Economic Effects of Grandfathering CO_2 Allowances

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Background and Objective of study

- Background:
  - Introducing ET in Western Europe
  - Major issue: initial allocation of CO_2 allowances: auctioning or grandfathering?
  - In case of grandfathering: major capital transfers may occur among economic sectors
- Objective of study:
  - To estimate the potential capital transfers between economic sectors resulting from grandfathering CO_2 allowances in Western Europe over the period 1990-2030

Methodology (1): Policy variants

- 2 design variables:
  - Coverage of sectors:
    - variant **A**: only exposed sectors participate in ET
    - variant **B**: all sectors, but emissions of sheltered sectors are covered indirectly, i.e. via their 'exposed energy suppliers' ('upstream')
  - Accounting system of allocating allowances:
    - Flat rate (**F**) system: based on past emissions
    - Proportional (**P**) system: based on future, projected baseline emissions
- Four policy variants: AF, AP, BF and BP

Methodology (2): Sector definitions

Variant A	Variant B
Exposed sectors	**Exposed sectors**
Agriculture	Agriculture
Basic metal industries	Basic metal
Glass and ceramics	Electricity
Inorganic chemical industries	Gas
Iron and steel	Glass and ceramics
Paper	Inorganic chemicals
Petrochemical industries	Iron and steel
Power plants (including waste incineration)	Liquid fuels
Refineries	Paper
	Petrochemicals
Sheltered sectors	Refineries
Commercial & service sector	Solid fuels
Construction materials (including cement)	
Freight transport	
Other transport	
Public transport	
Residential sector	
Rest industry	

Methodology (3): emission scenarios

- Baseline scenario (business-as-usual):
  - no additional abatement policies
  - final demand is exogenously given
- Mitigation scenario: “Kyoto Plus”:
  - CO_2 mitigation in 2010:
    -8% (compared to 1990)
  - CO_2 mitigation in 2020 and beyond:
    additional -8% (compared to 2010)
  - final demand is price elastic

Methodology (4): model + calculations

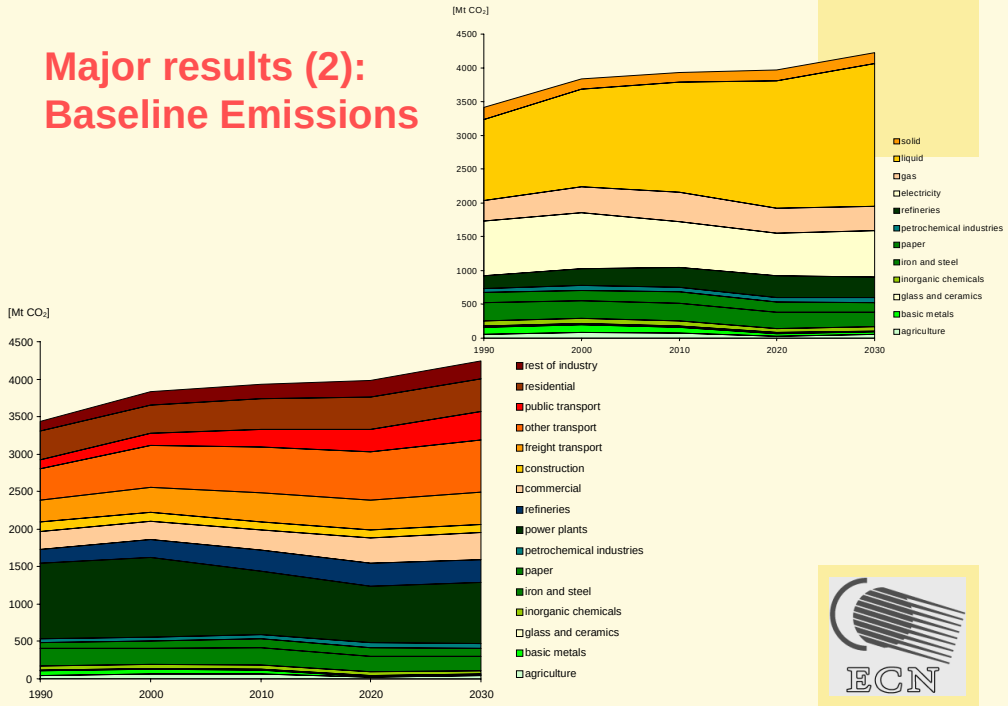
- Model: MARKAL-MATTER 3.0
  - major output:
    - baseline and mitigation scenarios
    - (marginal) abatement costs/price of CO_2 allowance
- Trade in CO_2 allowances =
  Difference between initial grandfathering of CO_2 allowances and optimal (i.e. least-cost) allocation of CO_2 allowances
- Capital Transfers =
  Trade in CO_2 allowances * Price per CO_2 allowance

Major results (1): CO_2 emissions

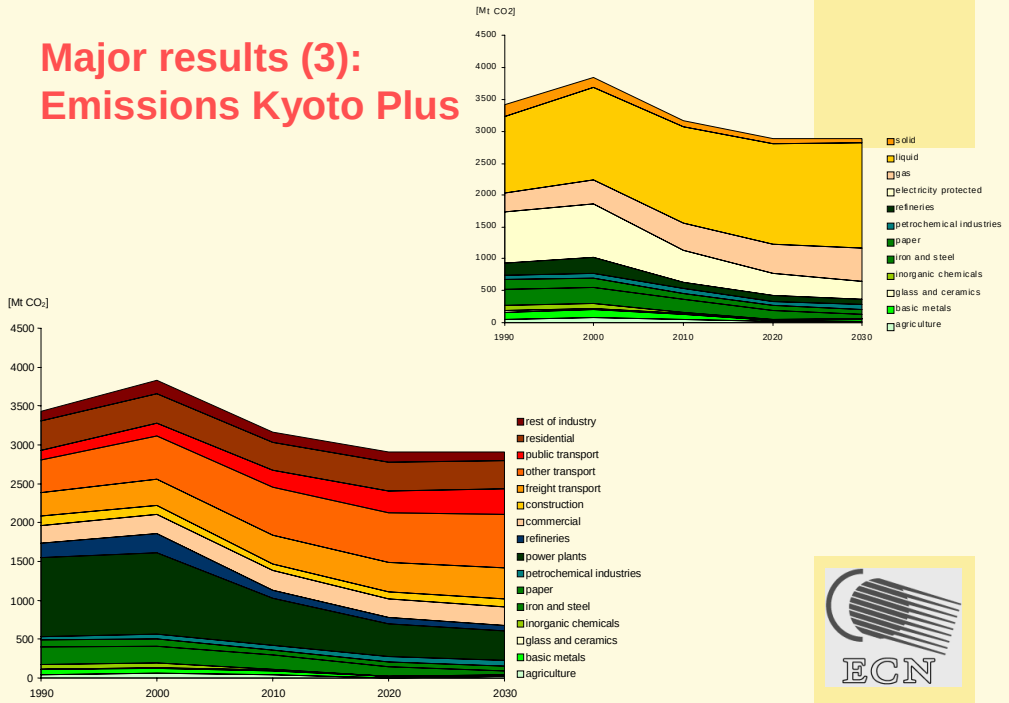
CO_2 emissions in Western Europe, 1990-2030 (in Mt)

	1990	2010	2020	2030
Baseline scenario				
Exposed sectors (variant A)	1734	1719	1549	1590
Sheltered sectors (variant A)	1700	2212	2431	2648
All sectors (variants A and B)	3434	3932	3980	4238
Kyoto Plus mitigation scenario				
All sectors (variants A and B)	3434	3159	2906	2906

Major results (2): Baseline Emissions



Major results (3): Emissions Kyoto Plus



Major results (4): aggregated capital transfers

Emissions trading and capital transfers due to different policy variants of grandfathering for the year 2030

	Variant A Flat rate (AF)	Variant A Proportional (AP)	Variant B Flat rate (BF)	Variant B Proportional (BP)
Initial allocation of allowances [Mt]	1468	1091	2906	2906
Total trade in allowances [Mt]	189	145	922	502
Percentage of trade compared to allowance	12.9	13.3	31.7	17.3
Price per emission allowance [Euro95/t CO_2]	32	39	48	48
Total capital transfers [billion Euro95]	6.0	5.7	44.1	24.0

Major results (5): Sectoral capital transfers

Sectoral capital transfers by different policy variants of grandfathering in 2030 [meuro95] (selected sectors)[1]

	Variant A Flat rate (AF)	Variant A Proportional (AP)	Variant B Flat rate (BF)	Variant B Proportional (BP)
Basic metals	-1563	50	-3403	-256
Glass and ceramics	41	-89	-518	-111
Inorganic chemicals	-1255	-1148	-2525	-1594
Iron and steel	-1396	915	-7737	-3892
Paper	595	306	-2050	-725
Petrochemicals	1653	1939	1115	1057
Refineries	-1699	-4292	-4241	-6414

[1] A minus (-) indicates selling emission allowances and, hence, receiving a capital transfer.

Main conclusions (1)

- Capital transfers due to grandfathering are sensitive to the policy variants considered as they can effect both the size and the direction of these transfers. As a percentage of industrial output, however, these capital transfers are generally rather modest, although they are more substantial in variant B, notably BF, than in variant A. Moreover, in all policy variants, they can be quite significant at the disaggregated level of individual sectors.

Main conclusions (2)

- Those sectors with a growth rate of their baseline emissions below average, i.e. mostly exposed sectors, will prefer allocation system F (past emissions), whereas those sectors with a growth performance above average, i.e. mostly sheltered sectors, will prefer allocation system P (future emissions).
- Total abatement costs (excluding transaction costs) are significantly higher in variant A than in variant B.

Report downloadable form:

- http://www.ecn.nl/unit_bs/kyoto/mechanism/et.html