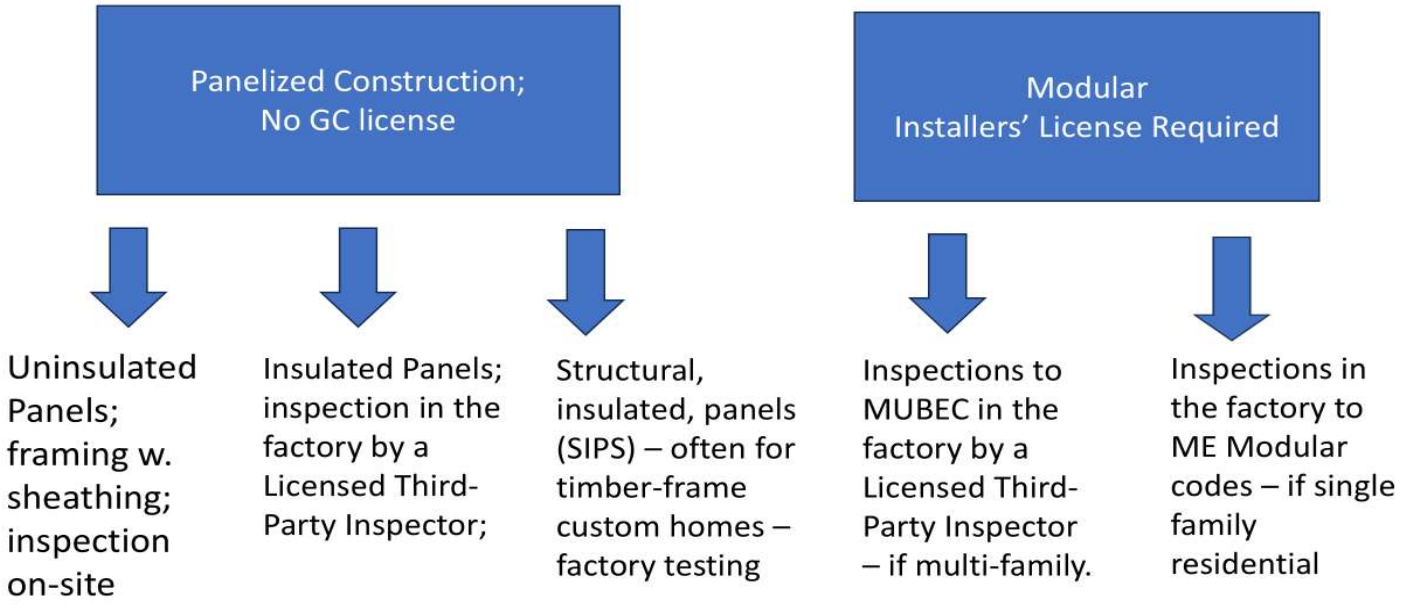
Can factory automation improve affordability?

MAHC research review and panel discussion

4 February 2025

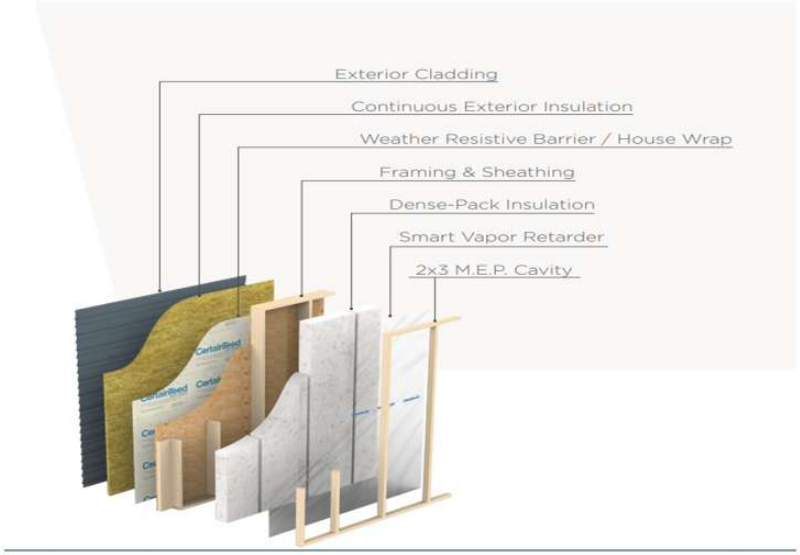
Can construction technology solve the problem? Defined terms and key differences



Examples:

Insulated Wall panels (exterior cladding/rigid insulation/framing + sheathing/moisture barrier/wall framing/dense-pack insulation/electrical chase)(CertainTeed)

Modular Installation (Weston Ave Madison/KBS)



Can greater adoption of factory technology improve affordability?

Type and utilization

- **Uninsulated panels** (framing + sheathing) – widely used but doesn't save much as it's only partially replacing 1 specialty (framing)
- **Insulated Panels** -> savings 15+/-% of total costs (source: CertainTeed); Category often used; opportunity exists for expansion to other projects and uses (floors/walls/ceilings)
- **Modular** → 10-35% +/- of total savings from faster = lower development/soft cost + faster occupancy (Harvard JCHS); not widely used; rural rental projects just starting to utilize for multi-family

Opportunity to "bend the cost curve"

- Widely used and savings already built in.
- Opportunity exists to extend already wide-spread usage – industry knowledge is erratic
- **Greatest opportunity – especially if Maine could achieve some level of standardization**

Insulated-Panels Pros/Cons vs Site-built:

Pros:

- **Faster = more certainty; less risk; lower costs**
- **Savings vary (up to 15% depending on materials/job specs - mainly from lower carrying costs** interest, taxes, insurance, mngmt overhead, onsite-services), source; CertainTeed
- **Eliminates coordination of additional subs** (framing/insulation)
- **Reduced seasonality**
- Quicker to weather-tight = **increased safety** for labor/location
- **TPI:** Framing inspection in the factory
- **Fewer labor-hours ->** circumnavigating the building exterior by 1-2 times less, with a process that is relatively similar to site-built

Cons:

- **Familiarity and Legacy Industry Practices**
- **More time up front** getting specs right
- **Accuracy essentiality:** Engineering and manufacturing – have to be spot on; energy loss btw panels if not installed properly
- **Transportation** risks – damage during transit
- **Logistics** – JIT delivery; crane and space for materials delivery
- Lack of local **CEO knowledge of TPI**
- **Changes in cash flow timing**

Modular Process – Pros/Cons vs. Site-built

Pros:

- **Quality and performance in controlled environment** (e.g. optimally timed factory processes result in higher energy performance achieving sub 1 ACH blower door testing; more certainty of construction quality)
- **Faster**
- **Less seasonality** - albeit timing of large number of boxes installed onsite has a learning curve
- **Better utilization of Maine's workforce**
- **10-35% total project savings:**
  - **Volume buying**
  - **Faster occupancy**
  - **More ergonomic construction**
  - **Faster = Less carrying costs (**interest, taxes, Insurance, management oversight, dumpster/porta-potty/security fencing/run-off control/Temporary power)
- **Less waste** hitting land-fills
- **Code-inspections happen in the factory**

Cons:

- **Lack of industry knowledge and competition**
- **Design**; designs that are optimized for modular, have higher cost savings. More time spent upfront on specs
- **Site work may be high cost on a more-limited scope of work** (subs may charge just as much as if they were doing the work on site – hence the need for micro-licensing)
- **Incentives vs. Perceptions of risk** - will the time savings be obtained for a process that is less familiar? Will the components arrive damaged? Fear is higher with lack of familiarity. Lack of incentives to use new technology vs. pain of cost-overruns should time savings not occur
- **Site layout considerations** .
- **Learning curve on timing of transit/install** to get to weather-tight and avoid rework
- **Modular-installation-licensing required**
- **Lack of familiarity by local code-enforcement**
- **Sales Tax charged twice; Changes in cash flow timing from deposits**

What barriers can be removed: **panelized** construction

- Evaluate and train to improve industry practices, especially around **code enforcement and inspections for factory-built components**
- **Lack of understanding of code-enforcement nexus** between:
  - Structural Engineers (how many times are they paid (by the end household ultimately) to show up -> adding to construction costs);
  - Third- Party Inspections in the Factory, and
  - Local code enforcement. Duplicate inspection fees are reported. Extra time in plan review occasionally; Sometimes towns have wanted “their own TPI” in the plant adding to costs/time/oversight
- **Increase industry familiarity** through licensing standards and training (from engineering thru subs)

What barriers can be removed: modular construction

- **Streamline MHB's role (move to MOCA or separate modular from mobile home oversight)**
- **Suspend the finished-goods sales tax** (2nd layer of sales tax) on modular manufactured in Maine. Just like site-built, sales tax is paid on materials. And then there is a 2nd layer of sales tax collected upon delivery. Remove this second layer which could be especially important for market-based construction
- **Fund new positions to increase set-crews licensed:**
  - **(1) training programs for licensure**;
  - **(2) corporate license** (only individuals are licensed – not the company) and
  - **(3) Consider developing a super-installer license that would include limited licensure to connect the home** (limited plumbing and electrical licensing) allowing cost-savings via vertical integration
- **Clarify nexus** of state/local code enforcement and TPI in factory
- **Create a state-wide design & contract for volume pricing of modular housing**