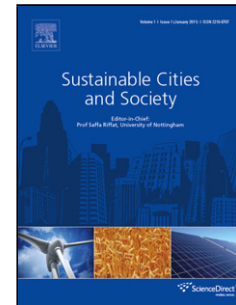


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## Wind power potential assessment of roof mounted wind turbines in cities

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### Highlights

- A new methodology to evaluate energy output of roof mounted wind turbines.
- Energy yield calculations of a Darrieus turbine placed at corners of a building.
- Coupling CFD results with meteorological wind data to estimate energy output.
- Investigation of low and high density urban environments.

### Abstract

A new methodology to evaluate performance and energy output of roof mounted wind turbines in cities is presented. The methodology combines Computational Fluid Dynamics (CFD) and meteorological data related to a city to assess the energy production of turbine placement on the roof of a building located in a city. The interaction between a Darrieus turbine and a building when the turbine is placed on the roof-top is analysed based on CFD and an accurate power curve is generated. Afterwards, energy yield calculations of this Darrieus turbine placed at each of the 4 corners of a building are performed for both a low and high density urban environments. The energy yield calculations are based on modelling actual regions of a city, followed by simulation of the wind for 8 directions and coupling CFD results with meteorological wind data to obtain an accurate estimate of the energy output. Simulation results indicate that energy production in high density urban environments is significantly reduced due to local wind behaviour.

Keywords: Wind energy; Vertical Axis Wind Turbine; roof-mounted; CFD; URANS; Urban area.

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