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D.C. couple on a tight budget tries for 'net-zero' power on fixer-upper home



By Christine MacDonald July 16

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Patrick Hughes, left, and Amy Sticklor found inexpensive ways to reduce the carbon footprint of their 100-year-old home on Capitol Hill. (John McDonnell/The Washington Post)

Energy-efficient, solar homes tend to be brand-new architectural gems powered with the latest — and priciest — technology. But a couple who bought a century-old fixer-upper on Capitol Hill in 2013 are proving you don't have to be rich to embark on a “net-zero” quest.

A net-zero home is one that produces all of its own clean and renewable energy. They tend to be new construction or gut remodeling projects because

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it's easier to get to net zero by building super-insulated spaces that don't require much to heat and cool, then add top-of-the-line geothermal heating systems, heat pumps, solar panels and other "green bling" to operate them as efficiently as possible.

Patrick Hughes and Amy Sticklor began their do-it-yourself approach in fall 2013, shortly after purchasing their first home in Washington's Atlas District. Instead of replacing big-ticket items such as the aging furnace and boiler (both of which still have a few years of service left in them), they slashed their energy usage in half with less than \$500 in insulation, new lighting and other equipment available at the average hardware store or online.

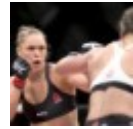
Updates alone made it possible to run their entire 952-square-foot, two-bedroom home for several months of the year without exceeding the amount of energy produced by the solar array they had installed on their rooftop. Their utility bills have plummeted. In environmental terms, meanwhile, Hughes says the couple have saved 1,238.5 kilowatt-hours of power by lowering their energy usage alone. That's equivalent to planting 22 tree seedlings that would remove carbon dioxide from the atmosphere over 10 years or driving 2,033 fewer miles.

"It goes to show that you can get really significant energy savings without spending a lot of money," says Hughes, who has done most of the handiwork and tracks the couple's progress on a spreadsheet.

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The couple put a backyard composter on their wedding registry. (John McDonnell/The Washington Post)

Subtle shades of green

From the outside, their brick Colonial doesn't look much different from the other attached rowhouses on the block. The solar array on the flat rooftop isn't visible from the street. Inside, too, the energy-saving updates are so discrete that they don't stand out in the house built in 1900. The off-white

walls and dark wood floors offset the large collection of books. Like many newlywed households, there's a mishmash of furniture that survived the merger of Hughes's and Sticklor's lives.

You have to look closely to discern the energy-saving changes. Three minimalist black pendant lamps hanging above the glass-topped dining room table are one of Hughes's favorite upgrades. He installed them himself using products made by Southwire Co. While the LED bulbs in the lamps use very little electricity, they give off a cozy soft white light just like the old fashioned, energy-hogging incandescent bulbs.

It was crucial to reduce their energy usage to make it feasible to run the house on no more than the energy that can be produced by the relatively small 2.2 kilowatt solar array installed by San Mateo, Calif.-based solar power provider SolarCity.

The solar panels have generated 2,580 kilowatt-hours of energy since they first went up in February 2014 through the end of May. Counting their reduced energy usage, the couple have garnered a total savings of 3,818.5 kilowatt-hours, or 5,805 pounds of climate-changing carbon dioxide. This is the equivalent of not driving 6,269 miles, which is like taking your car off the road for more than six months of the year, according to the [EPA's clean energy calculator](#).

From May through September last year, the panels easily out-produced their household needs, but official net-zero status requires 12 consecutive months without the need for additional energy, a target that has proved more elusive even as they move closer to achieving it.

The decision to sign a contract with SolarCity, essentially renting their roof to the company, saved Hughes and Sticklor from a large upfront investment in the panels, while locking in a rate of about 8 cents per kilowatt-hour, 45 percent less than the nearly 15 cents an hour paid to Pepco before the panels went up in late February.

A natural fit

Having just signed a mortgage on the \$505,000 home and in the midst of planning their wedding, they didn't have a lot of extra cash when they began the project in late 2013. But what they lacked in capital they made up for in working knowledge and a commitment to reducing their carbon footprint. They are both environmentalists who met while working on climate-change policy at the United Nations Foundation's Pennsylvania Avenue NW offices.

Today, Hughes is director of government relations at the National Electrical Manufacturers Association (NEMA). He even managed to tie his home-improvement project to his job — using light bulbs, lighting sensors and solar energy equipment manufactured by NEMA members, and blogging about his

efforts on the organization's Web site. (Hughes installed the dining room pendant lights, for instance, with technology made by NEMA member Southwire Co.)



A clothes line in the back yard is one of the inexpensive ways Patrick Hughes and Amy Sticklor reduce the carbon footprint of their home. (John McDonnell/The Washington Post)

Sticklor says she became environmentally conscious after seeing the devastation Hurricane Katrina wrought on New Orleans in 2005, when she was attending Tulane University in the city. In May, she finished a master's

degree at Georgetown University and hopes to soon work on climate change mitigation in the developing world.

They are such committed environmentalists they weaved their eco-consciousness into their wedding in May 2014. Instead of cut-flower centerpieces, they used potted daisies, azaleas and other flowers that guests could take home and plant in their own gardens. They also had a green wedding registry that allowed invitees to help them with their net-zero quest by selecting environmentally friendly gifts instead of the traditional stemware or home appliances.

“I haven’t seen such a green registry before, but I definitely was not surprised,” says Sticklor’s friend since childhood, Alex Doty. Doty and her boyfriend bought the couple a backyard composter from the registry. “It was nice to get them what they wanted.”

Other guests bought them a push lawn mower and contributed cash toward bigger investments such as the new front and back doors and an energy-efficient boiler the couple had picked out and are still saving for.

“They always talked about doing something like this,” Doty said of the net-zero project. “All of our friends aspire to being as green as they are.”

Indeed, Hughes and Sticklor may have taken their DIY quest further than

your average homeowner. But they are among a growing number of people interested in living more sustainably, according to experts.

A growing trend

A quarter of all new single-family houses built in 2014 qualified as green, up from just 2 percent of the market in 2005, according to McGraw Hill Construction Dodge Forecast. The value of green single-family housing starts will reach as much as \$80 billion by the end of 2016, more than 10 times its value in 2005. Nearly 80 percent of the builders who responded to McGraw Hill's most recent green building survey said they expect it to be part of the standard services by 2018.

The dramatic shift to new energy conservatism is fueled largely by growing awareness of how the nation's seemingly insatiable demand for power is harming the planet, says Courtney Baker, residential product manager at the U.S. Green Building Council, which oversees LEED, the country's leading "green building" standard. According to the U.S. Environmental Protection Agency, indirect greenhouse gas emissions from the electricity used by homes and businesses to fuel heating, air conditioning, lighting and appliances have increased by 26 percent since 1990.

"The surge of consumer electronics, flat-screen TVs, laptops and cellphones have caused a surge in energy demand. Now we're seeing an increase in smart

systems and sensors designed to save energy,” Baker says. The trend, he says is driven by “a mix of [concern about] sustainability but also convenience,” referring to, say, a programmable thermostat that turns up the heat automatically before you get out of bed in the morning.

More do-it-yourselfers like Hughes and Sticklor could be a very good thing for the planet, according to Baker.

“If we can get 10 million homes to do this, it would be significant” to reducing the carbon footprint of U.S. buildings, he says.

To revamp their century-old home, Hughes and Sticklor deployed a three-part strategy: reduce the amount of energy it takes to keep the lights on, kill the “vampire energy” and stop throwing away money on heating bills.

“Some of the things, we would have done anyway — like installing the sensors and changing to LED light bulbs,” he says. “Some of the other projects, like adding the insulation, was more involved and kind of messy. It probably wouldn’t have been worth the effort, except that we were looking for that small, incremental energy saving to reach our goal.”

They signed up for Pepco’s Energy Wise Rewards Program, allowing the company to turn down their air-conditioning for short periods during times of peak summertime energy demand in exchange for reduced electric bills and a

free programmable thermostat. Pepco pays more for energy during those spikes in demand, and the environmental consequences are higher, too, since the country's oldest, dirtiest and least-efficient plants are usually powered up to meet demand.

For further savings, they made a few lifestyle changes, stringing a clothesline in the back yard, for instance, to dry bulky items such as sheets and towels. They say it was surprisingly easy to cut their energy consumption by being more conscious of how they used energy and eliminating waste whenever possible.

The biggest energy savings came from reducing the house's lighting load. Besides replacing every light bulb in the house with energy-saving LEDs and motion sensors and daylight sensors to light switches, they replaced a few light fixtures with lower-energy models, including a solar-powered backyard spotlight. Those changes alone allowed them to reduce the amount of electricity used to light their house by 85 percent, which helped drive down by one-half their overall energy usage, without even factoring in solar power production.

Undaunted after setback

Their electric meter first started spinning backwards (a sign they were producing more solar energy than the house needed) in May 2014. By

September, they had built up a hefty “net positive” energy balance. But just as it looked like they’d met their goal, their aging roof sprang a leak and needed to be replaced, a fix that set them back \$10,000. It also required removing the solar panels, dashing their hopes to complete a year at net zero by spring.

The couple paid a little extra for a new white roof made of recycled material that reflects solar rays and should reduce their summertime air-conditioning needs. But the solar panels spent six weeks idling in the back yard. To compensate, the couple signed up with Arcadia Power and pay \$5 a month for wind-generated “clean energy” carbon offsets to more than cover what Hughes estimates is about a 20 percent differential between the house’s energy usage and its energy-generating capacity.

“It seems like a great project,” says Andrew Corral, green building and training manager for Elysian Energy, a company that tests energy efficiency for several green building certification programs. But, Corral adds, even if the roof had held, the couple probably wouldn’t be able to achieve year-round net-zero energy usage without replacing their furnace with a higher-efficiency model or adding more solar panels. But that doesn’t diminish what they’ve achieved to date, he says.

“Patrick and Amy have attempted a very difficult task,” says Corral, who adds he’s impressed by how much they’ve been able to cut their home’s energy usage.

Hughes and Sticklor should be commended, Corral says, but he also expressed concerns about Hughes's DIY insulation work. On older homes, tightening up the building can lead to condensation, mold or sometimes more serious carbon monoxide buildup unless the structure has adequate airflow. He suggested they get a home energy audit to make sure they won't have air quality problems this winter.

While Corral's assessment is disappointing, the couple continue to work toward their net-zero energy goal since the solar panels went back up on the new roof in November. Both Hughes and Sticklor say they're surprised and happy with how far they've already come to their goal, even without replacing their old, inefficient furnace and boiler.

"The whole experience has been so much easier and so much less expensive than I thought it would be," says Sticklor, adding she's merely made a small shift in the "mental checklist" she goes through before purchasing. Now she thinks about energy usage along with the usual considerations of cost, size and style.

"You just have to think a little more," she says. "I don't think it's changed our lifestyle at all."

Christine MacDonald is a freelance writer.

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