

WINTER/SPRING 2020

# Evidence Matters

Transforming Knowledge Into Housing and Community Development Policy

## FACTORY-BUILT HOUSING

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*Photo credit: Nancy Holliday Photography*



PD&R





## Message From the Assistant Secretary

The 2019 *The State of the Nation's Housing* report by the Joint Center for Housing Studies of Harvard University estimates that annual housing construction should “now be on the order of 1.5 million units, or about 260,000 higher than in 2018.” Housing production over the past decade has not kept pace with demand, which in many places has made the cost of buying or renting a home rise faster than incomes. This issue of *Evidence Matters* focuses on a segment of housing production in the United States that plays a vital role in closing this gap: factory-built housing.

Since Congress passed the National Manufactured Housing Construction and Safety Standards Act in 1974, HUD has been responsible for maintaining the uniformity of construction and safety standards for factory-built manufactured homes. These standards generally have eased the burden on manufacturers and lowered manufacturing costs while also protecting residents by ensuring minimum quality and safety thresholds for manufactured homes. To support the faster adoption of innovative building techniques and materials, Congress established the Manufactured Housing Consensus Committee (MHCC) in 2000. MHCC recommends revisions to the manufactured home construction, safety, and installation standards.

Based on recommendations from MHCC, HUD Secretary Ben Carson recently announced a proposed rule that will update current construction and safety standards. The proposed standards — new and revised — include requirements related to carbon monoxide detectors, water heaters, and bathroom light switches. They also incorporate provisions for certain building innovations that previously were allowed only through a separate approval process; these provisions will allow manufacturers to avoid the burden and time involved in obtaining special approvals. As Secretary Carson stated, “This proposal is a strong example of how we believe we can both reduce regulation and improve safety and security for the nation’s homebuyers.”

In addition to these new standards, HUD is introducing regulatory reform that should further enhance the factory-built housing industry. President Trump has been a conscientious advocate for regulatory reform throughout the federal government, as illustrated by his signing of Executive Order 13878, which specifically addresses affordable housing. The June 2019 executive order established the White House Council on Eliminating Regulatory Barriers to Affordable Housing. Chaired by Secretary Carson and composed of several federal agencies, the council will identify laws, regulations, and administrative practices that raise the cost of housing development, including “outdated manufactured-housing regulations and restrictions.” By creating a regulatory environment within the factory-built housing industry that is conducive to innovation and cost efficiencies, President Trump and Secretary Carson are expanding access to affordable housing for people throughout the United States.

HUD’s enthusiastic and ongoing support for factory-built housing was on full display during the first annual Innovative Housing Showcase. Held over five days in June 2019 on the National Mall in Washington, DC, the free public event showcased new building technologies and housing innovations intended to make homeownership more affordable for American families and housing manufacturing more affordable for homebuilders. This issue of *Evidence Matters* highlights some of the benefits of, and innovations in, factory-built housing that were exhibited at the Innovative Housing Showcase.

— Seth D. Appleton, *Assistant Secretary for Policy Development and Research*

# Editor's Note

The factory-built housing industry is constantly evolving to meet the changing needs of its customers. From disaster resilience technology that makes manufactured homes safer in the event of natural disasters to energy-efficient innovations that help reduce energy costs and environmental impacts to labor innovations that lower housing costs to make homeownership accessible to more people, the factory-built housing industry adapts rapidly to benefit individuals, families, and communities. This issue highlights some of the innovations in this industry as well as some of the challenges that are hindering its expansion.

The lead article, “Factory-Built Housing for Affordability, Efficiency, and Resilience,” discusses the many benefits of — and barriers facing — factory-built housing and offers suggestions for overcoming those barriers to realize its potential. The Research Spotlight article, “Effects of Market Forces on the Adoption of Factory-Built Housing,” explores market forces that may spur growth in the industry. Finally, the In Practice article, “Programs Support Energy-Efficient Modular and Manufactured Housing,” explores innovative programs and laws in Vermont and Oregon that were created to overcome some of the challenges confronting the industry.

We hope this edition of *Evidence Matters* sparks further interest in the potential of factory-built housing to expand homeownership and make rental housing more affordable nationwide, from single manufactured homes in rural areas to manufactured home communities owned by residents to multifamily manufactured housing in densely populated cities.

This issue was written right before the emergence of coronavirus disease 2019 (COVID-19) in the United States. Our next issue will focus on the Federal Housing Administration, a key safety net during times of crisis and uncertainty, and we are excited to bring this very timely and relevant issue to our readers as the country faces the COVID-19 pandemic. Please provide feedback on any of our issues at [www.huduser.gov/forums](http://www.huduser.gov/forums).

— Heidi Joseph, *Managing Editor of Evidence Matters*

## FEATURE Factory-Built Housing for Affordability, Efficiency, and Resilience

The Joint Center for Housing Studies of Harvard University's *The State of the Nation's Housing, 2019* report notes that a “continuing short-fall in supply” of housing “is keeping the pressure on house prices and rents, eroding affordability...”<sup>1</sup> Increasing the supply of factory-built housing, one of several potential approaches to address this shortfall, may ease price and rent pressures and offer options for affordable and sustainable rental and ownership. One type of factory-built housing, manufactured housing, is already the largest source of unsubsidized affordable housing in the United States.<sup>2</sup> A variety of demand, regulatory, zoning, and other barriers, however, have limited the reach of this promising affordability solution. The construction of new factory-built housing not only offers an affordable housing option

but also presents the opportunity to add units with improved energy efficiency and resilience to weather and natural disasters. This article discusses the realized and potential benefits of factory-built housing, the barriers to its wider use, and ways to overcome those barriers.

### Factory-Built Housing: An Overview

Unlike traditional site-built housing, in which building materials are shipped to and assembled onsite, factory-built housing is assembled in a factory setting and shipped either complete or in substantially complete parts that are installed at the site. Both single- and multifamily housing can be factory built, and new research illuminates the potential for this construction method, particularly for multifamily housing.<sup>3</sup>

## HIGHLIGHTS

- **Increasing the supply of factory-built housing — including manufactured housing, modular housing, and accessory dwelling units — is one of several approaches to address ongoing challenges to housing affordability.**
- **Manufactured housing is the largest source of unsubsidized affordable housing in the United States.**
- **Federal, state, and local governments can take steps to mitigate the demand, regulatory, and financing barriers that have prevented wider adoption of factory-built housing.**

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Factory-built housing falls under four general types: manufactured, modular, panelized, and precut. Manufactured homes, also known as HUD Code homes, are built in a factory to the federal building code (HUD Code) and have a permanent chassis on which they can be transported. Manufactured homes, when sited, may be placed on a foundation that meets conventional

lending requirements. Modular homes are also built in a factory and transported in sections to be installed on a fixed foundation. Unlike manufactured homes, however, modular homes are built to conform to local codes. Other categories of factory-built housing include panelized construction, in which factory-built wall panels are shipped to a site for assembly, and precut housing, in which materials are cut to size before being shipped to a site for assembly.<sup>4</sup> This article focuses on manufactured and modular homes, which are substantially built and assembled in a factory setting. (For more information on

panelized housing, please see the Spring 2017 issue of *Evidence Matters*.)

Manufactured housing has been subject to the HUD Code since 1976; it preempts local codes and facilitates production at scale to make the housing marketable across state lines.<sup>5</sup> The HUD Code has evolved over time. The Manufactured Housing Improvement Act of 2000 mandated updates to the HUD Code and required HUD to develop Model Manufactured Home Installation Standards and create a federal installation oversight program while leaving states and local governments to oversee

installations in their jurisdictions. After 2007, states could retain responsibility for installation oversight or defer to HUD standards. (Currently, 36 states retain this responsibility, and 14 have deferred to HUD standards.)<sup>6</sup>

In 2018, information reported to the U.S. Census Bureau included data for approximately 55,000 new manufactured (HUD Code) homes that were sold and placed in the United States. Of these, 37 percent were placed in manufactured housing communities (parks, courts, or subdivisions). Most (65%) were placed on piers (also known as blocks), and

## HUD Standards for Manufactured Housing

In 1974, the United States had three model building codes with many state and local modifications. That year, Congress passed the National Manufactured Housing Construction and Safety Standards Act (*42 U.S.C. § 5401 et seq.*), which authorized HUD to establish and enforce construction and safety standards for factory-built manufactured housing. Congress granted HUD this authority primarily to ease the administrative burden on manufacturers while establishing consumer protections, allowing manufacturers to build to a single construction standard that preempts state and local codes. In addition, federal supervision of building standards for manufactured homes reduced the burden on states that lacked resources to adequately oversee the construction of homes within and out of state. Finally, establishing a uniform code applicable to all states decreased manufacturing costs while ensuring a minimum level of safety, thus reinforcing manufactured housing as a safe and affordable housing option.

Congress made significant statutory changes through the Manufactured Housing Improvement Act (MHIA) of 2000. The changes included granting HUD the authority, for the first time, to establish model installation standards for manufactured homes that would become nationwide minimum standards. These installation standards do not have the same preemptive effect as the construction and safety standards; rather, they establish minimum requirements for manufacturers to address through home installation instructions. The MHIA also created the Manufactured Housing Consensus Committee (MHCC), a federal advisory committee composed of 21 voting members representing manufactured housing producers, retailers, consumers and consumer organizations, and general interest and public officials with an interest in manufactured housing. MHCC is responsible for recommending changes to both the construction and safety code and installation standards.

HUD's manufactured housing program, implementing the statutory distinctions, differentiates between construction and installation activities. The construction and safety standards, which were authorized by the National Manufactured Housing Construction and Safety Standards Act of 1974, provide requirements that must be met before a home may be shipped from the production facility and generally cover the design and construction of manufactured homes. The 1974 Act established the requirements for manufacturers to self-certify that their manufactured homes conform with the Federal Manufactured Home Construction and Safety Standards. Such certification is required to be in the form of a label or tag permanently affixed to each transportable section (floor) of a manufactured home.

HUD's model installation standards, authorized by the MHIA, provide requirements affecting manufacturers' installation instructions and the work performed at the site as part of the placement of the home, such as the foundation, anchorage, close-up work, and postplacement connections of some appliances and utility systems.

In 2018, nearly 97,000 homes consisting of approximately 150,000 transportable sections were produced under this national building regulatory program. Approximately 135 manufacturing plants are located across the United States. Manufactured housing represents roughly 10 percent of all new single-family construction starts and constitutes higher percentages in rural areas.

slightly less than a quarter (23%) were placed on foundations of masonry or concrete. These new manufactured homes were concentrated in the South, where 61 percent were sited; 16 percent were in the Midwest, 16 percent were in the West, and 7 percent in the Northeast. New manufactured homes in the South were typically placed on piers, and most new homes were placed outside of manufactured home communities. New homes in the Northeast and Midwest, on the other hand, were more likely to be placed in manufactured home communities.<sup>7</sup> Durst and Sullivan stress the variation within manufactured housing in terms of location (rural or metropolitan) and tenure (owner occupied or rental).<sup>8</sup> The average sales price of a new manufactured home in 2018 was \$78,500 (\$52,400 for a single-piece home and \$99,500 for a two-piece home).<sup>9</sup> The Manufactured Housing Institute (MHI) estimates that 22 million people with a median annual household income of \$30,000 live in manufactured homes.<sup>10</sup> Nearly one-quarter of residents of manufactured homes are between 8 and 29 years old, and 19 percent are older than 60. More than half (55%) earn less than \$30,000 per year.<sup>11</sup> Although an estimated 80 percent of manufactured home residents own their home, most rent the land on which it is sited.<sup>12</sup>

Modular homes account for a comparatively smaller share of the housing market than manufactured housing. In 2018, site-built homes accounted for 97 percent, and modular homes just 1 percent, of all privately owned, single-family construction exclusive of manufactured homes in the United States. Regional differences exist in the use of modular, panelized, and precut construction methods. Of the U.S. Census Bureau's four national subregions, the Northeast has the highest percentage of single-family homes constructed offsite exclusive of manufactured homes, with 7 percent of new homes being modular and 3 percent of homes built with panelized sections or precut materials in 2018. By contrast, in the West, 1 percent of new

single-family homes were modular and an additional 1 percent were built with panelized sections or precut materials in 2018.<sup>13</sup> Modular construction remains a very small part of the multifamily construction market as well; as of 2018, 99 percent of the nation's multifamily buildings were built onsite.<sup>14</sup>

## Benefits of Factory-Built Housing

The potential benefits of factory construction have been a subject of longstanding interest. HUD's Operation BREAKTHROUGH, which began in 1969, was founded on the premise that shifting from onsite to factory construction could reduce housing costs. Although the program's impact on the industry was limited, a National Academies Press report credits Operation BREAKTHROUGH with achieving "marketplace acceptance that increased factory production of housing improves construction efficiency, quality, and affordability."<sup>15</sup> Constructing housing in a factory setting and transporting it to the site offers numerous benefits, including reduced labor, materials, and financing costs; a compressed construction schedule; and conditions favorable for quality control. Factory construction methods can also incorporate advances in energy efficiency and disaster resilience. Centralizing production facilitates the standardization of construction processes, and the controlled factory environment protects materials from exposure to the elements and avoids construction delays because of adverse weather. Factory construction also reduces noise, traffic and parking disruption, and environmental and other impacts.<sup>16</sup>

**Cost savings and affordability.** The cost savings from factory construction promise increased affordability for homeowners and renters. These savings are not guaranteed, however, and building and equipping a factory and creating repeatable designs generates considerable upfront costs. Bertram et al. suggest that cost savings will be greatest when production achieves high scale and repeatability, and they should improve

with technological advances and continued research. Under such conditions, they estimate that modular construction could achieve an overall savings of up to 20 percent over traditional construction.<sup>17</sup> MHI reports that the average price per square foot of a manufactured home is \$49 compared with \$107 for a site-built home.<sup>18</sup> Overall, Schlottmann and Boehm find that manufactured housing is "a low-cost housing alternative... [that] is observed to have higher average quality rankings across both the neighborhood and structural dimensions of housing services than rental units."<sup>19</sup> "There is really no competition in terms of the cost to produce factory-built housing," says Esther Sullivan, assistant professor of sociology at the University of Colorado Denver.<sup>20</sup>

Several factors, including labor and materials, could potentially contribute to cost savings. Factories can break the construction process into repetitive tasks that require less skill and eliminate the need for subcontractors. Factory quality control procedures could reduce the need for (or time lost associated with) rework and more efficiently detect and remedy defects in materials. Work schedules can be managed more efficiently and predictably.<sup>21</sup> Finally, factories can be located in areas with lower prevailing wages. In a 2001 study, Winter et al. report that the labor cost of a factory-built home ranges from 8 to 12 percent of the total construction cost compared with 40 to 60 percent of the total cost for a site-built home.<sup>22</sup> Bertram et al. estimate that modular construction can achieve an overall labor savings of up to 25 percent on a project compared with traditional onsite construction.<sup>23</sup>

Factory construction can also reduce the cost of materials. Factories can buy materials in bulk, typically at a savings, and can buy a greater proportion of materials directly from suppliers rather than through intermediaries such as subcontractors.<sup>24</sup> Factories with precision, computer, and laser tools can reduce mistakes and waste, and recycling

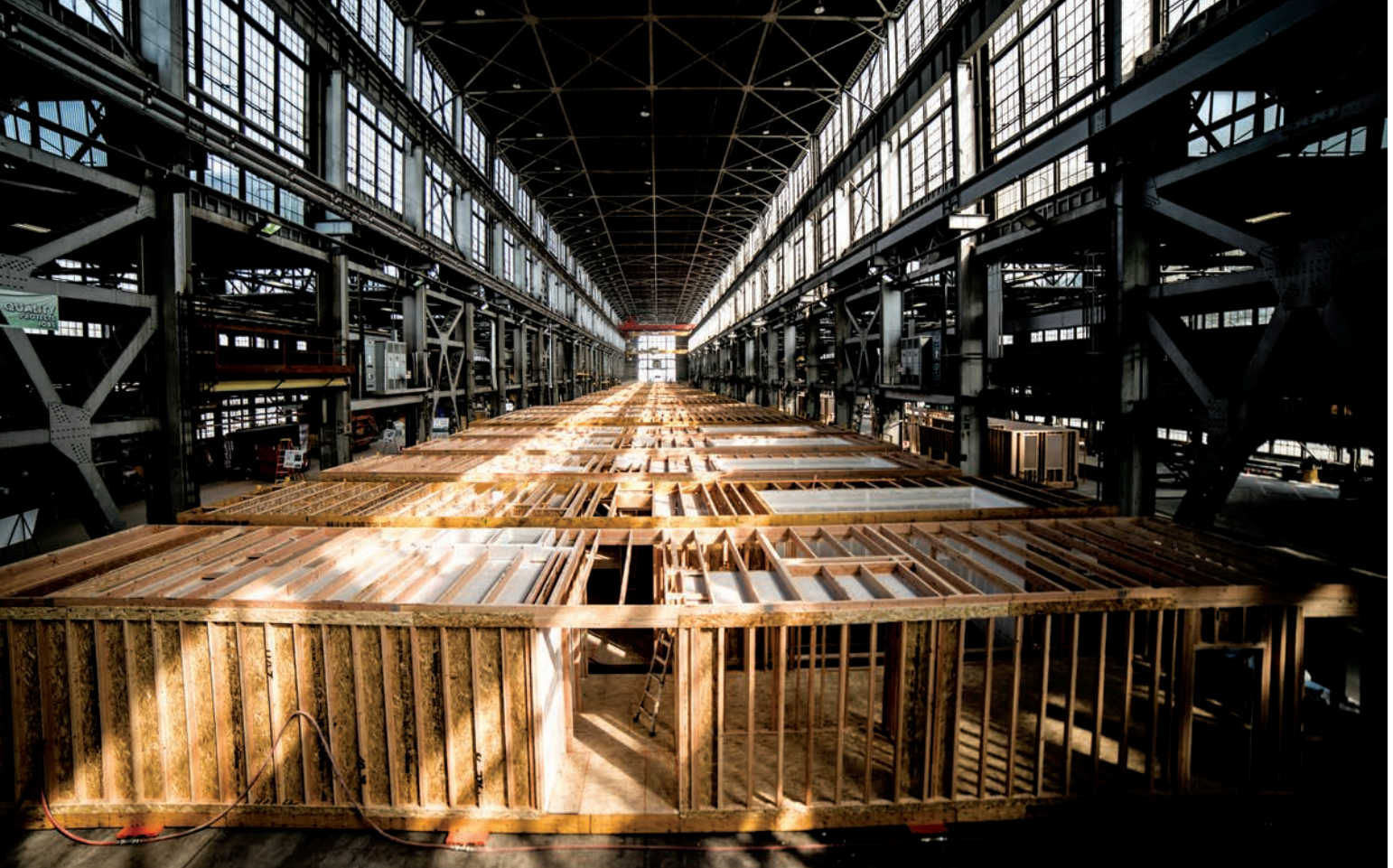


Photo courtesy of Nancy Holliday Photography

In northern California, multifamily housing builder Factory\_OS hosts an Innovation Lab of the Turner Center for Housing Innovation to study and advance factory construction techniques.

or disposal of what waste remains is more efficient in a factory setting. A controlled environment not only protects materials from weather-related damage, loss, and the need for replacement but also protects the production schedule from weather-related delays.

Eliminating weather delays is just one way that factory construction can compress the construction schedule. Factory building also means that home construction and site preparation can happen concurrently. Bertram et al. estimate that modular production can reduce construction time by 20 to 50 percent.<sup>25</sup> Shortening the construction timeline can offer substantial savings in various financing costs, such as interest paid on construction loans.

Increasing the use of prefabrication in multifamily housing may also promote affordability. Galante et al. examine offsite production of three- to four-story, wood-framed multifamily housing and find potential savings of up to 20 percent on the cost of construction

compared with traditional building methods.<sup>26</sup> The use of prefabrication with low-income housing tax credits (LIHTCs) is still relatively new, but the reduced construction times of prefabricated construction could be an advantage in using LIHTCs.<sup>27</sup> HUD Code and modular homes can also function as accessory dwelling units (ADUs), which increase the affordable housing supply in tight markets.

**Energy efficiency.** In addition to its affordability benefits, factory-built housing can incorporate advances in energy efficiency, thereby using resources more responsibly and reducing residents' utility bills. Although energy costs for older manufactured housing tended to be high, new technologies are much more efficient, and research suggests that manufactured and modular housing can incorporate advanced building envelopes for energy efficiency without significantly affecting cost.<sup>28</sup> Manufactured homes can qualify for ENERGY STAR® certification if they meet requirements to be “substantially

more energy efficient than a comparable standard code home.”<sup>29</sup> There have also been efforts to exceed the energy efficiency standards set by the HUD Code. For example, the Bonneville Power Administration has collaborated with the manufactured housing industry since 1992 (beginning with the Manufactured Homes Acquisition Program) and with state energy offices since 1995 (under the branding of Super Good Cents) to establish a high standard for energy efficiency for electrically heated homes in the Pacific Northwest region. Now known as the Northwest Energy Efficient Manufactured Housing Program (NEEM), the initiative has expanded from its core requirements, which focused on the performance of the building shell, to include more efficient windows, lighting, and equipment. A 2008 evaluation estimated a potential savings of 50 percent.<sup>30</sup> More recently, the program has developed the NEEM+ certification standard, which uses 30 percent less energy than the ENERGY STAR® standard.<sup>31</sup>

**Disaster resilience.** Attention to the materials and design of manufactured housing can improve not only energy efficiency but also disaster resilience. In the past, manufactured housing was highly susceptible to damage in natural disasters. The HUD Code has mandated changes that make modern manufactured homes significantly more resilient to fire and natural disasters than pre-HUD Code housing. Manufactured homes built after the HUD Code standards were implemented have a fire rate per 1,000 occupied units that is roughly one-third lower than pre-HUD Code homes and a death rate per 100 fires that is roughly one-half lower. Between 2007 and 2011, manufactured homes had a fire death rate per 100,000 that was similar to that of other single-family homes.<sup>32</sup> The HUD Code adopted new wind load standards after Hurricane Andrew in 1994; manufactured homes built to the new standards held up better than those built before the standards were implemented, and homes built between the advent of

the HUD Code and the new standards fared better than those built before the implementation of the HUD Code.<sup>33</sup> Research shows that the performance of new factory-built housing is comparable to that of site-built housing. For example, in their review of factory-built housing in coastal areas, Fenner et al. state that “owners and construction companies have found that prefabricated construction allows the rebuilding of homes affordably, efficiently, and quickly. In addition, new prefabricated units can be as wind- or earthquake-resistant as site-built buildings, minimizing the effects of strong climate events.”<sup>34</sup> In some cases, natural disasters have catalyzed innovations and improvements in disaster resilience. Following Hurricane Sandy, the New York City Mayor’s Office of Housing Recovery Operations and the Build It Back program used a portion of its Community Development Block Grant Disaster Recovery funds to construct approximately 100 single-family modular homes. Having successfully piloted modular construction, the city

is now incorporating modular construction into its broader plans to produce affordable housing.<sup>35</sup>

Despite the considerable benefits of factory-built housing, traditional, site-built housing remains overwhelmingly dominant. Numerous barriers and challenges stand in the way of the wider use of manufactured and modular housing.

## Barriers to Factory-Built Housing

Dawkins et al. write that market factors such as “regional location, population density, median family income, the existing inventory of manufactured housing units, and proximity to manufactured housing plants” interact with regulatory constraints and “local perceptions of manufactured housing to influence manufactured housing supply.”<sup>36</sup>

**Zoning.** Although HUD Code housing is not subject to local building codes, local zoning ordinances pose a significant barrier to the placement of manufactured housing. Some local ordinances prohibit manufactured housing outright, whereas others limit permitted locations or impose additional design standards.<sup>37</sup> Dawkins et al. report that “lack of by-right zoning, burdensome fees, permits, snow load standards, fire codes, zoning codes, subdivision regulations, architectural design standards, and environmental regulations” influence the placement of manufactured homes.<sup>38</sup> Local zoning restrictions may also pose a barrier to ADUs, whether factory- or site-built, because many communities have outright bans on accessory structures. Opposition to ADUs may stem from concerns about new, possibly transient residents as well as higher-density development and associated stresses on traffic, parking, and infrastructure.<sup>39</sup>

**Permitting and codes.** Although the HUD Code preempts local codes for manufactured housing, non-HUD Code



Photo courtesy of Amanda Belue

New manufactured homes typically have the same appliances, fixtures, and amenities that you would find in a site-built home.

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# Factory-Built Accessory Dwelling Units for Affordable Housing Options

Recognizing the potential for accessory dwelling units (ADUs) to help address housing needs, several jurisdictions at the state and local level have attempted to encourage their use by reducing regulatory barriers and offering various incentives. The cities of Seattle; Denver; and Portland, Oregon, are among those that are actively encouraging the use of ADUs. Seattle, for example, adopted legislation in 2019 to make it easier to add ADUs to properties within single-family zones. The city will also streamline the design and permitting processes, in part by developing pre-approved plans.<sup>1</sup> At the state level, California, through multiple rounds of legislation beginning in 2017, has renewed a push to promote the use of ADUs through reduced regulatory barriers, supports and incentives, and streamlined approval and permitting processes (see the Spring 2018 issue of *Evidence Matters*).<sup>2</sup> According to the California Department of Housing and Community Development, as of May 2019, more than 200 local jurisdictions had adopted ADU ordinances in accordance with the enabling legislation. Although many of these jurisdictions have simply updated their regulations to comply with state law, some have taken additional measures to proactively encourage ADU development.<sup>3</sup>



Photo courtesy of Abodu and Joe Fletcher

The City of San Jose is encouraging the adoption of accessory dwelling units through preapproved factory-built designs such as the one pictured above.

Experience to date indicates that factory-built ADUs would be a part of any expansion of ADU use. Factory production of ADUs offers the same benefits as factory production of single- and multifamily homes: reduced material and labor costs, shorter construction timelines, and overall affordability advantages. The city of San Jose's new ADU Master Plan Program offers express and priority reviews of preapproved ADU plans to expedite the permitting process. As part of the program, the city has invited vendors to submit "master plans" — one recently approved master plan is for a factory-built ADU that is 495 square feet.<sup>4</sup> In Los Angeles County, a recently completed pilot program provided subsidies for building or preserving ADUs along with technical assistance and streamlined approval. The program was part of the county's Homeless Initiative.<sup>5</sup> Within this ADU-friendly regulatory context, the Los Angeles affiliate of the nonprofit Volunteers of America (VOALA) has helped homeowners take advantage of county incentives to invest in ADUs that they rent to recipients of HUD assistance. VOALA has found factory-built ADUs to be most efficient to build. VOALA plans to acquire and rehabilitate single-family homes, place factory-built ADUs in their backyards, and rent both to veterans participating in the HUD-Veterans Affairs Supportive Housing program.<sup>6</sup>

<sup>1</sup> Seattle Office of Planning and Community Development. "Encouraging Backyard Cottages" ([www.seattle.gov/opcd/ongoing-initiatives/encouraging-backyard-cottages](http://www.seattle.gov/opcd/ongoing-initiatives/encouraging-backyard-cottages)). Accessed 18 November 2019.

<sup>2</sup> California Department of Housing and Community Development. 2018. "Accessory Dwelling Unit Memorandum."

<sup>3</sup> California Department of Housing and Community Development. 2019. "Accessory Dwelling Units (ADU) — Ordinances Received by HCD."

<sup>4</sup> City of San Jose Department of Planning, Building, and Code Enforcement. "Preapproved ADUs" ([www.sanjoseca.gov/business/development-services-permit-center/accessory-dwelling-units-adus/adu-permit-plan-review-process/adu-single-family-master-plan-program](http://www.sanjoseca.gov/business/development-services-permit-center/accessory-dwelling-units-adus/adu-permit-plan-review-process/adu-single-family-master-plan-program)). Accessed 10 December 2019.

<sup>5</sup> Los Angeles County Department of Regional Planning. n.d. "Second Dwelling Unit (Accessory Dwelling Unit) Pilot Program."

<sup>6</sup> Wendy Broffman. 2018. "Backyard bonuses," *Multihousing Pro*, 1 December.



factory-built housing must meet local codes, which can add impediments that discourage the siting of factory-built homes. Factory builders may need to secure building permits before construction and then manage and coordinate both factory and onsite inspections during the building process, which may be burdensome. Most states require a third-party government agency for factory inspections of modular structures.<sup>40</sup>

**Negative Perceptions.** Because of negative stereotypes about the quality of manufactured housing and its association with low-income residents, local governments and community residents may consider it undesirable. Factory-built housing has had a reputation for being an “ugly, cheap, poor-quality option,” but it is becoming increasingly indistinguishable in aesthetics and quality from site-built housing.<sup>41</sup> Innovations such as increased roof pitches, the use of traditional roofing and siding materials, and two-story home models allow factory-built housing to blend into neighborhoods predominantly composed of site-built homes.<sup>42</sup> Despite these improvements, negative perceptions and dated ordinances limit the supply of factory-built options.

**Design.** Although design is a critical element of any construction project, Abu-Khalaf notes that designs for factory-built housing must be even more efficient and precise than those of site-built housing. Factory building often relies on lower-skilled labor completing repeatable tasks and offers little room for adjustments and alterations once production has started. These limitations increase the importance of precise design. The nature of factory-built housing imposes unique design challenges, including that the home or its constituent parts must be designed for transport to the site.<sup>43</sup>

**Delivery challenges.** Transport itself can present a barrier to factory-built housing. Delivery to remote areas can be challenging or cost prohibitive. (Often, these are the same places to which

the delivery of materials for site-built housing can be difficult.) Dense urban areas can be difficult for large delivery trucks to navigate. The cost of transport as well as the cost and logistics of using a crane, which is necessary for assembly in some cases, can offset some of the savings that factory building offers.<sup>44</sup> Departments of transportation in some jurisdictions may also require special permits for transport and delivery.

**Financing.** Unfamiliarity with the unique aspects of factory-built housing presents obstacles to the financing of its construction and purchase. For construction loans, lenders may perceive factory-built housing as higher risk and therefore charge more than they would for comparable, but more familiar, site-built housing. A key difference between site-built and factory-built housing that might account for this perception is that factory-built housing requires lenders to supply a larger proportion of the total cost upfront rather than disbursing

funds in installments as construction reaches benchmarks.<sup>45</sup>

Many owners of manufactured housing finance their purchase through a chattel or property loan. Purchasers may use a chattel or personal property loan to finance a manufactured home that will be sited on land they do not own, as in a manufactured home community.<sup>46</sup> Chattel loans typically are more expensive than a real estate mortgage — an estimated 4.4 percentage points more per year, according to research by Goodman and Ganesh. Goodman and Ganesh also find that many borrowers who take out a chattel loan could have qualified for a mortgage. In most cases, a borrower financing a manufactured home as real property with a mortgage also must own the land on which it is sited. Goodman and Ganesh estimate that nationally, as many as 53 percent of new manufactured homeowners owned the land and might have been eligible for a mortgage but instead



Homeowners can purchase a factory-built accessory dwelling unit and site it on their property if local zoning regulations permit.

Photo courtesy of Macy Homes, Inc., Ventura, CA



Photo courtesy of ROC USA / Mike Bullard

Lois Parris served as the first board president at Lakes Region Manufactured Housing Cooperative when the community became a resident-owned community (ROC) in June 2000, and she has since helped take the ROC model nationwide.

financed their home with a personal property loan. They note that although many borrowers may choose the more expensive chattel loan for the sake of convenience, some might not be aware of the alternative option with the lower rate.<sup>47</sup>

### Addressing Challenges and Overcoming Barriers

There is a continued need for factory-built housing to become an even greater source of affordable housing. Nearly 3 million households live in manufactured housing communities where residents may own their homes but rent the land on which the home is sited.<sup>48</sup> According to MHI, there were about 40,000 such land-lease communities in 2017, and most of these are “well-managed, well-maintained, and offer many benefits to residents.”<sup>49</sup> Land-lease communities can offer desirable amenities such as laundries, recreational facilities, and community space; services and maintenance such as landscaping and snow removal; and infrastructure such as utilities, roads, and parking.<sup>50</sup> For those who are unable to qualify for a loan to purchase a lot, a land lease affords the opportunity to

site their home, and if not financing the purchase of a lot, the savings in upfront charges could allow the buyer to purchase a more expensive unit.<sup>51</sup>

In some land-lease communities, however, rents may not be sufficient to cover infrastructure maintenance and investors may not keep up with infrastructure costs, eroding the quality of life in these communities and decreasing the value of their manufactured units.<sup>52</sup> Tenants are also vulnerable to rent increases or the sale of the land on which their homes are sited. If they cannot afford the rent or if the property is repurposed by the new owners, they may face eviction. Theoretically, homeowners could transport their homes to a new site, but the cost of moving may be prohibitive, finding an alternative site may be difficult, and the structure may not be able to withstand a move. In these cases, homeowners may effectively be forced to abandon their homes.<sup>53</sup>

One way to address these challenges would be to create and preserve avenues for tenant purchase of land. As of 2014, 19 states had adopted legislation to facilitate resident ownership.<sup>54</sup> Carolyn

Carter, deputy director of the National Consumer Law Center, says that state laws that give residents advance notice of any sale of the property (not only in the case of a change of use) and allow residents to make an offer to purchase (in particular, laws that require an owner to accept the residents’ offer if it matches that of a third-party bidder) are most effective. Laws that provide tax incentives to owners who sell to residents are helpful but less effective.<sup>55</sup> Owners of manufactured communities have challenged laws granting residents right of first refusal or requiring owners to accept a matching offer from residents in court with mixed results. In 2000, the Washington State Supreme Court ruled in favor of the Manufactured Housing Communities of Washington, stating that an act giving tenants a right of first refusal was “an unconstitutional taking of private property for private use.”<sup>56</sup> The Massachusetts Supreme Judicial Court ruled in 1996 that a law giving tenants right of first refusal to purchase was not a “regulatory ‘taking’” and that the law “substantially advances a legitimate State interest.”<sup>57</sup> Park owners have also opposed lengthening advance notice

periods, arguing that the resale restrictions should not be changed after a park's purchase.<sup>58</sup>

ROC USA is a nonprofit working to promote resident ownership of manufactured home communities. Currently, 250 limited equity cooperatives are in ROC USA's network, in which residents own their homes and an equal share of the park property. Residents of these communities typically are able to keep their site fees below market rates, make health and safety improvements, engage with other community members, and enjoy other economic benefits such as being able to sell their homes more quickly and for higher prices.<sup>59</sup> Establishing community land trusts through a nonprofit owner that can control land and leases under conditions that maintain affordability and stability is another strategy for protecting residents.<sup>60</sup> Resident-owned communities and community land trusts, however, represent only a small portion of manufactured home

communities. According to a report by Freddie Mac, only approximately 2.4 percent of manufactured housing communities are resident owned.<sup>61</sup>

To increase the volume of factory-built housing, federal, state, and local officials can identify and eliminate unnecessary regulations and restrictions. HUD recently reduced regulatory burdens for manufactured housing in the HUD Code. Effective March 2016, HUD issued a rule governing features that can be completed onsite so that manufacturers need not seek prior approval from HUD. HUD continues to evaluate the best way to regulate this construction to ensure consumer safety and minimize regulatory burdens.<sup>62</sup> In addition, several rulemakings in process will, once final, eliminate regulatory burdens associated with producing certain structures, such as multistory homes and garage- and carport-ready homes, and certain features, such as accessible showers and tankless water

heaters. MHI chief executive officer Lesli Gooch says that "there needs to be a uniform process for updating the HUD Code in a responsive and efficient manner" to keep up with industry innovations.<sup>63</sup>

State and local governments can expand the areas zoned to accept factory-built housing, including manufactured housing and ADUs (see "Factory-Built Accessory Dwelling Units for Affordable Housing Options," p. 8).<sup>64</sup> As of 2011, Dawkins et al. noted that "more than half of states require[d] localities to allow HUD-Code units somewhere within local jurisdictions."<sup>65</sup> Localities could adjust codes to permit manufactured and other factory-built housing, which could possibly increase the affordable housing supply in these jurisdictions. Localities could also allow mixtures of housing types that include factory-built housing so that manufactured housing is not simply siloed into designated areas or parks but is more fully integrated into communities.<sup>66</sup>



Photo courtesy of ROC USA / Mike Bullard

Marilla Country Village, a 145-site community near Buffalo, New York, has invested more than \$250,000 in improvements with only one rent increase of \$10 per month since residents took ownership in December 2011.



Photo courtesy of ROC USA/Mike Bullard

The 111 families of Lakes Region Manufactured Housing Cooperative in Belmont, New Hampshire, have enjoyed the security of co-op land ownership since June 2000.

The Federal Housing Finance Agency is helping to address financing challenges through the Duty to Serve (DTS) program. DTS requires Fannie Mae and Freddie Mac to facilitate a secondary market for mortgages on housing for very low-, low-, and moderate-income families in certain market sectors, including manufactured housing.<sup>67</sup> To further expand financing opportunities for individual homeowners, Goodman and Ganesh suggest that policymakers examine ways to make it easier for buyers of manufactured homes to title their purchases as real property rather than chattel so they can obtain more affordable loans.<sup>68</sup>

The government-sponsored enterprises have also used their influence over the market to encourage borrowers to institute certain tenant protections. Freddie Mac, for example, is “seeking to increase protections for tenants in MHCs [manufactured home communities]” through regulations that create a minimum set of landlord requirements for a loan on an MHC to qualify for DTS

credit, including a 30-day written notice of rent increases and a 5-day grace period for rent payments. These requirements could be enforced by state laws or adopted voluntarily in the lease agreement.<sup>69</sup> Comments on these regulations from the manufactured housing industry indicated opposition and a preference for “a funding option unconstrained by pad lease requirements.”<sup>70</sup> Some states already have legislation that requires landlords to give adequate notice or relocation assistance if the park owner decides to sell.<sup>71</sup> (See “Programs Support Energy-Efficient Modular and Manufactured Housing,” p. 23.) However, relocation may have negative consequences, such as transportation, siting fees, difficulty finding a new lot, and social dislocation.<sup>72</sup> In some cases, owners of manufactured home communities have favored greater flexibility than what existing requirements allow. For example, the Florida Manufactured Housing Association supports legislation that would allow eviction notices to be sent by first-class mail and posted to front doors rather than sent by certified mail.<sup>73</sup>

The manufactured housing industry has also worked with Fannie Mae and Freddie Mac to develop conventional financing for manufactured homes with designated popular features through a financing vehicle called CrossMod™. Gooch says that this development is a “huge step” for manufactured housing because, “for the first time ever, HUD Code homes can qualify for conventional financing and be appraised alongside site-built homes.”<sup>74</sup>

Finally, ongoing innovations in factory-built housing have made it more affordable and energy efficient as well as higher in quality, which can make it more attractive to consumers. Engineering advances that allow for two-story residences and building innovations such as hinged roofs have made factory-built housing more like site-built housing in some neighborhoods and expanded the number of styles available.<sup>75</sup> Materials advances such as cost-optimized attic insulation that increases insulative value without prohibitive cost enhance the affordability of factory-built housing by lowering utility costs.<sup>76</sup> New construction and logistics technologies may facilitate production in ways that boost affordability. Although not widely used, some builders have experimented with the use of recycled materials such as shipping containers, and some factory-built homes have been constructed using 3D printing technology. Factory-built construction is more easily adapted to automation than site-built housing, and advances in automation may impact the cost and efficiency of factory building.<sup>77</sup> In terms of logistics, innovations in digital technologies can improve design, precision, and productivity in construction and facilitate processes.<sup>78</sup>

## Realizing the Potential of Factory-Built Housing

Factory-built housing offers many benefits, including lower production costs, and holds tremendous promise for increasing the availability of affordable rental and owner-occupied housing in the United States. Incorporating modular construction into the

development of multifamily rental housing can provide significant savings that can be passed on to renters, and, especially when residents own the land on which their homes are sited, manufactured homes offer a promising path to affordable and sustainable homeownership for low- and moderate-income buyers. Modern factory-built housing can be indistinguishable in appearance and quality from similar site-built housing and incorporates the latest innovations in energy efficiency and disaster resilience. To fully realize its benefits, however, policymakers need to understand and address the persistent barriers facing the industry, such as prohibitive regulations and zoning, community opposition, and financing challenges that restrict the construction and siting of factory-built housing. **EM**

<sup>1</sup> Joint Center for Housing Studies of Harvard University. "The State of the Nation's Housing, 2019," 1.

<sup>2</sup> Renia Ehrenfeucht. 2018. "Moving Beyond the Mobile Myth: Preserving Manufactured Housing Communities."

<sup>3</sup> Carol Galante, Sara Draper-Zivetz, and Allie Stein. 2017. "Building Affordability by Building Affordably: Exploring the Benefits, Barriers, and Breakthroughs Needed to Scale Off-Site Multifamily Construction," Turner Center.

<sup>4</sup> Steven Winter Associates. 2001. *A Community Guide to Factory-Built Housing*, Prepared for U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 13–4, 40.

<sup>5</sup> Richard Genz. 2001. "Why Advocates Need to Rethink Manufactured Housing," *Housing Policy Debate* 12:2.

<sup>6</sup> Michael Hollar, Daniel Marcin, and Alastair McFarlane. 2019. "Report to Congress on the On-Site Completion of Construction for Manufactured Homes."

<sup>7</sup> U.S. Census Bureau. 2019. "Selected Characteristics of New Manufactured Homes Sold and Placed for Residential Use by Size of Home and Region 2014–2018."

<sup>8</sup> Noah J. Durst and Esther Sullivan. 2019. "The Contribution of Manufactured Housing to Affordable Housing in the United States: Assessing Variation Among Manufactured Housing Tenures and Community Types," *Housing Policy Debate* 29:6, 2.

<sup>9</sup> U.S. Census Bureau. 2019. "Average Sales Price of New Manufactured Homes Placed by Size of Home by State 2014–2018."

<sup>10</sup> Manufactured Housing Institute. 2018. "2018 Manufactured Housing Facts: Industry Overview."

<sup>11</sup> Ibid.

<sup>12</sup> Ehrenfeucht.

<sup>13</sup> U.S. Census Bureau. "2018 Characteristics of New Housing: Construction Method, Single-Family Housing."

<sup>14</sup> U.S. Census Bureau. "2018 Characteristics of New Housing: Construction Method, Multifamily Buildings."

<sup>15</sup> National Academies Press. 2008. *Rebuilding the Research Capacity at HUD*, 67. See also, Todd Richardson. 2018. "Operation Breakthrough," *PD&R Edge*.

<sup>16</sup> Ahmad Abu-Khalaf. 2019. "New Reflections on Affordable Housing Design, Policy and Production: Overcoming Barriers to Bringing Off-Site Construction to Scale," 8.

<sup>17</sup> Nick Bertram, Steffen Fuchs, Jan Mischke, Robert

Palter, Gernot Strube, and Jonathan Woetzel. 2019. "Modular construction: From projects to products," McKinsey & Company, 12.

<sup>18</sup> Manufactured Housing Institute.

<sup>19</sup> Alan Schlottman and Thomas P. Boehm. 2004. "Is Manufactured Housing a Good Alternative for Low-Income Families? Evidence from the American Housing Survey," Prepared for U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 1.

<sup>20</sup> Interview with Esther Sullivan, 16 October 2019.

<sup>21</sup> Bertram et al.

<sup>22</sup> Steven Winter Associates, 16.

<sup>23</sup> Bertram et al., 14.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

<sup>26</sup> Galante et al.

<sup>27</sup> Teresa Garcia. 2017. "Could Modular Housing Be Affordable Answer to Rising Construction Costs?" *Novogradac Journal of Tax Credits* VIII:X.

<sup>28</sup> E. Levy, M. Mullens, and P. Rath. 2014. "Advanced Envelope Research for Factory Built Housing, Phase 3—Whole-House Prototyping," U.S. Department of Energy.

<sup>29</sup> "Designing ENERGY STAR Certified Manufactured Homes," Energy Star website ([www.energystar.gov/partner\\_resources/residential\\_new/working/builders\\_developers/guidelines\\_plants/designing\\_manufactured\\_homes](http://www.energystar.gov/partner_resources/residential_new/working/builders_developers/guidelines_plants/designing_manufactured_homes)). Accessed 22 October 2019.

<sup>30</sup> Tom Hewes and Brady Peeks. 2013. "Northwest Energy Efficient Manufactured Housing Program Specification Development," U.S. Department of Energy, Building Technologies Program.

<sup>31</sup> "Welcome," Northwest Energy Efficient Manufactured Housing Program website ([www.neemhomes.com](http://www.neemhomes.com)). Accessed 22 October 2019.

<sup>32</sup> John R. Hall. 2013. "Manufactured Home Fires," National Fire Protection Association.

<sup>33</sup> Kevin M. Simmons and Daniel Sutter. 2008. "Manufactured home building regulations and the February 2, 2007 Florida tornadoes," *Natural Hazards* 46.

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<sup>37</sup> Ibid.

<sup>38</sup> Ibid.

<sup>39</sup> Vicki Been, Benjamin Gross, and John Infranca. 2014. "Responding to Changing Households: Regulatory Challenges for Micro-Units and Accessory Dwelling Units," New York University Furman Center.

<sup>40</sup> Abu-Khalaf, 11, 16.

<sup>41</sup> Steven Winter Associates, 9, 16, 19, 39, 58–9; Bertram et al.

<sup>42</sup> Daniel R. Mandelker. 2016. "Zoning Barriers to Manufactured Housing," *The Urban Lawyer* 48:2, 239.

<sup>43</sup> Abu-Khalaf, 14; Steven Winter Associates, 16, 39.

<sup>44</sup> Steven Winter Associates, 19; U.S. Department of Housing and Urban Development. 2015. "Local Initiatives Promote Homeownership in Indian Country," *Evidence Matters* (Spring).

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<sup>46</sup> Manufactured Housing Institute. "Manufactured Home Financing" ([www.manufacturedhousing.org/manufactured-homes-lender/](http://www.manufacturedhousing.org/manufactured-homes-lender/)). Accessed 15 October 2019.

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<sup>48</sup> Ehrenfeucht, 1.

<sup>49</sup> Manufactured Housing Institute 2018; Manufactured Housing Institute. "An Insider's Look at Manufactured Home Communities" ([www.manufacturedhousing.org/communityinsider/](http://www.manufacturedhousing.org/communityinsider/)). Accessed 5 May 2020.

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<sup>53</sup> Esther Sullivan. 2018. *Manufactured Insecurity: Mobile Home Parks and Americans' Tenuous Right to Place*, Oakland: University of California Press, 16.

<sup>54</sup> Ehrenfeucht.

<sup>55</sup> Interview with Carolyn Carter, 23 October 2019.

<sup>56</sup> *Manufactured Housing Communities v State*, 13 P.3d 183 (2000).

<sup>57</sup> *Greenfield Country Estates Tenants Assoc., Inc. v. Deep*, 423 Mass. 81, 666 N.E.2d 988 (Mass. 1996).

<sup>58</sup> Washington House Committee on Judiciary. 2017. "House Bill Report HB1514."

<sup>59</sup> Paul Bradley, email correspondence, 22 October 2019.

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<sup>62</sup> Hollar et al.

<sup>63</sup> Email correspondence with Lesli Gooch, 21 November 2019.

<sup>64</sup> Ehrenfeucht.

<sup>65</sup> Dawkins et al., xii.

<sup>66</sup> Interview with Esther Sullivan.

<sup>67</sup> "Duty to Serve," Federal Housing Finance Agency website ([www.fhfa.gov/PolicyProgramsResearch/Programs/Pages/Duty-to-Serve.aspx](http://www.fhfa.gov/PolicyProgramsResearch/Programs/Pages/Duty-to-Serve.aspx)). Accessed 15 October 2019.

<sup>68</sup> Goodman and Ganesh, 4.

<sup>69</sup> Freddie Mac Multifamily. n.d. "Tenant Protections in Manufactured Housing Communities," *Spotlight on Underserved Markets*.

<sup>70</sup> Federal Housing Finance Agency. 2016. "Enterprise Duty to Serve Underserved Markets," *Federal Register* 81:250, 96256.

<sup>71</sup> Ehrenfeucht.

<sup>72</sup> Interview with Esther Sullivan; Sullivan 2018, 16.

<sup>73</sup> Florida Realtors. 2020. "Laws Could Change for Owners of Mobile Homes."

<sup>74</sup> Email correspondence with Lesli Gooch.

<sup>75</sup> Ben Nelms. 2013. "Design Innovations in Manufactured Homes," May 15 blog post.

<sup>76</sup> U.S. Department of Energy. 2014. "Cost-Optimized Attic Insulation Solution for Factory-Built Homes."

<sup>77</sup> Joseph Neelamkavil. 2009. "Automation in the Prefab and Modular Construction Industry," Institute for Research in Construction; Falcon Structures. n.d. "Shipping Container Structured: An Eco-Friendly Business Choice"; Orbital Systems. 2019. "Get Ready to Deploy a 3D Printed House, Off the Grid."

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# Effects of Market Forces on the Adoption of Factory-Built Housing

In 1969, HUD launched Operation BREAKTHROUGH, a \$30 million demonstration program to test ways to expand the use of factory-built housing. This experiment produced 2,794 units and tested a number of new industrialization techniques.<sup>1</sup> In the end, however, the homebuilding industry largely did not adopt the techniques that Operation BREAKTHROUGH developed due to marketing challenges, conflicting building codes, labor opposition, and transportation costs, among other factors.<sup>2</sup> More than 50 years later, is the industry finally primed to make greater use of factory-built components?

Although nearly all housing is constructed onsite, substantial improvements in the quality, design, and cost-effectiveness

of factory-built housing during the past decade may increase its adoption. Sometimes referred to as prefabricated or “prefab” housing, factory-built housing systems include modular units, panelized construction, manufactured components such as wall panel systems and roof trusses, and the manufactured homes that HUD regulates.<sup>3</sup> Modular housing systems can make the construction of single-family homes and multifamily buildings less expensive, make more efficient use of increasingly costly land, and, ultimately, build vibrant neighborhoods.

We begin this article by illustrating trends in the adoption of factory-built housing and some of the benefits of factory-built components. Following a look at barriers to adoption facing

## HIGHLIGHTS

- Nearly all housing is currently constructed onsite, but improvements in the quality, design, and cost-effectiveness of factory-built housing could increase its adoption.
- Market pressures from increased land and labor costs could potentially lead to wider use of factory-built components.
- HUD is working to improve access to quality data to better research and understand market entry, innovation, and trends in the factory-built sector.

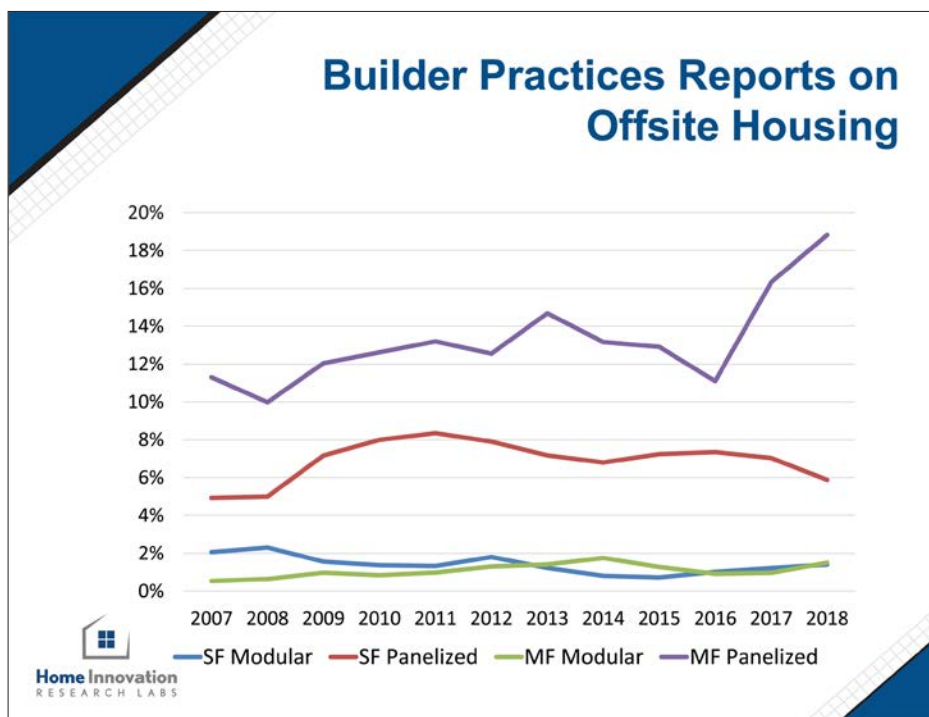
consumers and builders, we discuss two market pressures that potentially could lead to the increased adoption of factory building: land costs and labor costs. We conclude with recommendations for future research to build on our current knowledge in this field.

## Current State of Factory-Built Housing

HUD Code manufactured homes represented just 9 percent of homes produced in 2017.<sup>4</sup> According to the Home Innovation Research Labs (HI), in 2018 fewer than 2 percent of single-family and multifamily builders used modular housing, whereas roughly 6 percent of single-family builders and more than 18 percent of multifamily builders used panelized construction methods (see figure 1).<sup>5</sup>

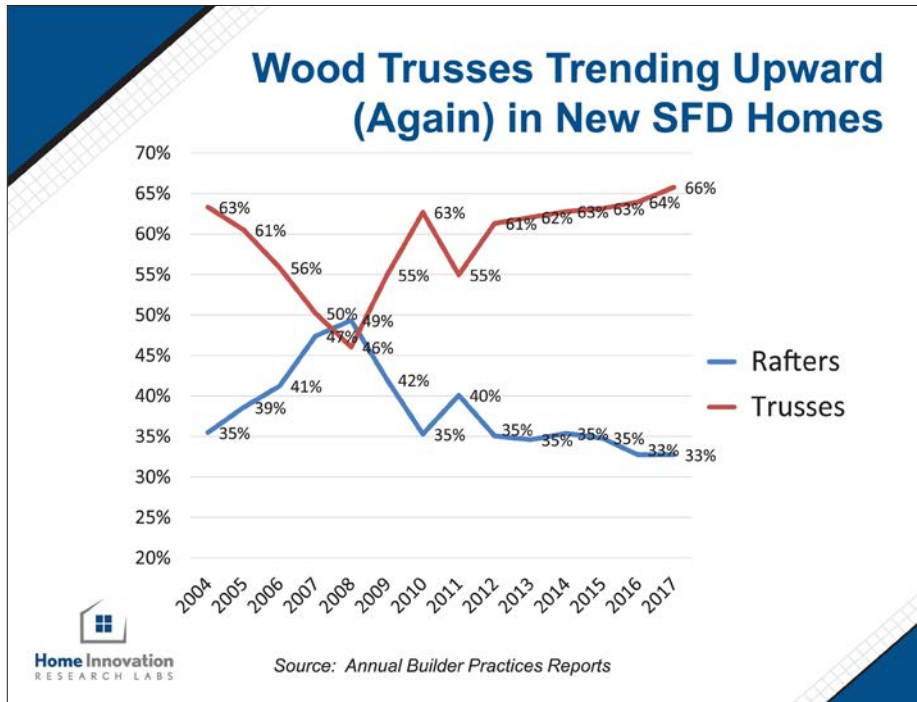
Roof trusses built in a factory setting tend to be popular among a majority in the industry. HI found that in 2017 66 percent of surveyed homebuilders used factory-built roof trusses for new single-family detached homes (see figure 2). The second most commonly used factory-built component is turn-key framing; 31 percent of builders anticipate using it for the next five years. Both factory-built roof trusses and turn-key framing offer builders advantages over traditional methods.

**Figure 1. Builder Practices Reports on Offsite Housing, 2007 to 2018**



Reprinted from: Ed Hudson. 2019. "Builder Outlook on Use of Components and Offsite Housing Technologies: Summary of Findings August 2019 Survey," Home Innovation Research Labs, 6.

**Figure 2. Use of Rafters and Trusses in New Single-Family Detached Homes, 2004 to 2017**



Note: SFD = single-family dwelling.

Reprinted from: Ed Hudson. 2019. "Builder Outlook on Use of Components and Offsite Housing Technologies: Summary of Findings August 2019 Survey," Home Innovation Research Labs, 9.

### Benefits of Factory-Built Housing

In theory, modular housing can save time and reduce waste because all the framing and a substantial portion of the finishes and systems can be assembled in a factory.

Building a home in a factory may reduce the time needed to complete the home. Modular housing, for example, can be built 30 to 50 percent faster than conventional site-built homes (see figure 3).<sup>6</sup> Modular homes and their components

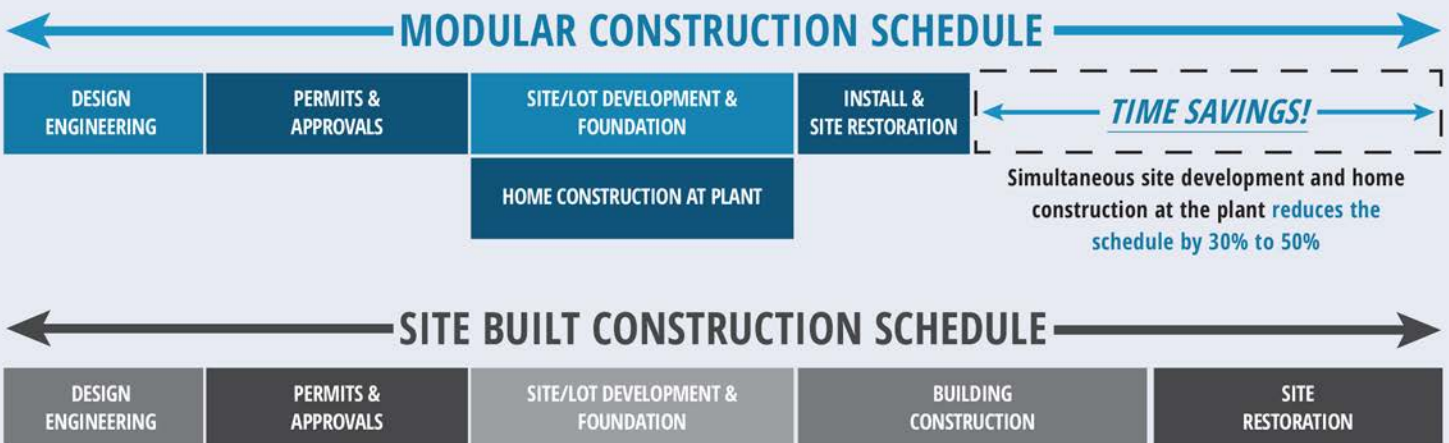
are built in the factory while site planning is taking place, which significantly shortens the construction schedule.<sup>7</sup>

Further, because much of the construction process for factory-built housing takes place in a climate-controlled factory, poor weather conditions are not a hindrance, making on-time delivery more likely.<sup>8</sup> Building materials can be stored in the factory, safe from unpredictable weather events such as rain and snow, which prevents not only damage to materials but also further work delays.<sup>9</sup> Even with these trends, however, the market has not fully realized the benefits of factory-built housing. In the next sections, we explore possible reasons for this.

### Consumer Perceptions of Factory-Built Housing

Factory-built housing has undergone many physical changes that have made it more similar to, and in many ways indistinguishable from, conventional site-built housing. In terms of style and design, factory-built homes are growing in square footage, with larger double- or multisection units now more common than smaller single-section homes. Further, because of technological innovations that integrate the chassis with the floor system, as well as the ease of transporting modules and

**Figure 3. Modular vs. Site-Built Construction Timelines**



Source: Modular Building Institute. "What is Modular Construction?" ([www.modular.org](http://www.modular.org)). Accessed 16 March 2020.

construction materials used for assembly, two-story homes are now being built in climate-controlled facilities and then transferred to the site. Quality improvements in construction and installation practices have increased durability so that the life expectancy of factory-built housing increasingly is comparable to that of site-built or onsite housing.

Even with these advances in factory-built housing and the benefits previously discussed, advocates of factory-built

housing still face the common consumer perception that homes built in a factory are not high quality, affordable, or aesthetically pleasing. A recent McKinsey & Company report concluded that increasing the use of modular construction would require consumers and builders to shift their mindsets toward factory-built approaches and understand that these products are “aesthetically pleasing, sound structures — [that] deliver considerable efficiencies.”<sup>10</sup> Although there has been

some success in changing perceptions, particularly within the modular industry, experts agree that more should be done to raise awareness and educate homebuyers about the evolution of factory-built housing over the past three decades.

As potential homebuyers and renters learn more about factory-built homes, they might be more willing to pursue this kind of housing. In the 2007 study *Factory-Built Construction and the American*

**Figure 4. Current and Expected Use of Factory-Built Components for Single-Family Homes**

CONSIDERING ONLY THE NEW HOMES YOUR COMPANY BUILDS, HOW OFTEN DO YOU ANTICIPATE USING THE FOLLOWING CONSTRUCTION PRACTICES IN THE NEXT YEAR COMPARED TO LAST YEAR?	Plan to Use It About the Same	Less Often	More Often
Roof Trusses — Shop Built	64%	5.3%	10.3%
Precut Framing Package	25%	5.3%	6.6%
Factory-Built Open Wall Panels	12%	3.3%	7.3%
Factory-Built Closed Wall Panels	10%	5.3%	3.3%
Panelized, Preassembled Floor Sections	12%	4.0%	3.3%
Modular	8%	5.3%	3.0%
Turn-Key Framing Services	31%	5.3%	7.0%
Precast Concrete Floor, Wall, or Roof Panels	18%	6.6%	3.3%
Manufactured Homes (HUD Code)	7%	4.0%	1.0%
CONSIDERING ONLY THE NEW HOMES YOUR COMPANY BUILDS, HOW OFTEN DO YOU ANTICIPATE USING THE FOLLOWING CONSTRUCTION PRACTICES IN NEXT FIVE YEARS COMPARED TO LAST YEAR?	Plan to Use It About the Same	Less Often	More Often
Roof Trusses	66%	4.6%	15.2%
Precut Framing Package	25%	5.6%	9.6%
Factory-Built Open Wall Panels	14%	5.0%	11.9%
Factory-Built Closed Wall Panels	13%	3.3%	7.0%
Panelized, Preassembled Floors	11%	3.6%	6.6%
Modular	10%	3.0%	6.6%
Turn-Key Framing Services	31%	4.3%	9.6%
Precast Concrete Floor, Wall, or Roof Panels	15%	4.0%	6.6%
Manufactured Homes (HUD Code)	9%	2.6%	1.3%

Data provided to authors by Ed Hudson, Home Innovation Research Labs.



*Homebuyer: Perceptions and Opportunities*, HUD found that a consumer's interest in and willingness to purchase a factory-built home is influenced less by the virtues of individual elements than by the overall look of the home.<sup>11</sup> This survey was conducted by phone and online. The web-based survey asked respondents to react to pictures of different types of housing that did not include a description of the housing itself, and the telephone survey asked respondents about four housing types (site-built, modular, manufactured, and panelized).<sup>12</sup> The respondents rated site-built housing types most favorably; however, based on specific housing features (quality of construction, look and feel of the home), modular and panelized homes were rated only slightly below site-built homes. The study also found that for 92 percent of respondents, construction quality was very important when considering a new home. This finding suggests that an effective marketing strategy would be to emphasize similarities in the quality of factory-built construction, particularly modular and panelized homes, to that of site-built homes. Charles J. Kibert, professor at the M.E. Rinker, Sr. School of Construction Management at the University of Florida, observes that modular home manufacturers are marketing their products based not on lower costs but on other factors — namely, quality.

## **Builder Barriers**

Just as consumers have been hesitant to embrace factory-built housing, the building industry has been reluctant to use factory-built components. HI asked builders to explain why they do not use factory-built components.<sup>13</sup> Builders expressed concern that if they switched to factory-built components or homes, they risked being unable to switch back to conventional construction methods, a concern compounded by the tight labor market. A builder that no longer employs a framing subcontractor because it switched to a panelized wall system may have trouble finding a new framing subcontractor if it needs

### **Definitions Provided by Home Innovation Research Labs**

Roof trusses are wooden structures that are used to support the roof. They are assembled in a factory using preengineered structures and joints. Panelized floors are wooden structures that are used as the floor of the home over a basement, crawlspace or any floor above the ground floor. They are assembled in a factory using preengineered structures and joints. Open wall panels are open or unfinished on the side facing the inside of the home and have structural sheathing on the opposite side. They are assembled in a factory from a variety of materials.

Closed wall panels are closed or finished on the side facing the inside of the home and have structural sheathing on the outside. They are assembled in a factory out of a variety of materials. Precut framing package is a framing kit in which all of the lumber for a home has been cut and labeled offsite. Precut framing packages are delivered to the construction site with detailed assembly instructions. Turn-key framing is a catchall term for any factory-built framing system (such as open or closed wall panels or roof trusses) in which the component manufacturer also provides the installation.

one in the future. Builders also noted the challenge of keeping their staff fully employed. Furthermore, builders perceive factory-built components and homes as lacking enough customization options to satisfy customer demand.

Other challenges that builders face are the expense of transporting home modules and factory-built components and restrictive local regulations that increase the cost of transporting components from the factory to the job site.<sup>14</sup> Modular homes also may require significantly more preconstruction capital than site-built homes to account for factory operations and material costs — as much as 50 percent of the funding might be required before manufacturing, which could prove too costly for some developers.<sup>15</sup> For the risk-averse builder, the opportunity costs of factory-built uptake may be too high.

## **Embracing Factory-Built Housing**

Although current data show that the use of factory-built housing has not increased dramatically since the 2008 housing crisis, a recent survey administered by Ed Hudson, director of market research at HI, provides reason for

renewed optimism that now is the time for a real embrace of factory-built housing and components. The survey asked 300 homebuilders about their current and expected use of different types of factory-built components (see figure 4).<sup>16</sup>

Although drawing conclusions from the small sample size is difficult, the data show that these builders are planning to use more panelized components in the next five years. The chart also shows that roof trusses and panelized systems continue to be the most popular manufactured components in the factory-built housing industry.<sup>17</sup> Although anecdotal information suggests that we will see growth in this area, more survey research is needed to confirm these claims.

## **Multifamily Builders**

Studies sponsored under HUD's former Partnership for Advancing Technology in Housing program noted that adoption of innovations is more likely in the multifamily sector than in the single-family housing industry.<sup>18</sup> Factory-built housing firms are taking advantage of potential market gains stemming from the rising demand for multifamily housing units. Although researchers

are working hard to develop consistent and reliable data, we currently lack the information necessary to confirm these trends. We do know, however, that the multifamily factory-built housing industry is growing due to the efforts of some of the most well-known manufacturers of both modular and HUD Code manufactured housing. Nationally recognized firms such as OneBuild, Blueprint Robotics, Katerra, and Blokable are implementing innovative solutions for overcoming barriers to entry in the multifamily homebuilding industry, and their business models are well suited for the strengths of multifamily factory-built construction.<sup>19</sup>

### Market Forces

As builders become more receptive to using factory-built components, two market pressures — land costs and labor costs — could potentially lead to more widespread adoption of these components.

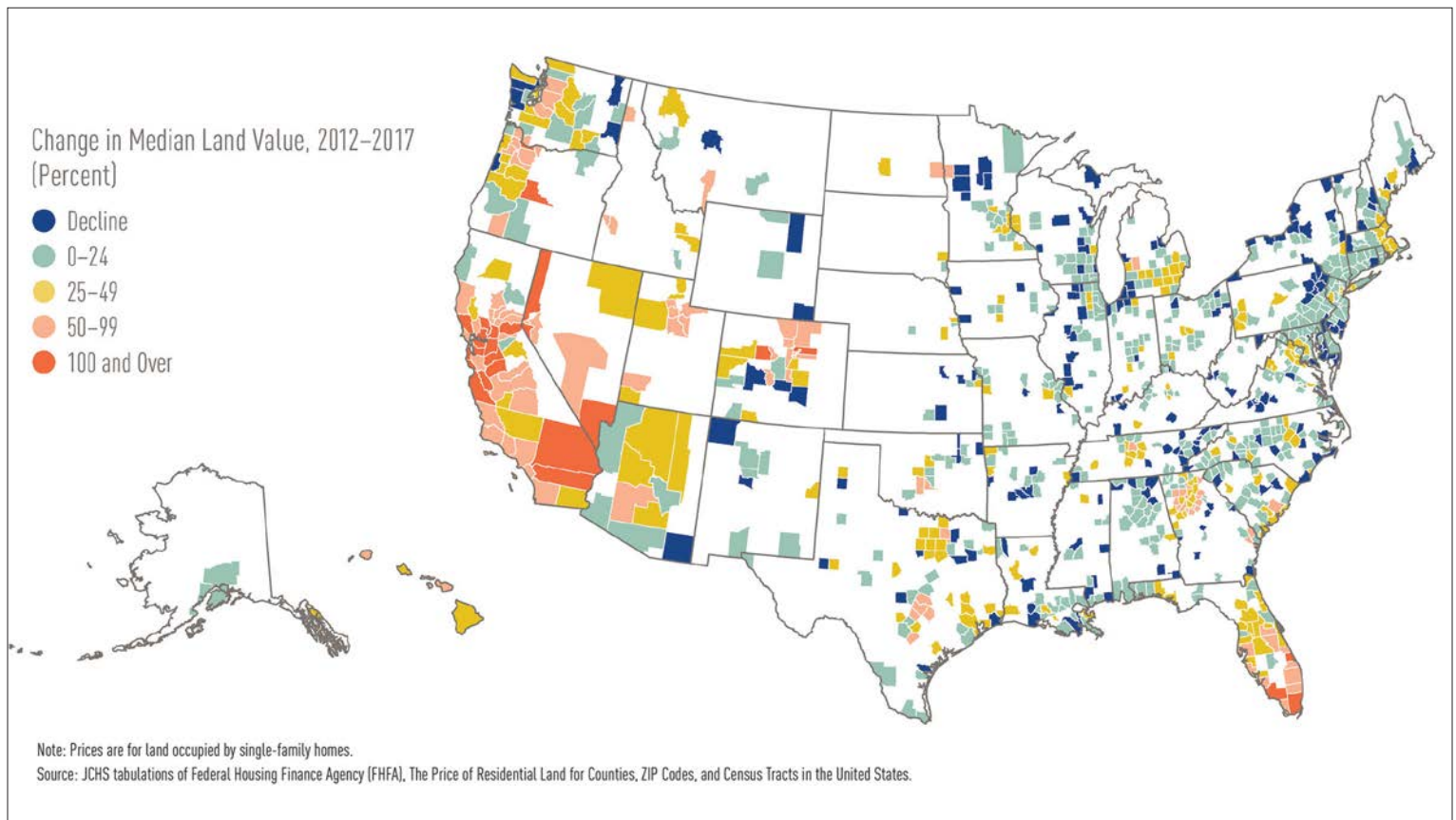
### Land Prices and Land Use Regulations

Land prices nationwide have been rising steadily since 2012, with some areas, such as California, Nevada, and southern Florida, seeing increases of more than 100 percent (see figure 5).<sup>20</sup> The price of land for new construction is driven by demand, but it is also affected by impact fees that local governments impose on developers.<sup>21</sup> Impact fees are intended to shift the costs of public financing from the general taxpayer to the market.<sup>22</sup> Builders, however, often express concern that the burden of paying for new infrastructure stifles growth in the housing industry or, when imposed, may restrict the supply of affordable housing that otherwise would be available to low- and moderate-income families. In this scenario, impact fees are often viewed as barriers because the cost of doing business generates more risk for the builder when land prices are high.<sup>23</sup>

Local governments impose land use regulations or zoning requirements to determine the siting, location, design, and construction of housing. Whether intentional or not, these rules can become barriers to housing development when the costs of compliance are too burdensome. The evidence is clear that land use regulations, including excessive impact fees, drive up the cost of land. Those costs, in turn, are shifted to the renter and homeowner in the form of higher rents or housing prices, respectively.<sup>24</sup> Seeing little incentive to build more housing for communities that need it, developers might shift their investments toward areas with a more robust tax base or decide against doing business in the industry altogether.

Several jurisdictions have responded to rising land costs and the paucity of new construction by beginning to permit higher-density construction

**Figure 5. Changes in Land Prices Since 2012**



Although accessory dwelling units (ADUs) are being used more frequently, communities may still resist adopting this type of construction. Some opponents believe that blanket zoning changes allowing the siting of ADUs in a community impinge on the expectations other homeowners had when they bought in the area.<sup>26</sup>

Some property owners in Montgomery County, Maryland, were fiercely opposed to a recent effort to change zoning laws to make it easier to construct ADUs on single-family lots, citing concerns with increased traffic, pressure on already strained street parking, and reduced property values.<sup>27</sup> As more communities attempt to embrace ADUs, stakeholders need to ensure that community concerns are heard and addressed.



ADU under construction.

Boxabl

within traditionally single-family communities. A growing number of communities nationwide are also adopting ordinances allowing accessory dwelling units (ADUs), supporting the creation of more affordable housing within existing neighborhoods.

Allowing ADUs could lead to an increase in modular-housing production because the size of ADUs is well suited to modular construction. Although most ADUs — often called “granny flats” or tiny apartments — are existing structures that are already attached to a single-family home, an ADU can be constructed offsite in a factory and transported to the site. In response to the opportunity for creating small homes, a growing number of manufacturers, including companies such as prefabADU, Boxabl, and California Modulars, are offering modular ADUs. Research by the Turner Center on the experience of Portland, Oregon; Seattle, Washington; and Vancouver, British Columbia, with ADUs finds that 56 percent of ADUs built in these cities are freestanding

cottages averaging 631 square feet.<sup>25</sup> Most ADUs are being built as permanent housing rentals with reasonable rents.

#### **Labor Costs and Shortages**

In a recent study, 82 percent of single-family builders rated the cost and availability of labor as the most important factor affecting the cost of homes.<sup>28</sup> The cost of labor for residential building has increased steadily since 2011 (see figure 6).<sup>29</sup>

This labor shortage can be seen in the large number of unfilled construction jobs in the industry. In September 2019, there were 338,000 job openings in construction, a slight decrease from the peak of 404,000 available jobs in the years following the economic downturn that ended in June 2009.<sup>30</sup>

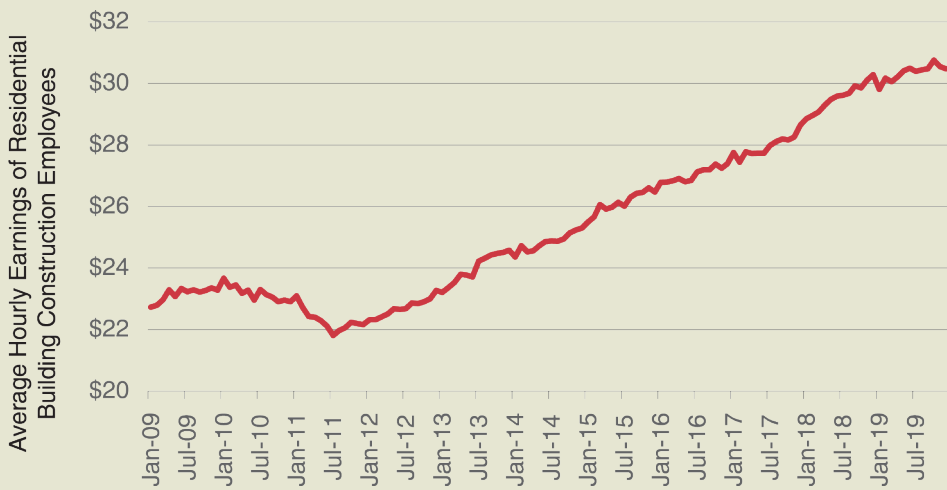
The construction industry has been experiencing shortages in both subcontractors and labor directly employed by builders for many years (see figure 7).

In July 2019, roughly 68 percent of builders experienced a labor shortage, and 72 percent of builders experienced a subcontractor shortage.<sup>31</sup>

The U.S. Bureau of Labor Statistics projects that the number of construction jobs will increase by 11 percent between 2018 and 2028, from 1,645,700 to 1,819,000.<sup>32</sup> Even as the number of construction jobs is increasing, the availability of skilled workers has declined because of the large numbers of workers who left the industry between 2009 and 2011, a lack of interest in the field among young workers, and an aging workforce.<sup>33</sup>

Labor shortages lengthen construction timelines and therefore increase the cost of the entire project. Delays can increase both direct costs, such as building supplies, labor, and equipment, and overhead costs, such as onsite project management, support services, and related costs that are spread across multiple projects. As the process takes longer,

**Figure 6. Cost of Labor for Residential Building, 2009 to 2019**



Source: U.S. Bureau of Labor Statistics. "Employment, Hours, and Earnings from the Current Employment Statistics survey (National)" ([www.bls.gov/data](http://www.bls.gov/data)). Accessed 19 March 2020.

some builders may forgo new residential projects, leading to fewer homes being built. In addition, having fewer available

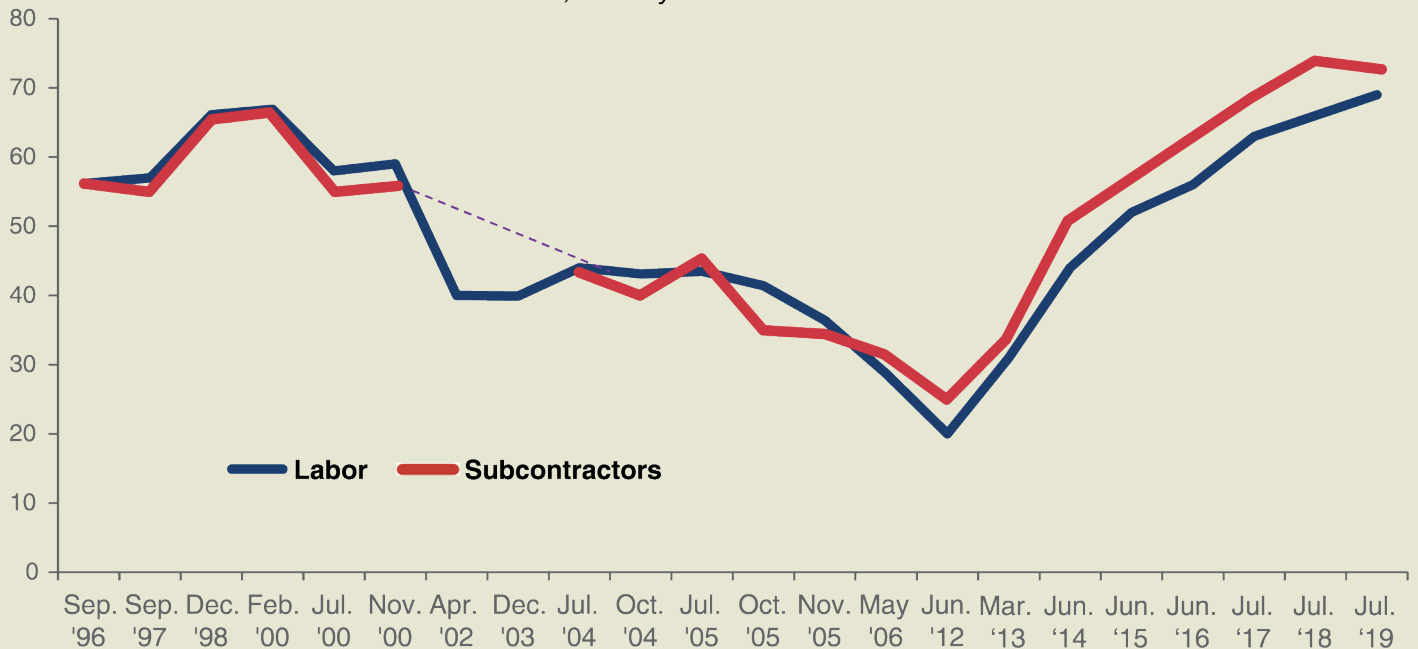
laborers leads to higher wages and subcontractor bids, which in turn leads to increases in average home prices.

Rose Hoyle, a commentator for the International Risk Management Institute, recently wrote, "The risks [associated with a skilled labor shortage] range from unskilled workers performing skilled tasks, new workers not trained in safety procedures, aging workers getting injured on the job, schedule slippage due to unrealistic expectations of available labor, and errors/accidents due to lack of adequate supervisory oversight."<sup>34</sup> Construction quality issues resulting from the use of inadequately trained laborers often are realized during inspection. Correcting these defects, called "rework," can be costly and time consuming. A recent McKinsey & Company report stated that reducing or eliminating rework can potentially shorten construction schedules by several months.<sup>35</sup> The construction process for residential projects, unlike that for commercial or industrial projects, rarely has provisions for penalties in the event of delays, leaving the increased costs

**Figure 7. Labor and Subcontractor Shortages**

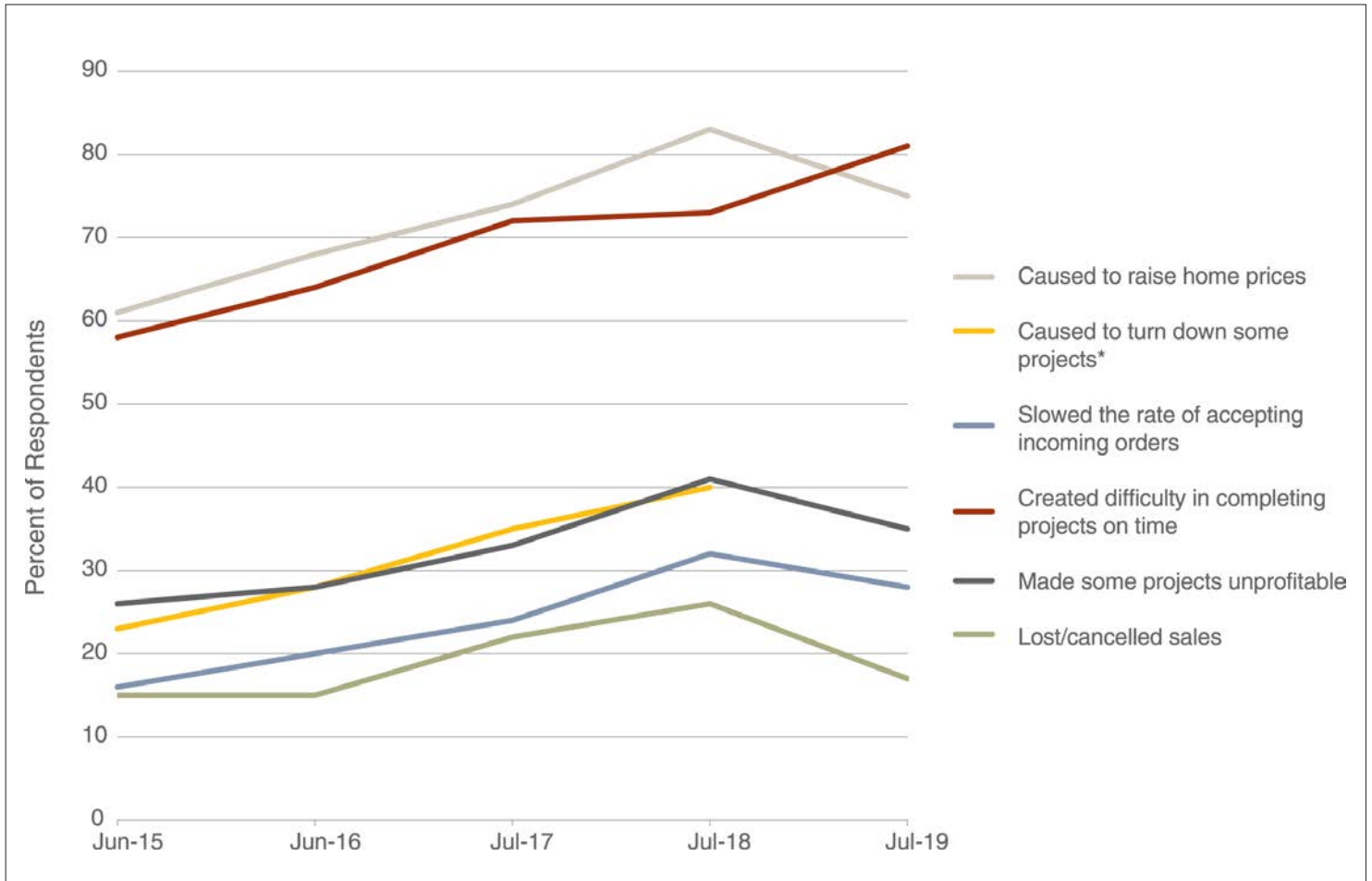
**Labor (directly employed) and Subcontractors' Serious to Some Shortage: Average Percent for 9 different trades**

*Carpenter-Rough, Carpenter-Finished, Electricians, Excavators, Framing crews, Roofers, Plumbers, Bricklayers/Masons and Painters*



Reprinted from: National Association of Home Builders, Economics and Housing Policy Group. 2019. "Housing Market Index: Special Questions on Labor and Subcontractors' Availability," 13.

**Figure 8. Impact of Labor Shortage on Homebuilders**



Source: National Association of Home Builders, Economics and Housing Policy Group. 2019. "Housing Market Index: Special Questions on Labor and Subcontractors' Availability," 17.  
 \*Data not available for July 2019.

to be borne by renters and homeowners in the form of higher prices or by homebuilders as decreased profits.<sup>36</sup> As Robert Hazelton, chief executive officer of Dominion Due Diligence Group, puts it, "Industrialized housing savings are not only in the hard construction costs but also in the monetization of a more efficient construction timeframe, including less construction interest, less construction waste, and [an] increased absorption rate."<sup>37</sup>

In a survey for the July 2019 National Association of Home Builders/Wells Fargo Housing Market Index, respondents were asked to rank their concerns associated with labor shortages. The most pressing concern, expressed by 87 percent of respondents, was higher wages and subcontractor bids. Other concerns respondents cited were

difficulties in completing projects on time (81%), difficulty finding subcontractors with well-trained workers (79%), and higher home prices (75%).<sup>38</sup>

These concerns are not new. Over the past five years, builders have reported an increase in housing projects that do not generate profit, so the rates of uptake and sales have slowed and more deals are lost. Figure 8 further details how labor shortages and project delays have negatively affected the industry.<sup>39</sup>

Factory-built homes and components offer a less labor-intensive alternative to traditional site-built construction because factories often use an assembly line and modern tooling that requires fewer laborers and a less-skilled workforce. In addition, some builders noted that as the pool of qualified laborers shrinks,

they were more likely to rely on subcontractors for prefab work, such as using more factory-built components. In addition, more individuals may choose to work in the factory homebuilding industry because the work is more consistent; its location is fixed, reducing commuting and other costs; and the working conditions are indoors and climate controlled. Workers also may need to supply fewer tools or personal equipment, which makes entering the industry easier.

Note that the skilled labor involved in setting and finishing modular homes in the field is unique and would degrade if the pace of installations wanes. Builders therefore will need to have a work backlog that can support the effective utilization of the skills and equipment needed to install modular products.

## Conclusion

Despite the recent technical improvements to factory-built homes and the benefits this housing offers, the industry still faces significant challenges in the production and market uptake of this type of construction. For various reasons, builders and consumers have been reluctant to embrace factory-built homes as a viable option for affordable housing. Solutions for addressing market imbalance, including increasing land supply, reducing burdensome land use requirements, and improving workforce access and skills, could potentially speed up the adoption of factory-built housing.

Future research efforts should be directed at better understanding market entry, innovation, and trends in the factory-built sector. Access to quality data will go a long way toward accomplishing this goal. HUD is currently sponsoring three studies on factory-built housing to close some of these information gaps. These studies examine ways to reduce the challenges manufacturers face in gaining market share, such as reducing the regulatory burdens that often impede innovation and disseminating information to consumers and the homebuilding industry. These studies will offer guidance to both manufacturers and consumers about the benefits of factory-built housing as a cost-effective option for expanding the supply of affordable housing in the United States and beyond. **EM**

— Jagruti Rekhi, *HUD Staff*  
— Michael Blanford, *HUD Staff*

Disclaimer: This article was written before the emergence of coronavirus disease 2019 (COVID-19) in the United States. Although possible impacts of COVID-19 were not known at the time of publication, some of the trends discussed in this article may change because of the pandemic's potential effect on the global housing market.

<sup>1</sup> \$30 million in 1969 dollars is the equivalent of more than \$200 million today; Michael H. Moskow. 1970. "Prototype Construction and Demonstration. Operation Breakthrough Part II," U.S. Department of Housing and Urban Development, 20.  
<sup>2</sup> Elmer B. Staats. 1976. "Operation Breakthrough: Lessons Learned about Demonstrating New Technology," U.S. General Accounting Office.

<sup>3</sup> Manufactured housing refers to HUD Code housing and formerly was used interchangeably with the term "mobile homes." Manufactured housing is an important part of the nation's housing stock and is particularly important in the supply of affordable housing for low-income Americans. The Manufactured Home Construction and Safety Standards Program (HUD Code) established national design, performance and installation standards for manufactured homes built after June 15, 1976; "Manufactured Home Construction and Safety Standards," 2015.  
<sup>4</sup> Manufactured Housing Institute. 2018. "2018 Manufactured Housing Facts, Industry Overview."  
<sup>5</sup> Ed Hudson. 2019. "Builder Outlook on Use of Components and Offsite Housing Technologies: Summary of Findings August 2019 Survey," Home Innovation Research Labs.  
<sup>6</sup> Nick Bertram, Steffen Fuchs, Jan Mischke, Robert Palter, Gernot Strube, and Jonathan Woetzel. 2019. "Capital Projects and Infrastructure Modular Construction: From projects to products," McKinsey & Company, 10–1.  
<sup>7</sup> Modular Home Builders Association. "Why Choose A Modular Home?" ([www.modularhousing.com/Html-Page.aspx?name=why\\_modular\\_homes](http://www.modularhousing.com/Html-Page.aspx?name=why_modular_homes)). Accessed 20 December 2019.  
<sup>8</sup> Michele Lerner. 2018. "Prefab houses were once the 'holy grail of design.' So why aren't there more of them?" *Washington Post*, 20 June.  
<sup>9</sup> Modular Home Builders Association.  
<sup>10</sup> Bertram et al., 10.  
<sup>11</sup> Kenneth Temkin, Grace Hong, Lauren Davis. 2007. "Factory-Built Construction and the American Homebuyer: Perceptions and Opportunities," U.S. Department of Housing and Urban Development.  
<sup>12</sup> Manufactured housing, or HUD Code homes, include housing that is at least 320 square feet with a permanent chassis to ensure the initial and continued transportability of the home. HUD Code is a national standard that overrides all local building codes.  
<sup>13</sup> Home Innovation Research Labs operates as a wholly owned independent subsidiary of the National Association of Home Builders.  
<sup>14</sup> Carol Galante, Sara Draper-Zivetz, and Allie Stein. 2017. "Building Affordability by Building Affordably: Exploring the Benefits, Barriers, and Breakthroughs Needed to Scale Off-Site Multifamily Construction," Turner Center for Housing Innovation, University of California, Berkeley.  
<sup>15</sup> Alexandra Stein. 2016. "Disruptive Development: Modular Manufacturing in Multifamily Housing," master's thesis, University of California, Berkeley, 30.  
<sup>16</sup> Hudson.  
<sup>17</sup> "Panelized systems" are precut framing packages; factory-built open or closed wall panels; and panelized, preassembled floors.  
<sup>18</sup> C. Theodore Koebel, Maria Papadakis, Ed Hudson, and Marilyn Cavell. 2004. "The Diffusion of Innovation in the Residential Building Industry," U.S. Department of Housing and Urban Development, 38.  
<sup>19</sup> Erica Barnett. "Modular Construction: A Housing Affordability Game-Changer?" Sightline Institute, 2 August.  
<sup>20</sup> Joint Center for Housing Studies of Harvard University. 2019. "The State of the Nation's Housing 2019," 10.  
<sup>21</sup> Impact fees are a one-time tax that local governments levy on developers to control excessive growth; they cover the cost of providing new infrastructure to support housing, such as roads and public services.  
<sup>22</sup> American Planning Association. "APA Policy Guide on Impact Fees" ([www.planning.org/policy/guides/adopted/impactfees.htm](http://www.planning.org/policy/guides/adopted/impactfees.htm)). Accessed 20 December 2019.  
<sup>23</sup> We define a "barrier" as any state or local law, regulation, or policy that adversely affects the supply, availability, development, and/or cost of providing affordable housing.  
<sup>24</sup> Sanford Ikeda and Emily Hamilton. 2015. "How Land-Use Regulation Undermines Affordable Housing," Mercatus Center at George Mason University, 4 November.  
<sup>25</sup> Karen Chapple, Jake Wegmann, Farzad Mashhood, and Rebecca Coleman. 2018. "Jumpstarting the Market for Accessory Dwelling Units: Lessons Learned from Portland, Seattle and Vancouver," Urban Land Institute, 15.  
<sup>26</sup> Conrad Swanson. 2019. "Accessory dwelling units should be attached with owners living on site, Colorado Springs City Council suggests," *Colorado Springs Gazette*, 11 June.  
<sup>27</sup> Kate Masters. 2019. "Updated: After Zoning Changes for New Accessory Dwelling Law, Council Focusing on Legal Amendments," *Bethesda Magazine*, 16 September; University of Southern California. 2019. "Housing Typologies Toolkit," 7.  
<sup>28</sup> Kent Colton and Gopal Ahluwalia. 2019. "A Home Builder Perspective on Housing Affordability and Construction Innovation," Joint Center for Housing Studies of Harvard University, 11.  
<sup>29</sup> U.S. Bureau of Labor Statistics. "Average hourly earnings of all employees, residential building, seasonally adjusted" ([www.bls.gov/ces/data/home.htm](http://www.bls.gov/ces/data/home.htm)). Accessed 6 April 2020.  
<sup>30</sup> Julia Falcon. 2019. "NAHB: Construction job openings are increasing," *HousingWire*, 6 November; National Association of Home Builders. 2019. "Unfilled Construction Jobs at Post-Recession High," *NAHB Now*, 13 June; U.S. Bureau of Labor Statistics. "What Construction Laborers and Helpers Do" ([www.bls.gov/ooh/construction-and-extraction/construction-laborers-and-helpers.htm#tab-2](http://www.bls.gov/ooh/construction-and-extraction/construction-laborers-and-helpers.htm#tab-2)). Accessed 6 April 2020.  
<sup>31</sup> Paul Emrath. 2019. "Labor Shortages Still Hurting Affordability," *Eye On Housing*, National Association of Home Builders, 5 August.  
<sup>32</sup> U.S. Bureau of Labor Statistics. "Construction Laborers and Helpers: Job Outlook" ([www.bls.gov/ooh/construction-and-extraction/construction-laborers-and-helpers.htm#tab-6](http://www.bls.gov/ooh/construction-and-extraction/construction-laborers-and-helpers.htm#tab-6)). Accessed 20 December 2019.  
<sup>33</sup> Feby Abraham, Jack Cahn, Brendan Fitzgerald, and Ezra Greenberg. 2019. "Strategy in the face of disruption: A way forward for the North American building-products industry," McKinsey & Company.  
<sup>34</sup> Rose Hoyle. 2019. "Dealing with the Construction Workforce Shortage," expert commentary, International Risk Management Institute.  
<sup>35</sup> Bertram et al., 12.  
<sup>36</sup> Construction projects in the industrial or commercial sector often include liquidated damages if the construction effort exceeds the contractually agreed-upon schedule.  
<sup>37</sup> Email communication with Robert Hazelton, 19 November 2019.  
<sup>38</sup> National Association of Home Builders. 2019. "Housing Market Index, Special Questions on Labor and Subcontractors' Availability," 16; Only concerns cited by more than 50 percent of respondents are listed here; other concerns included needing to seek labor from a wider geographical area, having some projects be unprofitable, needing more time to accept other orders, and losing and canceling sales.  
<sup>39</sup> Paul Emrath. 2018. "Labor and Subcontractor Costs Outpacing Inflation, Raising Home Prices," *Eye On Housing*, National Association of Home Builders, 10 September.

# Programs Support Energy-Efficient Modular and Manufactured Housing

Modular and manufactured homes offer low-income families an affordable alternative to traditional site-built housing. For many households looking to purchase a manufactured home, however, financing can be a significant obstacle. High energy costs reduce affordability for many existing residents of older units, whereas others have lost their homes because of the rising cost of leasing the land or a decision to close a manufactured home park. Some states are addressing these challenges through programs that offer prospective and current manufactured housing residents financial assistance and energy-efficiency upgrades. Efficiency Vermont and its partners help low-income homebuyers purchase and move into Zero Energy Modular (ZEM) homes, which offer highly durable features to maintain efficiency and comfort. Oregon Housing and Community Services and the state legislature have developed several initiatives, such as funding for weatherization programs and the replacement of old manufactured housing units as well as legislation for preserving manufactured home parks.

## Zero Energy Modular Housing in Vermont

Manufactured homes make up about 7.2 percent of residential housing units in Vermont, with more than one-third of these located in manufactured home parks. As of November 2019, the state had 238 manufactured home parks, many of which were built more than 40 years ago; some have closed due to water or septic problems, flooding, sale of the property, or new development on the land.<sup>1</sup> According to a 2011 survey, more than 70 percent of Vermont households living in manufactured home parks were low-income, very low-income, or extremely low-income households as defined by HUD. Furthermore, 26 percent of households had at least one child under the age

of 18, and 37 percent of households had at least one person over age 65. Households with health conditions or disabilities made up 41 percent of those surveyed. Manufactured homeowners in Vermont spend 66 percent more of their income on energy costs than do owners of traditional site-built homes in the state, largely because of the age and inefficiency of the homes.<sup>2</sup>

In 2011, Tropical Storm Irene caused widespread damage to the state's housing stock. Although manufactured homes represent only 7 percent of Vermont's housing stock, they made up 15 percent of the homes damaged in the storm.<sup>3</sup> Public sentiment already favored making more affordable housing options available to low- to moderate-income Vermonters. The devastation from Tropical Storm Irene, however, "revealed more dramatically how little resiliency there was" in manufactured housing, according to Phoebe Howe, program manager at Efficiency Vermont, and was the catalyst for creating the ZEM pilot program as a more durable solution.<sup>4</sup>

## HIGHLIGHTS

- **Efficiency Vermont provides technical and financial assistance to replace aging manufactured homes with Zero Energy Modular homes, which offer energy-efficient features to maintain long-term affordability and comfort.**
- **The state of Oregon funds loans to nonprofit organizations and individual homeowners striving to preserve manufactured home parks and replace older manufactured homes with new, energy-efficient ones.**
- **Both Vermont and Oregon have passed resident purchase laws that require advance notice from park owners before the sale of a manufactured home park, giving residents the opportunity to form cooperatives to facilitate the financing process.**

In the wake of Tropical Storm Irene, Efficiency Vermont — a statewide energy-efficiency utility created by the Vermont General Assembly and the Vermont Public Utility Commission — and the Vermont Housing and Conservation Board (VHCB) initiated the Modular Housing Innovation Project (MHIP).<sup>5</sup> According to Howe, MHIP



Modular homes are built inside a factory and transported using flatbed trailers and cranes for installation on a permanent foundation.

Photo Courtesy of USDA Rural Development



Photo Courtesy of Efficiency Vermont

Constructing ZEM homes inside the Vermod factory reduces weather-related delays and provides stable working conditions for employees.

was a working group to devise high-quality housing options for low- and moderate-income Vermonters.<sup>6</sup> The 10-home ZEM pilot resulted from the working group discussions.<sup>7</sup> In 2013, VHCB received a \$90,000 grant from the High Meadows Fund to build and site the first ZEM home, which was unveiled and marketed at a fall 2013 press conference at Vermod Homes — the first company to build ZEM homes.<sup>8</sup> On the first day of the conference, more than 100 visitors toured the model home.<sup>9</sup> Housing advocates and representatives from nonprofit organizations who toured the model learned about the benefits of ZEM homes.<sup>10</sup> Efficiency Vermont partnered with local affordable housing organizations to find interested buyers for the 10 pilot homes.<sup>11</sup>

ZEM homes meet Efficiency Vermont's High Performance Homes standard, which sets requirements for durability, insulation, airtightness, and water and energy efficiency.<sup>12</sup> Every home is customized to the needs and wishes of buyers, and all models have the same level of energy efficiency as an all-electric home built to identical specifications regardless of budget.<sup>13</sup> The roofs have insulation values of R60, which translates into better thermal performance. For an uninsulated attic, the U.S. Department of Energy and the

U.S. Environmental Protection Agency recommend R-values of between 49 and 60 for homes in the colder climates of Zones 5 to 8, and Vermont is in Zone 6.<sup>14</sup> ZEM homes also feature rooftop solar panels to help reduce energy costs and triple-paned windows to prevent drafts and increase comfort. The double 2-by-4-foot walls use more than twice the blown fiberglass insulation found in a typical manufactured home, keeping the homes warm in the winter and cool in the summer.<sup>15</sup> In addition, optional backup batteries help ZEM residents manage power outages during heavy snowfall, ice storms, high winds, and other severe weather events.<sup>16</sup> ENERGY STAR®-certified lighting and appliances and water conserving features maintain energy and resource efficiency. The homes also have cold climate heat pumps and a fresh air ventilation system that provide heating, cooling, and optimal indoor air quality, reducing pollutants that cause allergies and asthma.<sup>17</sup> An average two- to three-bedroom ZEM home ranges from 800 to 1,200 square feet.<sup>18</sup> The homes can also accommodate porches and decks and can comply with Americans with Disabilities Act requirements by adding wheelchair-accessible ramps.<sup>19</sup>

To date, all ZEM homes delivered in Vermont have been constructed at

the Vermod Homes factory in Wilder, Vermont. Vermod Homes is the only partner builder of ZEM homes in Vermont, although other builders and initiatives are starting in other parts of the country. Howe noted that other modular builders in Vermont and elsewhere in the northeast region are also capable of building to ZEM standards. Efficiency Vermont is collaborating with two of these builders to meet ZEM specifications while maintaining affordability standards in the hope that they will become ZEM partner builders.<sup>20</sup> Efficiency Vermont provides residents needing to replace older manufactured homes with technical assistance and financial support through referrals for homebuyer education, incentives, and financing; advocacy for homeowners negotiating with lenders, manufactured home park owners, and builders; and training and ongoing support for homeowners during the move-in process and the first few months in the new home.<sup>21</sup> According to Howe, the typical cost per square foot for a ZEM home of 800 to 1,200 square feet is approximately \$170 inclusive of the home, finishes, and appliances. The total cost of an average project, including the site work, solar panels, sales tax, foundation, truck delivery, and foundation placement, ranges from \$150,000 to \$250,000 for a basic home aimed at low- to moderate-income buyers. This figure also includes all energy production for the ZEM home annually, Howe noted.<sup>22</sup> According to the 2013 to 2017 American Community Survey 5-Year Estimates, the state's median home value is \$220,600, and Efficiency Vermont estimates that households pay an average of \$3,200 annually in energy costs.<sup>23</sup> Efficiency Vermont works with other affordable housing partners to help homebuyers access subsidies, incentives, and low-interest financing to bring down the overall cost and create manageable monthly mortgage payments.<sup>24</sup>

One of the financing sources available to buyers interested in purchasing a ZEM home in a manufactured home park or replacing an old manufactured



home on owned land with a new one is the Manufactured Housing Down Payment Loan Program. Champlain Housing Trust, a community land trust, manages the loan program. The maximum loan amount is \$35,000 with zero interest and no payments until the home is sold. To be eligible for the program, participants must meet several criteria. A borrower's monthly income must be less than 120 percent of the area median income. Borrowers must contribute a minimum of \$2,500 toward closing costs on their first mortgage. Because the program is a second mortgage, residents must qualify for a first mortgage to cover the balance of the purchase and site costs. Residents must prove that they have successfully completed a homebuyer education course. The new home must be located on a permanent foundation in a park that is not in a Federal Emergency Management Agency Special Flood Hazard Area, and it must be the borrower's primary residence.<sup>25</sup> In addition, the U.S. Department of Agriculture (USDA) Rural Development's Direct Loan program delivers financing through 30-year first mortgages with interest rates of 1 to 3 percent.<sup>26</sup>

## Achieving Positive Results

As of October 2019, Vermont had nearly 100 ZEM homes. More than 50 percent of these homes are in manufactured home parks, cooperatives, or multifamily communities, with the remaining homes on private land. More than 60 percent of ZEM homes are owner occupied, with the balance being affordable rental homes. Collectively, ZEM residents have saved an estimated \$1 million in heating and electric costs.<sup>27</sup> Although the homes are designed to produce as much electricity as they need each year and draw on net-metering credits during Vermont's cold, snowy winters, Efficiency Vermont estimated that owners of ZEM homes would spend approximately \$180 per year in utility charges to be connected to the power grid.<sup>28</sup> Howe observed that several outreach tactics to attract interest have been effective, including word-of-mouth recommendations. Efficiency Vermont maintains a model home that is transported to community events to increase visibility. People can tour the model, familiarize themselves with the features of ZEM homes and learn strategies to weatherize their own homes, said Howe.<sup>29</sup>

In 2017, researchers at the University of Vermont's Center for Rural Studies interviewed 16 residents of ZEM homes. Most residents indicated that the air quality in their ZEM home was better than their previous home, and more than half said that their monthly costs were lower. Most residents expressed positive or very positive experiences with their homes' energy-efficient features. The resident interviews indicated that residents purchased their home intending to stay for many years. Residents pointed to the high upfront cost for the purchase of a ZEM home as a weakness of the program, and many indicated that they would not have been able to afford a ZEM home without the subsidies.<sup>30</sup> Residents identified the opportunities that ZEM homes can have in Vermont, a state with an aging housing stock and a lack of affordable housing. ZEM homes may be attractive to first-time homebuyers, seniors, people with disabilities, and other homebuyers on fixed incomes. Howe noted that ZEM housing can also appeal to residents with various interests and needs, such as those seeking environmentally friendly housing, overall comfort during the cold winter



Photo Courtesy of Jacob Hannah for the New York Times

Tenant protection laws in Vermont and Oregon help maintain stability if a manufactured home park owner sells or closes a community.

months, or a healthy living environment for children with allergies and asthma.<sup>31</sup>

In Vermont, ZEM and non-ZEM residents of manufactured home parks have several options if a park owner decides to sell. Although most manufactured home parks are privately owned, 13 have converted to resident-owned cooperatives since 2011. A total of 17 parks are cooperatively owned, and 47 are owned by nonprofit housing

in good faith” with the group or nonprofit that represents the residents. In 2012, the Vermont General Assembly updated the 1987 resident purchase law after considering feedback from cooperative and nonprofit buyers, who determined that the steps needed to develop a sale agreement exceeded 90 days. As a result, one of the major components of the 2012 law was an update extending the negotiating period to 120 days, which certainly can delay

qualified contractors in the industry has constrained the production of ZEM houses.<sup>36</sup> According to Kristen Connors, general manager at Vermod Homes, employees at all levels earn a competitive living wage, but many tradespeople are retiring, and few qualified and reliable applicants exist to replace them.<sup>37</sup> One remedy, explained Howe, is to partner with trade schools and other workforce development groups to establish a pipeline for qualified tradespeople. ZEM housing can also be a great economic development tool for the state because it creates local business opportunities for green supply chains, manufacturers, and distributors. Howe emphasized that the work environment for ZEM builders is very stable, pointing out that the “job site is in the same location every day, [and] they have reliable hours and good working conditions.” Furthermore, constructing a ZEM house inside a factory eliminates weather-related delays.<sup>38</sup>

To make the adoption of ZEM housing more widespread, Howe suggested that developers should be involved in the construction of cluster ZEM communities, where homebuyers can purchase an existing ZEM home. Although building a ZEM home in the factory takes approximately six to seven weeks, the entire process to learn about ZEM, prequalify for loans, identify subsidies, select designs, and finalize paperwork can be complex for people who may also be juggling health issues, low incomes, and uncertainty about their current living arrangements. By constructing cluster ZEM communities with already-built ZEM homes, said Howe, developers can make ZEM homes more attainable because it is much easier to purchase “an existing home instead of having to figure it out from scratch.” Finally, Howe emphasized that ZEM housing lends itself to many creative uses, such as farmworker housing or transitional housing, that can benefit communities. The ultimate opportunity that ZEM offers, Howe suggested, is to revitalize manufactured home parks in Vermont and



Photo Courtesy of Efficiency Vermont

Families that replace older manufactured homes with ZEM homes, such as this one located in a nonprofit-owned park in Vergennes, Vermont, can customize them to include porches, decks, and wheelchair accessible ramps.

development organizations.<sup>32</sup> The Vermont General Assembly resident purchase law requires park owners to provide residents with 45 days’ notice before selling a manufactured home park. A majority of residents must express interest in purchasing the park within the 45-day advance notice period. During these 45 days, a park owner cannot accept a “final unconditional offer to purchase the park.”<sup>33</sup> Arthur Hamlin, housing program coordinator for mobile home parks at the state’s Agency of Commerce and Community Development, indicated that park owners can continue to negotiate and draft private purchase and sale agreements as long as they do not sign anything. If residents exercise their right to purchase the park, the park owner must “negotiate

the private sale of a park.<sup>34</sup> Although the community owner remains free to choose between the residents’ offer and the competing offer, good faith negotiation requires landlords to allow residents to develop their offer. The landlord is required to give it reasonable consideration and notify residents if an outside bidder submits a higher offer. Community owners who fail to comply are liable to homeowners in the amount of \$10,000 or 50 percent of the gain realized from the sale of the community, whichever is greater.<sup>35</sup>

## Opportunities

Although ZEM housing has been around since 2013, many opportunities have yet to be fully realized in the field. Howe noted that the lack of

foster manufactured home replacement. Manufactured home parks offer many opportunities for “public investment in infrastructure and high-quality housing to be models of a true sustainable community.”<sup>39</sup>

## Preserving Manufactured Housing in Oregon

The state of Oregon recognizes that manufactured homes are an important source of affordable housing. Representing more than 14 percent of the housing stock in the state, manufactured housing is a “critical naturally occurring affordable homeownership opportunity for Oregonians in communities large and small,” said Nicole Stoenner, legislative and communications coordinator at Oregon Housing and Community Services (OHCS), the state’s housing finance agency. Oregon has approximately 1,060 manufactured home parks, one-third of which are senior parks housing residents aged 55 and older.<sup>40</sup> More than 55 percent of manufactured homes in Oregon were built before 1980.<sup>41</sup> According to Energy Trust of Oregon, these older manufactured homes have several energy challenges: reduced insulation in the ceiling, walls, and floors; air leaks; and inefficient windows and heating systems. These issues lead to higher energy costs and health challenges, such as asthma, stemming from poor indoor air quality.<sup>42</sup> Because so many homes have exceeded their life expectancy, the state has made the preservation and replacement of these units a high priority.<sup>43</sup> OHCS has developed initiatives to replace these units. Several needs exist for this housing stock and its residents, such as obtaining energy assistance, preventing park closures and subsequent displacement of residents, and securing financing. OHCS and local Community Action Agencies (CAAs) offer Oregonians resources to address these needs.

## Current Initiatives

OHCS administers Oregon’s Low-Income Weatherization Assistance Program. Primary funding for the

program is from the U.S. Department of Energy’s Low-Income Home Energy Assistance Program, along with other funds from the U.S. Department of Health and Human Services, utility companies, and the Bonneville Power Administration. These resources are delivered through a network of CAAs that serve every county in Oregon. CAAs provide weatherization and energy conservation services at no cost to households earning incomes at or below 200 percent of the federal poverty level.<sup>44</sup> Approximately half of all weatherization efforts are performed on manufactured homes — particularly older homes — with critical energy efficiency, health, and environmental concerns. The state also administers funds through the Energy Conservation Helping Oregonians (ECHO) program, which provides resources to Pacific Power and Portland General Electric residential customers for weatherization and updates to reduce energy burden while improving the health and financial stability of residents. To determine the feasibility of weatherizing a home rather than replacing it, CAAs first determine whether they have the financial resources to replace the home. If they do, CAAs then examine the overall livability of the home, “looking to see if there are health and safety concerns [and] energy-efficiency concerns,” explained Stoenner.<sup>45</sup> According to Ken Pryor, program coordinator at OHCS, these programs overlap, and weatherization can encompass window and roof replacement, improved insulation, and a new furnace, for example.<sup>46</sup> In 2017, these programs helped weatherize 670 units.<sup>47</sup>

Energy Trust of Oregon, in partnership with OHCS, Community and Shelter Assistance Corporation (CASA) of Oregon, NeighborWorks Umpqua, St. Vincent de Paul of Lane County, and regional CAAs, launched a pilot program to retire aging manufactured homes and replace them with new, energy-efficient manufactured homes that exceed code requirements. The pilot will identify qualified homes or

parks, seek additional funding opportunities and partners, and monitor the impact of retiring and replacing older (pre-1995) manufactured homes with new, energy-efficient models. Energy Trust of Oregon is offering participants up to \$15,000. In addition, OHCS is allowing participating pilot CAAs to use up to \$20,000 of ECHO program funds to support the replacement and decommissioning work. Evaluation activities will help the state understand the energy and nonenergy benefits achieved from the replacement homes, needed financial resources of the market, and the qualitative benefits and challenges of replacing the homes.<sup>48</sup>

The Oregon Legislative Assembly passed House Bill 2896, effective September 2019, which allocates \$9.5 million to OHCS to provide loans to nonprofit corporations to establish preservation programs for manufactured home parks. The law also allocates \$2.5 million to the Manufactured Home Preservation Fund, which provides loans of up to \$35,000 per individual homeowner to replace older, inefficient manufactured homes with energy-efficient ones that meet OHCS standards. The Manufactured Home Preservation Fund also helps families decommission and dispose of a manufactured dwelling and will help finance advisory board initiatives such as annual evaluations. To qualify for loans, households must have an income that does not exceed 100 percent of the statewide or local area median income, whichever is greater; purchase a home that meets energy-efficiency standards as prescribed by OHCS; and agree to site the unit in a park that is registered with OHCS’ Manufactured Communities Resource Center (MCRC) and either has currently entered into a regulatory agreement or is negotiating one with OHCS. OHCS will administer a grant program funded from \$3 million deposited in the Manufactured Dwelling Park Account aimed at people who need to decommission and dispose of a manufactured dwelling. OHCS recently established an advisory committee,

required under House Bill 2896, that includes representatives from relevant state and local agencies; HUD; USDA Rural Development; park owners; park residents; lenders; and nonprofit organizations such as Craft3, St. Vincent de Paul of Lane County, and the Network for Oregon Affordable Housing that offer loan programs, financial counseling, and homebuyer education. The advisory committee will develop strategies to preserve manufactured home parks as affordable housing; propose solutions to mitigate barriers that hinder the development of parks; identify strategies to fund, preserve, and improve park infrastructure; establish equitable financing sources for purchasing manufactured dwellings; develop services to help homeowners weatherize existing manufactured dwellings; promote homebuyer education; and annually evaluate the progress of the committee and state agencies.<sup>49</sup>

## Fostering Positive Outcomes

Land values in Oregon have been increasing, encouraging landowners to sell and risking the closure of manufactured home parks to make way for new development. Between 1997 and 2008, 65 manufactured home parks closed in Oregon. In 2007, however, the state passed Residential Landlord and Tenant legislation to protect homeowners in the event of a closure, and since 2014, only 3 of the state's roughly 1,060 parks have closed.<sup>50</sup> The legislation requires park owners to give tenants no less than one year's notice before the park's closure. Owners are required to compensate tenants \$6,000, \$8,000, or \$10,000 for a single-wide, double-wide, or triple-wide home, respectively. Landlords are also required to notify tenants of eligibility criteria and application information for a tax credit as well as information on how to appeal property tax assessments on their manufactured homes.<sup>51</sup> Pryor noted that the one-year notification requirement for park closures gives residents time to meet with CAAs to attend job fairs and employment training, determine new schools

for their children to attend, and identify transportation needs.<sup>52</sup>

The Oregon Legislative Assembly created MCRC in 1989 to provide services and information to residents and landlords of manufactured housing parks, develop positive working relationships, implement a referral program to encourage voluntary dispute resolution, and maintain a directory of manufactured home parks. MCRC monitors the park closure notification process and offers counseling and service referrals to residents. MCRC collaborates with OHCS' park preservation program to encourage resident ownership of parks that might otherwise close.<sup>53</sup> OHCS has funded 22 preservation efforts through the cooperative and nonprofit model. MCRC is funded through an annual assessment of \$10 for each manufactured home on rented or leased land and an annual park registration fee of \$50 or \$100, for landlords of parks with 20 or fewer lots and parks with more than 20 lots, respectively.<sup>54</sup> MCRC is also part of the tenant relocation team that helps residents navigate park closures, access service referrals, and understand their rights and responsibilities and the availability of services.<sup>55</sup> CAAs also assist residents by helping them access rapid rehousing, rent assistance, and voucher waiting lists.<sup>56</sup>

In 2014, the Oregon Legislative Assembly approved changes to the Residential Landlord and Tenant Act requiring the owner of a manufactured home park to give written notice of interest in selling the park before marketing it for sale or upon receipt of an offer. Owners must give this notice to all tenants or a tenants committee as well as the Office of Manufactured Dwelling Park Community Relations of OHCS. Within 10 days after receiving this notice, tenants choosing to purchase the park must notify the owner in writing to express their interest, indicate that they have formed a single tenants committee, and provide a representative's contact information.<sup>57</sup> During this 10-day period, a representative of the tenants committee can issue a written request for

financial information that a park's seller customarily provides to a prospective purchaser, which the owner must supply within 7 days. If the owner fails to comply, tenants can restrict the landowner from selling the park or transferring it to another entity.<sup>58</sup> Once the tenants committee submits an offer, the owner can accept or reject the offer or submit a counteroffer. Although park owners were initially opposed to some of these requirements, concessions from both park owners and tenants eventually led to the passage of the legislation.<sup>59</sup>

For tenants interested in purchasing their manufactured home parks, CASA will also appraise the property and interview residents to determine how much they can afford to pay.<sup>60</sup> CASA helps manufactured homeowners attain the financing and technical assistance needed to purchase their communities, and it operates the Manufactured Housing Cooperative Development Center, which is one of nine certified technical assistance providers under the national ROC USA network. To date, CASA's loan fund has provided resident cooperatives with more than \$3.8 million in park purchase financing and more than \$250,000 in predevelopment financing.<sup>61</sup>

## Challenges and Lessons

Stoenner emphasized the need for more resources to assist manufactured housing residents. She indicated, for example, that the waiting list to get homes weatherized is long. Personal property loans commonly used to purchase manufactured homes often come with higher interest rates and shorter repayment periods than traditional mortgages, making state and nonprofit loan programs a vital source of financing. Financing remains a critical need, particularly in rural areas, where manufactured homes make up a substantial portion of the housing stock. In addition, as Pryor mentioned, residents attempting to purchase their manufactured home park may be outbid by private-market buyers who present an all-cash offer. Despite these challenges, however, OHCS is committed to serving

## Next Step's SmartMH Program

Next Step is a Kentucky-based nonprofit organization created in 2010 that is transforming the manufactured housing industry by educating homebuyers, increasing affordability, and enhancing energy efficiency. Next Step has a national network of more than 450 members including manufacturers, affordable housing advocates, lenders, retailers, developers, and housing counseling organizations.<sup>1</sup> Recognizing that increasing energy efficiency in manufactured housing could result in utility savings and improved housing quality for residents, Stacey Epperson, president and founder of Next Step, launched the SmartMH program in 2015 in Kentucky. The program emerged from her observation that less than 1 percent of the manufactured homes in Kentucky met ENERGY STAR® certification standards. Through SmartMH, Next Step identifies lenders that support the purchase of ENERGY STAR® manufactured homes.<sup>2</sup> In addition to increasing traditional mortgage lenders' participation in the manufactured housing market, the SmartMH program also aims to increase the number of manufactured housing retailers in the program, expand the pool of educated homebuyers, and collaborate with nonprofit housing counseling agencies to guide prospective buyers.<sup>3</sup>

In 2017, Next Step partnered with Freddie Mac to expand the SmartMH program to North Carolina, Tennessee, Mississippi, and Texas. Representatives from Next Step train housing counselors, retailers, and lenders in these states to work with them. Next Step also partnered with eHome America in 2017 to develop an online curriculum in both English and Spanish for manufactured home buyers. A vital component of the homebuyer education course is an explanation of the long-term benefits of buying a high-quality, energy-efficient home. Upon completion of homebuyer education, lenders preapprove interested buyers for an energy-efficient manufactured home. A total of 30 lenders — both industry lenders and traditional lenders such as banks — were participating in the SmartMH program as of October 2019. These lenders refer prospective homebuyers who have difficulty securing financing to the SmartMH program.<sup>4</sup> As of September 2019, more than 1,150 individuals were enrolled in the SmartMH program. The program also has 410 retail sales centers that refer enrollees to one of 8 HUD-certified nonprofit housing counseling organizations, where families can meet with manufactured home specialists.<sup>5</sup>

Next Step's SmartMH and other programs and commissioned research have helped boost awareness of the need to improve the manufactured housing stock and the negative impact that inefficient homes have had on residents' health and finances. Epperson noted that factory tours, open houses, social media, and videos sharing families' success stories have been essential for overcoming negative perceptions and building interest in manufactured housing. In addition, leveraging cross-sector partnerships among affordable housing advocates, government agencies, housing finance organizations, and other stakeholders has been key to ensuring that communities interested in expanding and improving their manufactured housing stock have access to quality technical assistance.<sup>6</sup>

<sup>1</sup> Next Step. "About Us" ([www.nextstepus.org/about/](http://www.nextstepus.org/about/)). Accessed 20 August 2019; Next Step. 2018a. "2018 Annual Report"; Stacey Epperson and Paul Fortenberry. 2018. "Shedding the Stigma: Today's manufactured homes offer high quality, energy-efficient and stylish options for affordable housing"; Sherry Farley and Stacey Epperson. 2016. "Manufactured housing done right with the Next Step Network."

<sup>2</sup> Farley and Epperson; Interview with Stacey Epperson, 2 October 2019.

<sup>3</sup> Next Step. 2018b. "Freddie Mac and Next Step Expand Manufactured Housing Education and Counseling Program"; Next Step. 2016. "2016 Annual Report."

<sup>4</sup> Interview with Stacey Epperson; Next Step 2018b.

<sup>5</sup> Grant Beck. 2019. "Next Step and Freddie Mac Expand Manufactured Housing Education and Counseling Program."

<sup>6</sup> Next Step 2016: Interview with Stacey Epperson.

this population, which is more likely to be over age 75, receive Supplemental Nutrition Assistance Program benefits, and earn an annual median income of approximately \$35,000. The state recognizes that manufactured housing is a vital source of affordable housing, and improvements in manufactured housing and financing mechanisms

can make homeownership and housing stability a reality for vulnerable groups, said Stoenner.<sup>62</sup>

### Conclusion

Implementing strategies to finance, preserve, and construct energy-efficient modular and manufactured homes is essential to ensuring that this type of

housing gains traction in the marketplace. Programs such as Efficiency Vermont's ZEM housing initiative can help factory-built homes remain a viable, affordable housing option for low-income families. According to Howe, recognizing the "power of partnerships" is critical for other communities wishing to implement similar initiatives. ZEM housing

would not have been possible without partner organizations to manage financing, homebuyer education, construction, and public outreach.<sup>63</sup> Although Oregon’s MCRC has been around for more than 25 years, the passage of House Bill 2896 has made manufactured housing a newer priority for OHCS. The new advisory group will be essential for leading discussion and evaluating progress toward manufactured housing goals.<sup>64</sup> Assessing current needs, harnessing existing resources, and cross-sector collaboration are important steps when determining how to scale up factory-built housing and ensure long-term benefits. **EM**

<sup>1</sup> State of Vermont Agency of Commerce and Community Development. “Mobile Home Facts and Park Registry” ([accd.vermont.gov/housing/mobile-home-parks/registry](http://accd.vermont.gov/housing/mobile-home-parks/registry)). Accessed 7 August 2019.

<sup>2</sup> VEIC. “Zero Energy Modular<sup>SM</sup> Homes Offer Comfort, Affordability to All” ([www.veic.org/our-results/success-stories/zero-energy-modular-homes-offer-comfort-affordability-to-all](http://www.veic.org/our-results/success-stories/zero-energy-modular-homes-offer-comfort-affordability-to-all)). Accessed 10 April 2019; University of Vermont. 2012. “Vermont Mobile Home Parks: Resident Demographics.”

<sup>3</sup> VEIC.

<sup>4</sup> Interview with Phoebe Howe, 27 September 2019.

<sup>5</sup> Efficiency Vermont. “Our History” ([www.veic.org/about/history](http://www.veic.org/about/history)). Accessed 26 August 2019; Interview with Phoebe Howe.

<sup>6</sup> Interview with Phoebe Howe.

<sup>7</sup> Ibid; Email correspondence with Phoebe Howe, 18 October 2019.

<sup>8</sup> Charlotte Albright. 2013. “Weather-Resistant Modular House Unveiled in White River Junction”; High Meadows Fund. “2013 Grants Listed Alphabetically by Organization” ([www.highmeadowsfund.org/2013-grantmaking](http://www.highmeadowsfund.org/2013-grantmaking)). Accessed 23 October 2019.

<sup>9</sup> Peter Schneider. 2013. “The mobile home of tomorrow: Vermont leads the way.”

<sup>10</sup> Albright.

<sup>11</sup> Email correspondence with Phoebe Howe, 18 October 2019.

<sup>12</sup> Phoebe Howe. 2018. “Efficiency Vermont Zero Energy Modular Initiative”; Schneider.

<sup>13</sup> Interview with Phoebe Howe.

<sup>14</sup> Ibid; “Recommended Home Insulation R- Values,” Energy Star website ([www.energystar.gov/index.cfm?c=home\\_sealing.hm\\_improvement\\_insulation\\_table](http://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_insulation_table)). Accessed 18 October 2019.

<sup>15</sup> Efficiency Vermont. 2016. “Comfort, quality and long-term affordability that sets the stage for your future”; Vermont Housing and Conservation Board. “Zero Energy Modular Construction Details & Financing Options” ([vhcb.org/zero-energy-modular-construction-details-financing-options](http://vhcb.org/zero-energy-modular-construction-details-financing-options)). Accessed 21 August 2019; VEIC.

<sup>16</sup> Email correspondence with Phoebe Howe, 23 October 2019.

<sup>17</sup> Schneider; Efficiency Vermont 2016.

<sup>18</sup> Interview with Phoebe Howe.

<sup>19</sup> Schneider.

<sup>20</sup> Interview with Phoebe Howe.

<sup>21</sup> “Efficiency Vermont ZEM Program,” VERMOD Homes website ([vermodhomes.com/efficiency-vermont-zem-program/](http://vermodhomes.com/efficiency-vermont-zem-program/)). Accessed 10 April 2019.

<sup>22</sup> Interview with Phoebe Howe.

<sup>23</sup> U.S. Census Bureau. “Selected Housing Characteristics: 2013-2017 American Community Survey 5-Year Estimates” ([data.census.gov](http://data.census.gov)). Accessed 4 September 2019; Justine Sears and Kelly Lucci. 2019. “Vermont Energy Burden Report,” Efficiency Vermont, 6.

<sup>24</sup> Interview with Phoebe Howe.

<sup>25</sup> Champlain Housing Trust. “Manufactured Housing Down Payment Loan Program” ([www.getahome.org/loans/manufactured-housing-down-payment-loan-program](http://www.getahome.org/loans/manufactured-housing-down-payment-loan-program)). Accessed 13 November 2019; Interview with Phoebe Howe; Champlain Housing Trust. n.d. “Quick Reference Guide and Consumer Privacy Policy”; Champlain Housing Trust. “About Us” ([www.getahome.org/about-us](http://www.getahome.org/about-us)). Accessed 13 November 2019.

<sup>26</sup> Interview with Phoebe Howe.

<sup>27</sup> “ZEM impact: 2013-August 2019,” Document provided by Phoebe Howe; Interview with Phoebe Howe.

<sup>28</sup> Megan Roush. 2015. “USDA housing chief: New, long-term affordable mortgages available for mobile home park residents,” 30 June press release.

<sup>29</sup> Interview with Phoebe Howe.

<sup>30</sup> Jane Kolondinsky, Dan Baker, Erin Roche, Orest Pazu-niak, Jini Kades. 2017. “Assessment of the market for energy-efficient factory-built homes sold in Vermont,” Center for Rural Studies at the University of Vermont, 6–7; 16–8; 25.

<sup>31</sup> Interview with Phoebe Howe.

<sup>32</sup> State of Vermont Agency of Commerce and Community Development. “Mobile Home Facts and Park Registry” ([accd.vermont.gov/housing/mobile-home-parks/registry](http://accd.vermont.gov/housing/mobile-home-parks/registry)). Accessed 7 August 2019.

<sup>33</sup> Vermont General Assembly. 2012. *Title 10: Conservation and Development Chapter 153: Mobile Home Parks*. § 6242. Mobile home owners’ right to notification prior to park sale; Vermont General Assembly. 2011–2012 Session. “Acts Affecting Vermont Statutes.”

<sup>34</sup> Ibid; Email correspondence with Phoebe Howe, 7 February 2020.

<sup>35</sup> Vermont General Assembly 2012; Vermont General Assembly 2011–2012 Session.

<sup>36</sup> Interview with Phoebe Howe.

<sup>37</sup> Email correspondence with Phoebe Howe, 7 February 2020.

<sup>38</sup> Interview with Phoebe Howe.

<sup>39</sup> Ibid.

<sup>40</sup> Joint interview with Nicole R. Stoenner and Ken Pryor, 2 October 2019.

<sup>41</sup> Oregon Housing and Community Services. 2016a. “Manufactured Home Park Solutions Collaborative Local Agency Toolkit,” 8.

<sup>42</sup> Energy Trust of Oregon. 2017. “Energy Trust of Oregon Manufactured Home Replacement Pilot”; Shelley Beaulieu, Alexandra Buylova, Mitchell Hannoosh, and Peter Schaffer. 2018. “Ten-Year Plan: Reducing the

Energy Burden in Oregon Affordable Housing,” 4.

<sup>43</sup> Claire Seguin. 2019. “Oregon Sets an Example for Preserving, Repairing and Replacing Manufactured Housing.”

<sup>44</sup> Oregon Housing and Community Services. 2018. “Low-Income Home Energy Assistance Program”; Joint interview with Nicole R. Stoenner and Ken Pryor.

<sup>45</sup> Joint interview with Nicole R. Stoenner and Ken Pryor.

<sup>46</sup> Ibid.

<sup>47</sup> Seguin.

<sup>48</sup> Beaulieu et al., 34–5; Joint interview with Nicole R. Stoenner and Ken Pryor.

<sup>49</sup> Oregon Legislative Assembly. 2019. *House Bill 2896. An Act Relating to manufactured dwellings; creating new provisions; amending ORS 90.840, 90.849, 456.579 and 456.581; and prescribing an effective date*, Joint interview with Nicole R. Stoenner and Ken Pryor.

<sup>50</sup> Joint interview with Nicole R. Stoenner and Ken Pryor; Oregon Housing and Community Services. “Manufactured Home Park Closures in Oregon” ([www.oregon.gov/ohcs/Pages/manufactured-dwelling-park-closures-oregon.aspx](http://www.oregon.gov/ohcs/Pages/manufactured-dwelling-park-closures-oregon.aspx)). Accessed 7 October 2019; Oregon Housing and Community Services. “Oregon Manufactured Dwelling Parks Closure Information” ([o.hcs.state.or.us/MDPCR/Parks/ClosedParks.jsp](http://o.hcs.state.or.us/MDPCR/Parks/ClosedParks.jsp)). Accessed 7 October 2019.

<sup>51</sup> Oregon Housing and Community Services. “Manufactured Home Park Closures in Oregon”; Oregon State Legislature. 2017. *Title 10 Property Rights and Transactions. Chapter 90 — Residential Landlord and Tenant. 90.645 Closure of manufactured dwelling park; notices; payments to tenants; rules; 90.650 Notice of taxprovisions to tenants of closing manufactured dwelling park; rules*.

<sup>52</sup> Joint interview with Nicole R. Stoenner and Ken Pryor.

<sup>53</sup> Oregon Housing and Community Services. 2016b. “Manufactured Communities Resource Center (MCRC) Overview.”

<sup>54</sup> Joint interview with Nicole R. Stoenner and Ken Pryor.

<sup>55</sup> Oregon Housing and Community Services 2016a, 23.

<sup>56</sup> Joint Interview with Nicole R. Stoenner and Ken Pryor.

<sup>57</sup> Oregon State Legislature. 2017. *Title 10 Property Rights and Transactions. Chapter 90 — Residential Landlord and Tenant. 90.842 Notice of sale of manufactured dwelling park; contents; formation of tenants committee for purchasing park*.

<sup>58</sup> Ibid.

<sup>59</sup> Oregon Park Owners Alliance. 2014. “HB 4038-3: Clarifying and substantive amendments are necessary”; Brian Johnson, Johnson Mobile Estates. 2014. “Witness Testimony,” Senate Committee on General Government, Consumer & Small Business Protection; Amber Monte, Owner of Country Estates in Grants Pass & Columbus Greens in Albany. 2014. “Witness Testimony,” Senate Committee on General Government, Consumer & Small Business Protection; John VanLandingham, Lane County Legal Aid & Advocacy Center. 2014. “Comparison of Current Law with HB 4038A.”

<sup>60</sup> Joint interview with Nicole R. Stoenner and Ken Pryor.

<sup>61</sup> CASA of Oregon. “Promoting affordable home ownership through the creation of resident-owned, manufactured housing communities” ([www.casaoeforegon.org/for-individual/manufactured-housing-cooperative-development/](http://www.casaoeforegon.org/for-individual/manufactured-housing-cooperative-development/)). Accessed 25 September 2019.

<sup>62</sup> Joint Interview with Nicole R. Stoenner and Ken Pryor.

<sup>63</sup> Interview with Phoebe Howe.

<sup>64</sup> Joint Interview with Nicole R. Stoenner and Ken Pryor.

# Additional Resources

- The U.S. Department of Housing and Urban Development’s website hosts a frequently asked questions page that addresses many issues concerning manufactured housing that are of interest to consumers and builders. [hud.gov/program\\_offices/housing/rmra/mhs/faqs](http://hud.gov/program_offices/housing/rmra/mhs/faqs).
- Prosperity Now’s “Manufactured Housing Toolkit” offers communications tools, policy briefs, policy guides, sample local policies, and data to equip policymakers and the general public to support residents of manufactured housing. [prosperitynow.org/topics/housing-homeownership/manufactured-housing-toolkit](http://prosperitynow.org/topics/housing-homeownership/manufactured-housing-toolkit).
- “Displaced in Place: Manufactured Housing, Mass Eviction, and the Paradox of State Intervention” (2017), by Esther Sullivan, analyzes the divergent responses to eviction from mobile home parks in Florida and Texas. [journals.sagepub.com/doi/abs/10.1177/0003122416688667](http://journals.sagepub.com/doi/abs/10.1177/0003122416688667).
- “High Performance Factory Built Housing” (2015), by Jordan Dentz, discusses planning, innovation, and marketing for energy advances in factory-built housing. [energy.gov/sites/prod/files/2015/05/f22/rbi23\\_Dentz\\_041515.pdf](http://energy.gov/sites/prod/files/2015/05/f22/rbi23_Dentz_041515.pdf).
- “Improving Construction Efficiency & Productivity with Modular Construction” (2010), by the Modular Building Institute, describes the stages and advantages of modular construction, such as a streamlined construction process and efficient use of resources. [modular.org/marketing/documents/Whitepaper\\_ImprovingConstructionEfficiency.pdf](http://modular.org/marketing/documents/Whitepaper_ImprovingConstructionEfficiency.pdf).
- The Joint Center for Housing Studies of Harvard University’s “PRO Neighborhoods: Innovative Strategies for Affordable Housing” (2019), by Alexander von Hoffman and Matthew Arck, discusses model programs that allow residents to purchase the land under their manufactured homes and promote naturally occurring affordable housing and accessory dwelling units. [jchs.harvard.edu/sites/default/files/Harvard\\_JCHS\\_PRO\\_Neighborhoods\\_Innovative\\_Strategies\\_for\\_Affordable\\_Housing\\_0.pdf](http://jchs.harvard.edu/sites/default/files/Harvard_JCHS_PRO_Neighborhoods_Innovative_Strategies_for_Affordable_Housing_0.pdf).
- “Prefabrication and Modular Construction 2020 SmartMarket Report” (2020), by Dodge Data & Analytics, explains the current and future uses of prefabrication and modular construction and analyzes users’ benefits and challenges. [modular.org/documents/public/PrefabModularSmartMarketReport2020.pdf](http://modular.org/documents/public/PrefabModularSmartMarketReport2020.pdf).
- “Disaster Housing Construction Challenges in America: Exploring the Role of Factory-Built Housing” (2019), by Michael Windle, Sarah Quraishi, and Jarrod Goentzel, investigates the potential for using factory-built housing for meeting immediate needs in disaster recovery and as an ongoing source of affordable and resilient housing. [dspace.mit.edu/bitstream/handle/1721.1/122651/MIT\\_HSCL\\_Housing\\_Report\\_final\\_102819.pdf?sequence=3&isAllowed=y](http://dspace.mit.edu/bitstream/handle/1721.1/122651/MIT_HSCL_Housing_Report_final_102819.pdf?sequence=3&isAllowed=y).
- “Will Homebuilding Finally Evolve? Lessons from the American Experience with Factory-Built Housing” (2019), by Lynn M. Fisher and Scott C. Ganz, reviews the history of factory-built housing in the United States and considers how factory-built housing might be adopted more broadly and lead to cost savings. [aei.org/wp-content/uploads/2019/05/Will-Homebuilding-Finally-Evolve.pdf](http://aei.org/wp-content/uploads/2019/05/Will-Homebuilding-Finally-Evolve.pdf).

For additional resources archive, go to [www.huduser.gov/portal/periodicals/em/additional\\_resources\\_2020.html](http://www.huduser.gov/portal/periodicals/em/additional_resources_2020.html).

## Evidence Matters

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