



▲ A house for the 21<sup>st</sup> century. "Winters here are incredibly cold and windy," say the owners. An energy-efficient house can keep costs down. Yet even in the hottest parts of summer, no air conditioning is needed at Black Bank Hill. Photo by Andrea Hunniford for Solares Architecture.



# Energy-Efficiency at Black Bank Hill

By Dan O'Reilly Photos by Mike Davis except where noted

Located on a high plateau overlooking the Mulmur Township hills, a 1,756-square-foot L-shaped bungalow offers its owners scenic views, a comfortable lifestyle, and low energy bills.



**K**nown as Black Bank Hill after its location, the house could be considered a testament to sustainable design and construction and an example of how in-depth planning can keep building projects on time and

budget, meet all the Niagara Escarpment Commission (NEC) approvals, as well as keep energy consumption costs to a bare minimum.

"It uses 60 per cent less energy than a typical Canadian home of an equivalent size and has achieved an Energuide

Rating of 86 through a combination of design and construction techniques and building materials," says Christine Lolley, a designer and co-principal of Solares Architecture Inc.





▲ Pass through the large mudroom entry, turn the corner and you're in the large, open heart of the house. The concrete floor with electric heating coils adds to the moderating effect of the house's thermal mass.

Some examples include the use of 18-inch-thick insulated concrete form blocks for the exterior walls, triple-glazed fibreglass frame windows, a steel roof which reflects the sun's rays, and a concrete floor slab with in-floor electric heating.

"This reduces wild swings in temperature," says Lolley. "During the day the slab absorbs heat and slowly releases it at night." Other factors include the simplified floor plan which reduced the number of wall corners. "It's the corners where you get the air leakage," she adds.

The southeast orientation also contributes to its energy efficiency. High windows in the kitchen and main living areas allow the low winter sun to stream into those areas, while deep roof overhangs diffuse the high summer sun.

Lolley operates Solares Architecture with her architect husband Tom Knezic, and two intern architects. The Toronto-based firm specializes exclusively in the design of energy-efficient homes. Beside their design focus and philosophies, the husband and wife team have considerable expertise in dealing with the NEC.

"We've worked with the NEC on two previous projects and subsequently worked with them on two other projects since this one," she explains.

As this house is on the Niagara Escarpment, Lolley had to guide the owners through the regulatory, as well as the design process. The owners are a semi-retired Toronto couple who eventually intend to live



◀ The cosy living area focuses on the view outdoors and an efficient wood-burning stove.



◀ Dining, kitchen and living spaces that are open to each other help keep temperatures comfortable and make for great party spaces. "A passive solar home is more efficient if it's small," say the owners.

Clean, tidy, everything in its place, makes an open kitchen sociable. Beyond, a pantry for storage. ▶



◀ One of the three bedrooms in the house.



◀ Luxury where it counts. A deep, cast-iron soaker tub for indulging in hydrotherapy, and a separate shower stall for getting the job done quickly. Owning 40 acres means curtains aren't necessary. Photo by Andrea Hunniford for Solares Architecture.



## The Price of Country Living

Few people, at one time or another, haven't thought about purchasing a vacant lot in a bucolic setting and building their own house. Achieving that goal, however, comes with some hefty expenditures, says Christine Lolley, a designer and co-principal of Solaris Architecture Inc.

"I recommend budgeting \$200 a square foot for an energy-efficient home with modest finishes," says Lolley, explaining that square feet is the area above grade, including the exterior walls. That figure doesn't include soft services such as the architectural and survey costs which are approximately 10 to 15 per cent of the construction cost, she says.

The homeowners will also need a well dug, a septic system installed, a driveway built, and the house connected to the hydro transmission grid. Although the costs for these site services vary, some yardsticks can be used. The price for a driveway, for example, is totally dependent on the length.

"I've worked on projects where the driveway cost \$5,000 and some where the cost was \$40,000," says Lolley. "We estimate \$15,000 for a typical project."

At least \$10,000 should be set aside for hydro servicing, \$10,000 for the well, and a bare minimum of \$15,000 for the septic system. Local soil conditions, the lot size, the capacity requirements and proximity to open water will determine the final price, says the designer, citing some septic systems projects where the final price was \$40,000.





▲ Located near the pantry, the mechanical room houses an energy recovery ventilator which exhausts hot, stale air from the air-tight house and supplies cool, fresh air. While making this exchange, heat and moisture from the stale air is transferred to the fresh air, reducing energy waste with a 95 per cent heat recovery rate.

there full time. Their original idea was to have the house built on the highest peak of a hill on the southwest edge of their property.

After fleshing out the couple's vision and reviewing their budget, Lolley had a "very informal" telephone discussion with the NEC area planner. The purpose was to gauge the agency's initial reaction.

"The planner said the house couldn't go on the hill because it would interfere with neighbouring residents' views," she says. That was an opinion, not a ruling, and could have been appealed. Rather than doing that, Lolley and her clients decided the house should be built on the plateau below.

"Initially our clients were upset. But they definitely respect the important role the NEC plays in protecting Ontario's natural landscape and ultimately building on the plateau was a better move, for design and cost reasons. If we had built on the hill the house probably would have

had to be larger and there would be additional expenses such as constructing a driveway up the hill." And, she, notes, the plateau is still 470 metres above sea level.

Altering the location was just the start of the project's next phase which was the preparation of the very detailed architectural drawings. "The more detailed the plan, the more chance of approval," she advises. Eventually a myriad of documents were submitted to the NEC including site plans, floor plans, elevation drawings and drawings of the building's various sections.

If there are no complications, it usually takes the commission 10 weeks to review a development application. If the project is approved, the applicant still has to wait another two weeks which is the review period area residents have to file an objection, she says.

Not only were there no objections, the detailed planning also paved the way for a relatively straight-forward construction.



▲ Apologies for the view. A cloudy day limits the views which can reach to Barrie and Lake Simcoe. “At night Alliston lights up like a Christmas tree,” the owners say.

Shelburne-based Metz Homes started building in July 2010 and completed construction in March 2011, with Solares acting as the contract administrator as well as the architect.

The construction cost was approximately \$150 a square foot, which doesn't include the design fees, site servicing, building permit, and other associated costs. “But these clients, like all our clients, wanted a different house, a super energy-efficient house requiring little maintenance and low utility bills. In a way they invested more money now as a way of future-proofing against rising energy costs.”

For anyone wanting to build in the NEC planning area, one of the lessons they can learn from the couple's experience is the need for patience. Almost a year transpired from the time planning and design commenced until they obtained a building permit. Says Lolley, “People shouldn't contact us in January and expect to start construction by summer.”

“The NEC works closely with applicants to ensure that their proposed developments are in keeping with the policies of the Niagara Escarpment Plan, which are intended to minimize ecological and scenic impacts on the landscape,” says its communications officer, Karen Carruthers. “Residents of the Niagara Escarpment Biosphere Reserve are drawn to the area for its spectacular scenic beauty, and they are important Escarpment stewards.” **NEV**

*Dan O'Reilly is a Caledon-based freelance writer who covers construction, real estate, and historical preservation issues. He is a frequent contributor to the Daily Commercial News and his articles have also appeared in Toronto Star's New In Homes section, Ontario Home Builder, and Engineering News Record. His previous articles for Escarpment Views were “The Best Burn in Winter,” Winter 2008, and “Devereaux House: Restoration in Progress,” December 2008.*