



EU 20-20 policy implications on the EU energy system – an analysis with TIMES PanEU

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Semi-annual ETSAP Workshop 2008
December 15th 2008 in Sophia Antipolis



Motivation

- Evaluation of the EU Energy and Climate Package as proposed by the Commission in January 2008 by studying the impacts on the energy system

The Energy and Climate Package aims at achieving 20-20-20-2020 via

- EU Emission Trading Scheme: -21% GHG in 2020 compared to 2005
- Non-ETS: -10% GHG in 2020 compared to 2005
- RES: 20% of final energy consumption in 2020

Assessment of the...

- Proposed target distinctions for ETS and Non-ETS
- Effort sharing proposals between member states
- Role of the RES target

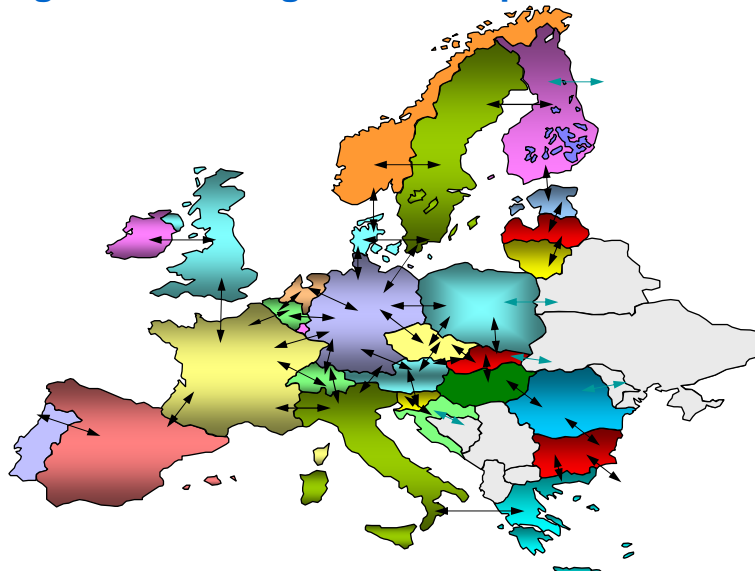


Characterization of the TIMES PanEU model

- 30 region (EU 27 + NO, CH, IS) partial equilibrium energy systems, technology oriented bottom-up model.
- Energy system model
 - SUPPLY:** reserves, resources, exploration and conversion Country specific renewable potential and availability (onshore wind, offshore wind, geothermal, biomass, biogas, hydro)
 - Electricity:** public electricity plants, CHP plants and heating plants
 - Residential and Commercial:** End use technologies (space heating, water heating, space cooling and others)
 - Industry:** Energy intensive industry (Iron and steel, aluminium copper ammonia and chlorine, cement, glass, lime, pulp and paper), other industries , autoproducer and boilers
 - Transport:** Different transport modes (cars, buses, motorcycles, trucks, passenger trains, freight trains), aviation and navigation
- Country specific differences for characterisation of new conversion and end-use technologies
- Time horizon 2000 - 2050
- GHG: CO₂, CH₄, N₂O, SF₆/Others pollutants: SO₂, NO_x, CO, NMVOC, PM_{2.5}, PM₁₀



Regional Coverage Pan-European TIMES model



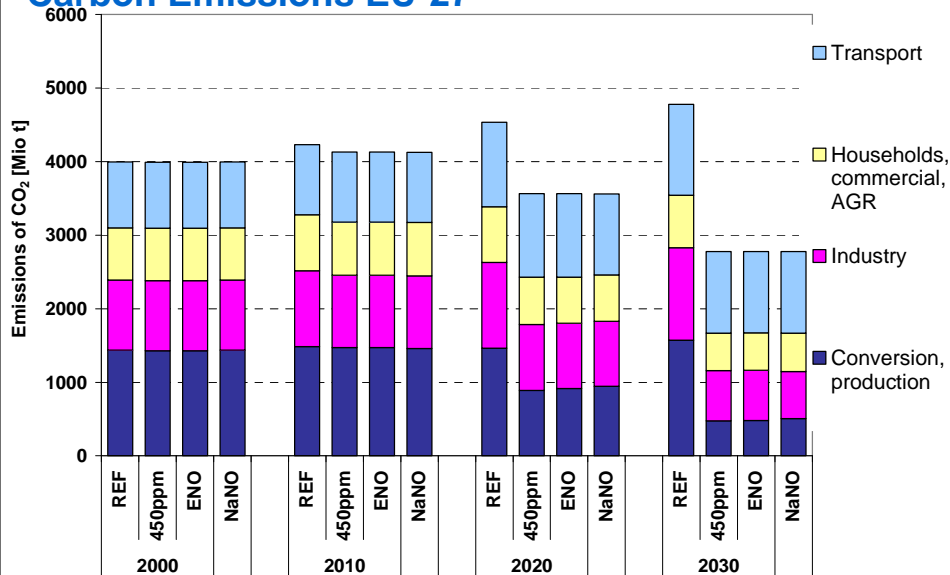


Energy System Analyses with TIMES-PanEU Scenario Definition

Scenario Name	Characteristics
REF	<ul style="list-style-type: none">- No emission reduction measures- Nuclear phase out according policy of respective EU countries [all scenarios]- Minimum renewable energy use according national targets [all scenarios]
450ppm	<ul style="list-style-type: none">- EU GHG emission reduction -71% by 2050 (equivalent to max. GHG concentration in atmosphere of 450ppm = max 2°C)- Minus 20% GHG emissions in 2020 compared to Kyoto base- Minimum 20% renewable energy at FEC in 2020
ENO ETS and Non-ETS Overall Cap	<ul style="list-style-type: none">- EU GHG emission reduction -71% by 2050- Minimum 20% renewable energy at FEC in 2020- 21% GHG emission reduction ETS sector compared to 2005- 10% GHG reduction non-ETS sector EU-27 wide compared to 2005
NaNO National Non-ETS Objectives	<ul style="list-style-type: none">- EU GHG emission reduction -71% by 2050, 20% renewable energy in 2020- 21% GHG emission reduction ETS sector compared to 2005- EC national GHG emission reduction targets for non-ETS sector

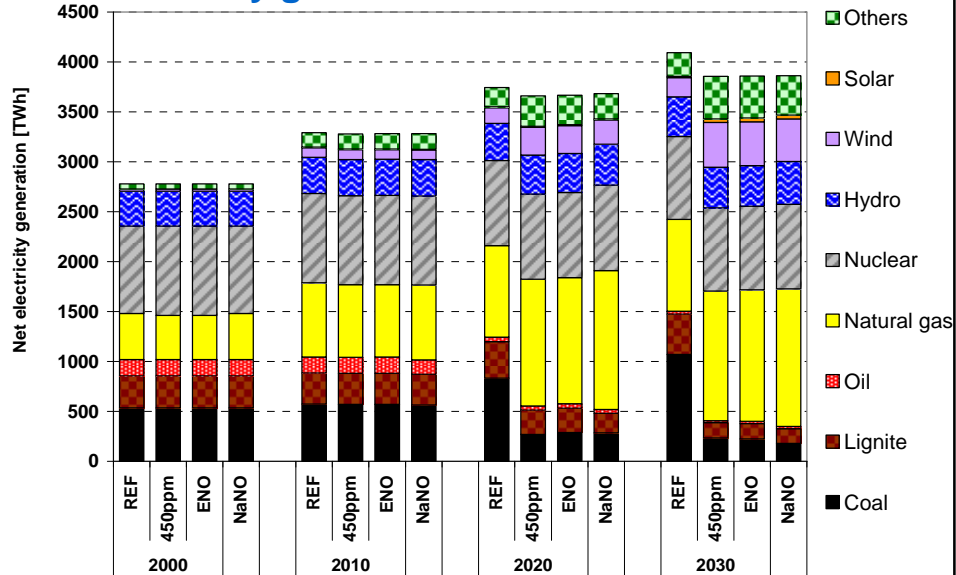


Carbon Emissions EU-27





Net electricity generation EU-27



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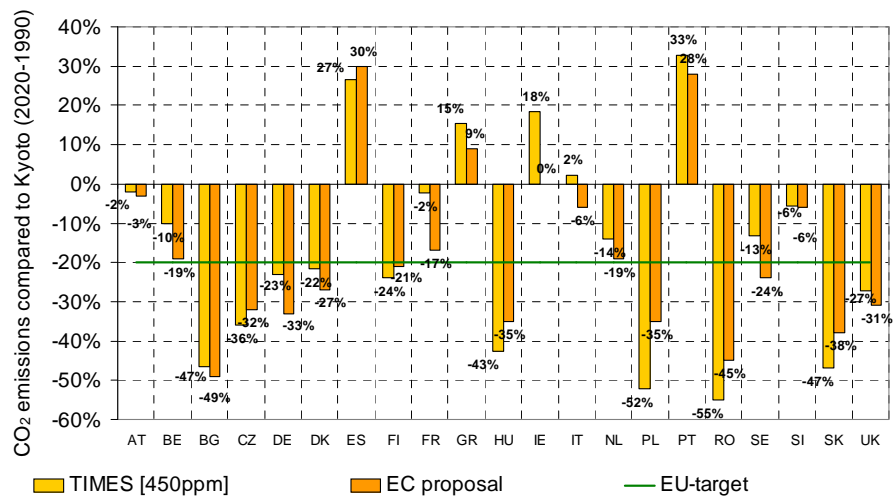
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Cost Optimal Burden Sharing of 20% EC 2020 Target



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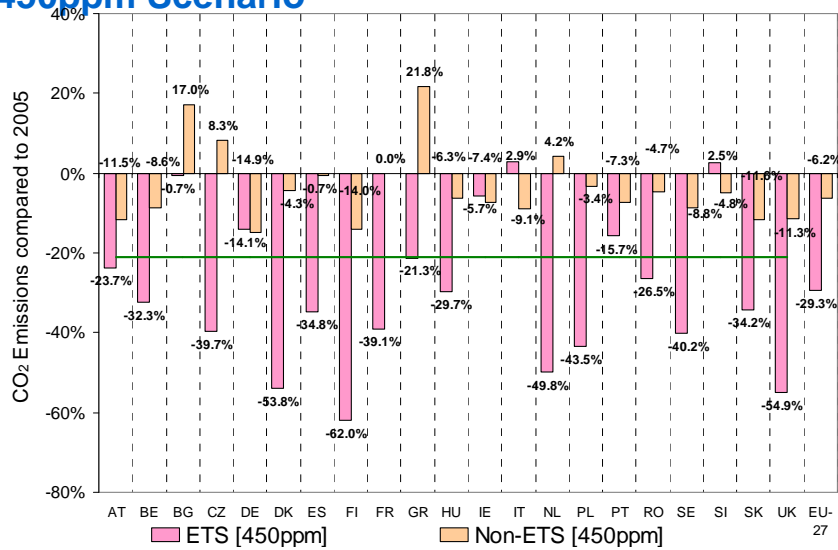
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Emission Reduction ETS vs. NonETS+RES in 450ppm Scenario



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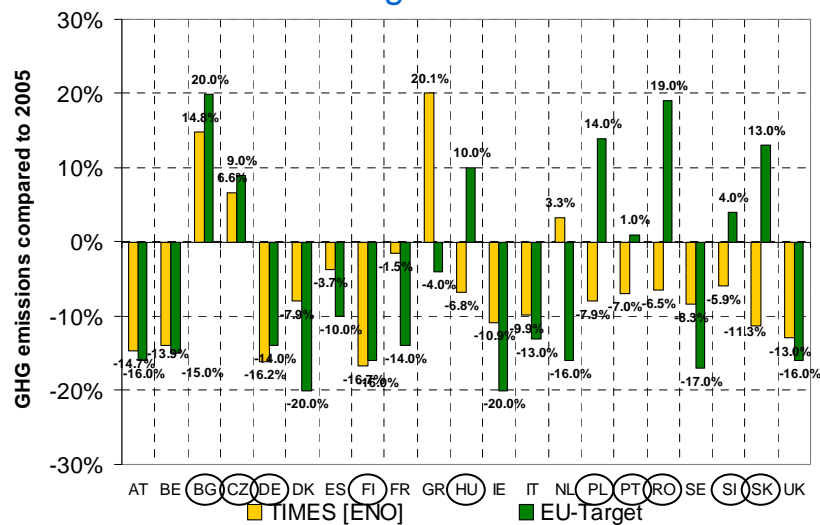
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Cost Efficient Emission Reductions in the Non-ETS Sector vs. EC 2020 Targets



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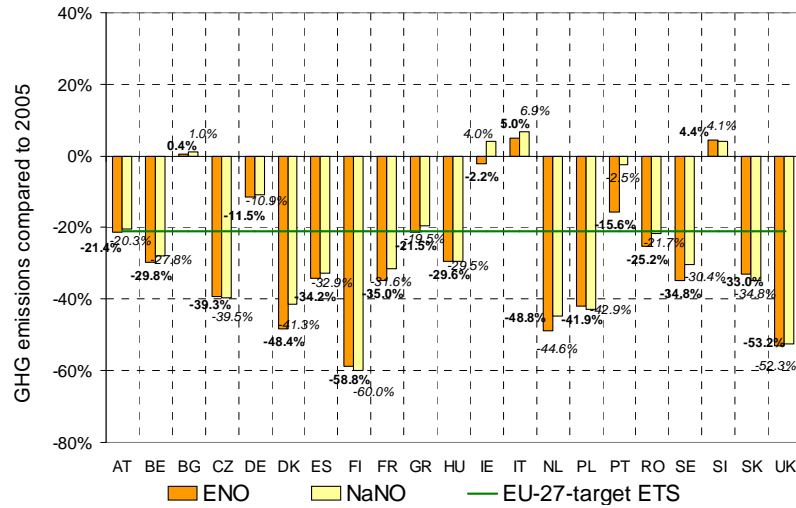
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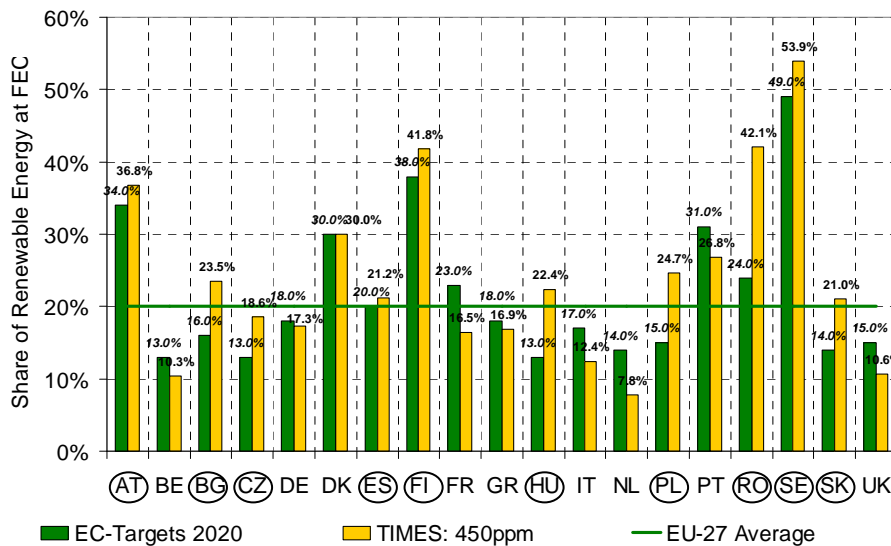
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Emission Reductions of ETS Sectors by Country in ENO and NaNO Scenario

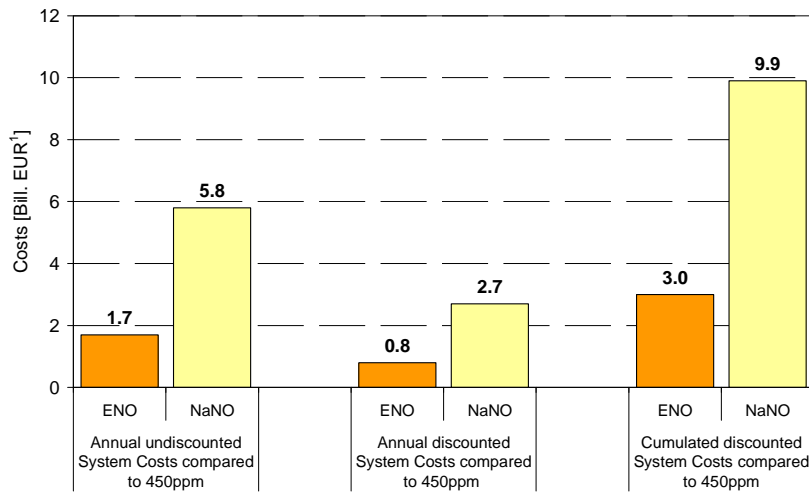


Optimal RES Allocation vs. EU-Targets





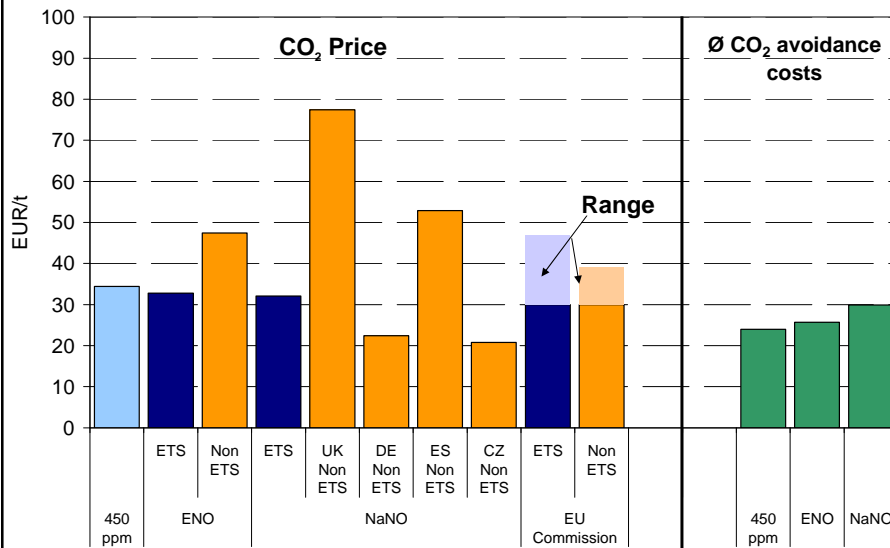
System Costs in 2020



¹ = 10⁹ EUR



CO₂ Prices and CO₂ Costs in 2020





Conclusion TIMES-PanEU

Total CO₂ emissions in 2020

- Highest reduction of CO₂-emissions in 2020 in Eastern European countries (BG, CZ, HU, PL, RO, SK)

ETS - non ETS

- Reductions in ETS sector fits to EU target (-21%)
- Non-ETS target leads to higher average CO₂ avoidance costs

CO₂ emissions of non ETS sectors in 2020

- Eastern European countries tend to reduce more than postulated by their national targets (BG, CZ, HU, PL, RO, SK)