Grid-connected distributed VRE

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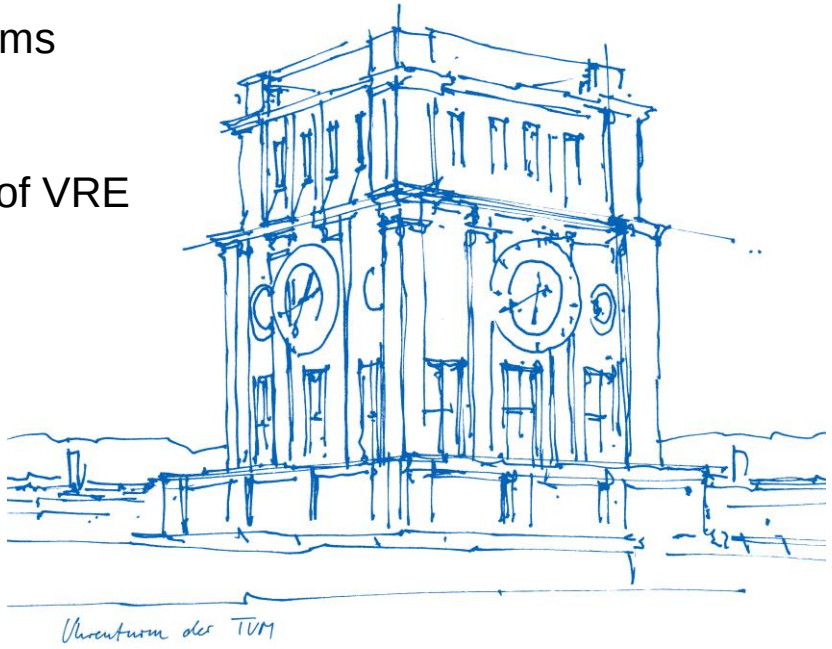


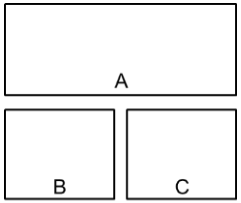
My approach to modeling space

Estimation of the PV potential in ASEAN with a high spatial and temporal resolution

Impact of the choice of regions on energy system models

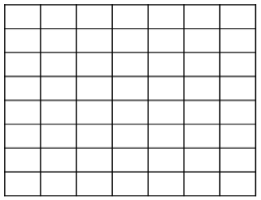
Linking optimization models with multi-regional input-output analysis

Resolution of input data



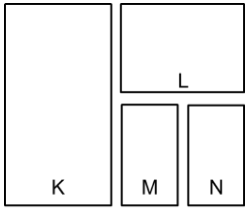
DIVIDE

High resolution

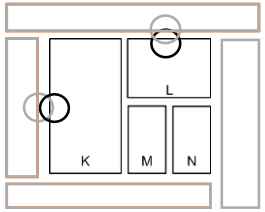


CONQUER

Desired resolution

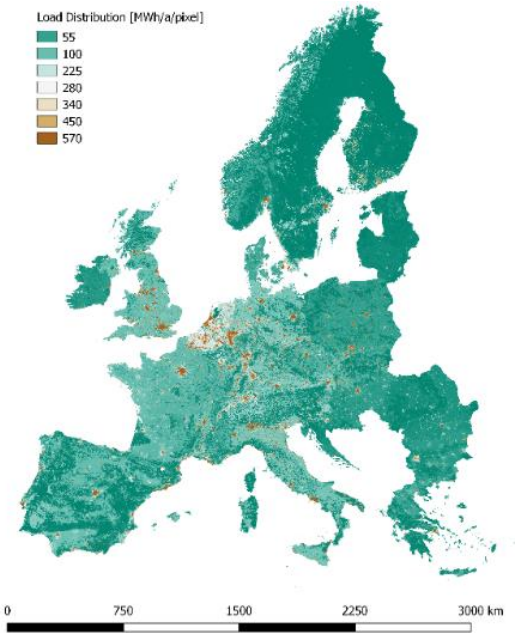


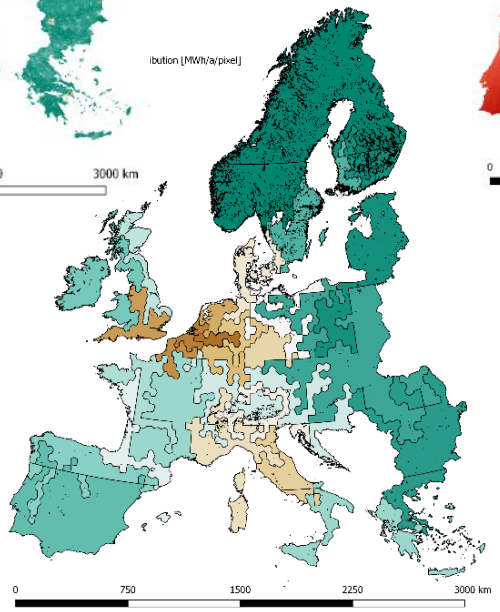
Eventually: model linking

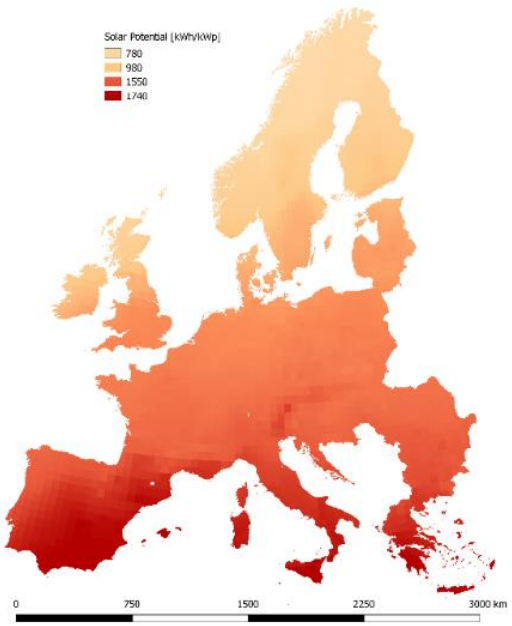


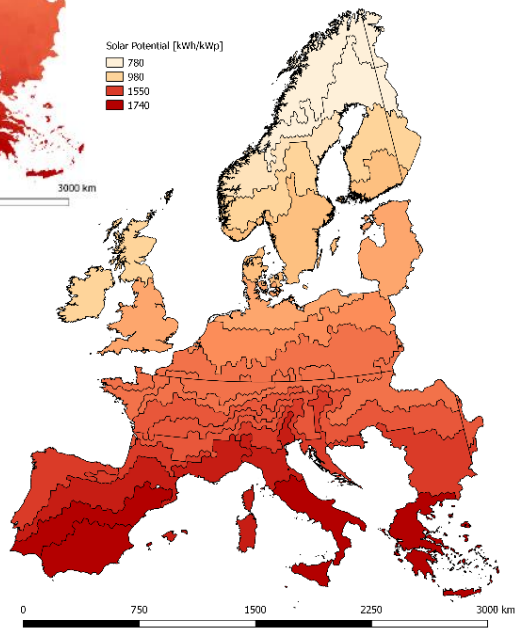
tum-ens/
renewable-timeseries
geoclustering
generate-models

My approach to modeling space

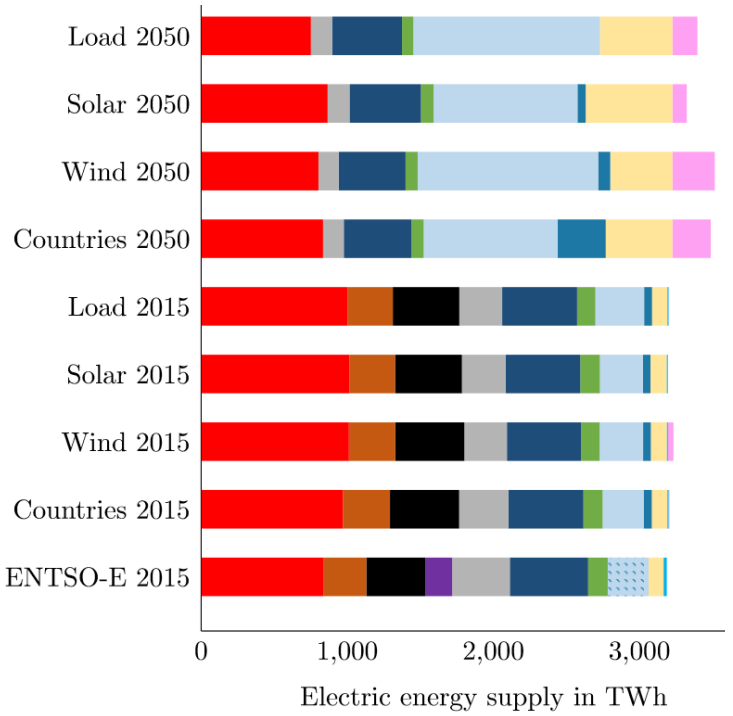


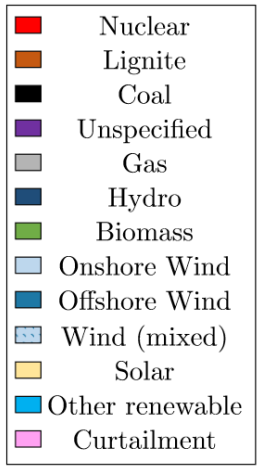


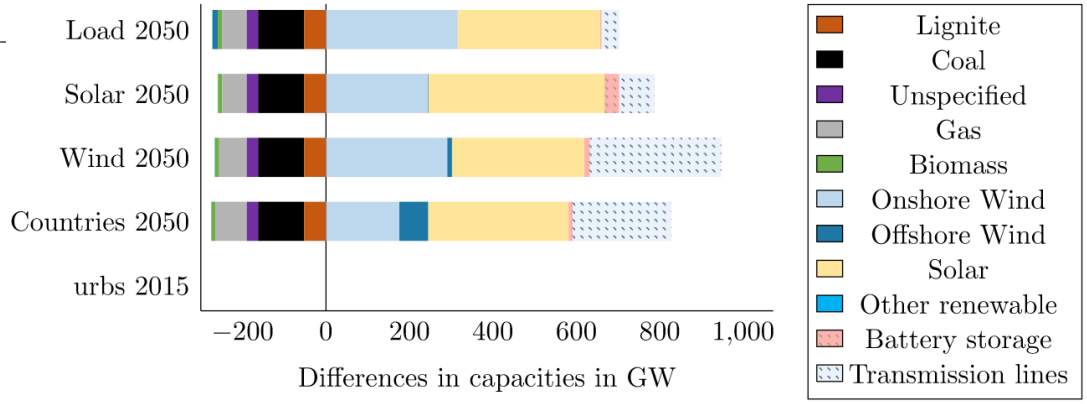




Impact of choice of regions







Reflecting distributed VRE in models

- Flexibility in creating models requires knowledge about exact locations of power plants

- IRENA (and most sources) only provide statistics per country

Q1: Do these statistics include all distributed VRE?

Q2: Are the load profiles „residual“, i.e. including the effect of distributed VRE?

Q3: How to distribute capacities that are provided per country?

Reflecting distributed VRE in models

Q1: Do these statistics include all distributed VRE?

- Usually there is a threshold (1 MW, 50 MW, etc.) depending on the source
- Acceptable threshold depends on the geographic scope
- Cross-check different sources!

Reflecting distributed VRE in models

Q2: Are the load profiles „residual“, i.e. including the effect of distributed VRE?

- Usually two different sources for the load and the power plants
- Try to obtain load time series before the expansion of distributed VRE
- Try to open the black box of the load curves, in order to model its future evolution

Reflecting distributed VRE in models

Q3: How to distribute capacities that are provided per country?

- Use algorithms to distribute the capacities based on potential maps, political incentives, and random effects
- Expect errors / high uncertainty in the distribution – effect could be critical in models with a high resolution
- This issue will be solved by providing the location of the power plants!

Recap

- Flexibility in creating models requires knowledge about exact locations of power plants

Q1: Do these statistics include all distributed VRE?

Q2: Are the load profiles „residual“, i.e. including the effect of distributed VRE?

Q3: How to distribute capacities that are provided per country?

Links

GitHub repositories

- https://github.com/tum-ens/renewable-timeseries
- https://github.com/tum-ens/geoclustering
- https://github.com/tum-ens/generate-models

Publications

- https://doi.org/10.1016/j.renene.2015.11.061
- https://doi.org/10.1016/j.esr.2019.100362
- https://doi.org/10.1016/j.esr.2019.100391