

# Importance of renewable energy variability for electricity mix transformation

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## Introduction

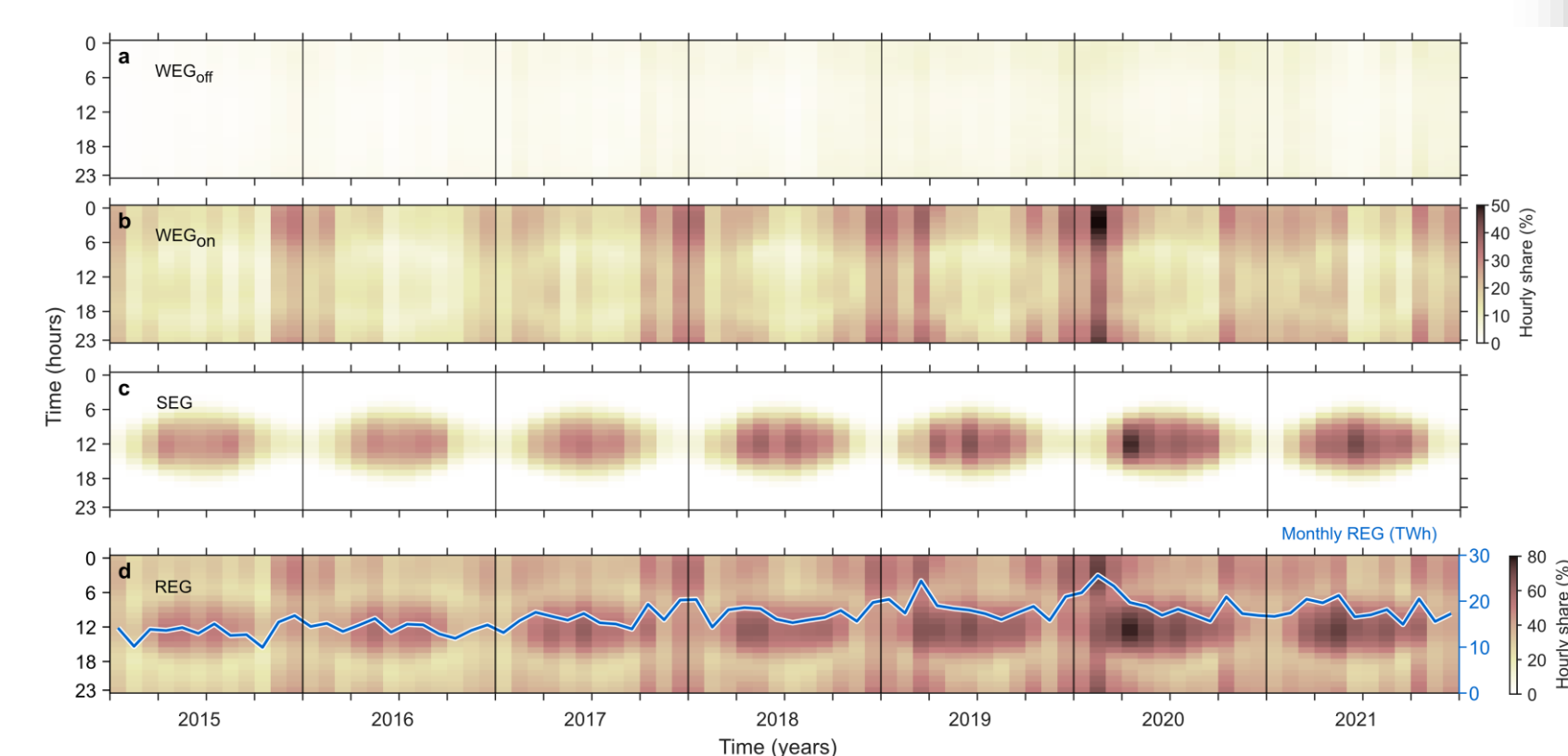
Natural variability of variable renewable energies (VRE) prevents complete control over electricity generation and demand fulfilment.

## Methods

1. Electricity market data (SMARD) from 2015-2021
2. Complementarity assessment in the time and time-frequency domain (wavelet coherence)
3. Capacity factor calculation
4. Electricity generation scenarios

## Results

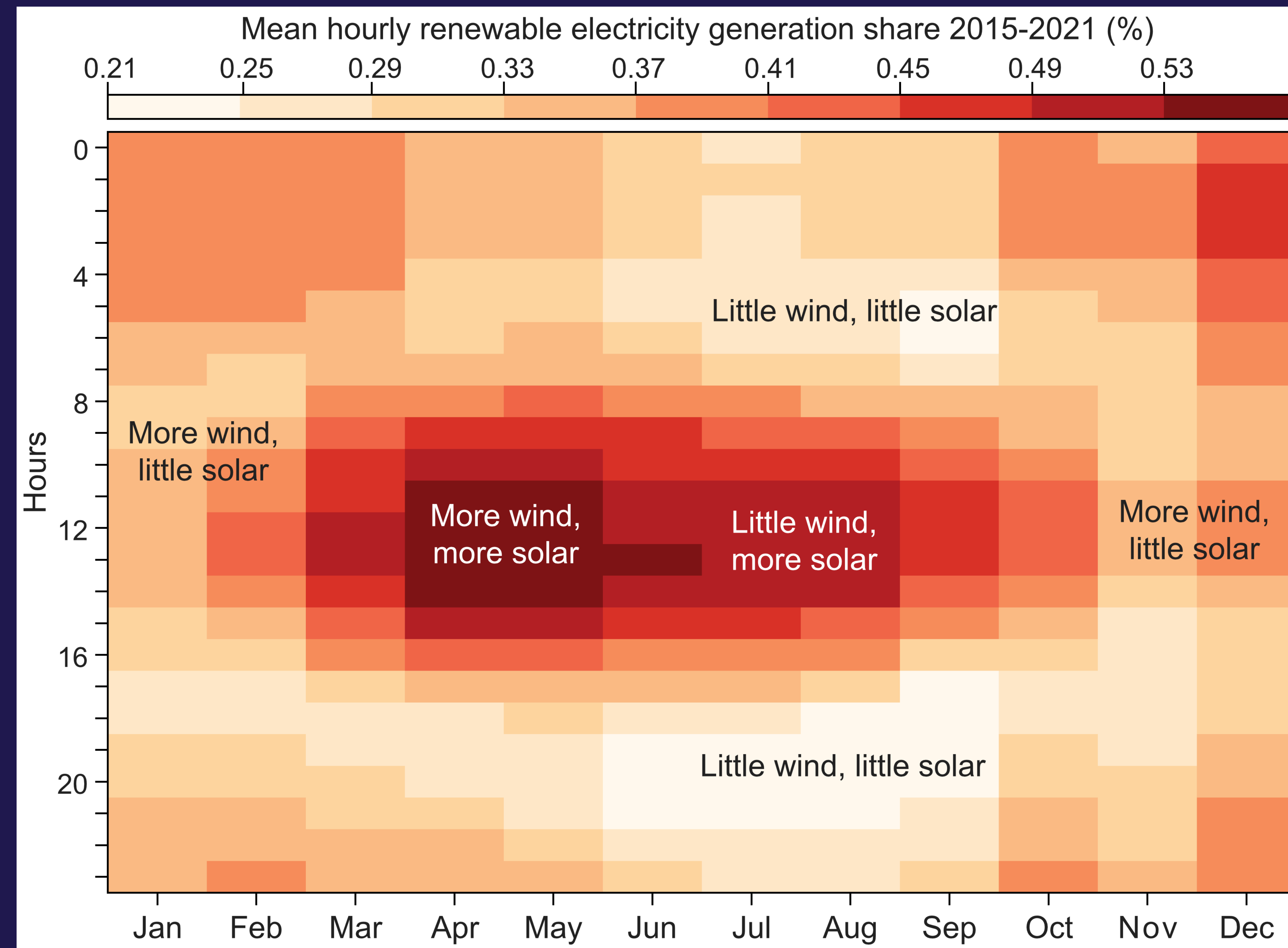
The temporal dynamics of wind and solar energy generation contributions show the complex nature of the VRE supply:



## Conclusion

All options for RE expansion must be rigorously pursued and implemented to compensate for the natural VRE variability.

# The natural variability of solar and wind will continue to be a challenge for electricity mix transformation.



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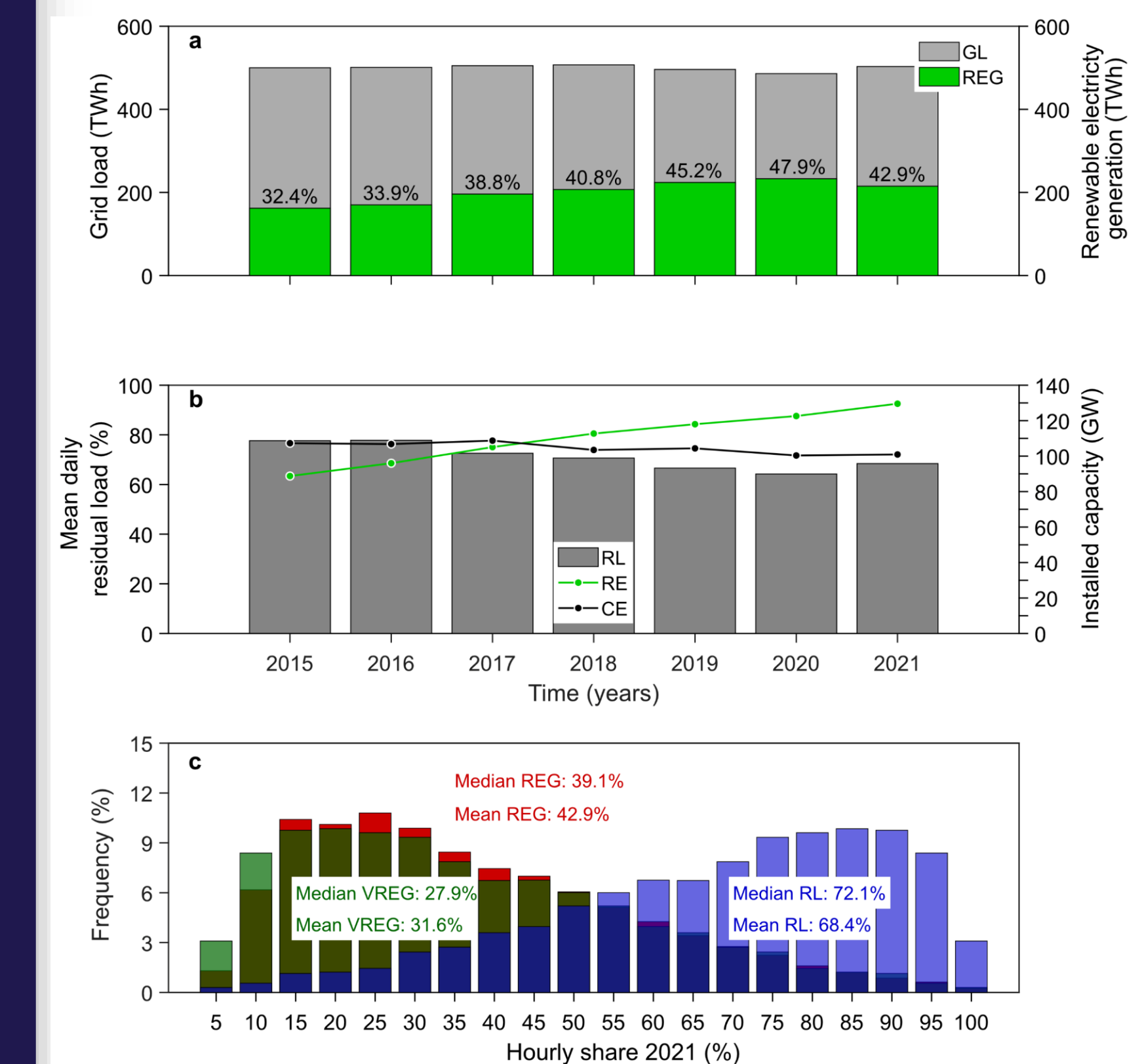
Background information (Schindler et al., 2022)

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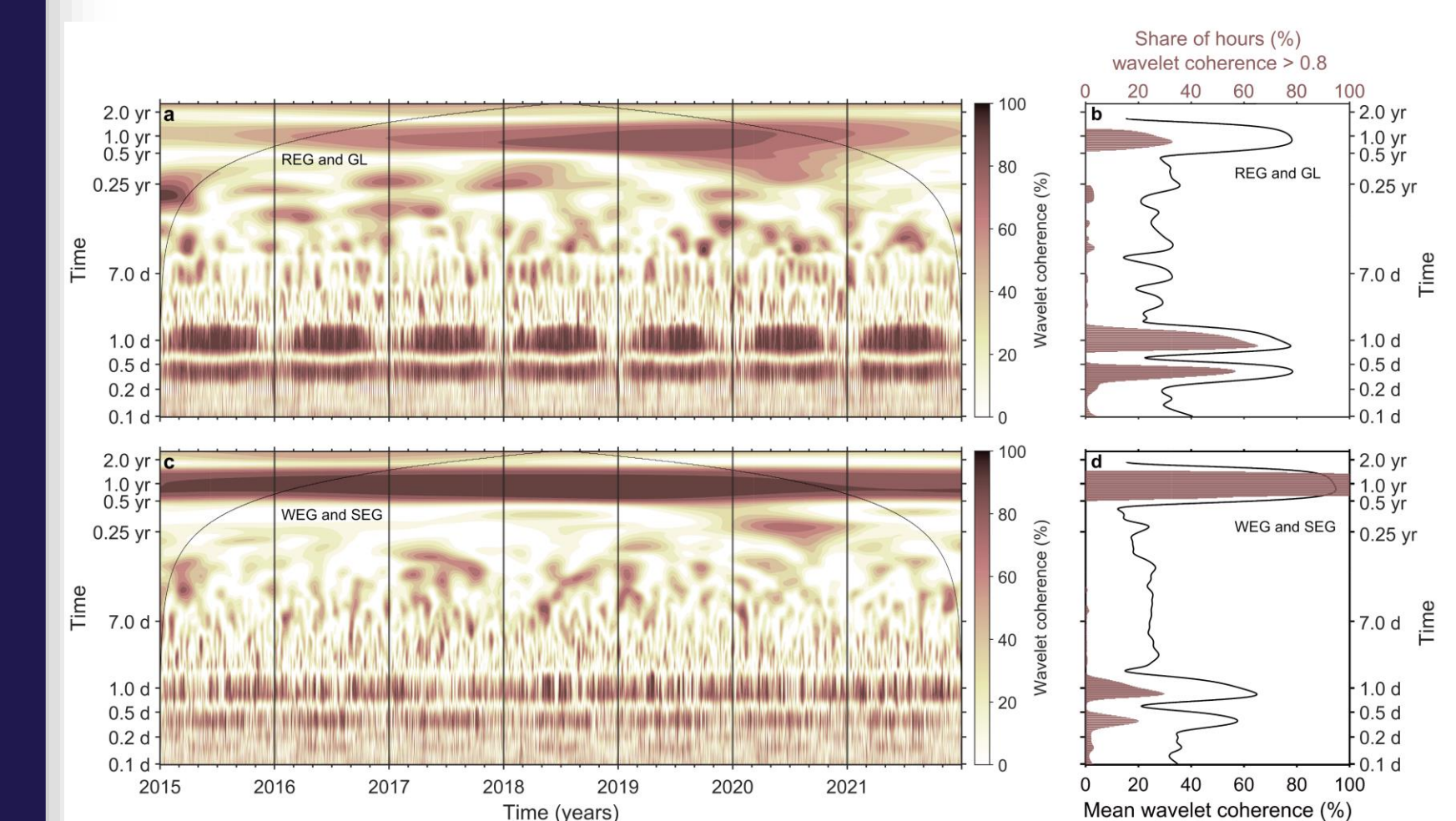


## Additional info

Development of renewable energies in Germany from Germany 2015-2021:



Hourly wavelet coherence (WCoh) from 2015-2021:



Renewable electricity generation shares from 2015-2021 projected on 2030:

