

DOE Zero Energy Ready Home

2019 Leading Builder Roundtable Summary

October 2019



ZERO
ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY

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October 2019
Denver, Colorado

Prepared for
DOE Zero Energy Ready Home Program

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Intro

All signs continue to point to a dramatic zero energy ready home movement. This includes doubling of certified Zero Energy Ready Homes for three straight years, total zero energy and zero energy ready homes in the U.S. and Canada nearly quadrupling from 6,000+ to 22,000+ from 2015 to 2018, and an increasing number of city and state commitments to net zero energy and zero energy ready policies, programs, and codes. Much of this progress can be attributed to a relatively small contingent of our nation's leading builders demonstrating the technical, cost, and design feasibility for this level of excellence. At this roundtable, the winners of the 2019 DOE Housing Innovation Awards gathered to share lessons-learned, identify key challenges moving the housing industry to high-performance homes, and collaborate on opportunities moving forward.

Agenda

Meeting Plan		
<p>Confirmed Builder Attendees:</p> <ul style="list-style-type: none"> Charis Homes Deltec Homes Clifton View Homes CVF Home Ferrier Homes Healthy Communities Habitat for Humanity, Catawba, NC Habitat for Humanity South Sarasota County Imery Group Insight Homes Mandalay Homes Module Housing Philgreen Construction Sareth Builders SD Jessup TC Legend Homes Thrive Home Builders Tim O'Brien Homes United Way of Long Island 		
<p>Lunch Sponsor: TopBuild</p> <p>Other Participants:</p> <ul style="list-style-type: none"> DOE/ZERH Program Staff Indoor airPlus Staff PNNL Staff 		
<p>Desired Outcomes:</p> <ul style="list-style-type: none"> List of biggest experiences with ZERH this past year by builder partners List of key lessons-learned in 2018/2019 by leaders constructing Zero Energy Ready Homes List of key challenges moving forward in 2019/2020 constructing Zero Energy Ready Homes List of what DOE can do to better support ZERH builder partners 		
Agenda:		
Time	What	Who/How
10:00-10:30am	Agenda/Introductions	Joe Nebbia Around the Room Cards/Sorting
10:30-11:30am	"Biggest surprise with ZERH this past year?"	
11:30-12:00pm	Review of DOE FY 2018/2019 New Developments <ul style="list-style-type: none"> Program Tracking Data Spec Changes/Amendments Marketing Resources 	Joe Nebbia/ Sam Bowles
12:00-1:00pm	LUNCH	David Bell welcome
1:00-2:00pm	Key Challenges Moving Forward w/ZERH in 2019-2020	Cards/Sorting
2:00-3:00pm	What Can DOE Do to Better Support Builder Partners?	Cards/Sorting

Biggest Surprise in Building Zero Energy Ready Homes

The first module of the meeting asked participants to identify their “Biggest Surprise” building Zero Energy Ready Homes the past year. Specifically, we were looking for unexpected experiences in 2019, either positive or negative. For many, the surprise had to do with lack of awareness or understanding of Zero Energy Ready Homes both with builders and homeowners. On the builder side, many were surprised that more builders in their area are not participating in the program. Many mentioned the minimal jump from ENERGYSTAR and the opportunities that have come through their participation in the Zero Energy Ready Home program as reasons they are surprised more builders aren’t involved. Several builders mentioned that building to ZERH standards and leveraging the program’s marketing materials has helped differentiate themselves in their market and propelled their business. Other builders mentioned that because of their participation in the program and their leadership in building high-performance homes, they were given first opportunity to lots in developing communities and new residential districts. There was a general consensus that builders across the country need to step up and do better.

Regarding homeowner education, several builders indicated they were surprised at how uneducated homeowners were about the program, and even about how to operate their homes correctly when they had already purchased a Zero Energy Ready Home. There is a general lack of understanding about the value of the homes and lack of awareness of the program. Additionally, homeowners need to be more educated on how their home works as a system and how operating equipment in certain ways can have negative effects on the rest of the home. However, several builders also indicated they were surprised to learn how much their customers cared about the performance of their home and had seen an increase interest in high-performance homes from the general public.

Other items that were discussed include issues with specific equipment types and building systems, as well as the affordability and installation of solar on homes.

Biggest Surprises/Lessons Learned Building ZERH

Systems/Equipment	<ul style="list-style-type: none"> • Mini split Coil Failure • SIPS haven't been available with weather proof skins • Thermal break and using Trane multistage heat pump help delivering customer satisfaction • Restriction on furnace sizing affecting equipment performance rating
Solar	<ul style="list-style-type: none"> • Issues with solar installers • Still no affordable solar programs in our areas (Florida)
Builder Education	<ul style="list-style-type: none"> • Only the rich can afford ANY new home anymore. If we are not building MORE NEW HOMES we are going backward • How low the threshold is and why it's so hard to reach for some builders • Not a lot of extra requirements from ENERGYSTAR • Observing other builders in our area that don't do ZERH when it is so helpful to us • Builders are not doing better • ZERH help get Thrive the first residential metro-district in Fort Collins, CO
Homeowner Education	<ul style="list-style-type: none"> • How many buyers still INSIST on gas appliances in a high-performance home for cooking, etc. • How uneducated ZERO Homeowners are with their home
Marketing and Awareness	<ul style="list-style-type: none"> • Lack of awareness of what ZERH is in our area • Ongoing challenge of marketing the serious benefits of ZERO • Increase interest from public for ZERO houses • How little people know about ZERH, including offsite manufacturing

Challenges Faced Building Zero Energy Ready Homes

The next module asked builders to discuss challenges they had faced when building Zero Energy Ready Homes and how they addressed them. One of the more popular topics of conversation during this portion of the meeting was education and training. This is a challenge that we often hear about from our partners and one that collectively the ZERH program and our partners continue to work on. Many builders talked about the need to educate homeowners on how their home is different and works as a system. Several builders even indicated that without homeowner education, there is often a customer expectation that their home should be perfect, without the understanding that their behavior impacts the home. Providing more information on the home and including the homeowner throughout the build process, if possible, has worked for some builders. For example, one builder indicated they send their clients information at every stage, highlighting the difference between their high-performance home and a typical code built home, and the extra steps taken to ensure the home performs and lives better. Another builder noted that they have implemented a QR matrix barcode on various components throughout the house to allow the homeowner to access content identifying the component and how it should be operated.

Training subcontractors, trades, architects, sales teams, and everyone included in the home building and selling process is another significant challenge many builders discussed. It is critical for everyone involved to understand what the goal of the project is, the program requirements, how the systems work together, and the value of a Zero Energy Ready Home to the customer. Some discussed the need to train architects on designing to meet program requirements and get the right level of detail on drawings for subcontractors. Additionally, many noted that training trades and subcontractors in the field is far more effective in getting participation than classroom training.

On the technical side, many builders discussed the use of new technologies or changing their designs and systems to combat issues they have faced during construction, or to make their process more efficient. Some issues include controlling moisture and humidity during the building process, finding the most cost effective wall system, optimizing energy efficiency, the high cost for high-performance windows, and optimizing duct location. As a result, builders are constantly researching and trying new, innovative technologies and leveraging the knowledge of their peers on these various issues to test new systems and designs.

Finally, program growth with increasing market share for Zero Energy Ready and high-performance homes was a popular topic of discussion. Today, homebuyers are more informed, know what they want, and are beginning to be more interested in how their home works. As this trend continues, it will become increasingly more important for builders to provide as much homeowner education as possible. Continuing to raise awareness of the program and push the value of Zero Energy Ready Homes to consumers is vital, especially as builders see a significant uptick in the demand and desire to have a better performing home. Many indicated that they see more customers wanting better homes, they just don't know what that actually means and where to find it. To enhance the growth of the program, partnering with local utility programs has been a successful strategy in many markets.

Key Challenges Building ZERH

Education	<ul style="list-style-type: none"> • Education about ZERH is as important as building one • Implemented a QR matrix barcode on various components that can be scanned to allow user to see what it is and how it should be used. (Homeowner Education) • Homeowner should be at the HVAC walk through • Include whole house dehumidification in every project • Occupant behavior is important and educating the homeowner is critical • IT's just a better house....doesn't mean it's perfect. Customers expect perfection and ability to offset their energy use when seeing ZERH label.
Marketing	<ul style="list-style-type: none"> • Customers are 50/50 on benchmark plaques. Do not want them in lead walks • How to market a whole ZERH community (public spaces, club house, etc.) without a commercial/amenity designation • Marketing words need to be specific to buyers needs
Training	<ul style="list-style-type: none"> • Training of our architects in cost effective and appealing design • Better training for volunteers and contractors with ZERH program • On-site training is the best way to get trades to participate • Drawings for subs with the right level of detail • Educate trades • Train everyone on your team to the value of ZERH
Technical/ Systems	<ul style="list-style-type: none"> • Moisture management/humidity control when closing in the structure • Gained advantage of using drainage wrap as an added air barrier • Ducted Heat Pump Water Heaters to a crawl or garage if possible • Using Aerobarrier with SIPS has helped us • High quality window tape vs. liquid flashing • Fan coil units for HRV to heat and cool w/air chillers through ducted system • Moved from CPVC to PEX • Mechanical vs. electrical contractor now installs bathroom ventilation • Geothermal heating unit that heats water also • Solar changes- local vs. national • Trying to find the cost effective sweet spot for wall construction. Moved away from outbound insulation to double stud walls • Changed to integrated recirculating systems in hot water heaters • Triple-pane vs. double-pane windows 7% more efficient but cost 25% more
Growth	<ul style="list-style-type: none"> • Utility programs take a long time to shift • Grid friendly homes may be a better future than net zero • City owned utilities have goals similar to ZERH and are excellent partners • Customers actually want better homes. They just don't know what better is or how to get it. How can we expand? • Customers are asking for triple zero (Rainwater which has issues, energy, Carbon) and to power their electric car • Customers much more interested in how their home works than we expected • Need ZERH rebates for our clients and builders (as offsite fabrication business)

Process	<ul style="list-style-type: none">• Always researching products• Check list and verify installation of products• The spec being a little above the norm forces us to think outside the box• Ask clients specific details about comfort and temperature expectations before designing HVAC and selecting systems• Struggling with code officials delaying build due to concerns about more moisture intrusion
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Opportunities for Growth/What Can DOE do?

This roundtable stimulated extensive information sharing about various problems and ways to address them relative to components, technologies, and systems. This led to the suggestion for continued collaboration throughout the year. Several builders recommended the use of a ListServ amongst ZERH partners similar to that used by Builder 20 style groups. Others indicated they would like to see DOE host several “Ask the Experts” online meetings that could help builders find solutions for common problems such as ventilation and moisture management.

Increased marketing and awareness was a popular subject amongst participants both for consumers and other builders. For many, adding more builders constructing more ZERH homes was viewed as beneficial to their business as opposed to competition. Several builders said that showcasing existing ZERH builders, and the path they took to get there (design, construction details, systems, technologies, etc.) could help push more builders into the program. Ideas for showcasing their success include training and education both online and in-person through local Home Builders Associations; a Zero Energy Ready Home Road Show targeting specific audiences (e.g., builders, trades, homebuyers); and Voice of the Builder feature in ZERH newsletters. The builders noted that attracting more builders would bring more trades up to speed relative to program requirements and work quality expectations. In addition, increased manufacturer support would help further grow the program. Continued marketing efforts targeting consumers was supported across the board by participants.

The meeting participants had a number of other ideas for continued program success. One suggestion was to continue reaching out to state and local governments and utilities including educating them on the value of ZERH to their mission. Opportunities include state QAPs, local Climate Action Plans, and utility rebates for ZERH certified homes. There was also interest in the idea of adding a designation for ZERH certified communities, not just homes. Lastly, an opportunity was suggested to market the program to developers as well as to the rental market based on the ability to offset higher rent with lower utility bills and offer healthier living with fresher air and less contaminants.

Opportunities for Growth/What Can DOE Do?	
Information Sharing	<ul style="list-style-type: none"> • Roundtable ListServ • Ask the expert • Builder 20 style group for sharing lessons-learned • Sharing successful practices of other builders
Marketing: Consumers and Builders	<ul style="list-style-type: none"> • Voice of the Builder in ZERH Newsletter • Voice of the Builder in ZERH Contractor/sub/buyer roadshow • Showcase existing ZERH builders paths to ZERH <ul style="list-style-type: none"> - More builders = more trades = more manufacturer support • Continue marketing brand awareness through HBAs • Sticker for certified homes • Continue working on simplifying the ZERH message • Marketing materials and education • Assist in website creation • Keep building brand awareness and driving new builders to the program • Help create standardized website content that can be customized by the builder • Help customers understand how a better home can be built with reasonable upfront investment • Leverage resources from DOE and builders in the room to improve our marketing • Sponsor Live and/or video Tour of Zero • Video testimonials of key messages
Training and Education	<ul style="list-style-type: none"> • Provide a working group focused on solving ventilation • Help with “Range Hoods” optimized for IAQ • Range Hood and ventilation video Trade Partner ZERH education program • Moisture management education Realtor and appraiser education
Local and State Governments and Utilities	<ul style="list-style-type: none"> • Promote and educate state and local building departments • Work with municipalities on the value of zero • Local government to recognize ZERH program • San Antonio new climate action plan <ul style="list-style-type: none"> - Mayor promoting affordable homes • National net metering law with mandatory battery component for 30% solar tax credit • Rebates for ZERH on our panelized projects to the customer and their builder
Opportunities for Growth	<ul style="list-style-type: none"> • Design a ZERH Community <ul style="list-style-type: none"> - HOA owns panels centralized in one location - Buy in in cost of home

	<ul style="list-style-type: none">• Utility paid by HOA which bills homeowner \$45/month ZERH subdivision• Active adult community<ul style="list-style-type: none">- ZERH + Universal design + affordable universal homes• Rental market- single family home<ul style="list-style-type: none">- Charge more for lower utility bills and clean/fresh air• Innovate in the build process. Faster, better, more cost effective• Standardized process, simplify for larger demand
Technical	<ul style="list-style-type: none">• Reduce electrical load through alternative cooling options• Fan coil units in Zehnder HRV for whole-house HVAC and other IAQ improvements

Appendix A: 2019 Zero Energy Ready Home Report Card

The following report card summarizes the recommendations from builder participants in the 2018 Leading Builder Roundtable Meeting and the progress DOE has made in those subject categories.

Categories	Recommended DOE Actions	DOE Progress	Grade
Technology Gaps	<ul style="list-style-type: none"> • Hold summit with potential disruptors • Personally engage with the HVAC companies to help understand the gravity of the disconnect between HRV, HVAC, Filtration and IAQ monitoring and control systems • Help develop advanced technology designs for “mass customization” of homes and commercial buildings that integrate: <ul style="list-style-type: none"> - High performance rapid deployment homes - ZNE energy and storage systems - Electric share mobility services • Pool all voices to share and drive collaborative innovation 	<ul style="list-style-type: none"> • Advanced Building Construction added as a major program focus for BTO addresses potential disruption with offsite construction. Results will be shared with ZERH stakeholders. • Outreach webinar engaging offsite constructions in ZERH scheduled for November • Continue to encourage balanced ventilation • Highlight mini-split units and optimized duct location in technical training 	B
Smart Home & Technology Integration	<ul style="list-style-type: none"> • Explore micro-grid ready homes and buildings • Recognize that net metering campaign is important 	<ul style="list-style-type: none"> • ZERH is fully integrated with BTO’s Grid Integrated Efficient Building research and will share with ZERH stakeholders 	B
Marketing and Outreach	<ul style="list-style-type: none"> • Developed media content, mass media recognition • Initiatives to increase consumer awareness • Marketing that gets customers to ask builders about ZERH • Make ZERH as familiar as ENERGY STAR • Clothes, logo stickers, job site signs • Beef up Facebook and social media • Develop more shareable content • Leverage innovation partners to sponsor consumer marketing campaign, builder certification, trades training and research • Marketing materials that utilize DOE database on past winners • More testimonials • Provided a script for sales agents to help explain ZERH value • Get on TV, ZERH building comp • Improved web content • Introduce ZERH to state and municipal building departments • Get Colorado and other states to include ZERH in State QAPs 	<ul style="list-style-type: none"> • New attribute fact sheets leverage comparison bars and ZERH consumer testimonial data base. • New ZERH testimonial tool leverages all ZERH homeowner quotes from HIA applications since 2013. • New 75 second ZERH introductory video • New consumer section of ZERH website • Working with ‘Team Zero’ on a larger consumer awareness national campaign • ZERH is included in state QAPs in DE, NJ, GA, DC, and PA • Incentives for ZERH in NJ, CT, and CA • Outreach materials for local jurisdictions • ZERH integrated into Enterprise Green Communities (2020) • Engaged in talks with CO Housing Authority and CHAFA about Colorado QAP and local jurisdictions making ZERH Code (Summit County) • ZERH integrated in RI stretch code • ZERH on schedule to be basis for OR code in 2023 	A
Training and Education	<ul style="list-style-type: none"> • Partner with EEBA on builder certification program for net zero pros • More real estate training classes (e.g., Ft. Collins) • Develop real estate professional training • More or updated info on IAQ 	<ul style="list-style-type: none"> • Significant updates to ZERH training content • Building America Solutions Center updated with latest ZERH spec 	C

	<ul style="list-style-type: none"> Green appraisal training 	<ul style="list-style-type: none"> New webinars on technical topics as well as updated Orientation webinar and Sales webinar being scheduled Market based changes for Rev. 07 of ZERH spec 	
Trade Contractors	<ul style="list-style-type: none"> Online virtual supervisor training Work with national partner to develop training certification programs Leverage innovation partners to sponsor trades training 	<ul style="list-style-type: none"> Trade contractor webinar scheduled for December to motivate their interest and establish the value of spec 	C-