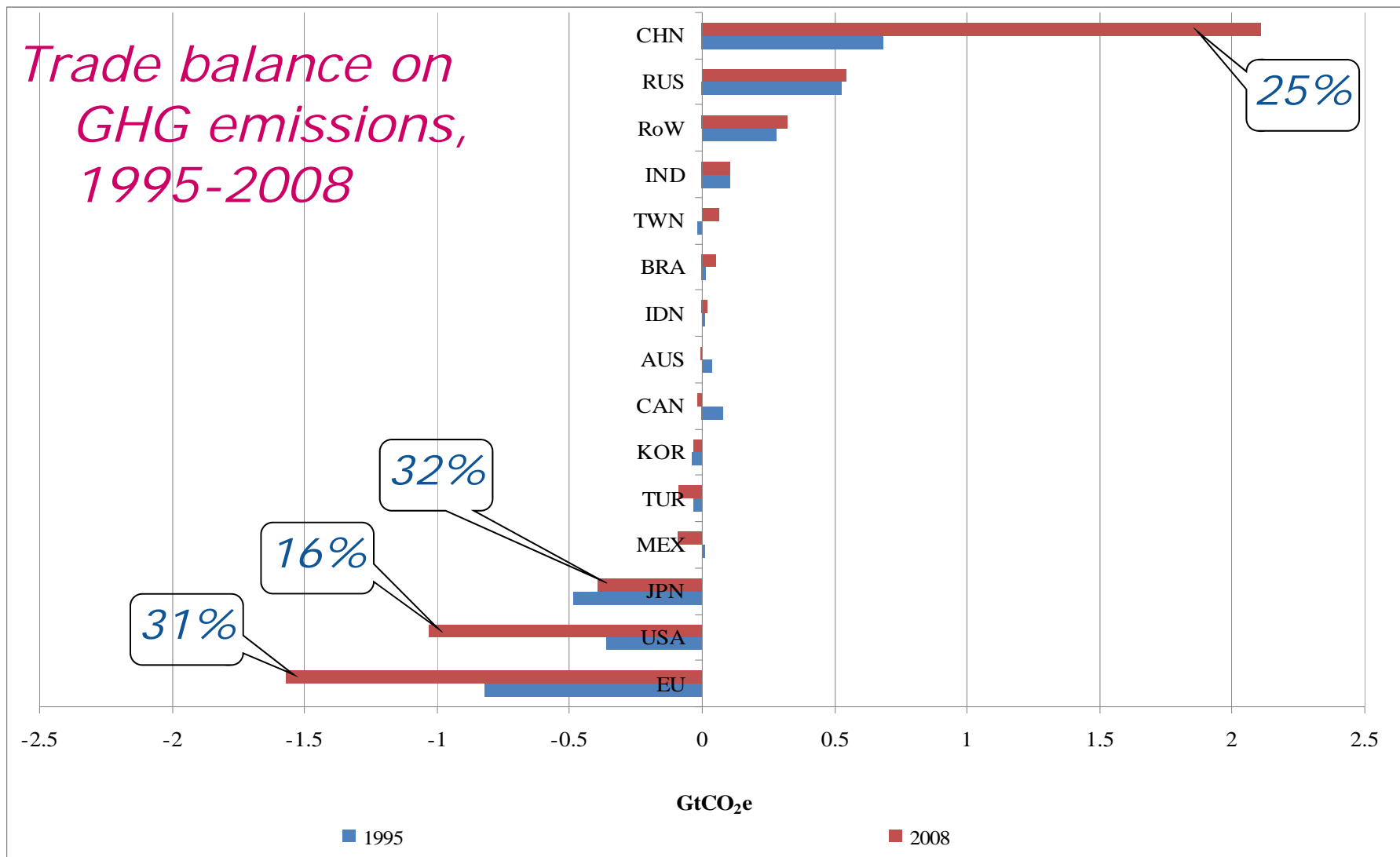
- ✓ Trade balance: Emissions – Carbon footprint.





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Trade balance on GHG emissions, 1995-2008





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Employment





Employment embodied in exports

Some preliminary facts 1995-2008

- *World employment linked to trade amounted up to 605 Mio. jobs (81% increase from 1995); of which in 2008:*

CHN -> 37.2%

EU -> 5.0%

RoW -> 33.2%

BRA -> 2.8%

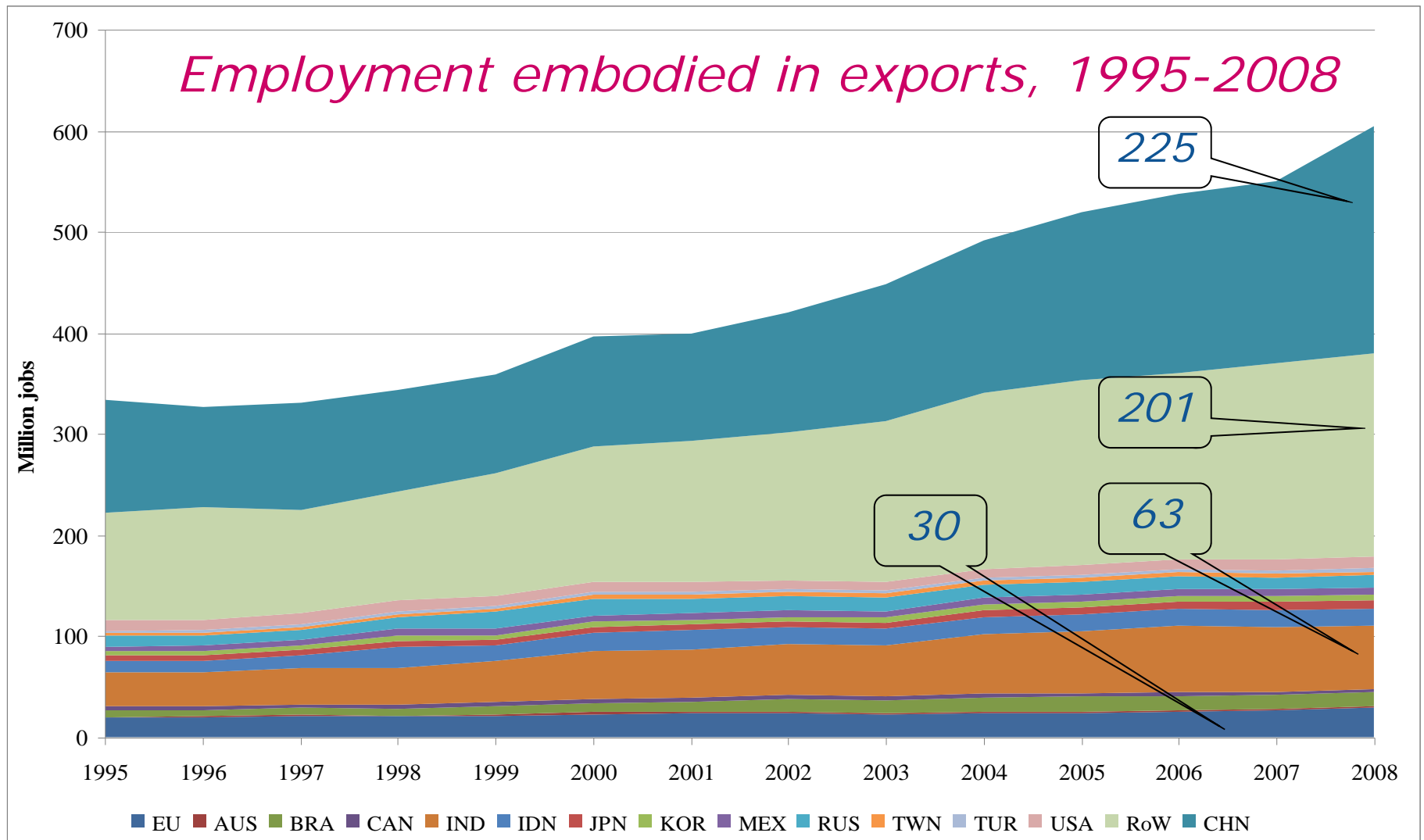
IND -> 10.4%

- *Largest shares of embodied employment in exports out of total national employment: TW (39%); CHN (29%); KOR (24%)...*



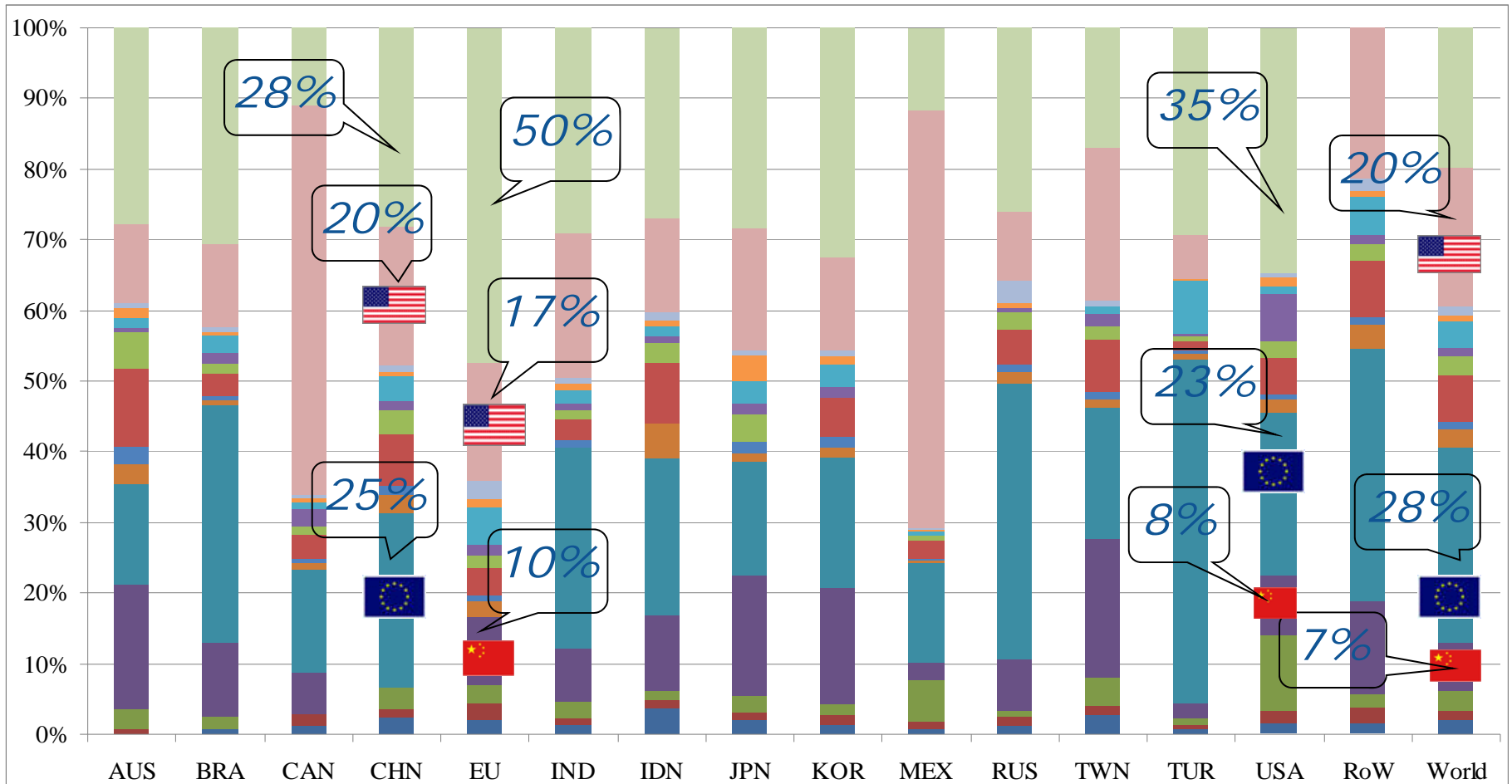


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Employment embodied in exports, by destination - 08

AUS BRA CAN CHN EU IND IDN JPN KOR MEX RUS TWN TUR USA RoW





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The link between GHG Emissions and Employment





The link between GHG emissions and employment

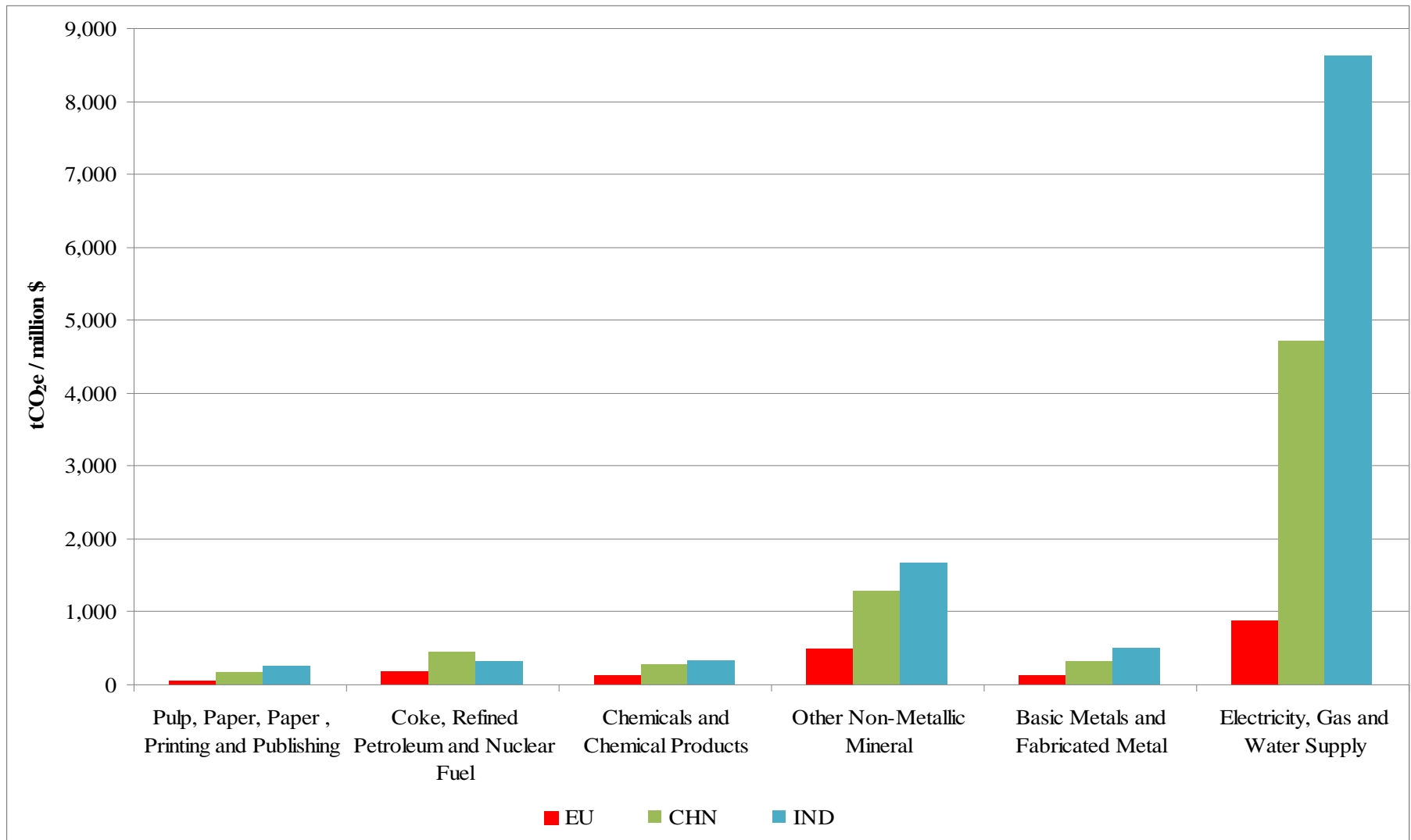
- *Give priority to policy measures involving actions (e.g. taxes, market based instruments, technology transfers) affecting the commodities/sectors with the greatest potential to reduce emissions and the least impact on employment...*
- *In other words, those commodities/sectors with **highest “emission-labour intensities”***





	European Commission Share of GHG emissions embodied in exports		Share of employment embodied in exports		Employment in exports / Emissions in exports (jobs / 1000 tCO ₂ e)	
	Good	Sector	Good	Sector	Good	Sector
Electrical and Optical Equipment	12.4%	0.8%	11.7%	4.1%	55	297
Mining and Quarrying	11.6%	13.6%	6.3%	6.6%	32	29
Basic Metals and Fabricated Metal	10.9%	10.0%	4.5%	2.9%	24	17
Chemicals and Chemical Products	9.6%	7.0%	4.3%	1.7%	26	14
Agriculture, Hunting, Forestry and Fishing	6.3%	12.6%	13.8%	34.9%	129	163
Coke, Refined Petroleum and Nuclear Fuel	5.8%	4.0%	2.0%	0.2%	20	3
Transport Equipment	4.6%	0.4%	4.0%	1.3%	51	189
Textiles and Textile Products	4.5%	0.7%	10.8%	5.1%	140	448
Machinery, Nec	4.4%	0.4%	3.8%	1.8%	51	278
Food, Beverages and Tobacco	4.3%	0.5%	8.7%	1.6%	118	180
Water Transport	3.3%	3.9%	1.0%	0.5%	18	7
Manufacturing, Nec; Recycling	2.8%	1.2%	4.5%	2.6%	94	127
Inland Transport	2.7%	4.0%	1.7%	3.6%	37	52
Renting of M&Eq and Other Business Activities	2.6%	0.8%	4.6%	4.2%	104	317
Other Non-Metallic Mineral	2.1%	3.5%	0.6%	0.7%	18	11
Air Transport	2.0%	2.2%	0.8%	0.3%	23	8
Rubber and Plastics	1.8%	1.2%	1.8%	1.9%	58	94
Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	1.4%	0.3%	2.4%	3.4%	99	582
Electricity, Gas and Water Supply	1.3%	28.7%	0.1%	0.7%	6	1
Other Community, Social and Personal Services	1.0%	2.0%	2.4%	6.3%	141	188
Rest	4.5%	2.2%	10.3%	15.5%	135	423
Total	100.0%	100.0%	100.0%	100.0%	59	59







Summary of conclusions

- *Importing countries gain environmental benefits due to displacements of pollution outside their countries; Exporting countries also benefit from the employment needed to produce such exported commodities;*
- *From a global perspective, we argue that **policy instruments leading to reduce the consumption of emission intensive commodities and/or sectors need to keep an eye on the employment impacts on the exporting country, so that it would be at the minimum cost level (sector and/or commodity)***





Other related research

Xuemei Jiang and Yifang Liu, "Exports, Carbon and Global Value Chain: Case of ICT industry" (IIOA International Conference, Kitakyushu, 2013)

Alexandra Marques, Joao Rodrigues and Tiago Domingos, "Carbon Footprint of Income" (IIOA International Conference, Kitakyushu, 2013)





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