

Optimizing whole-home efficiency with net zero energy construction

Case Study

Contractor Name:
Greenhill Contracting

Location:
New Paltz, New York

Measures Implemented:

- Energy-efficient, cost-effective shell by isolating foundation from the ground and adding significant additional insulation
- Solar and geothermal technologies

Benefits:

- Produce as much electricity as homes draw from the utility grid, so bills zero out over a year
- Priced competitively with similarly sized area homes

Background

Anthony Aebi builds homes of the future today in the Hudson Valley. Designed to be highly efficient, these new homes incorporate solar and geothermal technologies and are priced competitively with similarly sized area homes.

Seventy miles north of New York City, Aebi—president of Greenhill Contracting in New Paltz—developed New York State’s first two net zero energy residential developments. Net zero homes have the potential to produce as much electricity as they draw from the utility grid, so bills zero out over a year. Net metering allows excess electricity generated during the day to be sold to the utility, with its value credited back to the homeowner. Annual energy costs for typical, similarly sized area homes average \$2,500.

Groundbreaking Construction

Greenhill’s two net zero developments in New Paltz are among America’s first. Green Acres—customized three-bedroom homes on one-third acre lots—began in 2008, and is the first single-family, net zero development in the State. Every home was designed to achieve net zero energy performance.

These homes were designed, constructed, and tested to ensure they meet standards for New York ENERGY STAR® Certified Homes, a New York State Energy Research and Development Authority program. Their energy-efficient shells include insulating foam to isolate the home’s concrete slab from the ground. Foam-block forms shape the exterior walls from foundation to roof, where 12 inches of insulating foam completes the building envelope. Triple-paned windows are sealed outside and inside. Heat-recovery ventilation systems deliver fresh air inside while retrieving heat from air to be vented to outside, helping control humidity.

Greenhill Contracting built two residential developments to net zero energy standards – homes can produce as much energy as they consume, averaged over a year.

“Verification and testing by a Home Energy Rater follows nationally recognized procedures and allows me to demonstrate to buyers and lenders the advanced energy efficiency my homes deliver.”

— Anthony Aebi, President
Greenhill Contracting, New Paltz

Roof-mounted solar panels are designed to generate at least enough electricity to power each home. Systems were installed with a rated capacity of 7.4 kW, to generate about 8,500 kWh annually, which is the typical usage for homes this size. Roofs face south for maximum sun exposure; each home's 28 panels are tilted 38 degrees to maximize sunlight capture. The sun heats up the panels from daybreak on, melting off snow or ice and enabling the panels to produce electricity. The homes also use geothermal systems, which supply efficient space heating and cooling along with domestic water heating.

Happy Homeowners

Long-term utility savings have attracted buyers to both of the New York ENERGY STAR Certified Homes developments. Federal tax credits encourage construction of high-performance homes and support the builder's engagement of Residential Energy Services Network Home Energy Raters. “Verification and testing by a Home Energy Rater follows nationally recognized procedures and allows me to demonstrate to buyers and lenders the advanced energy efficiency my homes deliver,” said Aebi.

Solar and geothermal systems increase home construction costs, but State and federal tax credits help to offset costs. Utility rebate checks confirm the homes' efficiency. Green Acres homeowner David Shepler received \$80 the first year and \$172 the second—money back from his utility for the extra energy his home produces.

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