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Potential Pathways to Scale Innovative Construction Methods in California

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Executive Summary

California faces a complex and deepening housing affordability crisis. Rising home prices and rents, high rates of homelessness, overcrowding, and displacement are widespread. For decades, California's home prices have outpaced other states—in 2019, the median home value was $568,500, more than twice the national median home price ($240,500). Underproduction of housing is one of the main drivers of the state's housing affordability crisis.

The state has not built enough housing to meet the demand. According to the California Department of Housing and Community Development, California must build 2.5 million homes by 2030 to meet the state's housing needs. Over the last decade, California has taken real steps to expedite housing production by addressing land use constraints and approval timelines, expanding the amount of land zoned for housing, and providing greater certainty in the entitlement process. Yet because of high and increasing hard costs associated with construction, many projects cannot be built at a reasonable cost—i.e., they do not "pencil"—and do not move forward.

Innovation in the building industry has emerged as a potential pathway to lower costs and increase housing production. In theory, these efficiencies could translate into lower per-unit costs; reduced financing risk; and ultimately, greater housing supply. However, it has yet to scale in the United States. California has seen growing interest in this sector; with the need for affordable housing and cheaper construction methods, the state may be well positioned to adopt innovative construction methods more broadly.

To better understand the barriers to scale and the State's potential role, Speaker of the Assembly Robert Rivas convened a Select Committee on Housing Construction Innovation (Select Committee) on December 4, 2025. Chaired by Assemblymember Buffy Wicks and made up of 14 assemblymembers, the Select Committee's charge is not to determine whether California should pursue innovation in housing construction in the abstract, but to understand how the State can play a role in reducing the barriers that prevent promising methods from achieving scale.

The underlying theory is straightforward: if construction costs are a key driver of the housing shortage, and if innovative methods of construction have the potential to contain those costs, then State action that aids factory-based production could help unlock that potential. In doing so, the State can support higher productivity in the construction sector; lower the cost of delivering housing; and ultimately, contribute to expanding supply and improving affordability.

One task of the Select Committee has been to develop policy ideas to guide the legislative agenda. To do this with a full understanding of the industry landscape, the Select Committee partnered with the Terner Center to conduct research with industry stakeholders and experts. From November 2025 through early January 2026, Terner Center researchers spoke with more than 65 people, including both market-rate and affordable housing developers; general contractors; off-site manufacturers; architects; investors; lenders; building trades unions and carpenters union members; state and regional government staff; building code experts; and representatives from companies using 3D printing, artificial intelligence, or other emerging technologies.

The research participants identified seven themes around which policies could be developed to help the industry:

1. Increase certainty through building code reform
2. Increase consistency and certainty through other process reforms
3. Reduce financial risk and liability to encourage industry growth
4. Support pipeline certainty through demand aggregation
5. Increase long-term industry certainty by developing a strong workforce pipeline
6. Modify existing state funding streams to reflect FBH realities
7. Address negative perceptions of risk through education and data

This paper chronicles the participants' policy ideas in these seven categories.

Background

California's Housing Crisis

California faces a complex and deepening housing affordability crisis. Rising home prices and rents, high rates of homelessness, overcrowding, and displacement are widespread. For decades, California's home prices have outpaced other states—in 2019, the median home value was $568,500, more than twice the national median home price ($240,500).[1] Additionally, the San Jose and San Francisco metro areas have the highest median rents in the country—at $3,000 a month.[2]

Housing costs continue to rise more rapidly than household incomes. From 2000 to 2019, home values rose approximately 180 percent, while median household incomes increased by 23 percent.[3] Consequently, housing has become increasingly unaffordable.[4] Housing cost burdens are more severe for extremely low-income households, where almost 80 percent spend over half of their income on rent.[5] The need for affordable housing is vastly outstripping the supply; there are only 24 available affordable rental units for every 100 extremely low-income households.[6] Increasing housing costs, coupled with housing scarcity, have led to California having the highest rates of homelessness in the country. According to 2022 data, 30 percent of people experiencing homelessness on a single night in the United States were in California.[7]

Underproduction of housing is one of the main drivers of the state's housing affordability crisis. The state has not built enough housing to meet the demand. According to the California Department of Housing and Community Development (HCD), California must build 2.5 million homes by 2030 to meet the state's housing needs.[8] In fact, California is second to last in terms of housing units per capita, with 358 units per 1,000 people, trailing behind the national average of 419 units.[9]

While there are several reasons for the housing shortage—including lengthy development timelines, stringent and variable building codes, and land use regulations—a key contributor is high development costs. Hard construction costs—defined as materials and labor—typically make up more than 60 percent of total development costs. A past Terner Center report found that hard costs associated with development have risen starkly; projects started between 2016

and 2018 cost an average of $68 more per square foot than projects started between 2009 and 2011. Wood, plastics, and composites costs rose by 110 percent after accounting for inflation, and finishes costs rose by 65 percent.[10] Further, a recent RAND report has found that hard costs in California are 2.3 times higher than in Texas.[11] The total development costs for multifamily housing in California typically exceed $400,000–$500,000 per unit and are even higher in the high-cost metro areas where housing needs are most acute.[12] Labor costs, in part driven by an aging construction workforce and an acute shortage of workers, also contribute to high development costs.[13] These trends are likely to continue, particularly given elevated tariff rates on imported materials and the federal government's current immigration policies, which are accelerating the removal of existing undocumented construction workers and severely limiting inflows of immigrant workers.

An Opportunity for Innovative Construction

Over the last decade, the State of California has taken real steps to address land use constraints and approval timelines, expanding the amount of land zoned for housing and providing greater certainty in the entitlement process. Yet overall housing production has not meaningfully increased.[14] While the causes of this shortfall are complex, there is broad agreement that the cost of producing housing—particularly the cost of construction—has become a substantial constraint on new development. Projects that cannot be built at a reasonable cost—i.e., those that do not "pencil"—do not move forward.[15]

Innovation in the building industry has emerged as a potential pathway to lower costs and increased housing production. Industrialized construction (IC) has precedent in the United States and abroad and refers to a broad spectrum of practices that apply the ideas and methods from the manufacturing industry to housing design and construction. This includes prefabricated building elements (such as walls, floors, or entire units) assembled in facilities separate from the project site, as well as technology like on-site 3D printing. HCD uses the term "factory-built housing" (FBH) to refer to the specific subset of IC focused on off-site prefabrication, such as panelized elements or volumetric modular units. This is distinct from manufactured housing units, which are similarly produced off-site but are governed by federal code and follow distinct market and regulatory dynamics.[16] IC methods promise shorter timelines, greater predictability, improved quality control, and the potential for economies of scale. In theory, these efficiencies could translate into lower per-unit costs; reduced financing risk; and ultimately, greater housing supply.[17]

Specific applications of off-site construction have documented savings of up to 20 percent on the cost of building a three- or four-story wood-frame multifamily development, and projects with substantial off-site construction components can reduce timelines by between 40 and 50 percent.[18] There are also promising benefits for efficiency, climate resiliency, employee safety, and a diverse labor pool.

Despite these advantages, factory-built construction has struggled to reach scale in the state.[19] While there are successful projects and firms operating in California, the sector remains small relative to

conventional site-built construction, with some estimates putting it as less than 5 percent of total new residential construction.[20] This gap between technical potential and market reality suggests that the constraint is not simply whether factory-based methods can work, but whether the broader policy, regulatory, financial, and institutional environment will allow them to work.[21]

Stakeholders consistently emphasized that the failure to scale can be traced back to the distinct barriers related to risk, certainty, and liability that IC faces. Factory-based production requires upfront capital, standardized processes, and predictable approvals; yet current regulatory and financing systems were largely designed around site-built construction and often introduce uncertainty, duplication, and misaligned incentives. As a result, some of the efficiencies that IC is meant to deliver are eroded by friction elsewhere in the development process.

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The Select Committee on Housing Construction Innovation

To better understand the barriers to scale and the State's potential role, Speaker of the Assembly Robert Rivas convened a Select Committee on Housing Construction Innovation (Select Committee) on December 4, 2025. Chaired by Assemblymember Buffy Wicks and made up of 14 assemblymembers,[22] the Select Committee's charge is not to determine whether California should pursue innovation in housing construction in the abstract, but to understand how the State can play a role in reducing the barriers that prevent promising methods from achieving scale.[23]

The underlying theory is straightforward: if construction costs are a key driver of the housing shortage, and if IC has the potential to contain those costs, then State action that reduces risk, increases certainty, and aligns institutions with factory-based production could help unlock that potential. In doing so, the State can support higher productivity in the construction sector, lower the cost of delivering housing, and ultimately contribute to expanding supply and improving affordability.

The Select Committee has done two things to increase understanding of the IC landscape. First, the Select Committee was charged with convening public hearings. These hearings—held on January 6 and January 14, 2026—featured experts who discussed the benefits and risks of IC methods, including potential cost savings; ability to reduce project timelines; and regulatory, labor, and budget considerations. The hearings also explored barriers to and opportunities for scaling construction innovation.

The second task of the Select Committee has been to develop policy ideas to guide the legislative agenda. To do this with a full understanding of the industry landscape, the Select Committee has partnered with the Terner Center to conduct research with IC stakeholders and experts. From November 2025 through early January 2026, Terner Center researchers spoke with more than 65 people familiar with the industry, including both market-rate and affordable housing developers; general contractors; off-site manufacturers; architects; investors; lenders; building trades unions and carpenters union members; state and regional government staff; building code experts; and representatives from companies using 3D printing, artificial intelligence, or other emerging technologies. These conversations led to more than 75 policy ideas across seven broad themes, outlined below.

The Research and Report

Over the data collection period, the Terner Center conducted in-depth qualitative research, speaking with industry leaders and practitioners in focus groups and one-on-one interviews. The transcripts from these conversations were then coded, tagged, and analyzed. Specific policy levers and broader policy themes were identified and thematically grouped; patterns emerged about both the undergirding problems associated with IC and potential policy solutions. Details of our methodological approach can be found in the Appendix.

This report is designed to support the Select Committee in identifying potential interventions by chronicling the policy themes and ideas that resonated most widely across the data collection period. It is important to note that this report is not an exhaustive list of policy options that may help to scale IC, nor is it the Terner Center's policy recommendations. Rather, this report synthesizes insights from a wide range of practitioners and subject-matter experts and presents the findings of our qualitative work. This is a new and emerging field; there is no established and tested blueprint. What follows are industry stakeholders' hypotheses about what would alleviate their most acute pain points and provide essential support for solutions.

Results

This section presents the policy themes and mechanisms identified through the data collection process about barriers and proposed solutions to scaling IC in California.

Three cross-cutting conceptual themes emerged from the data: risk, certainty, and liability. Participants described IC as having a fundamentally different risk profile than traditional, site-built construction, and much of the industry's effort is focused on managing or reducing both real and perceived risk. Though greater certainty about costs and construction timelines is often touted as a benefit of factory-based construction, the field itself is full of uncertainty—about the stability of demand and project pipelines, about whether and when factories should invest in additional capacity or automation, and about whether factories can reliably take on certain types of projects. Layered on top of this are persistent questions about liability. Investors and insurers, in particular, raised concerns

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about how risk is allocated and, ultimately, who bears the cost if a project fails. Participants described these factors as central to decision-making across the development, financing, manufacturing, and regulatory processes. Together, they shape whether projects move forward, how capital is deployed, and the extent to which IC methods are adopted at scale.

In total, participants articulated seven major approaches to addressing those factors and proposed approximately 75 discrete policy levers. These were then winnowed down and consolidated to the approximately 40 ideas discussed below. Some approaches—like an overhaul of building codes to increase certainty for manufacturers, developers, and investors—had broad support. The ideas that came up frequently are indicated with an asterisk in the tables below and discussed in detail. Some approaches, like the State providing seed money for new factories, were rejected in the current climate until other reforms could be adopted first. The discussion below documents the identified strategies and summarizes the range of stakeholder perspectives regarding their feasibility, impact, and relative cost to the State.

1. Increase Certainty through Building Code Reform

Problem: Fragmentation in the Building Code and Uncertainty in Enforcement

California has 540 local jurisdictions, each with authority over building code enforcement. Differences in building codes across jurisdictions can reflect variation in local environmental conditions—such as snow loads, wind loads, and seismic risk—as well as the cumulative effect of locally adopted amendments and policy decisions over time. The State has adopted a uniform set of building standards for housing constructed in factories, but stakeholders reported that meaningful variation persists in how these standards are applied. A factory-built product is still subject to local plan review; site and foundation inspections; and water, sewer, and electrical connection inspection after the unit is placed onsite. The dual inspection framework—in-factory inspections conducted by the State and on-site inspections conducted by local jurisdictions—is clearly delineated in the State's FBH program guidelines. However, participants described instances in which local jurisdictions inspected building elements that had already been reviewed during the in-factory inspection process. While there are understandable reasons this may occur, as discussed below, participants repeatedly characterized these situations as duplicative inspections.

Building code fragmentation presents challenges for all builders, but it poses a particularly acute barrier for IC. Factory-based production depends on standardized designs and repeatability to achieve economies of scale. When approvals vary across jurisdictions, manufacturers are unable to use standardized models across multiple markets. As one developer explained, manufacturers are reluctant to produce units "on spec" without assurance that they will be approved across jurisdictions. This uncertainty slows production timelines, increases risk, and directly constrains housing supply.

Stakeholders also raised concerns about inconsistent understanding of state-level requirements among local building inspectors. Manufacturers, developers, and local building inspectors cited exam-

ples in which local inspectors were unfamiliar with the state regulatory framework for FBH, leading to costly delays, redesigns, or requirements to reopen completed work. This lack of familiarity is understandable: many local inspectors have encountered factory-built housing projects only a handful of times over their entire careers. Although HCD has developed guidance materials for conducting these reviews, stakeholders shared that these resources are used inconsistently and not always well understood.

Stakeholder-Identified Solutions

While participants described the current system as a significant barrier to scaling IC, they also articulated a range of potential solutions. The most consistently supported proposal was to further consolidate review and inspection authority at the state level. Stakeholders broadly agreed that the portions of the process overseen by HCD function relatively well, citing knowledgeable staff, clear procedures, and predictable timelines. Locating more of the review process at the state level had broad appeal.

There was less consensus, however, on the precise form that greater State involvement should take. Some participants advocated for broader State preemption of local enforcement authority beyond the current in-factory oversight structure, with on-site inspections conducted exclusively by State staff or State approved third-party inspectors. Others suggested a more limited approach focused on clarifying and narrowing the scope of local review, thereby reducing uncertainty without fully removing local authority. Others suggested the development of a single statewide building code for IC that would preempt local amendments, citing recent efforts in other states as potential models.

Participants were passionate about state preemption, but it is a complicated change and there are elements that require additional research before they are adopted. For example, there was discussion of moving to a performance-based building code—that is, a building code based on outcomes such as the structural strength and energy efficiency needs, rather than based on inputs like requiring specific materials or assembly details. This idea is not, in and of itself, new; the California FBH building code now has elements of performance-based code, and countries like Sweden have based their entire construction industry on performance-based code. However, there are some unknowns—particularly how impactful this change would be and how much time, effort, and money it would take to develop these new codes. Before the State embarks on this work, additional research should be done to fully understand the scope of both the task and the potential impact.

As interim steps, several participants suggested clarifying or strengthening enforcement of existing state authority, which they characterized as underutilized or insufficiently enforced. There are elements of the current code that participants reported to be overly specific and restrictive. Additionally, participants suggested that the state-run technical assistance (TA) program be built out and made more robust. Others emphasized the need for even clearer statutory delineation of state and local responsibilities, coupled with training and technical assistance for local inspectors. Previous research has shown that the appeals process for building codes is fraught and opaque.[24] A better appeals and clarification process for the construction industry would help IC, as well as conventional site-built construction.

Sharing the results and lessons of these appeals would help build the capacity of the industry.

Participants generally agreed that fully standardized housing units—i.e., the same unit being produced by multiple factories—are impractical in a competitive industry. Several suggested that standardizing key components would strike a balance between uniformity and customization. One participant likened this approach to standardizing rail-gauge widths while allowing flexibility in the design of the railcars themselves.

Finally, local building inspectors' unfamiliarity with FBH units—stemming primarily from a lack of exposure—can be addressed with concerted training. Participants emphasized that if local inspection authorities continue to play a significant role, targeted and ongoing training will be essential to reduce delays and improve consistency in code interpretation and the correct enforcement mechanisms.

Table 1. Participant-suggested approaches to building code reform

Expand state authority over building codes and inspections	
Policy actions identified in the research	**Description**
*Have the state building code preempt local codes for FBH projects	Building to the statewide code and circumventing potential local duplication has the potential to translate into significant cost and time savings. Participants suggested that this may be high-impact and low-cost for the State.
*Allow FBH projects to use third-party inspectors for an entire project (including on-site work)	Allowing third-party inspectors—hired by the project developer—to perform on-site inspections would reduce local friction and may increase efficiency. Participants suggested that this may be high-impact and low-cost for the State.
Improve enforcement and expand TA for existing FBH program run by HCD	HCD providing additional technical assistance for its FBH program and more enforcement for existing FBH rules would extend and support popular work the department is currently doing. Participants suggested that this would be somewhat impactful and low-cost for the State.
Revise and strengthen pathways for the State to preside over building code appeals	Fixing the opaque building codes appeal process would allow for faster reviews and more knowledge-sharing. Participants suggested that this would be somewhat high-impact and low-cost for the State.
Establish a statewide certification process for FBH production processes or standardized components	Creating a certified process would allow FBH processes and components to circumvent additional review, creating more efficiency in the process. Participants suggested that this would be high-impact and low-cost for the State.

Amend the state building code to facilitate innovation and cost savings	
Policy actions identified in the research	**Description**
Shift toward statewide performance-based building codes	Adopting more performance-based elements may allow for more building innovation by circumventing the prescriptive code. Participants were unsure about the impact of this for the industry and thought it would be somewhat costly for the State.
Establish specifications for connecting modules across different FBH providers to encourage interoperability between factories	Standardized components and connections could lead to interoperability between factory products; a State certification process would incentivize greater standardization. Participants shared that this would be somewhat impactful and relatively low-cost for the State.
Revise overly prescriptive parts of the building code	Amending pieces of the building code that are relics or overly specific without cause could allow for more innovation in the field. Participants reported that this would be low-impact and low-cost for the State.
Train local jurisdictions on FBH code	
Policy actions identified in the research	**Description**
*Create a training module on FBH methods and state inspection program for local building officials, planning officials, and inspectors	Local building officials and inspectors need additional training. Participants suggested this would be somewhat impactful and low-cost for the State.

**Indicates themes and policy ideas that came up most frequently*

2. Increase Consistency and Certainty through Other Process Reforms

Problem: Inconsistent Standards and Processes Undermine Certainty and Replicability

Stakeholders explained how variation across factory-built housing products, components, and connection systems creates uncertainty in the permitting and approval process, and it limits the ability to replicate projects across jurisdictions. While differentiation allows firms to compete and innovate, participants emphasized that the lack of regulated standards makes it difficult to achieve the consistency and predictability needed for scale. Developers noted that it is challenging to compare products across manufacturers, and several highlighted risks that arise when a factory closes and partially completed projects cannot be easily transferred or completed elsewhere under existing approval frameworks.

Participants noted that inconsistency is not limited to product design; it extends to local permitting and review processes—specifically how and when requirements are communicated and decisions are made—making it difficult for factories and developers to plan production and installation with confidence.

One manufacturer explained how the absence of standardization and predictable processes forces firms into short-term, project-by-project decision-making rather than long-range planning:

> You want to [build] for scale and replicability, and so you gear up for that, and you staff for that, and you have your software and all your supporting services and everything built around that. And then if there's any adjustment in the pipeline—whether that's driven by interest rates or, you know, tariffs, or what have you, and there's a fluctuation, and that pipeline starts to break down. You become project-focused, and project-focused means you're only looking at the next two to three months ahead, instead of looking two years ahead… There's still a range of options, but once you start to drive that, then you can have certainty, and you can start to say, 'Okay, I've got a two-year plan.' And a two-year plan for a company looks very different than the short-sighted two-month plan.[25]

Participants also raised concerns about the sequencing of factory production and site readiness. Under current practices, permits for units manufactured off-site are typically issued only after a site has been selected and assigned an Assessor's Parcel Number (APN), requiring factories to wait until site approvals are complete before beginning production. For panelized walls there is a similar problem; though factories can assemble the panels before the APN is assigned, they cannot be inspected prior to the APN. Factory operators shared that this requirement prevents manufacturers from building inventory in advance and contributes to persistent backlogs.

Participants noted that they struggle when site requirements are opaque or change during the construction process. Specifically, they gave examples of shifting utility and infrastructure requirements that were both costly and extended the project timeline significantly. While this may also be a problem for conventional site-built construction, FBH requires earlier design decisions than site-built and thus, is less able to pivot in response to changing requirements.

Stakeholder-Identified Solutions

The most frequently suggested approach to reducing fragmentation was the development of preapproved building plans. Participants expressed interest in a system in which a limited set of plans could receive state-level preapproval, reducing or eliminating the need for repeated plan review at the local level. Some stakeholders identified permanent supportive housing (PSH) and emergency shelters as particularly appropriate use cases for preapproved plans, given that the requirements for these project types vary little across projects.

Others suggested allowing factories to reproduce previously approved designs without undergoing full re-review, enabling faster deployment of proven models. As one manufacturer put it, "We all have standard plans already; we're underwriting projects, pro formas off of those. If we could actually open up a legal way to build those standard plans and inventory the product, I think that changes the entire game altogether."[26]

Stakeholders also raised and were enthusiastic about the notion of shot clocks. If a jurisdiction does not issue a decision on the open question during the shot-clock period, there are clear consequences, such as automatic approval or escalation. In this case, shot clock refers to a local jurisdiction's limited time to conduct a plan review, issue building permits, or conduct on-site inspections. Though there are strong existing shot clocks for permitting, it is not clear that they are being enforced effectively. Participants hoped that by developing or amending shot clocks for different parts of the FBH process, they could avoid a major point of friction. As one affordable housing developer put it, adopting new shot clocks would mean that the local jurisdiction could no longer "do death by delay."[27]

A smaller number of participants proposed developing standardized foundation designs as a way to reduce site-level inspection delays. Stakeholders pointed to U.S. Department of Housing and Urban Development (HUD) Code manufactured housing as a precedent, noting that preapproved foundation types can streamline plan check and permitting processes.[28] Participants suggested that a similar approach could reduce uncertainty and delays associated with local site review for factory-built housing. Developing a small number of standardized foundation designs—tailored to different ground conditions, seismic requirements, and climate zones—could potentially preempt a significant portion of the site-level inspection that currently occurs at the local level. While we do not yet know whether this approach would be feasible or advisable in the California context, the existence of a close precedent suggests that it is sufficiently promising to warrant further investigation.

To address concerns about the sequencing of factory production and site readiness, several participants advocated for allowing factory construction to proceed prior to site assignment, enabling a more inventory-based production model, akin to a car sales lot. One manufacturer put it well, "[Removing the requirement for the APN] unleashes the developers with a new tool. So I think it's the first domino that sets everything in motion—the capital, the demand, the innovation. We're all hung up trying to break this project-by-project stride, which is not a stride."[29]

Table 2. Participant-suggested approaches to permitting and streamlining

Establish and expand preapproved plan sets for streamlined permitting	
Policy actions identified in the research	**Description**
*Provide preapproved unit plans from the State	Establishing preapproved plans at the state level—perhaps for certain project types, such as emergency shelters or permanent supportive housing—would allow factories to streamline permitting and plan-check processes while filling in gaps in their pipeline. Participants suggested that this would be somewhat impactful and low-cost for the State.
Expand pathways for preapproved plans, such as reusing plans that have been approved in the past	Allowing factories to get plans approved once and then reuse them across multiple projects would increase efficiency for all parties. Participants suggested that this would be high-impact and low-cost for the State.
Provide preapproved foundation plans from the State to reduce local variation and review scope	Manufactured HUD Code homes have a set number of foundation plans that have been reviewed and approved by the government and do not require additional plan check and permitting by local jurisdictions. Participants suggested that adopting a similar approach for FBH foundations would be low-impact and low-cost for the State.
Pursue additional streamlining for FBH projects	
Policy actions identified in the research	**Description**
*Establish accelerated and enforced shot clocks and plan check timelines for FBH projects	While there are shot clocks in the current statute, participants suggested that there should be both additional shot clocks and better enforcement mechanisms. Participants reported that this would be low-impact and relatively low-cost for the State.
Require earlier and transparent decisions from local jurisdictions on project requirements, such as utility and infrastructure upgrades	Mandating upfront utility and infrastructure decision-making from local jurisdictions would allow developers to plan accordingly and reduce unexpected costs and delays. Participants suggested that this would be somewhat impactful and low-cost for the State.
Allow FBH producers to build units without an assigned APN	Allowing factories to build FBH without an APN would create a more responsive market, with factories holding a surplus of units that are ready to go. Participants suggested that this change would be somewhat impactful and low-cost for the State.

**Indicates themes and policy ideas that came up most frequently*

3. Reduce Financial Risk and Liability to Encourage Industry Growth

Problem: Perceived and Actual Financial Risk

One stakeholder reported that, without fixing access to capital through state derisking in the short- and medium-term, the IC industry will not get off the ground:

> You have this disconnect between capital, which is tied to risk aversion, long development cycles, land use, legal issues, and property rights, and pure manufacturing. The two couldn't be harder to match up. You're trying to align two timelines with very different incentives, and the slower one is the one that controls the money.[30]

Participants reported that financial institutions and insurers frequently view IC as riskier than traditional site-built construction where they understand the risks. And several participants acknowledged that the skepticism about IC is not unfounded. Industrialized construction methods represent a fundamentally different production model, with distinct risk profiles related to factory capitalization, logistics, sequencing, and interdependencies between factory and site work. Participants cited highly visible factory and project failures that have shaped lender and investor perceptions.

The consequence of higher perceived risk is that accessing capital is very difficult. One investor explained, "Money is the Achilles' heel of the modular industry. I've seen billions of dollars [in proposals] pass through our inboxes, and the vast majority of it never turns into a single project. It's not a standardization or permitting issue—it's that the capital never materializes."[31]

The State does not have any shared risk program for IC (e.g., state bonding for factories, state loan guarantees, etc.) and participants described this as limiting to the industry. One factory owner shared, "The lending and private markets are happy to step in and provide capital when they have confidence in the process."[32] For now, without that confidence in the market, private capital holders, especially lenders, have been reticent to invest.

As one affordable housing developer explained, uncertainty about financing often determines construction method decisions early in the process:

> Can we make it happen? Can we get funding? … And this is where a lot of affordable housing developers just say, 'You know what, we're not sure we're going to be able to get the money. We're going to go to stick-built.' Like, you know, this risk is too much for them.[33]

Faced with questions about whether capital can be secured, developers frequently default to conventional construction methods that, while slower or more expensive, are more familiar and viewed as safer and more readily financeable. This dynamic limits experimentation, constrains demand for factory-built products, and inhibits the industry's ability to mature and scale by preempting potential economies of scale.

Stakeholder-Identified Solutions

Participants broadly agreed that reducing real and perceived financial risk is important to enable growth in IC.

Stakeholders most frequently cited two state-level interventions that they thought could have a transformative impact on the industry. The first is the creation of a State bonding mechanism for IC factories.

The State could provide bonding support to factories that meet certain eligibility criteria, effectively guaranteeing performance and agreeing to compensate developers, lenders, and subcontractors if a factory were to fail mid-project. Participants emphasized that access to bonding is often a major constraint for factories, particularly in the early stages of growth, and that limited bonding capacity can restrict the number and size of projects a manufacturer can take on.

The second frequently proposed intervention is a State loan guarantee program to support developers building housing using IC. As described by participants, such a program would require the State to assume a portion of loan risk, while allowing private lenders to originate and service the loans on specific projects. If a developer was unable to pay back a loan—because the factory failed mid-project, or any other reason—the State would pay some portion of the loan amount to the lender. Several stakeholders drew parallels to federal loan guarantee programs, noting that institutions with private capital are often willing to participate when risk is clearly defined and partially absorbed by a public entity.

In addition to these ideas widely supported by focus group participants, several others generated interest but less consensus. Some suggested a State-managed revolving loan or credit facility that could support predevelopment costs including deposits, or other financing gaps that private lenders are reluctant to cover. However, others expressed concern about the scale of public investment such a program might require. Even if not fully spent, the funds for the programs described here would have to be allocated in the State budget.

Across discussions, stakeholders emphasized that dispersed risk allocation and targeted public intervention could unlock private capital, reduce uncertainty, and accelerate adoption of IC methods.

Table 3. Approaches to reducing financial risk and liability from the research

Provide targeted funding to address liability gaps and derisk FBH adoption as the industry matures	
Policy actions identified in the research	**Description**
*Allow existing state agencies to bond FBH producers to reduce risk for developers and general contractors	State-backed bonding for FBH producers would help address performance risk and reduce concerns about factory failure mid-project. Participants suggested that this would be high-impact and potentially costly for the State.
*Establish a loan guarantee program for FBH projects with more expansive coverage than bonding mechanisms	A state loan guarantee program would allow the State to absorb a portion of project-level financial risk, encouraging private lenders to finance FBH projects. Participants suggested that this would be high-impact and potentially costly for the State.
Establish a revolving loan fund to provide reliable access to capital for IC projects or producers	A revolving loan fund could provide flexible, early-stage financing for factory deposits, predevelopment costs, or other gaps that private lenders are reluctant to cover. Participants suggested that this would be high-impact and potentially costly for the State.

**Indicates themes and policy ideas that came up most frequently*

4. Support Pipeline Certainty through Demand Aggregation

Problem: Volatile Demand and Project Uncertainty

One of the most common concerns we heard was about uneven factory pipelines—full of peaks and troughs driven by market demand. Right now, there isn't enough consistent demand to support a smooth, predictable flow of projects for most manufacturers. When production slows, the consequences can be severe: factories still have to cover fixed costs, pay staff, and keep facilities running, even if units aren't being built. Stakeholders identified the lack of a steady project pipeline as a core structural issue for the industry. Factories face the real possibility of closing when demand falters. And while this may seem like a natural consequence of a free market, the closure of factories in lean years means that there are no factories when demand picks up. Stakeholders argued that if the State wants FBH to be a viable industry in the long term, there needs to be protection against factory closure in the short and medium terms.

Participants often contrasted this with traditional site-built construction. In on-site construction, firms can scale labor up and down as work ebbs and flows. In a factory setting, however, extended gaps in projects can threaten the viability of the entire operation. Nearly everyone we spoke with agreed that this volatility in demand is a real and distinctive problem for factory-built housing.

While natural market forces are a substantial driver in the uneven pipeline for factories, project-level uncertainty also contributes to the lack of predictability. When projects are in the predevelopment phase, they reserve future manufacturing capacity in a factory. The factory holds this time for this project; if a project falls through—due to a lack of funding or other issues—the factory is left with a major, hard-to-fill gap in their production timeline.

It is important to note that this topic was one of the most divisive across focus groups. Some expressed that demand aggregation was absolutely necessary to setting up a self-sustaining market. On the other hand, one manufacturer shared, "I think incentives, it's a crutch, and it doesn't force the industry to be truly innovative and make it a successful business … If IC is worthy of the pursuit it should stand on its own."[34]

Stakeholder-Identified Solutions

In terms of possible solutions, participants focused on using state programs, public land, and public-sector procurement to help create larger, more predictable blocks of demand for newly built IC products that could smooth factory production and reduce the risk of long gaps between projects.

Several stakeholders were supportive of leveraging existing public funding streams rather than creating entirely new funding streams. For example, there was interest in the University of California and California State University systems directing some of their housing dollars toward factory-built projects. Others suggested that the state could prioritize IC when developing or disposing of underutilized public land, either directly or by giving additional preference to IC projects in competitive funding processes. These approaches were seen as ways to stabilize demand over time by channeling a share of already-funded projects toward factory-built methods, rather than relying on new appropriations.

A few participants also raised the idea of committing to factory-built housing for specific categories of state-funded housing, such as permanent supportive housing, interim housing (such as temporary shelters), or emergency and disaster-response programs. These housing types are easily standardized and replicable. Furthermore, some existing programs, such as the state's Excess Sites program, already provide direct incentives to applicants who propose innovative construction strategies that could be strengthened or expanded upon.

Stakeholders raised regional demand aggregation as another policy idea. They suggested that establishing regional coalitions to buy IC products could be transformative for smoothing the demand pipeline. And more acutely, regional aggregation was seen as a direct lever to address the high transportation costs associated with FBH. Bulk orders at the regional level would help projects avoid the extraordinary cost of moving FBH across California.

We also asked directly about the idea of the State helping to finance or seed new factories. Despite this being a common suggestion in the literature, nearly everyone we spoke with was skeptical about pursuing it now. The issue, they argued, is not the ability to build factories, but the lack of sustained demand to keep them running. As one manufacturer put it, "If the demand is there, the market will react and more factories will get set up … I don't think it's that hard to set up a factory in California … I'd rather you take the tax credits … and shift it more toward demand."[35] Many worried that investing in new capacity without first addressing demand could further strain an already fragile industry and risk repeating past mistakes.

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Beyond increasing near-term production, participants emphasized that these demand aggregation strategies are fundamentally about stabilizing factory pipelines and reducing the risk of shutdowns during market downturns. By helping smooth demand over time, the State could help manufacturers stay open, retain workers, and preserve production capacity so that the industry is positioned to scale when broader market conditions improve. In this way, aggregation is not only a tool for delivering projects, but also for sustaining the underlying manufacturing base.

Table 4. Participant-suggested approaches to demand aggregation

Utilize specific State-supported project types to create stable demand for FBH producers	
Policy actions identified in the research	**Description**
Establish a State commitment to purchasing an annual baseline of FBH units to be deployed for use in disaster recovery or shelters	A State purchase commitment would create a predictable source of demand for FBH producers, helping stabilize factory pipelines and reduce the risk of shutdowns during market downturns. Participants suggested that this would be somewhat impactful and costly for the State.
Encourage or require FBH to be used for a proportion of housing built on state excess land, or as student housing for state colleges and universities	Directing a share of State-supported projects toward FBH would leverage existing public investment to create more consistent demand for factory-built products. Participants suggested that this would be high-impact and relatively low-cost for the State.
Aggregate demand at the regional level	
Policy actions identified in the research	**Description**
Establish or empower regional housing authorities to aggregate demand across local jurisdictions	Regional demand aggregation could bundle projects across multiple jurisdictions, creating larger and more predictable orders for FBH producers. Participants suggested that this would be high-impact and costly for the State.
Provide support for more factory starts in California	
Policy actions identified in the research	**Description**
Establish direct funding or incentives for new FBH facilities, such as low-cost loans or tax credits for producers opening new factories	Providing direct incentives for new factories could expand in-state production capacity and reduce transportation costs over the long-term. However, participants cautioned that without first stabilizing demand, this approach risks adding supply without sufficient projects to sustain it. Participants suggested that eventually this would be high-impact and costly for the State.

**Indicates themes and policy ideas that came up most frequently*

5. Increase Long-Term Industry Certainty by Developing a Strong Workforce Pipeline

Problem: A Shrinking Workforce

Participants widely agreed that California's housing production challenges are compounded by a shrinking and aging construction workforce. One participant described how rising housing costs are pushing experienced tradespeople farther from their job sites, as many can no longer afford to live near the areas where development is most active. At the same time, he continued, increasingly extreme weather is making outdoor construction work more physically demanding and less predictable—contributing to burnout, earlier exits from the workforce, and reduced hours on job sites. Participants also emphasized the physical demands of conventional site-built construction, which become harder to sustain as the workforce ages. Participants noted that on-site construction exposes workers to a wide range of safety risks that can deter long-term workforce participation. Finally, shifting immigration policy is constraining the inflow of new workers, further tightening an already limited labor pool.

In his Select Committee hearing testimony, a construction worker who had transitioned from conventional site-built construction to FBH, described the challenges with on-site construction:

> On-site construction has several disadvantages for workers. Long travel times— sometimes up to one and a half hours one way—creates fatigue and is often unpaid, and delays from traffic or weather add to the strain. Weather interruptions can slow projects, increase safety risks, and cause workers to miss days, reducing their ability to provide for their families and limiting consistent hourly income. Extended time away from home affects family dynamics, as workers miss daily responsibilities and important events, increasing stress and reducing work-life balance. Overall, these factors can lower morale, impact family stability, and make the road difficult to sustain without proper support and compensation.[36]

Participants described factory construction jobs as well-suited to address the problems facing workers in the construction industry, but because there are relatively few of these jobs, the workforce isn't experiencing the benefits.

Stakeholders noted that relatively few workers are trained for factory-based construction, in large part because existing workforce development and training systems are still oriented toward site-built methods. At the same time, until factory-built housing reaches greater scale, there are not enough factory jobs to absorb a meaningful share of the construction workforce, limiting incentives to develop specialized training pathways. This creates a feedback loop: the lack of trained workers makes it harder for factories to scale, while the lack of scale makes it difficult to justify investments in training.

Stakeholder-Identified Solutions

Factory-based environments offer protection from the elements, enabling consistent year-round production and reducing exposure to extreme heat. In a factory setting, work schedules are more predictable. A predictable schedule offers

workers a more stable income and better work-life balance, and participants suggested better health and safety conditions. Additionally, participants reported that fixed factory locations eliminate the need for workers to commute to different job sites for each project, cutting down commuting times substantially. The same participant continued his testimony to describe the benefits to his new job, in a factory setting:

> Consistent location … reduces fatigue and lowers personal expenses like tolls, gas, car maintenance, etc. Workers benefit from predictable schedules, stronger communication with teams, and improved safety due to familiarity with their environment. Being able to return home daily supports [a] better … life. Balance allows participation in family responsibilities and creates greater stability at home. This contributes to a higher morale, steady income, and more sustainable working arrangements.[37]

Participants also emphasized that factory work is generally less physically demanding than traditional on-site construction, expanding the potential labor pool to include women, older workers, and individuals with physical limitations.

Factory-based environments offer workers protection from the elements and more predictable work schedules. Fixed factory locations also eliminate the need for workers to commute to different job sites for each project, cutting down commuting times substantially.

A manufacturer noted:

> We had seven women out of 12 students in one of our cohorts. That was one of the first times I'd ever seen that many women working hands-on in this field. Historically, we simply haven't exposed women—or the next generation more broadly—to the kinds of opportunities that exist in factories.[38]

Organized labor representatives highlighted apprenticeship programs as a particularly promising avenue for workforce development. They expressed openness to incorporating factory-built housing modules into existing apprenticeship curricula, which would expose future workers to factory environments and help seed factories with trained, unionized labor. Stakeholders characterized this approach as mutually beneficial, supporting workforce stability while expanding IC labor supply.

Finally, several stakeholders suggested that greater standardization across factories could improve workforce mobility and reduce retraining costs, though there was no consensus on how such standardization should be achieved or what role, if any, the State should play in facilitating it. Participants raised concerns about the limited transferability of skills across factories because factory layouts, processes, and technologies vary, and training received at one facility may not fully translate to another.

Table 5. Participant-suggested approaches to developing a sustainable workforce

Establish and integrate training on IC methods for the existing workforce	
Policy actions identified in the research	**Description**
*Create a training module for on-site installation of FBH components for on-site subcontractors	A targeted training module would help on-site subcontractors better understand FBH systems—reducing installation errors, delays, and coordination challenges. Participants suggested that this would be somewhat impactful and somewhat costly for the State.
Create an IC training module for apprenticeship curricula	Supporting the integration of IC content into existing apprenticeship programs would expose new workers to factory-based construction methods and help build a pipeline of trained labor for the industry. Participants suggested that this would be low-impact and somewhat costly for the State.
Support recruitment and training pathways for the IC workforce	
Policy actions identified in the research	**Description**
Ensure IC providers are eligible for existing state programs that provide funding and incentives for workforce recruitment and training, such as Employment Training Panel Grants and the Joint Venture Program	Clarifying eligibility would allow FBH manufacturers to access existing workforce funding to train and recruit workers. Participants suggested that this would be low-impact and low-cost for the State.

**Indicates themes and policy ideas that came up most frequently*

6. Modify Existing State Funding Streams to Better Align with the Realities of Factory-Built Housing

Problem: Existing funding streams are disconnected from the realities of FBH

One industry expert noted how existing state funding streams—like those allocated by the California Tax Credit Allocation Committee (TCAC) and California Debt Limit Allocation Committee (CDLAC)—are fundamentally mismatched with FBH needs:

> The one big problem is the funding timelines lining up with the life cycle of a modular project. And I want to emphasize that it's not only a problem on the back-end in terms of getting a project queued up for modular; it's also that there are readiness deadlines that are imposed on us at TCAC and CDLAC. There's this whole development timeline that we have to fall into that is from a stick-built construction world … There is very little flexibility for the types of situations that we run into with modular projects around [factory] availability, around deposits, around all the uncertainty that's wrapped up in our world.[39]

Participants noted that several key state housing funding programs, such as the Low-Income Housing Tax Credit (LIHTC), are poorly aligned with FBH, both in their program requirements and how projects are evaluated. For example, funding timelines are typically structured around conventional, site-built construction timelines, with funding programs releasing funds as on-site work is completed. This approach conflicts with the cash flow needs of factory-based projects, where significant costs are incurred earlier in the process. The mismatch forces developers to secure alternative financing for factory deposits and early production costs.

Similarly, when a developer is awarded LIHTC credits, they have six months to begin on-site construction (known as the "shovel-ready" requirement). This does not fit well with IC, which generally involves a longer off-site construction period followed by a much shorter on-site installation phase. While the overall construction timeline for factory-built housing is often comparable to—or shorter than—that of site-built projects, this rule makes it difficult to comply with the funding requirements.

As one manufacturer explained, the current process makes it difficult to form stable, experienced teams because projects must first select a factory and then competitively bid out a general contractor (GC), even when certain pairings already have proven working relationships: "So you first bid it out to the factory, then you select the factory. Now you need to bid it out to a GC. But if you work with a certain factory already, it's really hard to get three competitive GC bids … I think, you know, maybe in 10 years, we're at the point where there are enough offers on any given bid, but we're not there yet."[40] As he notes, in a still-small industry, the current bid process can limit competition and slow project delivery, while also creating concerns for jurisdictions about compliance with procurement rules.

Beyond these specific financing mechanics, participants also noted that state incentive programs do not always account for the broader benefits associated with IC. They pointed to attributes such as lower costs, more predictable timelines, reduced time on site (and

therefore less disruption to surrounding neighborhoods), and less construction waste. For programs like LIHTC, however, these benefits are not included as part of scoring applications. Several stakeholders described this as a missed opportunity to use existing funding frameworks to indirectly support and encourage wider adoption of IC methods.

Stakeholder-Identified Solutions

Participants described three main ways in which existing state programs could be modified to better support factory-built housing to mitigate fluctuations in the demand pipeline and compete within existing state programs.

First, they emphasized the need to better align affordable housing financing requirements with the process and requirements of IC. One suggestion was to allow pre-assembled teams—developers, factories, and general contractors—to apply together, rather than requiring sequential and separate procurement. Participants shared that this would allow teams to learn together and act more efficiently as they take on subsequent projects. Stakeholders shared that experienced teams that have worked together before are able to deliver both time and cost savings.

Second, participants also strongly advocated for aligning state funding timelines with how and when IC projects spend money. FBH typically requires larger upfront payments to manufacturers. Stakeholders suggested that allowing state funds to be used for deposits and adjusting drawdown schedules to reflect off-site fabrication would significantly reduce financial friction. In addition, there was broad consensus that changing the readiness rule referenced above (that a project must begin on-site work within six months of the award) so that FBH projects have twelve months to begin on-site work would be impactful.

Third, participants discussed spurring IC by changing how projects are scored and incentivized across state programs. They argued that the outcomes IC can deliver are already aligned with state priorities for affordable housing and should be better reflected in scoring criteria. These include reduced construction noise and traffic, as well as less material waste. This is in addition to shorter construction timelines and lower per-unit costs—the two traditional metrics that can be improved with FBH. In their view, programs need not privilege factory-built housing per se, but could place greater weight on the performance metrics that IC is often well-positioned to achieve. While this idea was popular among participants, a few noted that measuring these outcomes is difficult and would require further research to quantify fully.

A small number of participants raised the idea of creating a set-aside of 4 percent LIHTC credits that are non-competitive, regardless of whether California has already hit its annual bond cap. These credits, referred to as "over-the-counter," would be available to projects that are ready to go and do not need additional time to begin construction. Without targeting FBH explicitly, this format works particularly well for the industry, and participants described it as potentially high-impact.

Participants noted that several key state housing funding programs … are poorly aligned with FBH, both in their program requirements and how projects are evaluated.

Participants also raised ideas for ways the State can incentivize IC outside of funding mechanisms, including property tax abatements for projects that use IC methods, and density bonuses for infill developments that use FBH in order to encourage economies of scale. Some stakeholders suggested counting each FBH unit as more than one unit toward a jurisdiction's Regional Housing Needs Assessment (RHNA) quotas.

Table 6. Participant-suggested approaches to modifying existing programs to better align with IC

Adjust specific mechanisms within existing funding programs to align with the needs of IC projects	
Policy actions identified in the research	**Description**
*Restore the availability of over-the-counter LIHTC awards to increase funding certainty for eligible projects	Restoring over-the-counter LIHTC awards would reduce competition-related uncertainty and allow ready-to-build projects to move forward more predictably. Participants suggested that this would be high-impact and low-cost for the State.
*Adjust eligible uses of funds in existing funding programs to reduce friction with IC projects, such as allowing upfront deposits, earlier drawdowns, and pre-assembled teams	Allowing funds to be used for factory deposits, off-site work, and earlier drawdowns would better align state programs with how IC projects incur costs. Participants suggested that this would be high-impact and low-cost for the State.
*Adjust the shovel-ready requirement on LIHTC applications for FBH projects from six to 12 months to give factory partners more lead time	Extending the shovel-ready timeline from six months to 12 months would better reflect the longer off-site production phase typical of FBH projects. Participants suggested that this would be somewhat impactful and low-cost for the State.
Adjust scoring criteria of existing funding programs to encourage IC methods	
Policy actions identified in the research	**Description**
Directly award additional points for projects utilizing IC methods	Awarding points specifically for IC use would signal State support for construction innovation and help offset perceived risk. Participants suggested that this would be high-impact and low-cost for the State.
*Allocate additional points for primary outcomes, such as construction speed and per-unit costs	Scoring projects based on faster delivery and lower per-unit costs would indirectly incentivize IC without explicitly privileging a construction method. Participants suggested that this would be high-impact and low-cost for the State.
*Allocate additional points for secondary outcomes, such as reducing construction landfill waste, traffic, and noise impacts around the project site	Rewarding secondary benefits would recognize broader public gains often associated with IC projects, such as reduced disruption and waste. Participants suggested that this would be somewhat impactful and low-cost for the State.

Incentivize IC methods through alternative (non-funding) mechanisms	
Policy actions identified in the research	**Description**
Provide property tax abatement for IC projects	Property tax abatements could lower operating costs for projects using IC, improving overall feasibility. Participants suggested that this would be somewhat impactful and low-cost for the State.
Allocate additional credits in RHNA calculations for housing units delivered via IC methods	Granting additional RHNA credit for IC-delivered units could incentivize local jurisdictions to support these projects. Participants suggested that this would be high-impact and low-cost for the State.
Establish density bonuses for FBH projects to encourage economies of scale and infill housing	Density bonuses could help IC projects achieve the scale needed to realize cost efficiencies, particularly in infill locations. Participants suggested that this would be somewhat impactful and low-cost for the State.

**Indicates themes and policy ideas that came up most frequently*

7. Address Negative Perceptions of IC through Education and Data

Problem: Perceived Cost and Construction Risk

Participants consistently reported that perceptions of IC as inherently risky or not yet cost-effective shape decisions by investors, lenders, insurers, and developers. They also acknowledged that some of this skepticism is understandable. There have been several high-profile factory failures over the past decade,[41] and those experiences have made entering the factory-built housing market feel too risky for many actors. Several stakeholders noted uncertainty about whether factory-built housing reliably delivers cost savings relative to traditional site-built construction. As one investor observed, pricing advantages have not yet been consistently reflected in investment decisions.

Industry proponents attributed this skepticism in part to a self-reinforcing cycle. Limited demand constrains factories' ability to achieve scale, while the absence of demonstrated, large-scale cost savings discourages additional demand. Participants emphasized that while some projects have not realized anticipated efficiencies, others have achieved substantial cost savings, particularly when certainty and vertical integration are present. Stakeholders suggested that inconsistent outcomes, rather than uniformly poor performance, have contributed to confusion and mistrust in the broader market.

Participants also discussed perceptions of heightened construction-phase risk associated with factory-built housing. Highly visible project failures, particularly related to weather exposure during site installation, were cited as shaping industry narratives. However, several stakeholders—including insurers—argued

that factory-built housing may present lower overall construction risk than traditional site-built methods. Faster construction timelines reduce exposure to hazards, and factory environments mitigate certain fire and safety risks common during on-site framing. Participants emphasized that these risk-reducing attributes are often overlooked in favor of anecdotal accounts of past failures.

Stakeholder-Identified Solutions

Participants identified education, technical assistance, and data transparency as key mechanisms for addressing negative perceptions. Several suggested expanding State-produced educational materials to complement existing guidance—including plain-language resources, frequently asked questions, and best-practice documentation. Stakeholders indicated that State-led technical assistance could help normalize factory-built housing processes and clarify misconceptions among developers, lenders, and local officials.

Data-sharing emerged as another frequently cited strategy. Participants noted that information on project performance, costs, timelines, loan performance, and lease-up outcomes is largely held privately, limiting the industry's ability to demonstrate success at an aggregate level. While recognizing the need to protect proprietary information, stakeholders argued that greater transparency around high-level metrics could help counter outdated narratives and provide evidence of viability. Several emphasized that the absence of recent, positive performance data has allowed earlier failures to dominate perceptions of IC. Participants also noted that through additional data collection and dissemination, HCD could serve as an information hub for the industry.

Participants identified education, technical assistance, and data transparency as key mechanisms for addressing negative perceptions.

Participants described experiential learning opportunities as particularly effective in changing perceptions. Factory tours were repeatedly cited as transformative, allowing observers to see production processes firsthand and better understand quality control and efficiency. Demonstration projects were similarly viewed as valuable tools for illustrating feasibility and performance. Finally, a small number of participants suggested that state investment in a research and development (R&D) facility housed at a California university, as well as evaluation and publication by neutral third parties, could further contribute to credibility and knowledge dissemination.

Table 7. Participant-suggested approaches to changing negative perceptions through data and education

Establish statewide standards and materials	
Policy actions identified in the research	**Description**
Adopt standardized language and data metrics for IC approaches	Establishing consistent terminology and shared metrics would reduce confusion across agencies, developers, and financiers and improve comparability across projects. Participants suggested that this would be low-impact and low-cost for the State.
Expand IC educational materials and technical assistance for local building officials, developers, and other stakeholders	Expanded education and technical assistance could address knowledge gaps that contribute to delays, misinterpretation of requirements, and risk aversion. Participants suggested that this would be low-impact and low-cost for the State.
Establish stronger data-sharing and benchmarking for IC sector performance	
Policy actions identified in the research	**Description**
*Establish a data-sharing program and practice that include metrics for IC projects on: development costs and schedules, sale/lease-up rates, and loan performance	A structured data-sharing effort would allow the industry and policymakers to better assess IC performance at scale. Participants suggested that this would be high-impact and somewhat costly for the State.
Increase industry exposure to IC methods and support deeper knowledge-sharing	
Policy actions identified in the research	**Description**
*Provide State support for housing industry stakeholders to tour FBH facilities and projects	Factory and project tours were repeatedly described as one of the most effective ways to change perceptions and build confidence in IC methods. Participants suggested that this would be high-impact and low-cost for the State.
Provide State funding for research on the detailed impacts of IC methods, such as through demonstration projects or third-party publications	Targeted research could provide credible, neutral evidence on IC's cost, timeline, and risk performance. Participants suggested that this would be high-impact and somewhat costly for the State.
Establish seed funding for an R&D facility at a university to support long-term knowledge creation and industry education around construction innovation	A university-based R&D facility could serve as a neutral hub for research, testing, workforce training, and industry education. Participants suggested that this would be somewhat impactful and costly for the State.

**Indicates themes and policy ideas that came up most frequently*

Areas for Future Research

In addition to the widely shared perspectives presented in the previous sections, a number of ideas surfaced less frequently. While these ideas did not have broad enough consensus to be included above, they align with ongoing discussions in the field and, in some cases, with emerging practices in other jurisdictions. This section outlines these concepts and highlights them as areas warranting further exploration, research, and analysis.

A Sales Tax Exemption for Factory-Based Construction Materials

A small number of participants suggested that exempting materials used in factory-based housing production from state sales tax could incentivize new factories in California. Stakeholders indicated that such an exemption could encourage factories to locate or expand operations within California, which in turn could create construction and manufacturing jobs. Locating factories closer to project sites could also reduce transportation costs, which stakeholders shared are a substantial part of the factory-built housing cost.

One factory owner noted that a sales tax exemption on factory inputs could materially affect his decision about whether to invest in new factories in California. Proponents of this policy suggested that, because the exemption would apply to inputs rather than direct subsidies, it might directly cost the State relatively little.

This idea did not surface broadly across interviews and focus groups, and participants did not provide detailed perspectives on its political feasibility or costs to the State. However, given the idea's potential to affect factory construction, transportation costs, and in-state employment, the feasibility and impacts of a targeted sales tax exemption warrant further examination.

Changes to California Escort Requirements for Factory-Built Housing

While many participants mentioned the high cost of transporting factory-built housing, only one offered a specific, actionable idea. This participant noted that California's rules for transporting large modules differ from those in neighboring states, particularly in requiring two California Highway Patrol escort vehicles to accompany units of a certain size on highways. According to the participant, this requirement can substantially increase transportation costs and places additional economic pressure on the industry in California. The participant suggested that these rules may be subject to change.

Further research would be needed to understand the regulatory basis for the current escort requirements, appropriate levers for modifying them, and agencies and stakeholders that would need to be involved. As a starting point, such work could look to states with lower reported transportation costs—such as Oregon and Idaho—to understand how their escort and permitting regimes differ and what lessons might be applicable in California.

Support for New Factories: Timing and Program Design

Participants discussed at length the idea of direct state grants to support factory development. The broad consensus was that the timing is not right for this type of intervention. Stakeholders emphasized that the central challenge facing the industry is not a lack of manufacturing

capacity, but insufficient and unstable demand. In this context, subsidizing the creation of new factories could add supply without addressing the underlying demand constraints, potentially placing additional financial pressure on existing manufacturers.

At the same time, participants noted that there may be a point in the industry's maturation when targeted support for new factories would be both appropriate and beneficial. In the future, additional factory capacity could help meet higher levels of demand, allow production to be more geographically distributed, and reduce transportation distances and associated costs. However, there was no clear agreement on when such a shift in conditions might occur or what the appropriate design of a grant program would be.

Given this uncertainty, participants suggested that further research is needed to better understand the conditions under which public investment in new factory capacity would be warranted, how such a program could be structured to avoid market distortion, and how it could be aligned with broader efforts to stabilize demand and reduce risk in the sector.

Conclusion

California's housing affordability crisis is fundamentally a supply problem, driven in part by the high and rising cost of construction. While the State has made meaningful progress in tackling land use and entitlement barriers, construction costs remain a major constraint on the amount of housing that gets built. Innovative construction offers a promising way to address these challenges by bringing greater efficiency, predictability, and potential cost savings into the construction process. Yet the sector has not scaled in California.

Across interviews, focus groups, and hearings, participants consistently pointed to three factors shaping decisions in the IC ecosystem: risk, certainty, and liability. Fragmented code enforcement, misaligned financing and incentive programs, unstable demand, workforce and training gaps, and unresolved questions around risk allocation and liability all create a landscape in which the potential advantages of factory-built housing are hard to realize. These frictions raise costs, slow projects down, and make investors and lenders cautious about participating in the IC market, limiting the efficacy of IC in mitigating the state's housing shortage.

Stakeholders put forward a wide range of practical policy ideas for how the State could help reduce these barriers. Many of the proposed actions build on existing systems—such as amending building code administration, affordable housing finance, workforce training, and public procurement. Other policy ideas point to the need for risk-sharing, improved access to bonding and capital, more predictable review processes, and standardization.

This white paper is not intended to prescribe a single path forward. Instead, it documents what manufacturers, developers, lenders, insurers, and labor representatives identified as pressing challenges and promising opportunities. Some ideas generated broad consensus; others surfaced only a few times and are highlighted as areas for future research. Together, they demonstrate that the IC industry may unlock more housing supply and address the affordability crisis in California—if only the barriers to scale can be addressed.

APPENDIX

Table A1. Key Industrialized Construction Terms and Definitions

Key Term	Definition
Industrialized construction	Refers to a spectrum of building techniques that produce parts or an entire housing unit off-site, then assemble and install units on the project site. Also referred to as "off-site" or "IC."
Factory-built housing	A dwelling unit, residential building, or building components that are assembled off-site, in a factory setting, and installed on the project site.
Volumetric modular	A building technique where entire housing units, or "modules," are built in a factory setting.
Kit-of-parts	These individual building components are designed and prefabricated to be assembled on the project site.
Flat-pack	Refers to the prefabrication of larger elements, like walls and floor systems, to be stacked for shipping and attached on the project site.
Manufactured housing	Used to describe single-family homes that are factory-built and follow building codes defined at the federal level.

Note: These categories are not mutually exclusive. For example, volumetric modularis a type of factory-built housing and industrialized construction.

Source: Pullen, T. (2022, February). "Scaling Up Off-site Construction in Southern California: Streamlining Production of Affordable and Supportive Housing." Terner Center for Housing Innovation, UC Berkeley. Retrieved from: **https://ternercenter.berkeley.edu/wp-content/uploads/2022/01/Southern-California-Off-Site-Construction-February-2022.pdf**

Methods

This report's findings come from a series of focus groups and interviews conducted from November 2025 through early January 2026 with both market-rate and affordable housing developers, general contractors, off-site manufacturers, architects, investors, lenders, building trades unions and carpenters union members, state and regional government staff, building code experts, and representatives from companies using 3D printing, artificial intelligence, or other emerging technologies.

To select interviewees and focus group participants, we employed purposeful sampling, creating an extensive list of industry experts from across IC to ensure that we had a broad range of perspectives. Respondents were grouped by stakeholder type, availability, and interest area. Respondents who were unable to attend a focus group but still wanted to participate were invited to participate in individual interviews or small group conversations. In total, 126 stakeholders were invited to participate and 67 participated.

The ten focus groups included two to nine participants each, grouped by stakeholder type. Manufacturers, affordable housing developers, market-rate housing developers, investors, government staff and researchers, technology and artificial intelligence experts, and industry experts each had their own focus group. The focus groups lasted between one hour and 90 minutes and were conducted virtually (on Zoom), audio recorded, and transcribed.

Data collection

Of the 67 people who participated in the study, 16 participated in one-on-one or small-group interviews and 51 participated in focus groups (see Table 1). The interviews lasted approximately one hour and followed a semi-structured set of questions about the interviewee's role in the IC industry, barriers to scaling innovative construction methods, potential policy ideas to address these barriers, and how to implement these recommendations. Researchers also asked follow-up questions—including what meaningful legislation would look like, who should lead this effort, and what support or opposition might exist for such interventions.

The focus groups followed a semi-structured interview guide that included a series of broad policy goals and ideas. The researchers selected this methodology to efficiently capture respondents' perspectives on multiple concepts and to identify and understand preferences. The policy goals and ideas in the interview guide stemmed from preliminary conversations with industry experts and practitioners, as well as a review of the literature. The interviewer selected policy goals and ideas from this list, based on the group's expertise and interests, and presented them. Policy goals included: increase standardization and consistency through state code and permitting reform; support the pipeline through incentives or direct demand aggregation; support FBH producers in setting up new factories; establish FBH as a catalyst for building industry workforce growth; and drive education and research about FBH to improve familiarity and comfort among public and private sector actors (see Appendix A2).

The interview guide included questions about whether a policy goal was worth pursuing, how it could be implemented, and participants' perspectives on its feasibility and value. Policy ideas included: support the practical and political viability of state-only FBH code compliance; clarify and establish state-level pathways for performance-based code compliance for FBH; and mandate shot clocks for local permitting and the inspection of buildings with state's stamp of approval for FBH elements, including others (see Appendix A2 for a list of policy ideas). The interview guide included questions about each intervention's impact and feasibility, implementation, cost considerations, potential opposition, trade-offs, and opportunities to increase its overall impact.

Table 8. Numbers of study participants by type and study component

Stakeholder type	Pre-survey	Focus group	Interview*	Total
Industry experts	12	13	4	17
Developers	8	11	2	13
Government staff and researchers	4	3	6	9
Manufacturers	5	8	1	9
Investors	4	4	0	4
Tech and AI experts	4	4	0	4
Other	2	8	3	11
Total	**39**	**51**	**16**	**67**

* *Note: Interviews included one-on-one and small group conversations.*

Analysis

After interviews, researchers thematically analyzed the transcripts. First, we reviewed the interview notes and transcripts to identify recurring themes and develop thematic codes. Then, we developed a set of codes that identified content related to the barriers and pathways to scaling innovative construction methods (see Table 2). Over several rounds, the research team coded the transcripts, refined definitions for these codes, and created new codes. Then the researchers coded the full set of qualitative interview and focus group data.

Table 9. List of codes used to categorize policy ideas and concepts

Code	Definition
Productization	Interventions that would facilitate repeatable processes or standardization during the construction phase (e.g., creating standardized plans, preapprovals).
Certainty through code reform	Strategies that aim to promote consistency in the permitting process through code reform.
Certainty through derisked access to capital and minimized liability	Strategies that reduce the perceived risk and minimize the liability for lenders or investors (e.g., loan guarantee programs, state bonding programs).
Demand aggregation	Policy interventions that would centralize demand in order to create a consistent, reliable pipeline for manufacturers (e.g., local and state governments using modular housing for affordable housing, Accessory Dwelling Units, student housing).
Education and data	Refers to the need for educational resources and additional data or research about the industry (e.g., data-sharing among firms).
Workforce development	Strategies related to skills training for laborers (e.g., training programs, state certification programs).
Incentives	Financial incentives for manufacturers, developers, and others to encourage the use of innovative construction methods (e.g., property tax abatement, loan products, density bonuses for modular).
Shift negative perception	Strategies to address the negative perception of the innovative construction industry (e.g., targeted curricula, demonstration projects).

To determine key policy solutions, the researchers grouped the codes into broader themes, or recurring "theories of change" (e.g., "increase certainty in the industry through code reform")—general types of strategies that participants described for improving the IC sector—as well as recurring specific goals or interventions. The researchers reviewed the data corresponding to each theory of change and within each, further identified policy focus areas with specific policy actions for consideration.

The data analysis process was iterative: the research team met regularly to discuss emerging themes and findings from the analysis. These meetings were instrumental in informing the data analysis process to understand the implications of the policy goals and ideas.

Scope and Limitations

The Terner Center conducted interviews and focus groups to understand the barriers to scaling IC in California and to identify potential solutions. This paper documents and synthesizes the perspectives shared by participants. Some of these themes are consistent with the existing literature on IC, whereas others represent practitioners' and experts' perspectives. The interviews and focus groups also surfaced innovative new directions. We present these in the final section of the paper, *Areas for Future Research,* since they have the potential to meaningfully affect the field even if their potential impacts—both positive and negative—are not yet well understood and merit further exploration and study. It is important to note that this report is not an exhaustive list of all policies that could help to scale IC, nor is it intended to put forward formal policy recommendations. Rather, it synthesizes insights from a wide range of practitioners and subject-matter experts. This report does not represent an evaluation of the recommendations and their potential effectiveness.

This analysis has a few limitations, as well. First, we conducted purposeful sampling, not random sampling. We chose people whose expertise and perspective were meaningful for this work and who would have diverse opinions on policy solutions. However, because we did not incorporate randomization in the sampling procedure, we cannot claim that our findings are necessarily generalizable to the entirety of the IC sector or its stakeholders. Additional research could identify other perspectives and opinions not captured here. In addition, legislative staffers attended focus groups and interviews, which may have affected participant responses.

Table A2. List of policy goals and ideas presented during focus groups and interviews

No.	Policy Goal	Policy Ideas
1	Increase standardization and consistency in design and process requirements through state code and permitting reform.	• Support the practical and political viability of state-only FBH code compliance. • Clarify and establish state-level pathways for performance-based code compliance for FBH. • Mandate shot clocks for local permitting and the inspection of buildings with the State's stamp of approval for FBH elements. • Enable developers to use third-party inspectors statewide, even for on-site work. • Include FBH-friendly zoning/building code reforms and education in Housing Element requirements and technical assistance.
2	Help FBH producers secure and maintain a production pipeline through incentives or direct demand aggregation.	• Incentivize projects that cut time/costs or demonstrate high cost-certainty (i.e., meeting or beating original schedules or budget estimates). • Reform affordable housing programs to align funding with modular drawdown schedules and payment schedules. • Create a sales tax exemption for construction materials purchased for all affordable housing projects. • Create preapproved designs and financing tools that support FBH missing middle housing. • Use FBH for student housing through University of California/California State University Housing, scaling the approach being used at Cal Poly. • Use FBH for housing built on Surplus State Land sites. • Establish a State-assisted technical assistance program for regional governments (such as LACAHSA or BAHFA) to create demand aggregation and strengthen the pipeline for regional factories. • Use FBH methods for disaster recovery and rebuilding projects through state-level purchase agreements.

No.	Policy Goal	Policy Ideas
3	Support FBH producers in setting up new factories.	• Provide direct grants and/or low-interest loans to new factories. • Create tax incentives for factories to open in or move to California. • Establish debt guarantee programs for factories to ease access to private financing for setup.
4	Establish and strengthen pathways for FBH to be a catalyst for building industry workforce growth writ large.	• Align existing state programs supporting workforce development with FBH factories conducting training in their facilities. • Create funding opportunities for workforce development within FBH specifically.
5	Drive education and research around FBH to improve familiarity and comfort among public and private sector actors.	• Identify or create a champion within the state government for this work. • Form an interagency working group in the state government to support this work. • Create consistent, standardized language for FBH—including clarity on manufactured housing—to anchor legislation, initiatives, etc. • Create a publicly accessible database of projects utilizing FBH elements. • Fund a physical facility to anchor industry-wide research and development, technology prototyping, entrepreneurship, workforce training and curriculum development, and education.

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