

12. Wind

12.1 Overview

Wind energy is generated when the kinetic energy of the wind is harnessed by large wind turbines and converted into mechanical energy. To generate electricity, this mechanical energy is used to rotate generators situated in the hub of each turbine. Wind turbines can range in size from small home or boat based 50W units to the large 6MW commercial units which have an overall height of nearly 200m.

Wind turbines for commercial power generation are generally arranged in an array, collectively called a wind farm. Wind farms are typically located in areas where a consistently high level of wind is present. The performance of wind turbines increases exponentially with the linear increase in wind speed. Therefore consistent strong winds are critical to the financial viability of a wind farm. Wind speeds are stronger at higher elevation levels, and on top of smooth hills, which is why most wind turbines are mounted on high masts and on top of hills where possible.

Electricity generated from all the turbines in the wind farm is combined and modified to feed into the power transmission network in the area.



Mark Lewis

Darling Wind farm, South Africa's first commercial wind farm

12.2 The Case

It has been estimated that South Africa has the potential to generate 50 GW of power through land based wind turbines (Banks and Schaffler,2006), more than the current generation capacity of Eskom (approximately 40GW)

Wind turbines are currently one of the most financially feasible renewable energy technologies available. Proof of this is their inclusion in the national renewable energy feed in tariff (REFIT). The REFIT electricity purchase price for wind energy of R1.25/kWh is considered highly attractive by project developers, and many wind companies are now gearing up to install wind farms in South Africa.

Small scale residential wind generation is currently not as financially feasible as large wind farms. This coupled with additional factors such as erratic wind supply in built areas, environmental and zoning infringements and 'blade noise' makes it difficult to justify for residential use. Various designs for urban wind turbines are being developed to make them more efficient and financially viable. However, these products are mostly in research and development stage, and cannot be considered serious solutions as of yet.