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Disrupting and accelerating the prefab construction sector

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Manufactured housing is not a new, new thing. Not even close. I remember talking about it with a group of multifamily developers years ago during my days at CBRE Global Investors (now CBRE Global Investment Management). So, why are we talking about it now? Technology. That's right – the niche sector of manufactured housing is due for an overhaul, with technological advances in additive manufacturing, otherwise known as 3D printing, at the center.

But let's back up and clarify what we are talking about when we say "manufactured housing." These are h[illegible] made in components in a factory (prefabricated) and shipped to a location for permanent, on-site installment and assembly. We are not talking about the mobile home or trailer segment (but, as an aside, 3D printing may make these segments obsolete at some point in the future).

Now, let's talk technology. The industry still considers 3D printing new and in its infancy. However, the technology is fast evolving (remember when cell phones and the internet were new, new things? It won't take long). 3D printing enables the formation of an exciting new mainstream future. Imagine living in a community where every house is unique, with different floorplans, with different designs and materials spanning basic to luxury. Envision pitched and shingled roofs and spacious layouts in a variety of configurations. Don't forget the amenities! Spas, fireplaces and high-end kitchens, to name a few. Two-story houses too? No problem. How about Victorian-style houses or a traditional New England colonial-style home? Again, no problem. These houses would be virtually indistinguishable from a regular, stick-built on-site house. There is a pool out back, the streets are lined with beautiful trees, and right on the corner is a bustling playground. Sounds like a regular neighborhood. But what if we said that every house in this neighborhood was built in a factory in a handful of days, for a fraction of the price of a typical house, and can be delivered and installed on-site? It's affordable. It is also made from sustainable materials and methods. That is the future of manufactured housing. Technology makes it possible. Therein lies the new, new thing.

This requires a mental imagery adjustment; manufactured housing has a lousy reputation, especially among institutional investors. The average investor doesn't think about owning a beautiful, unique home in a grassy community when they think about manufactured housing. They think about trailers. They think about trailers on rented land plots in confined spaces. They also think about flat roofs, box-like structures and cookie-cutter designs. The industry has an image problem. And in the factory, the manufacturing process has functioned pretty much the same way for decades. We think it's time to reimagine what's possible.

According to the Manufactured Housing Institute, manufactured housing accounted for approximately 9 percent of total new housing starts in 2020. Doesn't seem like a lot — which means opportunity. We don't need to reference the endless statistics to know there is a massive housing shortage in the United States, or that the housing shortage is also an affordability one. With interest rates on the rise, you don't need to look far to find a report about how Americans can't afford to buy a home anymore. According to the National Association of Home Builders, with a $1,000 increase in the median new home price ($346,757), 153,967 households are priced out of the market (based on 2021 estimates).

3D printing offers a choice to build houses more quickly and cheaply, with less waste and more efficiency, than a regularly constructed house. 3D construction companies also say their materials are more durable than most traditional building materials. There may be something to the claims — according to Allied Market Research, the global construction robot market is projected to grow at an annual compound growth rate of approximately 23 percent from 2020 to 2027. It's worth adding that the construction robotics industry not long ago didn't even exist. 3D-printed manufactured homes can be installed with less impact to the surrounding environment and only require the pouring of a concrete foundation before the home can be delivered.

The technology is here, albeit in early rollout. Habitat for Humanity has advocated for 3D-printed homes as an approach to addressing the affordable housing shortage in the United States. They broke ground on two 3D-printed home projects in 2021, one in Williamsburg, Va., and the other in Tempe, Ariz. The Williamsburg home was 3D printed in around 28 hours. Think about the benefits 3D-printed homes could have in rural communities where there are both housing and labor shortages.

California-based Mighty Buildings has pioneered a 3D-printing system to construct 3D-printed prefabri homes. The company says it can print not only the walls of its homes, but also the roofs, ceilings and flo the ability to automate up to 80 percent of the building process (on-site installation is required for things as electrical, plumbing and windows). As a result, its production techniques require 95 percent fewer human-powered hours than conventional builds and can reduce construction timelines by up to 75 percent. That's the type of change that could potentially transform the construction industry.

Even things like pouring insulation can be done robotically in the printing process. In June 2022, the Structural Building Components Association (SBCA) and National Framers Council (NFC), as part of the 2022 Innovative Housing Showcase, framed a house in less than half a day – a process that would take traditional builders weeks to complete. Black Buffalo 3D Corp., a construction technology company, lays out on its website the cost/benefit proposition for 3D printing versus traditional construction methods. The website purports that 3D printing can reduce all-in construction costs by more than 50 percent (by largely cutting labor costs) with minimal waste material lost (because it is an additive process).

There are real, tangible benefits from revamping the manufactured housing industry with 3D printing by creating affordable and sustainable solutions to a housing problem that has only worsened in recent years. 3D-printing solutions have taken two forms thus far – the prefabrication and shipment of housing parts that we discussed, as well as alternative, on-site 3D printing of homes. We see greater practicality and longer-term benefits from the prefabrication model because of its scalability. It seems logical that 3D printing on-site involves higher costs, given that "printers" have to be brought out to the necessary location, requiring more labor, and also requiring enough available mobile printers to match the demand for the product.

The factory-based 3D-printing prefabrication model, however, has the ability to generate economies of scale, both within a facility and across the nation (via strategically located industrial 3D facility hubs). It has the potential for scalability, longevity and contribution to achieving affordability and sustainability objectives that should generate broader interest from the investor community. Looking at it in a different way, the additive 3D-printing process offers the potential of a construction timeline that is known and favorable; construction costs that are known and favorable; and materials that are better, sustainable, stronger and efficiently used to deliver a product that is profitable to investors while still being favorable to homeowners. Who said win-wins can't be achieved?

This is, of course, not without challenges. Building codes and zoning regulations can still be difficult for structures described as manufactured housing. Layer in the advances in 3D printing, and it's probably safe to say new regulations for this product are still very much in process. Transportation may also present problems as the industry scales. There is an argument that trying to do too much with the technology may mean nothing gets done at all. We also note there is a danger in reflecting early advances in terms of whimsical visions of living in a house straight out of *Star Trek.* While enlightening, we advocate for practical applications and leaving the futuristic extensions in the time machine for a later date.

So, with all that said, we finish where we started, envisioning a time when a 3D-printed, prefabricated house, mixed into your neighborhood, is mainstream, indistinguishable from the traditional, on-site house next door. A time when people will no longer ask how long it will take to build their house, but rather which factory will it come from. It really is time to rethink manufactured housing – the sector has the technology, tools and capability to do it. Therein lies the opportunity. Exciting times are ahead.

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