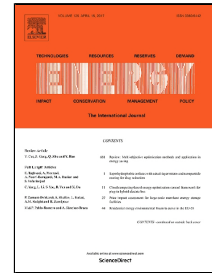


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Towards energy landscapes – “Pathfinder for sustainable wind power locations”

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1 Towards energy landscapes – “Pathfinder for sustainable wind 2 power locations”

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10 **Abstract**

11 Land is a scarce resource, especially when its multiple demands for use are taken into consideration.
12 With more than 25,000 wind turbines installed currently, wind power plays an integral role in the
13 development of renewable energy technologies in Germany. In addition to the positive effects, e.g.
14 reduction in greenhouse gas emissions, wind power also has negative effects on the environment
15 and human well-being. With this in mind, it is important to identify most suitable locations for wind
16 turbines that accounts for different aspects of sustainability. The approach suggested here is a
17 practical method to identify sustainable sites at local to national scale. Additionally the paper
18 compares emerging technology (system friendly wind turbines) with standard technology with
19 respect to environmental concerns and assesses the current performance of wind power in a specific
20 study region. The study finds that the approach enables sustainable locations to be identified in a
21 feasible but scientifically robust manner, and that the system friendly technology outperforms the
22 standard technology in each case. The current allocation of wind turbines is less efficient since
23 repowering and reallocation means that more electricity can be generated by fewer turbines.
24 Furthermore, the impact on the environment and human well-being can also be reduced.

25 **Keywords**

26 Multi-criteria-optimisation, sustainable wind power allocation, system friendly wind power
27 technology

28 **Highlights**

29 We developed a multi-criteria optimization for wind power allocation for multiple scales

30 System friendly wind power technology outperforms standard technology

31 Trade-offs between environmental impacts, human well-being and electricity production are
32 significant between both technologies

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