

# Zero Energy Ready Home 2020 Leading Builder and Rater Roundtable Meetings Summary

January 22, 2021



## **Table of Contents:**

Page 3:	Key Builder and Rater Roundtable Findings
Page 4:	Hard Trends Predictions
Page 7:	Builder Strategies to Address Hard Trends
Page 8:	Rater Strategies to Address Hard Trends
Page 9:	Summary of Builder and Rater Strategies to Address Hard Trends
Page 11:	Recommended Actions for DOE
Page 13:	DOE Proposed Actions for 2021 in Response to Recommended Actions
Page 15:	Appendix A – Summary of Soft Trends

## KEY BUILDER AND RATER ROUNDTABLE FINDINGS

### 1. **Significantly increased interest and demand for healthy homes**

- Consumers are becoming more aware of the impact that indoor air quality (IAQ) has on their health and want to live in homes that work and live better.
- Investing in a healthy, efficient, resilient and durable home like a Zero Energy Ready Home is a more enticing option for many consumers.
- While interest in healthy homes was surging pre-pandemic, partner input affirms that the pandemic has been a profound accelerant to this trend.
- As a result, there is a strong desire for marketing and sales resources that speak to the health benefits of Zero Energy Ready Homes and Indoor airPLUS.
- Product manufacturers should use this time to study IAQ innovations such as automated controls and monitoring systems.

### 2. **Shortage of trained and experienced trades and code officials familiar with above code programs**

- A sustained loss of workforce the past decade since the 2008 to 2010 recession and a ‘grey tsunami’ of retiring code officials whose experience has been difficult to replace is a hard trend that began well before the pandemic.
- As a result, there are problems implementing high-performance construction details with the existing trade contractor workforce and delays and challenges in code compliance.
- Investing in training and education for these groups, as well as real estate professionals and financial institutions is necessary.
- There is a need to raise awareness on the various career opportunities available in the construction industry.

### 3. **Remote verification likely not going away**

- Remote verification, if it is here to stay, can ultimately be a productive method for streamlining compliance and certification processes. In some cases, it was already being utilized and these professionals were ahead of the learning curve when the pandemic hit.
- The development of standardized processes, possible exemptions, streamlined checklists, and connecting 3<sup>rd</sup> party verification and above code programs to code compliance can help to reduce concerns about the quality of virtual inspections, ease the burden on code officials and local building departments, and improve the efficiency and value of rating professionals.

## **HARD TRENDS PREDICTIONS**

### **Hard vs. Soft Trends**

The year 2020 will be long remembered for the COVID19 health crisis and the profound impacts on our personal and working lives. Everyone has had to make major adjustments, and the housing industry is no exception. While many of the industry’s changes are likely to be temporary pivots, the global pandemic has exposed significant inefficiencies in current business practices that are likely to lead to permanent changes. This realization inspired us to start the roundtable meetings by asking each participant, “What have been the key impacts on your business as a result of the pandemic?” After sharing and discussing responses, the group categorized each of the impacts cited as either “Hard” or “Soft” trends. A hard trend was defined as a “long-term change” and a soft trend was defined as a “temporary change until the crisis is resolved.” This separation allowed the discussion to focus on hard trends identified by the group that would significantly impact the housing industry for the foreseeable future.

### **Hard Trends – Builder Perspectives**

As builders identified hard trends, common themes began to arise. First, health and indoor air quality is clearly more important than ever. While this was trend well established prior to the pandemic, COVID and the Western region wildfires amplified their importance. In response, builders are actively interested in technical solutions to improve the indoor air quality in their homes, particularly optimized ventilation strategies. The corollary is that marketing health benefits effectively has become extremely important for a significant number of builders. This includes innovating virtual or contactless techniques to educate consumers about the health benefits that make a strong emotional connection. Many builders, specifically those in more remote locations, also observed a significant uptick in demand due to movement of households away from cities. Another trend was construction schedule delays due to labor shortages, supply chain issues, and permitting backlog. This includes difficulties complying with state and local laws related to COVID-19 compounded by a shortage of workers to complete the permitting process in building department offices. Lastly, there have been significant supply chain issues including long delays with lumber and appliances.

### **Hard Trends- Rater Perspectives**

Many hard trends cited by raters were consistent with those raised by builders. Like builders, raters noted that indoor air quality and healthy homes is a critical focus on both a technical level (finding better solutions) as well as in sales and marketing. And this growing interest in health is stimulating a greater interest in high-performance homes across the country because of health-related benefits. To take full advantage of this opportunity, raters indicated the need to develop more resources focused on the benefits of a healthy home and find ways to get that message across to consumers.

Raters agreed with builders that training and education are critical to success and that the pandemic has made it increasingly difficult to conduct training. The logistics and limitations of in-person meetings has forced a lot of training to an online platform, which can prove difficult when trying to introduce new technologies, building practices, and systems to construction teams. Observations included a wide knowledge gap among sub-contractors and a high turn-over rate for construction teams that results in new, untrained workers on the job site. Similar to builders, raters also see the need for code official training to get up to speed with high-performance home building practices and technologies that often look different than a typical code-built home. They also touched on scheduling challenges due to COVID-19 regulations and supply chain issues, specifically with appliances.

One area of interest for the raters, which was only briefly mentioned by builders, was remote verification. Many jurisdictions across the country have turned to virtual inspections to comply with local health and safety requirements. From the discussion it was clear that there were different experiences amongst the group with these virtual inspections. Many indicated that they were finding it to be successful, even to the point that they feel they will continue to use them into the future as a way to streamline their businesses. Others noted they feared virtual inspections might become the norm due to quality concerns compared to in-person inspections.

<b>Table 1: Summary of Hard Trends</b>		
<b>Category</b>	<b>Builder</b>	<b>Rater</b>
<b>Technical</b>	<ul style="list-style-type: none"> <li>• Demand control ventilation based on air quality measurement. Clients love it</li> <li>• Indoor air quality standards are something to consider</li> <li>• New fresh air solutions such higher filtration for wildfires</li> </ul>	<ul style="list-style-type: none"> <li>• Dehumidification and condensation management solutions</li> <li>• Addressing hazardous air quality due to wildfires</li> </ul>
<b>Remote Verification</b>	<ul style="list-style-type: none"> <li>• Inspections being done virtually with empty homes/buildings</li> </ul>	<ul style="list-style-type: none"> <li>• Virtual inspections rely on trust with builders - quality concerns</li> <li>• Greater use of remote verification for all clients/jobs</li> <li>• QA concern with virtual inspections becoming the norm and permanent RESNET allowance</li> </ul>
<b>Sales &amp; Marketing</b>	<ul style="list-style-type: none"> <li>• Healthy Home Takes Lead in Marketing</li> <li>• Communication with clients and helping them feel connected to the process.</li> <li>• Touchless contact with customers. Online presence in sales/ virtual tours</li> <li>• Focus on healthy homes but ensure a reliable, accurate message to deliver on. A promise you can deliver</li> </ul>	<ul style="list-style-type: none"> <li>• Interest in indoor air quality</li> <li>• Client relations and customer service - lack of connection; communication issues</li> </ul>
<b>Training &amp; Education</b>	<ul style="list-style-type: none"> <li>• The more customer education the better</li> <li>• More Consumer Education on Health</li> </ul>	<ul style="list-style-type: none"> <li>• Wide gap in job site knowledge. Trades don't get it</li> <li>• Increased Training Demand</li> <li>• Introducing New Technical Items</li> </ul>
<b>Market, Cost, &amp; Value</b>	<ul style="list-style-type: none"> <li>• Interest in Accessory Dwelling Units</li> <li>• Cost increasing doesn't mean value is increased.</li> <li>• Appraisal needs to catch up with market value</li> <li>• Lower appraisal doesn't match new costs</li> <li>• Shift in demand from inner city to suburbs</li> </ul>	<ul style="list-style-type: none"> <li>• Increased interest in high performance</li> <li>• Trouble introducing new innovations</li> </ul>
<b>Supply Chain</b>	<ul style="list-style-type: none"> <li>• Supply Chain/Delays</li> </ul>	<ul style="list-style-type: none"> <li>• shortage of products such as Energy Star appliances</li> </ul>
<b>Compliance</b>	<ul style="list-style-type: none"> <li>• Permitting delays</li> </ul>	<ul style="list-style-type: none"> <li>• Code officials are behind on what is high performance</li> <li>• More regulatory focus and pressure on performance</li> </ul>
<b>Labor</b>	<ul style="list-style-type: none"> <li>• Affordable housing contributions have dried up</li> <li>• Scheduling with Subcontractors</li> <li>• Experience a labor shift. Shortage of workers.</li> <li>• Higher labor costs</li> </ul>	<ul style="list-style-type: none"> <li>• Challenging scheduling since builders haven't slowed down</li> <li>• Newer untrained staff</li> <li>• Running at triple capacity</li> </ul>

## **Builder Strategies to Address Hard Trends**

After identifying the hard trends, the builders were then asked to share what are their current and planned strategies to adapt to them and continue operating a successful business. In response to the increased emphasis on health, many builders discussed the need to develop more technical strategies for improving IAQ. Some ideas included working with manufacturers to optimize filtration and ventilation requirements and innovation, and to introduce automated controls and monitoring systems to ensure fresh air delivery.

This increased emphasis on a healthy home, combined with more Americans spending more time in their homes, has resulted in increased interest in high-performance homes and many of the Zero Energy Ready Home builders indicated they are seeing an uptick in inquiries and sales. Builders are focusing much of their marketing efforts on communicating the health benefits of Zero Energy Ready Homes, shifting away from the emphasis on energy efficiency. They are investing in marketing resources that make a connection with consumers without the need for face-to-face meetings, open houses, and walk throughs including updating their websites with informational resources, videos, and virtual tours.

The need for education also applies to their teams. This includes training their teams on technical specs, building systems, and construction strategies, as well as the goals and benefits of Zero Energy Ready Homes. Builders have found it to be extremely beneficial to have both their construction and sales teams educated on the goals and vision of their projects, and the key benefits of the homes, specifically with regards to IAQ during this time. To better educate subs, and to develop more skilled labor to combat the shortage of highly trained workers, builders could collaborate with training programs on high-performance homes and raise awareness of good, well-paying jobs in the construction industry.

To help with construction delays, builders discussed a variety of ideas that could work including teaming with large builders and vendors in the area to develop an inventory program to help with supplies and storage. On the permitting side, allowing 3<sup>rd</sup> party inspectors to conduct code inspections and approve compliance in order to receive a permit could help reduce the building department backlog issue causing permit delays and also take a burden off of the jurisdictions permitting and code enforcement offices, which are regularly overloaded with responsibilities. Additionally, these construction delays and supply chain issues cost builders money. These rising costs ultimately impact the builders by either decreasing their margins if the sale price is locked in, or presenting a situation in which the builder has to go back to the buyer and discuss an increase in the sales price. Several builders mentioned tactics for combating this issue including bidding and locking costs with subcontractors and suppliers during the design phase, adding a price escalation clause to contracts, and providing information and resources for the public regarding potential price increases.

## **Rater Strategies to Address Hard Trends**

With similar health crisis impacts cited by raters and builders, it was not surprising rater identified similar strategies and actions for DOE. Related to the increased emphasis on IAQ and health, the raters discussed more training targeting IAQ and whole-house solutions. On a technical level, there was a lot of discussion around the need for dehumidification and moisture requirements for various high-performance home programs. They also noted that guidance and training on filtration was important, particularly for homeowners, to fully understand the purpose of the system and how they can ensure good performance. Like builders, raters would like to see more, high-quality consumer information specifically on IAQ and the health benefits.

Training and education were another major topic during this discussion. Raters like builders find there is a wide knowledge gap on the job site when it comes to high-performance construction. Sub-contractors, code officials, and even some raters simply do not understand more efficient and innovative building practices, systems, and technologies, and program specifications. Further, they lack an overall understanding of the goals of the project and why these homes are different than a typical code built home. With the high turnover rate for construction teams, the training issue is amplified. Potential solutions aligned with the builder recommendation for teaming with training programs and educational institutions, and raising awareness of career opportunities in the industry.

Strategies for improving and streamlining compliance were also discussed. There was more desire to have HERS third-party certification as a code compliance path. Keeping the rating industry informed about advanced codes and legislative updates would help to streamline the process and reduce barriers and complications. To help make inspections more efficient (and help with virtual inspections) some raters discussed allowing exemptions for duct testing based on real world experience with builders who have shown consistent tight-duct results over time. With regards to the remote verification process, developing and solidifying a set of standards for these inspections would significantly improve their efficiency and help to reduce quality concerns. Many raters felt that these virtual inspections will not go away, and the possibility of a hybrid approach (on-site and virtual) is likely in the future.

## SUMMARY OF BUILDER AND RATER STRATEGIES ADDRESSING HARD TRENDS

Table 2: Summary of Bulder and Rater Strategies Addressing Hard Trends		
Category	Builder	Rater
<b>Technical</b>	<ul style="list-style-type: none"> <li>• Improve filtration and ventilation and innovation</li> <li>• Refocus on Passive House level homes</li> <li>• Control IAQ by reducing ACH and including an air purifier</li> <li>• Fresh air/IAQ automated controls and monitoring system</li> <li>• Communication with manufacturers re: responsive ventilation and filtration</li> <li>• Design for future upgrade flexibility/adaptability</li> <li>• Communicate high capture filtration need to ventilation manufacturers</li> </ul>	<ul style="list-style-type: none"> <li>• HVAC ducted system is a lot more complicated than non-ducted going through ENERGY STAR verification</li> <li>• Passive house lessons in Filtration - HEPA works</li> <li>• Consistency in ratings depends on scope</li> <li>• Need dehumidification and moisture requirements from programs</li> <li>• Extend dehumidification requirements for whole country</li> </ul>
<b>Remote Verification</b>	<ul style="list-style-type: none"> <li>• Improve coordination and planning to help save time after learning curve</li> </ul>	<ul style="list-style-type: none"> <li>• HVAC duct testing exemption impacts HERS rating</li> <li>• Establish guidance and parameters for remote verification - can still achieve quality</li> <li>• Future hybrid approach using high quality remote verification and in-person testing</li> <li>• Leaning on Builder/virtual verification with support</li> </ul>
<b>Sales &amp; Marketing</b>	<ul style="list-style-type: none"> <li>• Updating website to modernize</li> <li>• Being proactive about customer uncertainty</li> <li>• Awareness of the public priority for health and IAQ</li> <li>• Advertising works and leveraging award to drive demand</li> <li>• Communicate value so it resonates with consumer</li> <li>• Educated internally on selling high-performance homes</li> </ul>	<ul style="list-style-type: none"> <li>• Promote HEPA filtration products</li> <li>• Sell the value of third-party certifications (as it relates to certification compared to just "building to spec")</li> </ul>
<b>Training &amp; Education</b>	<ul style="list-style-type: none"> <li>• Educating heating and cooling companies on IAQ issues</li> <li>• Educating and engaging Realtors to teach them benefits</li> <li>• Training staff to build affordably and reach net zero goal</li> <li>• Clear communication on price increases and fluctuation. promoting Contract and Disclosure inclusion</li> <li>• Internal staff focus on training sub crews as a way to scale</li> <li>• Warranty videos to educate buyers how home works</li> <li>• QR code to educate homeowners on equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Good information on IAQ - no "green-washing"</li> <li>• Capitalize on interest in IAQ to provide whole solution</li> <li>• Simplicity of program helps with training raters, builders, trades</li> <li>• Train the trades; new crews constantly coming in</li> <li>• HERS Rating Class at Solar Decathlon</li> </ul>

<b>Market, Cost, &amp; Value</b>	<ul style="list-style-type: none"> <li>• Push banks to be required to use Green Certified Appraisers</li> <li>• Communicate the value to customer and banks</li> <li>• Streamline processes to be able to take on more demand</li> <li>• Small home concept and ADU market increasing</li> <li>• Bid and lock in cost with subs and suppliers at design</li> <li>• Add flexibility in specs due to price fluctuation</li> <li>• Price escalation clause</li> <li>• Public information to reference for price increases</li> </ul>	<ul style="list-style-type: none"> <li>• Collect data on costs to inform participants and industry</li> <li>• Incentives are important to offset increased costs.</li> <li>• Fannie/Freddie loans.</li> </ul>
<b>Supply Chain</b>	<ul style="list-style-type: none"> <li>• Working with vendors on supply chain.</li> <li>• Cheaper model for storage, renting space, etc.</li> <li>• Partner with bigger builders for supplies</li> <li>• Inventory program to handle supply chain issues.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<b>Compliance</b>	<ul style="list-style-type: none"> <li>• Permit delays</li> <li>• Push municipality to allow third party inspections with builder paying fees</li> </ul>	<ul style="list-style-type: none"> <li>• Be the Easy Path; streamline without giving up quality</li> <li>• Loosening ENERGY STAR Certified Home paperwork</li> <li>• Credentialing requirement specifically</li> <li>• Allow for assumptions in duct tests based on real world experience</li> <li>• Position rating industry to align with advanced codes</li> <li>• Align rating with legislative updates</li> <li>• Connect HERS raters to code verification</li> <li>• Eliminate 'quasi' certification</li> <li>• Build in above-code programs as code compliance pathway</li> </ul>
<b>Labor</b>	<ul style="list-style-type: none"> <li>• Builders collaborate with training programs to deal with labor shortage and aging workforce</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

## RECOMMENDED ACTIONS FOR DOE

The first two sections of the meeting identified some of the changes, challenges, and opportunities that will come to the building industry and how builders and raters have started to adapt. The final section of the meeting then asked builders to identify actions that the DOE Zero Energy Ready Home program can take to support our builder partners during this unprecedented time. Much of this conversation centered around training, education and awareness for a variety of stakeholder groups. On the consumer side, builders discussed the need for more messaging on the health benefits of Zero Energy Ready Homes. Providing online, user friendly resources that highlight the value of Zero Energy Ready Homes and target specific attributes would be beneficial. In addition, several builders discussed “how to” manuals for operating systems and equipment to help homeowners get the most out of their homes. This type of education would also be extremely valuable for real estate professionals and financial institutions for them to understand the true value of these high-performance homes.

As discussed in the previous section on builder strategies, addressing the labor shortage and training sub-contractors was another common topic. For DOE, one way to help address the labor shortage is to start to raise awareness of the various types of jobs available in the construction industry. Whether that’s developing training programs, partnering with educational institutions, or just providing resources available to the public on the importance of high-performance building and the variety of careers within the industry, information coming from a voice of authority such as DOE, then shared locally with builders would help. Another common theme that was raised was sub-contractor and sales training. Online curriculums and resources that DOE could provide, with specific modules focused on various elements of Zero Energy Ready Homes would allow builders to more effectively train their teams to be on the same page with regards to the goals and technical specifications of their homes, and help all team members communicate the value these homes deliver. These could include “how to” videos from ZERH staff and builder partners, or helping builders collaborate with one another by setting up platforms for builders to share the successes and ideas. In addition, these types of resources would also help educate municipalities and building inspectors on what to expect to see when visiting a Zero Energy Ready Home, making their inspections more efficient and avoiding confusion on components that might be different than typical code-built homes the inspectors are used to. To further reduce the burden on code officials, advocating for 3<sup>rd</sup> party inspections to also qualify as code compliance inspections is another action that DOE could help support.

**Table 3: Recommendations for DOE Future Actions Based on Hard Trends**  
 [Bold actions highest priority]

<b>Category</b>	<b>Builder</b>	<b>Rater</b>
<b>Technical</b>	<ul style="list-style-type: none"> <li>Integrate smart home technology in program</li> </ul>	<ul style="list-style-type: none"> <li>Address dehumidification and condensation</li> <li>Address hazardous IAQ due to wildfires</li> </ul>
<b>Remote Verification</b>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Address builder trust/quality concerns with virtual inspections</li> <li>Support more use of remote verification</li> </ul>
<b>Sales &amp; Marketing</b>	<ul style="list-style-type: none"> <li>Provide empirical evidence with 3rd party inspections</li> <li>Develop messaging on healthy homes</li> <li>Prepare short &amp; sweet documents to help educate public</li> <li>More information on the healthy home</li> <li>User friendly online consumer education on value of health and the home</li> </ul>	<ul style="list-style-type: none"> <li>Leverage interest in indoor air quality</li> <li>Support client relations and customer service - lack of connection; communication issues</li> <li>Address lack of big meetings to communicate broadly and see who is interested</li> </ul>
<b>Training &amp; Education</b>	<ul style="list-style-type: none"> <li>Move to have online training and education</li> <li>Sharing secrets of success on strategies</li> <li>“How to” manual in taking care of pieces of equipment</li> <li>Training for municipalities and building inspectors to be more receptive</li> <li>Prepare short and sweet documents help educate public</li> <li>More frequent builder roundtables- maybe targeted at certain topics</li> </ul>	<ul style="list-style-type: none"> <li>Help with wide knowledge gap on the job site; trades don't get it</li> <li>Increased Training Demand</li> <li>Help introducing new technical items</li> <li>Logistics and limitations of in-person trainings</li> </ul>
<b>Market, Cost, &amp; Value</b>	<ul style="list-style-type: none"> <li>Work with appraisers and getting better appraisals</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
<b>Supply Chain</b>	<ul style="list-style-type: none"> <li>Sharing of solutions for clauses in contracts</li> </ul>	<ul style="list-style-type: none"> <li>Shortage of products (e.g., ENERGY STAR appliances)</li> </ul>
<b>Compliance</b>	<ul style="list-style-type: none"> <li>Prepare case studies with DOE on accepting 3rd party certification</li> <li>Promote verification takes burden off code officials</li> </ul>	<ul style="list-style-type: none"> <li>Code officials are behind on what is high performance</li> <li>More regulatory focus and pressure on performance</li> </ul>
<b>Labor</b>	<ul style="list-style-type: none"> <li>Increase awareness of available construction jobs and growth in a career path in construction.</li> </ul>	<ul style="list-style-type: none"> <li>Scheduling challenge; builders haven't slowed down</li> <li>Help with newer untrained staff</li> <li>Running at triple capacity</li> </ul>

## DOE PROPOSED 2021 ACTIONS IN RESPONSE TO RECOMMENDED ACTIONS

Based on recommendations from builders and raters attending roundtable meeting, DOE proposes the following continued or new actions to best prepare for the hard trends defining our future:

Table 4: Proposed DOE Actions	
Category	Proposed DOE Action
<b>Technical</b>	<ul style="list-style-type: none"> <li>• Review Version 2 draft specifications for Indoor airPLUS and Zero Energy Ready Home, to ensure that smart home technologies are appropriately recognized and not facing barriers</li> <li>• Ensure that dehumidification and condensation provisions within Indoor airPLUS are updated appropriately within the Version 2 update</li> <li>• Highlight DOE R&amp;D on relevant innovations in program communications</li> <li>• Requirement of MERV 13 filters on all supply ventilation in V2</li> </ul>
<b>Remote Verification</b>	<ul style="list-style-type: none"> <li>• Encourage / guide DOE investment in standards for remote verification of above-code EE programs; case studies</li> <li>• Convene a roundtable of above-code programs, Raters, and code officials to identify pathways to greater utilization of remote inspection process for energy code and above-code program compliance</li> <li>• Continue current ZERH allowances for remote inspections and consideration of requests to use default leakage values in lieu of on-site testing</li> <li>• Highlight remote inspection examples in program communications.</li> <li>• Solicit examples of remote verification in next HIA cycle.</li> <li>• Develop best practices guide for remote verification with leading raters who are using it successfully</li> </ul>
<b>Sales &amp; Marketing</b>	<ul style="list-style-type: none"> <li>• Work with IAP program to develop health-focused marketing messages that are both compelling and credible. Formats may include fact sheets, videos, testimonials, etc.</li> <li>• Focus on gathering homeowner testimonials that speak to IAQ benefits in the next HIA cycle</li> <li>• Develop and promote consumer video focused on IAQ benefits in ZERHs</li> <li>• More consumer facing short, educational videos and resources to further education/awareness</li> </ul>

<b>Training &amp; Education</b>	<ul style="list-style-type: none"> <li>• Create online ZERH training module tailored for code officials that shows overlay of ZERH with IECC compliance, explains role of third-party Rater, and illustrates incentives that localities can offer ZERH projects</li> <li>• Create online ZERH training module tailored for real estate agents that demonstrates homeowner benefits, highlights consumer messaging resources, and showcases energy and non-energy financial benefits</li> <li>• Mini Builder Roundtable that is shorter and just focuses on 1 key issue.</li> <li>• Consider expanding ZERH Homeowner Manual with “how to” manuals (e.g., maintaining the home’s ventilation system and HVAC).</li> <li>• DOE has other funded efforts outside of ZERH that will provide training for code officials which include modules on above code programs, in addition to case studies focused on tour of zero content.</li> <li>• Work with ZERH Builder Partners to leverage BASC Code Briefs to educated code officials.</li> </ul>
<b>Market, Cost, &amp; Value</b>	<ul style="list-style-type: none"> <li>• Develop a short article comparing long-term value of ZERH homes as compared to a price spike driven by current supply chain issues</li> <li>• Develop short video/resource that focuses on all the areas in which ZERH saves money in total cost of ownership.</li> <li>• Develop presentation showing a typical new construction home vs. ZERH and all the areas in which money is spent outside of monthly mortgage to emphasize total cost of ownership.</li> </ul>
<b>Supply Chain</b>	<ul style="list-style-type: none"> <li>• Provide flexibility in ZERH program requirements for the use of ENERGY STAR appliances</li> <li>• Provide a communications platform where ZERH partners can discuss supply chain challenges/strategies</li> </ul>
<b>Compliance</b>	<ul style="list-style-type: none"> <li>• Develop and deliver training content highlighting the IECC compliance gained via ZERH certification</li> <li>• DOE has other funded efforts outside of ZERH that will provide training for code officials which include modules on above code programs, in addition to case studies focused tour of zero content</li> </ul>
<b>Labor</b>	<ul style="list-style-type: none"> <li>• Work in conjunction with DOE Workforce training efforts to recruit and train younger people to the workforce</li> <li>• Develop educational resource highlighting the variety of career options and showing a career growth path to provide incentive for more to join the workforce</li> <li>• Leverage any programs DOE already has in place with vocational schools and look for possible synergy with USDA or Dept. of Labor training</li> <li>• DOE career path tool has launched – multiple training efforts will use this tool for workforce development training</li> </ul>

## APPENDIX A: SUMMARY OF SOFT TRENDS

Table 1: Summary of Soft Trends		
Category	Builder	Rater
<b>Remote Verification</b>	<ul style="list-style-type: none"> <li>Delays/issues with remote verification and inspections due to learning curve</li> </ul>	<ul style="list-style-type: none"> <li>More use of remote verification for all clients/jobs</li> <li>Halt on in-person inspections in occupied homes</li> <li>Stop pursuit of certification due to potential risk of raters and others entering homes.</li> </ul>
<b>Sales &amp; Marketing</b>	<ul style="list-style-type: none"> <li>Confidence in clients to move forward. Unsure of job certainty</li> <li>Appraisal delays</li> <li>Availability of Jumbo Loans</li> <li>Spending down time improving online presence/website</li> </ul>	<ul style="list-style-type: none"> <li>No big meetings to communicate broadly and see who is interested</li> </ul>
<b>Training &amp; Education</b>	<ul style="list-style-type: none"> <li>Team communications are difficult and not as effective. Harder to keep team involved.</li> <li>Transitional job training for those who have lost their jobs</li> <li>Office space complicated by safety concerns</li> </ul>	<ul style="list-style-type: none"> <li>Training is more difficult and less effective remotely</li> <li>Logistics and limitations of in-person trainings</li> </ul>
<b>Market, Cost, &amp; Value</b>	<ul style="list-style-type: none"> <li>Keeping client interested through delays</li> <li>Pre-sales are a liability with shifting material costs</li> <li>Utility crews shut down or limited and delays with power hookups.</li> <li>Balancing order schedule vs. shifting prices.</li> <li>Cost increases between \$16,000 and \$21,000</li> <li>Price increases are traumatic for affordable housing</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

<b>Supply Chain</b>	<ul style="list-style-type: none"> <li>• Price increases and availability on materials (lumber, sheathing)</li> <li>• Inconsistency in reliability in manufacturers and deliveries</li> <li>• Plant shut downs causing delays</li> </ul>	<ul style="list-style-type: none"> <li>• Shortage of products and delays in supply chain</li> </ul>
<b>Compliance</b>	<ul style="list-style-type: none"> <li>• Limited availability of ENERGY STAR appliances</li> <li>• Travel compliance for out-of-state clients</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance flexibility due to supply chain delays</li> </ul>
<b>Labor</b>	<ul style="list-style-type: none"> <li>• Getting subcontractors to follow broad COVID/PPE regulations.</li> <li>• Policies on how to work safely indoors</li> <li>• Voluntary labor force availability has decreased resulting in slowed production</li> <li>• Labor shortage due to shut downs</li> <li>• Subs are moving to other states where they are still working.</li> <li>• Anxiety and health concerns internally with team</li> <li>• Labor issues due to virtual school</li> </ul>	<ul style="list-style-type: none"> <li>• Health impacts of staff due to virus</li> </ul>