

Energy Design Update

The Monthly Newsletter on Energy-Efficient Housing

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IN DEPTH

Clearing Performance Hurdles: Award-Winning Cottle Home Goes on a Multi-Year Journey to Zero Net Energy (Part 1)

US Department of Energy (DOE) Zero Energy Ready Home Program certification; ENERGY STAR® Certified Homes Version 3.0 certification; EPA Indoor airPLUS certification; Passive House Institute U.S. Standard (PHIUS+) certification; US Green Building Council (USGBC)® LEED for Homes, Platinum Certification – and Grand Award Winner in the Custom Builders category at the September 23, 2014 DOE Housing Innovation Awards: the Cottle Zero Net Energy Home, by One Sky Homes, in San Jose, California, has reached the pinnacle in home performance (see Figure 1). But the story of how it got there sheds important light on building performance, and what energy efficiency means for the residential building community as a whole.

“The big thing is to understand your priorities up front, and design that way,” stresses Allen Gilliland, Certified Passive House Designer and Certified Green Building Professional, One Sky Homes. “By understanding priorities, you suddenly realize that it makes sense to dramatically simplify.”

Real Performance, Years in the Making

The nascence of Cottle Zero Net Energy Home began in 2008 (refer to Sidebar 1, Page 4, for more details on the home’s specifications).

“After the technology crash, I rediscovered my roots in building,” Gilliland explains. “I discovered sustainable building and building performance. I realized why many of the ‘standard’ building practices we have been using were so stupid!” Gilliland dove into building science education, with a particular emphasis on passive house as a design framework. “Passive house has a history in the US dating back from the 1970’s, with the ‘super insulated house.’ Because California passed the Global Warming Solutions Act in 2006, we knew we were facing mandated net zero energy construction by 2020.”

For Gilliland, the real action is in building performance, rather than “green” homes. “With net zero energy performance, in particular, you follow a simple concept where you produce as much energy as you use. That’s intuitive – the right way to think: simple, elegant.” Gilliland, and One Sky Homes, decided to do just that – to figure out exactly how to build a net zero energy home. “Back in 2007, the only way we figured we could do it was to do it as a spec project, where we would have complete control and maximize our learning content,” Gilliland explains. “Learning is usually a good investment.”

various equipment strategies. Under equipment specifics, 2015 has different protocol for heat recovery ventilation and on-site renewables. “One of our technical committee members gave a presentation last year, questioning the cost effectiveness of heat recovery ventilators (HRVs) specifically,” Wright noted. “That actually was one area where we did put in an override on cost, based on our own research on what HRVs, especially high performance ones, cost. The larger study confirmed our suspicion. In most cases, a home has to be in a climate about as cold as Chicago, Illinois, with as long of a heating season, before an HRV is justified.” Wright cautions that paybacks can vary, and factors affecting the equation can be subtle. Nevertheless, at current prices for HRVs, data shows their cost effectiveness to be borderline in many places.

On the other hand, photovoltaics (PV) are rapidly becoming a power-player in both energy yield and cost effectiveness. “There are a few places where PV is straight up cost effective now, and in the ‘low hanging fruit’ category,” said Wright. If a home will be located in a zone with lots of sun and expensive electricity, for Wright, there is no question about doing PV there. 2015’s revision will include credits for fractions of solar electricity, wind, or hydro-energy generated and used live onsite.

“In cooling-dominated zones, we really like the idea of thermal mass and overhangs, as strategies, but they don’t compete well in delivering annual energy savings with heat

pumps,” Wright explained. “We’d like to put on 8-foot overhangs, but these need to be strong enough to hold up to wind, so costs are about \$20 a square foot. By the time you’ve bought one overhang, you could have purchased a SEER-27 air conditioner and been ahead. I still like passive strategies, but we’re trying to be realistic about how much of that can be afforded.”

With any change comes the inevitable barrage of fault-finding. “People are worried that we’re backing off too much – that depends on which end you look,” Wright stated. “If you look at percentage difference from code minimum between 2014 and 2015, there’s hardly any difference. If you look from the perspective of 0, then we’re allowing more, in most places. We’re hoping to convince some of the mass market to adopt a passive house perspective and some of the passive house community to adopt a production perspective. There’s a lot of middle ground to work in there. Yet we’re still pretty close to extreme performance. We could add a couple of zeroes to our project count and still be to the right of the decimal point on market share,” Wright concludes.

The 2015 PHIUS criteria will launch in January 2015. PHIUS will allow a crossover period as builders adapt to the new standard. In correlation with the climate research conducted by PHIUS and BA, Wright and colleagues will release a BA report offering an in-depth look at results.

EDU thanks Graham Wright for his in-depth discussion and for allowing us a preview of changes to the standard.

IN BRIEF

Zola Unveils American Heritage SDH™ Window

Announced November 2014, Zola Windows now offers a high-performance, all-wood simulated double hung window for landmarked and historic buildings. This replica-quality window has been engineered to include a lower Zola Tilt & Turn and a Fixed upper that provide outstanding performance metrics while maintaining the style and proportions of a traditional double hung window.

The double hung window design dates back to the English manor houses of the 1670’s. This double hung design came with English immigrants to the United States and these windows were then implemented in many colonial buildings, becoming an architectural staple of historic American buildings. In earlier renditions, the double hung window design relied on ropes, counterweights, and pulleys to open and close, and featured a prominent dividing bar. The simulated Zola design replicates these proportions (see Figure 11 and Figure 12).

The Zola American Heritage SDH™ is designed to aid historic properties pursuing energy-efficient restorations and high performance retrofits, including the

stringent Passive House standard. In energy efficient retrofits, air tightness and R-values of the windows become crucial (see Figure 14). Double hung windows, which are very common in older buildings, present a major challenge to architects and builders aiming to significantly improve energy efficiency of historic buildings while preserving their architectural heritage. The Zola American Heritage SDH features R-11 glass and triple air seals. At the same time, it maintains the original architectural aesthetic due to its historic style, proportions, and also the use of offset glass planes that create the shadow line that is characteristic of a historic double hung window (see Figure 13).

With its triple seals and low-iron European glass, the American Heritage SDH offers superior acoustic performance. For increased sound protection, Zola offers the window with custom asymmetrical glazing, which provides up to 51 decibels (dB) of sound deadening performance. The American Heritage SDH also has a visible light transmittance of VT=0.71, allowing for maximum daylighting.



Figure 11. The new Zola American Heritage SDH™ is designed to aid historic properties pursuing energy-efficient restorations and high performance retrofits. Interior shot of the Zola Tilt & Turn simulated double hung design. Photo courtesy Teresa Peterson and Zola European Windows.

Zola's all-wood American Heritage SDH is available in a variety of furniture-grade species, including FSC-certified pine, oak, and meranti.

Visit Zola and American Heritage online at <http://www.zolawindows.com/simulateddoublehung/>.

Nest Purchases Revolv

On October 24, 2014, the *Denver Business Journal* reported that Nest (<https://nest.com/>), itself purchased by Google in 2013, acquired Revolv, a Boulder, Colorado manufacturer of a hub for smart-home products. The Revolv technology graduated from the 2012 TechStars program under its original name, MobiPlug, and raised \$6.7 million in venture capital. The Revolv smart hub offered control over lights, speakers, locks, and other automated home services through an app. Notably, Revolv successfully partnered with multiple manufacturers' devices, including Yale®, Kwikset®, Trane®, Honeywell, Belkin™, Philips, Sonos®, and Nest. Up until its purchase, Revolv systems were available on Amazon and at some Home Depot stores.



Figure 12. Exterior profile of the new Zola American Heritage SDH™ simulated double hung. Photo courtesy Teresa Peterson and Zola European Windows.



Figure 13. Shot of an exterior facade in New York City with Zola American Heritage SDH™ installed. Photo courtesy Teresa Peterson and Zola European Windows.



Figure 14. The Zola American Heritage SDH features R-11 glass and triple air seals, allowing for high performance windows in buildings looking to maintain historical seals.

For more, go to: http://www.bizjournals.com/denver/blog/boosters_bits/2014/10/google-offshoot-nest-buys-boulder-smart-home.html.

WDMA Study Predicts Continued Residential Window Market Growth

Released on August 12, 2014, the Window and Door Manufacturers Association’s (WDMA) Window and Entry Door 2014 US Market Study shows continued growth for the residential window market through 2015. The study, prepared, researched and analyzed by Metrostudy and the Virginia Center for Housing Research at Virginia Tech, forecasts overall residential window market growth of 9.1% for 2014 and 8.3% for 2015. This follows market growth of 10% in 2013.

From a product mix standpoint, in 2013 vinyl windows made up nearly 69% of the residential market, followed by wood clad windows at 20% (see Figure 15).

The WDMA report delivers timely, detailed information on residential entry door and residential and light

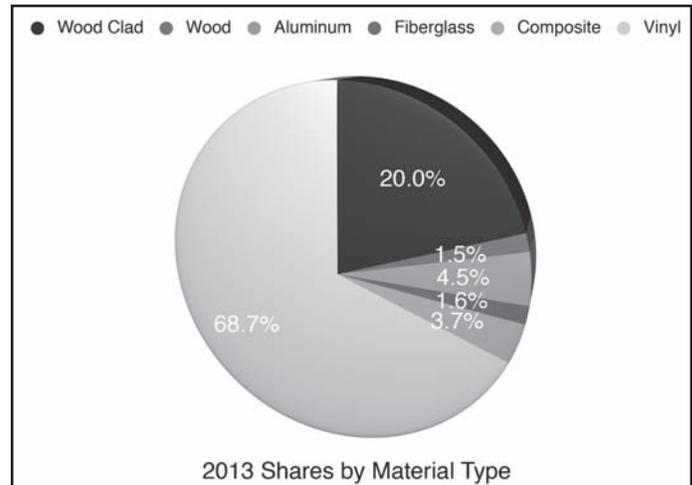


Figure 15. The Window and Door Manufacturers Association’s (2015) recently released Window and Entry Door 2014 U.S. Market Study shows continued growth for the residential window market through 2015. The study, prepared, researched and analyzed by Metrostudy and the Virginia Center for Housing Research at Virginia Tech, forecasts overall residential window market growth of 9.1% for 2014 and 8.3% for 2015. This follows market growth of 10% in 2013. Image from the Window and Door Manufacturers Association (WDMA).

commercial window market trends and product relationships; historic data for 2011 and 2012, and forecast data for 2014 through 2016. Forecasts are based on projections of construction activity as of May 2014. Also included in the report is data on ENERGY STAR® 2013 production and market growth.

The WDMA Window and Entry Door 2014 U.S. Market Study is available for purchase online in the WDMA Bookstore. For further inquiries, contact Jeff Lowinski at 1-312-673-5891.

Press release courtesy WDMA and available online at <http://campaign.r20.constantcontact.com/render?ca=bb248c72-d389-4b7b-a510-4b0f9e48dfc6&c=8427ff20-bb48-11e3-bfb6-d4ae52806905&ch=844f8450-bb48-11e3-bfb6-d4ae52806905>.

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