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Poultry Housing Tips

Wind Turbines and Tunnel Fans

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Have you ever thought of placing wind turbines behind your tunnel fans to generate your own power? Many poultry producers have. Tunnel fans can operate thousands of hours each year generating wind speeds of 10 to 15 mph. So why can't we use this wind to generate power to operate our fans, feeders or lights? The fact is that you can...the problem is that it is not very economically feasible.

For example, the average air speed exiting a 48" fan moving 20,000 cfm is approximately 1,600 ft/min or 18 mph. If we were to place a 46" diameter wind turbine on the exhaust side of the fan (a couple of feet away) we could likely expect an average wind speed of around 15 mph. At 15 mph the typical 46" diameter wind turbine would produce approximately 60 watts of power or 0.06 kW-hrs of energy for every hour the fan operated (most 48" fans use about 1,000 watts of power). If we used the 48" fan with the wind turbine as our primary exhaust fan (minimum ventilation and cooling) it would operate approximately 4,000 hours a year and the wind turbine would produce 240 kW-hrs of energy (0.06 kw X 4,000 hours). At an electrical rate of $0.10 per kW-hr the energy generated over the course of the year would have a value of approximately $24. Considering the fact that a 46" diameter wind turbine would cost approximately $800, it would take roughly 33 years for the wind turbine to pay for itself.

What if two 48" fans were ducted into a larger six foot diameter wind turbine? Again assuming an air velocity of 15 mph a high quality wind turbine would generate approximately 300 watts of power or 0.3 kW-hrs of energy for every hour it operated. If we assume the two 48" fans would operate 4,000 hours a year the six foot diameter wind turbine would generate approximately 1,200 kW-hrs of energy. At a electrical rate of $0.10 per kW-hr the energy generated over the course of a year would have a value of approximately $120. A six foot diameter wind turbine (with power control and inverter) would cost at least $6,000 to purchase and install, resulting in a payback period of roughly 50 years.

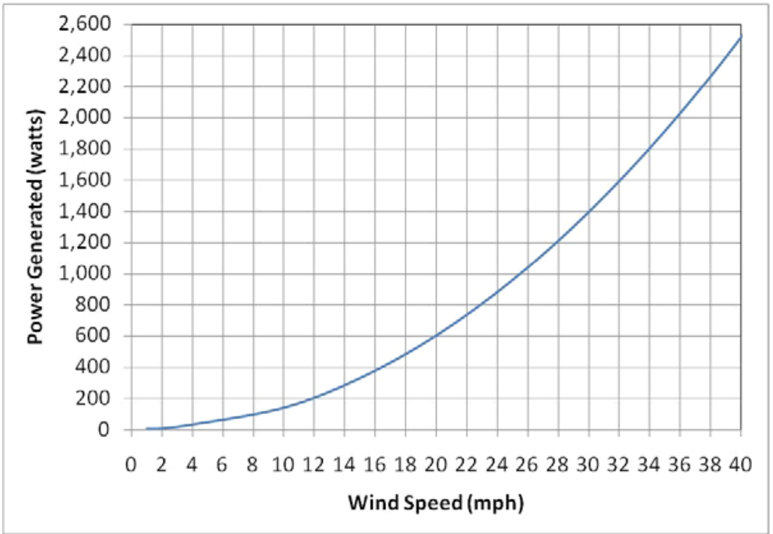

Figure 1. Example of power generated by a six foot wind turbine.

A few facts to consider:

1) Literature for wind turbines often state maximum power production, which is typically achieved at air speeds in the neighborhood of 30 mph (Figure 1). Air speeds a few feet from the tunnel fans are around 10 mph.

2) Wind turbines tend to produce relatively little power at wind speeds less than 10 mph. Most produce no power at all until the wind speed reaches a speed of between five and eight mph (Figure 1).

3) Placing wind turbines in very close proximity to exhaust fan (to achieve higher wind speeds) would create a "back pressure" on the fan, reducing the air moving capacity of the fan.

4) It is doubtful that a wind turbine would have a very long life considering the dust and moisture emanating from a poultry house exhaust fan.

5) A wind turbine requires an inverter/controller to convert the DC power to a more usable 120/240 AC power.

6) Though there are government cost share programs that could pay for a large portion of a wind turbine and local electricity rates could be significantly higher than the $0.10 kW-hr used in the above examples, the return on investment on a wind turbine system powered by exhaust fans is still very likely exceed 10 years.

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