

Build Smarter, Better, Faster: Proposal to Develop Canada as a World Leader in Housing Production through Design for Assembly/Manufacturing

Challenge:

Two of the biggest obstacles to reducing the cost of housing production are the availability of skilled labour and building practices. Current building practices, even with some focus on current prefabrication, simply require too much skilled labour.

Opportunity:

Canada has an opportunity to lower the cost of housing production and improve labour productivity by leveraging our expertise in Design for Assembly/Manufacturing (DFA/M) to improve quality, reduce costs and increase production volumes.

DFA/M has reduced cost by 30%+ and improved quality in other industries.

Proposal:

That the Government of Canada expand the mandate of Build Canada Homes to include the development of a national housing industry with the goal of creating a low-cost housing production industry and positioning Canada as a world-leader in housing production. Lowering the cost of producing housing, using standard designs, leveraging the volume of housing required benefits all forms of housing; seniors, indigenous, students, young families, etc.

DFA/M typically requires significant investment. Developing new technologies, new production techniques, and automation, etc., is expensive. To fund and realize a reasonable ROI on the investment, a significant volume of production is necessary.

Achieving that volume is possible if the role of Build Canada Homes includes the overall responsibility to develop a Canadian housing industry, incorporating DFM/A working with private industry in the Canadian housing industry. This could be modelled somewhat like Atomic Energy of Canada Ltd, which led the efforts to create the CANDU reactor and an industry to produce it. Following the AECL model, Build Canada Homes establishes a consortium of private and public resources to implement the solution.

Background:

In April 2024, the Government of Canada created Build Canada Homes, which focuses on:

1: Building more homes: Bringing down construction costs, getting cities to allow more homes to be built, transforming how we build them, and growing the workforce to get the job done.

2: Making it easier to rent or own a home: Making it easier to rent or own a home and ensuring every renter or homeowner can retain their home.

3: Helping Canadians who can't afford a home: Working to end chronic homelessness in Canada, and building more affordable housing for students and seniors.

This policy proposal recognizes that Canada has to build more housing than it ever has before and seeks innovative approaches to overcoming significant obstacles. In 2025, CMHC estimated that up to 480,000 housing units need to be built per year. This is about double what is currently being built, and lately the number of housing units under construction has been declining.

While the Government of Canada, Provinces and Municipalities have taken steps to address the housing crisis with many programs to address seniors housing, housing for young families, indigenous housing, student housing, reduced permitting costs, changing zoning to encourage multi-unit buildings, etc, the actual cost of producing the housing is something that receives little attention.

To date, much of the federal government's efforts have focused on establishing standardized housing plans (Housing Design Catalogue) and a greater focus on prefabricated housing. While these efforts, alongside other government programs, will lead to incremental improvements in the pace of housing construction, they will not double housing builds at affordable prices.

Example:

In Calgary, ATCO Structures and Attainable Housing Calgary are partnering to build affordable studio apartments.

ATCO is building 56 modular units to deliver 84 studio apartments.

By using factory built prefabricated units, this project can be delivered at a lower cost, higher quality and much less time than traditional building methods.

Modular build provides efficiencies in the construction of the housing units. Modular units arrive and are put in place using cranes. This results in a building from start of construction to occupancy completed in nine months. Traditional build would take years.

Factory build allows for strict quality control and is impervious to weather. While this provides incremental improvement over traditional build (each unit completed in 21 days), it is still a manual production process. Opportunities for automation are limited as this is a one-off contract for one building.

<https://www.cbc.ca/news/canada/calgary/attainable-homes-modular-1.7600079>

<https://www.atco.com/en-ca/about-us/stories/modular-affordable-housing-calgary.html>

Vision:

The concept, in this policy proposal, looks to the opportunities presented by the need to build 200,000 to 300,000 more housing units per year. Those volumes would support the R&D and automation to achieve transformational improvement. In other industries savings of 30% or more have been achieved.

Not only would the cost of housing production be reduced, but significant savings are achievable in the supply chain and in time to market.

Consider the possible advantages contracting components. The Calgary project sourced 84 entry doors, 84 refrigerators, 84 kitchen sinks, etc. Leveraging national housing demand contracts would be for 200,000 plus on a multi-year contract. Opportunities for better pricing, but more importantly, volume of business that could, using DFM/A, be leveraged into significant savings resulting from manufacturing improvements. At these volumes the supply chain would be able to invest in automation and new production techniques.

One example is drywall. Today the largest common sheet of drywall is 4X12'. Anything larger becomes very difficult to handle. With this proposal larger sheets would be possible and, with volume at reasonable prices.

If the standard size depth for apartment units was set to be 25' with 8' high walls, drywall could be 8X25". These large sheets could be delivered to the factories packaged to be fed into the automation. Automation would then handle the sheets as part of the assembly process. Dramatically reducing finishing time and cost.

Time to complete projects would be significantly reduced. Today a Request for Proposal is issued. Once a developer is chosen design begins. When the design is approved multi-year construction begins.

In this proposal, a housing project is initiated. It could be student, seniors, indigenous, low income or any other type of housing. Build Canada Homes has established a consortium of private and public organizations that, leveraging standard designs and national housing requirements manufactures housing in standardized highly automated factories. Projects choose from the standard plans, with options to meet their requirements, not dissimilar from ordering a vehicle. As these standard designs are in production, the order is scheduled, built and delivered.

<https://housing-infrastructure.canada.ca/housing-logement/design-catalogue-conception/index-eng.html>

What is Design for Manufacturing/Assembly (DFM/A)?

DFM/A is a methodology used by other industries to improve quality, reduce costs and increase production volumes. Productivity improvements of 30%+ have been achieved, with significantly improved quality, in many sectors, particularly automotive.

Briefly, DFM/A considers the entire process from raw materials to delivering the product to the customer.

Benefits of DFM/A:

- Simplifies product design by reducing the number of components and minimizing assembly steps, making manufacturing faster, cheaper, and more consistent.
- Standardizing parts, incorporating modular design, reducing costs and minimizing errors.
- Designing for symmetry and applying mistake-proofing techniques improves assembly efficiency and prevents incorrect part orientation.
- Considering assembly constraints early in the design process enhances manufacturability, lowers production costs, and improves overall product reliability.
- Optimizes product design by selecting the most suitable materials and manufacturing processes, ensuring easier and more cost-effective production.
- Early integration of DFM principles minimizes manufacturability issues, reducing redesign costs and shortening time to market.

- Enhances collaboration between designers and manufacturers, leading to higher quality products and a smoother manufacturing process.
- Fosters sector sustainability by investing in processes and products that reduce waste and reflect the impact of climate change
- Reflect the unique geographic needs and challenges of building affordable housing in rural, remote, and Indigenous communities

<https://fractory.com/design-for-assembly-dfa/>

<https://fractory.com/design-for-manufacturing-dfm/>