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# extreme green

Two new Bethesda-area homes push  
the limits of green construction—  
in very different ways

By Louisa Jaggar

**W**hen Susan Mahan of Bethesda adds up her utility bills each month, she understands why a growing number of people want to live in “green” homes. Mahan says the monthly total for gas and electric for her 5,000-square-foot colonial has gone as high as \$1,200. “This house was perfect for raising our seven children and seeing them off to college, when the costs of maintaining this house were not crazy,” she says. “If I was looking to buy now, absolutely I would look for a home with alternative energy sources.”

The increasing interest in green building has been sparked by concerns about the environment and the skyrocketing costs of heating and cooling traditional homes. Although building a green home can be expensive, the prices for alternative energy systems are declining, and federal, state and county tax breaks are making green construction even more attractive.

Rob Nehrebecky, an architect and co-owner of ECOLiving Homes in Bethesda, says many people still mistakenly view green buildings as exotically designed, out-in-the-woods homes, when, in fact, green construction is infiltrating the urban and suburban home marketplace. “People who live in the Bethesda-Kensington area are interested in green design, and that interest is primarily motivated by two important issues: a healthier indoor environment and the bare-bones cost-effectiveness of having an energy-efficient home,” Nehrebecky says.



The Bethesda Zero house  
will be cost-free for utilities,  
with the exception of water,  
the architects say.

COURTESY MEDITCH MURPHEY







## extreme green



ERICK GIBSON

Several Bethesda-area architects and builders are pushing the envelope and building ultra-green spec homes. For example, husband-and-wife architects Marcie Meditch and John Murphey of Chevy Chase have designed the Bethesda Zero house, which they say will be cost-free for utilities, with the exception of water. Meditch and Murphey bought a lot shaped like a pie wedge in Bethesda's Bannockburn neighborhood, tore down the existing house and are now bringing their dream of sustainable housing to life.

"Most green homes have been built as a statement, and that statement costs thousands and thousands of additional dollars," Murphey says. "We are building our vision—a home that combines beauty, sustainability and, equally important, affordability." The 4,680-square-foot home, scheduled to go on the market in May for about \$1.7 million, is expected to be LEED Platinum Certified—the highest rating for green buildings. LEED, or Leadership in Energy and Environmental Design, is a third-party certification program created by the U.S. Green Building Council, a nonprofit organization.

In net-zero design, the owner buys an

energy system that generates its own power, such as solar or wind, instead of using traditional energy sources to run the house. People call this "going off the grid."

"The financial advantage is that you have paid for your home's heating and cooling and the electricity upfront for the life of your home at a fixed price," says John Spears of Sustainable Design Group in Gaithersburg. "You become immune to price increases of the utility company."

The green technology of the Bethesda Zero house, which includes photovoltaic solar panels, solar hot-water panels, a geothermal heating-and-cooling system, and an insulation system that far exceeds traditional building standards, costs \$78,570, Meditch says. But, she says, when you eliminate some extra and expensive design elements, such as bay windows and crown molding, the sale price will not exceed that of a traditional Bethesda home. "It's all a matter of choice," she says. "We choose to keep the lines of the Bethesda Zero house simple and elegant—making simplicity a virtue. This pays off by costing less to build, and the money we save by not adding fancy trim is used for the Bethesda Zero house's

alternative-energy systems."

Not everyone is convinced that it's possible to live a normal life in a net-zero house built for a reasonable price. "I find little of what's being called green actually practical," says Mark Scott, owner of Mark IV Builders in Bethesda. Scott visited the Bethesda Zero house and says it seems to be a well-designed and well-executed house. But he doubts people will be willing to make the design and lifestyle trade-offs he thinks will be needed to have a net-zero house. "I have become a convert where insulation and energy efficiency is concerned, but the idea of a net-zero house is laughable," he says. "The person who buys this house will be someone who uses recyclable shopping bags at Whole Foods and then loads their groceries into an SUV. Of course you can make it cost almost zero dollars to run your house, but are you going to give up TV and your computer to be green and cost-effective?"

Murphey strongly disagrees. "It is no longer true that the only way to achieve net-zero energy balance is to do without modern comforts; that mind-set is really obsolete," he says. "It ignores 40 years of improvements to insulation, mechanical

systems, lighting technologies and photovoltaics. The whole point of the Bethesda Zero house is to prove you can achieve net-zero energy use without having to sacrifice a comfortable lifestyle, including your TV and computer. We have built a house that will appeal to the typical Bethesda family as well as a house that is super efficient.”

The Bethesda Zero house features a contemporary design, and Meditch and Murphey use light and windows to fuse the inside of the house with the outdoors, unlike Bethesda’s typical colonial. Its design is straightforward and is shaped by its site location. A visitor entering the front of the house will step into a great room that combines the living room, dining room and kitchen. A powder room, mudroom and a master bedroom with a full bath also are located on the first floor. “We have designed this house as a lifetime home,” Murphey says. “This means a couple can live downstairs on one level if they desire or need to...Because this house will be zoned, an owner can shut off the [heating-and-cooling system for] three bedrooms as well as a study upstairs when the children have left home...and turn it back on when the family comes home to visit.”

Peter Guida, owner of Bethesda Bungalows, a home-building firm, is also focused on green construction. But his take is different. Meditch and Murphey are building a home that is modern in design, with net-zero energy costs as the principal goal. Guida says he believes that how a house looks is equally important. “We live in an architecturally conservative area where the modern home is not in great demand like it is on the West Coast,” Guida says. “The Bethesda Zero house will be stunning when it is done, but I am building homes more in line with the conservative architectural genre of the area.” Though he views the Bethesda Zero house as an amazing testament to going all-out green, Guida also believes smaller homes that maintain their character (bungalows and Frank Lloyd Wright-inspired prairie-style homes) are the future green of Bethesda. “A bungalow or a prairie-style house maintains its character even when you build small,” Guida says.

Guida is building The Incredibly Green

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COURTESY BETHESDA BUNGALOWS

Peter Guida (top) is building The Incredibly Green Home of Chevy Chase. He says his goal is for the home's (bottom photo) utility bills to be about \$250 a month, half the cost of heating and cooling the average Bethesda-Chevy Chase residence.

Home of Chevy Chase in the Bradley Hills section, just off Bradley Boulevard. The house will be 4,761 square feet, including the basement, and Guida also is seeking LEED Platinum certification. The Incredibly Green Home's focus is on conserving energy as well as using it efficiently. "For various reasons, such as lot orientation and size, we are not using solar on this house," Guida says. The home will be well insulated and use a geothermal system for heating and cooling. Though the costs to run this green house will be far lower than a traditional home, it will remain on the grid 24/7. "We are giving the homeowner the ability to significantly lower their utility bills," Guida says. "The goal is [that] the utility costs should be half of what the normal Bethesda-Chevy Chase house is. With the temperature set at 68 degrees in the winter and 70 degrees in the summer, [the] heating-and-cooling bills should come to less than \$250 a month."

Energy efficiency combined with traditional design is more desirable than net-zero, Guida says, because "the net-zero house looks like an industrial complex, very modern with the whole front

of the house's roof covered with solar panels, among all the colonials in a neighborhood. It simply doesn't blend in. Our house blends into the neighborhood, and we still can achieve a LEED Platinum rating."

The Incredibly Green Home is scheduled for completion in August. Guida believes its green elements will increase the price of the house by about 15 percent, but that the money saved long-term in energy costs makes it more than worth the investment. The home has three floors, including the basement. An asymmetrical house, it is being built with only one hallway. This allows light to enter each room from three or four directions, creating more visual space and a sense of connection to the outdoors. The main floor has an office, a formal dining room and, toward the rear, a wide family room that connects to a gourmet kitchen. A patio off the back leads to a Japanese-inspired garden, which provides a secluded and intimate exterior environment. Three of the bedrooms are upstairs, and a fourth bedroom, a rec room and a home theater are in the basement. The asking price is \$2.3 million. "My house is a high-end custom home located where you can walk into [downtown] Bethesda. Our cabinets alone are \$50,000. The trim is also expensive, but adds to the house's character," Guida says. "Why is my house more expensive? Probably the location of the lot is the biggest reason."

Scott, the owner of Mark IV Builders, is also skeptical about The Incredibly Green Home. "Guida is on the bleeding edge of green," he says. "The bleeding edge is where builders cross over the cutting edge and simply go too far. Their choices cost too much. The homeowner doesn't get enough out of it, and so it doesn't make sense."

Replies Guida: "Yes, the house may cost more up front but the payback is so fast that the costs make sense. This is not only not the bleeding edge; this is the wave of the future."

Tours of the Bethesda Zero house are available. For more information, go to [www.meditchmurphey.com](http://www.meditchmurphey.com).

To view The Incredibly Green Home of Chevy Chase, go to [www.bethesda-bungalows.com](http://www.bethesda-bungalows.com).

## How Green Is Green

### Comparing the Bethesda Zero house and The Incredibly Green Home of Chevy Chase

#### Passive Solar Energy

Decades ago, air-conditioning wasn't available and heating a home required coal or firewood, so houses were built in ways that took advantage of the sun and wind. This is called passive solar energy. No machines are needed to use the sun's natural energy to heat a house—just the proper orientation of the structure. The optimal use of passive solar energy requires a southern exposure for the longest side of a house. By placing windows on this side of the house, the sun and the wind can help heat or cool the structure.

The Bethesda Zero house takes full advantage of the sun's free energy. The orientation of the house enables the sun to help heat it in the winter. (Properly placed window shadings can block intense summer rays.) In addition, on the north and south sides of the house, breezes pass through windows and doors and can cool the home far more cost-efficiently than homes not utilizing passive solar energy. "The orientation of the Bethesda Zero house is a primary reason why we are able to build a net-zero home," says John Murphey, of Meditch Murphey Architects. The landscaping is another part of the passive solar energy package. Deciduous trees like red Japanese maples, serviceberries and forest pansy redbuds will provide shade in the summer and then drop their leaves in the winter, allowing the sun to help heat the house when it is most needed. Because the trees will never top 20 feet, they will not cast a shadow on the roof and block the solar panels.

Peter Guida, owner of Bethesda Bungalows, says The Incredibly Green Home of Chevy Chase is situated on a lot that would not accommodate a south-facing house without extreme design changes. "We did not focus on passive solar because the site has too many limitations," Guida says. "We put our primary focus on conservation and efficiency of energy use. That's why the robust installation package

and the geothermal system were needed. That's how we are getting our energy costs so low. Given the right lot orientation, would I consider using passive solar? Absolutely. But people think green homes means they have to be passive solar. Passive solar is just one tool in the green tool kit."

The size and orientation of most Bethesda-area lots make it difficult to take advantage of passive solar energy, according to Rob Nehrebecky, of ECOliving Homes. "It is almost impossible to get the perfect north-south orientation off an already existing lot in this area," he says. "The lots are often not large enough to offer the wiggle room needed to rotate the design plan to take full advantage of passive solar energy."

"How unimaginative to think you can't do this," says Murphey. "You can always design a south-facing roof. A good architect can always find the right sun angle, can tweak any design, unless a huge building is shading the whole top of the house. We have designed traditional homes and had them face the street, but then rotated the rear of the house to the proper sun angle. This is not rocket science. And if a building blocks the sun, there are other strategies, such as insulation, window placement and geothermal that can be put into place."

#### Active Solar

##### Photovoltaic (PV) Panels:

Solar PV panels convert the sun's energy into electricity. Oriented to take full advantage of the sun, the roof of the Bethesda Zero house has 49 PV panels. Murphey and his wife and partner, Marcie Meditch, believe these panels will supply 90 percent of the home's energy needs. The \$75,000 solar system costs around \$39,000 after federal, state and county tax credits and rebates.

What happens if the sun doesn't shine? The house is connected to the grid, so it always has access to electricity, but this doesn't mean the house won't be net-zero. In the dog days of summer, solar panels



typically produce more electricity than is needed, according to Mike Binder, an architect for Meditch Murphey Architects. The extra electricity generated by the panels is fed into the utility grid, spinning the meter backward and generating a credit. "Overall, we expect the house will be producing as much energy as it consumes over the course of a year," Binder says.

In order for solar panels to produce as much energy as possible, the roof of the house must be facing south, and nearby trees can't shade it. Because The Incredibly Green Home's southern exposure is limited, Guida believes that currently available solar panels would not produce enough energy to be worth the expense. As a result, his home will not be powered by the sun, but it will be pre-wired for solar panels. Guida says the efficiency of PV panels will improve significantly in the next five years, so pre-wiring will facilitate installation later.

### Solar Hot Water

The Bethesda Zero house will also have

solar hot water panels. Binder says a combination of new federal and county tax incentives means that the \$8,970 solar hot water heater will cost \$5,570. Solar hot water heaters require only two panels, and work throughout the year using the sun's energy. Given the tax incentives, Binder believes this system will pay for itself in three to seven years. The Incredibly Green Home will not have solar hot water, but will be pre-wired for it.

### Geothermal Energy

A geothermal energy system, also called a ground source heat pump, uses the natural warmth of the earth to heat and cool a house and, in most cases, provide hot water. A geothermal system, though similar to a regular air source heat pump, doesn't use the air outside with its fluctuating temperatures. Instead, it harnesses the more constant temperature of the earth, which stays around 55 degrees. Because this system heats and cools air at the earth's starting temperature of 55 degrees, rather than heat-

ing from a possible winter temperature of 20 degrees or cooling from a possible summer temperature of 90 degrees, it is far more efficient.

The Incredibly Green Home will have a geothermal system. "This system will not only heat and cool the entire house, but additionally heat an 80-gallon hot water storage tank, providing ample hot water for the house," Guida says. "The tax credits make all the difference in the world in terms of affordability. This system is so efficient that I believe the owner will recoup the investment within five years." After federal, state and local tax credits and rebates, the geothermal system will cost close to \$15,000, Guida says.

The Bethesda Zero house will also have a geothermal system. With the combination of rebates and tax incentives, Meditch and Murphey are hoping to get the complete geothermal units for \$14,000 more than the cost of a traditional heat pump with the same Energy Efficiency Rating (EER).

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## Insulation

Murphey and Guida agree that insulation is the key when it comes to energy efficiency. And they say it offers a quick payback. Insulation is rated by R-values—the higher the value, the more insulated the house. Insulation for the Bethesda Zero house and The Incredibly Green Home will far exceed the traditional R-values of R-19 for walls and R-33 for roofs. As is typical in green homes, the insulating materials in both houses will contain few to no volatile organic compounds (off-gassing chemicals) and no formaldehyde.

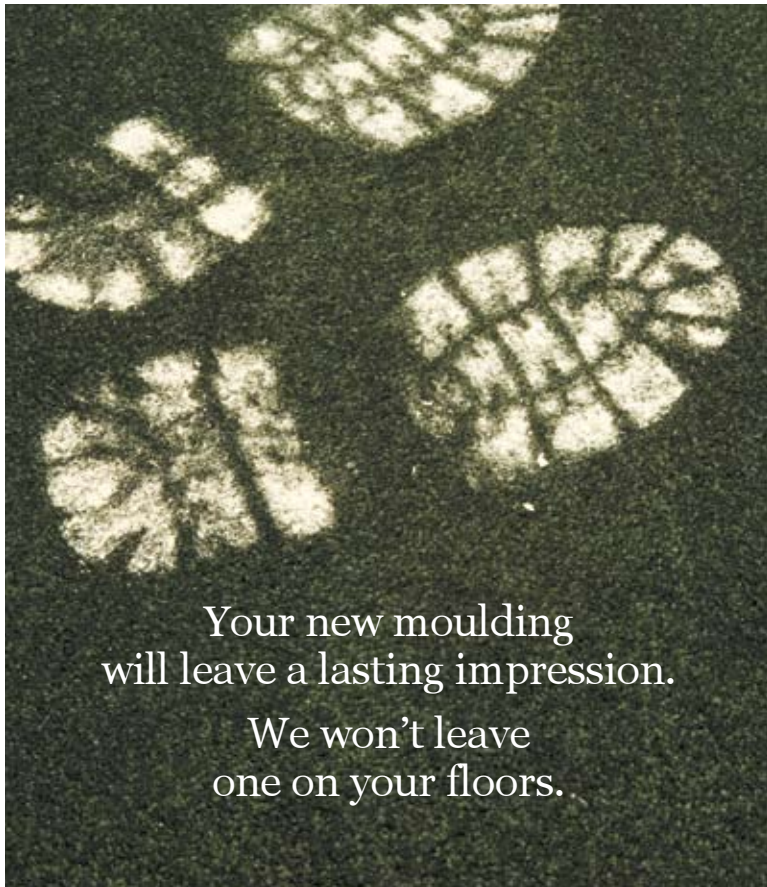
The Bethesda Zero house is essentially being packed inside a rigid foam insulation shell, which includes an additional weather-resistive barrier membrane. Murphey says a concern about using rigid insulation is that it does not allow a house to breathe and can trap moisture, potentially rotting the wood that supports the structure. “We dealt with this by getting rid of the plywood sheathing that supports the walls [the wood sheathing was necessary on the roof for structural reasons], and instead we strength-

ened the structure in the walls by reinforcing studs using metal bracing,” Murphey says. The roof has a 2-inch exterior layer of rigid foam on top of three-quarter-inch wood sheathing, combined with 9 inches of medium-density, soy-based spray foam between the rafters. “This creates an R-value of 50,” Murphey says. The walls are insulated to R-33 by using an inch-and-a-half layer of rigid foam on the outside and 2 inches of soy-based spray foam combined with 3.5 inches of fiberglass batting insulation. Standard insulation for a home this size would be \$4,500. The insulation for the Bethesda Zero house costs \$20,000. “This is expensive,” Binder says, “but we are going all out to be sure this house reaches our goal of net-zero energy cost. Spray foam insulation, in addition to giving higher R-values than batting, also provides superior sealing against drafts and inhibits the growth of mold within the walls and roof.” And the Bethesda Zero house’s soy-based spray foam has a unique benefit. “Being biodegradable, this is one of the few products that

will not end up occupying a landfill long after your house has been demolished,” Binder says. “The lesson here is that nothing lasts forever, and homeowners should be thinking about what happens when we are done with it.”

The Incredibly Green Home is being sealed with Icynene, a polyurethane spray foam. “If The Incredibly Green Home was insulated with batting, it would cost \$5,500. Icynene costs \$15,000,” Guida says. “Since it lowers the energy costs of heating and cooling a house by 30 to 50 percent, the insulation earns back [its cost] in two to three years. Why not a rigid foam layer, plus foam, plus fiberglass batting? Frankly, for the price, [Icynene] is the Rolls-Royce of insulation, and that is why I chose it. Every house is different, and we can achieve the same energy envelope by going about it in a different way, but I prefer Icynene.” **B**

*Bethesda resident Louisa Jaggard has written for The Washington Post, Real Simple Magazine, and PBS.*



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