

**Subcommittee on Energy**  
**Hearing on**  
**“Building a 100 Percent Clean Economy: Solutions for the U.S. Building Sector”**

**September 20, 2019**

**Mr. Arn McIntyre**  
**President**  
**McIntyre Builders, Inc.**  
**On behalf of National Association of Home Builders**

**The Honorable Fred Upton (R-MI):**

- 1. You stated that “net zero” or near “net zero” building is extremely difficult, costly and impractical in many parts of the nation.**

- 1. Could you provide an estimate of the added cost to the average consumer?**

The balance of systems and the cost of associated measures required to achieve a near net-zero or net-zero energy performance continues to be a source of debate and a subject of continued evaluation. The answer will vary dramatically depending upon the geographic location, specific climatic conditions, building system type, financing options, customer preferences, available fuel sources, local development policies and incentives, and other project-specific factors.

It is important to recognize that achieving net or near net-zero has two primary areas of a building system to consider. First is the structure itself and the energy load or efficiency of the structure. The second is the addition of site energy generation capability. It must be realized that there are no building systems currently available that will allow a building on its own to achieve net-zero. While building methods have improved dramatically over the last couple of decades the building itself is still an energy load. At some point and I feel we are at or near that point we will reach a diminishing cost return with current building technology. That brings forth the second building system, site generation. Today for a building to reach the net or near-net it must be coupled with a site generation or community generation system. This includes a multitude of options such as solar, wind, hydro, micro-hydro, etc. We need to recognize that any of these systems are a significant extra cost to the homeowner and in the eyes of most consumers are not necessary for them to have a livable home.

Depending on the baseline starting point to achieve a near net-zero or net-zero home, you can expect the following costs to impact the price for the consumer:

- The added cost of an onsite generation system
- The added cost of the building envelope
- The added cost of the mechanical systems
- The added cost of continued upkeep and management of the more sophisticated building systems and controls

With respect to cost as I stated above, the site generation system in its entirety is an added consumer cost. Depending on the method of generation and the system size, this can range greatly with \$20,000 to \$50,000 plus to be expected. As I mentioned in my previous testimony, my solar panel system installed in July 2019 was near \$20,000 which included materials only with all installation labor being performed by myself. To add installation cost would double that figure. This is a cost above and beyond the building cost.

As a complete building system site generation combined with building improvements for a typical 2,500-square-foot single-family house, an expected price premium to achieve a net-zero performance will range between \$30,000 and \$60,000 or more depending on the factors described above. Returns on these investments will take significantly longer and, in some cases, incentives will be needed to achieve payback within the expected life of the equipment.

Finally, there will be added costs for maintaining the efficiency and functionality of the more sophisticated equipment and mechanical systems. For example, a range of reported operation and maintenance costs for a 10kW solar PV system is \$130-\$300 per year.

## **2. Could you explain why it is impractical in certain parts of the nation, such as Michigan, for example?**

Michigan is a classic example of why it is impractical to mandate "net-zero" or "near net-zero" energy homes. The heating load throughout the state (especially in the UP) is extremely high; even with highly insulated walls and ceilings, high-performance windows, and the highest efficiency heating/cooling equipment. That means there will still be a large amount of energy needed to heat/cool and operate the house over the year. To achieve net-zero or near net-zero with Michigan's high heating demands and low solar resources, a high number of solar panels will be necessary which could easily exceed the roof area with southern exposure. Just the solar panels needed to meet the total energy demand for a house would add over \$40,000 to the price of the house.

To achieve the levels of performance implied by the net-zero target, builders would need to significantly change their construction practices and turn to solutions that are not cost-effective to the consumer, not readily applicable within the constraints of the residential building sector, not supported by the current building industry infrastructure, and unwelcome by the home buyer. Imposing a net-zero mandate would be onerous and harmful to the building industry, but more importantly, it would negatively impact housing affordability for the consumer and stifle the supply of new homes – all with only a marginal contribution to the goal of reducing emissions from fossil fuel combustion by the US economy.

There is not a one-size-fits-all solution to attaining reductions in emissions in a way that strikes a balance between making a meaningful impact on emissions, maintaining a vibrant economy, and meeting consumer expectations and the ability for home affordability. Net-zero homes is not the answer for Michigan conditions defined by low winter temperatures and one of the lowest solar resource in the continental United States.

**2. I would rather allow consumers to pick the winners and losers among competing technologies and high-performance building designs, rather than the Federal government.**

**a. What are some consumer-focused or market-driven policies that we could consider in contrast to a Federal mandate?**

Rather than focus on near net-zero homes with their rooftop solar systems, the focus should be on improvements to utility-scale generation. Utility-scale generation using renewable sources of energy can already be cost-effective when compared to adding further efficiency measures to the construction of new homes. According to NREL, utility generation using solar energy is about 1/3 of the price per kW delivered to the site compared to rooftop solar PV generation.

The concept of a net-zero building is not the most cost-effective strategy for achieving meaningful reductions in emissions from burning fossil fuels. New homes represent only a small fraction of the overall energy use by the building sector (homes built since the year 2000 account for about 3.7% of total U.S. energy use) and homes built annually are adding about 0.2% percent to the total. A more significant effort should be developed for improving the energy performance of the existing housing stock through consumer incentives and improved valuation and financing mechanisms that would be attractive to the homeowner.

As with any product introduction to the market, consumer acceptance and adoption are key to product scaling. There are many examples over the decades of products scaling beyond expectations. One of the later examples is the smartphone and an emerging example would be electric automobiles. Neither of these products involved mandates. There are many more examples but the key point is that any product that disrupts and reshapes an industry has delivered significant consumer value. Value to the point that the consumer makes the active decision based on the received benefit to adopting the product. There are few if any examples that mass-market adoption of a product was achieved through mandates. Mandates in themselves will only deliver what is mandated and nothing more because the consumer is not driving the decision and is only buying "what they have to". Mandates will likely deliver less of an impact because they are mandating the wrong thing. This is very likely the case that would occur with net-zero homes. The American homeowner is a very intelligent consumer and, when presented with a value-driven buying opportunity, they will make the right decision and most often go beyond our expectations.

To achieve this, our lawmakers need to understand the policies that impact the ability of the industry to deliver value in high-performance homes. Policies that impact cost and performance. Rather than look at the specific measures to construct a net-zero energy home look at the business case to deliver it. Focus on regulation reduction, tax policy, incentive programs, technology development, zoning impact, utility buy-back, appraisal metrics, etc. Develop a policy that is regular and consistent over time. Policy that the industry can count on which allows us to develop and deliver an affordable, cost-effective, high-value product to the American homeowner.

