

BY DAVID GERSTEL

Building Well in the 21st Century: A Review of *Pretty Good House*

Just five decades back, when I was a union framer, we were focused on building houses that were durable and architecturally engaging. That was the full extent of our writ. If someone had asked “what about performance,” we would have been puzzled. “Performance? We’re building houses, not hot rods.”

Fast forward to the 21st century. Performance has become a central concern, pushed to the front by a cascade of changes that have, in turn, been stimulated by three forces: Innovation in material technology. Acceleration in the cost of energy and dependence on imported fuels. Concern about historically rapid climate evolution.

The introduction of plywood and drywall made houses more resistant to airflow and slower to dry. Moisture retention and resultant decay were compounded by the addition of insulation. That prompted focus on water resistive barriers. New building wraps and flashings showed up on the market. Rainscreens to protect the water barriers appeared in architectural drawings.

Even well-wrapped and flashed buildings allowed streams of air to shoot into and out of buildings. That impaired energy efficiency and carried moisture into the framing cavities. We began to bear down on air-sealing, another term that would have elicited puzzlement on jobsites during an earlier time.

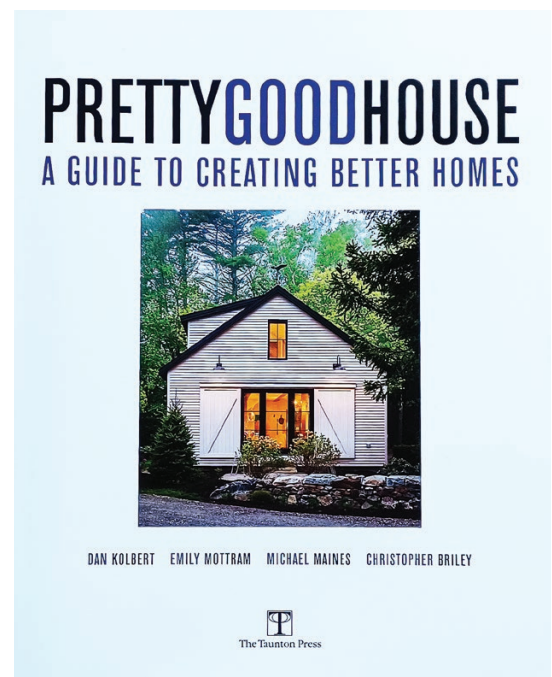
The changes kept coming: Vapor barriers. Heat- and energy-recovery ventilators (HRVs and ERVs) to get rid of the pollutants that built up in the tight 21st century homes. And other gadgetry, from monitors for tracking temperature, humidity, and indoor air quality, to solar panels and batteries, to smart this and that.

In just one lifetime, houses had evolved from simple shells made of sticks and ground-up minerals (concrete, masonry, and gypsum), with a few pipes and wires winding through, into complex devices. Their emergence birthed whole new trades: Building scientists. Enclosure designers. Third-party inspectors and verifiers, people who inspect houses to make sure they perform as intended.

Meanwhile, we were still trying to build homes that were affordable and architecturally appealing. The immensity of the challenge became clear to me when I

designed and built a house intended to meet 21st century requirements and chronicled the effort in a book, *Crafting the Considerate House* (Latitude 67, 2010). About the time I was taking on the challenges for a West Coast site, four other construction pros—Dan Kolbert, a builder, and three designers, Emily Mottram, Michael Maines, and Christopher Briley—were taking them on in southern Maine and getting together to share accounts of their struggles and victories. They have now pooled their expertise in a book: *Pretty Good House* (Taunton Press, 2022).

***Pretty Good House* (PGH), for all the modesty of its title, is an ambitious book.** The authors aim to empower designers, builders, and their clients to construct homes that are architecturally pleasing, high performing, durable, comfortable, and yet affordable.



Title page of a pretty good building book.

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They even hope, by promoting more energy efficient construction, to help rein in global warming. Did they succeed with their book? In certain respects, not quite. In large part, yes.

From the first pages onward—and through most of the “case studies” that close out each of their 10 chapters—the authors keep cost control front and center, encouraging volumes and rooflines that are easy to frame and to insulate. Though simple in form, the buildings they display are sometimes striking. My favorite is not a house but the “pretty good garage,” a charming, compact, multi-use structure designed by Maines that draws on his experience as a timber framer.

Good design, *PGH* drives home, is about more than visuals: “We’ve been conditioned to have emotional attachment to things we can see, but what about key elements that we can’t, that affect our well-being, both physical and emotional,” like how the house regulates “temperature, humidity, and air quality?” *PGH* provides a comprehensive primer on air, moisture, and temperature management as well as energy efficiency. High performance around those issues, the authors emphasize, cannot be tacked on toward the end of design with specification of green gadgetry. It must be put in place from the outset of a project, beginning with the creation of an owner-designer-builder team committed to working collaboratively.

PGH is resolutely specific with its recommendations for a team:

- Their work must take into account local climate and the constraints at their building site. No transplanting a Spanish revival from the sunny Southwest and putting it on a lot in frigid Maine with big windows facing north to capture forest views.
- Rather than being built with concrete and steel—whose production contributes roughly a sixth of annual global carbonization of the atmosphere—basement slabs can be constructed with foam and locally timbered wood.
- For framing, double stud construction that makes room for deep insulation gets *PGH*’s persistent endorsement, though it also introduces the more exotic “Larsen truss,” deep furring attached to wall framing to make space for “outsulation.” Happily, *PGH* encourages “frugal framing,” as I call it. By making use of 24-inch-on-center rather than 16-inch-o.c. layout and other smart economies, frugal framing reduces framing costs for a house by roughly a third even while improving energy performance by reducing thermal bridging.

***PGH* focuses most intensely on the construction that will determine house performance.** It gives due attention to equipment selection. Several pages tally the pros and cons of various ventilation systems. A chart ranks six different heating systems from wood stoves to air-source heat pumps (ASHPs) around seven different factors from life span to operating cost. ASHPs come out on top overall. Wood stoves place last.

The authors emphasize, however, that equipment selection is just a third player in achieving high performance. Good design and a properly specified and installed building envelope come first. And that’s where *PGH* primarily directs our attention. The installation of the four “control layers” is covered in three chapters amounting to nearly a quarter of the book. Here we are plunged into building enclosure engineering—a topic that would have drawn blank looks from designers and builders 50 years ago, and continues to bewilder many today. Mercifully, the authors start us off with a drawing that clearly displays the control layers, one

A CASCADE OF CHANGES

Beginning even earlier, but accelerating in the latter part of the 20th century, a cascade of changes around energy use, moisture control, and material technology transformed home construction. Among the most impactful are:

- The widespread adoption of structural plywood and OSB.
- Wide use of air conditioners and central heating.
- Insulation requirements for walls, floors, and ceilings.
- The elaboration of water-resistive building wraps and flashings.
- Rainscreens with insect barriers.
- Vapor barriers.
- Insulated glass and low-e coatings.
- Air-sealing.
- Blower door testing.
- Heat- and energy-recovery ventilators.
- Heat pumps.
- Photovoltaics.
- Indoor air monitoring devices.
- Building science and enclosure engineering.
- Performance codes and special inspections.
- Commissioning of building systems.
- Additionally, a stream of new materials including pressure-treated wood, three-tab and laminate asphalt shingles, fiber-cement siding, PVC trim, rigid- and spray-foam insulations, and composite fiberglass windows and doors.

each for weather, air, thermal, and vapor. Of those layers, weather management comes first because, the authors explain, "If you can't keep the rain outside the building envelope, none of the other layers really matter." Your building is toast.

As you would expect, *PGH* advocates rainscreens. But it also suggests less-commonplace water management such as capillary breaks at foundations to prevent moisture from wicking upward through concrete into the frame. I am particularly appreciative of *PGH's* discussion of vapor barriers. It demystifies them, making clear that their purpose is to prevent water vapor from reaching and condensing on cold surfaces.

At its discussion of the thermal layer, *PGH* delivers a pair of key lessons on the wise use of dollars for 21st century home construction. First, a graph illustrates the rapidly diminishing effectiveness of wall insulation beyond R-20 (see original graph from Allison Bailes, right). And that suggests there may at times be better ways to budget your money than building double stud walls or Larsen trusses with ultra-thick insulation. Second, the authors underscore the fact that a quarter of a typical home's heat escapes through the cracks and seams in the building envelope. Preventing those leaks, they remind us, is the most cost-effective way of reducing loss of conditioned air.

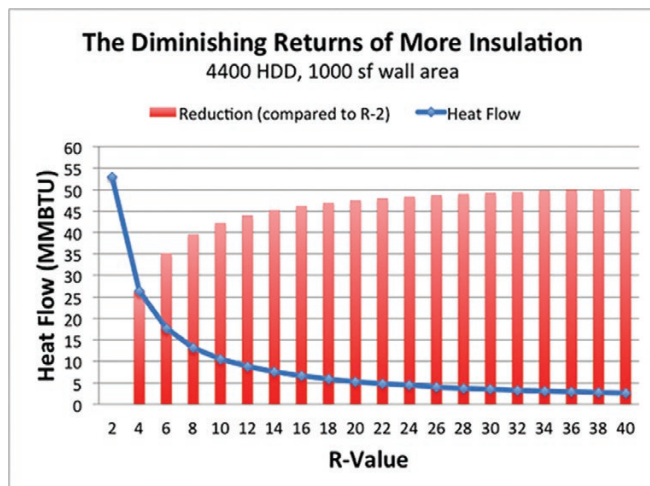
To reinforce that point, the authors put down what they regard as the nonsense "that houses must breathe." Humans must breathe, they say. Houses must resist water and air penetration. So, the need for humans to breathe should be taken care of not by building leaky houses but by ventilation systems, ideally HRVs or ERVs.

Moving beyond air-sealing, *PGH* goes on to discuss health issues and material choices. A chart lays out in detail the authors' take on seven categories of siding and trim. Locally sourced wood gets applause. Vinyl is frowned upon.

Though they bear down on performance, Kolbert, Mottram, Maines, and Briley are not house hot-rodders. They are not bent on accelerating to net zero and beyond or speeding across the line that would bring them platinum stars from "green" rating agencies. They want to keep an eye on cost as well as performance. They want to build houses that are relatively affordable. That concern extends into their detailed discussion of a particularly brutal cost of construction—doors and windows. Pay attention, *PGH* instructs, to U-factor, solar gain, light transmission, and condensation ratings (all of which the book explains clearly) to maximize utility for your bucks.

For all the authors' practicality, the pretty good house they prescribe is a pretty darn complicated device, incorporating all of that technology alluded to at the outset of this article. While they are emphatic that it is all necessary for building well in the 21st century, the authors are aware of the additional burdens the new complexities place on designers, builders, and owners. They note that a pretty good house not only must pass the straightforward building inspections that were required since I was first learning to drive nails but also must be "commissioned"—its envelopes and mechanicals tested for leakage and function—by a new class of qualified verifiers.

Owners, the authors urge, must be equipped to manage their devices in order to prevent failure and deal with malfunction. Houses should be equipped with monitors for tracking interior humidity, temperature swings, presence of organic compounds, and multiple other conditions. And finally, the authors urge, builders and designers should provide clients with an operation manual such as would be provided with a new car.



***Pretty Good House*, for all its thoroughness, does come up short in several respects, ranging from coverage of technical issues to overall organization and editing.** Martin Holladay, the respected former editor of *Green Building Advisor*, has questioned a few of *PGH's* prescriptions for vapor barriers and ventilation systems. While I can't argue those, pro or con, I was surprised to see how thin is *PGH's* coverage of MPE other than mechanical. Plumbing and electrical deserve more attention than they are given. Both are huge factors in determining the energy consumption as well as the livability of a home. But plumbing is given only one pretty picture unaccompanied by useful explanation and a few paragraphs of general tips. It is not even mentioned in the index. Coverage of electrical is more extensive but, other than the discussion of lighting, is superficial. (Windows and doors, by contrast, get 17 pages.)

PGH's value is compromised by a built-in provincialism. Its authors are three designers and one builder of custom homes. All operate in Maine. Consequently, they tell us about building houses that are, for all *PGH's* focus on cost control, actually affordable only for folks who are among the most economically privileged in the world: Americans who can finance homes designed by architects supported by a team of engineers. (For an enlightening contrast, see Fernando Ruiz Pages' *Building the Affordable House*, in which the author describes the construction of pretty darned good houses that are, nevertheless, within the financial reach of people of modest means.)

Because the authors' work experience is largely in Maine, their

DANGEROUS DEVICES?

The authors of *PGH* understand that houses have evolved from rudimentary shelters into complex devices. They know such homes can be dangerous and guide builders to a website where they can get help creating a manual that instructs owners on the safe operation of their homes.

I am skeptical about the effectiveness of such manuals. The great majority of car owners neglect the maintenance recommended in their car manuals. Why should we think pretty good house operators will do better?

I doubt they will. I fear that the greater likelihood is that as HRVs, monitors, and the like wear out, go offline, or are otherwise disabled, owners will ignore maintenance and may end up breathing unhealthy air.

In other words, the 21st century houses we are building now may, by the 22nd century, have brought forth problems as severe as those we now have with our leaky, inefficient, climate-damaging 20th century houses. —D.G.

book is highly New England-centric. When they discuss conditioning of indoor air, their focus is almost entirely on heating. They decry tubular skylights as “energy sucking holes.” However, tubular skylights, if carefully installed to control air and water, can provide pleasing, low-cost lighting without significantly compromising energy efficiency.

PGH has problems more severe than its scattered technical shortcomings. They arise from the poor editing. The book is frequently redundant. Though it is intended for owners as well as construction pros, specialized terms like “stack effect” and “vapor variable membrane” are dropped into the text with no explanation. In some cases, technical terms are not even defined in the anemic glossary or referenced in the stingy index.

What is particularly irksome is that the reader is regularly forced to flip back and forth through the pages to find complete explanations of a concept brought up in one chapter but not adequately covered until later. Thus, blower door tests are introduced briefly on page 106. But after a mention of “theatrical smoke machines” (whose function goes unexplained), the reader is referred forward for an explanation of the tests—but with no page number indicated.

Occasionally, the poor editing has left in place muddy presentation of key subjects like heat pumps. Several pages of text and photos are devoted to them. But no clear explanation of how they work emerges. Similarly, as was pointed out to me by another knowledgeable reader of *PGH*, the discussion of heating systems separates “radiant” systems” from “hydronic” systems, when they are, in fact, the same. “A close reading,” the reader noted, “suggests that the authors specifically mean to address ‘radiant slabs’ separately from other hot-water distribution, but their presentation muddies the waters (pun intended).”

Surprisingly, for one does not expect weak graphics from the

publisher of *Fine Homebuilding* magazine, illustrations are occasionally indecipherable. Some photos are blurry. Text in graphics is sometimes so tiny or obscured it is unreadable. And certain drawings resemble puzzling modernist gargoyles more than the enclosure sections they are intended to portray.

While reading *PGH*, I sometimes felt yanked from one subject to the next and fire-hosed with information that, though valuable, was not delivered within a well-structured framework. The problems arise, I suspect, partly from the authors’ admitted lack of experience at book writing. Though several had produced articles for publication, none had ever written a book before. With *PGH*, they were trying to write one collaboratively, each taking on a chunk of it, firing emails back and forth to coordinate their efforts.

Though I have written six books, I can’t imagine attempting that. It would be like constructing a house with three other builders, each designing and constructing a portion of it. Without an uber-GC to coordinate our efforts, the result would be disconnects, omissions, and redundancy. Likewise, *PGH*’s four authors needed able coordination by a general editor. Because the authors clearly did not get that support, *PGH* is more difficult to read and less useful as a reference than it could be.

For the reader willing to wade past its deficiencies, *Pretty Good House* will prove a useful and engaging read.

It can ground homeowners eager to build their own homes in design fundamentals from climate consideration through choice of finish materials. For both owners and construction professionals, it offers a comprehensive overview of building enclosure engineer-

High performance, the authors emphasize, cannot be tacked on toward the end of design with specification of green gadgetry.

ing. In sum, it is a valuable if not well-organized and, on occasion, technically questionable manual for the construction of 21st century houses. Of course, it’s debatable whether building ever more single-family homes is a wise path forward for our society or good use of our skills as builders and designers. But it’s evident that is what our clients want and what we are going to continue to do for the foreseeable future. We may as well do it with as much consideration for the environment and the clients as we can manage. The authors of *Pretty Good House* have made a spirited attempt to push us down that road.

David Gerstel is a veteran builder and construction industry educator. You can review his books about estimating and bidding and about achieving financial freedom at DavidGerstel.com and at Amazon.