

# Efficiency and effectiveness of wind energy utilization

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## Introduction

- Meteorological and geographical factors influence site quality
- Wind potential (RPI) is spatially highly variable and varies between countries

## Methods

1. Obtaining wind turbine sites
2. Acquiring wind turbine siting suitability
3. Preparing wind speed and land cover data
4. Determining suitability of installed wind turbines
5. Calculating wind potential use efficiency
6. Calculating use effectiveness

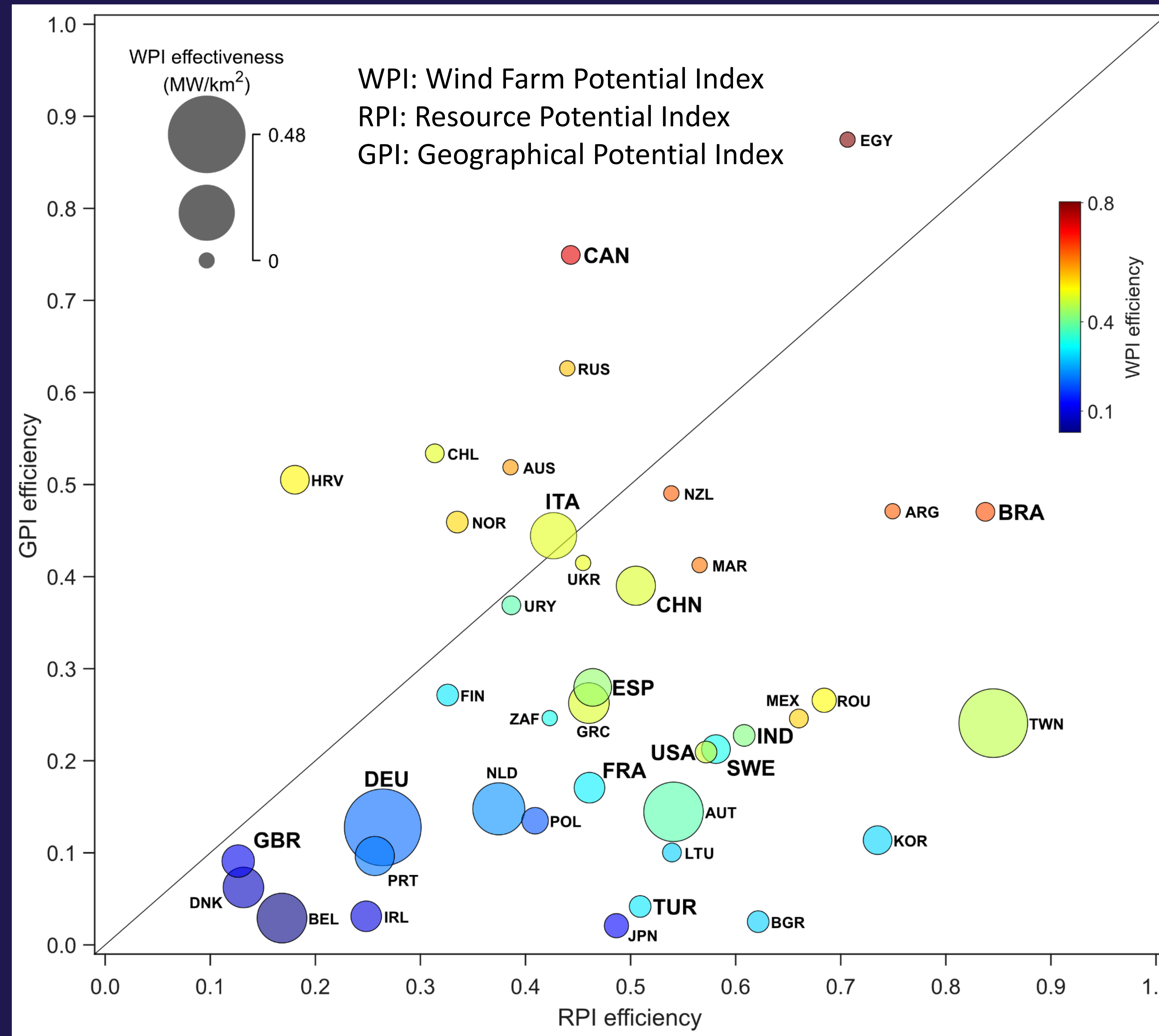
## Results

- 81.9% of onshore wind turbines operate at suitable sites
- Simultaneous occurrence of high effectiveness and efficiency is not given in any country

## Conclusion

- It is critical to quantify progress of wind energy expansion based on the effectiveness and efficiency, not installed capacity and capacity factor

# The world lacks an efficient and effective expansion of wind energy.



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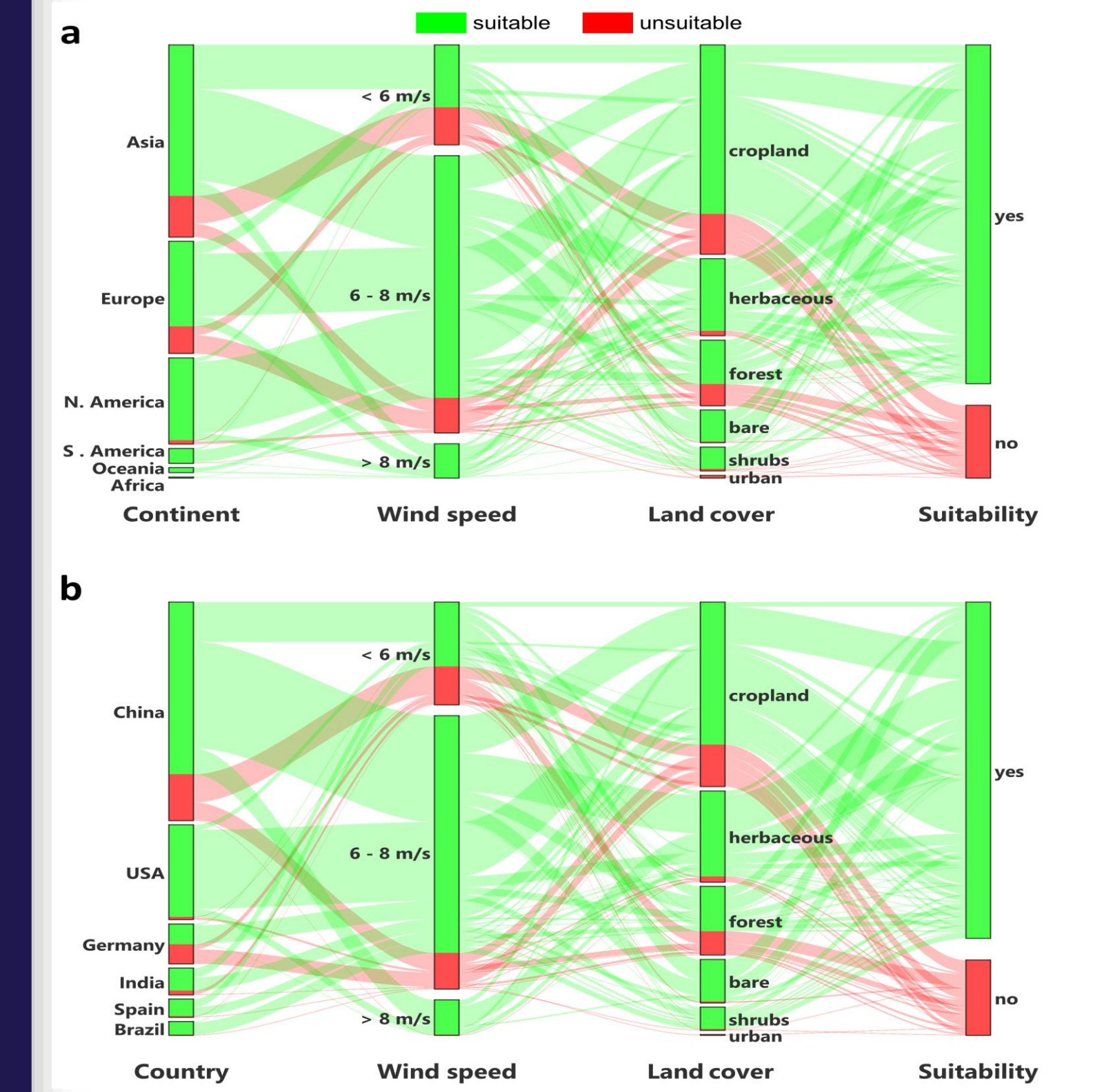


Background information  
(Jung and Schindler, 2023)

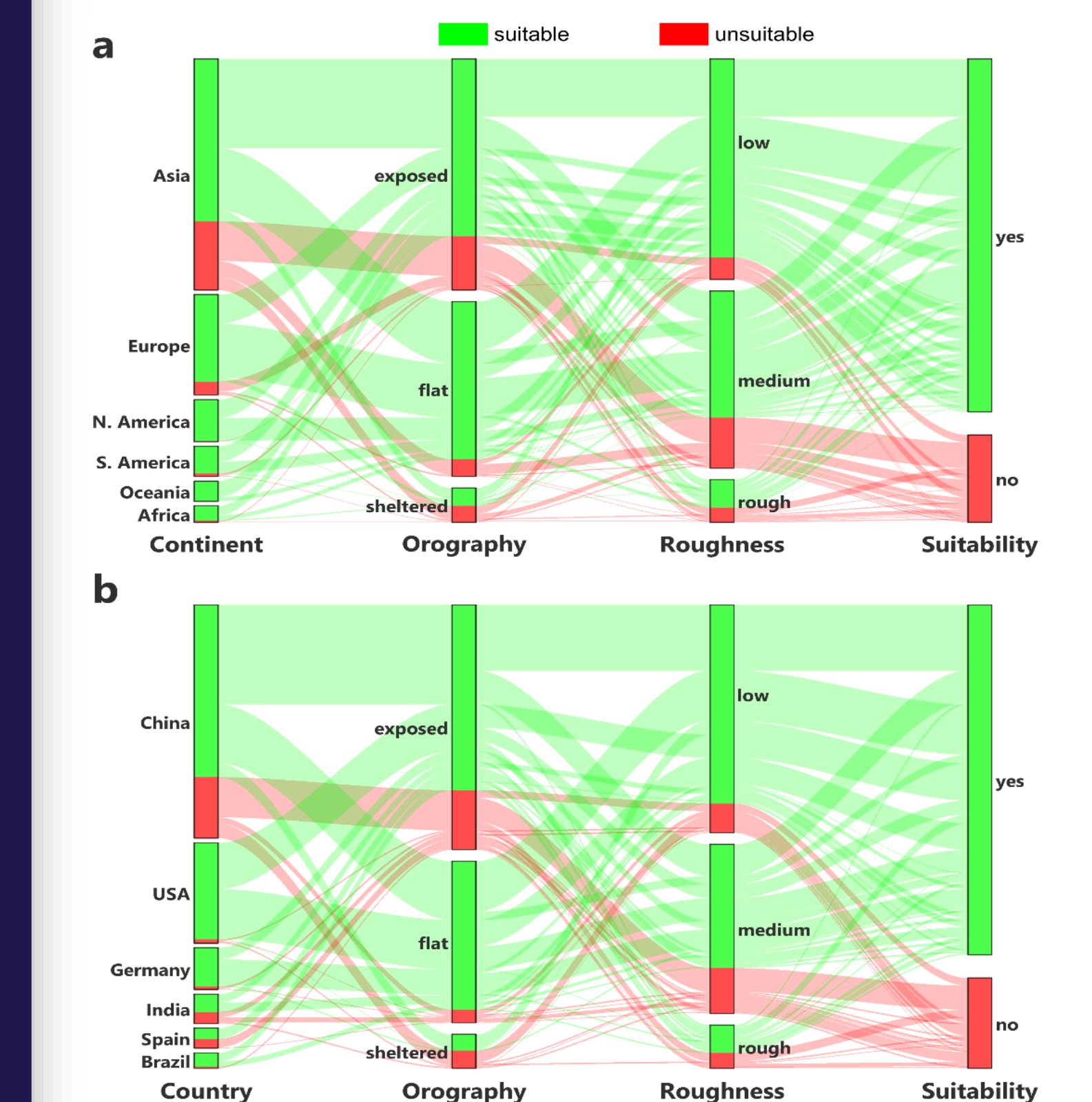
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## Additional info



Share of un-/suitable wind capacity according to the WPI classified in mean wind speed and land cover type for a) continents, and b) the six countries with highest installed capacity.



Meteorologically un-/suitable wind capacity according to RPI classified in orography and roughness for a) continents, and b) six countries with the highest installed capacity.