

## Wind Power Project U.S. Naval Base, Guantanamo Bay, Cuba

### Wind Power Project:

- Four wind turbines.
- Construction cost of \$11.8 million dollars.
- Produce a maximum of 3.8 MW of electricity.
- Generate electricity at a minimum of 8 mph and are at full power above 35 mph.
- Shut down for wind speeds above 56 mph (turbines cut out at 56 mph).
- Can withstand wind speeds up to 135 mph, or a Category 3 hurricane.
- Will normally produce electricity for about 10 hours per day.
- Are manufactured by Vestas – N.E.G. Micon and there are about 3,000 units of this model installed throughout the world.



### Environmental Benefits:

- Will save \$1.2 million dollars in energy costs annually.
- Produces 7520 MWh each year, reducing the usage of 650,000 gallons of fuel oil.
- Will reduce air pollution annually by 26 tons of sulfur dioxide and 15 tons of nitrous oxide.
- Will reduce greenhouse gas emissions by 13 million pounds per year.

### Steel towers:

- 55 meters (185 feet) tall and have an internal ladder (not a stairway) that extends all the way to the top.
- The location for a computerized control system that can be accessed at the turbine or remotely by modem.
- Bolted to a foundation of reinforced concrete with 22 anchor bolts between 35 and 40 feet deep into the underlying rock.
- Protected from corrosion in the salt air with multiple layers of marine paint.
- Topped by a nacelle that houses the mechanical equipment to allow the turbine blades to rotate a full 360 degrees and have exterior sensing devices to monitor wind and weather conditions.

### Blades:

- Three blades equally spaced apart on a fixed axis. Each blade is 27 meters (90 feet) long.
- Rotate 22 rpm at full speed with a tip speed of 140 mph, which is slow enough for birds to see them.

- Have a pitch that can be adjusted 3 degrees in either direction to obtain the maximum power level.
- Are fitted with lightning receptors, which ensure that lightning strikes are discharged via the steel cables of the blade tip brakes, through the blades and hub, and down through the steel tower, which is well grounded.
- Are made of a fiberglass epoxy composite material.
- Have tips that turn to provide braking to control blade speed.
- Are painted white in this location to reflect the sun but can be painted black in colder climates to melt ice buildup.

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