Pre-Purchasing to Increase Modular Construction Capacity

By Lauren E. Leonard and A.J. Herrmann

Summary

Modular construction has the potential to reduce residential construction costs by up to 20-30% and speed construction timelines by up to 30-50%. However, while modular construction has been widely adopted in much of the rest of the developed world, it has failed to launch in the United States, representing less than 5 percent of all new construction. Its adoption in the US has been stymied by myriad challenges, including a patchwork regulatory environment and a risk-averse finance and development community. Furthermore, modular facilities require a significant upfront investment, and the cost savings from modular are greatly reduced if the homes need to be transported long distances, requiring factories to be sited locally. Modular manufacturers are therefore reluctant to invest in new facilities unless there is a sufficient pipeline of local demand for modular homes to justify the costs of financing and construction a new production facility.

A promising approach to mitigating this challenge is the pre-purchasing or financial guarantee of base level of demand for modular homes by local governments, either themselves, their housing authorities, or through cooperative pre-purchasing among multiple local governments. Taking such an approach to modular homes would diffuse the risk and cost of investing in modular construction facilities and generate a sufficient pipeline of local demand to jumpstart the modular industry across broader regions.

The Challenge this tool solves

Construction costs have increased at more than double the rate as overall inflation over the last 10 years. This is true across the spectrum of housing types: for sale, for rent, market rate, and affordable. There are many contributing factors to these increased costs: a national labor shortage of construction workers and skilled tradespeople, increased costs of raw materials including lumber, and regulatory requirements that make housing more scarce and more expensive. Modular construction can reduce many of these costs through economies of scale, improved efficiency in the use of materials, the ability to continue work independent of weather conditions, and faster construction timelines. Pre-purchasing agreements allow local jurisdictions to reduce the risk for modular manufacturers, making it more likely they will locate a facility or expand capacity in their jurisdiction, and making it more likely the potential cost savings from modular will translate into reduced production costs and greater housing affordability.

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Types of Communities that could use this tool

The siting of a factory for offsite manufacturing requires sufficient demand in a region for new housing units of a similar type — either single family, townhouses, small apartments, or larger apartment buildings. There are myriad transportation, regulatory, and labor issues to consider when communities choose to invest in a modular factory. Communities that have a shortage of housing units, available land to site housing, and a regulatory environment that can easily allow for inspections and building permitting of housing units constructed off site are good candidates for this tool.

Expected Impacts

In an ideal environment, estimates suggest that modular construction could decrease time costs by up to 30-50%, and overall construction costs by up to 20%. Investing in recruiting an offsite manufacturing facility can increase the pace of construction of housing in a region, while decreasing the per unit costs over time.

Background

Modular construction bridges the gap between traditional site-built construction and manufacturing, leveraging the best practices of each to allow for greater efficiency. "Modular" generally refers to volumetric, three-dimensional boxes (modules) fabricated offsite, but also can refer to other offsite construction methods, such as the manufacturing of panelized and other smaller building components. Modular construction can be used to build single-family, multifamily, commercial, and industrial buildings. Modular structures may be permanent or relocatable.

Work at the physical construction site—where the completed final structure will ultimately be occupied—includes preparation, foundation work, and running of utilities. Building components like walls, floors, and roofs are fabricated simultaneously in a factory in an assembly-line like process. These modules are then transported and delivered to a site and integrated into the foundations to become the final structure. The integration may include connecting all building components like a set of Legos or placing a stand-alone turn-key structure delivered with completed mechanical, electrical, plumbing systems as well as interior finishes and fixtures.

Modular construction utilizes the same materials as traditional site-built construction. Modules are standardized to streamline the process but can be customized and designed to be architecturally indistinguishable from adjacent site-built structures. While some nations (Canada) and several states—Montana, Utah, and Virginia—have adopted modular building codes, the United States does not have a singular national modular building code. While manufactured housing built with a permanent chassis is subject to a building code promulgated by the Department of Housing and

Urban Development (the "HUD Code"), all other buildings are regulated at the state and local levels.

There are many potential benefits to utilizing modular construction methods, including:

- **Faster Construction Time**. Modular homes can be built in the factory while site preparation occurs simultaneously. This parallel construction reduces project timelines significantly, lowering costs related to financing, permits, and temporary housing for workers. Furthermore, since modules are built indoors, delays caused by weather (rain, snow, extreme temperatures) are minimized, reducing labor and material costs due to damage or delays.
- **Mass Production & Economies of Scale**. Since modules are built in a factory setting, materials can be bought in bulk at lower costs, and labor can be utilized more efficiently.
- **Reduced Labor Costs**. Factory-based construction can reduce the need for expensive on-site labor. It also allows for a more controlled environment where tasks are standardized, potentially reducing labor costs.
- **Less Material Waste**. Modular factories can more efficiently use material than traditional construction sites, leading to significant savings. Excess materials can be also reused for future projects more easily than in traditional construction methods, where excess materials must be transported away from the assembly site.
- **Lower Site Preparation & Logistics Costs**. Because a large portion of the work is completed off-site, the need for extensive site work, storage, and staging areas is reduced, cutting down expenses on logistics and site management.
- **Standardization & Design Efficiency**. Modular homes often follow standardized designs that streamline production. This lowers architectural and engineering costs compared to custom-built homes. It can also help reduce maintenance costs for building operators, since it is easier to determine how to fix or replace certain components.
- **Energy Efficiency & Sustainability**. Many modular designs incorporate energy-efficient materials and construction techniques, reducing long-term operational costs for heating, cooling, and maintenance.

With all its promise, modular construction is only efficient where it is allowed to be. There are several obstacles limiting its adoption and deployment.

- **Logistics.** Modular requires transportation from the manufacturing site to the assembly site, with costs increasing based on distance traveled. Some modular structures may also be too big to transport without special planning and permitting; others will require special permits and inspections to travel across state lines. Finally, smaller streets and density in some American cities may complicate the delivery and installation of modular.

- **Perception.** Given the structure of housing development, where decisions are made by owners, general contractors, and architects, multiple parties need to be enthusiastic in choosing modular as the means of construction for a particular project. For owners, general contractors, and architects unfamiliar with modular and concerned about minimizing risks, it can be challenging to introduce new techniques and materials into the construction process. Organized labor may also resist the adoption of modular construction because it can reduce the reliance of builders on certain skilled trades.
- **Regulations and Compliance.** Without a national building code, modular is subject to the regulations of different localities. Because modules for development are built in one geography and delivered in another, the lack of a uniform building code can increase compliance costs for developers who need to work with building inspectors in the jurisdiction where the housing will be built. Even minor differences in code requirements can require additional customization of modular homes, further increasing costs.
- **Upfront Costs.** The cost to build a volumetric modular factory is estimated at $40-$50 million—depending on size, location, and equipment used. This is a significant investment that many private manufacturers will be unwilling to make unless they are confident in a long-term pipeline of demand in a region. Modular manufacturers will typically require a down payment of 30-40% from the ultimate purchaser, higher than traditional suppliers of building materials.

Proposed Solution: Pre-Purchasing to Increase Modular Construction Capacity

A potential solution for addressing these challenges and facilitating more widespread adoption of modular is "pre-purchasing" agreements. These agreements can build a pipeline of demand for modular homes in a particular geography. Ultimately, the goal of these efforts will be to create a fly-wheel effect, where the initial investment to help attract the modular manufacturer to a region promotes the broader adoption of modular construction methods by other developers, increasing its overall impact on reducing the cost of housing.

Historically, local governments do not procure homes, except for Public Housing Authorities. However, many local governments do incentivize the creation of affordable housing through their public land disposition process, incentive and grant programs targeted at developers of affordable housing, or subsidies for builders and operators of housing for specific populations, such as veterans or the elderly. These three mechanisms: public housing authorities, public land disposition, and partnerships and incentives all provide avenues for local governments to support and incentivize the use of modular construction. Furthermore, if local leaders can catalyze the development of a robust modular manufacturing sector in their region, it could help reduce the

other incentives and subsidies many cities currently provide to developers to make projects financially feasible.

One possible approach to facilitating this outcome was recently adopted by the City of Cleveland. At the direction of Mayor Justin Bibb, Cleveland's Site Readiness Fund for Good Jobs Fund (SRF) issued an RFP in December to attract an off-site construction manufacturer to help address the city's 15,000-unit housing shortage. The RFP is designed to identify and select a modular manufacturing partner who will site a new factory on a 20+ acre parcel of land. The RFP process consists of two rounds: the first will identify manufacturers who are the best fit for the initiative and city; the second will involve discussion, site visits, evaluation and negotiations, with the goal of selecting up to three developers who will construct a pilot to build 15 homes to be directly purchased by SRF.

The city and its partners are providing a number of incentives and other forms of support to encourage manufacturers to respond to the RFP and increase the chances of long-term success. The city is securing base demand among non-profit, governmental agencies, and for-profit developers, with a targeted commitment of 100-200 homes per year for the next ten years beginning in 2026. Prior to the release of the RFP, SRF partnered with the City of Cleveland, City Council, and the Cuyahoga Land Bank to identify 18,000 vacant lots ready for development (and on which modular homes could be deployed). Manufacturers will also be able to leverage the city's existing TIF and tax abatement tools, as well as state and local tax credits and incentives for projects that lead to 50+ new jobs. The city is also committed to improving zoning, permitting, and inspections processes to help speed the production and deployment of these new homes.

The city is focused on deploying the homes in a concentrated way to catalyze neighborhood revitalization, with the target of deploying up to 100 homes in one neighborhood or district each year. Neighborhoods will be selected by a combination of elected officials, staff, and CDCs. Selection criteria including neighborhood interest, the presence of a high concentration of vacant lots conducive for development, recent or planned infrastructure investments, and the presence of other organizations interested in investing in affordable housing. This approach will also allow the city to better target focused infrastructure improvements through TIF and other tools. Ultimately, the city hopes to create a redevelopment playbook that can be replicated year after year to further increase efficiency.

Finally, a new modular factory in Cleveland is expected to not just serve the city, but also the 2.5 million people in the broader metro area, as well as the cities of Columbus, OH, Toledo, OH, Pittsburgh, PA, Detroit, MI, and Buffalo, NY, which are all within three hours and have easy interstate access.

The Minneapolis Public Housing Authority (MPHA) has used modular construction to construct 84 units of redeveloped public housing across 16 different developments through its Family Housing Expansion Project (FHEP). The project is composed of 26 two-bedroom and 58 three-

bedroom homes in fourplexes and sixplexes across 16 sites throughout Minneapolis, all of which will be available to households at or below 30% of the Area Median Income (AMI). Minneapolis Public Housing Authority (MPHA) — the developer, owner and property manager of the project — these 84 new homes can serve approximately 420 families over the next 30 years.

To reduce costs and speed the development time for this project, MPHA issued an RFP for a modular manufacturer to design and build the units. The winning bid was a consortium of Rise Modular, an existing Minnesota based modular construction company, Frerichs Construction, a general contractor, and DJR architecture. Their approach has resulted in less noise and fewer neighborhood disruptions at each site while delivering the project 30 percent faster than would have been likely using traditional construction methods.

MPHA was able to provide 84 project-based vouchers to fully subsidize the units to achieve the project's deep affordability and made a significant contribution with a $12.5 million dollar loan to the project. Additionally, the project benefited from a $1.4 million Local Housing Incentives Account (LHIA) award from the Metropolitan Council, a $500,000 award of Hennepin County's Affordable Housing Development Accelerator fund, and more than $500,000 in equity through solar tax credits. The project was one eighteen finalists for the Urban Land Institute's 2024 Americas Awards for Excellence.

In 2023, Louisville Mayor Craig Greenberg unveiled a comprehensive housing strategy that aims to create and preserve 15,000 affordable housing units by 2027. The housing strategy included the need to attract modular construction companies to Louisville to provide quick and cost-effective options for constructing housing. Because of constraints caused by a state tax incentive program, Louisville Metro Government had to get creative to attract a modular construction company, and in early 2024, the city awarded $1.7 million, including $1.2 million in CDBG grants, to an international modular housing manufacturer to locate in a five-acre industrial facility in one of the city's historically Black neighborhoods. The facility has created 75 new jobs and is already producing housing units. It is anticipated the facility will produce up to 500 housing units annually.

Another mechanism for local government to grow the modular construction industry locally is partnering with neighboring jurisdictions to enter into cooperative pre-purchasing agreements. Cooperative pre-purchasing, or purchasing consortia, is already used in states, cities, and municipalities across the US to get the best value, ensure favorable contractual terms, and encourage competition and innovation. For example, states including California, Illinois, Massachusetts, New Jersey, New York, Virginia, Ohio, Pennsylvania, Rhode Island have established "Community Choice Aggregators (CCAs)" to source cheaper electricity for local communities resulting in lower utility bills and more renewable energy sourcing. However, co-operative purchasing has rarely been used for housing.

The Department of Housing and Urban Development recently awarded the Boston-area Metropolitan Area Planning Council (MAPC) a $3 million Pathways to Removing Obstacles to

Affordable Housing (PRO Housing) grant to explore innovative ways to build and install modular housing in the Greater Boston region. The grant application explicitly noted "that the lack of a manufacturing facility within 50 miles of Boston is the most significant barrier to the use of offsite construction due to the transportation and logistical challenges of transporting modules across state and country boundaries."

Grant funding will be used to determine the best mechanism for the towns of Boston, Cambridge, Everett, Newton to pool enough demand to locate a modular facility in the Greater Boston region, with the goal of producing 500 units annually by 2030. The coalition is also partnering with representatives from labor to understand how offsite construction jobs can complement on-site construction jobs to improve the overall construction industry and result in quicker, but still high-quality and durable, housing development.

Diffusion and Scaling of Modular Pre-Purchasing

To scale and encourage the widespread adoption of modular construction methods through pre-purchasing agreements and regional consortia, local and state leaders should consider taking the following actions:

Assess the Current Modular Ecosystem in your Community

Many cities have facilities where prefabricated elements including windows, doors, trusses, panelized wood framing, timber and streel framing, precast concrete systems, curtainwall, and structural insulated panels are regularly incorporated into traditional construction techniques. Where these prefab facilities already exist, there could be an opportunity to pool demand to produce other building systems at scale. For example, in a city with a need for and policies to support six-story mid-rise residential infill construction, demand may be pooled to incentivize a steel, timber, or mass timber supplier to produce the structural core of the buildings. In some jurisdictions, dwelling components like bathrooms could be prefabricated and delivered to the site ready for integration, but suppliers may need active participation by local government leaders to organize the necessary commitments from local developers.

Create a Regulatory Environment which Facilitates Modular Construction

Local leaders may need to update zoning laws to allow modular construction in more areas, including mixed-use and infill sites. They will also need to standardize and clarify building codes specific to modular homes to prevent delays and inconsistencies. They could also potentially implement a fast-track permitting process for modular home projects. While the ICC's modular codes have created greater harmony in industry, broader structural reforms to building codes are necessary for modular to reach its full capacity and impact the housing crisis at scale.

Incentivize Suppliers to Site or Expand New Factories

The potential cost savings from modular construction and manufacturing are reduced the further the unit must be transported from its production facility. Thus, incentivizing a modular factory to locate in your community is an important first step. Incentives could include tax abatements, or programs like Cleveland's SRF which supports new manufacturing facilities. Before taking this step, communities should ensure there is a sufficient pipeline of demand to warrant the significant upfront investment ($40-$50 million) required to build a factory.

Support Workforce Development and Engagement with Labor

Meeting the housing demand using any means of construction will require significant investment in workforce development. Where modular factories exist and where new ones will be built, cities and municipalities can pool a new, modern workforce and work with labor representatives to find new ways of working with manufacturing partners.

Lauren E. Leonard *is a graduate research analyst at the Nowak Metro Finance Lab at Drexel University where she is pursuing a Master of Science in Urban Strategy.* ***A.J. Herrmann*** *is the Director of Policy and Program Innovation at Accelerator for America and former Policy Director for Kansas City Mayor Quinton Lucas.*