Research - Housing Affordability and Climate Change

The climate crisis is a housing crisis (still a work in progress -LY)

What is the housing crisis?

The definition of the housing crisis in Canada is not exactly clear. The housing crisis relates to both supply and affordability. It is commonly understood to be the unaffordability of purchasing a home either due to excessive demand caused by a rapidly increasing population, foreign investment or a lack of supply. Canada's housing market is among the most unaffordable in the Organization for Economic Cooperation and Development (OECD) member states, with one of the highest house-price-to-income ratios. In addition, renters are facing rent increases double that of inflation, alongside evictions and displacement. Homelessness is on the rise, disproportionately affecting the most marginalized groups.

Housing affordability is not a new problem. Canada had a strong housing welfare system in the 1960s and 1970s, but in 1993 the federal government stopped funding social housing programs. Public housing currently makes up only 4% of housing stock,

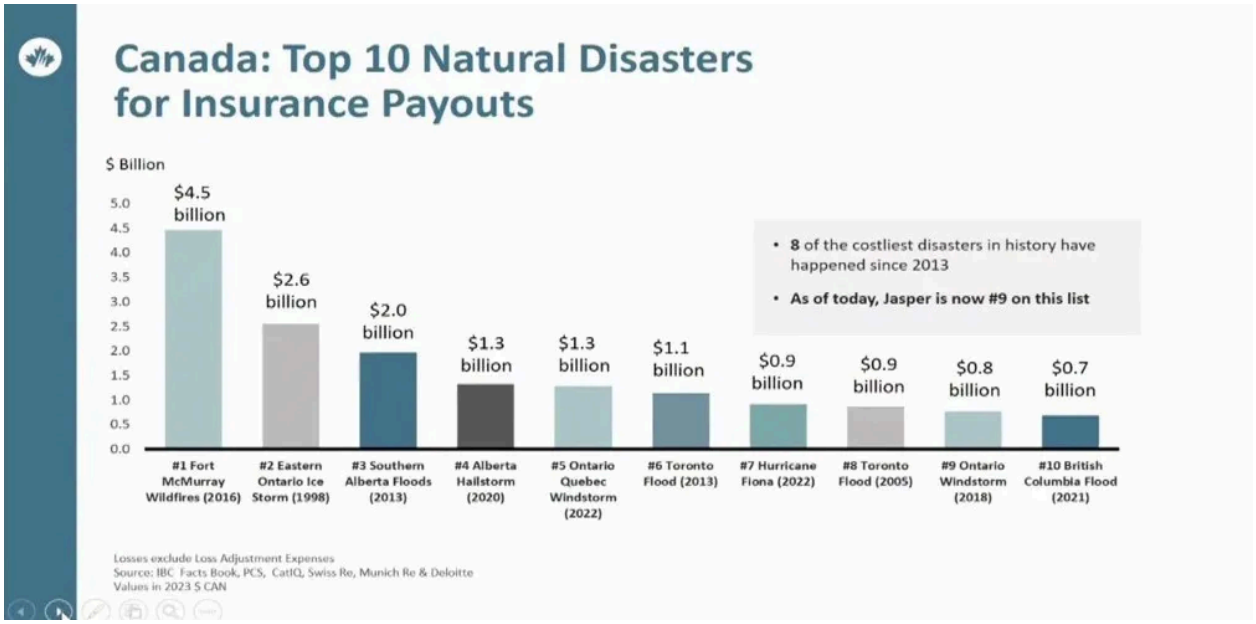
It is unrealistic to assume that the affordable housing crisis will be solved by the private sector and market housing. Solutions will require partnerships. The public sector must take a leadership role to provide non-market housing.. Each level of government has a role - federal, provincial and municipal as well as non-profits, and other agencies. The private sector will play a supporting role.

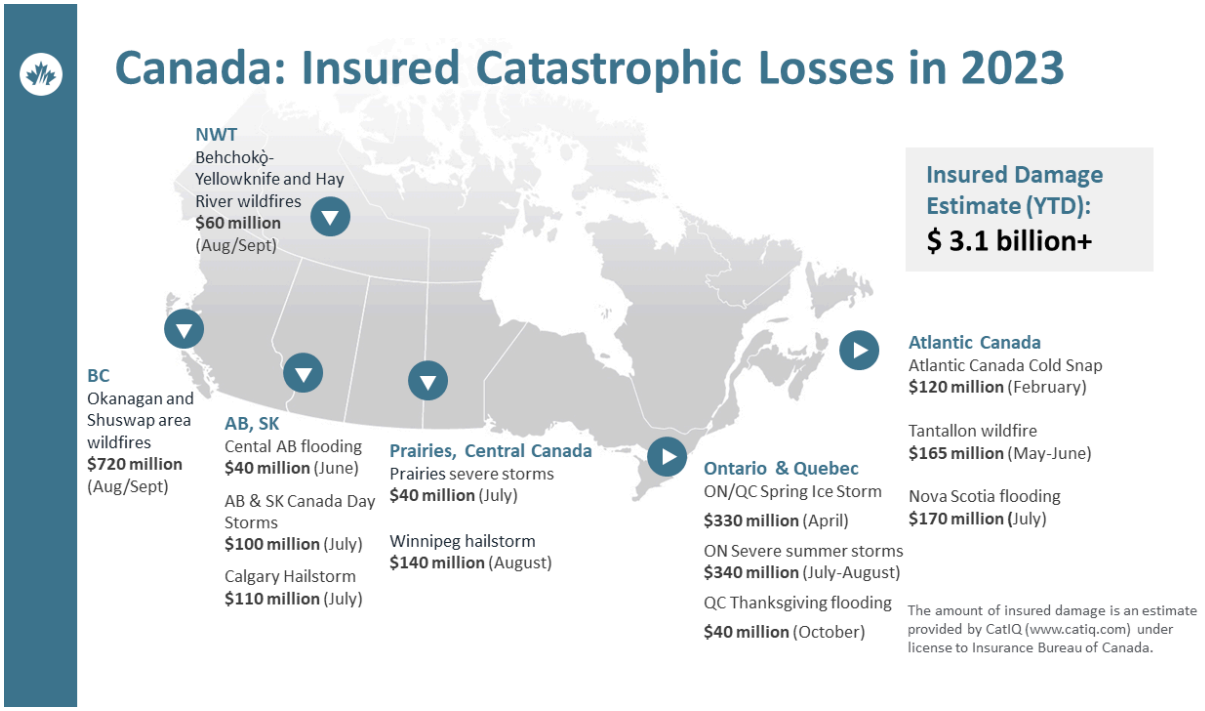
The Impact of Climate Change on housing

Climate change continues to compromise housing and living circumstances especially for marginalized populations.

Climate Institute-Climate Fueled Disasters Climate Institute report 2022 notes that economic damage from climate change is expected to cost the Canadian Economy an estimated $25 billion by 2025. Insured damage for the Jasper wildfire is estimated at $880 million. -Jasper lost about 800 housing units. The Fort McMurray Wildfire destroyed over 2,400 homes and cost $3.58 billion in insurance cost.

Flooding is the most common and costly disaster in Canada. In the past decade, floods have averaged nearly $800 million in insurance losses annually (Insurance Bureau of Canada 2024). Insurers estimate that for every dollar in insured losses, there are two dollars in uninsured damage borne by homeowners.





Global relocation is occurring due to climate change and the resulting natural disasters the world is experiencing at increased magnitude and frequency. Canada is not exempt from this trend.

The IEP, an international think tank, predicts that globally, climate change will force the displacement of 1.2 billion people by 2050. Canada does not record climate refugees but Toronto-based Migrant Workers Alliance for Change estimates numbers who have moved to

Canada to be in the tens of thousands.(Broadview.org). Many of these people end up as temporary foreign workers.

What is the Climate Change problem associated with housing?

The International Energy Agency (IEA) reports that 10% of global emissions come from heating buildings (cooling is not included). Building emissions are the third largest source of emissions in Ontario after transportation and industry and account for 24% of the province's total emissions.

Homes that aren't well designed or insulated raise homeowners' energy costs in the short term and maintenance and retrofit costs in the long term. To achieve net-zero emissions by 2050, every building in Canada will need to be retrofitted.

The Cool Way to Heat Homes Report states that if by 2025 heat pumps were installed in new Canadian homes instead of air conditioners, 19.5 million tonnes of Carbon Dioxide would be prevented. This would also result in a $10.4 Billion savings in energy bills

The building and construction sector account for 39% of global energy-related carbon dioxide emissions – most in middle and high income countries.

The location, construction and energy consumption of homes directly affect their contributions to greenhouse gas emissions and climate change.

The intersection of housing affordability and climate action

How governments plan on tackling the housing crisis will significantly impact the commitments Canadians have made to reducing greenhouse gas emissions. Affordability need not block reducing greenhouse gas emission or building more neighbourhoods resilient to the impact of climate change. Well thought through public policies can address these priority concerns concurrently.

The federal government can play a key role by supporting policies that will improve housing affordability and set the stage to increase housing supply. The Affordable Housing Fund is available to help build new homes and repair existing units across the country. The Rapid Housing Initiative supports construction of supportive housing for those in greatest need. The Housing Accelerator Fund helps local governments create transformational change to increase housing supply. The Apartment Construction Loan Program aims to boost construction of rental housing. The Canada Rental Protection fund provides capital for non-profit housing organizations. The Canada Housing Infrastructure Fund provides communities with funding to build or improve critical infrastructure. 2024 Fall Economic Statement will double the loan limit for the Canada Secondary Suite Loan Program. This makes it easier for homeowners to create a rental apartment in basement, garages or laneway homes. This increases housing density.

Mortgage reforms will also lower down payment requirements and expand 30-year amortizations

Ontario set a goal of building at least 1.5 million homes by 2031 and assigned targets for the largest municipalities.The Building Faster Fund creates new funding for municipalities that are on target to meet their provincial housing targets. Ontario has four pieces of legislation to increase housing supply: cutting through red tape, modernizing zoning, improving decision timelines and improving land-use planning. - expand density around transit, increase city density. Ontario has also increased funding to the Community Infrastructure Program and the Housing-Enabling Water Systems Fund and launched the Municipal Housing Infrastructure Program.

Municipalities set and enforce official plans, zoning rules, engineering standards and bylaw

Planning for growth

https://climateinstitute.ca/higher-ground-housing-affordability/

We need to build more homes in Ontario. This can be done while aligning with other critical criteria such as affordability and reducing climate change. Continuing our growth trends through expanding land use is detrimental in many ways. Sprawl causes increased traffic, impinges on agricultural land use, destroys wetlands, grasslands and forests all of which act as sinks for carbon capture. Fast tracking developments through Mini MZO's and other poorly thought through decisions can favor sprawl.

In the Greater Golden Horseshoe (GGH), more than enough land is available to build over 2 million homes by 2031 without expanding urban boundaries

https://environmentaldefence.ca/wp-content/uploads/2023/03/REVIEW-OF-EXISTING-HOUSING-UNIT-CAPACITY-IDENTIFIED-IN-MUNICIPAL-LAND-NEEDS-ASSESSMENTS-R.pdf

The Ontario government has (arbitrarily) set housing targets for 2031 for 29 municipalities. 25 are in GGH. The total target for Ontario is 1.5 million new housing units. According to the above report "Designated greenfield areas and rural areas at the time the Local Needs Assessment for upper and single tier municipalities in GGH exceeded 2 million units – with no new lands added to urban areas. Existing capacity is well distributed across municipalities (2/3 in built-up areas and 1/3 in designated greenfield areas and rural areas)"

In addition, Land Needs Assessment (LNA)'s use past purchasing tendencies to determine the mix of housing required for future growth. The requirements have changed (work from home, family size, access to public transit, age, etc) and may result in higher than realistic forecasts for single-detached units and lower than realistic forecasts for apartments. Communities can build more equitable, resilient and future ready neighborhoods if they choose to.

https://www.ohchr.org/en/special-procedures/sr-housing/climate-change-and-right-housing

By prioritizing a diverse housing mix through inclusionary zoning in and around existing neighborhoods, cities and towns can rely on walkable neighborhoods and transit-oriented developments, promoting inclusion, affordability and reducing energy consumption. Housing with access to transit helps owners/renters deal with the affordability issue.Another approach to ensuring that cities increase the supply of affordable housing and promote mixed income, inclusive communities is inclusionary zoning.

Many Regional plans have been well developed to support growth in communities with significant input from many stakeholders. In York Region, the plan extends to 2051 and attempts to balance the planned population growth, economic development, infrastructure and preserving the environment. It favours intensification especially along public transit corridors with a variety of housing varieties.. https://www.york.ca/business/planning-for-regional-growth

NIMBYism (Not In My Backyard) exists and more steps must be taken to expedite/eliminate frivolous resistance to planned development and intensification. Further changes to official planning to increase intensification and allow for building multiple types of housing – purpose built rental, multi residential buildings (low and high rise, semi attached and detached in the same neighbourhoods).

Building Resilience to Climate Change Impacts - Adaptation

Canada's rapidly changing climate and the related disasters (wildfires, floods, storms, heat waves, etc) are damaging buildings and impairing the safety and security of Canadians in their homes. Climate informed decisions can: protect communities, improve service, reduce property damage and enable speedier recovery from disasters. The **National Adaptation Strategy (NAS)** outlines the approach to building a country that is better able to handle the impacts of climate change. Best Practices guides, standards, tools and technical solutions are being developed to improve infrastructure resilience to climate change from design through construction or retrofit. Nature-based solutions such as green roofs and restoring coastal wetland for flooding, erosion and urban heat islands are being trialed. **Codes and Standards for Resilience**

Over 1.5 million homes across Canada are located in areas of high flood risk (Ness and Florez Bossio 2024). Eighty percent of Canadian cities are built in whole or in part on floodplains (Public Safety Canada 2022)

According to the Canadian Climate Institute for every dollar spent on adaptation measures today, $13-$15 will be returned in years ahead in direct and indirect benefits. In the long term, ensuring infrastructure resilience to climate change benefits people and the economy.

Canadian cities across the country are leading the way to building resilience to climate change. Resilient Canadian Cities

Building More Efficient Homes

Retrofits:

We can lower energy costs, reduce maintenance cost and reduce the environmental footprint by: replacing the roof, positioning windows for increased daylight, and replacing heating, ventilation and air conditioning systems with renewable technologies such as electric heat pumps and geothermal systems. There was overwhelming uptake on the Federal Greener Homes Grant which provided up to $40K rebate to homeowners for energy saving retrofits. Funding was fully committed ahead of schedule and the program is currently closed to new applicants. Ontario offers the Ontario Energy Affordability Program to income-eligible electricity consumers to increase home comfort and manage electricity costs.

The provincial government has left the bulk of the work of reducing home heating costs up to Enbridge, providing $4.5 million to encourage homeowners to install electric heat pumps to reduce their energy bills. (Clean Home Heating Initiative - Sept 2022) — a fund the Ontario government reinstated last April after discontinuing it when it first took power.'

New Homes

Energy Sources Ontario - Enbridge Natural Gas to new developments

The Ontario Energy Board instructed Enbridge Gas to charge developers for new natural gas hook ups thereby pushing Enbridge to more seriously consider more eco-friendly, economical alternatives such as heat pumps for heating and cooling. The Ontario government paused the Ontario Energy Board decision making existing gas customers continue to subsidize Enbridge's new pipelines, keeping customer gas bills more expensive and potentially tying them to stranded assets.

Scaling the prefab home industry will speed up the building of more affordable condos, townhouses and single detached homes, minimize waste and reduce emissions. Homes are built in modules at a factory and then shipped to a permanent location. Building in a controlled facility enables a repeatable construction process creating little waste. Fewer construction materials are required as unused materials from one project are used in another. Weather damage is also eliminated. Traditionally built homes require heavy equipment movement to and from the job site. When homes are prefab in a factory, this movement is minimized. Homes built in a factory can be built to tighter tolerances ensuring tighter joints and seams providing overall better thermal performance.

Mass Timber buildings can be built faster, keep construction costs down and utilize renewable forestry resources grown in Ontario. Mass timber are manufactured wood products which have comparable structural, fire protection and seismic performance as traditional materials used in tall buildings such as concrete and steel

Standards and Codes

Programs such as LEED - Leadership in Energy and Environmental Design Canadian Green Build Council certification provides a framework for healthy, highly efficient and cost saving green buildings. LEED helps owners and developers create high performing, resilient buildings that reduce carbon emissions, save water, conserve energy and reduce waste. As of April 2024,

there were 4,759 buildings in Canada with a LEED certification. These set excellent examples of how to build but to date certification is costly.

The end goal of Canada's National Energy Code (CNEC) 2020 is that all new buildings will be built to net-zero energy-ready standards by 2030.. *(Efficiency Canada - CNEC)* NECB 2020 is one of the most cost effective tools for achieving energy efficiency in new buildings through a four-tiered system. While it does not include onsite renewable energy production to offset annual energy consumption from operations, the code will help reduce energy consumption, save on energy bills, reduce peak energy demand and improve the comfort of buildings. While Ontario has adopted much of the NECB 2020, the proposed Ontario Building Code does not include energy efficiency for houses/large buildings. Ontario has delayed introducing them in its push to hold up housing development. The most cost effective time to incorporate energy efficiency measures into a building during the initial design and construction phase. It is much more expensive to retrofit buildings later. Despite this, there is no current plan to move forward in efficiency in Ontario. Many municipalities have instituted higher green standards to ensure new buildings are energy efficient and minimize emissions.

The provinces committed to reducing greenhouse gas emissions to 20 per cent below 2005 levels by 2023. In 2017 22 percent of emissions came from buildings. Ontario had a plan in 2022 to implement green building standards. Ontario has delayed committing to federal strategies that would help lower energy bills in new homes. Ontario's new building code scheduled Jan 2025 does not include energy efficiency for houses or large buildings. Rules to ensure new homes use less energy could reduce homeowners' bills and improve resilience to climate change. At a meeting between the province and federal government, Ontario said it's focused on building fast and cheap. New home owners, potentially with government funded grants/loans would need to pay for more expensive energy retrofits at a later date. https://thenarwhal.ca/ontario-green-building-standards-emissions/

Building Materials Carbon Footprint and Cost

Green steel is the manufacture of steel without the use of fossil fuels. Green hydrogen is one solution although low-carbon hydrogen is not readily available. Electric arc furnaces (EAF)are another and only if electricity is powered by renewable sources.

The Federal government will invest $400 million and the Ontario government will invest $500 million in green steel at Hamilton's ArcelorMittal Dofasco to replace coke ovens and blast furnaces with electric arc furnaces. This is predicted to cut greenhouse gas emissions by 2/3 when completed in 2028. The project is currently stalled.

Algoma Steel's foundry near Sault Ste. Marie began the shift from coal-fired basic oxygen furnaces (BOFs) to EAFs in 2021, assisted by $420 million in federal support. When completed and fully connected to the electrical grid, Algoma's emissions will be reduced by 70 per cent, and allow it to become a major steel recycler.

Electric furnaces also use a higher percentage of scrap steel. It is estimated that when complete, the two mills in Ontario will cut their combined carbon emissions equivalent to the emissions of 12 million cars per year.

Green Concrete and Cement uses a carbon-negative process of manufacturing. The major raw material includes mostly discarded waste from industry (fly ash and slag). It is, however, of lower quality than traditional concrete. Different grades of concrete with different levels of carbon reduction are available depending on the finished application. There have been significant reductions since 2017 in Ontario. The goal is carbon neutral by 2050.

Toronto is providing cash incentives from $2400-$5300 per apartment for builders who voluntarily limit embodied carbon in their projects. https://www.corporateknights.com/buildings/toronto-cracks-down-carbon-heavy-building-materials-green-construction/ Toronto has set incentivized caps.

The Federal government has indicated it will require a 30% reduction of embodied carbon in structural materials of new public buildings in 2025.

Part of Canada's Roadmap to Net Zero - Dec 6 2023 Canada announced launch of the Cement & Concrete Breakthrough initiative at COP28 in Dubai.This initiative reaffirms Canada's commitment to working with countries, businesses and international partner organizations to accelerate investments in the technologies, tools and policies that the cement and concrete industry needs to realize net-zero solutions by 2050.

Reuse of materials (circular economy)

The global demand for resources is rapidly increasing, with the building sector accounting for 40 percent of global resource usage and expected to double by 2060 (OECD, 2019). This sector also contributes significantly to global carbon emissions, responsible for 39 percent of energy- and process-related emissions as of 2020 (UNEP, 2021). The extraction of raw materials is a major contributor to biodiversity loss and water stress, with G20 countries accounting for nearly 75 percent of global materials use (OECD, 2021).

In Canada, the construction industry significantly contributes to landfill waste and carbon emissions. 3.4 million tonnes of construction materials are disposed of in landfills annually, accounting for approximately 1.8 million tonnes of embodied carbon (Delphi, 2021). If embodied carbon emissions are added to operational carbon emissions, the building sector's overall carbon emissions jump from 17 percent to 30 percent.

The building sector accounted for 24 percent of Ontario's total carbon emissions, but that number is much higher in major cities, accounting for 58 percent of emissions in Toronto (City of Toronto, 2022).

A Canadian study on waste prevention interventions across six sectors, including construction and manufacturing, reveals the potential of circular economy practices to reduce waste by 4.9

million tonnes, cut 5 million tonnes of carbon emissions, create 20,000 jobs, and generate $41 billion in additional revenue or cost savings (National Zero Waste Council, 2021).

According to Canada Green Building Council, buildings generate 35% of landfill waste. In Canada, construction and demolition waste is one of the major contributors to municipal solid waste. ‘Statistics Canada estimates that about 4 million tonnes of C&D waste were generated in Canada in 2010’.

Demolition debris can be sent to landfill or it can be recycled. It may require deconstruction policies to encourage transitioning from current consumption to a more sustainable circular system.

Recycling is essential to maximize CO2 abatement and can save significant money on construction projects. Only an estimated 16% of Construction, Renovation and Demolition (CRD) waste is recycled or reused in Canada compared with approximate 85% possible diversion.
https://circularinnovation.ca/wp-content/uploads/Developing-a-Circular-Building-Materials-System-and-Fostering-Innovation-from-Construction-Demolition-and-Renovation-CRD-Waste-COIL-CIC.pdf

In Ontario CRD waste is about 9% of Ontario waste. Ontario has set high diversion goals but is failing to meet them.

https://www.mckinsey.com/industries/engineering-construction-and-building-materials/our-insights/building-circular-maximizing-co2-abatement-and-business-opportunities

Some pilot programs in British Columbia have been implemented (City of Vancouver; Port Moody, Nanaimo to name a few) have implemented diversion bylaws demonstrating significant diversion rates of 75% and higher). The LEED project waste information indicates that municipal and regional governments can ask for much higher rates of diversion from builders than is currently being required.

City of Toronto is developing a circular economy roadmap over a 10 year strategy.
https://www.canada.ca/en/services/environment/conservation/sustainability/circular-economy/workshop-report-opportunities-circularity-wood-construction-renovation-demolition.html

https://greenbuildingcanada.ca/construction-debris-recycling-guide/

Concrete and metal are valuable building materials. Concrete recycling is a common method of dealing with demolition waste. The concrete is crushed into gravel sized pieces. It can then be used or sold.

Metal beams can potentially be reused in rebuilds. Metal can be melted and reformed making it an excellent upcycling material.

Wood can be reused in some cases but it is often old and brittle so should be shredded to use as an organic.

Bricks can be reused (driveways, pathways, etc) or crushed to be used in backfill.

Policies aimed at limiting disposal options, adding disposal fees and virgin material levies can be implemented. Building codes, green building standards and support for desconstruction infrastructure are needed. Industrial education,….
https://circularinnovation.ca/wp-content/uploads/Developing-a-Circular-Building-Materials-System-and-Fostering-Innovation-from-Construction-Demolition-and-Renovation-CRD-Waste-COIL-CIC.pdfOntario Ministry of Environment, Conservation, and Parks oversees the governance of waste management under the Environmental Protection Act alongside the Resource Recovery and Circular Economy Act of 2016 (Auditor General of Ontario, 2021). Regulations exist for waste audits and waste reduction plans for building over 2,000 sq m but there are no regulations for waste diversion.

The current barriers to circular construction materials economy include:

- Building industry's resistance to changes to current building methods - not able to respond quickly enough to the current housing crisis
- Lack of provincial and federal regulation
- Government subsidies for virgin materials
- Limited market for reclaimed materials
- Low cost for builders to dump waste
- Challenges of separating materials at source