



TOH general contractor Tom Silva and host Kevin O'Connor cut lumber for a screened porch that allows outdoor access from an addition that will double the size of the existing 1,000-square-foot cottage (top right). All-new systems will enable the renovated house to use only as much energy as it produces.



JAMESTOWN NET-ZERO HOUSE

Little Green GIANT

Traditional architectural details and a more open floor plan combine with the latest energy-saving—and energy-producing—technologies at a new *This Old House* TV project

BY JEFFERSON KOLLE / PHOTOGRAPH BY CARL TREMBLAY

One summer Sunday, as they reluctantly prepared to corral their two boys and hit the road at the end of another weekend at the Jamestown, Rhode Island, beach house they shared with their extended family, Don and Dana Powers confronted the question: “Why don’t we live how we really want to live?”

And with that they decided they would leave their house in Providence, where Don’s architectural office is located, and find a new home in the small island community across a toll bridge from Newport. Thus began a two-and-a-half-year hunt that ended with an accepted offer on a 1,000-square-foot cottage, built in the 1920s, in need of extensive renovation—now being documented for the 40th season of *This Old House* TV.

Don’s design goals for the house were multifaceted. First, he wanted to rework the floor plan and enlarge the house to accommodate their family of four. At the same time, he would keep the house recognizable as a Jamestown shingled cottage. “I didn’t want the house to be the sore thumb of the neighbor-

PHOTO: (TOP) KEVIN O'CONNOR



ABOVE: Homeowners Dana and Donald Powers with their sons Theo, age 7, and Nate, 13.

RIGHT: The addition's factory-made concrete foundation panels are insulated with foam and backed with steel studs.

BOTTOM LEFT: A crane unloads the panels, then lifts them into place on compacted gravel subfootings where they are bolted together.

BOTTOM RIGHT: Tom Silva and Jeff Sweenor, the builder on the Jamestown project, check the measurement for the step-down addition's foundation height.

FAR RIGHT, TOP AND BOTTOM: Sweenor Builders' apprentices at work. Mary McGuire Smith cuts rafter tails with a jigsaw; Kevin Barker helps frame a dormer.

FOUNDATION WALLS AND INSTALLATION: Superior Walls
JIGSAW: DeWalt



PHOTOS: KEVIN O'CONNOR; (OPPOSITE PAGE, LEFT) JOHN TOMLIN; (BOTTOM) KEVIN O'CONNOR



hood, with a big bulky addition. And I wanted to add some architectural flair.”

Just as important was energy efficiency, something Don knows a lot about from his work designing sustainable-community projects. The couple decided to build a net-zero home—a building standard that dictates that a house use only as much energy as it can produce. In the Powers house, photovoltaic solar panels and a heat-recovery HVAC system will supply the needed energy, while layers of insulation, Energy Star appliances, triple-glazed argon-filled windows, and LED lighting will keep energy use low.

The couple have a realistic outlook about living in the finished house. “Many folks in the net-zero world feel that any energy use more than absolutely necessary is almost morally wrong,” Don says. “We’ll be responsible energy users, but we’re not going to live like monks.”

The renovated house will grow in length, but not in height or depth, with a two-story addition continuing the eave line of the original house to keep the low, cottage scale of the neighborhood. The original roof carries unbroken onto the new construction, where the size and placement of existing front and rear shed dormers are duplicated. But the addition is not a mirror image of the original house. It’s more of an artful extension.

Inside, an 8-foot-wide opening will connect the kitchen and dining area to the adjacent living room. “We wanted most of the floor to be a big social space but with the intimacy of individual rooms,” Don says. In the living room, there’s a three-sided “music nook” for their son Nate’s baby grand piano. A den is tucked into a front corner of the house with a door separating it from the common areas. Upstairs, there will be bed-

rooms for each of their sons, a shared bath, and, down a short bookshelf-lined hall, a master suite.

The addition’s screened porch steps down to the yard. “Being outside is a big part of how we live here,” Don says. “It’s a Jamestown thing to hang around the fire pit at night,” Dana adds.

Behind the house is a post-and-beam barn. Purchased as a kit and assembled on-site, the multiuse building has one garage bay and a small shop downstairs. “I’ll finally have a place to use my father’s woodworking tools,” says Don. Upstairs is open space for an office/art room and a guest suite.

One step in achieving net zero is to ensure the building will use as little energy as possible, so the first challenge was to tighten up the existing structure as well as insulate the new addition. The house’s existing foundation and slab were lined with a combination of rigid mineral-wood panels and rigid foam panels. Instead of a typical poured-concrete



foundation, the addition's basement walls were factory-built insulated, reinforced concrete panels installed on-site. Above the basement, the stud walls are filled with spray foam, with rigid foam applied to the exterior on top of a vapor barrier.

The underside of the existing roof was also insulated with closed-cell spray foam; then a matrix of 2x6s and OSB sheathing filled with one 2-inch layer and one 3-inch layer of staggered rigid mineral-wool board was installed on top of the new and old rafter systems. "Basically, they built structural insulated panels [SIPs] on-site," says *This Old House* general contractor Tom Silva. "This saved time and money."

Though Sweenor Builders, the crew on the project, goes out of its way to build a tight house, all houses have air leaks. A blower door test on the Powers home showed 4 air changes per hour (ACH), considered to be tight. But a new air-sealing technology, first developed for HVAC ducts, reduced the house's ACH to less than 1, all in about 60 minutes.

Here's how it works: Lengths of tubing with spray-nozzle tips are set up inside the house on small tripods—several on each floor. Then, while a blower door pressurizes the house, a compressor pushes an acrylic-glue-like substance through the tubing and out the nozzles. The atomized gluey mist travels toward any air leaks, where it begins to collect around the holes. Glue particles stick to other glue particles, eventually clogging the opening. "This technology is



ABOVE: Tom Silva and Kevin O'Connor discuss a vinyl-mesh wall wrap with builder Jeff Sweenor. The mesh helps the white cedar shingles dry from the back side, increasing their life span and keeping moisture out of the house.

RIGHT: A computer rendering shows how the finished house, with double the living space of the original cottage, will retain its neighborly scale.

WALL WRAP: Home Slicker
 WHITE CEDAR SHINGLE SIDING: SBC
 RED CEDAR ROOF: Liberty Cedar
 ROOF UNDERLAYMENT: Cedar Breather
 WINDOWS: Marvin
 BARN: Country Carpenters
 SOLAR PANELS: Vivint Solar
 HVAC SYSTEM: LG Air Conditioning Technologies
 VENTILATION SYSTEM: RenewAire and Panasonic



PHOTOS: CARL TREMBLAY; (OPPOSITE PAGE) KEVIN O'CONNOR

a game changer," says *TOH* plumbing and heating expert Richard Trethewey. "It's a faster and better way to air seal any building, old or new."

Photovoltaic panels on the southern slope of the barn's cedar roof will generate all the electricity used by the Powers family. An innovative heat-recovery system that monitors five zones in the buildings, and can actually move heat from one area to another, will provide ultra-efficient HVAC. It will also heat water for the faucets. An energy-recovery ventilation system will provide fresh air for the house but will harvest heat from the air before exhausting it outdoors.

Moving to Jamestown will mean lots of lifestyle changes for the Powers family. They will be living outside the city in a small, close-knit community near the ocean. The house is two-thirds the size of their previous home. Net zero means increased attention to electricity use and heating and cooling demands. "But the way we look at it, a net-zero house will enhance our life, not dictate it," says Don. Adds Dana, "It's all part of living the way we want to live." ■

ABOVE: Red cedar roof shingles and white cedar sidewall shingles with woven corners (meaning no corner boards) are hallmarks of coastal New England cottages. Unadorned, flat exterior trim on rake boards, windows, and doors completes the look.

RIGHT: The post-and-beam barn arrived on-site in kit form. Cutting the barn frame at a factory, rather than on-site, saved time and money. After assembling the frame, the crew cut, then installed, the 2x12 rafters.

