



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

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Current policy in Germany - the integrated energy and climate program of the German government

Target:





- 30 % reduction of the GHG emission by 2020 related to the year 1990

Main elements:

- Doubling of the share of electricity generation by combined heat and power plants (CHP) of the total electricity generation to 25 % by the year 2020
- Increase of the share of renewable energy on the total electricity generation to 25-30 % by 2020, and a continue increase in the future
- Increase of the share of renewable energy related to the heat production to 14 % in the year 2020
- Minimum addition of 10 % bio gas in the natural gas grid by 2030
- *Increase of the share of bio fuels till 2020 to approximately 20 volume percent (corresponds 17 % energetic)*
- Increase the requirements of standards in the building sector (30 % in 2009, after 2012 again a comparable reduction)



The German targets

		 2005	 2020	 2005	 2020
GHG	Total	- 11 %		?	
	ETS	- 21 %			
	Non-ETS	- 10 %		- 14 %	
Renewable energy	Total	8,5 %	20 %	6 %	18 %
	Bio fuels	1 %	10 %	3,8 %	10 %
Energy consumption		- 20 % (related to the Baseline)			



The TIMES Pan-European model (PanEU)

Model description:

- PEM is a 30 region (EU 27 + NO, CH, IS) partial equilibrium energy systems, technology oriented bottom-up model.
- Time horizon: 2000-2050
- 12 time slices (4 seasonal, 3 day level)
- GHG: CO₂, CH₄, N₂O, SF₆
- Others pollutants: SO₂, NO_x, CO, NMVOC, PM2.5, PM10
- The database integrates results of LCI and specific Damages with the aim to integrate the treatment of Externalities in the optimization procedure

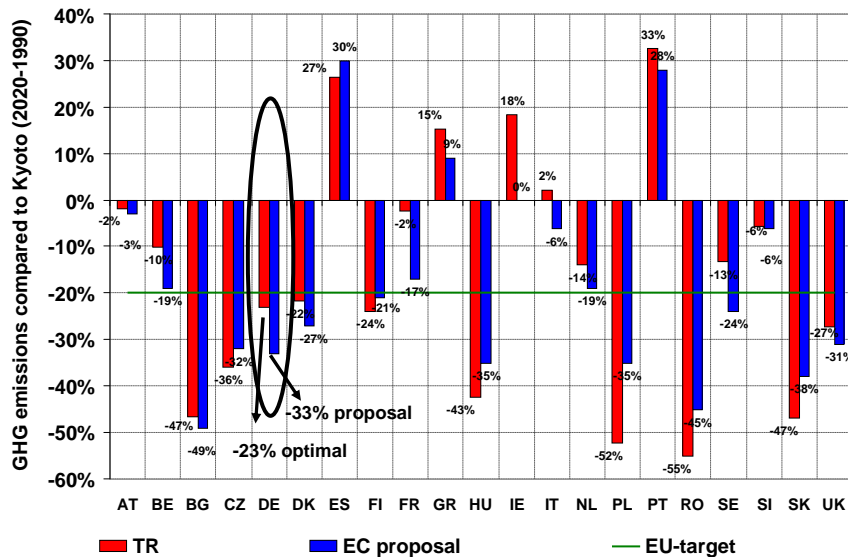


Scenario Definition

Scenario name	Characteristics
REF	<ul style="list-style-type: none">- No emission reduction measures- Nuclear phase-out according policy of respective EU countries- Minimum renewable energy use according national targets
Climate policy	<ul style="list-style-type: none">- EU GHG emission reduction -71% by 2050- Minimum 20% renewable energy at FEC in 2020
CP Current EU Policy	<ul style="list-style-type: none">- 21% GHG emission reduction ETS sector compared to 2005- EC national GHG emission reduction targets for non-ETS sector- Nuclear phase-out according policy of respective EU countries
EN ETS and Non-ETS Overall Cap	<ul style="list-style-type: none">- 21% GHG emission reduction ETS sector compared to 2005- 10% GHG reduction non-ETS sector EU-27 wide compared to 2005- Nuclear phase out according policy of respective EU countries
TR Emission Trading	<ul style="list-style-type: none">- Cost optimal burden sharing- Nuclear phase-out according policy of respective EU countries
LC Least Cost	<ul style="list-style-type: none">- Cost optimal burden sharing- Additional use of nuclear (new plants, prolongation of existing plants)
ES Energy Supply Security	<ul style="list-style-type: none">- Cost optimal burden sharing- Nuclear phase-out according policy of respective EU countries- Reduction of the net import dependency of oil (-30%) and natural gas (-40%) by 2050 compared to 2010

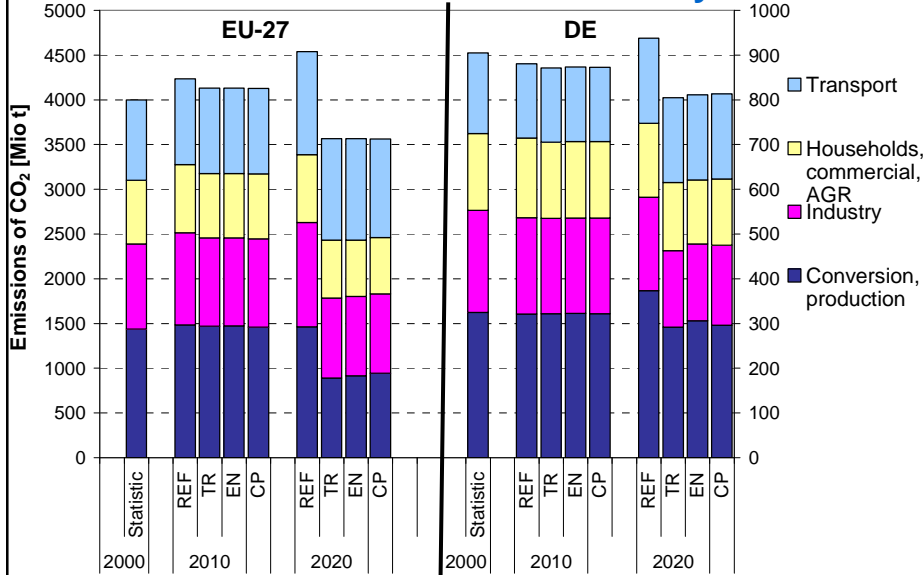


Cost Optimal Burden Sharing of 20% EC 2020 Target

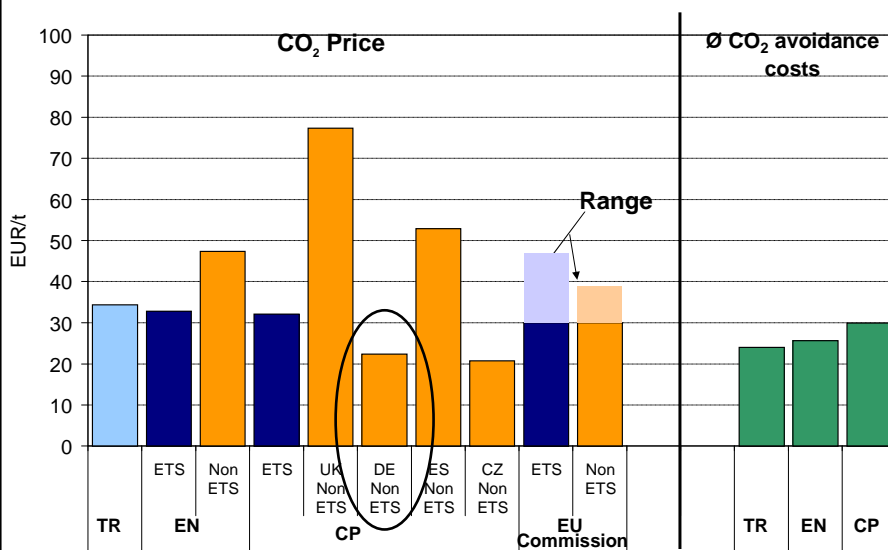




Carbon Emissions EU-27 vs. Germany

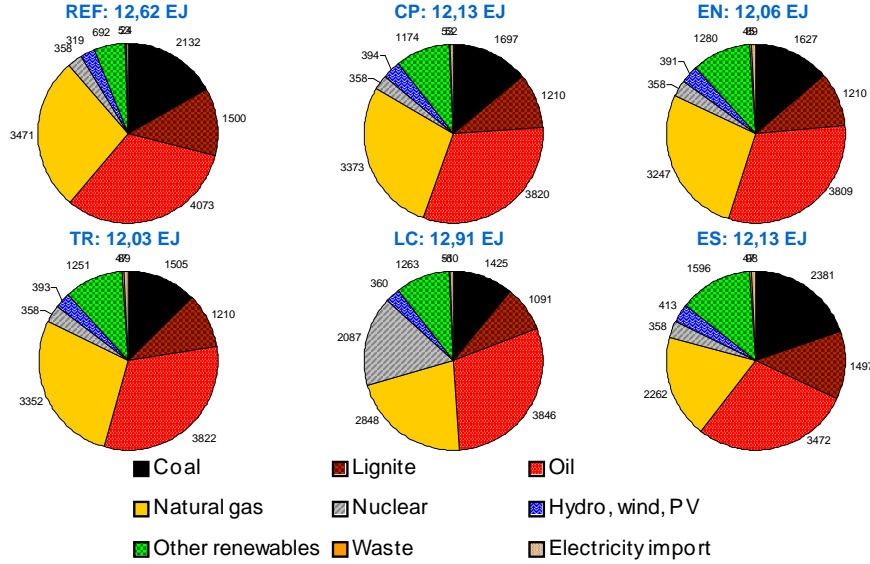


CO₂ Prices and CO₂ Costs in 2020

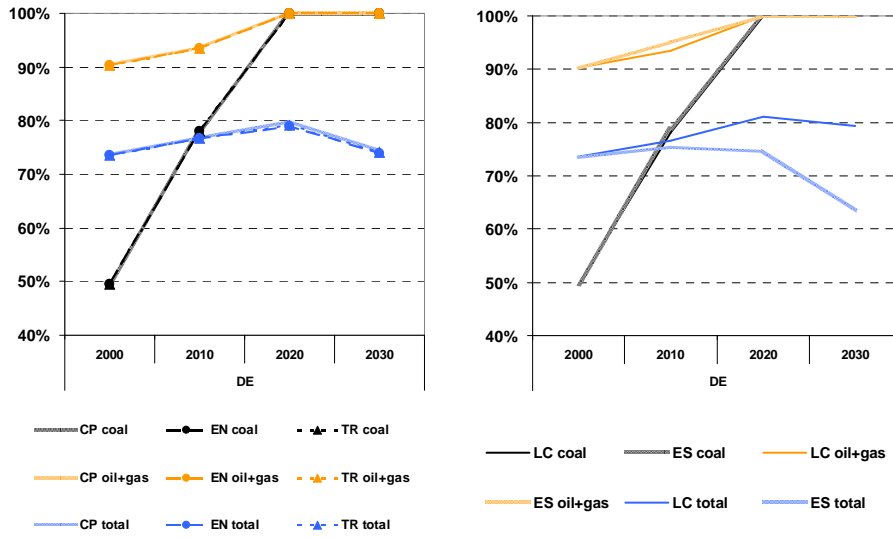




Primary energy consumption Germany in 2020



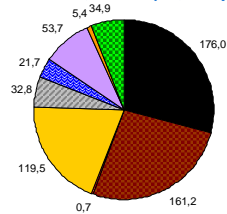
Import dependency of Germany



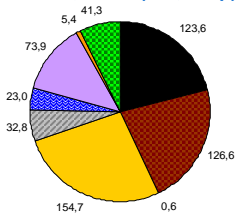


Net electricity generation in Germany in 2020

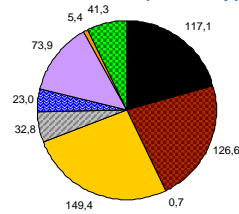
REF: 606,0 TWh (+6,6 Imp)



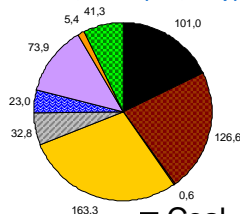
CP: 581,8 TWh (+14,4 Imp)



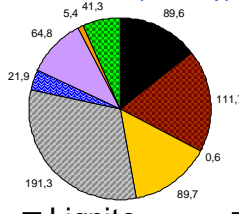
EN: 570,2 TWh (+24,9 Imp)



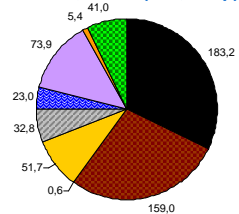
TR: 567,8 TWh (+24,6 Imp)



LC: 616,3 TWh (-16,7 Exp)



ES: 570,7 TWh (+27,2 Imp)



Contribution of Germany related to the EU 2020 target

2020 Key figures	DE				
	CP	EN	TR	LC	ES
GHG reduction rel. Kyoto - Basis (DE: 30 %) [%]	23%	25%	25%	28%	23%
CO ₂ -reduction rel. 2005					
- Total (without International Aviation) [%]	11,7%	13,4%	13,9%	17,8%	11,6%
- ETS [%]	10,5%	10,9%	13,1%	20,2%	2,9%
- Non-ETS (DE: 14 %) [%]	14,0%	16,8%	15,1%	14,5%	23,5%
Share of renewable energy of Final energy consumption (DE: 18 %) [%]	16%	17%	17%	17%	21%
Share of renewable energy of the Total electricity generation (DE: 30 %) [%]	25%	25%	25%	22%	25%
Energy efficiency improvement gg. 2006 (DE: 3 %/a) [%/a]	-2,80%	-2,85%	-2,86%	-2,37%	-2,81%
Share of CHP of the total electricity generation (DE: 25 %) [%]	25%	28%	25%	19%	15%
Cumulative discounted System cost by 2020 (rel. REF) [Bio. €]	11,7	12,8	12,0	-1,5	37,8

