

WellesleyWeston

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Building energy-efficient homes to suit all stages of life

ELIZABETH SUNEBY **writer**

while Governor Charlie Baker and Massachusetts legislators hash out specific energy-efficiency codes for new residential buildings in the state, three local families forge ahead to reduce their carbon footprint and create new homes that harness clean and sustainable energy.

Parents of 30-something “kids” embark on lifestyle-driven, energy-efficient rebuild

Mary Louise and Larry A. Krakauer had recently built a large but energy-efficient vacation home on Lake Winnepesaukee in New Hampshire when they started the search for a house to renovate in the suburbs west of Boston. “We were looking for a home to remodel suitable for large family gatherings, extended visits from our two adult children’s families, as well as one-floor living for us to age in place,” explains Larry.

The Krakauers’ realtor showed them several properties. Unbeknownst to her, the last one was Larry’s childhood home in Weston. They bought the house and kicked off the renovation process by adding new insulation. Unfortunately, the spray foam insulation caught on fire and burned the structure down. Grateful that nobody was hurt and the house was empty of possessions, the Krakauers switched to plan B: building a home from scratch.



Energy-efficient Homes

Rendering of Krakauer home, Weston



They reached back out to the architect of their lake home, Ken Tatro of the New Hampshire-based architecture firm Christopher P. Williams. Ken designed the open floor-plan home of their dreams—well over 6,000 feet with eight-foot plus ceilings. Collaborating with Nick Falkoff, owner and general manager of Auburndale Builders, the plans for the new home utilize the five Passive House Institute U.S. (PHIUS) energy-efficiency principles: super-insulated outside walls, roofs, and floors; airtight construction; high-performance glazing of windows and glass doors; thermal-bridge-free detailing; and heat recovery ventilation to exhaust stale indoor air and bring in fresh outdoor air.

Ken originally oriented the house so that the solar panels could be placed unobtrusively on the garage roof with minimal obstruction from the mature trees on the property. This plan required a new driveway cut from the street to the house that was not approved by the town. So, he flipped the orientation of the house. Unfortunately, the change reduced the panels' energy-generation potential due to the shade from existing trees that they were prohibited from taking down. To compensate, Ken designed a free-standing pavilion the size of a two-car garage in the backyard to hold solar panels.

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Passive House

A voluntary standard for energy efficiency in a building to reduce its ecological footprint.





Energy-efficient Homes

Nick suggested several additional energy-efficient strategies the Krakauers chose to employ, including partially insulating the walls with foam reclaimed from commercial buildings—saving it from landfills. He also recommended the use of wood in addition to concrete for the basement flooring, given that concrete has a high level of embedded energy—the energy used to make a product—saving the environment from the equivalent of an average car’s carbon emissions for two years. “My clients are determined to build environmentally responsible homes. I present options based on their values and priorities. Despite conventional wisdom, the major cost drivers are typically not the extra costs of energy-efficient choices, but of custom details,” explained the builder.

Recent empty nesters excited to build a zero net energy home

With their four children in or already graduated from college, Patti Quigley and Bob Dolan decided it was time to move to a smaller home. “We no longer need four floors of living space, six bathrooms, and a pool in our backyard,” said Patti. Patti and Bob love living in the Poet’s Corner section of Wellesley, but the smaller, older homes there typically

have choppy spaces and poor energy efficiency, so they decided to build a zero net energy home in their neighborhood with spaces that would both fit their next phase of life and protect the planet.

The couple hired the architect J.B. Clancy of the Boston-based architecture firm Albert, Righter & Tittmann (ART) Architects. They were drawn to his “form follows energy” philosophy that ensures that sustainability is used as a strategy to design an energy-efficient home that meets the goals of his clients. “Sustainable design should provide comfort, health, wellness, as well as lower energy consumption,” noted J.B. “In the end, we’re not simply building a green machine, but a space that promotes wellbeing and supports the lifestyle of its residents.”

Patti and Bob purchased a south-facing lot so their new home could take advantage of passive solar gains and daylighting, the placement of windows, skylights, doors, and reflective surfaces to maximize natural light and reduce energy use. All the communal rooms and bedrooms are situated to have southern exposure facing a U-shaped courtyard.

They opted for an open floor plan—with the kitchen, living area, exercise room, and their bedroom and bath on the first floor—that would serve them for years to come. The second floor includes four

Rendering of Quigley & Dolan home, Wellesley



RENDERING COURTESY OF ALBERT, RIGHTER & TITTMANN ARCHITECTS

Zero Net Energy Home

A home that is connected to the power grid, but is air-tight, well-insulated, and energy-efficient, producing as much energy from renewable sources as it consumes over a year, resulting in a zero net energy bill and a carbon-free home.



small bedrooms—with just enough space for a queen bed and a closet—to host returning children and, someday, grandchildren. And their outdoor and indoor spaces flow one from the other.

Their commitment to sustainability includes the purposeful removal of the existing property on the lot. They hired greenGoat, a local nonprofit, to salvage home materials prior to demolition. Their new building envelope—the exterior walls, foundation, roof, windows, and doors—as well as the mechanical systems were all selected to achieve the zero-energy goal.



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781.237.9090 | 71 CENTRAL STREET, WELLESLEY, MA 02482

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Okun home, Wellesley

COURTESY OF ZERO ENERGY DESIGN / PHOTO BY ERIC ROTH PHOTOGRAPHY

As with any home building project at any budget, Bob and Patti had to make tradeoffs. For example, due to zoning coverage requirements and their commitment to 11-inch-thick insulated walls, they accepted slightly less interior space. Also, with their selection of all-electric heating and cooling systems tied into the photovoltaic system on their roof, they sacrificed having a gas fireplace, gas cooktop in the kitchen, and gas BBQ grill in their backyard courtyard. And they spent more to build a net-zero energy home. “We are in a fortunate position to be able to invest upfront to achieve savings down the road in order to be stewards of the environment,” shared Patti.

A family with teens builds a LEED Platinum certified house

Josephine and Andrew Okun spent a couple of years searching for a property within walking distance to Wellesley High School and downtown Wellesley on which to build an energy-efficient home. Jo moved to the United States as a teen from Korea, where conservation and recycling is the norm. Then, after moving to Massachusetts from California, where water drought is an ongoing issue, she was keenly aware of the need to conserve natural resources. “My husband and I were committed to building a home that would reduce our family’s

carbon footprint and are thrilled we ended up building a home that achieved the highest sustainability rating: LEED Platinum,” said this mother of two.

The Okuns worked with architect Stephanie Horowitz, managing director at ZeroEnergy Design, and Paul Bevilacqua, principal of Bevilacqua Builders, to construct a 4,200-square-foot compact home that delivers an 89 percent reduction in energy use compared to a similar new home built to code. It is super-insulated and air-tight with triple-paned windows, an air-source heat pump for heating and cooling, an energy recovery ventilation system, a heat pump hot water heater, and photovoltaics for renewable energy.

The home also delivers on the Okuns’ other priorities for the design of their home: easy to clean, a respite from seasonal allergies, and free of common contaminants. They selected durable materials, finishes, cabinetry, and casework with low or no volatile organic compounds and no added urea formaldehyde. Most of the house does not have floor coverings since carpets hold dust and allergens. The few rugs they selected are made from recycled plastic bottles to support a healthy living environment.

The front of the Okuns’ home blends into the neighborhood of traditional New England homes, while the back is more contemporary in

COURTESY OF ZERO ENERGY DESIGN / PHOTO BY ERIC ROTH PHOTOGRAPHY



design, with a roof deck, outdoor living space, and a swimming pool. “The swimming pool in the backyard is my little sustainability sin, but I made sure to compensate with other energy-efficient strategies. For example, we collect 100 percent of the rainwater falling on our roof into a 2,000-gallon cistern underground and use this water to top off the pool and irrigate our yard,” explained Jo.

Many ways to improve the energy efficiency of your current residence

While the three families profiled built new homes, there are many ways to mitigate the



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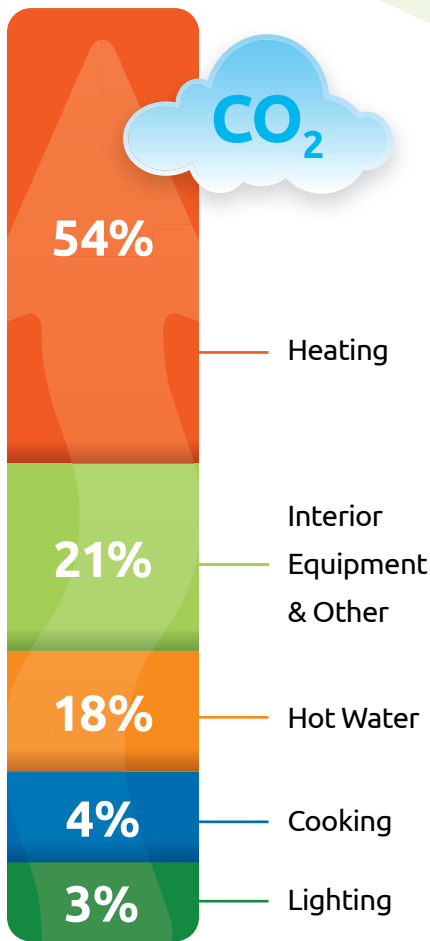
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negative environmental impact of existing homes. Adding insulation, sealing leaky windows and doors, and replacing light bulbs with LEDs are all low-hanging fruit. As old systems fail, substitute them with clean and renewable options. Swap out a gas stove for an

induction cooktop, a gas clothes dryer for an electric one, and a conventional showerhead faucet for a lower-water flow model. Replace your heat and air conditioning systems with an air-source electric heat pump that both heats and cools your home.

In addition to doing their part to protect humanity and the planet, homeowners who make energy-efficient improvements also realize financial benefits—reducing their utility bills and increasing the resale value of their homes. [WV](#)



The Massachusetts Clean Energy Center, MassCEC, documents the sources of residential greenhouse gas emissions. Heating accounts for 54 percent of greenhouse gas emissions from residential buildings.



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