



Insight from the Pan-EU TIMES model for NEEDS

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The Pan-European TIMES model

- 30 region model (EU 27 + NO, CH, IS)
- Energy system model
 - **SUPPLY:** reserves, resources, exploration and conversion
Country specific renewable potential and availability
(onshore / offshore wind, geothermal, biomass, solar, 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 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

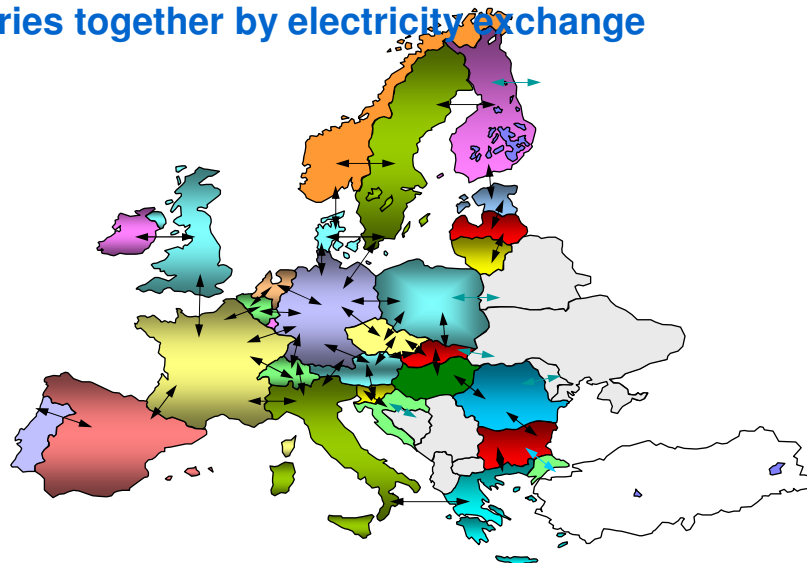


The modelling team of the country models

Institution	Country	Member State Model (MSM)	Contact person
CHALMERS	Sw	Sweden, Norway, Iceland	Erik Ahlgren
CIEMAT	E	Spain, Portugal	Yolanda Lechon
CRES	GR	Greece, Malta, Cyprus	George Giannakidis
ECN	NL	The Netherlands, Ireland	Koen Smekens
ENERO	RO	Romania	Anka Mihaela Tuhai
IMAA-CNR	I	Italy	Vincenzo Cuomo
INFM	I	Slovenia	Maria Macchiato
JRC	E		Antonio Soria
KANLO	F		Amit Kanudia
KUL	B	Belgium, Luxembourg, France	Denise van Regenmortel
POLITO	I	UK	Evasio Lavagno
PSI	CH	Switzerland	Socrates Kypreos
RISOE	DK	Denmark	Poul Erik Grohnheit
TTU	EST	Estonia, Lithuania, Latvia	N.N.
USTUTT	D	Germany, Austria, Czech R., Hungary, Slovakia, Poland + Bulgaria	Markus Blesl
VTT	FIN	Finland	Antti Lehtila

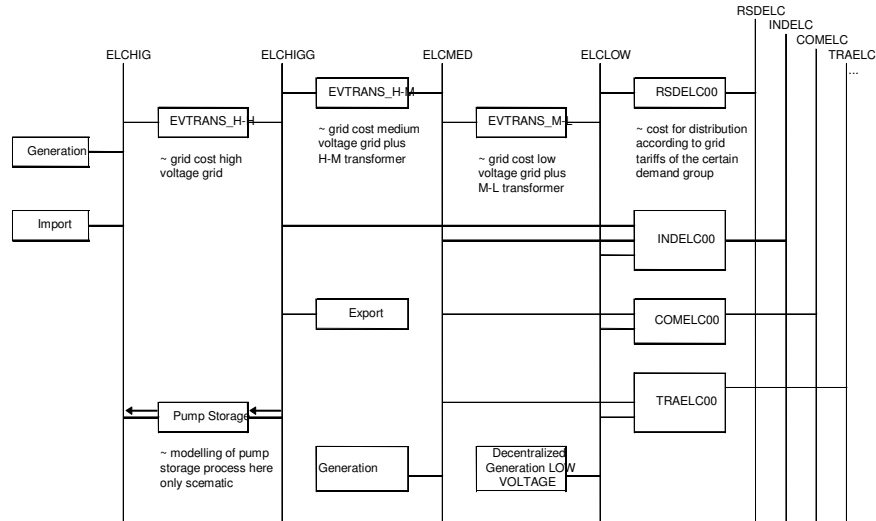


The Pan-European TIMES model - Linking the countries together by electricity exchange





Electricity structure in the PAN-European Model



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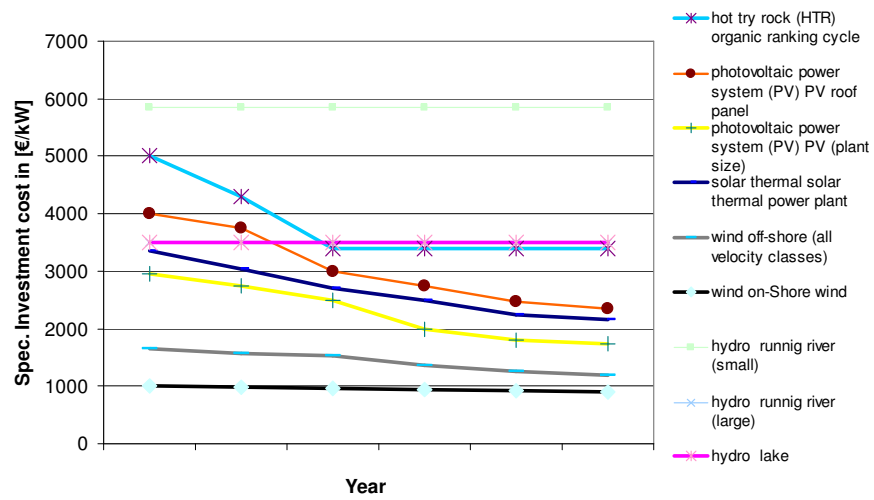
TIMES-D

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Comparison specific investment cost (Part 1)



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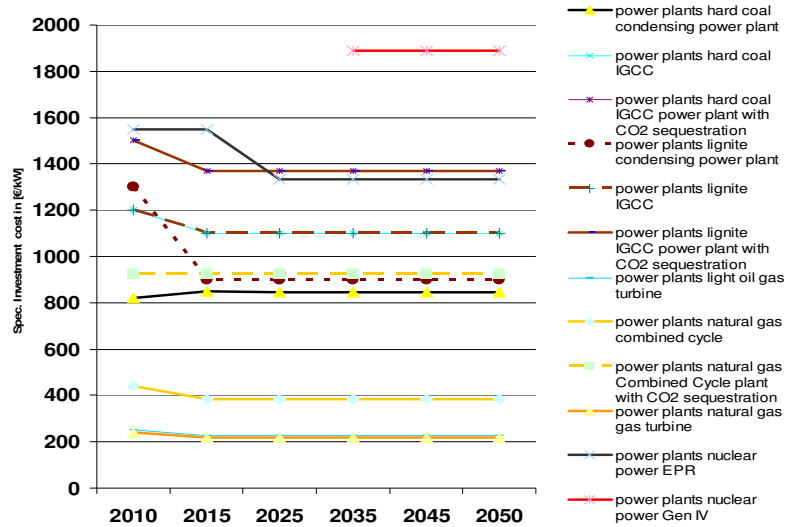
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Comparison specific investment cost (Part 2)



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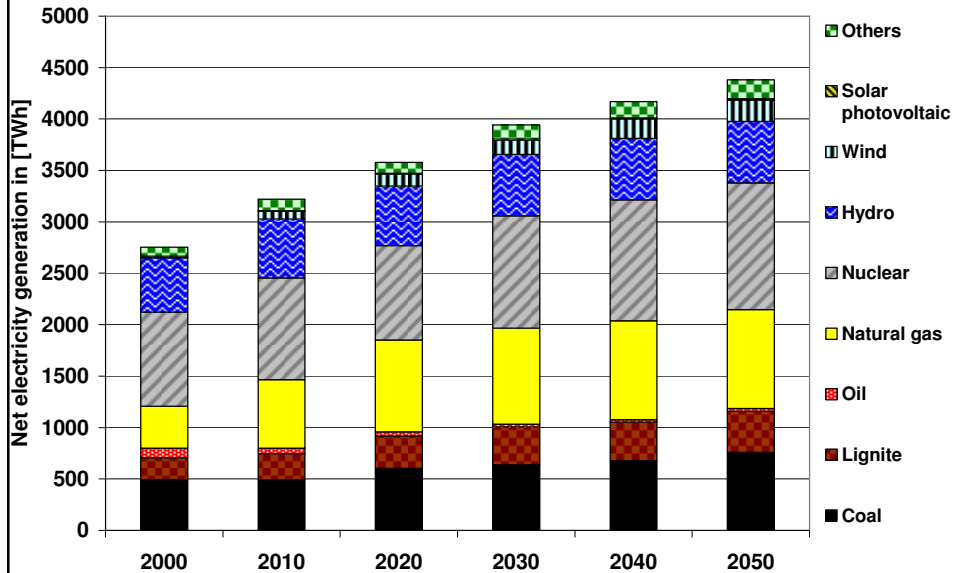
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Net electricity generation in TWh



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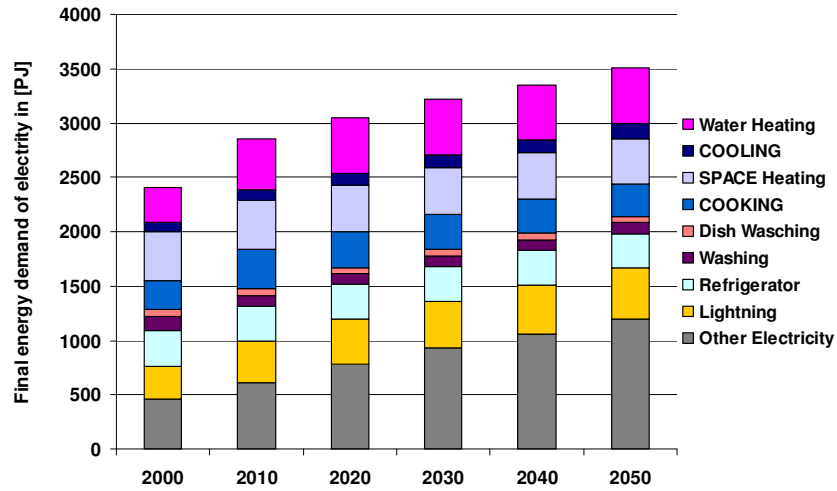
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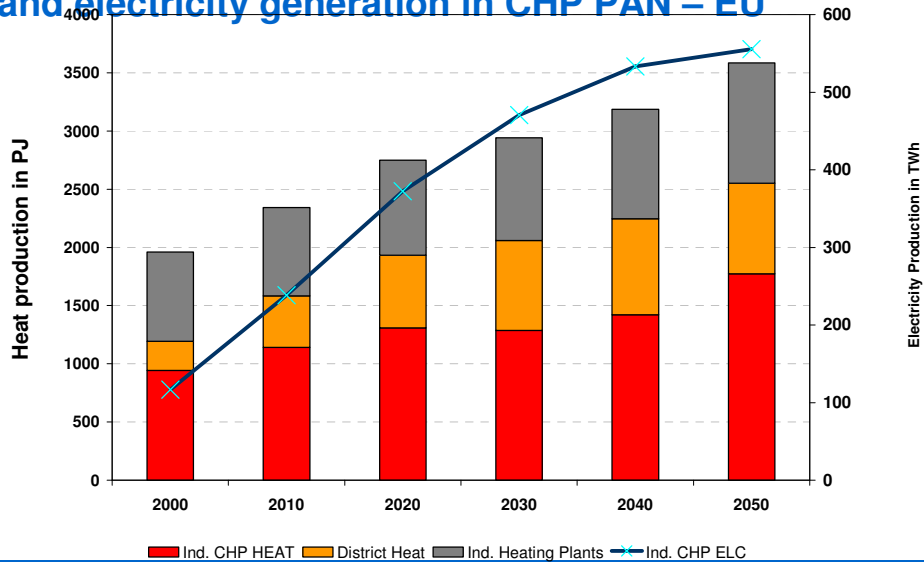
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Changes in final energy demand of electricity by end use categories in residential sector

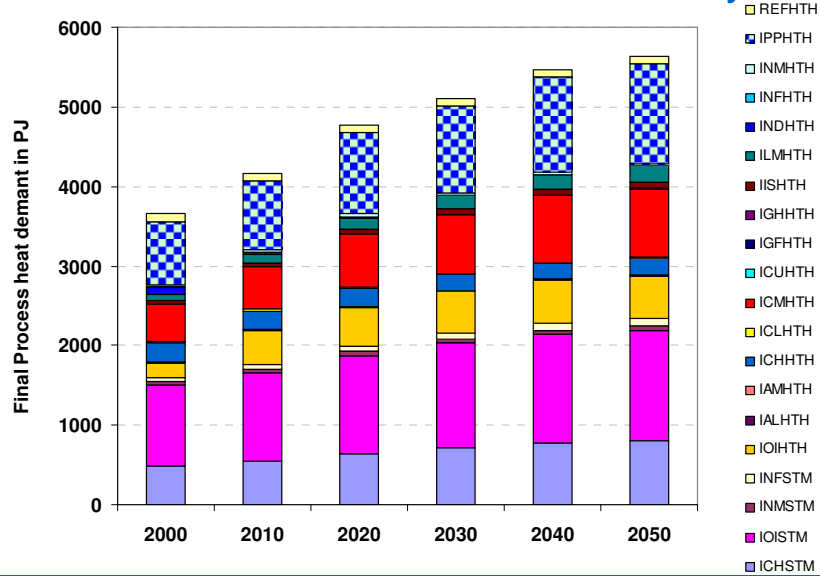


Industry heat / steam and heating boilers production and electricity generation in CHP PAN – EU





Process heat / steam demand in industry



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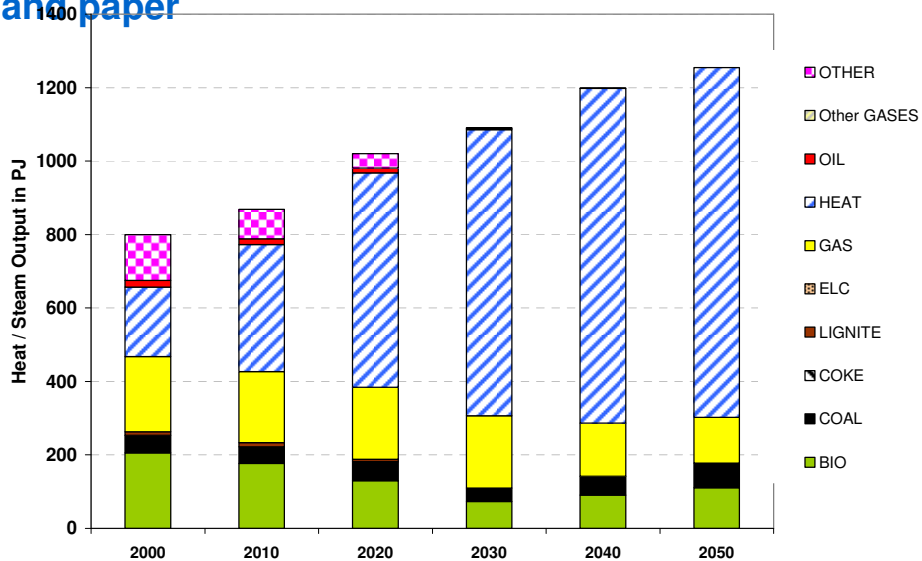
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Process heat generation by energy carrier in pulp and paper

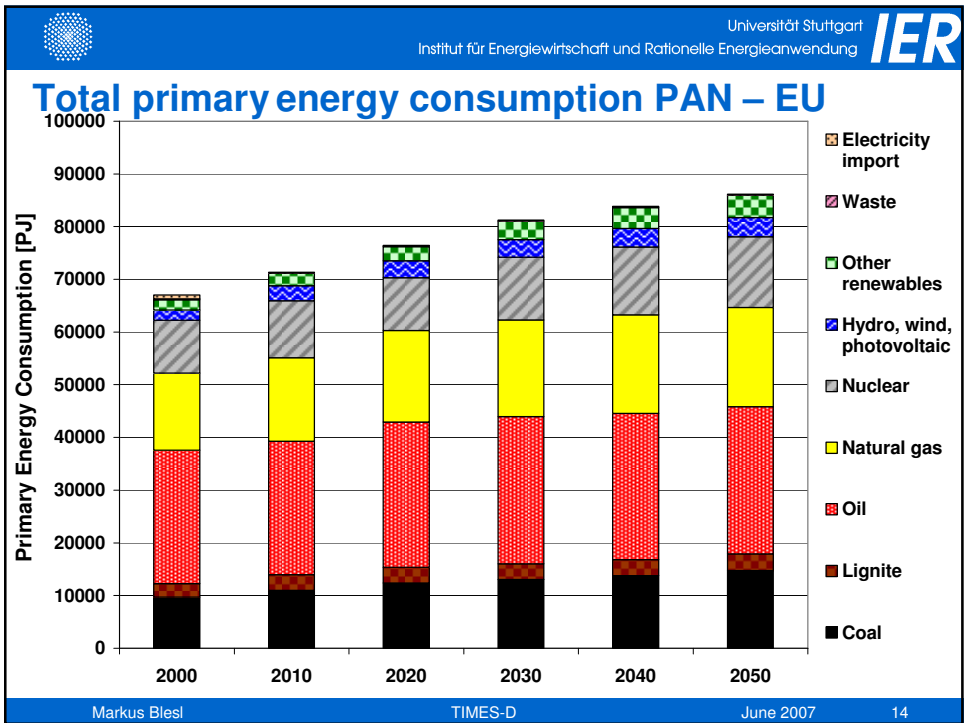
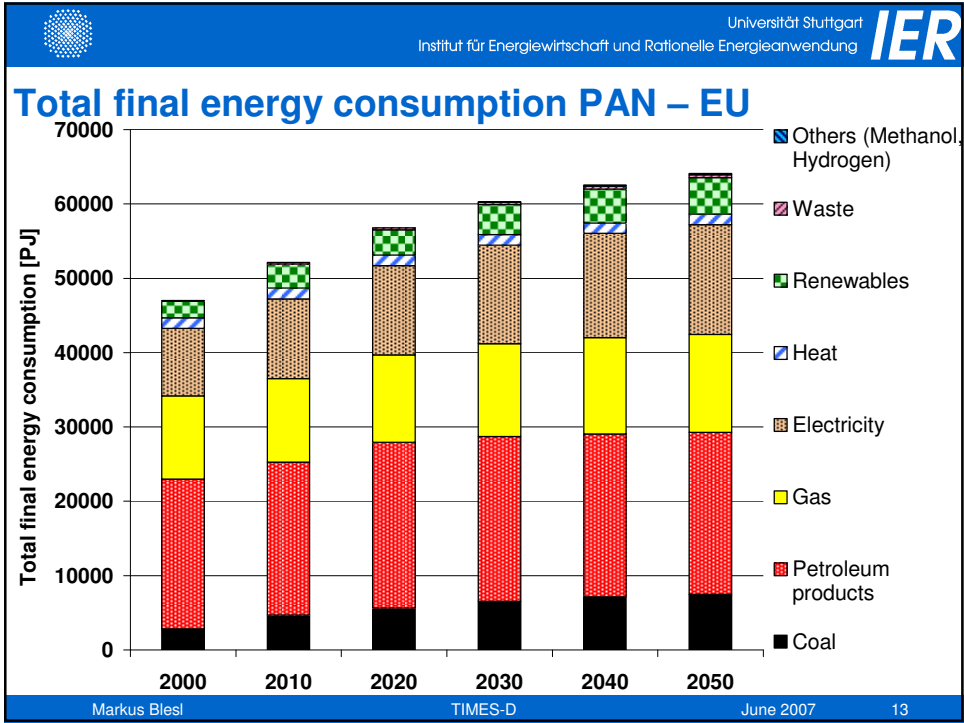


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TIMES-D

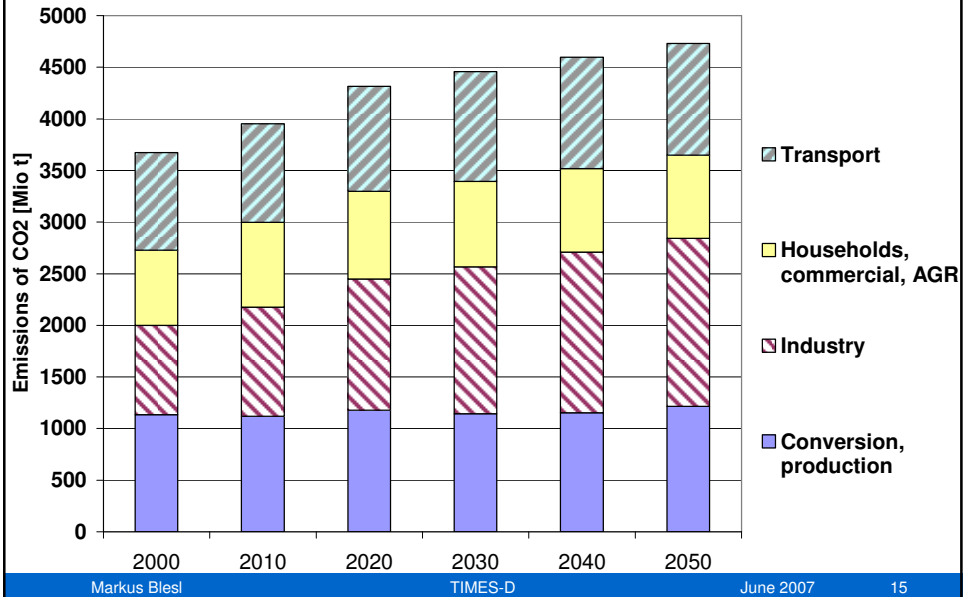
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Total CO₂ emission in the PAN-EU



Outlook: Scenario analysis - The Key Policy Cases

1. Specification of the **Baseline** case
2. **Post-Kyoto** climate policy to stabilize CO₂e concentrations at 550/450 ppmv
3. **Enhancement of endogenous energy resources**, (constraining imports of fossil fuels to foster the use of renewables, efficiency standards and new nuclear)
4. Improve **environmental quality** by endogenizing externalities related to local air pollution (i.e., w/o global externalities)

