RESTCo – Invitation to Collaborate on Creating More and Better Housing for Canada

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1 INTRODUCTION

As you are aware, as a response to mounting political pressure related to the current 'housing crisis', the Canadian government announced on December 12, 2023 a plan to create a new catalogue of housing designs, evoking the memory of the CMHC's successful catalogue of designs in the late 1940s noted for "veteran's cottages".

The announcement stated that a consultation period with experts would begin in January.

Some of RESTCo's principals have an abiding interest in, and extensive experience with, the design of housing, including pre-fab construction, building materials and techniques, healthy, energy-efficient and structures and more. Some of this is reflected in RESTCo's web pages on housing and infrastructure.

We believe that creating affordable, robust, efficient, healthy housing, which can be put in place more quickly than is currently typical is an essential goal. Housing must be considered in the context of the community where it resides, and how it provides services and necessities of life to residents. Infrastructure often takes longer to implement than houses, with costs that can be in the same order of magnitude.

New(ish) technologies have the potential for making better housing with lower overall cost of ownership (e.g. heat pumps), but need to be part of a rational strategy rather than an isolated box to be bolted onto an inefficient structure. We are already seeing the impacts of climate change on building structures and infrastructure. New and re-builds need to be able to better withstand the impacts of climate change, but also to reduce their contribution to climate change from materials used to construction as well as the decades of operating a house. A house is not simply a structure, but a collection of systems which use energy and materials.

RESTCo is, by design, a collaborative venture – the last word in its name is "Collaborative". We see the consultation exercise as an opportunity to leverage the planned creation of housing templates to also generate better housing based on better materials, components and

processes while considering the community context and future-proofing the structures and supporting infrastructure.

Above all, we see this as a golden opportunity to build shelter that is better able to survive foreseeable challenges, which is affordable and focused on occupancy-years per dollar as a performance metric vs. building permits issued.

RESTCo's principals wish to participate in such an undertaking and invite others with similar desires to collaborate with us. RESTCo is prepared to provide secretariat services for such an undertaking and space on its website for any materials chosen to put into the public domain.

In the following pages, we present some of the key ingredients of our thinking on this topic. If this cursory package strikes a chord with you, we invite you to comment and participate. Structure and next steps will unfold as we see who chooses to participate, and how the CMHC consultation process allows for engagement.

For additional information, please connect with RESTCo's CEO, Peter Russell, peter@restco.ca

2 FEDERAL GOVERNMENT LAYS THE FOUNDATION TO CHANGE HOW CANADA BUILDS HOMES

(This section is included as a reference reminder of what has prompted RESTCo to propose a major adaptation of the Government's plan.)

OTTAWA, ON, Dec. 12, 2023 /CNW/ - The Government of Canada is adopting new and innovative ways to build high-quality housing, in line with our work to make infrastructure climate resilient, and boost Canada's housing supply at an unprecedented rate.

Today, the Honourable Sean Fraser, Minister of Housing, Infrastructure and Communities, announced consultations that will begin in early January 2024 on a housing design catalogue initiative, building on the work already being done to address the challenges facing the housing sector.

This new initiative will help accelerate the delivery of homes by standardizing housing designs, starting with low-rise construction. It will explore a potential catalogue to support higher density construction, such as mid-rise buildings, and different forms of housing construction, such as modular and prefabricated homes. The government will also look at ways to support municipalities, provinces and territories looking to implement their own housing design catalogues.

Through these consultations, the government will engage with partners and stakeholders across the housing sector to seek their input and expertise.

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The Government of Canada is changing the way we build homes and using all levers at its disposal to build more homes, faster. By working together with various orders of government, private and non-profit sectors, partners, and experts, we can make housing more affordable and more attainable for all Canadians.

Quote from the Minister

"In order to build more homes faster, we need to change how we build homes in Canada. We are going to take the idea of a housing catalogue which we used the last time Canada faced a housing crisis, and bring it into the 21st century. This is going to help accelerate future developments, and tap into new and innovative construction methods that will make a real difference in building communities across Canada."
The Honourable Sean Fraser, Minister of Housing, Infrastructure and Communities

Quick facts

The Government of Canada is working to support innovation in the construction sector through programs such as the Housing Supply Challenge. This $300 million fund has supported projects across the country that are improving the productivity in Canada's construction sector through the adoption of new designs, digital tools, and modular and prefabricated construction techniques.

Working with municipalities, the Housing Accelerator Fund is a historic $4 billion investment that is breaking down barriers and build more homes, more quickly, to help people – from young families, to seniors, to newcomers – find a good, affordable place to call home. This includes more student housing, homes near public transit, and more rental units. It will help unlock over 100,000 new homes in cities from coast to coast to coast.

The government has also invested over $759 million under the Affordable Housing Innovation Fund to support new, innovative financing models and unique designs used to make housing more accessible, and lower the costs and risks associated with affordable housing projects. To date, funds committed under the program will create over 28,000 homes, with more than 18,000 of them being affordable housing units.

From the 1950s to 1970s, Canada Mortgage and Housing Corporation created a series of housing design catalogues to help Canada accelerate the production of housing. These efforts were an essential component of the comprehensive federal effort to build capacity in the construction sector and address post-war housing shortages.

SOURCE - Infrastructure Canada

For further information: (media only), please contact: Micaal Ahmed, Communications Manager, Office of the Minister of Housing, Infrastructure and Communities, 343-598-3920, micaal.ahmed@infc.gc.ca; Media Relations: Infrastructure Canada, 613-960-9251, Toll free: 1-877-250-7154, Email: media-medias@infc.gc.ca

3 THE CORE OF VETERANS HOMES SUCCESS

Figure 1- Construction of Victory Houses On Normandy Boulevard in 1947.

The Victory Houses in Georgetown were specifically built for veterans and could only be purchased by them. Built ***from prefabricated components, such as walls and roofs****, the construction of these homes reflected the mass production of the war effort. In all, under the direction of the Canada Wartime Housing Corporation, over 30,000 of these one-storey clapboard houses were built in communities across the country.* (Note: Later, comparable houses were principally storey and a half.)
https://www.haltonhillstoday.ca/then-and-now/victory-housing-gave-local-veterans-affordable-place-to-live-after-war-7751904

The Veterans Homes success, of speed of delivery, affordability – and as has proven, durability, almost certainly was due far more to their construction from prefabricated walls and roofs than to their layout. Panels of this era were of 2 x 4s and plywood. Today's panels, SIPs, (Structural Insulated Panels) comprise rigid foam insulation sandwiched between sheets of OSB (Oriented Strand Board).

4 RESTCO'S REACTION TO THE ANNOUNCEMENT

4.1 INTRODUCTION

"Never let a good crisis go to waste."

"Fast, Good, Cheap." Doing all three is really challenging. This was alternatively and most aptly expressed by Romy Bowers, President and CEO, CMHC, May 4, 2023 when she declared: -

"Our mission at Canada Mortgage Housing Corporation is simple:
We exist to help Canadians meet their housing <u>needs.</u>
But achieving that mission is complex — and has never felt more urgent."

She speaks of <u>needs,</u> not wants; of it being a mission and of it being complex.

RESTCo and others applaud the Government's plan to accelerate house building and are confident that our perspectives can help make the initiative a success.

It is our mission to see that all housing built within the bounds of Federal Government's initiative incorporate:

- Ability for production to be ramped up as quickly as possible
- Designs that maximize occupancy, healthily and safely
- Energy efficiency, not just as-built but capable of being adapted to take advantage of advances in technology
- Ability for the program to be administratively efficiently
- Other meritorious features as expanded on below. It's complex, and to deny that risks failure.

We contend that the issue is rather to increase accommodation – occupants per floor space - not number of housing units. A more spacious-than-necessary house for few occupants should not qualify.

4.2 HOUSING SPECIFICATION FACTORS

We offer an opportunity to enrich the proposed program by focusing on fundamental housing needs through integrating considerations of the following:

4.2.1 Speed of delivery

- **Building plan approval**

  What degree of standardization is imposable on the large diversity of codes at the municipal level, and how much time would be added or saved?

- **Reducing on-site time:**

  Extending work-week hours, **installing** prefab pieces can be done at night.

  Increasing prefabrication, tending site-work towards faster assembly through panelization and modular elements which can be manufactured at the same time as preparatory site work is carried out.

  Simplicity of design and absence of unneeded features.
  To the extent practicable, avoid definition of interior space and use of load-bearing interior walls to create maximum unobstructed space and flexibility of layout initially and over time.

  While the following is an outside-the-box suggestion it would be an incentive to minimize site time.
  Any market housing builder would be required to deposit the full construction value, or some significant proportion thereof, at the time a permit to build was issued. That deposit would be redeemed when a prescribed degree of occupancy was proven. Interest on the deposit could contribute to the approval process.

- **Efficiency of design**

  (The simper the design the quicker it is to build)
  Namely - maximizing usable space for a given house size

A criterion for comparison and to maximize:

[designed-for number of residents* / above-grade building exterior area]
* Based on bedroom capacity

Two significant way of boosting this are:
- reducing exterior envelope area - multiples, sideways and vertically
- increasing occupancy – e.g. design for livable basement space.
(CMHC report - Advances in Basement Technology)
https://publications.gc.ca/collections/Collection/NH18-22-90-217E.pdf

The external envelope area being a readily determined measure of material cost, time to assemble and heat loss

- **Public vs Private sectors**

(Public housing may offer greater opportunity to build at larger scale, and faster)

What measures will be effective to induce the industry to deliver modest accommodation?

- Public housing, the specifications of which are to meet resident and social needs, or
- In the case of market housing, leave the decisions of what fashionable, but unessential features to include to buyers, who can choose to have them included or not.

Any subsidization of housing under this plan should not bear the cost of the unnecessary.

A notable argument in favour of using municipal land is made by Brian Doucet, the Canada Research Chair in Urban Change and Social Inclusion and an Associate Professor in the School of Planning at the University of Waterloo in a presentation to Waterloo regional councillors. https://bit.ly/3ujuAwD

- **Productivity and/or accommodation densification**

Meeting an increasing demand for shelter with a lack of skilled construction workers can only be achieved in the case of site building by increasing productivity and/or by increasing the density of occupancy.

Which of the above measures would be most effective and implementable quickly?

4.2.2 Boosting those companies that are already fast tracking

Measures will be essential to not impose unnecessarily limitations on those panel and module companies that are already delivering fast on-site turn round. Quite reverse, they should be incentivized.

4.2.3 Not Inhibit Innovation

Prescriptive codes tend to inhibit innovation. Performance codes much less so. However, the latter may have a tendency to complicate the approval process, but will be less problematic when a design is applied to a significant number of comparable housing units.

4.2.4 Enhancing quality

When done professionally prefabrication will tend to increase quality since the work will typically have been carried out inside, free of the influence of adverse weather, especially wet weather.

The plan must ensure quality assurance programs are strictly applied. Warranties, hold-backs, must be fairly administered.

One measure that is a quantifiable check on building integrity and also of energy efficiency is to require every housing unit to have its airtightness measured with a blower door. This would allow imposition of performance airtightness thresholds and, if results were made public, would be a relevant measure of a builder's capability.

Air quality requires controlled air change rates with an HRV and measures to ensure no toxic off-gassing of materials or radon entry; avoidance of thermal bridging in the shell to reduce condensation and subsequent mold.

4.2.5 Minimizing life-cycle environmental impact

In the full measure of factors environmental impact is the aspect of the plan that is critical to also get as right, notwithstanding how imperative it is to also tackle affordability, reduce homelessness and to accommodate the large number of immigrants.

- Manage heat loss or gain by high levels of insulation, minimum thermal bridging and by passive means.
- Household or cluster scale generation from renewables, especially photovoltaics.
- Orientation for conflicting solar gain and shade.
- Adaptability – by designing for retrofit readiness to upgrade energy related features. This will also contribute to lengthening a house's life expectancy.
- Portability - of a structure can also increase the life of a building if it is threatened by climate change factors such as sea level rise, sitting in a flood plain, expanding landslide zones, shoreline erosion, growing wildfire zones, permafrost subsidence or communities when their accessibility is no longer viable.

- Take into account the embodied energy of building materials and their eventual reuse or recyclability.
- Anticipatory design, e.g. more passive cooling, in light of rising temperatures; design of staircases and other features that facilitate the increased demand for aging at home.
- Co-housing through its sharing of facilities.
- External/internal space for at-home horticulture.
- Secure space for electric bikes, sooters, etc.

4.2.6 Infrastructure factors

Comprising - electricity, water, wastewater disposal, garbage and recycle collection, communications, access for emergency and other reasons, and in special cases remotely generated piped in heat.

- Suitability of topography and soil type for installation of buried infrastructure, e.g. rock being exorbitantly expensive to trench.
- Where provision of conventional infrastructure, e.g. trenching, is not viable, a proven alternative is for houses to be linked to an infrastructure module. CMHC led the support of this option. It offers numerous advantages: fast installation, being a prefabricated module; cost and space saving – reducing the need for much HVAC and other in house elements; notably less costly to upgrade than would the case for each house; an efficient way to link to renewable energy generation and storage. It has at least been adopted by Parks Canada for off-grid facilities, and at resource development camps.

  https://www.restco.ca/Eagle%20Lake%20AYH_EN.pdf

  https://noblenorthern.com/

- Access to public transport and cycle paths.

4.2.7 Going all electric

While this is an integral facet of minimizing generation of GHGs it deserves special consideration.

In any event this is part and parcel of national plans, but the importance of Negawatts cannot be over emphasized.
Almost any on-site measure to renewably generate and store electricity or to reduce demand , especially at peak times, will be less expensive than the cost of increasing the capacity of generation, storage and delivery of supply. Heat pumps for space heating and cooling and water heating will be one of the essential on-site measures, augmented with phase-change heat storage.

The net effect of decommissioning GHG generating power stations; increasing load of going electric for cars public transport, manufacturing and more housing will put an enormous and costly demand for more (renewable) generation.

About the symbiosis of EVs and house energy needs.
Vehicle to grid (V2G) is problematic at scale, vehicle to house (V2H), - building (V2B) and - load (V2L) are established technologies which contribute to resilience at a practical scale and are not reliant on a fully-functional grid (increasingly at risk due to climate change or terrorism). And they avoid the imminent EV connector 'wars', potential hazard of back-feeding the grid and administrative issues associated with monitoring power transfers, when it happens and compensation which hobble V2G projects to date. Instead, the electrical storage capacity that will be manifest from the output of the extensive new large banks of batteries when linked to housing will both level grid electrical demand and increase resilience.

4.2.8 Resilience

To the degree possible it will be prudent to build in resiliency into house systems, most obviously by allowing for continuing operation of fridge, emergency lighting, communications, security and ventilation loads by linking them to an EV. So wiring should be ready for switching from grid to EV.

4.2.9 Relevance of One Planet Living (OPL) which underlines Windmill Corp. philosophy

I suggest this is a special example since so much of the **One Planet Living (OPL)** parallels what RESTCo is espousing, *consists of ten simple principles that make it easy to plan, deliver and communicate your commitment to sustainability* and the factors described above. The OPL principles are particularly stronger on community and social issues than is our focus. Windmill is almost exclusively into multi-unit development, in Ottawa, Victoria, Guelph and Toronto.
https://windmilldevelopments.com

5 EXAMPLES OF HOUSES AND COMMUNITY

Selection of Canadian net zero housing,
The Toronto Healthy House
https://www.restco.ca/Toronto_Healthy_House.shtml
CHBA Net Zero Home Labelling Program currently the number of Homes Labelled Across Canada: 1,708

Housing at the macro level:
One Planet Living https://www.bioregional.com/

Urban Pattern Associates, Fanis Grammenos
https://www.youtube.com/channel/UCwOFH2XU9XR3mlvAripR1zw/videos

Disaster in Ireland
https://www.evernote.com/shard/s153/sh/984babe3-4307-40ad-981a-0ec7b9d62738/qIgZC6mWv5ifmg-ZR58vFnR95P8f_rsT27Kug2xfs3PWbFfJ9pNPuIGw6w

Success in Vienna
https://www.theguardian.com/lifeandstyle/2024/jan/10/the-social-housing-secret-how-vienna-became-the-worlds-most-livable-city

6 PERSONNEL

RESTCo

Peter Russell P. Eng. President and CEO RESTCo
https://www.restco.ca

- Background in industrial engineering in UK, Nepal and Canada, and R&D in residential construction.
- 20 years in the Research Division of CMHC during which time he chaired a 13-nation IEA group on the Energy Related Environmental Impact of Buildings. https://www.iea-ebc.org/Data/publications/EBC_Annex_31_tsr.pdf
- Managed the Churchill, Manitoba, modular prefab home plant. https://news.gov.mb.ca/news/archives/1973/05/1973-05-18-manpower_corps_housing_plant_busy_in_churchill.pdf
- 1981, family built a 4-bedroom home emulating the first Saskatchewan conservation home, largely from materials recovered from deconstructing two ex-military homes, https://www.src.sk.ca/blog/closer-look-saskatchewan-conservation-house-and-four-others
- Project manager for Habitat for Humanity building a factory in Nepal to manufacture bamboo roofing panels. https://www.habitat.org/ap/about/newsroom/2010-12-20-Nepal-Runs-Bamboo-Factory-In-Jhapa
- For 3 years lived in a Veterans home in Ottawa before enlarging and upgrading it.

Darryl McMahon, B.Com., Owner, Econogics, Inc.
https://www.econogics.com

- Award-winning author of *The Emperor's New Hydrogen Economy*
- Certificate in Energy Programming and Evaluation
- Experienced project manager with a penchant for technology, health, social issues projects
- System designer
- Long-time advocate for alternate / renewable energy, load management and conservation
- Currently doing a deep retrofit on his cottage expecting to make it habitable year-round, fully zero-emissions electric and incorporating passive energy conservation design measures
- Owner and user of on-road and off-road electric vehicles for over 40 years
- Lead writer for alternate/renewable energy section for CHARS Blueprint Exercise
- Wrote backgrounders for Electric Mobility Canada on climate change and grid impact

- Conference presentations on climate change impacts and mitigation related to housing and infrastructure, electric vehicles, environmental solutions

Christopher IVES, MA Cantab - Mechanical Sciences - Housing Innovator.

- After emigrating to Canada in 1970, worked on integrating Healthy Housing Systems - water/sewage/energy infrastructure.
- Demonstrated 4 Homes with McGill, CNRC, CMHC, and First Nations support (1976-2000)
- With Brace Research of McGill (SOLAR) - InterSol 1985 Downward Heat Pipe for non-electric Solar DHW (1976-1990)
- CMHC Research Division (HOUSING) - Toronto Healthy House - Eagle Lake First Nation Healthy House (1990-2000)
- Spin-Off projects have included off-grid wastewater reclamation, now containerised ("EcoNomad" onsite micro-utilities provides notable benefits including major reductions in water draw (water/sewage infrastructure) + non-freezing Heat Recovery Ventilation)

7 PERTINENT ORGANIZATIONS et al

Provisional reference to organizations that also may well have an interest in the Government's plans and therefore would be appropriate to consult with, with the prospect of collaboration:

1 CHBA Modular Construction Council
https://www.chba.ca/CHBA/CommitteesCouncils/Modular_Construction_Council.aspx

2 Canada Green Building Council (CAGBC)
https://www.cagbc.org/

3 Passive House Canada
https://www.passivehousecanada.com/about-passive-house-canada/

4 Structural Insulated Panel Association
Based in Florida but with numerous Canadian members
https://www.sips.org/what-are-sips

5 Energy Star- performance rating protocol
https://www.energystar.gov

6 Canadian Renewable Energy Association, (CanREA)
https://renewablesassociation.ca/

7 Canadians for Properly Built Homes, (CPBH)
https://www.canadiansforproperlybuilthomes.com

8 Expertise in energy efficient building design
Peter Moffatt (Vancouver), Anthony Leaning (Ottawa), Jeff Armstrong (Ottawa)

9 Mass Timber Institute, University of Toronto
https://academic.daniels.utoronto.ca/masstimberinstitute/

8 COMPARING ALTERNATIVE CONSTRUCTION STREAMS TO ACCELERATE HOUSING DELIVERY

Goal To strike a rapidly implementable house (accommodation) building plan that would deliver more roofs over needy heads, which also permits consideration of which elements of the forgoing issues justify being incorporated.

Diagnosis - Comparing alternative construction streams for rapid increase in housing delivery

The following is an elementary comparison of the primary modes of construction. The buildings they generate and characteristics of the process chain they rely on.

Over-simplified there are three general modes:

(3D printing, is still too much at the exploratory stage to be considered here).:

1 Site construction, requiring substantial numbers of skilled workers, be they at the stick building or reinforced concrete construction used for multi-storey buildings
2 Panelized
3 Modular

Four criteria have used here to access the pros and cons of each of these modes.

1 Rapidly increase production **capacity**, this addresses the capacity of the whole supply chain to deliver the necessary materials for construction.
2 Increase **productivity**, this addresses the rate of construction per worker.
3 Lends itself to incorporation of **energy efficiency.**
4 Lends itself to improvement in **quality**.

Pros and cons of each option for each criterion

Site construction

/ Capacity
Pros – None, possibly increase number of women tradespeople
Cons – There is already a shortage of necessary skills to deliver existing construction demands
Increasing numbers of tradesmen workers is not realistic in time frame.
At urban sites, multiple deliveries cause congestion, parking for workers can be challenging
/ Productivity
- marginal gains would be possible through use of more productive tools, especially battery powered.
Pros - very marginal
Cons – Affected by adverse weather
/ Energy
Pros – improvements possible from changes in specifications to increase to net zero
Cons – Will slow production, education/inspection required to achieve higher airtightness for example

/ Quality
Pros - possible by training, motivation of tradespeople and inspection
Cons – Outside construction, especially rain is not controllable and adversely affects quality.

Panel

/ Capacity
Pros – lends itself to increase by adding shifts, some types of panel manufacture can be quickly set up for off-site manufacture, lends itself to economies of manufacture scale.
Cons – requires set up and investment in manufacturing facility.
Pros - off site, lends itself to various levels of automation.
Transport, highly efficient.
On site, fast construction, fewer skills required for an assembly rather than fitting task.
High level of material utilization, little site waste. In the case of CLT no additional fire protection layer required
Cons - Design of building somewhat dimensionally constrained by preferred panel dimensions.
Also: Panel/structure
Pros – SIPs and CLT plus other engineered wood offer high structural strength for amount of material. Little site waste. Large range of panel types possible.
Panel size exceeds module limits
/ Energy
Pros- High levels of insulation can be incorporated into SIP panels, intrinsically more airtight than site construction. Compatible with roof angles suited to PV.
/ Quality
Pros - not influenced by adverse weather during manufacture; accuracy easily achieved; on site fewer joints that need inspection; rapid close in. Dimensional accuracy makes interior finishing easier than site option.
Cons - Internal finish requires same level as care as site construction, but accuracy of dimensions makes drywalling simpler.

Modular

/ Capacity
Pros – factory manufacture parallel with site prep and foundations. Shortest site time. Could work shifts.
Cons – factories will have limited capacity of module size. Requires highest capitalization, and therefore time to ramp up capacity.
Transport involves moving a lot of air.
/ Productivity
Pros – not influenced by weather, greatest opportunity of deskilling site work. Fastest at site construction. Much less site delivery required compared with site construction. Lends itself to most efficient electrical and HVAC installation. Can include some of panel advantages. Can take advantages of scale of product standardization.

Cons – Module dimensions limited by transport, (especially height), plus cost, oversize load permit/need for accompanying transport. Need to somewhat overbuild structurally to cope with transportation stresses.
/ Energy
Pros – Can achieve highest specifications
Cons – transport width limit will put pressure to limit wall thickness and therefore R value
/ Quality.
Pros – can achieve highest standards
Cons – what is likelihood of independent quality assurance?

Additionally, two levels of hybridizing panelization + modular construction:

Level 1

Bathrooms and kitchens comprise a large proportion of house's plumbing and hardware. They lend themselves to being modulerized and, being of relatively modest total volume, are easily transported. So, a further streamlining of site construction is to incorporate such modules into an otherwise panelized structure.

Level 2

Especially applicable in the case of clusters, rows or other multiple housing is, in addition to incorporating Level 1 modules, to additionally link each housing unit to a utility hub module, as also referred to in "infrastructure" above. The advantages are numerous.

The module can be the source of co-generation, a link to renewable energy sources and storage, water purification, wastewater treatment, supply of reclaimed water; saving space and cost in each serviced home.

9 CONCLUSION AND TENTATIVE PLAN

Without quantifying the relative pros and cons of the three options we submit the hybrid SIP, level 1 or 2, offers not only the most pros relative to cons, but critically offers the fastest route to increasing supply chain capacity.

A preliminary verification of this became apparent in RESTCo's Zoom meeting with Jeff Taraba, owner of Thermapan, Fort Erie. His company is currently increasing capacity by a factor of 4 and would be able to increase production further in a short time, given assurances of demand.

Just as the government has recognized that to realize a rapid supply of EVs requires removal of what would be a battery bottleneck. I submit if a large increase in home construction is to be achieved one has to appreciate their critical supply chains and the cost and speed of being able to increase their capacity, the manpower, training, raw materials, investment and physical plant required.

Building plans, be they of singles or multiples will need to base on Panel components, just as Veteran homes did and offer efficient indoor space and forego bells and whistles.

The panels that comprise 2X lumber require the least capital equipment and would therefore be the fastest to have its capacity increased but compared with SIP of ICE (insulated composite envelope) is less susceptible to aspects of automation. Further, SIP and ICE panels incorporate polystyrene insulation that adds structural rigidity, absence of thermal bridges, insulation that is not vulnerable to moisture damage and will not deteriorate over time. Environmentally, polystyrene, is a difficult to recycle plastic using current facilities, not an ideal material but given the multiple constraints is almost certainly the least-worst insulation to be taken advantage of.

The very preliminary plan

1. Assuming a positive outcome from this submission, to collaborate with CMHC in the formation of a multi-interested party task group to draw up exemplar building and infrastructure specifications that fit the program requirements a) with minimal supply chain constraints and subsequently b) identify what will be required to fast tracking the building of supply chains that will inevitably take longer to implement.
2. Promulgate specifications for the house building industry, and municipalities to implement building plans.
3. Generate a fast-track approval protocol that nevertheless allows for local bylaw requirements.
4. Find the most competitive ways to boost the supply chains.