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Trade Impacts of a Sectoral Approach in the Cement Sector

Preliminary results of the quantitative CGE analysis

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Model used for GSA Assessment (BU-TD Model)

- Further development of PACE: Economy-wide global computable general equilibrium (CGE) model with bottom-up representation of the energy sector
- Level of sectoral disaggregation in core model is based on GTAP7 database (full bilateral trade flows)
- Explicit modelling of cement sector
 - Further sectoral disaggregation of the cement sector (prod, cons, trade)
 - Introduction of process emissions (approximately 50% of total emissions)
 - Sector specific carbon targets (marginal abatement costs in accordance with sectoral study)
- 4 Scenarios (EU, PLEDGES, GSA I, GSA II)

Sectoral Disaggregation of Cement Sector

	Agricultural products	Coal	Oil	Gas	Electricity	Petroleum products	Non-metallic minerals		Further sectors	Private consumption	Investment	Exports	Total value of use
							Cement	Rest of Sector					
Agricultural products									Production data (e.g. Eurostat, UN Industry Commodity Statistics)				
Coal													
Oil													
Gas													
Electricity													
Petroleum products													
Non-metallic minerals	Cement												
		Rest of sector											
Further sectors									Data on primary production factors (e.g. Eurostat)				
Capital													
Labour													
Imports													
Total value of production													

- for all regions
- production, consumption, primary factors, international trade
- balancing of extended IO-tables required

Scenarios (1)

Scenario EU

- No international agreement until 2020 → unilateral EU policy
- 21% GHG reduction in ETS sectors, 11% in NETS sectors vs 2005
- Full auctioning in power sector beyond 2012
- 100% of a benchmark free of charge in sectors exposed to risk of carbon leakage (Cement; Iron and Steel; Aluminium; Bricks, Tiles and Construction Products; Petroleum and Coal Products)
- Decreasing share of free allocation in other ETS sectors
80% of benchmark in 2013 ⇔ 30% of benchmark in 2020

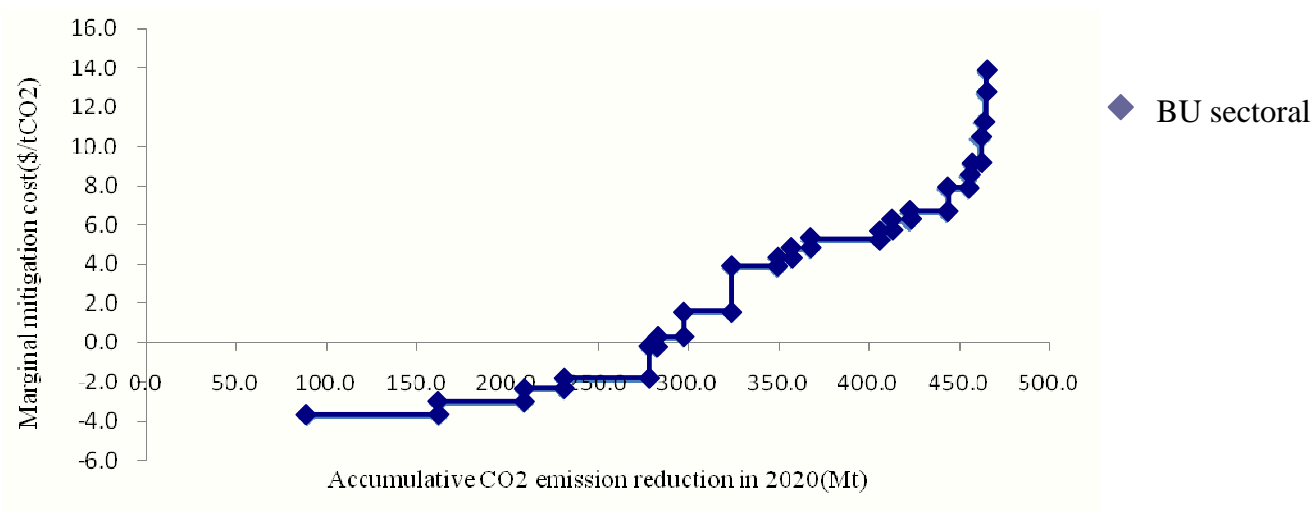
Scenarios (2)

Scenario PLEDGES

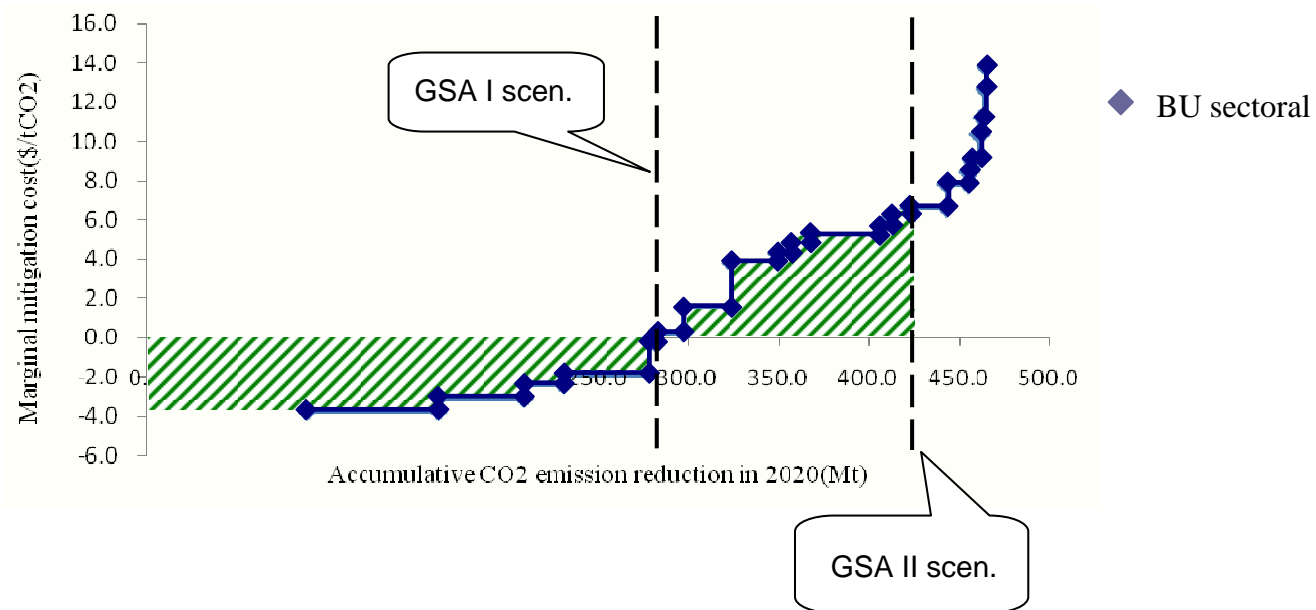
- Same reduction targets for EU27 as in Scenario EU
- Major developed countries commit to reduction targets vs. 1990

EU27	20%
Canada	3%
Japan	9%
US (assume no reduction until 2015)	0%
Russia	10%
Australia & New Zealand	13%

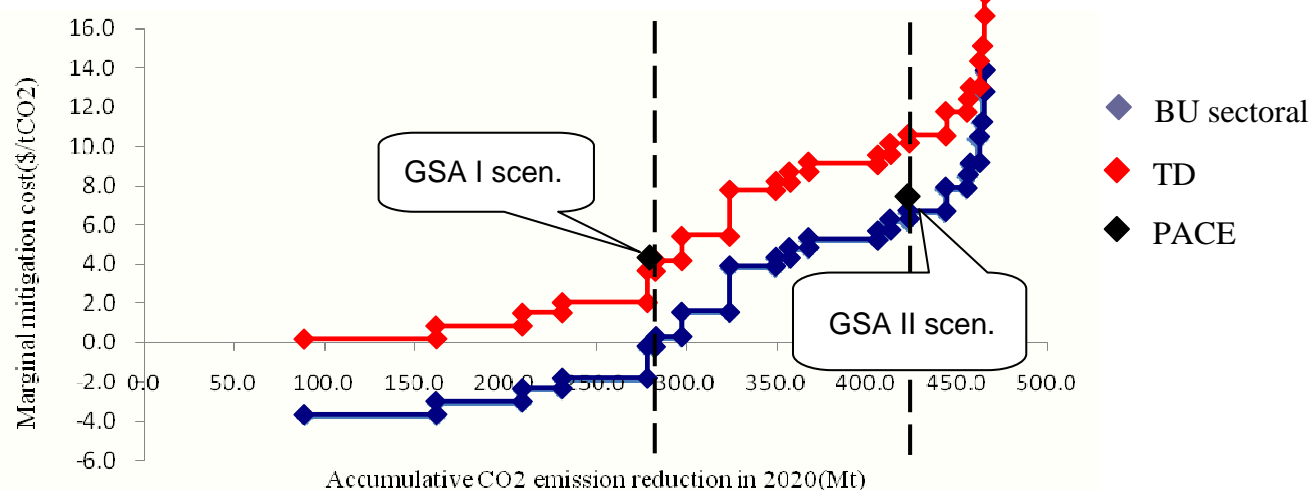
Marginal Abatement Costs



Marginal Abatement Costs



Marginal Abatement Costs



Significant share of negative cost options in sectoral analysis

BUT PACE is a neoclassical model w/o free lunch → shift MAC curve of CCAP sector study upwards and compare carbon prices

Scenarios (3)

Scenario GSA I

- PLEDGES reduction targets for EU27 and major developed countries
- Chinese cement sector introduces **unilateral** reduction target
- BU negative cost options are realized (costly in CGE model!)
- Corresponds to 8.6% reduction by 2020

Scenario GSA II

- Targets as in GSA I
- BUT cement BU cumulative costs are zero in China (more costly in CGE!)
- Corresponds to **unilateral** 13.4% reduction by 2020

Preliminary Results (EU27 - % change vs. BaU 2020)

	Region	EUR	
	Scenario	GSA I	GSA II
Welfare		-0.6	-0.6
Sectoral output	Cement	-1.1	-1.0

- Moderate welfare losses – smaller if other regions commit to emission reduction targets under PLEDGES
- Output decrease in cement sector in EU lower if Chinese cement industry sets higher unilateral reduction aims
→ addresses competitiveness concerns

Preliminary Results (China - % change vs. BaU 2020)

	Region	CHN	
	Scenario	GSA I	GSA II
Welfare		-0.13	-0.15
Sectoral output	Cement	-1.2	-2.0
Marginal abatement costs in cement production (\$/tCO ₂)		4.35	7.71

- Overall welfare loss moderate, even if cement sector reduces emissions
 - output decreases for **unilateral** policies
- BUT**
- reduced if other countries (and sectors) participate
 - reduced if financial flows are considered in a more realistic international scenario

Simulation Results (Emission Changes - % vs. 2005)

Scenario	GSA I	GSA II
EU	-16.1	-16.1
China	89.6	88.9
World	26.5	26.3

- Analysis only considers reduction targets in Chinese cement sector (small additional global reduction vs PLEDGES)
- Cement targets **reduces leakage** related increases in Chinese emissions
- Higher worldwide emission reduction expected if other developing countries and other sectors participate in GSA (**reduces leakage** to third countries)