

Surveying Wind Farms



The rugged terrain of the Appalachian Mountains in Pennsylvania and West Virginia can present challenges to travel and commerce. But the high ridges contain an important opportunity for new projects and revenue: they are ideal locations for wind power. According to the U.S. National Renewable Energy Laboratory, wind in southwestern Pennsylvania can provide more than six percent of the state's existing electricity needs. And the region generates more than electricity—in 2010, observers reported that Pennsylvania's wind power industry supported more than 3,000 jobs in manufacturing, construction and operation of the state's wind farms.

From its offices in Pennsylvania and Maryland, CME Engineering LP provides services for wind farm development in southwestern Pennsylvania and West Virginia. CME Project Director Dan Llewellyn said that wind farms call for a range of surveying skills. A major portion of each project is cadastral work to create maps and descriptions for the easements and rights of way that host the turbines, access roads and power lines. Additional work includes construction surveys for road improvements to handle the long trailers hauling turbine blades and towers to the ridge tops. Post-construction surveys include as-built locations of transmission towers and other facilities.

The difficult terrain demands a variety of surveying techniques and tools. CME Engineering Technician Asa Maust uses Trimble R8 GNSS with a Trimble TSC3[®] Controller running Trimble Access Software for both static and RTK surveys. Whenever possible, CME

utilizes the KeyNetGPS Real-Time Network (RTN), based on Trimble VRS technology, for its RTK work.

“Because of limited cell phone service in many areas, we often use the Trimble HPB450 radio modem for RTK,” Maust explained. “We use repeaters to carry the RTK signals into the deep, narrow valleys.” In areas where total stations are needed, CME technicians set control with GNSS and use a Nikon DTM-332 Total Station to run traverses between the GNSS control points. Roughly 60 percent of control is set using static methods, with the remainder placed by RTK. Most work is done with a precision of 3 mm (0.01 ft).

While the required precision varies, Maust said that wind projects have short construction cycles that require flexibility and quick response. He cited West Virginia's Pinnacle Wind Farm, which has 23 turbines and will supply power for 14,000 households. Construction began in spring 2011 and the farm was in full production by the end of 2011. Two CME crews used static GNSS to establish more than 100 control points for construction, aerial photography and cadastral surveys. CME also provided surveying for roads, turbine foundations and transmission lines.

Work on the wind projects is not letting up. Like many states, Pennsylvania has voter-approved requirements for increased use of wind and other alternative energy sources. It's an important opportunity, and surveyors with flexible tools and techniques will be well positioned to meet the demand.