



# Impact of policy measures in the direction of a decentralized energy system in Europe

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## The Pan-European model (TIMES PanEU)

- 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: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, SF<sub>6</sub>
- Others pollutants: SO<sub>2</sub>, NO<sub>x</sub>, CO, NMVOC, PM<sub>2.5</sub>, PM<sub>10</sub>
- The database integrates results of LCI and specific Damages with the aim to integrate the treatment of Externalities in the optimization procedure



## The Pan-European Model (2)

- **SUPPLY: Explicit modeling of reserves, resources, exploration and conversion**
- **Electricity:**
  1. Public electricity plants, CHP plants, heating plants, auto-producers
  2. Country specific renewable potential and availability (onshore / offshore wind, geothermal, biomass, solar, hydro)
  3. Country specific characterization of conversion technologies (in-use and new)
- **DEMAND: is based on a simulation routine linked with GEM-E3 /NEWAGE**
  1. Agriculture
  2. Industry: Energy intensive industry (iron and steel, aluminum, copper, ammonia and chlorine, cement, glass, lime, pulp and paper), Food and Tabaco, Other industries
  3. Residential and Commercial: Space heating/cooling, water heating, appliances and others)
  4. Transport: Passenger, Freight (different transport modes: cars, buses, motorcycles, trucks, passenger trains, freight trains) Air, Navigation.
  5. Country specific characterization of end-use technologies

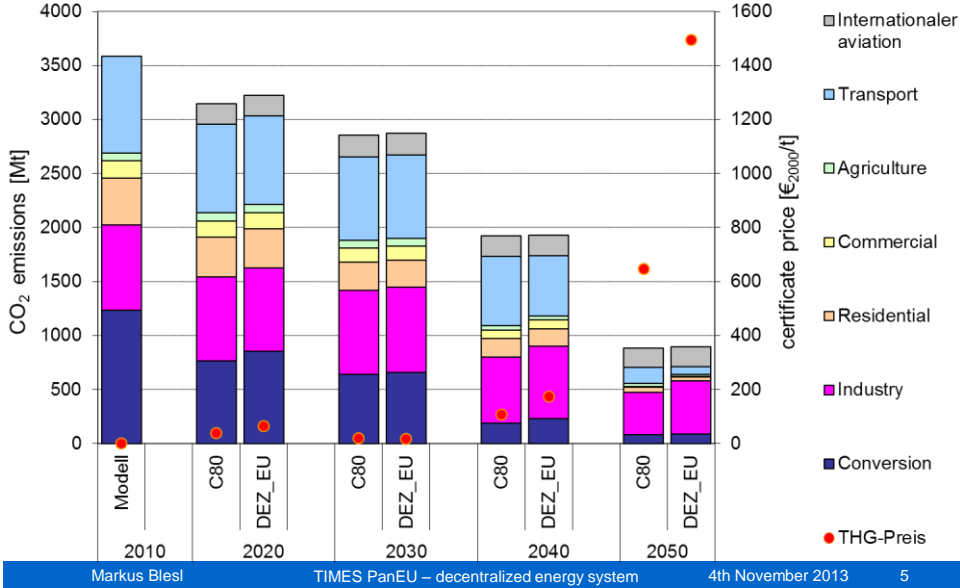


## Overview of Scenarios

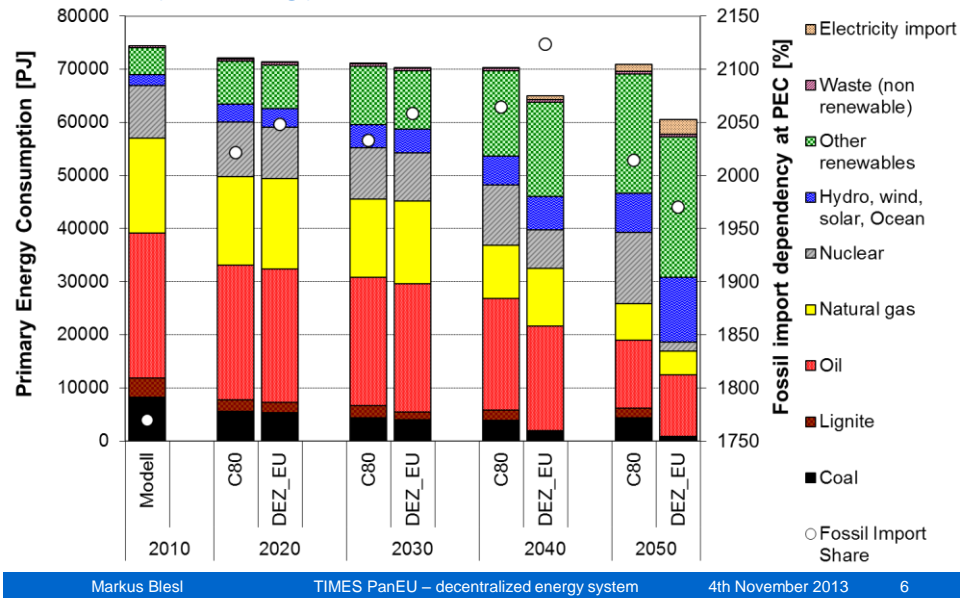
Decarbonisation Scenarios: GHG-Red. 25% in 2020; 80% in 2050 EU Roadmap 2050

C80
<ul style="list-style-type: none"> <li>• Increasing reliance on RES, 60% share in gross final energy and 65%share in electricity consumption 2050</li> </ul>
Decentralized electricity system in Europe DEZ_EU
<ul style="list-style-type: none"> <li>• No more fossil or nuclear power plants over 20 MWel</li> </ul>

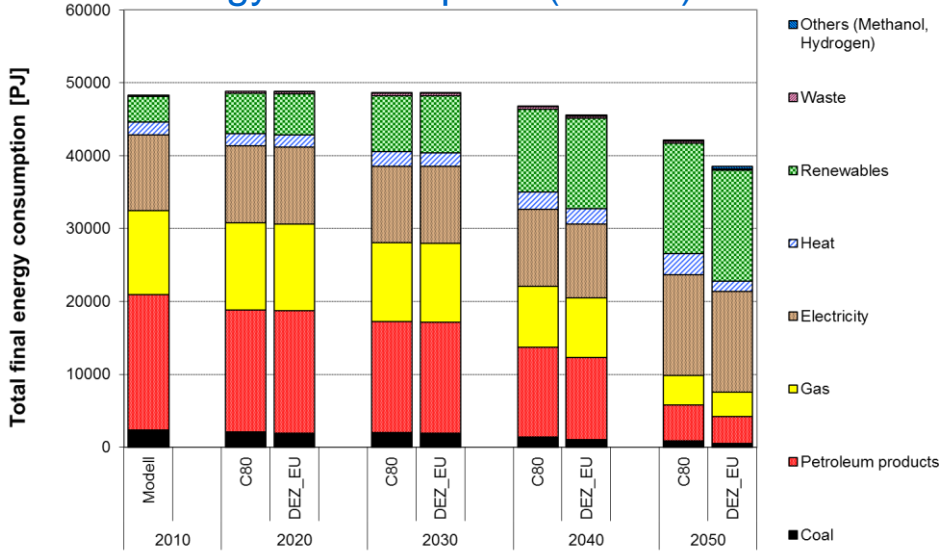
### Focus: CO<sub>2</sub> Emissions (EU-27)



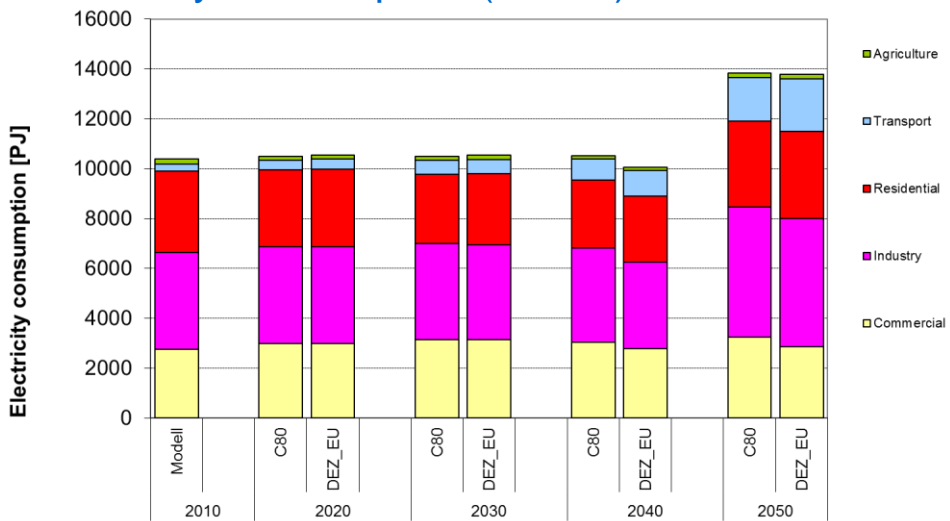
### Primary Energy Consumption (EU-27)



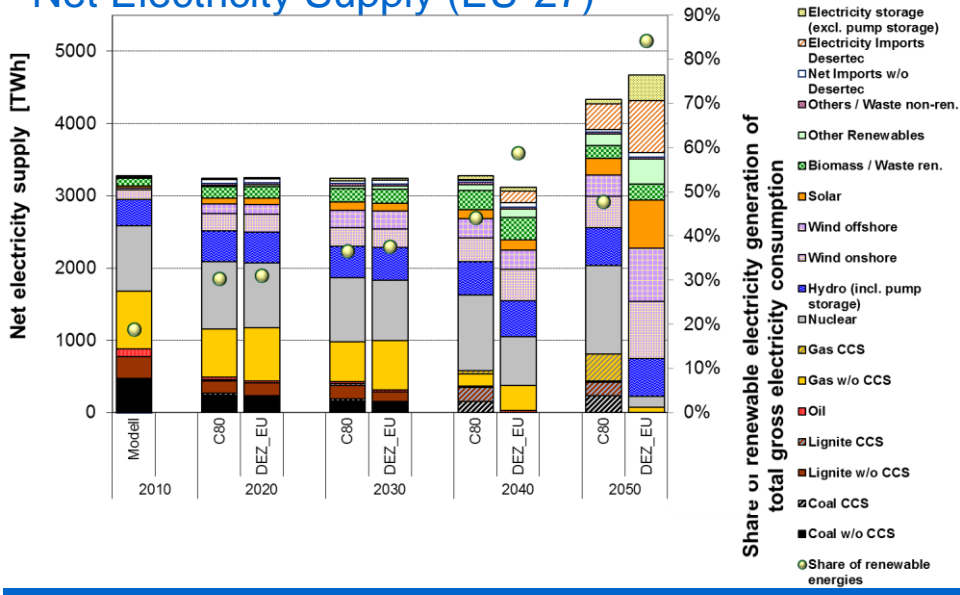
### Final Energy Consumption (EU-27)



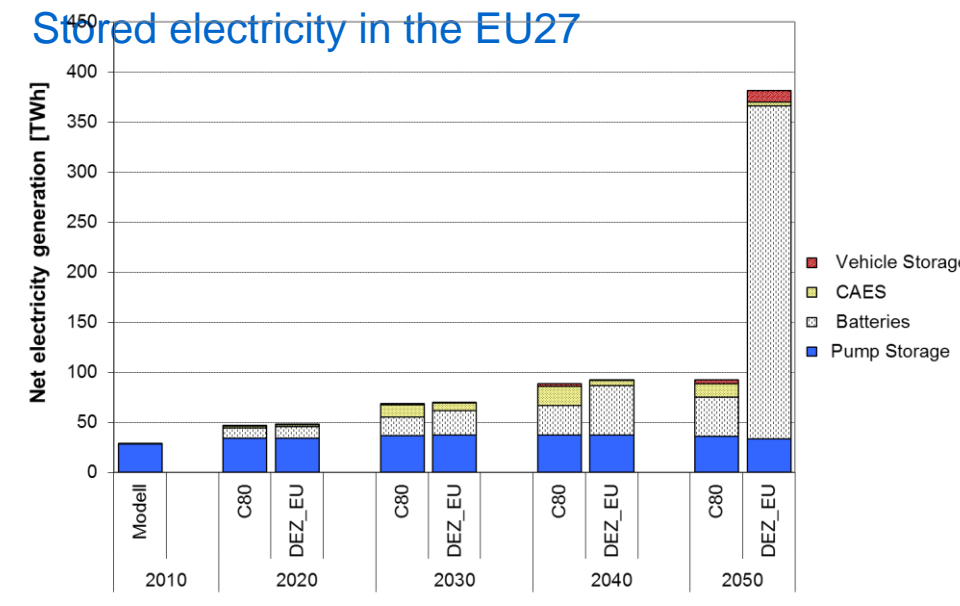
### Electricity consumption (EU-27)

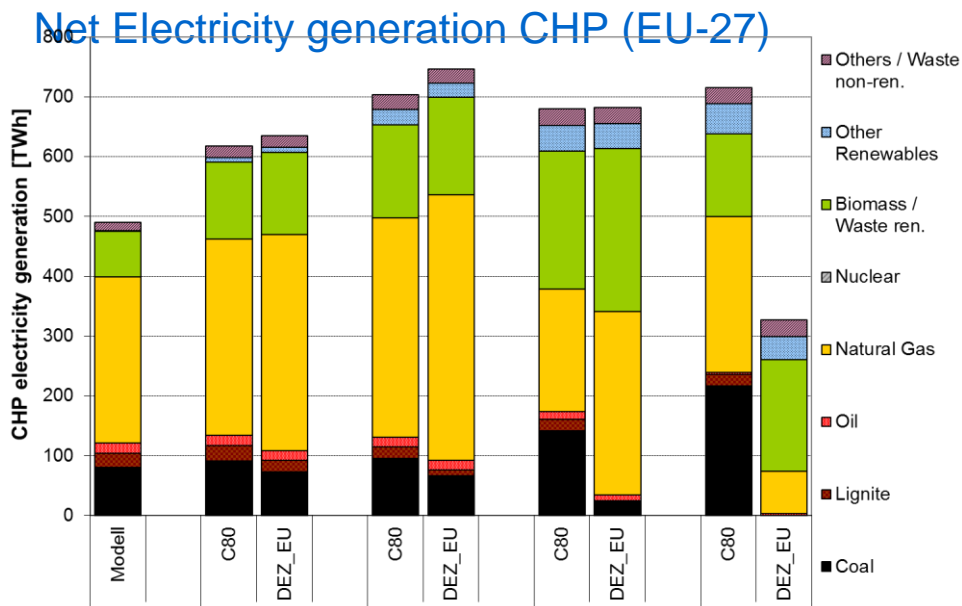
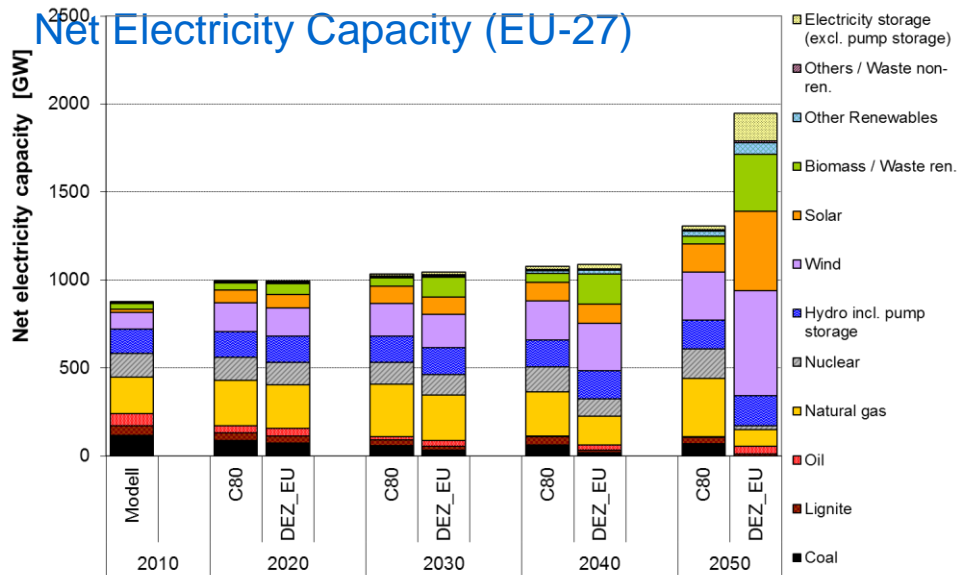


### Net Electricity Supply (EU-27)

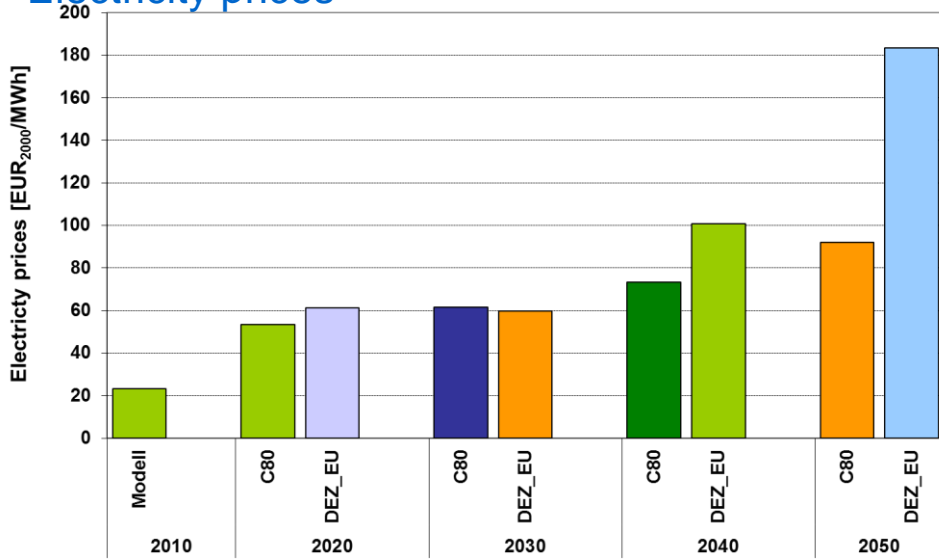


### Stored electricity in the EU27

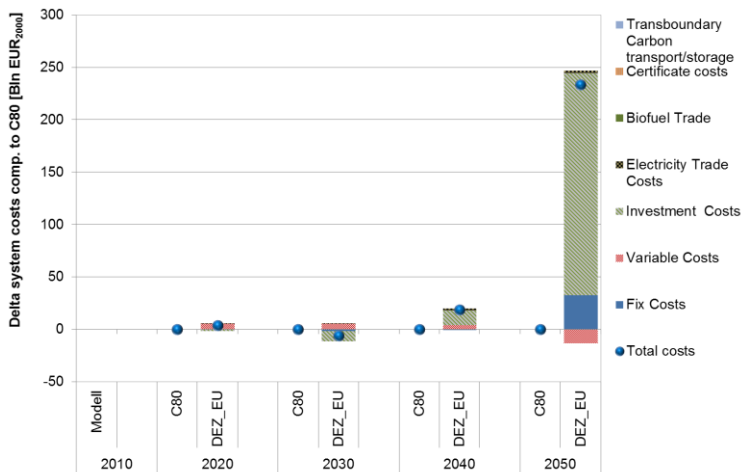




## Electricity prices



## Annual energy system costs compared to C80 2010 in the EU27





## Conclusion

- Decentralized System is not equal with a lot of small CHP (e.g. internal combustions engines) because of the given overall Greenhousgas reduction target.
- CCS is no option under such a policy.
- Decentralized Electricity system have impact to the electricity prices and the economic competition.

