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Spring Forward

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RETROFIT *on* ROWE HILL

Maine Passive House founder Jesper Kruse ups the efficiency of his modern homestead

written by Brian Shuff photography by Emily Delamater

"You could build a brand-new passive house, but if you use horrible materials (like spray foam), over the life of the home it will actually release more carbon than some traditional homes. Material choices are huge."

builder
MAINE PASSIVE
HOUSE





Balancing sustainability and aesthetics. “You don’t want to pull up and think, ‘Damn, it’s an ugly house, but at least it’s efficient,’” says Jesper.

Back in 2000, when Jesper Kruse and his wife self-built their Greenwood home, neither knew the first thing about green design. “I’d just started working with a builder,” Jesper says, “and she had helped her parents renovate a camp. That was it for our experience. We built the house on a shoestring. No frills. No closets. A stick-frame box with minimal insulation.”

And so it remained.

Years later, while spending time in his native Denmark, Jesper began to study the passive house (PH) design principles—airtight

construction, aggressive insulation, heat-recovery ventilation, passive solar gain—and to appreciate their myriad advantages—to one’s wallet, to one’s environment, to one’s soul (if ethical considerations move one). It was then that Jesper did what all wise people do when presented with new information: He changed his mind. More specifically, he rethought his approach to what a building could and should be. In 2014, he founded Maine Passive House (MPH), since then constructing some of the most environmentally friendly homes and commercial

spaces in the state, and just last year completed a mass retrofit of his original Greenwood homestead, modernizing the interior and bringing the hastily built structure closer to—and in some cases beyond—the exacting PH rubrics.

“It started with windows,” Jesper says of the retrofit. “Nowadays, a hundred companies in the U.S. sell triple-pane windows, but back when we started Maine Passive House, there were two.” To meet the demands of his growing business, Jesper began importing Ecliptica windows from Denmark, adding enough windows to each order to refit an additional side of his own



Table and chairs by George Nakashima. “My mother-in-law got them when he was starting out,” Jesper says.

“THE HOUSE IS TIGHT ENOUGH NOW TO MEET THE STANDARDS OF A NEWLY BUILT PASSIVE HOUSE,” JESPER SAYS.
“FOR A RETROFIT, THAT’S IMPRESSIVE.”

Situated on eight acres, the home’s front porch provides pleasing vistas of uninterrupted forest beyond a railing of stacked firewood.



Superinsulated deep walls are a tenet of passive house construction. “Hygge” is a natural by-product.



above, right A handmade fence forged with sticks creates a climbing mechanism for the lot’s abundant vegetation.

home. “We replaced them one wall at a time,” he says. “Starting with the south side around 2015.”

But as is often the case—especially when building to PH standards, which require all systems of the home to work in calibrated concert—one thing led to another.

“Once we had these high-end, supertight windows,” Jesper says, “it made no sense to install them in an old two-by-six wall system full of leaks, thermal bridging, tons of nasty problems.” To reap the windows’ full benefits, the walls around them needed better insulation. “Most of the work happened on the outside,” Jesper says. “We took off the siding and installed an airtight Pro Clima membrane along

the plywood. We basically wrapped the house like a present.” Next, 10 inches of cellulose were packed against the exterior before siding was reapplied. Things got trickier with the roof due to moisture that can collect in attic spaces, but the procedure was roughly the same: membranes followed by mass insulation. (In essence, the house got thicker. Notice the window returns. The walls are over a foot and a half deep!)

“The house is tight enough now to meet the standards of a newly built passive house,” Jesper says. “For a retrofit, that’s impressive.” These eco-conscious adjustments are admirable, and the savings on utilities, as expected, have been significant. However, Jesper and his

family seem most appreciative for their improved quality of life. “The elements that make a passive house so efficient,” Jesper says, “also make it much more comfortable than a traditionally built home.”

Both he and his wife rave about the air quality. A Lunos ventilation system filters fresh air in and out of the home. “The fans use next to nothing in terms of electricity,” Jesper says. The system also includes a HEPA filter, so pollen and other particles get removed. “It makes for clean, fresh air in all parts of the house,” says Jesper. “Yes, we’re having lower energy bills, but the comfort is remarkable. I can sit against the window on a day when it’s 20 degrees out and be



Rather than toxic fillers, passive house buildings use cellulose, membranes, and tapes to achieve tightness.



above, left A tangle of raspberries make themselves at home on Jesper's well-cultivated, eight-acre parcel of land.

Retrofitting can be done over time, Jesper says. "You will eventually need new windows, so why not think about better windows? When you replace siding, that's the perfect time to insulate."

completely comfortable. No drafts. Nothing. That's huge."

There is also the peace of mind. Heat-recovery systems preserve up to 80 percent of the heat typically lost to traditional ventilation. "That means if you lose power," Jesper says, "the place might dip down to 45 or 50 degrees, but it'll never freeze."

Even with these gains, the initial commitment required to build at PH standards remains a deterrent to many would-be beneficiaries. For these people, Jesper underscores that PH retrofits can be done with varying degrees of intrusion. His own home is a perfect example.

"People don't need to go all out with modifications to see real benefits," he says. "For instance, if you were only looking to save money on energy—if that were your main motivator—right off the bat you could get triple-pane windows and do some exterior insulation. Maybe a few solar panels."



For those interested in saving money on heating, there's a lot of low-hanging fruit."

From there, it's a matter of owner priority.

"It might make sense for some people to build all the way to passive house standards," Jesper says, "but there is always the financial question." He pauses to explain the sliding scale of *benefit* versus *cost* that he helps clients at MPH navigate daily. "Let's say you build a 2,000-square-foot home to strict PH code and you get your heating bill down to \$100 a year," he says. "That would be great. But with the options available today, I might also be able to build you a house that costs \$200 a year to heat but costs 10K less to build. The point is, there are choices. But regardless of how far people end up going, the science behind the passive house model makes undeniable sense." ■

left Stools by Hanson Woodturning in Cape Porpoise. The legs were custom-cut for a higher counter. *above* A thermal bridge is "any break in the insulation layer," says Jesper. "In a traditional home, the entire framing is a thermal bridge."



"On all this land, trees are coming down constantly," Jesper says. "There's free firewood everywhere, though we really don't burn that much."