

Junior Research Group MultiplEE

Optimal Spatial Allocation of Wind Energy Development in Germany until 2030 – Insights from an Expert Dialogue

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Content

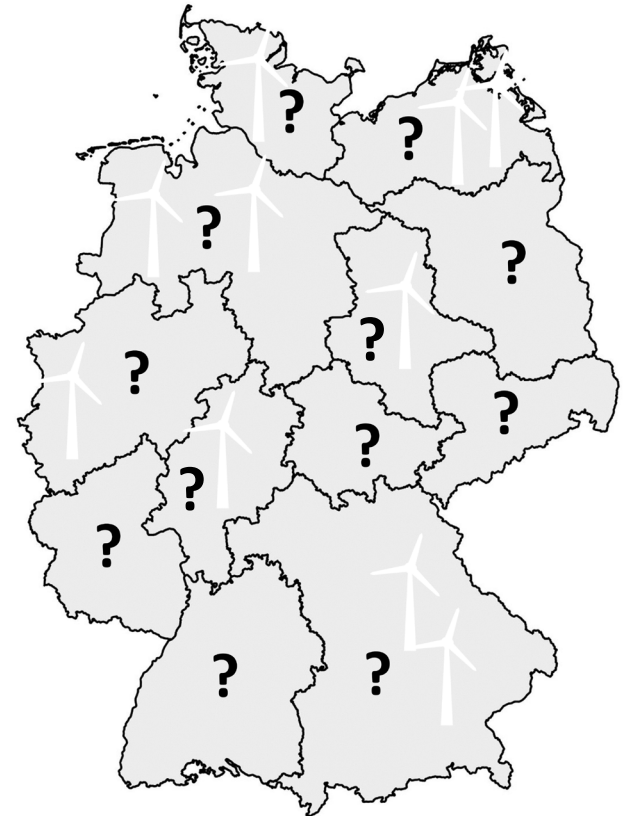
- Introduction and Guiding Question
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Spatial allocation of expanding onshore wind power plants

- Differing opinions on the siting of expanding number of wind power plants in Germany

Guiding question:

To what extent do experts agree or disagree on the weighting of sustainability criteria for the spatial allocation of onshore wind power plants?



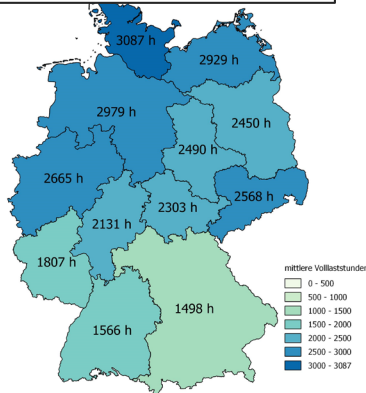
Spatial trade-offs

- Spatial trade-offs between different sustainability criteria:
 - **Minimization of power production costs**
 - **Minimization of power grid and system integration costs**
 - **Nature and landscape conservation**
 - **Distributive justice**
- Prevailing studies reach their limits for multicriteria optimizations

Method: Simulation game

Räumliche Verteilung des Ausbaus der Windenergie an Land bis 2030 – Nachhaltigkeitskonflikte und -synergien

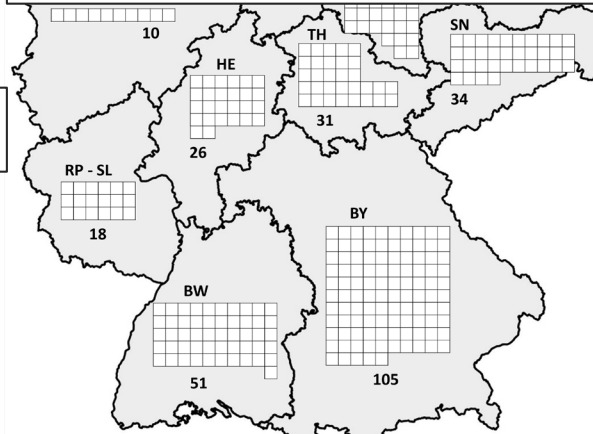
Wind yield



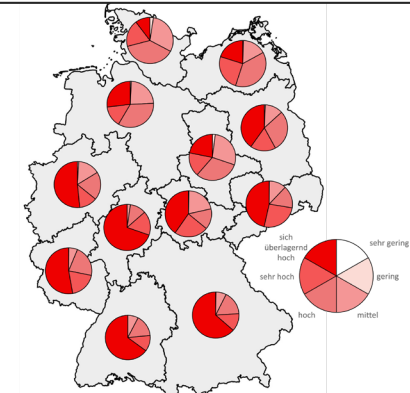
Quelle: Eigene Darstellung auf Basis von Masurowski (2016)

Leistungspotenzial je Bundesland [in GW]

Federal state's potential capacity for onshore wind power in GW

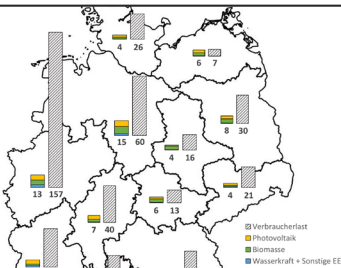


Ecological risk of conflict



Quelle: Eigene Darstellung auf Basis von Bosch & Partner/HS Ostwestfalen-Lippe 2018 (unveröffentlicht)

Spatial load proximity



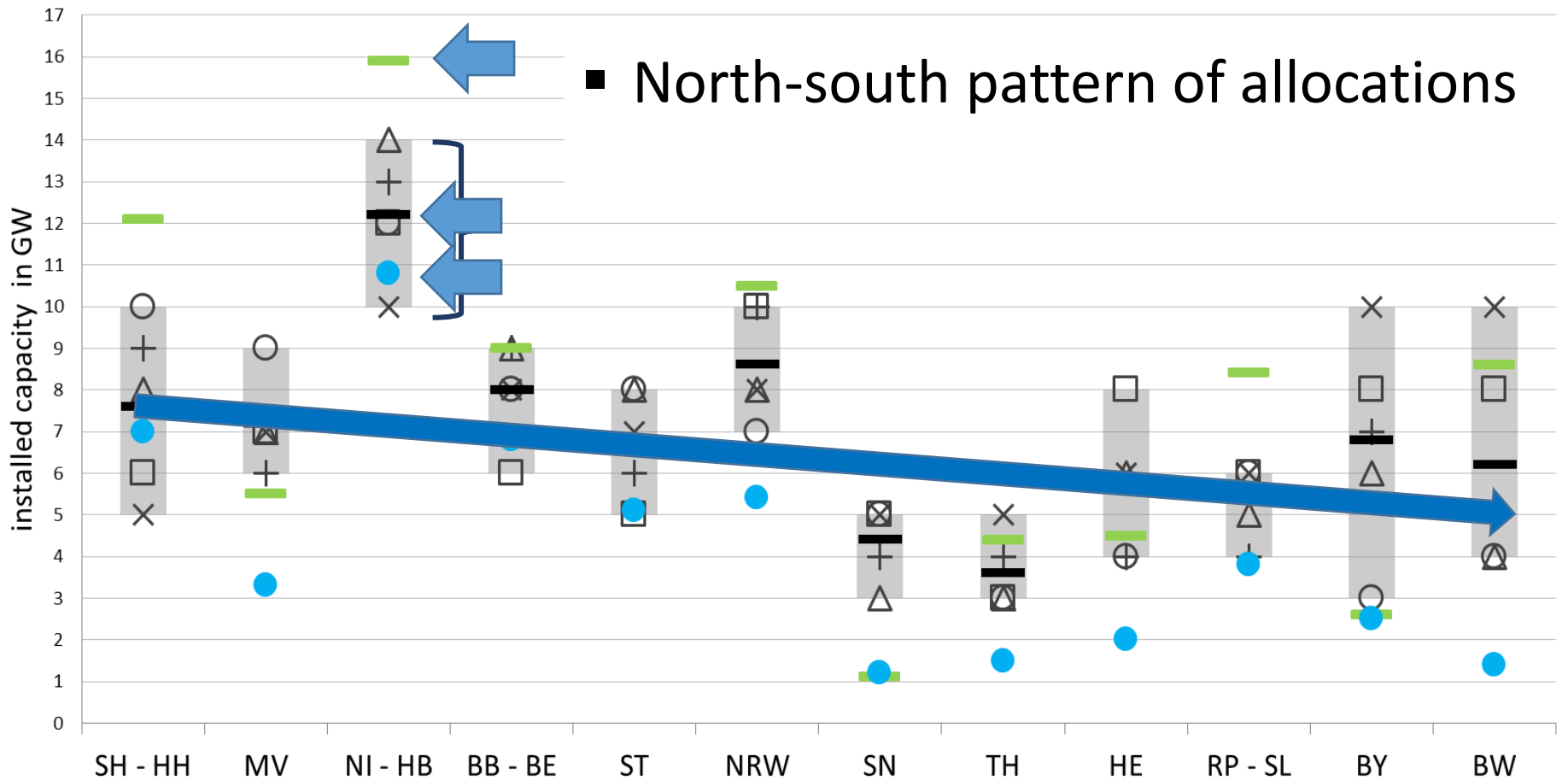
Distributional justice

Minimierung der Gesamtbelastung des Ausbaus
Balance zwischen Winderntrag, Lastnähe, Natur- und Landschaftsverträglichkeit

Deploy 200 TWh onshore wind energy among the german federal states in 2030

Results: Allocation of wind power expansion over the five groups

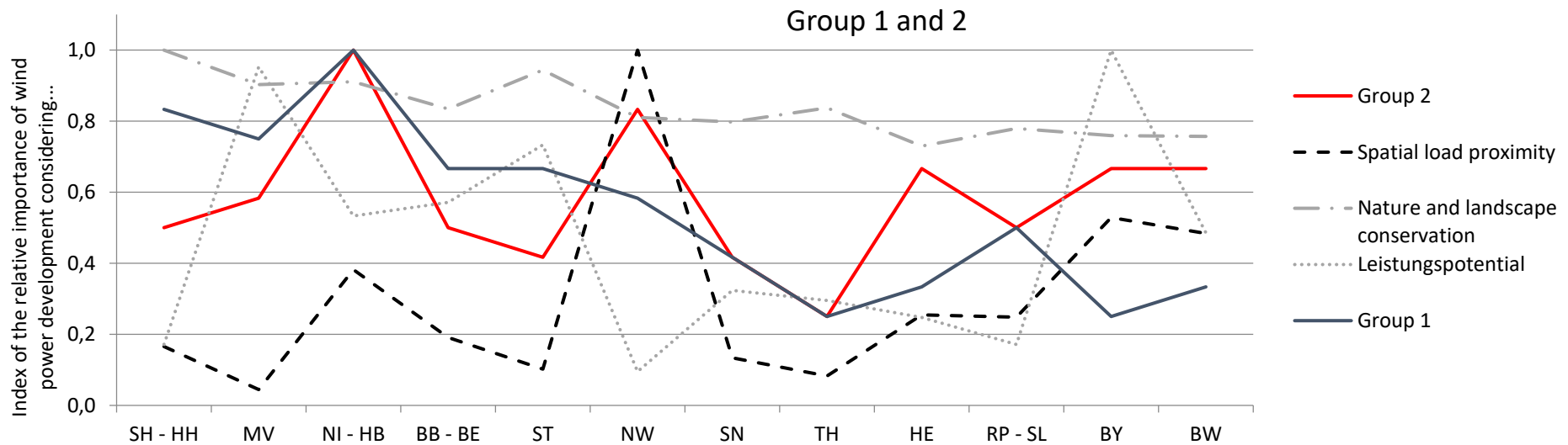
○ Group 1 □ Group 2 △ Group 3 × Group 4 + Group 5 – Mean of all groups — Development target 2030 ● Development status 2017



Results: Weighting of sustainability criteria

Sources for evaluation

- Self-reported group ranking of sustainability criteria
- Transcribed group discussions
- Correlation of group results with hypothetical allocations that are based on single criteria



Results: Weighting of sustainability criteria

- **Different weights for the four criteria** eventuate in different spatial allocations of wind power among states
- **Dominance of the trade-off** between minimization of power production cost and minimization of grid and system integration cost
- **Weak consideration** of nature and landscape conservation criterion
- Equal-distribution approach for all groups

Discussion

- **Explicit weighting of sustainability criteria** as prerequisite for the identification of priority areas for the sustainable expansion of wind power
- **Disagreement on the appropriate weighting of sustainability criteria** for the sustainable allocation of wind power plants
 - **Weights, definitions and indicator acceptance**
- Approach limited by the neglect of **regional preferences for wind power development**

Policy options

- **Spatially differentiated** governance to improve **spatial trade-offs between sustainability criteria**
- **Democratic decision-making process** for the final decision on optimal spatial management
- **Critical view** on the **centralization of decision-making processes** for the spatial government of wind power development



Thank you for your kind attention!

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