CityWindmills
SMALL WIND TURBINES FOR URBAN USE

City Windmills' CEO explains roof-top wind

Wind compression on the pitched or sloping roof of a house, or the top-edge of a flat-roofed building, known as the "Roof Effect", represents great potential for roof-top wind turbines. As wind strikes a pitched roof or roof-edge, it is forced upwards over the ridge, compressing with wind above and below it, and the accumulated effect of this compressed air is acceleration. This "roof effect" results in wind at the ridge of a roof increasing at up to 3 times the speed of nearby unobstructed wind.

The roof effect results in a fast travelling, compressed wind current maximized at the apex or peak of a pitched roof or roof edge, and is more pronounced the higher the roof and the larger the surface area below the ridge. A further factor, referred to as "wind gradient", determines that wind is stronger/faster as altitude increases, giving rise to the placement of horizontal axis propeller turbines at the top of towers or local high-points.

For vertical axis small wind turbines, the optimal placement is on the highest ridge or edge of the roof, which additionally benefits from capturing omni-directional wind available from 360 degrees. For this reason, the City Windmill wind turbines are designed to benefit from and to maximize their performance from the "roof effect" and "wind gradient".

Power generation from wind is governed by a simple equation :-

Power = ½ x Area x Velocity^3 x Rho where Rho is Air density (approx. 1.25)

Therefore power generated by a wind turbine is a function of area of the turbine struck by the wind, but more importantly by the cubed value of the velocity. Hence doubling wind speed will multiply the power generated by a turbine by a factor of 8-fold!! A potential roof effect that triples the wind speed could have a 25-fold positive effect on power output of a wind turbine, extremely significant…

Delft University in the Netherlands has studied the Roof Effect relating to the 'Undisturbed Air' or UDA. This UDA factor compares the increased wind speed over a rooftop to the nearby undisturbed wind that has not been accelerated or affected by a roof. Their findings confirm that the roof effect difference can be from 50% to over 300% - and more on taller buildings.

As a result of the roof effect and wind gradient, therefore, the placing of small wind turbines on roof-top ridges generates greatly increased performance and power output.

The City Windmill range of roof-top small wind turbines is suitable for household, commercial, industrial and campuses**.**

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