

# A RESIDENTIAL WIND POWER PROJECT IN LOUISIANA

by  
Bryan Crouch, P.E.

A small-scale wind turbine power system has recently been installed at a residence that is under construction on Lake Pontchartrain near Slidell, LA. The system consists of twin grid-tied wind turbines connected to a net metering system. The home will include many energy-efficient features as well as features to resist wind and water damage from hurricanes. Several staff members from TAD visited the construction site. See pictures on next page.

The 2000 square foot, 3 bedroom, 3 ½ bath home is engineered to withstand 260 mph winds and is elevated well above ground level to resist flooding. The house is designed to be very energy efficient and features passive heating and cooling design, a thermally reflective metal roof, an earth source heat pump system, closed-cell urethane foam insulation, and high efficiency tankless water heaters. Back-up power is provided via a 17 kW natural gas generator and two 2.4 kW wind turbine generators.

The wind turbines are Skystream 3.7's manufactured by Southwest Windpower, Inc. The Skystream 3.7 has a rotor diameter of 12 ft. and a rated capacity of 2.4 kW. It begins producing power at a wind speed of 8 mph and achieves rated capacity at a wind speed of 29 mph. It operates in a wind speed of up to 60 mph and automatically shuts down when the wind speed exceeds 60 mph. It is rated to survive in a wind speed of up to 140 mph. The turbines are mounted on 45 ft. tall utility polls and are located on opposite ends of the property, approximately 300 feet apart. They are grid-tied and net-metered, meaning that the amount of power that they produce reduces the metered power coming into the house from the grid (or the back-up natural gas generator) by the same amount.

The National Renewable Energy Laboratory categorizes wind resources into 7 power classes based on mean annual wind speeds. Class 1 has the lowest wind speed and is defined as anything less than 12.5 mph at an elevation of 164 feet, or 9.8 mph at an elevation of 33 feet. On-shore winds in Louisiana are rated as class 1. The particular site where this project is located is on the shore of Lake Pontchartrain with large areas of flat unobstructed land on all sides. These factors should mean wind speeds at the project site that are on the upper end of class 1. Based on manufacturer supplied figures and assuming an annual average wind speed of 10 mph, each Skystream 3.7 wind turbine would produce approximately 240 kWh per month. Increasing the assumed average annual wind speed to 12 mph increases the monthly energy output to 380 kWh per turbine. Considering the energy efficient design of the home, the wind turbines should be able to provide a significant percentage of the home's electricity.

Residential wind turbine systems currently do not make economic sense in most areas of Louisiana. The location of this system and areas along the coast may be exceptions, but payback times will still be relatively high. For example, a single Skystream 3.7 turbine would cost approximately \$20,000 installed in a net metering configuration. Louisiana offers a tax credit of 50% of the first \$25,000 of the system cost (\$12,500 maximum credit), and a federal tax credit is available for 30% of the system cost, \$500 per 0.5 kW of system capacity, or \$4000, whichever is less. The example \$20,000 system cost, after the tax credits are applied, would be reduced \$7,600. Assuming a 12.3 mph average wind speed, the system would produce 400 kWh per month or 4800 kWh annually. Assuming an electricity cost of \$0.10 per kWh, the wind turbine system would save \$480 annually in electricity costs for a simple payback of 15.8 years.

