



Assessing the impact of electricity trades restriction in achieving the carbon neutrality of the EU power system

Gildas SIGGINI¹, Edi ASSOUMOU¹, Sophie DEMASSEY¹

¹ Centre de Mathématiques Appliquées, France,

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The European power system

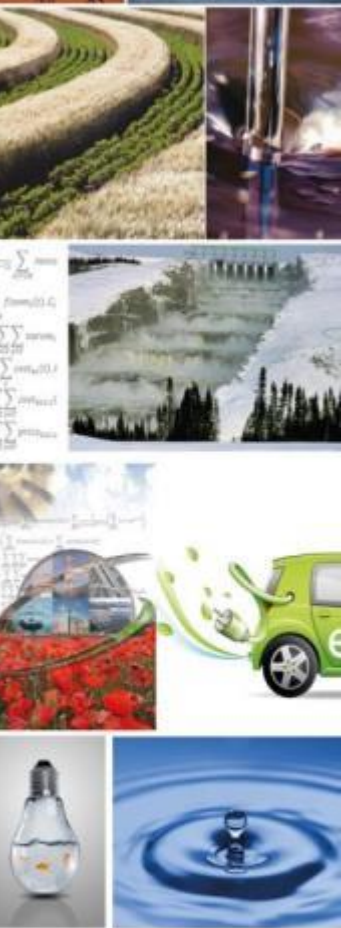
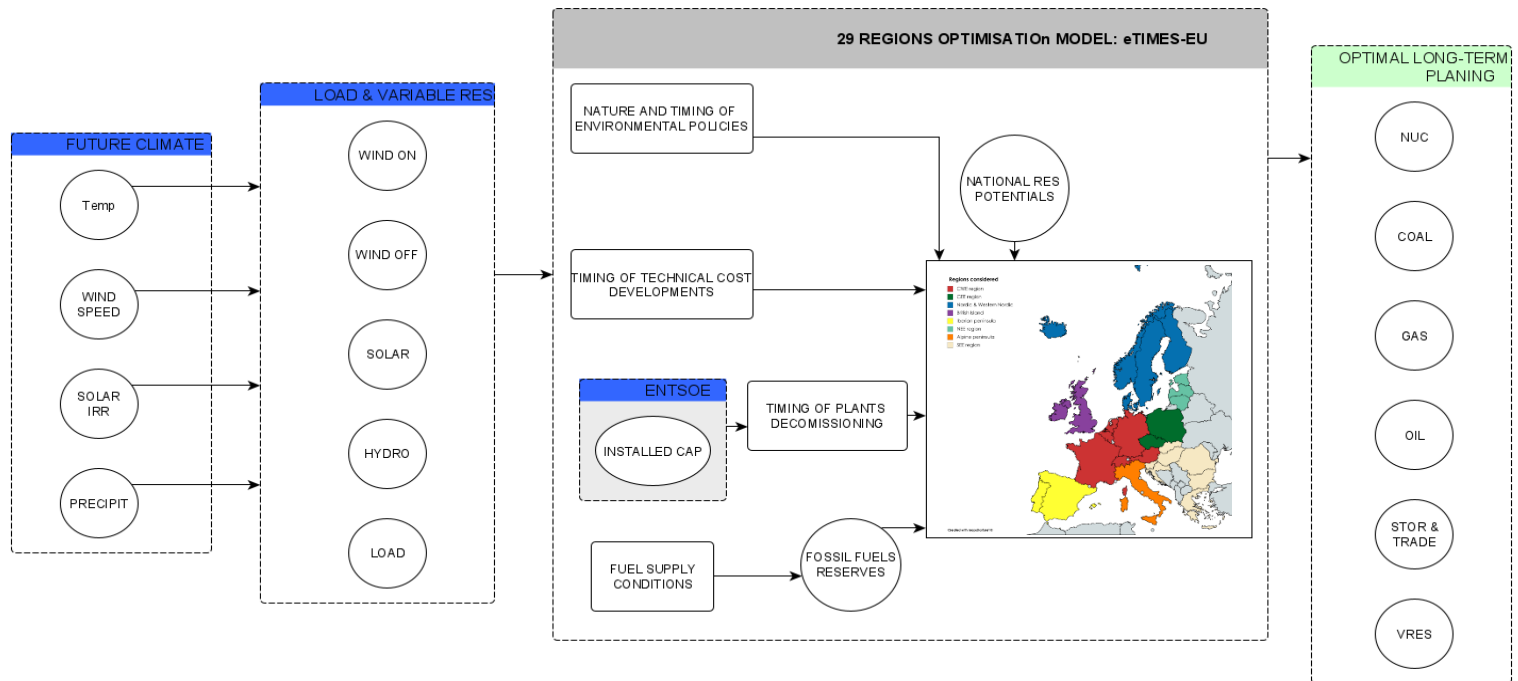
There is a need to think about the evolution of European electric systems as a whole:

- Highly interconnected grid with strong interdependencies
- Increased flexibility and adequacy concerns due to high VRES penetration
- Common environmental targets: the burden sharing issue
- Long term climate uncertainties



The Clim2Power project

Long term climate models → planning and future investment needs

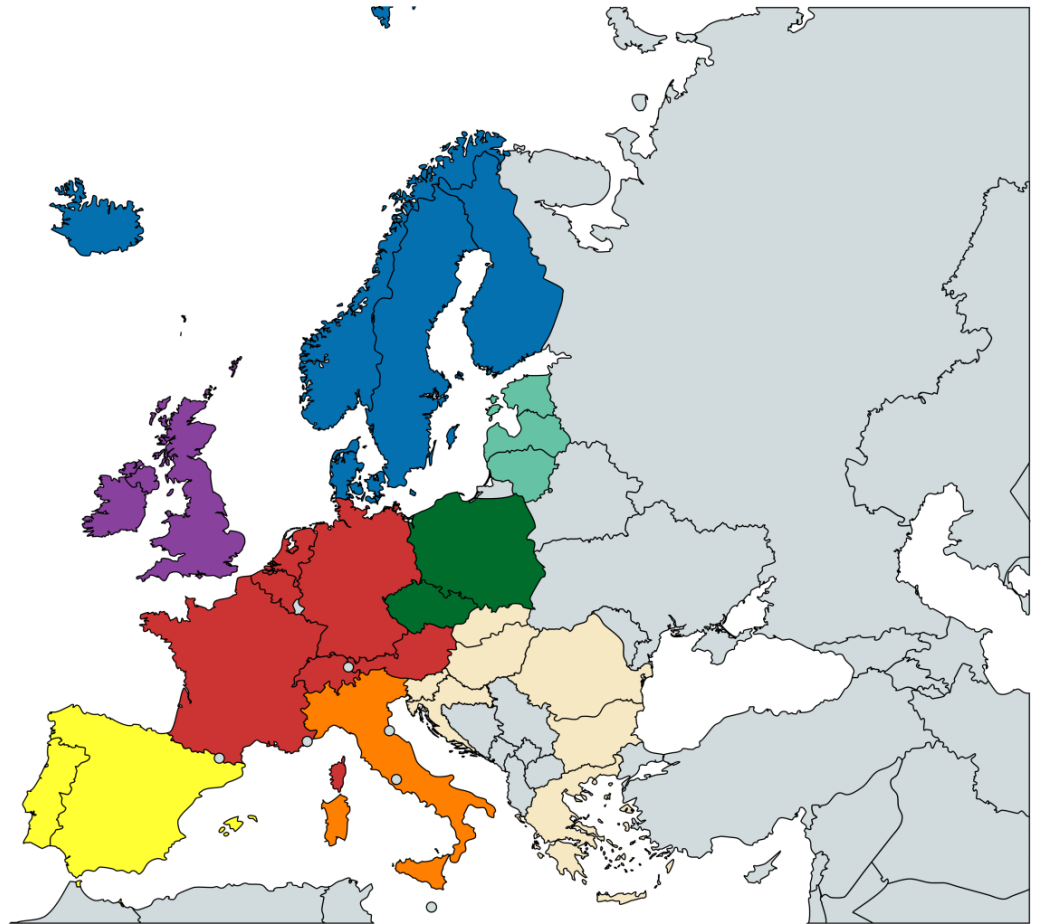


The eTIMES-EU model

- Spatial resolution

Regions considered

- CWE region
- CEE region
- Nordic & Western Nordic
- British Island
- Iberian peninsula
- NEE region
- Alpine peninsula
- SEE region

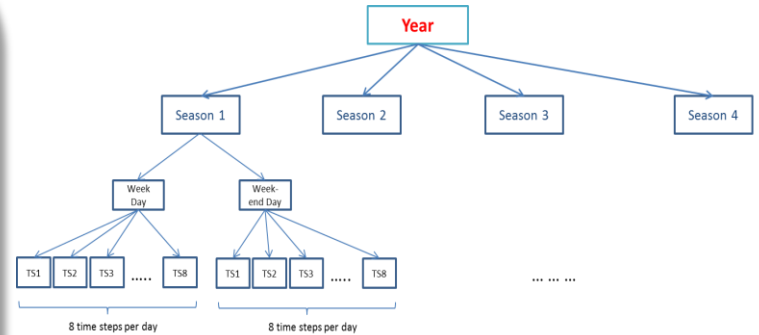
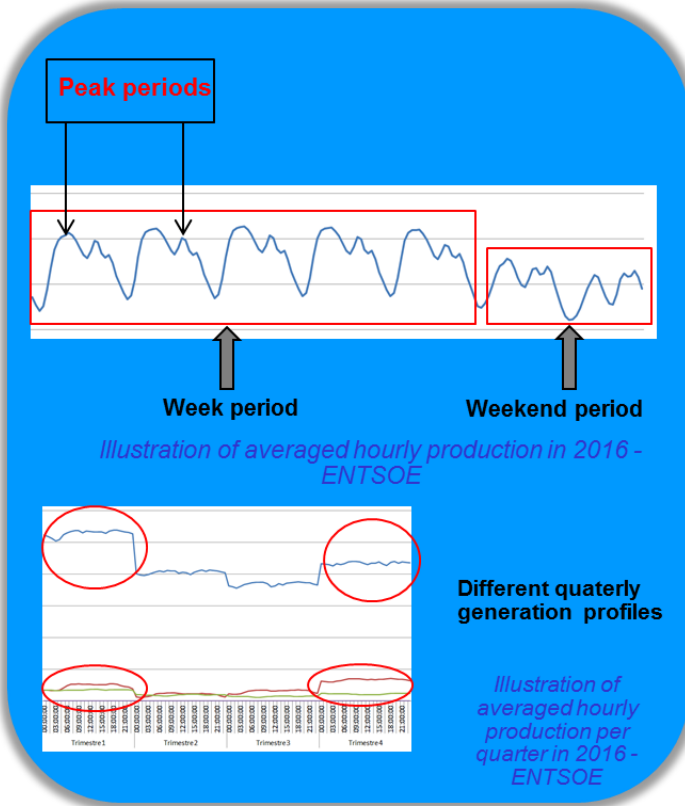


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The eTIMES-EU model

- Temporal resolution



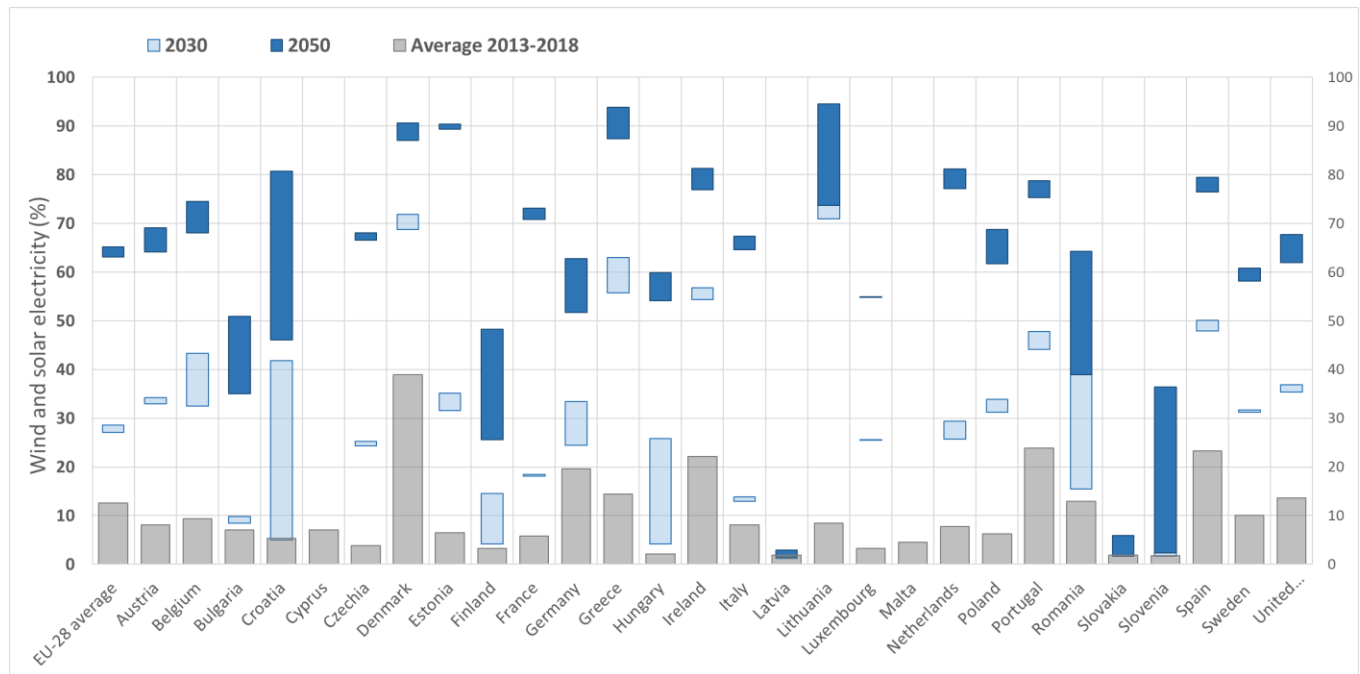
- Conservation of the intra-daily and weekly dynamics
- 64 times slices per region (before further extensions)



Some results of Clim2Power project

Impact of climate variability on VRES share

22 RCP 4.5 and RCP 8.5 EURO-CORDEX long-term projections



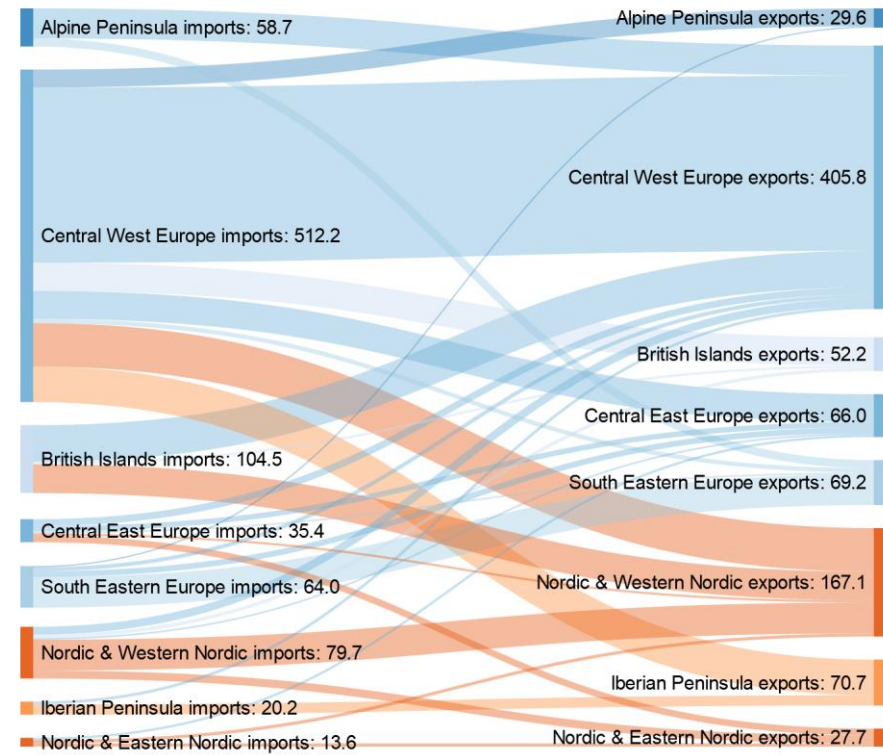
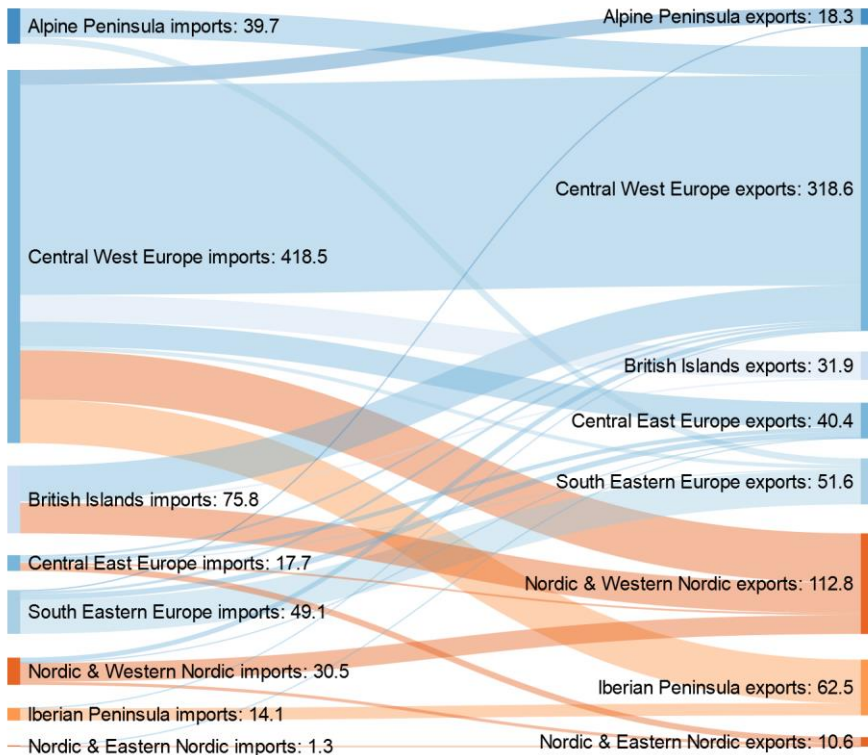
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Impact of climate variability on electricity trades

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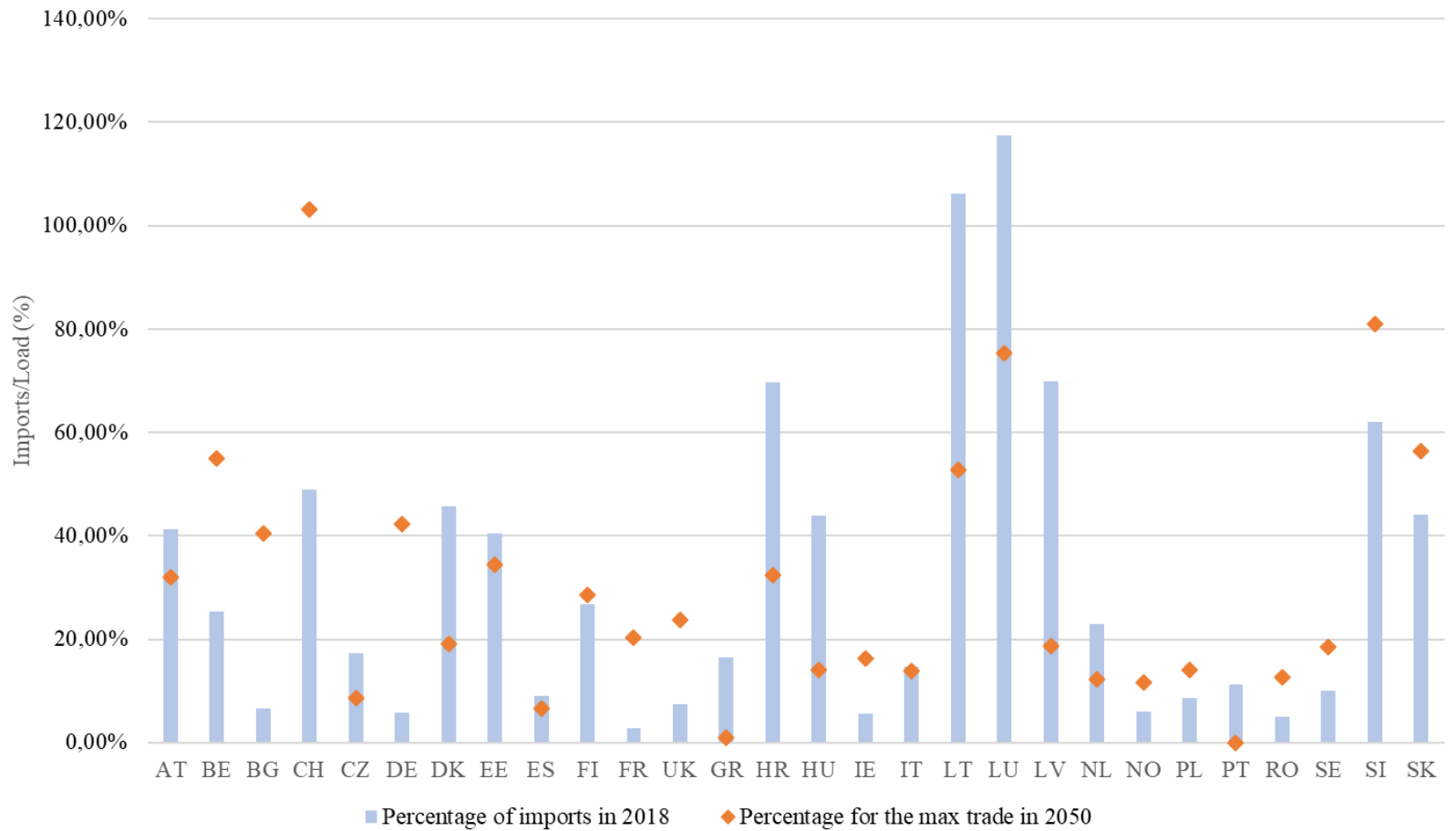
Min.

Max.



More on www.clim2power.com

The evolution of trades



Increase of Import/Load ratio in exporting regions today

How restrictions on trades impact the decarbonisation?



Scenarii description

Evaluating 2050 carbon neutrality pathways for different trade scenarios

Scenario **Free trade**: No limitation on the imported volume in each country

Scenario **Conservative**: The current ratio *Import/Load* is kept throughout the horizon

Scenario **UP- $\{x\}$ %**: Imported volume ceils to $\{x\}$ % of the demand from 2030 to 2050 in countries where lower. (Cases for $x \in \{5, 15, 25, 35\}$)

Scenario **UP-50%**: Imported volume ceils to 50% of the demand from 2030 to 2050 in all countries

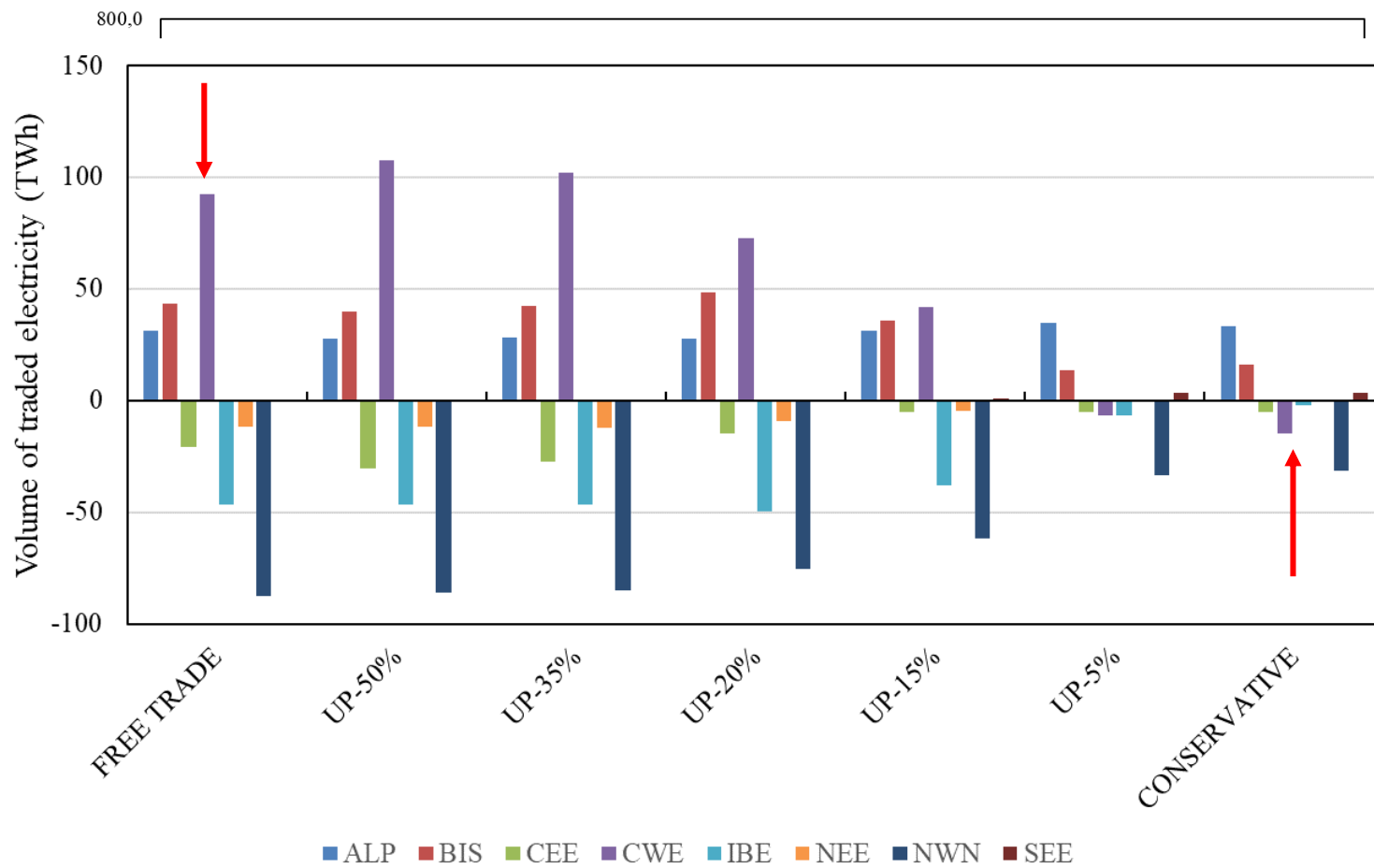
Default hypotheses:

- Demand from EU Reference Scenario
- Country specific development rhythms calibrated with historical values
- Announced coal phase outs arrive at planned date
- No targets on France nuclear activity
- Renewable potentials calibrated with JRC-ENSPRESO
- Fuel and technology costs calibrated with IRENA and WEO2016

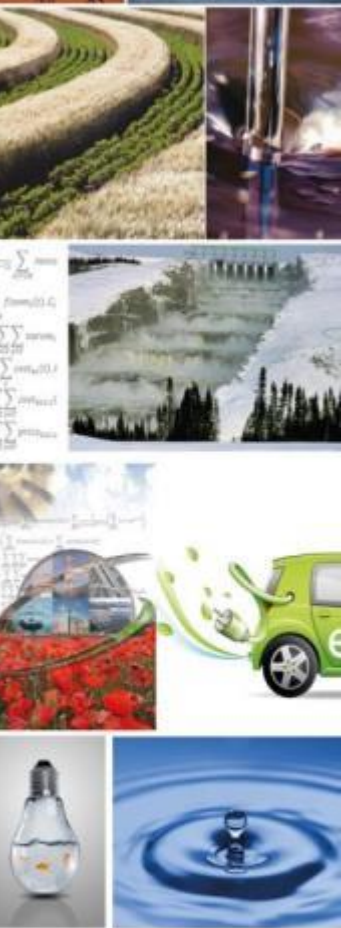
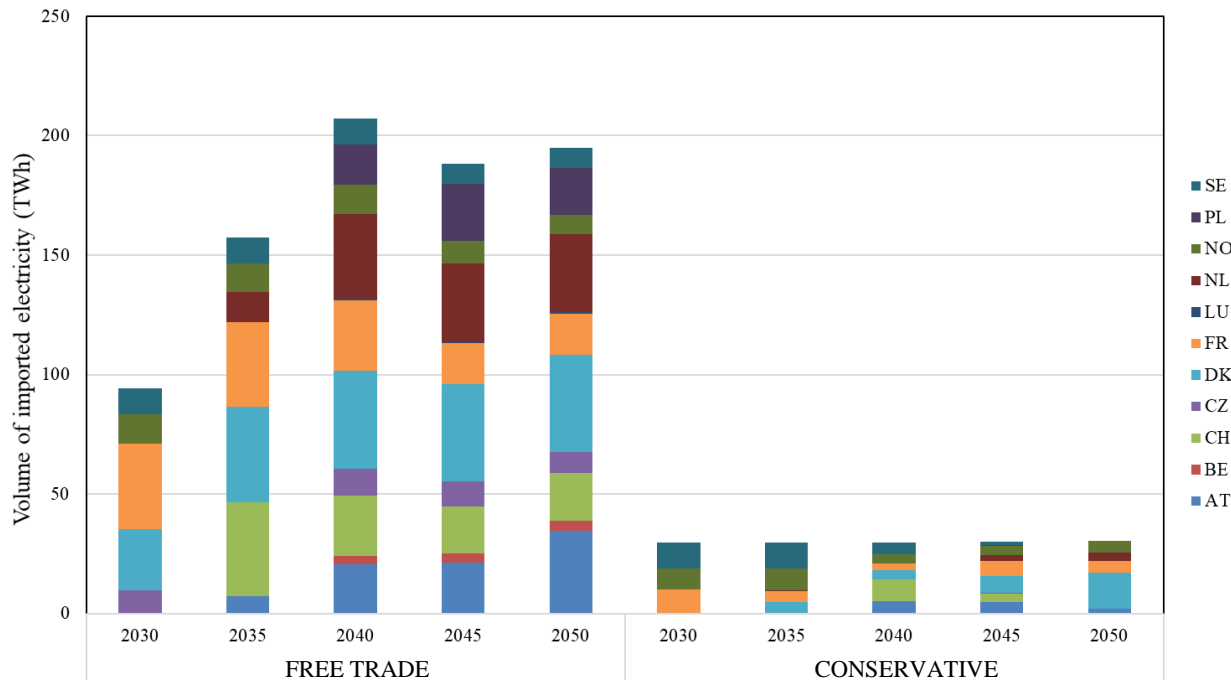


Results

Electricity flows comparison in 2050



Electricity flows comparison in 2050- Germany



Conclusions & future work

Conclusions

- A conservative scenario would drive to 50% less electricity traded on the grid
- More investment burden supported by specific countries (6 times higher in SI)
- Increased overall total system discounted costs of 15 billion euros

Future work

- Assess current policy orientations
- Use long term climate projections with the conservative scenario

Thank you for your attention

Thanks!



More on
CLIM2POWER:



<https://clim2power.com/>
sofia.simoes@lneg.pt

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