POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

Beyond 2020: Strategies and costs for transforming the European energy system

Enerday

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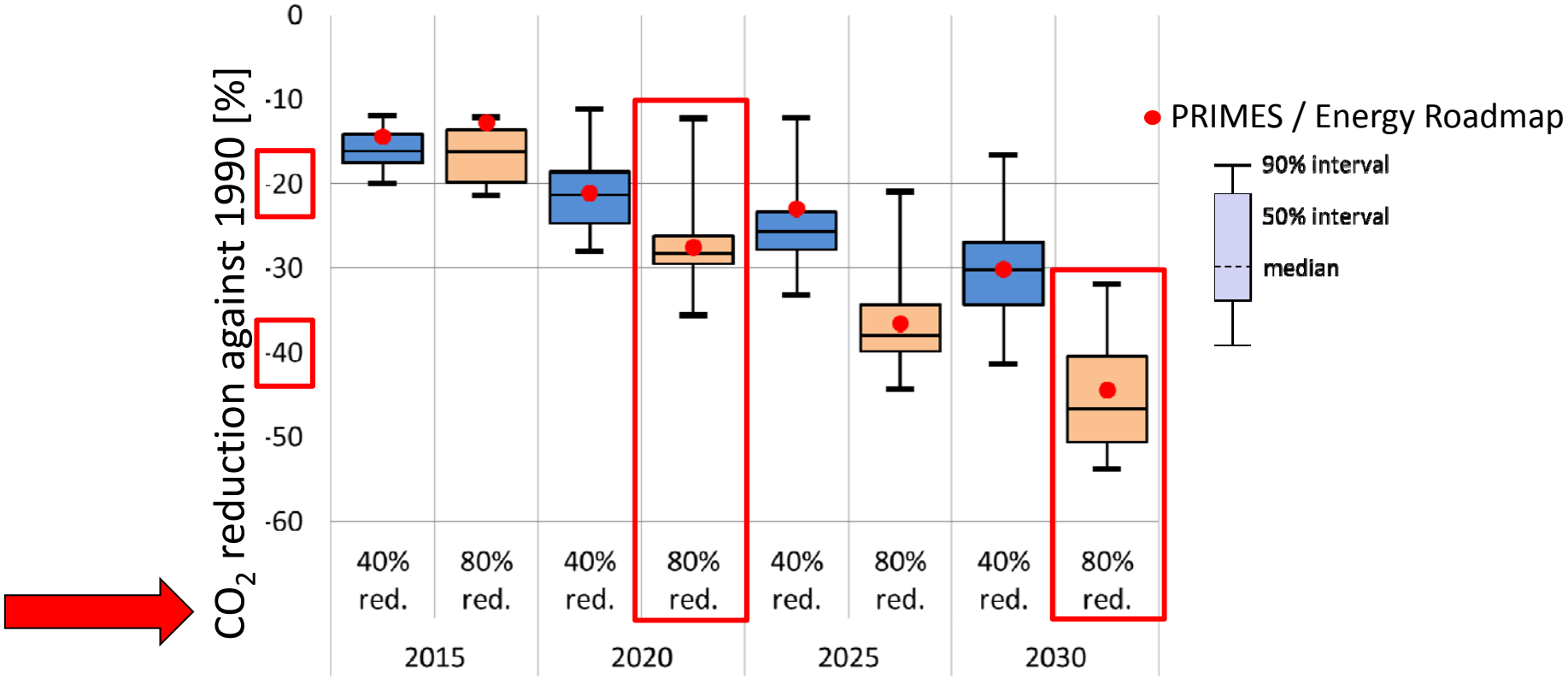
Brigitte Knopf (PIK), presented by Eva Schmid (PIK)

Yen-Heng Henry Chen (MIT), Enrica De Cian (FEEM), Hannah Förster (Oeko-Institute), Amit Kanudia (Kanors), Ioanna Karkatsouli (MIT), Ilkka Keppo (UCL), Tiina Koljonen (VTT), Katja Schumacher (Oeko-Institute), Detlef P. van Vuuren (PBL, UU)

The EMF28 Study on Scenarios for Transforming the European Energy System

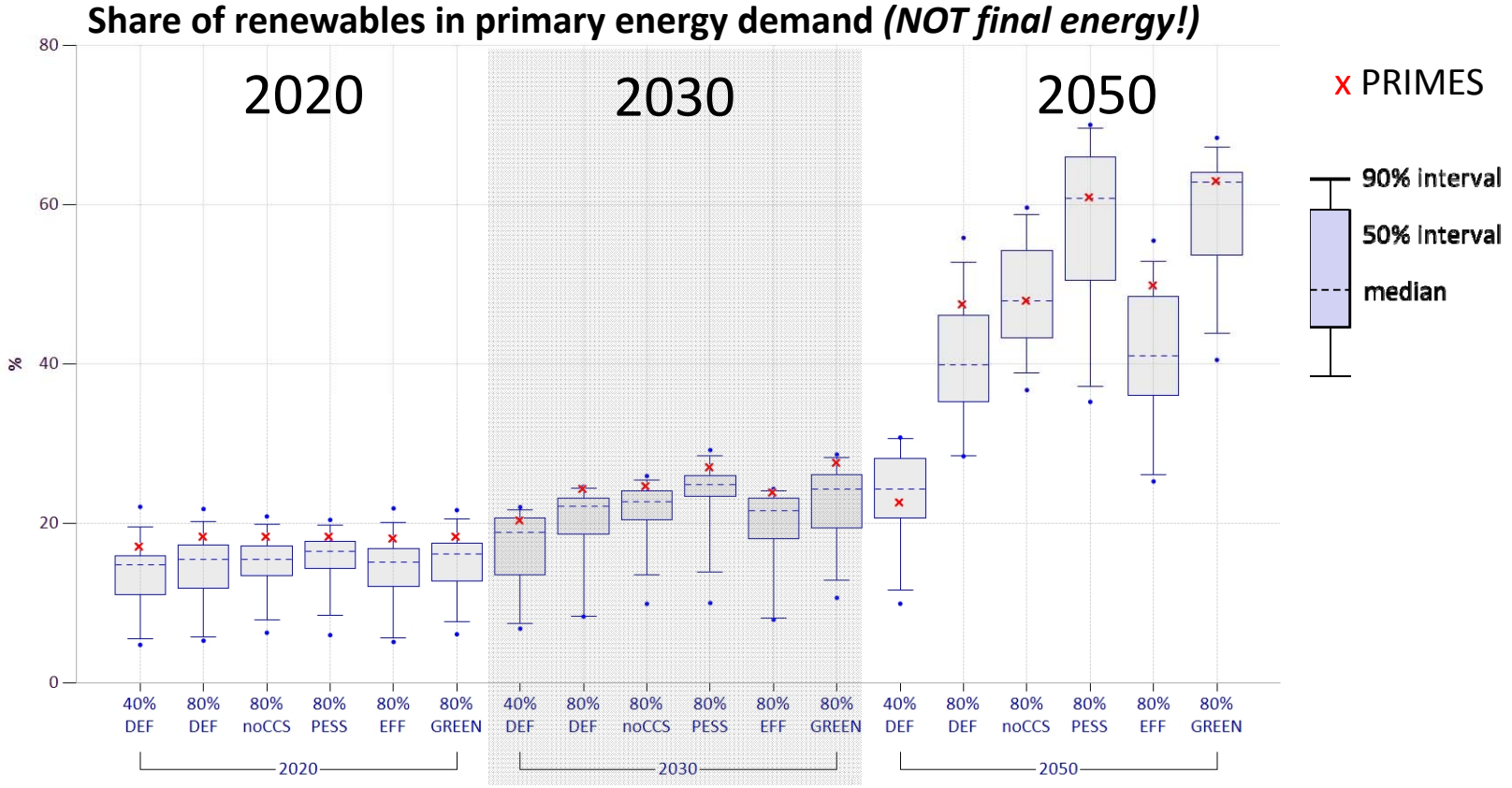
- Model comparison with 13 models (including PRIMES): Putting the EU Energy Roadmap (2011) into perspective
- Core scenarios: no policy baseline (BASE), 40% and 80% GHG reduction by 2050
- Structured sensitivity analyses on technology availability and on the level of global participation
- Published in a Special Issue in Climate Change Economics in Dec 2013
  http://www.worldscientific.com/toc/cce/04/supp01

EU 2030 targets: CO_2 Emission reduction



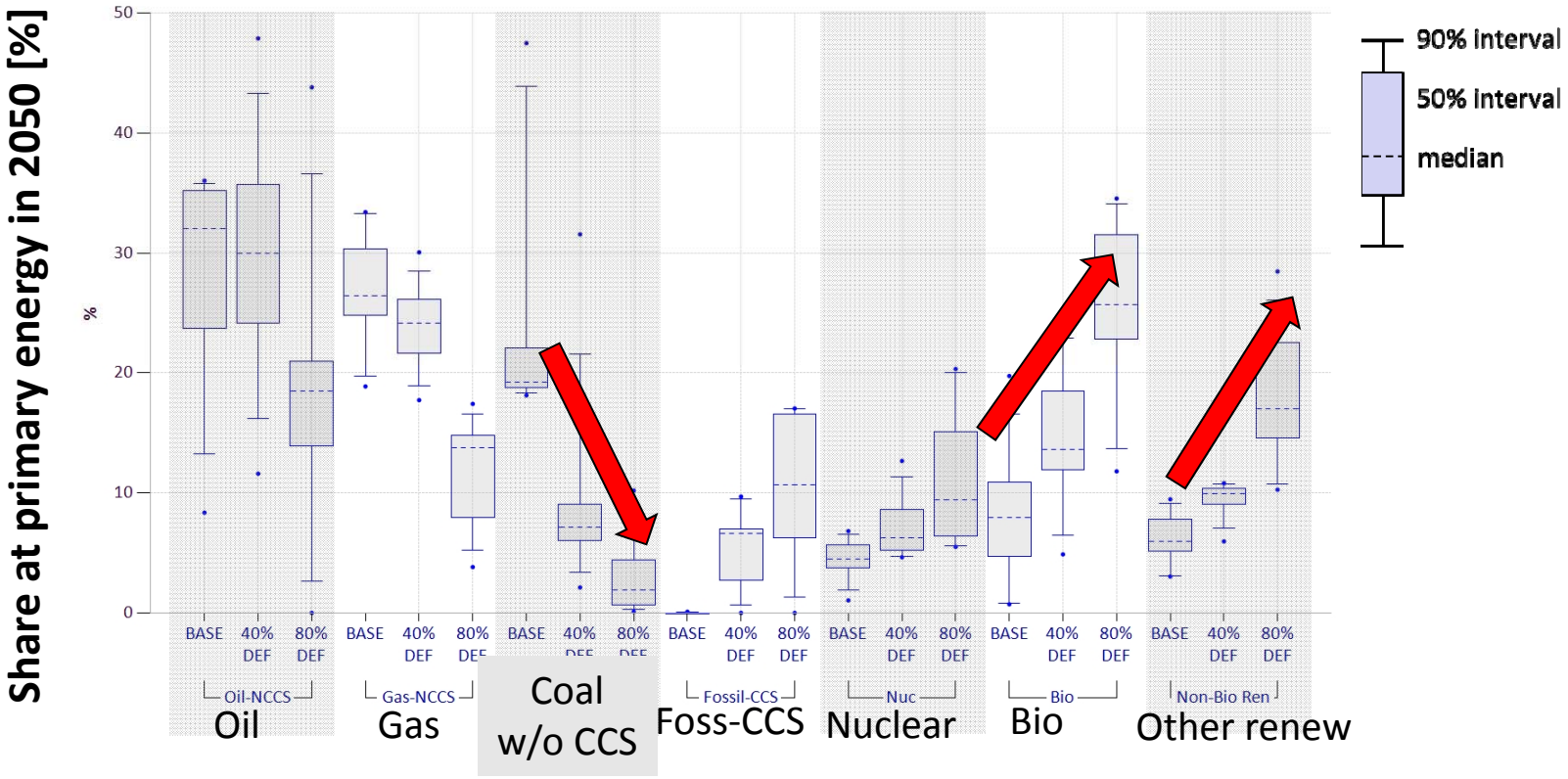
- Models show higher GHG reduction than 20% by 2020
- GHG reductions of at least 40% by 2030 are necessary within Europe as an effective milestone for reaching 80% by 2050

EU 2030 targets: Renewable energy



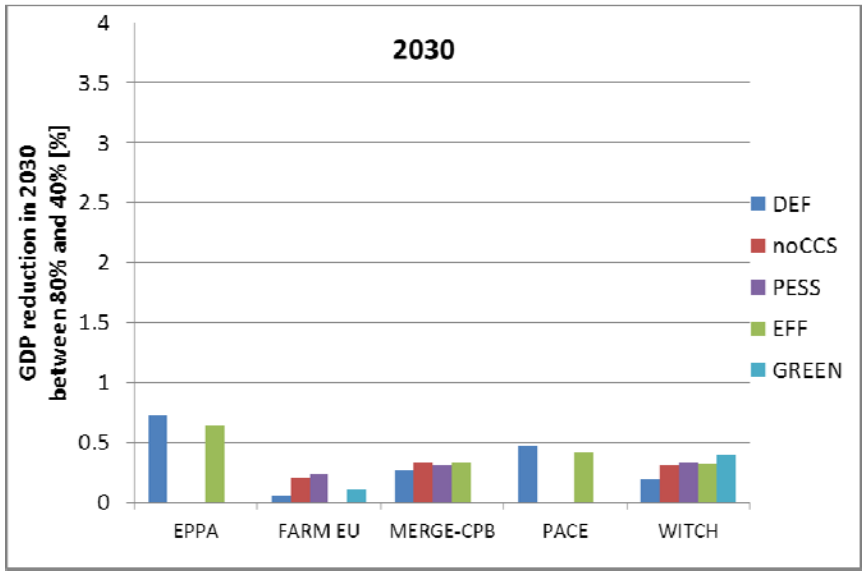
- Renewables share varies considerably with technology setting
- PRIMES is at the upper level of all models (Note: New IA displays lower levels)
- Models consider *only* the objective of GHG mitigation

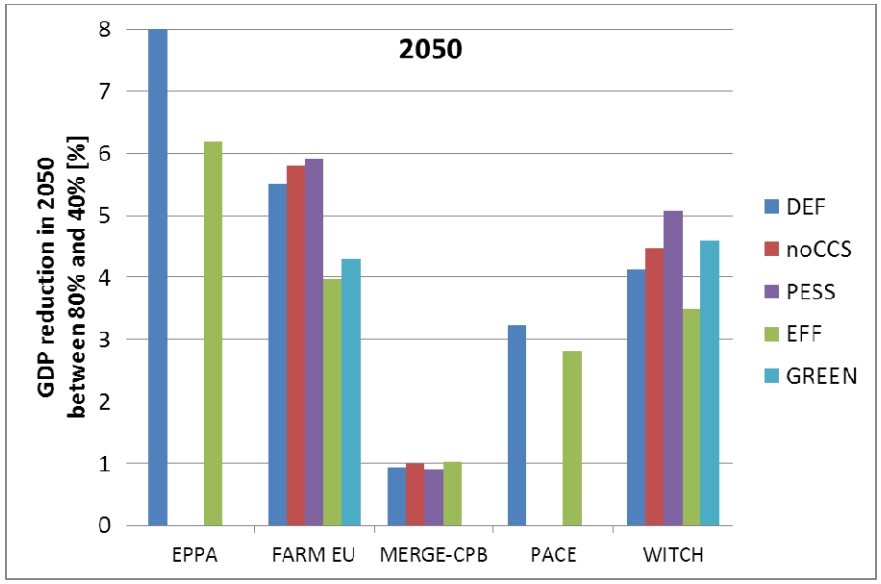
With increasing level of ambition: Phase-out of coal and upscaling of renewables



- There are several pathways for achieving ambitious climate change mitigation in Europe (biomass vs. wind and reduction of energy intensity vs. carbon intensity)

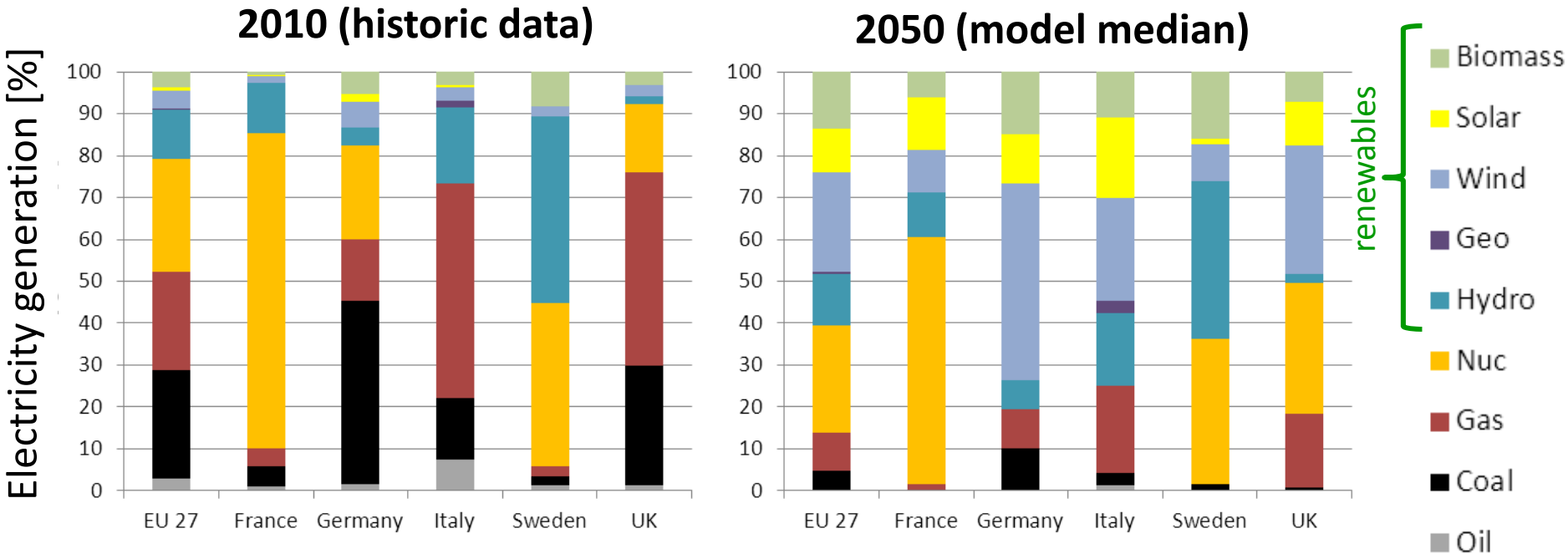
Costs for different technology settings





- Cost are low until 2030 but increase by 2050
- Scenario without CCS (and w/o nuclear) is possible at limited additional costs *(red bar)*
- Difference between models is more significant than technology setting

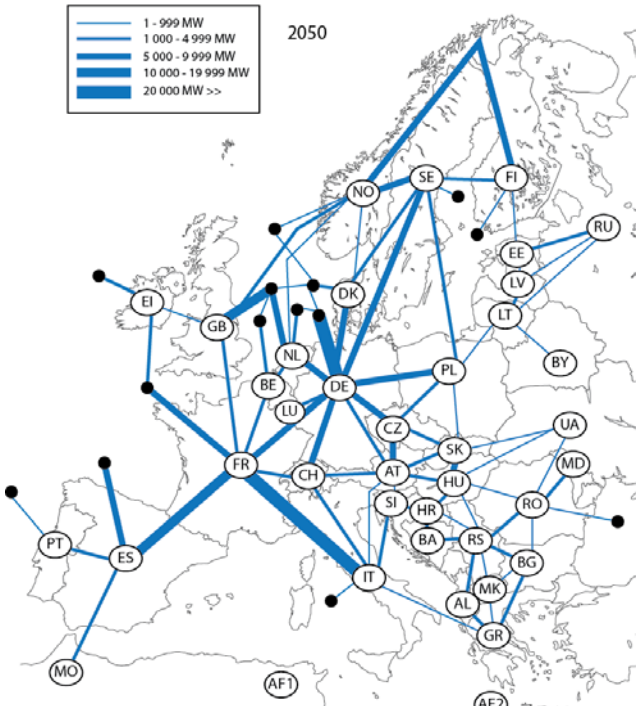
Effort sharing across Member States

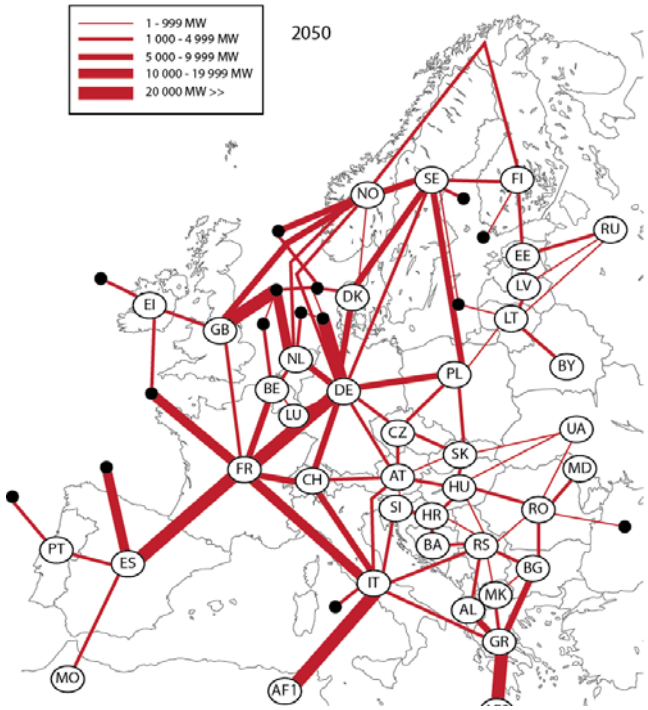


- Shift towards renewables in all Member States, but diversity remains
- Cost-optimal pathways suggest a division of labour across Europe; aggregated EU mix might not be a good guidance
- A fair burden sharing and potential transfers will become an important issue

Infrastructure requirements: Electricity, Gas, CO_2

40% GHG reduction **2050** **80% GHG reduction**





- Electricity: additional cross-border interconnections are a no-regret option
- Natural gas: could be satisfied by the current infrastructure in place
- CO_2 pipelines: would be supported by the possibility of additional revenues through Enhance Oil Recovery (EOR)

Conclusions

- EMF28 findings confirm the robustness of the EU Roadmap's main priorities and conclusions:
  - There are several pathways for decarbonising Europe
  - Energy efficiency and renewables are key
  - No new coal-power plants without CCS

- EMF28 suggest that at least 40% GHG reduction by 2030 is required as a cost-effective milestone for achieving 80% by 2050

- The transformation strategies in the different Member States could remain very diverse; fair burden sharing will be important

- Infrastructure enhancement is required to achieve decarbonization

Special Issue in *Climate Change Economics*

http://www.worldscientific.com/toc/cce/04/supp01

1. **Introduction (Weyant, Knopf, de Cian, Keppo, van Vuuren)**
2. **Synthesis on EMF28 (Knopf et al.)**
3. **International dimension and trade (de Cian et al.)**
4. **Costs of the transformation (Paltsev and Capros)**
5. **Sectoral analysis (Förster et al.)**
6. **Member States' perspectives (Knopf et al.)**
7. **Infrastructure requirements (Holz and von Hirschhausen)**
8. **Electricity prices (Schröder et al.)**

Contact: Brigitte Knopf, Knopf@pik-potsdam.de