Energy Design Update

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IN DEPTH

Good Intentions, Unintended Consequences

Florida Retrofit Challenge Mechanical Standard Offers Perspective and Lessons on Raising the Bar for Retrofit Codes (Part Two)

Are older homes doomed to languish in the dust of newer construction, or can an old home be taught new tricks? What are the consequences, both in energy consumption and livability, from upgrading existing homes? To navigate the potential mine field in a performance retrofit, what strategies ensure effective and clear goal communication to contractors?

Florida offers an ideal testing ground for these questions. From the 1970's through the 2000's, housing starts were strongest in the South and ranged from 4.6 to 5.9 million, nearly twice as many starts as any other region across all

Description	Scenario 1 Efficiency Enhancement Package (No Replacements)	Scenario 2 Efficiency Enhancements and Higher Performance Replacements	Scenario 3 Scenarios 1 and 2 Plus HVAC and Window Efficiency Upgrades at Replacement
HERS Index Pre-Retrofit	131	131	131
HERS Index With Minimum Replacements (where applicable)	NA	130	113
HERS Index Post-Retrofit	94	96	69
HERS Index Improvement (over minimum, if applicable)	28%	26%	39%
Projected Annual Energy Cost Savings (% over minimum if applicable)	20%	19%	28%
Estimated Full Costs	$2,880	$12,221	$23,379
Estimated Efficiency Cost Premium	$2,880	$1,921	$5,538
Annual Mortgage (7% @ 30 years)	$232	$155	$446
Projected Annual Energy Cost Savings	$505	$490	$644
First Year Cash Flow	$273	$355	$198
Simple Payback (years)	5.7	3.9	8.6

Figure 1. Scenario 3, a comprehensive implementation of the best practices in an average home (a home that, pre-retrofit, earned a HERS Index score of 131) represents the likely practical threshold for achieving deep retrofits in central Florida pre-code homes that generate positive first year cash flow. The base house closely approximates the average HERS Index score and characteristics found in the Phase 1 field study. Full implementation of the best practices in Scenario 3 resulted in a 39% improvement in the HERS Index score and 28% in projected annual energy cost savings comparing the post-retrofit to the minimum retrofit scenario. To reiterate, the minimum retrofit scenario includes minimum replacements at change out. Note, for instance, the HERS Index score for the minimum retrofit scenario is 113, significantly better than the as-found score of 131, because even the minimum efficiency replacements are significantly better than the as found conditions. Comparing the post-retrofit HERS Index score to the pre-retrofit, which was the Phase 1 metric, produces a 47% improvement in the HERS Index. Data and figure from *Applying Best Practices to Florida Local Government Retrofit Programs*, J. McIlvaine and K. Sutherland, Building America Partnership for Improved Residential Construction (BA-PIRC), December 2013, NREL Contract No. DE-AC36-08GO28308.

IN BRIEF

Zola Windows' ZNC™ First to Meet Passive House Institute US and Passive House Institute Germany certification

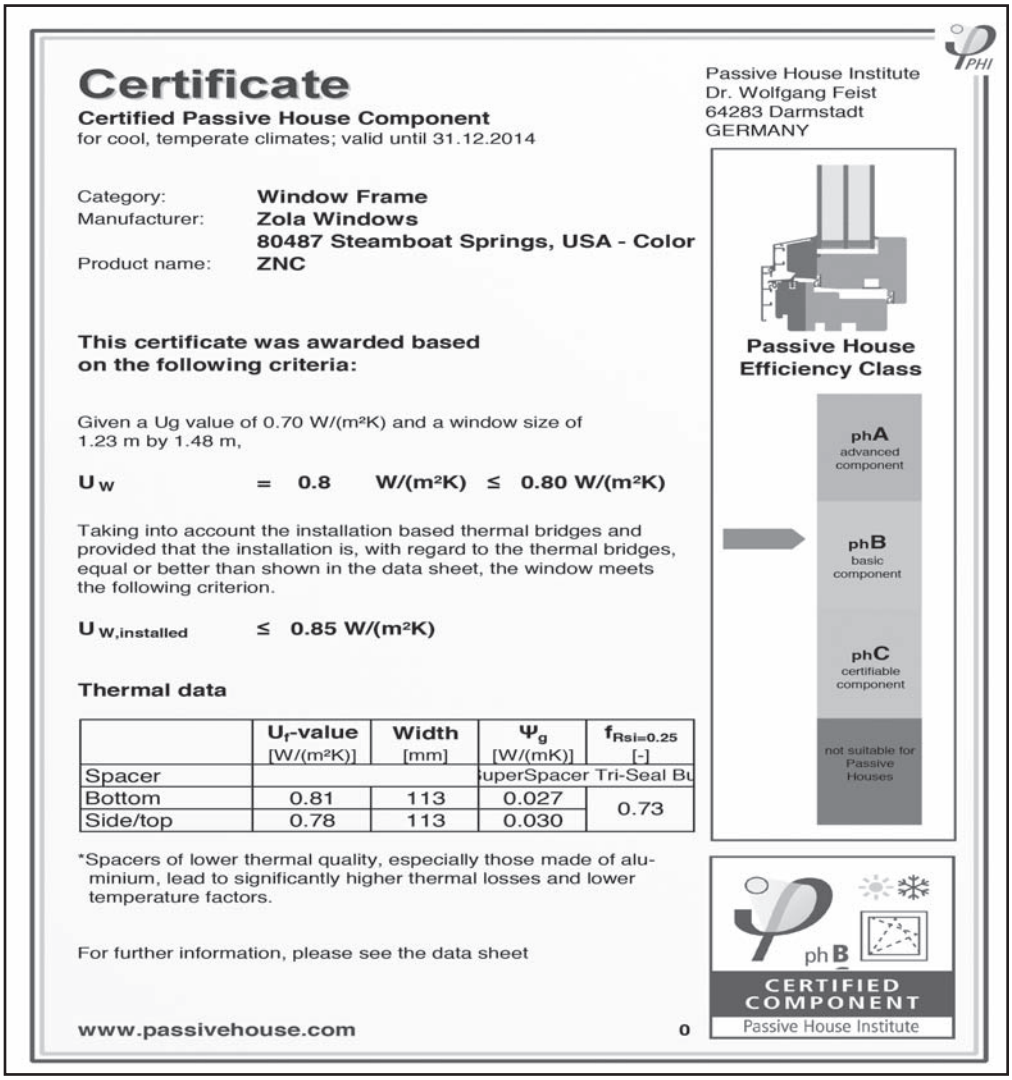
Zola European Windows' latest product line, the Zola No Compromise (ZNC™) window, became the first window to receive both Passive House Institute US (PHIUS) and Passive House Institute Germany (Passivhaus Institut, *http://passiv.de/en/*) certifications (see Figure 4).

Available with R-15 quad, or four-pane, glazing and coming standard in R-11 triple glazing, ZNC Fixed Windows can be as large as 8' wide and 10' high, and Tilt & Turn operable windows may measure as large as 5' wide by 9' high.

Additional features of the line include a slim profile design: 4.5" operable and 3" for fixed windows; a super spacer tri-seal warm edge spacer; and a precision crafted structural wood frame from responsibly harvested wood. ZNC windows come standard with concealed premium tilt and turn hinges. The exterior of the window is clad with a powder coated aluminum exterior for longevity, with a fully welded main seal for water tightness. Rail-mounted rainscreen cladding, as well as both head and jamb designed for over-insulation, are also standard design elements of the series (see Figure 5). Fully integrated screen systems are available. To learn more, visit *http://www.zolawindows.com/znc/*.

According to Zola, the ZNC window line was born out of the company's unwavering belief that a passive house window must not only boast outstanding thermal performance and be extremely airtight, but should also use responsibly sourced materials and be available in a myriad of standard finish and color options. Zola feels they have positioned and priced this window to be extremely competitive in the high performance window market.

For further information on PHIUS certification, visit *http://www.passivehouse.us/passiveHouse/CertifiedWindowData.html*.



Certificate

Certified Passive House Component
for cool, temperate climates; valid until 31.12.2014

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

Category: Window Frame
Manufacturer: Zola Windows
80487 Steamboat Springs, USA - Color
Product name: ZNC

This certificate was awarded based on the following criteria:

Given a Ug value of 0.70 W/(m²K) and a window size of 1.23 m by 1.48 m,

U_w = 0.8 W/(m²K) ≤ 0.80 W/(m²K)

Taking into account the installation based thermal bridges and provided that the installation is, with regard to the thermal bridges, equal or better than shown in the data sheet, the window meets the following criterion.

$U_{w,installed}$ ≤ 0.85 W/(m²K)

Thermal data

	U_f-value [W/(m²K)]	Width [mm]	Ψ_g [W/(mK)]	$f_{Rsi=0.25}$ [-]
Spacer			SuperSpacer Tri-Seal Bu	
Bottom	0.81	113	0.027	0.73
Side/top	0.78	113	0.030	

*Spacers of lower thermal quality, especially those made of aluminium, lead to significantly higher thermal losses and lower temperature factors.

For further information, please see the data sheet

www.passivehouse.com

Passive House Efficiency Class

phA advanced component
phB basic component
phC certifiable component
not suitable for Passive Houses

phB CERTIFIED COMPONENT Passive House Institute

Figure 4. The Zola No Compromise (ZNC™) window became the first window to receive both Passive House Institute US (PHIUS) and Passive House Institute Germany (Passivhaus Institut, *http://passiv.de/en/*) certifications. Figure courtesy Zola European Windows.

NREL, LBNL Report Reviews Estimates of Costs and Benefits of Compliance with Renewable Portfolio Standards to Date

On May 30, 2014 a new report, "A Survey of State-Level Cost and Benefit Estimates of Renewable Portfolio Standards," was released detailing costs and benefits of compliance with Renewable Portfolio Standards (RPS). Prepared by analysts from the US Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) and Lawrence Berkeley National Laboratory (LBNL), the report also explores how costs and benefits may evolve over time.

In summary, the Survey reviewed recent estimated RPS costs for most states, but found that a lack of benefit estimates and methodological differences limited the ability to

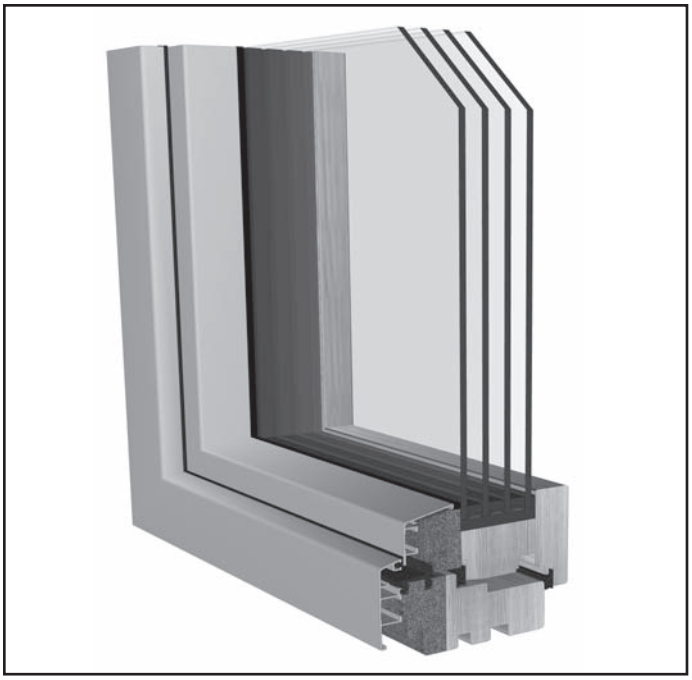


Figure 5. A cross-section of the new Zola No Compromise (ZNC™) window. Figure courtesy Zola European Windows.

directly compare benefits and costs. Such estimates are used to help inform policymaker assessments of existing RPS policies, gauge modifications to existing policies, and weigh potential new policies.

Based on a review and analysis of data from state compliance filings and other sources, the report finds that the estimated incremental RPS cost over the 2010-2012 period – the cost above and beyond what would have been incurred absent the RPS – was less than 1% of retail electricity rates on average. This is well below the cost caps that most state legislatures have adopted as part of their RPS.

The report includes a review of published quantitative assessments of RPS benefits. A limited number of states have developed quantitative benefits estimates, which vary widely in both methodology and magnitude.

Approaches to calculating RPS costs and benefits vary within and across states, which limits the ability to make comparisons. "Differences in methodologies and assumptions used by utilities to estimate RPS costs are leading some states to engage in processes to develop standardized methods," said NREL's Jenny Heeter.

"In future years, the costs as well as the benefits of RPS compliance will be influenced by a variety of factors, including technology costs, fuel costs, and increasing RPS target levels, but RPS costs are generally limited by existing policy mechanisms that cap costs, typically at less than 10%, and in many cases less than 5%, of retail rates," said LBNL's Galen Barbose.

States that have implemented RPS policies have collectively deployed approximately 46,000 MW of new renewable energy capacity through 2012.

Press release courtesy of NREL. NREL is the DOE's primary national laboratory for renewable energy and energy efficiency research and development. NREL is operated for the Energy Department by The Alliance for Sustainable Energy, LLC. Document information: Heeter, J.; Barbose, G.; Bird, L.; Weaver, S.; Flores-Espino, F.; Kuskova-Burns, K.; Wiser, R. (2014). "Survey of State-Level Cost and Benefit Estimates of Renewable Portfolio Standards." 109 pp.; NREL Report No. TP-6A20-61042; LBNL-6589E.

Speakers Announced for 9th Annual North American Passive House Conference

The ninth annual North American Passive House Conference will be held at the San Francisco Airport Waterfront Marriott Hotel in San Francisco, California, from September 10-14, 2014. William Rose, building envelope pioneer, will offer the keynote on Friday, September 12.

Rose is Senior Research Architect at the Illinois Sustainable Technology Center at the University of Illinois at Urbana-Champaign. He is a protégé of Seichi Konzo, the principal author of double-wall superinsulation, first introduced in 1976 in the Illinois Lo-Cal House. Superinsulation eventually became one of the foundations of what today is known as passive house. Rose authored the seminal "Water in Buildings," and for 12 years he chaired the ASHRAE® committee that produced the ASHRAE Handbook chapters on building envelopes. A founding member of ASHRAE Standard Committee 160 "Criteria for Moisture Control Design Analysis," he remains involved with the ASHRAE guideline "Energy Efficiency in Historic Buildings." In addition, Rose has consulted to address energy and water problems at the Guggenheim Museum, Independence Hall, Angkor Temples in Cambodia, and the United Nations Secretariat Building, among others.

"Because he knows where building science has been, Bill Rose can provide a one-of-a-kind perspective on where passive building needs to go," said PHIUS Executive Director Katrin Klingenberg. "We are honored that he'll be joining us, and eager for his insights."

Known for honesty and technical integrity, Rose has been called "The conscience of the building science industry" by Building Science Corporation's Joe Lstiburek.

Additional presentations at the conference include Lstiburek's day-long pre-conference session on building science fundamentals. Breakout sessions will zoom in on passive building as the best path to Net-Zero, building resiliency, the growing multifamily sector, building science fundamentals, and cost-effective, climate-specific passive building standards. Other sessions will target technology, policymaking, and business issues associated with passive building. The core conference will be bookended by optional intensive technical workshops on September 10 and 11, and a tour of Bay-area passive projects on September 14.