

Introduction

There are approximately 50,000 wind turbines in the U.S. Studies have estimated that they kill on the order of 573,000 birds and 880,000 bats each year.

On August 11, 2015 the “eagle take” rule proposed by the U.S. Fish and Wildlife Service (FWS) was defeated in federal court which brings more urgency to solving the bird kill problem.

This Whitepaper describes a proposed patent pending low-cost wind turbine bird strike prevention system that uses short range high resolution avian radar to detect, track, and deter away birds and bats on a collision course with a protected wind turbine.

Solution Attempts

Currently, there are no effective methods of preventing bird kills by wind turbines. Most prevention attempts are limited to selecting sites that avoid migratory bird paths. This is only partially effective because birds are everywhere and avoiding these paths remove otherwise acceptable wind turbine locations from consideration. Other prevention attempts include wide area radar to detect incoming birds, stopping turbine blades when birds are present, and posting guards to scare off birds.

Long range wide area radar installations cannot prevent wind turbine bird strikes because they lack the close-in resolution required to determine a bird's proximity to an individual turbine. The best they can do is indicate the arrival of flocks of birds so turbine blades can be slowed or shut down when large numbers of birds are present. However, doing this is very undesirable and expensive both in terms of the radar's cost and turbine power loss cost.

Origo's Proposed Solution

In contrast to long range wide area radar, Origo's proposed short range radar tracks birds in 3D with GPS accuracy and applies bird deterrents only when a bird is on a collision course with an individual turbine. Applying a deterrent only occasionally avoids the problem where deterrents work initially and then eventually become less effective as birds begin to become habituated to them.

Multiple types of deterrents are possible. Origo envisions using a narrow bright flashing light beam (focused LEDs or unfocused laser) that can be pointed directly at the bird since the bird's 3D position is known to within a couple of meters. It is doubtful any bird will continue to fly directly into the light as most bird strikes occur simply because they don't see the obstruction. Presumably, birds will simply alter course to move away from the light and wind turbine.

The proposed radar is low power, low cost, and non-scanning (no moving parts). This short range protection system will work in day, night, fog, rain, snow, or bright sunny day. In large compact wind farms, transmitter illuminators can be shared among turbines which further lowers the cost per turbine vs. a stand alone turbine system.

Estimated Cost & Way Forward

As installed turbines cost around \$1M to \$3M each, this proposed radar system could be added for an estimated 1% to 2% additional cost. This should be a cost effective investment to protect wind farms from fines, license rejections, or operating restrictions due to bird kills.

Preventing wind turbine bird strikes is no longer a technical problem. Based on my past radar design experience, I can think of no better, lower cost, or more practical solution to this problem than this proposed prevention system. All that is required is to find Wind Industry participants with the desire and means to fund its development.

Interaction with the Wind Industry and others will be required prior to any prototype development to ensure the design is applicable to wind turbine construction and operation. Deterrents will be tested on prototype systems to find one or more deterrent types that work best against birds and bats. The system design will be software based, completely programmable, and can easily be modified as operational experience is obtained.

Implementing this technology will be fairly low cost per turbine but requires an initial R&D expenditure for design, prototype hardware, software, and evaluation testing.

This radar technology is also directly applicable for drone intrusion detection to warn of approaching drones to any protected area such as power plants, substations, buildings, etc.

Further Information

A brochure is available at http://www.origocorp.com/Files/Origo_Wind_Turbine_Avian_Radar.pdf

A copy of the patent is available at <http://www.origocorp.com/Patents/US8742977.pdf>

Contact

Please call or email any questions, interests, or comments you may have. Thanks.

Greg Piesinger
President
Origo Corporation
www.origocorp.com
480-473-1995
gpiesinger@origocorp.com