

OFFSITE VS. ONSITE CONSTRUCTION — ECONOMY, IMPACTS & FUTURE



In Part I of a two-part series, industry pros weigh in on the economy and its impacts on the construction industry, specifically offsite construction, and forecast the future for this construction approach that's gaining prominence. Part II focuses on the benefits of offsite construction. To receive Part II, please register now by sending an email to: Duncan.robertson@tamarackgrove.com.

Offsite construction is the manufacturing, planning, design, fabrication, and assembly of building elements that are transported to a final construction site location. Offsite construction can be used for all building types including residential, educational, health care, and commercial, but offers distinct advantages.

All construction methods and delivery systems are heavily impacted by current economic conditions. We'll explore how offsite construction is becoming ever more viable given today's economic outlook and challenges, and present why it's coming into its own. We've assembled a team of experts representing the construction, engineering, and building systems industries to weigh in on what may make offsite construction the perfect option for your next project.

MEET THE PANELISTS:

Brian Sielaff, M.S.C.E., P.E., P.Eng, CEO, Tamarack Grove Engineering

Mikel Ochs, President-Operations, Whisper Creek Homes

Michael H. Weber, IOM, CGP, CSI, National Business Development Manager, The Euclid Chemical Co.

Devin Perry, Executive Director, Business Improvement Programs, National Association of Home Builders

Jack Armstrong, BSChE, Executive Director/COO - SIPA (Structural Insulated Panel Association)

Ken Semler, President & CEO - Impresa Modular

HOW HAVE YOU SEEN THE ECONOMY DRIVE INTEREST IN OFFSITE CONSTRUCTION?

Ochs: I've noticed a significant uptick in builders looking to incorporate off-site construction methods into their building programs. Consumers are also educating themselves on the benefits as everyone looks to solve the housing and construction issues we're facing.

Weber: Labor shortages, speed of construction, volume pricing, and the poor quality of what is being site-built have all been factors. Roof and floor trusses and wall panels have been around for a long time, but they're now being embraced by builders who are feeling the pinch of not having the time — or workforce — for traditional on-site, stick-frame construction.

Perry: Up to 2020, the overriding concern for builders was the labor force. The pandemic introduced materials and supply chain issues, and neither the labor shortage nor materials shortage is going away anytime soon. This has worked to broaden the pool of available construction methods to include the feasibility of moving construction offsite.

Armstrong: Over 300,000 skilled laborers are retiring from the construction industry annually which is fueling the ever-rising cost of general labor and increasing the difficulty in finding skilled labor. This coupled with the increasing cost of raw materials and energy are all favoring off-site construction and its efficiencies of scale in the production process.

Semler: Pre-Covid I saw a significant increase in offsite construction, and particularly modular construction at the 2020 International Builder Show. At that time, it was primarily driven by the lack of labor and overall costs.

At the 2022 IBS costs were off the charts — the broken supply chain, rapidly increasing costs, and the lack of labor has driven builders and developers to seek offsite modular construction and it has only gotten stronger. Economics is making everyone look at better and more efficient ways to build.

HOW HAS INFLATION AND THE COST OF FUEL TO SHIP TO A LOCATION AFFECTED CONSTRUCTION COSTS OVERALL?

Ochs: Inflation and the cost of fuel have definitely played a part in our ability to meet growing demand, but we've been able to keep going throughout at a steady pace. We've mitigated most issues with supply due to the fact that we can buy in bulk, and order truckloads of materials. We're also in an area where skilled labor is still reasonable.

Weber: Inflation affects every aspect of our economy — especially the construction industry. Mortgage rates for homeowners affects everyone regardless of the construction technology. An initial advantage for offsite construction could be due to the speed at which a home can be "completed" when interest rates are on the rise. For example, if you wait 6 - 8 months for a stick-built home to be completed in an economy where interest rates are going up, getting an "offsite" home constructed faster allows closure on the loan at a lower interest rate which may determine if the mortgage is still affordable.

Perry: Shipping costs occur regardless of whether you're shipping pre-construction materials or manufactured items, but an advantage of offsite construction is that materials are purchased in bulk by the manufacturer who has the capacity to store them in their warehouse. Essentially, you're getting in front of the materials shortage by securing your materials and leveraging the power of bulk buying.



Semler: Overall costs for shipping modules have increased marginally, however the real savings is in the alternative of using offsite construction. Fuel price increases multiplied across every subcontractor and materials supplier who has to make trips to or deliver to jobsites scattered across a given environment have skyrocketed. Fuel prices that have doubled increase onsite construction costs drastically.

INTEREST IN OFFSITE CONSTRUCTION IS EXPLODING WITH DEVELOPERS, OWNERS, AND CONTRACTORS ACTIVELY EXPLORING OPTIONS. HOW ARE YOU PREPARING FOR THE FUTURE BASED UPON ANTICIPATED DEMAND AND GROWTH IN THE OFFSITE CONSTRUCTION MARKET?

Ochs: So that we can continue to perform to the expectations of our clients, we are investing in additional space and technology, conducting outreach to the next generation of builders, and adding skilled crew to our team.

Weber: For my company, ensuring homeowners know their options helps them make a well-informed decision. In my role supporting cement-based, concrete wall systems, it's important to share the benefits of each technology based upon the location. That difference may be the amount of insulation required for energy

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— Devin Perry, National Association of Home Builders

Armstrong: It's cheaper to ship a finished assembly once as opposed to shipping miscellaneous parts multiple times on separate vehicle deliveries for an on-site project. Offsite remains more economical, especially in light of rising fuel and shipping costs.

codes, available installers of the systems, etc. There is one common message I always provide with a concrete wall system; it doesn't burn; provides protection from high wind events like hurricanes and tornadoes; is energy efficient; and is quiet and comfortable. With current price-points of wood and increased insurance

costs, concrete building systems are a product of choice with competitive first costs and lower monthly operating costs for the homeowner.

Perry: At NAHB we're positioned to provide offsite construction guidance and information to our members offering as many options as possible. We have a new complimentary guide that highlights the offsite construction industry and the types of building and construction systems: [Homebuyers' Guide to Offsite Construction](#).

Armstrong: At SIPA (Structural Insulated Panel Assoc.) we are exploring expanding our fabricator/distributor model to meet the demand of large manufacturers, developers, and homebuilders nationwide. Making the large panels available for shipping throughout the nation allows fabricators at the local level to cut in the doors, windows, and edges per final construction drawings much more cost effectively. Local project owners can focus on the final fabrication of the structural insulated panel (SIP) and installation into their building project. We also want to make sure that everyone understands the benefits of offsite construction in regard to time and budget savings on a project. SIPs go the extra mile both in eliminating crowded jobsites and minimizing time on the jobsite. For instance, a three-story, 61,000SF SIP apartment complex in Grand Junction, Colorado was installed in 14 business days. The job was completed in about one-third the anticipated time and required less onsite supervision and no specialized tools when compared to onsite construction.

Semler: We're working to develop a nationwide network of factories that will rival our current nationwide coverage as a builder. Developers are now exploring modular construction like never before. The problem we have now is an industry that lacks capacity, and we lack people with the skills to start up factories and who understand the process of turning construction into a manufacturing process. We're working to deliver housing as a service to developers whereby we can not only build the house in the factory, but we can work with the developer from design, manufacture, delivery, installation and through to completion.



HOW DOES WORKING WITH AN ENGINEER WHO IS EXPERIENCED IN THIS METHOD MAKE THE PROCESS MORE EFFICIENT?

Ochs: For us it's essential! We typically work with several engineers and designers familiar with our building system. Even if we receive plans from other architects, engineers, or designers we'll have them redesigned to fit within our system and send them to our engineer. At the end of the day, like any contractor, we rise, and fall based on how closely we adhere to schedule and working with engineers experienced in devising solutions incorporating offsite for differing construction applications.

Weber: Cement-based, concrete wall systems are well established in the commercial sector, and now with decades of growth in the above grade, exterior wall market for single family detached homes they have attained over 10% annual market share. Having an experienced design/build team on board saves money by offering a streamlined building process utilizing the latest technologies. However, manufacturers of the various systems have programs to support builders during their transition from other building technologies.

Perry: Having an engineer who clearly understands offsite construction and its benefits and challenges, as well as understanding the assembly once product is on site is a huge value-add. Not only are you getting the benefits of the flexibility and cost savings of offsite construction, but you're also getting the know-how. There is no substitute for experience in the field.

Armstrong: Without a doubt, working with engineers experienced in SIPs, like Tamarack Grove, is ideal as it allows best practices and implementation of SIP construction designs. SIPA's [Resource Page](#) offers best practices for this innovative technology. While offsite construction isn't a replacement for traditional construction, it offers an alternative that can make a project affordable and efficient while it solves a myriad of site and geographical issues. The multiple benefits of off-site construction continue to give it broad and growing appeal to a world that is constantly challenged by cost fluctuations in all sectors.

Semler: It's critical to have the right engineer. Offsite modular construction isn't a wrong way to build, it's a different way to build! But it's so different that an engineer who doesn't know the basics and the tricks of using modular construction can cost you money and time thereby defeating two of the biggest reasons to use offsite construction. Offsite is a completely new way to build and it all starts with design — poor design will cost you tremendously later in the process. So much of the installation work and the finish work and costs can be designed out of a project before it ever leaves the engineers office. Again, the right engineer is critical!

Sielaff: Offsite manufacturing processes are a wave of the future. To be able to analyze any material from

a prefabricated manufacture, whether it be panelized, modular, log, timber, or concrete, offers our staff the ability to literally think outside of the box with structural engineering practices. Proper education of clients, architects, and contractors on what offsite construction can do for their project is essential in the times we're in.

Our clients are developers, architects, contractors and owners designing and building custom log home residences; modular commercial office buildings/hotels/multi-family; insulated concrete pre-cast wall panelized residence; heavy timber frame residences; and structural insulated wall and roof panelized commercial and residential projects all over North America. Tamarack Grove will continue to educate the world one day at a time on the concept of offsite construction and the value it offers their projects.



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ABOUT TAMARACK GROVE

Tamarack Grove Engineering (TGE) is licensed in 49 states and works with all types of manufacturers and industries in all regions. TGE is also extremely familiar with the various construction methods and products and can expertly determine the optimum construction method, and product based upon the geographic region, specific location, project type, availability of labor, and jurisdictional climate. Regarding selecting on-site or off-site construction, a key differentiator for TGE is the ability to shift on a project-by-project basis as conditions change. The firm monitors the industry and proactively applies knowledge gained to keep projects moving forward and to maintain budgets. Contact Brian Sielaff, brian.sielaff@tamarackgrove.com for more information.