The Circuit - Solutions: Small Wind on Martha's Vineyard

By Gary Harcourt

Aug/Sep 2009 (#132) pp. 20
Introductory Level

Courtesy Gary Harcourt

Alexander Boyle and his family's quest to shrink their carbon footprint began in their oceanfront home. Only 150 feet above sea level, their property rises from the sea to a "Long View," overlooking Vineyard Sound to the westnorthwest— the direction from which the prevailing winter winds come. The property didn't have good southern exposure for a PV system, but the winter winds would provide ample power. This set a scenario for great energy production when the family's electric/geothermal heating system requires it most.

"Our objective…was to play a tiny part in what must be a national imperative to shift our country's energy supply to renewable, sustainable sources," says Alexander. "Our home has received considerable publicity as Martha's Vineyard's first 'zero net-carbon' house. With the geothermal heating and cooling system, and with the wind turbine, this home will operate totally without gas or oil fuel, which means no net greenhouse gases."

But the site presented obstacles to a tilt-up tower installation. The steep grade of the property, as well as the location of the house, which sits in the center of the lot, meant that the only viable location for the tower was 80 feet from the property line. Zoning bylaws required the setback to be the maximum height of the machine—plus 20 feet.

That required submitting an application to the West Tisbury zoning board for a special permit—which was granted only after a lengthy hearing. In preparation for the proceedings, wind system installer Gary Harcourt of Great Rock Windpower took photos from neighboring properties, calculated the path that a shadow made by the turbine would take, and solicited letters of support from nearby residents. The hearing was attended by many neighbors and townspeople who were concerned that, besides impinging on views from other properties, the turbine would be noisy. Harcourt presented data comparing the sound of the proposed turbine—an Endurance S-250—to that of a person rubbing his hands together rapidly. After reassuring hearing participants that the turbine would be fairly quiet, especially in the typical windy conditions at the site (40 to 50 mph winds are common), the Board voted unanimously to grant the setback variance.

The next obstacle was that the septic leach field occupied the only open ground on the property. Harcourt and his crew had to fine-tune the layout of the turbine foundation until the anchor points were not in the field. Last but not least, the side guy wire anchor points were about 9 feet in elevation difference. The team formed a custom-engineered concrete anchor, raising the low side to an acceptable height. The other side was excavated as low as was practical and a stone retaining wall was built to protect the soil around a prized beech tree.

It was a tight fit and the turbine sits fairly close to the house, but the Boyles are pleased—and the first month's production of 662 kWh was more than acceptable on Martha's Vineyard, where winter winds from November to March typically produce the most power.

PROJECT : Boyle residence
SYSTEM TYPE: Residential grid-tied wind electric
INSTALLER: Great Rock Windpower
DATE COMMISSIONED: April 2009
LOCATION: West Tisbury, Massachusetts; 41.26°N latitude
ESTIMATED ANNUAL PRODUCTION: 7,000 AC kWh
AVERAGE ANNUAL UTILITY BILL OFFSET: 90–100% (estimated)
COST OF UTILITY ELECTRICITY : $0.23 per kWh
INCENTIVE PAYMENT: $2.25 per rated watt
TURBINE : Endurance Windpower, S-250, three-blade
ROTOR DIAMETER: 18 ft.
TOWER: Endurance, tilt-up, guyed pipe, 84 ft. tall