

Heat-proofing community housing:

Prioritizing extreme heat adaptation
for vulnerable Canadians



ABOUT ACTION CANADA:

The Action Canada Fellowship is a 10-month public policy leadership program that aims to enhance emerging leaders' understanding of the country and develop the skills necessary to tackle the public policy challenges facing our nation. Each year Action Canada chooses a critical policy issue for Fellows to explore over the course of term. Working in task forces, the Fellows engage with experts and stakeholders across the country to prepare a report identifying policy solutions with the aim of contributing to national dialogue on key challenges facing Canadians. This year's theme is housing.

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DISCLAIMER:

This project was undertaken pursuant to an Action Canada Fellowship, a national policy engagement and leadership development program delivered in partnership by PPF and Action Canada. The views, opinions, positions and/or strategies expressed herein are those of the authors alone and do not necessarily reflect the views, opinions, positions or strategies of PPF, Action Canada, the Action Canada Foundation, or the Government of Canada.

Access the report online at
www.extremeheatcanada.com

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A photograph of a man and a woman walking away from the camera on a city street at sunset. The woman has long blonde hair and is wearing a light-colored jacket. The man is wearing a dark cap and jacket. The scene is bathed in the warm, golden light of the setting sun, with buildings and trees visible in the background.

EXECUTIVE SUMMARY

While Canada is better known for its cold climate, extreme heat is increasingly prevalent in many areas of the country, significantly impacting the suitability and livability of our housing.

It is estimated that if greenhouse gas emissions continue to rise at the same pace, many Canadian cities will see at least four times as many days per year with greater than 30 degrees Celsius temperatures between 2051 to 2080 compared to today.¹ Residents of community housing are amongst the most vulnerable members of Canadian society. Compared to the broader population, community housing residents are at a heightened risk for heat-related morbidity and mortality.



In this paper, we explore how policymakers can better protect community housing tenants from increasingly prevalent and severe extreme heat events.

While there is research on the impacts of extreme heat on Canadians and specific engineering interventions that can be adopted to retrofit or build climate resilient housing, there is little research on broader policy mechanisms to specifically protect tenants in community housing.

We focus on urban areas, as they are generally most vulnerable to the impact of extreme heat events due to the urban heat island effect, which is an urban or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities.



Canadian cities will see at least **four times** as many days per year with **greater than 30 degrees** Celsius temperatures between 2051 to 2080 compared to today

—Climate Atlas of Canada. Urban Heat Island Effect. Dec. 18, 2022.

Based on our literature review as well as 44 interviews conducted with stakeholders and experts across the country,² our paper provides **four key recommendations**:

1 Create **co-ordinated heat responses plans** to protect community housing tenants from extreme heat;



2 Adjust **government policy, code, funding and programs** to protect community housing tenants;



3 Leverage **holistic land use and urban design practices** to reduce the impact of urban heat islands on community housing in the mid- to long-term;

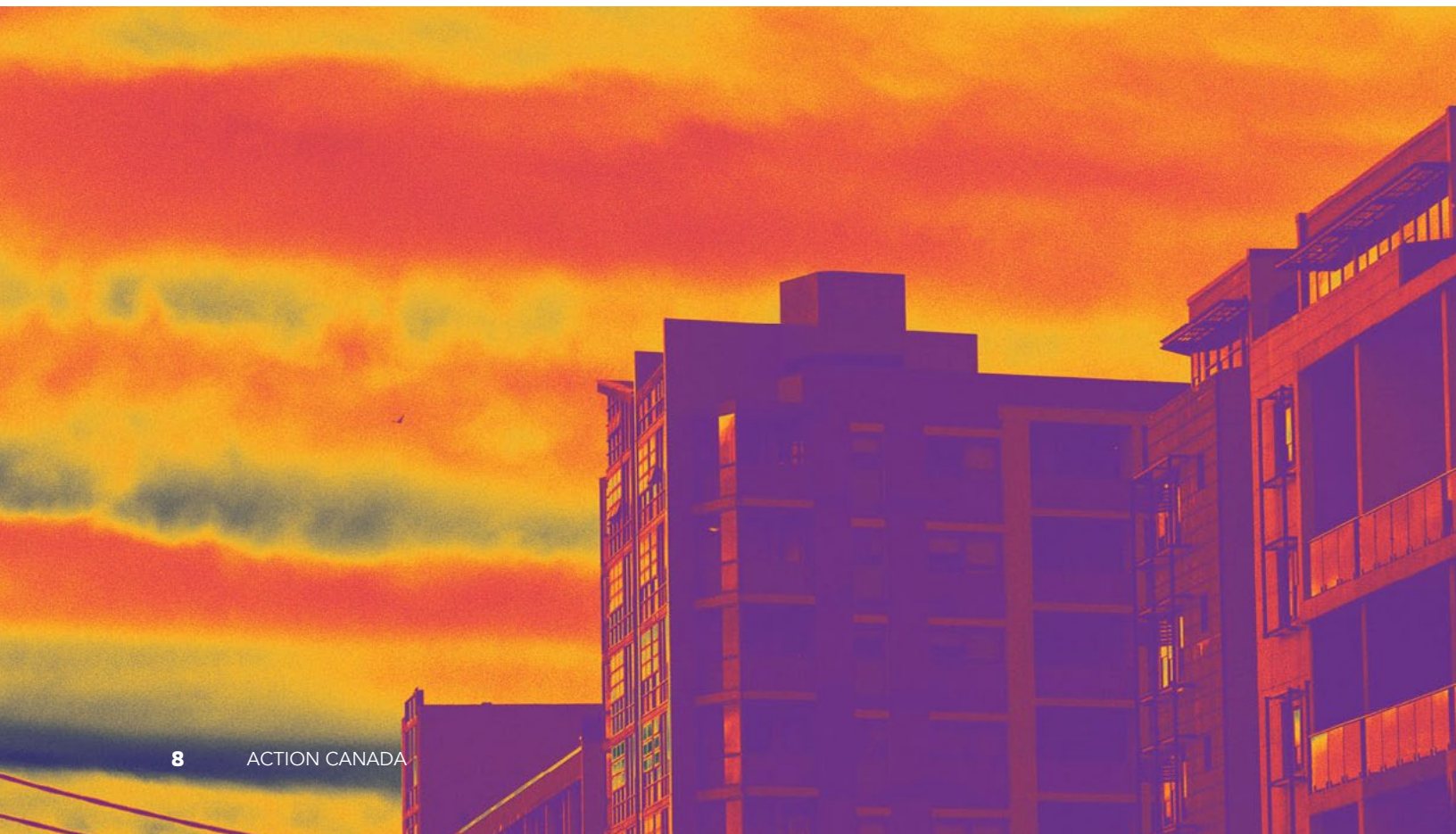


4 Generate **more private investment** to support the development of climate resilient community housing through replicating and scaling up proven approaches.



These recommendations would complement proposed government action under the National Adaptation Strategy and support the federal government's objectives of protecting human health and wellbeing through climate change adaptation. While our recommendations would benefit community housing tenants living in urban centres, they would also benefit Canadians as a whole.

This report is intended for climate change adaptation, public health, and community housing policymakers from all levels of government. To avoid preventable deaths as extreme heat worsens, we call on decision makers to take immediate action to improve the livability of community housing units and to enhance tenants' quality of life.



RECOMMENDATIONS SUMMARY TABLE

GOAL

RECOMMENDATIONS

RECOMMENDATION 1:
Create co-ordinated heat response plans to protect community housing tenants from extreme heat

- 1.1** Enhance partnerships to promote better co-ordination of programs and policies to meet the needs of community housing tenants
- 1.2** Improve heat-related data collection to develop and evaluate evidence-based response plans for extreme heat events
- 1.3** Add heat-related illnesses (HRI) to syndromic surveillance

RECOMMENDATION 2:
Adjust government policy, code, funding and programs to protect community housing tenants

- 2.1** Establish a maximum indoor temperature in community housing
- 2.2** Modernize Canada’s building codes to ensure community housing is climate resilient
- 2.3** Revamp and increase existing government funding programs to provide preferential funding for projects that increase heat resilience, with a focus on community housing
- 2.4** Launch a community housing intake under the 2 Billion Trees Program

RECOMMENDATION 3:
Leverage holistic land use and urban design practices to reduce the impact of urban heat islands on community housing in the mid- to long-term

- 3.1** Establish ambitious local urban tree canopy cover goals and concentrate planting efforts near community housing
- 3.2** Prioritize the installation of a variety of green infrastructure in community housing
- 3.3** Ensure a variety of land uses in neighbourhoods with community housing, including robust community amenities that can serve as cooling centres

RECOMMENDATION 4:
Generate more private investment to support the development of climate resilient community housing through replicating and scaling up proven approaches

- 4.1** Remove the provincial and federal taxes on municipal bonds to fund climate resilient community housing
- 4.2** Fund Energiesprong Canada to scale its approach
- 4.3** Use social impact bonds to fund climate resilient community housing
- 4.4** Leverage community bonds to fund climate resilient affordable housing
- 4.5** Create social impact focused Real Estate Investment Trusts
- 4.6** Leverage Energy Service Companies to retrofit community housing



INTRODUCTION

Canadians are experiencing increasingly severe and frequent heat events due to a quickly changing climate.³ On average, Canada is warming at twice the global rate, with disproportionate negative impacts on marginalized communities, including those living in community housing.^{4,5,6}

A ‘silent killer,’ extreme heat has the potential to cause widespread fatalities. Those living in Canadian cities, which have significant built-up environments, low vegetation and greater concentrations of poverty, are especially at risk.⁷

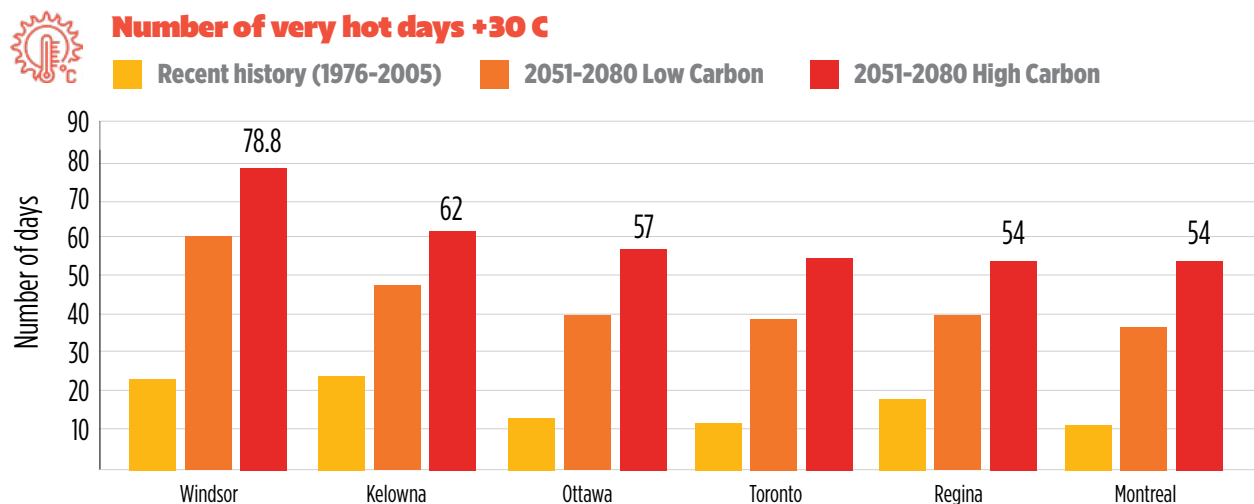
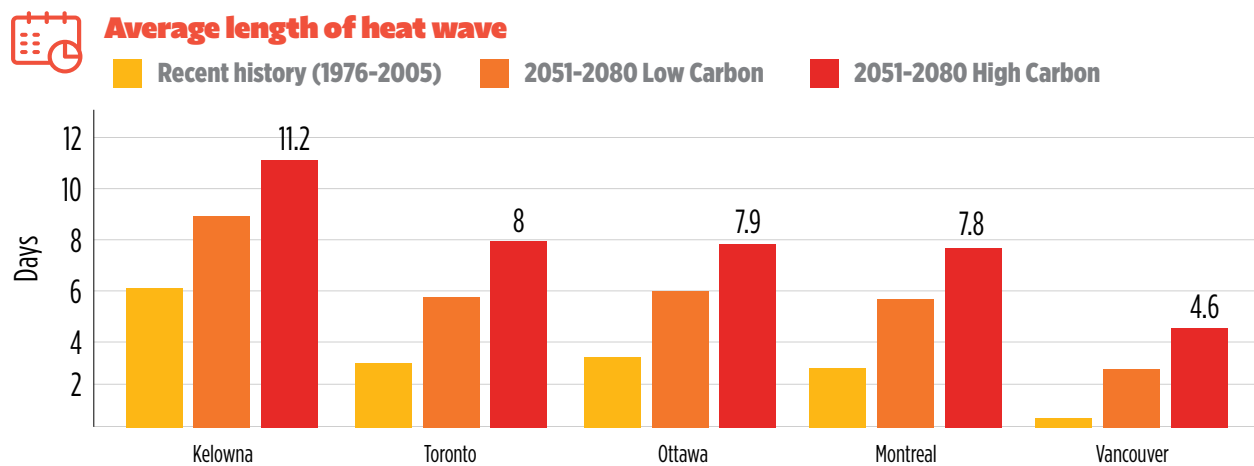
Housing is a critical factor in predicting heat-related mortality. The 2021 heat dome in British Columbia led to 619 heat-related deaths in a single week,

98% of which occurred inside peoples’ homes. Many of the deceased lived in “socially or materially deprived neighbourhoods” and “homes without adequate cooling systems.” Even though only 3.8% of Canadians live in social and affordable housing,⁸ they comprised approximately 10% of the deaths.^{9,10} Recent extreme heat events in other urban centres have also resulted in fatalities: 66 individuals died in Montreal’s 2018 heat wave.¹¹

Tenants in community housing have disproportionately higher rates of heat-related morbidity and mortality during extreme heat waves. This increased vulnerability is likely related both to reduced resources to adapt to rising temperatures, as well as a variety of social and behavioural factors, including reduced heat risk perception, lack of access to air conditioning and cooling centres, inherent community

housing characteristics (i.e. less surrounding natural vegetation), higher cognitive and physical disability limiting mobility, and greater rates of chronic disease limiting physiologic reserve.^{12, 13, 14} Adapting and preparing community housing for extreme heat is thus imperative to reduce fatalities, increase livability, and ensure community housing tenants are well protected from this growing public health crisis.

FIGURE 1: AVERAGE LENGTH OF HEAT WAVE AND NUMBER OF VERY HOT DAYS +30C



Climate Change Scenarios

Less Climate Change / **“LOW CARBON”** Scenario
Greenhouse gas emissions slow, peak mid-century, and then drop rapidly.

More Climate Change / **“HIGH CARBON”** Scenario
Emissions continue to increase at current rates.

Source: Climate Atlas of Canada portal (www.climateatlas.ca)

Defining Extreme Heat and Identifying Risks to Canadians

Although the definition of “**extreme heat**” varies by region, Environment Canada issues Heat and Humidex Advisories when temperatures are expected to reach or exceed 30 °C or the Humidex value (a combination of humidity and temperature) is expected to reach or exceed 40 °C. Similarly, a “**heat wave**” is defined by Environment Canada as “**a period with more than three consecutive days of maximum temperatures at or above 32 °C or 90 °F.**”¹⁵



By mid-century, the cost of heat-related illness in Canada will likely be over \$3 billion a year.

Rising temperatures and an increase in the frequency and severity of heat waves have significant public health implications, increasing morbidity and mortality. For example, prolonged exposure to extreme heat can lead to dehydration, fatigue, and a spectrum of heat-related illnesses (HRI), including heat stroke. Extreme heat can also exacerbate pre-existing chronic conditions such as cardiovascular and respiratory disease while increasing susceptibility to infectious diseases.¹⁶ By mid-century, the cost of heat-related illness in Canada will likely be over \$3 billion a year.¹⁷

The dangers of extreme heat for Canadians are further amplified by the fact that the vast majority of the population — over 70% as of 2020 — live in urban centres. Cities are often significantly warmer than surrounding rural areas.¹⁸ This temperature difference is due to urban heat islands — areas where natural vegetation and water bodies are replaced by buildings, asphalt, concrete roads, and other human-made structures. Urban heat islands absorb, rather than reflect, the sun’s heat, leading to significantly higher surface and overall ambient temperatures.

A ‘silent killer,’ extreme heat has the potential to cause widespread fatalities. Those living in Canadian cities, which have significant built-up environments, low vegetation and greater concentrations of poverty, are especially at risk.

2021 British Columbia heat dome

The 2021 heat dome in British Columbia led to **619 heat-related deaths in a single week**, 98% of which occurred inside peoples’ homes.

2018 Montreal heat wave

Recent extreme heat events in other urban centres have also resulted in fatalities: **66 individuals died in Montreal’s 2018**.

Heavily developed areas are particularly at risk, as air flow is reduced and hot air becomes trapped between tall buildings and narrow streets.¹⁹ The generation of heat by cities, released through sources such as vehicles, furnaces and air conditioners, further exacerbates the rural-urban heat difference.²⁰ As a result of these cumulative impacts, large cities can be as much as 12 °C warmer than surrounding areas.²¹

According to a recent study by the Intact Centre on Climate Adaptation, major cities such as Toronto, Montreal and Ottawa are all expected to see significantly more days over 30 °C, longer heat waves, and higher maximum temperatures by the end of the century.²² Other cities including Kelowna, Lethbridge, Regina, Winnipeg, Windsor, Brantford and Hamilton are also projected to be at a high future risk.²³

The National Adaptation Strategy and Existing Efforts to Address Extreme Heat

Released in November 2022, Canada's first National Adaptation Strategy (NAS) proposes a whole-of-society approach to climate adaptation and commits the federal government to 70 actions to address current and anticipated climate risks to Canadians.²⁴ While the NAS is comprehensive, the strategy places limited emphasis on how to specifically protect residents of community housing.

The NAS acknowledges that "Canadian homes and communities are unprepared for increasingly severe and frequent extreme heat."²⁵ Eliminating extreme heat mortality and reducing heat-related hospitalizations are identified as disaster resilience objectives under the NAS.

Targeting extreme heat, the NAS commits the federal government to:



Eliminating extreme heat deaths by 2040;

Ensuring **80%** of health regions have implemented **adaptation measures** to address extreme heat by 2026;

Expanding Health Canada's Protecting Canadians from Extreme Heat Program to increase guidance and resources for Canadians, including investments in Heat Alert and Response Systems and resources targeting the challenge of indoor heat.

Community Housing in Canada and Vulnerabilities to Extreme Heat

The Canada Mortgage and Housing Corporation (CMHC) has specified that “community housing” is “an umbrella term that typically refers to either housing that is owned and operated by non-profit housing societies and housing co-operatives, or housing owned by provincial, territorial or municipal governments.”^{26,27} Community housing is administered by roughly 3,000 housing providers across the country.²⁸ According to the Canadian Housing Survey, in 2021 there were 576,000 households in Canada living in social and affordable housing units, representing 3.8% of all households and 11.9% of renter households.²⁹ A further 227,200 Canadian households were on the waitlist.³⁰

According to the Canadian Housing Survey, in 2021 there were **576,000** households in Canada living in social and affordable housing units, representing **3.8%** of all households and **11.9%** of renter households.

“

We have a decades-long history of dealing with housing at the building level. But that’s where the thinking ends. We need to think about housing from a community context because that’s how it affects individuals’ lifestyles and behaviors, all of which are important for climate change.”

Steve Mennill,
Planning, housing finance and policy consultant & Previous Chief Climate Officer for the Canada Mortgage and Housing Corporation (CMHC)



Residents of community housing are amongst the most vulnerable members of Canadian society:

213,270 units house seniors	26,280 are home to immigrants and refugees
88,160 units house individuals with physical or mental disabilities	26,280 units house Indigenous households ³¹

* approximately

These intersecting identities place community housing tenants at a heightened risk for heat-related morbidity and mortality due to decreased adaptive capacity. For example, low-income individuals and households often cannot afford air conditioning and other interventions that provide cooling.³²

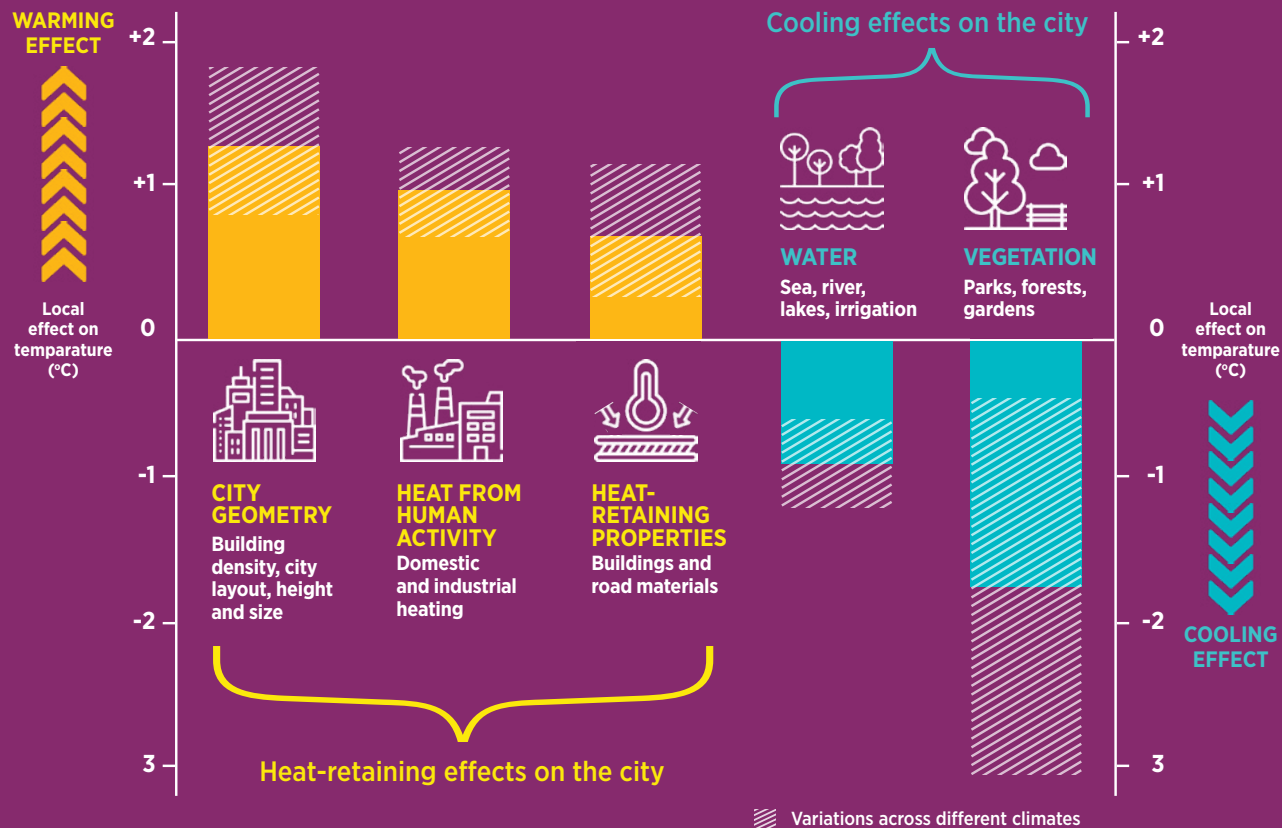
Seniors 70 years of age and older and people with chronic physical and mental conditions represented a disproportionate number of the 2021 BC heat dome deaths at 67% and 91%, respectively.³³

A significant portion of community housing units were built before the 1990s and many are in need of repairs. This creates unique challenges when it comes to climate change adaptation and extreme heat preparation. According to the CMHC's Social and Affordable Housing Survey, approximately 121,800 units were built pre-1970s, and 370,900 built between 1970-1989.³⁴ Of the 576,000 households living in social and affordable housing, 62,200 or 10.8% report living in units in need of major repairs. 127,800 or 22% of households report living in units in need of minor repairs.³⁵



In some cases, buildings may be so old and in need of such deep retrofits that the cost of heat-proofing proves unfeasible.^{36, 37} In these cases, it may be more affordable to demolish and rebuild than it is to invest in retrofits. **The state of disrepair of Canada's community housing stock creates a significant financial burden on community housing providers, limiting their capacity to advance retrofits and to build new heat-resilient housing.**

FIGURE 2: WHY CITIES ARE THE HOT SPOTS OF GLOBAL WARMING



Source: Intergovernmental Panel on Climate Change. 2021. "Regional fact sheet—Urban Areas." In *Climate Change 2021: The Physical Science Basis*.

According to the CMHC's Social and Affordable Housing Survey,



121,800 units were built pre-1970s



370,900 built between 1970-1989

Of the 576,000 households living in social and affordable housing,



62,200 or **10.8%** report living in units in need of major repairs



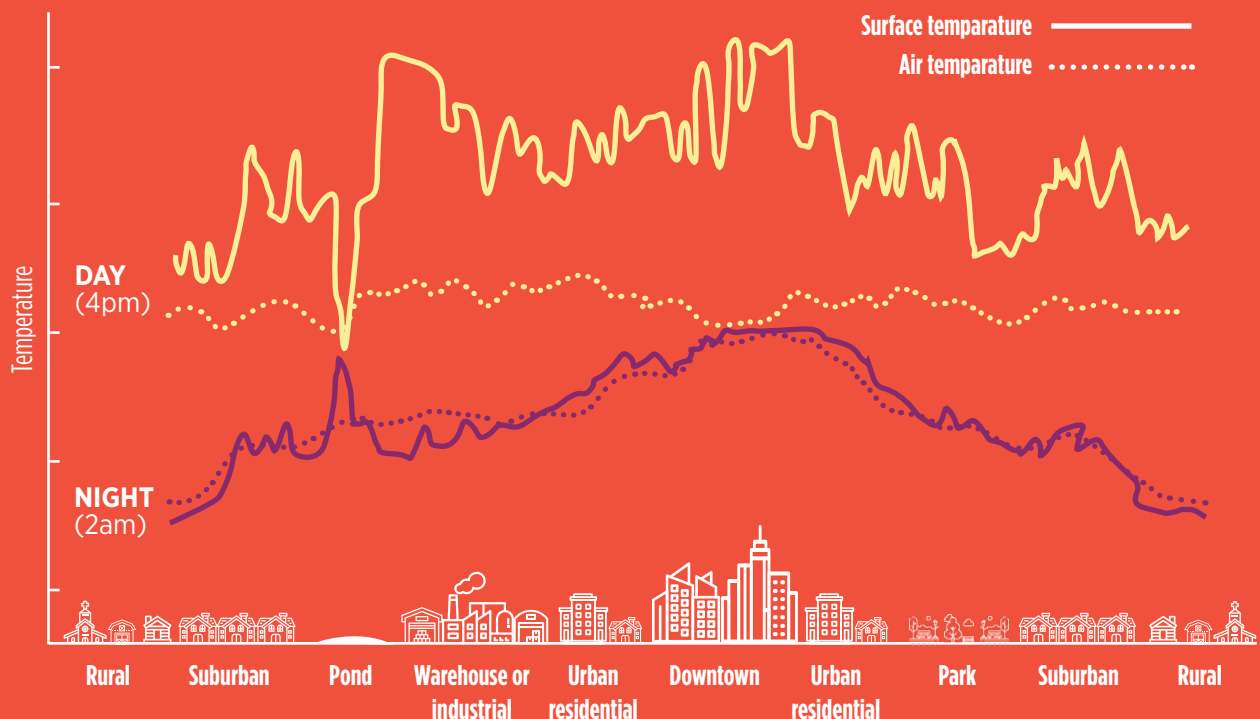
127,800 or **22%** of households report living in units in need of minor repairs

POLICY RECOMMENDATIONS

The recommendations in this report aim to save lives by providing policy solutions to protect community housing tenants in Canada’s urban centres from extreme heat. If no action is taken by governments, health professionals and community housing providers, extreme heat will cause many preventable deaths, especially as heat waves become more common and intense throughout Canada.



FIGURE 3: THE URBAN HEAT ISLAND EFFECT AND THE VARIATION OF SURFACE AND AIR TEMPERATURES OVER DIFFERENT LAND USES (ADAPTED FROM EPA, 2008)



Source: U.S. Environmental Protection Agency, 2008. "Reducing Urban Heat Islands: Compendium of Strategies."

This paper does not delve into the specific types of retrofits and building standards needed to protect residents of community housing from extreme heat. There is existing exhaustive research on the building science and engineering topics related to this subject.

Instead, this report focuses primarily on policy mechanisms that will not only enable engineering and design changes to be made effectively, but also create conditions in which community housing and its tenants will thrive.

Community housing is a multi-jurisdictional issue.



ONTARIO



Municipal

In **Ontario**, **municipal** governments are largely responsible for community housing.

MANITOBA



SASK.



BRITISH COLUMBIA



NOVA SCOTIA



Provincial

By contrast, **British Columbia, Manitoba, Saskatchewan, and Nova Scotia** have **provincial** Crown corporations that are the principal operators of community housing in their jurisdictions.



ALBERTA



QUEBEC



Municipal + Provincial

In **Alberta** and **Quebec**, the financial burden for community housing is shared between **municipal** and **provincial** governments.

This paper rarely specifies the policymakers that need to take action on each sub-recommendation, recognizing this inter-jurisdictional complexity. For clarity, this report also does not provide recommendations for how individuals or families should take actions to protect themselves from extreme heat. The recommendations in this report are intended for policymakers focused on climate change adaptation, public health and community housing at all levels of government.

While these recommendations would benefit society as a whole, they are targeted to community housing tenants living in urban centres who are at significant risk of extreme heat morbidity and mortality. For example, enhanced data tracking of Heat Related Illnesses (HRI) using syndromic surveillance would benefit all Canadians but would be particularly beneficial to community housing residents given their enhanced vulnerability to extreme heat.



“

To tackle extreme heat effectively we cannot only focus on air conditioning. Changing behaviours to protect the most vulnerable and working with nature to keep us cool must also be part of our toolbox.”

*Joanna Eyquem,
Managing Director,
Climate-Resilient Infrastructure,
Intact Centre on Climate Adaptation*



RECOMMENDATION 1:

CREATE CO-ORDINATED HEAT RESPONSE PLANS TO PROTECT COMMUNITY HOUSING TENANTS FROM EXTREME HEAT

Key barriers to climate adaptation in Canada and extreme heat adaptation in particular include a shortage of quality data and a lack of well-co-ordinated response plans. Collecting the right data to inform the development of response plans and to ensure ongoing evaluation is a key step towards promoting heat resilience.

1.1 – Enhance partnerships to promote better co-ordination of programs and policies to meet the needs of community housing tenants

Strategic partnerships between a wide range of non-government and government stakeholders will also be required to meet the challenge of extreme heat. These include municipal planners, public health professionals, emergency health services, non-profit organizations, community housing groups, environmental associations and private companies.³⁸

“

Government alone may not be able to identify the most vulnerable individuals. We need to better engage with on-the-ground workers including non-profit organizations that have the ability to reach the socially isolated.”

*Dr. Melissa Lem,
Canadian Association of
Physicians for the Environment*

Examples of partnerships between government and non-government partners that can meet gaps in current response plans include:

- **In recognizing the significant impact of social isolation on deaths during heat domes, community housing groups, non-profit organizations, and home and community care services can create region-specific “check-in” systems to ensure that the most vulnerable members of their community (i.e. the elderly or those with chronic medical conditions, limited mobility or cognitive concerns) are supported during heat domes;**
- **Public health officials can provide technical advice, organizational oversight as well as education and training to key stakeholders and the general public. Public health professionals can also play an important role in building heat-health vulnerability maps and health impact assessments to guide municipal planning and evaluating the impact of measures taken to reduce extreme heat mortality via the creation of a monitoring plan with multi-sectoral data input;³⁹ and**
- **Community housing organizations can collaborate with public health agencies on extreme heat awareness campaigns.**

A key finding of the British Columbia Coroners Service Report to the Chief Coroner following the 2021 heat dome was the need for greater co-ordination in responding to extreme heat events.⁴⁰

The NAS similarly highlights the importance of developing region-specific Heat Alert and Response Systems (HARS). Focused response plans, combined with multi-partner collaboration, are needed to reduce

extreme heat mortality. These systems have the core elements of: community mobilization and engagement, an alert protocol, community response, a communication plan, and an evaluation mechanism.



Case Study: Stakeholder Involvement and Co-ordination through imagineCALGARY



imagineCALGARY was a long-term city planning initiative with over 150 core participants from multi-disciplinary backgrounds, involving the extensive community consultation of more than 18,000 Calgary residents. Since it was endorsed by Council in 2007, the initiative has laid the foundation for many of the City's plans and policies. For example, one part of the

imagineCALGARY plan referenced a need to reduce the urban heat island effect; hence, Calgary's transportation plan, published in 2009, integrated the use of natural vegetation and a layered tree canopy in transportation corridors. The involvement of public health professionals in municipal planning processes enabled the integration of key health priorities.⁴¹

1.2 – Improve heat-related data collection to develop and evaluate evidence-based response plans for extreme heat events

A key barrier to extreme heat adaptation in Canada is the shortage of quality data on extreme heat related illnesses. Investing in research to determine region and population-specific heat-related risks is critical in guiding interventions. Public health organizations should thus liaise with municipal governments and community housing providers to improve heat-related data collection related to community housing tenants, recognizing the increased mortality risk in these populations.

Further data is specifically required to:



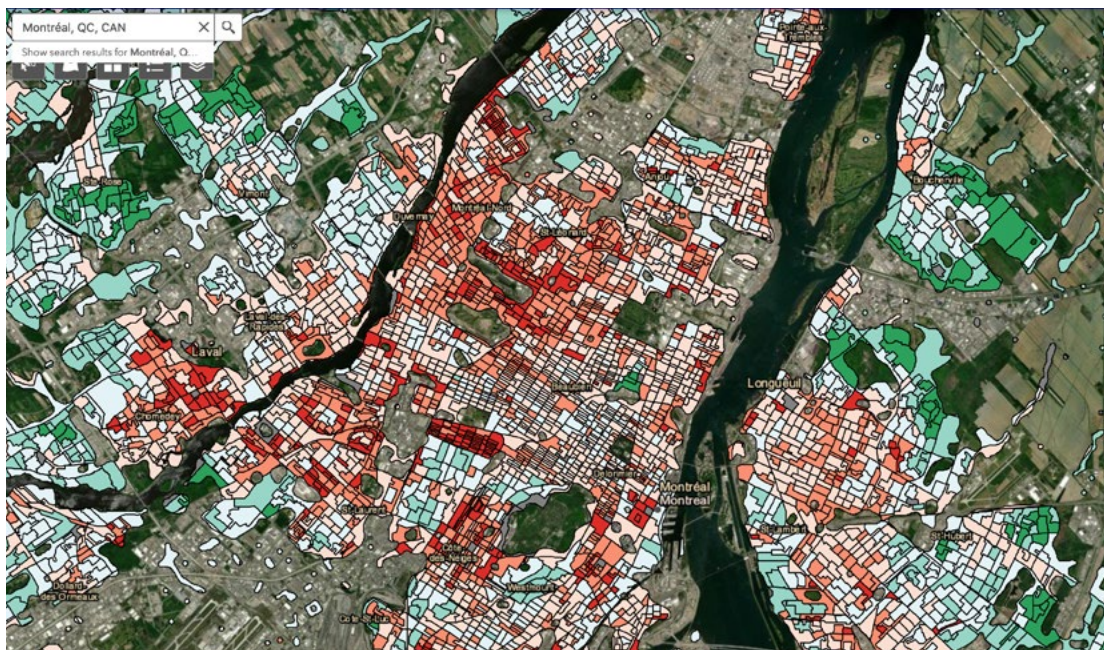
- **Understand region-specific heat trends to assess the vulnerability of exposed individuals and communities;**
- **Develop an explicit baseline for future evaluation of adaptation measures; and** ⁴²
- **Describe and evaluate the effectiveness of policies and programs.**

These assessments will identify gaps, and inform the need for targeted policies and programs. Information and data from assessments can guide municipal programs to increase urban greenery around high-risk residences or strengthen the ability of heat alert and response systems (HARS) to respond to the specific vulnerabilities of community housing tenants. The development of heat-health maps can serve as a powerful aid in analysis and communication.

Municipalities, provinces and public health professionals should also establish an iterative process for managing and monitoring health risks, specifying milestones for evaluation and identifying an agreed-upon set of minimum indicators to track health outcomes and progress.⁴³



Case Study: Heat-health mapping tool in Quebec



A screenshot of the heat-health mapping tool developed by the Institut National de Santé Publique du Québec (INSPQ).

The online heat-health mapping tool developed by the Institut National de Santé Publique du Québec (INSPQ) in Quebec sends automated alerts based on land surface temperatures in the southern portion of the province. The interactive map also contains key population-vulnerability data including cooling centres, vegetation, socio-economic deprivation, access to air-conditioning, etc.^{44,45}

1.3 – Add heat-related illnesses (HRI) to syndromic surveillance

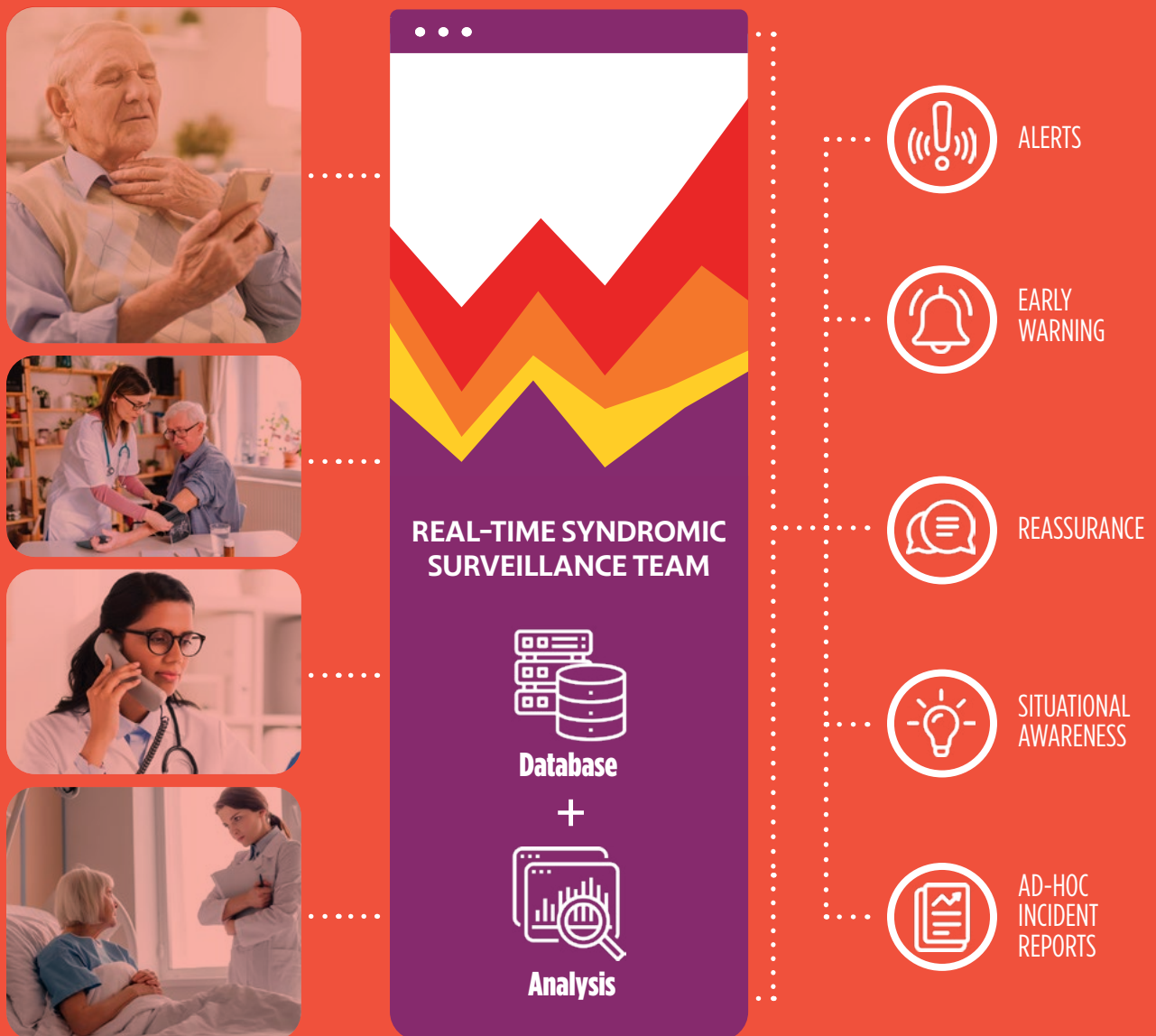
Following the heat dome in western Canada in 2021, the BC Coroners Service stated that, “There was a lag between the heat alerts issued by Environment and Climate Change Canada and public agencies and the public response.”⁴⁶ It is well understood that extreme heat can become a life-threatening event if not responded to promptly and appropriately. During extreme heat events, calls to local public health departments that require a response typically increase.⁴⁷ A standardized method is needed to activate a co-ordinated emergency

response system, including surge staffing for EMS and fire services to aid in direct assessments and response to HRI.

Syndromic surveillance is a system that allows public health agencies to keep in touch with the health of the community in real time.⁴⁸ It is commonly used in public health for early detection of outbreaks; to follow the size, spread, and tempo of epidemics; to monitor disease trends; and provide reassurance that an outbreak has not occurred.⁴⁹ Using syndromic surveillance, health-care teams can co-ordinate their response when individuals start to present clusters of syndromes through emergency response dispatch, urgent care or clinic, or in the emergency department.



FIGURE 4: EXAMPLE OF A REAL-TIME SYNDROMIC SURVEILLANCE TEAM RESPONSE



During an extreme heat event, syndromic surveillance can therefore provide geographic data on which areas are most affected, enabling an immediate and focused response.⁵⁰ At the same time, syndromic surveillance would provide ongoing information for short- and long-term emergency response planning. Community housing agencies and public health providers should leverage syndromic

surveillance data to create detailed extreme heat action plans.

Medical professionals must also correctly code HRI into electronic medical records for syndromic surveillance to work and effectively inform a localized response during extreme heat events. Thus, part of implementing syndromic surveillance requires localized training related to HRI.



Case Study: The Plan Integration Scorecard in Seattle

The Plan Integration for Resilience Scorecard (PIRS) assesses how well a given community's network of plans addresses hazards.⁵¹ More specifically, PIRS analyzes how well the built environment and policies at the community level are prepared for heat through a seven-step process designed to understand how a municipality is applying the following:

1. Policy tasks
2. Policy scoring for heat hazard
3. Mapping tasks
4. Assessing physical vulnerability
5. Assessing social vulnerability
6. Resilience through planning
7. Stories

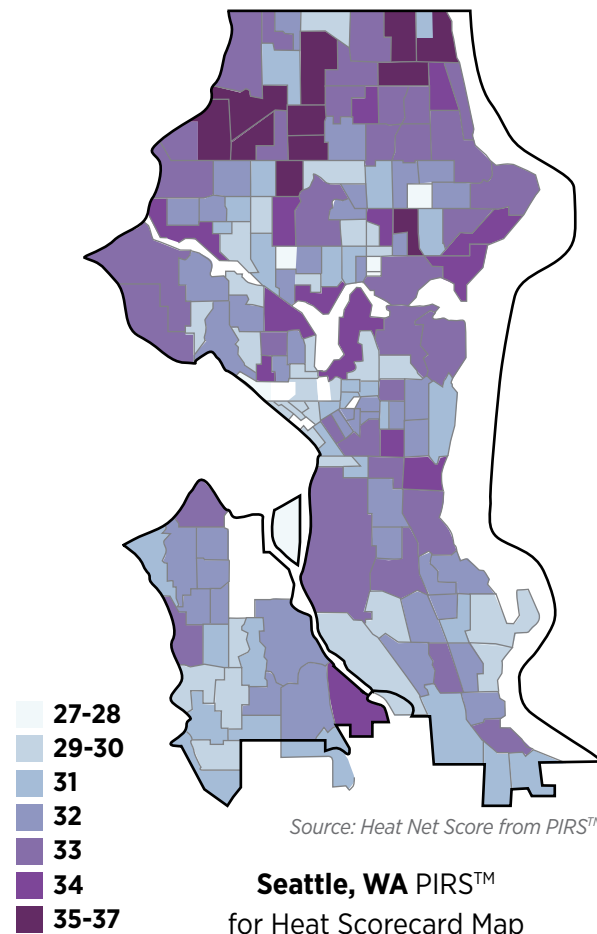
The output of PIRS is a map that presents policy incongruities spatially.

In Seattle, a review of the policies on land use analysis, capital improvements, financial incentives, and penalties highlighted where the city had focused and what areas could use improvement. The spatial output of Seattle's PIRS is provided below. Higher scores in dark blue indicate greater "policy attention" to heat mitigation.⁵²

PIRS scored how well Seattle had implemented heat-related policies and if these policies and related actions would reduce the effects of extreme heat. Additionally, PIRS

highlighted whether the measures reduced heat in the targeted policy areas and as well as whether there is a focus on the socially vulnerable, a lens that is particularly helpful for extreme heat response in community housing. Ultimately, using PIRS will help Seattle understand how well it is responding to extreme heat. Lessons from the Seattle experience can be exported to jurisdictions in Canada.

Image 1: Heat Scorecard Map Created with PIRS in Seattle, Washington⁵³





RECOMMENDATION 2:

ADJUST GOVERNMENT POLICY, CODE, FUNDING AND PROGRAMS TO PROTECT COMMUNITY HOUSING TENANTS

The federal government has emphasized the importance of climate adaptation with the recent publication of the NAS. While its commitments to developing and implementing action plans with the provinces, territories, and Indigenous leadership is beneficial, extreme heat requires explicit and immediate prioritization.

Because community housing tenants are at heightened risk for extreme heat morbidity and mortality, governments' prioritization of extreme heat, matched with a focus on community housing, will lead to significant benefits for community housing tenants, as well as all Canadians



nationwide. Mainstreaming extreme heat into government policies, programs and regulations would also address a key shortcoming with the NAS as identified by climate adaptation experts. In its current form, the NAS does not sufficiently identify the top risks facing Canadians.⁵⁴

2.1 – Establish a maximum indoor temperature in community housing

It is generally accepted that extreme heat morbidity and mortality would be significantly reduced through the introduction of a maximum indoor



temperature in provincial legislation. Municipal governments should use their bylaw making powers to implement maximum indoor

temperatures at the local level. The federal government should support these efforts by introducing clear guidelines on maximum indoor temperature.



“

Traditionally [in Canada] we worry more about people succumbing to cold weather. [...] If you look at our building codes, [we] tell you how much insulation you need to put in walls. But very little is written about how you cool, and actively cool and passively cool the buildings and structures that we choose to live in. [...] All of these things make a huge difference.”

*Dr. Jatinder Baidwan,
Chief Medical Officer, Office of the Chief Coroner of British Columbia*

From comments made during the June 7th, 2022 news conference.⁵⁵

2.2 – Modernize Canada’s building codes to ensure community housing is climate resilient

Canada’s national building code regulations are outdated and do not account for climate change.⁵⁶ The National Building Code and standalone provincial building codes



should be modernized to account for the impact of climate change and specifically extreme heat. Alterations to Existing Buildings, which is the

proposed retrofit building code anticipated to be in place by 2030, should also include provisions that protect Canadians from the impact of extreme heat.



“

In our society, indoor cooling is seen as a luxury instead of a necessity. This thinking is increasingly problematic in the context of climate change. We need a reasonable maximum indoor temperature established in Canada to prevent more deaths, especially among the elderly and people with chronic health conditions.”

*Sarah Henderson,
Scientific Director of Environmental Health Services,
British Columbia Centre for Disease Control*

2.3 – Revamp and increase existing government funding programs to provide preferential funding for projects that increase heat resilience, with a focus on community housing

Governments at all levels should amend housing-related and climate change-focused funding programs to make extreme heat adaptation an explicit area of focus. This would ensure preferential funding of projects seeking to increase heat resilience, including projects in community housing that would better protect tenants from extreme heat.

The federal government already requires housing providers to consider climate mitigation and greenhouse gas reductions when designing projects. The same should be done for climate adaptation more broadly and extreme heat in particular.

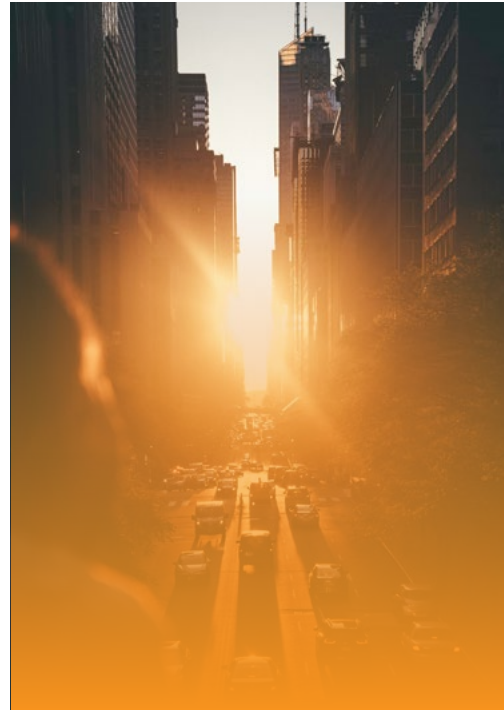
Given the extent of the capital needed to build and retrofit community housing units, governments at all levels should consider increasing overall funding for projects specifically focused on climate adaptation measures and extreme heat. While funding increases can be channelled through existing programs, governments should also consider launching new targeted programs. Creating more funding for community housing climate adaptation would help address expert concerns that the NAS is insufficiently resourced.⁵⁷





Case Study: British Columbia's Community Emergency Preparedness Fund

Provinces and territories should follow the lead of British Columbia (B.C.), which has already made significant progress in allocating funding to heat resilience projects through its Community Emergency Preparedness Fund. Thirty-six communities across B.C., including First Nations and local governments, will receive this funding for “extreme heat projects and strategies, such as extreme heat risk mapping, risk assessments, extreme heat response plans and climate adaptation planning.”⁵⁸ B.C. should set aside a portion of this funding to ensure new and existing community housing is built or retrofitted to heat-proof standards.



2.4 – Launch a community housing intake under the 2 Billion Trees Program

The 2 Billion Trees program provides a significant opportunity to help heat-proof community housing by leveraging an existing government initiative. Canada should launch an intake under the program calling for proposals for tree planting initiatives to be delivered in partnership with community housing providers and their residents. Planting trees in community housing neighbourhoods will increase shade and reduce overall ambient and surface temperatures in the mid-to-long term, helping to reduce the urban heat island effect and increasing livability for tenants.





RECOMMENDATION 3:

LEVERAGE HOLISTIC LAND USE AND URBAN DESIGN PRACTICES TO REDUCE THE IMPACT OF URBAN HEAT ISLANDS ON COMMUNITY HOUSING IN THE MID- TO LONG-TERM



Urban design and land use planning strategies can have a significant impact on mitigating climate change hazards such as extreme heat in the mid- to long- term.⁵⁹

The built environment has a direct impact on local climates. This means that poor planning and urban design decisions of the past have played a significant role creating the increasingly hazardous conditions facing community housing tenants and other low-income residents in Canada's urban centres. Incorporating holistic land use practices in existing, infill and new community housing developments can lead to smart growth, reversing and preventing the urban heat island effect while creating more heat-resilient neighbourhoods for tenants.



3.1 – Establish ambitious local urban tree canopy cover goals and concentrate planting efforts near community housing

Planting heat-resistant native trees and shrubs near community housing can contribute to lower air and ground temperatures,⁶⁰ reducing the risk of extreme heat for tenants. Not only do trees reduce ambient temperatures by creating shade, they also transpire, releasing water vapour throughout the day and cooling their surroundings at a city block-level scale.⁶¹

For many years, experts in the United States recommended a tree canopy coverage goal of 40%, meaning that 40% of land within a community is covered by vegetation.⁶² While 40% remains a strong benchmark, research now recommends that cities set specific tree



canopy coverage goals based on the optimal canopy cover level of the local community, considering factors like existing land uses and weather patterns.⁶³ Tree canopy coverage goals can also be linked to the amount of vegetation necessary to reduce the urban heat island effect or to reduce stormwater runoff flows.⁶⁴ Establishing a measurable target can help cities track efforts towards implementation, increasing the likelihood of success.

New developments should contribute to the expansion of the urban tree canopy through tree planting and park creation. Existing community housing projects can be transformed by leveraging underused parcels and open spaces and by planting large trees and creating parkettes designed to mitigate or reduce the risk of the urban heat island effect. A summertime study in Montreal found that tree coverage can reduce air temperatures at the tree level (up to 20 metres above the ground) by 4 degrees Celsius.⁶⁵ Notably, trees can similarly produce a significant cooling effect above the tree level. This same study found that tree coverage reduced ambient temperatures by

up to 2 degrees Celsius at 60 metres above the ground, the equivalent of a 20-storey building.⁶⁶ A study in Toronto also found that increasing the tree canopy cover by as little as 5% at the neighbourhood level can reduce heat-related ambulance calls to that neighbourhood by approximately 80%.⁶⁷

To concentrate the benefits of urban tree canopy coverage in lower-income communities most impacted by extreme heat, cities should focus tree planting efforts near community housing. Canada's 2 Billion Tree commitment, the proposed creation of a network of national urban parks and other reforestation initiatives can support this work.





Case Study: Toronto Community Housing Tree Project

In 2018, Toronto Community Housing (TCHC) and the City of Toronto partnered with Local Enhancement and Appreciation of Forests (LEAF) and Park People to work with tenants to plant native species trees on three separate TCHC properties. The focus of this project was to replace trees lost to weather events and to disease while combating the urban heat island effect and securing other environmental benefits for tenants.⁶⁸



3.2 – Prioritize the installation of a variety of green infrastructure in community housing

While trees can play an important role in reducing ambient temperature, green roofs, urban wetlands, permeable surfaces that help with water retention, and other forms of green infrastructure are similarly known to have a cooling effect in local neighbourhoods. For example, green roofs can actually reduce indoor air temperature by 1.5 to 3.0 degrees Celsius.⁶⁹ Retrofitting existing community housing units with green features and working with natural heritage systems when designing new buildings can therefore create notable benefits for communities when it comes to reducing or preventing the urban heat island effect.



3.3 – Ensure a variety of land uses in neighbourhoods with community housing, including robust community amenities that can serve as cooling centres

Complete communities are neighbourhoods with a mix of housing types, a diversity of land uses, robust amenities like community centres, schools and parks, and high levels of street connectivity. Key attributes of communities designed, planned and developed or redeveloped with these

features are their vibrancy, their walkability and the ability of local residents to work, learn and play all within a short distance of their homes.

Complete communities are also more resilient when it comes to extreme heat. A mix of housing types and land uses can lead to an improved urban geometry, preventing heat traps by promoting the release of heat.⁷⁰ They similarly reduce heat waste from vehicle use by prioritizing walkability, bikeability and public transit. Complete communities also feature community centres and schools, both of which can double as cooling centres during extreme heat events.



A mix of housing types and land uses can lead to an improved urban geometry, preventing heat traps by promoting the release of heat



Case Study: Infill Development in Toronto's Emerald City

Though it does not include community housing, a positive example of infill development and re-urbanization benefiting low-income tenants is the creation of Emerald City in Toronto's North York. Originally consisting of car-centric 1960s-era high rise rental towers surrounded by parking lots and green lawns, the area has been transformed through the addition of tree lined paths, parkettes, the creation of a community centre and

the introduction of townhomes, new purpose-built rental apartments and condos as well as new commercial spaces. The neighbourhood is also linked to public transit and now has robust pedestrian and cycling facilities. Many of these changes were facilitated by converting open air asphalt parking lots into parcels zoned for mixed use and by better leveraging open green spaces to create shade and new community amenities.



Source: Artist rendering of ELAD Canada's Emerald City Condos in Toronto



RECOMMENDATION 4:

GENERATE MORE PRIVATE INVESTMENT TO SUPPORT THE DEVELOPMENT OF CLIMATE RESILIENT COMMUNITY HOUSING THROUGH REPLICATING AND SCALING UP PROVEN APPROACHES

Many of our interviewees indicated that known solutions exist; the challenge is raising the sufficient financial investments to conduct the necessary construction. Retrofitting housing stock is expensive. For example, Toronto Community Housing Corporation has a capital budget for 2023 to 2031 of **over \$4 billion**, with approximately **85% of this budget earmarked for capital repairs and maintenance** and only **15% budgeted for new developments**. There is also more financial capital needed to build new community housing units that protect residents from extreme heat.

Compared to similar countries, such as the United States and the United Kingdom, the Canadian community housing sector raises far less capital for projects from the

private sector. This is likely because Canada's community housing sector is fragmented and contains many small housing agencies, limiting scalability and the expertise necessary to advance innovative financing approaches. Many community housing providers struggle to service loans because of limited revenue, thereby limiting the ability to raise private investment.

Compared to similar countries, such as the United States and the United Kingdom, the Canadian community housing sector raises far less capital for projects from the private sector.

Policymakers must scale the amount of private financial capital available to support the development of climate resilient community housing that protects residents from extreme heat.

In general, the Canadian community housing sector needs significant investments. The solutions identified below will also help tackle the insufficient supply of community housing units that has resulted in long wait lists, contributing to Canada's homelessness challenges. In investing in community housing, policymakers should also consider how they can support community housing providers to develop the capacity to pursue innovative financing approaches.

It is critical that both the private sector and governments provide financial investments to support community housing agencies. Advocating for increased private investment in no way abrogates the obligation of governments to provide funding to support the development and maintenance of community housing.



4.1 – Remove the provincial and federal taxes on municipal bonds to fund climate resilient community housing

Municipal bonds are one of the principal methods that municipalities leverage to fund community housing projects. The interest on Canadian municipal bonds is taxable, unless the purchasing entity is tax exempt. By contrast, the interest on municipal bonds has been tax exempt for over a century in the United States.

Though municipal bonds may be a potentially inefficient vehicle for increasing funding to municipalities,⁷¹ now is the time to make municipal bonds tax exempt due to the perilous state of many municipal finances, the lack of political will to make changes to fiscal federalism, and the pressing need to address capital deficits. Doing so could significantly lower the interest rates that municipalities pay to bond holders, allowing municipalities to take on more debt and invest further in capital projects such as retrofitting community housing for extreme heat.

As this policy change is essentially a transfer from the federal treasury to municipalities, policymakers should exercise caution. It may make sense to only make municipal bonds funding specific projects as tax exempt. Specifically, policymakers should consider designating municipal bonds that go towards funding climate resilient community housing as tax exempt.

**Policymakers
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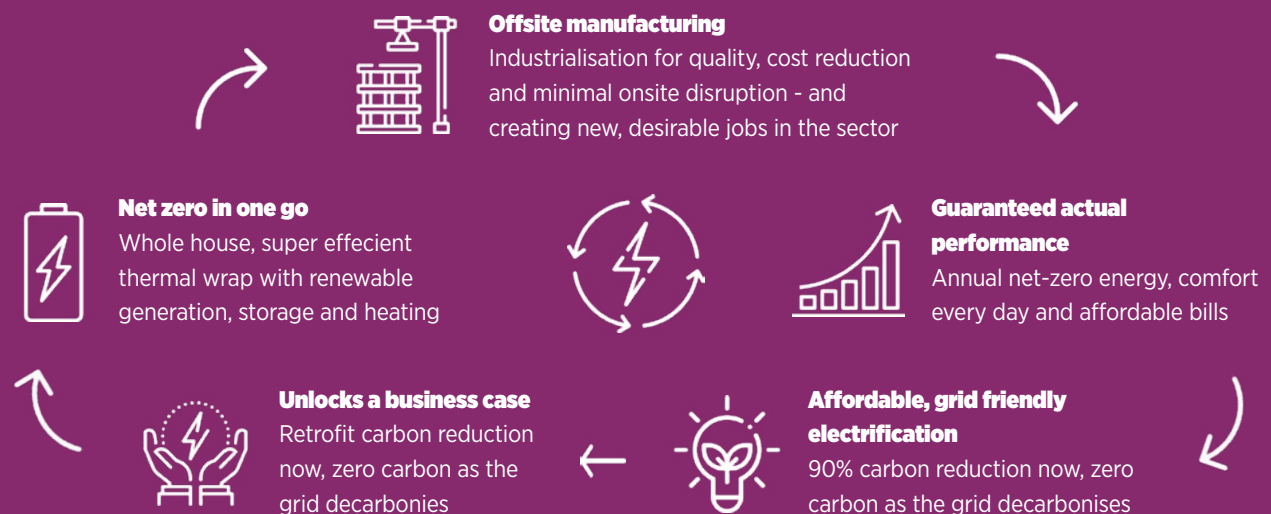


4.2 – Fund Energiesprong Canada to scale its approach

Energiesprong, which originates from the Netherlands, is a unique program that aims to aggregate individual retrofit opportunities into large segments of demand for equipment suppliers and constructors, encouraging large scale investment and economies of scale in providing products and services to meet the retrofit demand.⁷² Community housing

tenants also exchange their utility bill for a similar fee to their community housing provider to pay off a net zero retrofit with a 30-year warranty. Energiesprong can cut community housing retrofit installation times from two weeks to several days and reduce retrofit costs by 50%.⁷³ As of October 2017, Energiesprong has retrofitted over 2,000 dwellings in The Netherlands.

FIGURE 5: ENERGY-SAVING BENEFITS AFTER ENERGIESPRONG CANADA RETROFITTING



Source: Energiesprong Canada

While the Energiesprong model is very active in European countries, the approach is not currently being utilized in Canada beyond initial feasibility studies. The Government of Canada should fund Energiesprong Canada to promote awareness of the Energiesprong model and to encourage community housing providers to undertake retrofits using this approach, with the goal of protecting community housing residents from extreme heat.

According to a report from The Pembina Institute, “aggregating demand from a large number of dwellings can act as a catalyst to remove barriers to deep retrofits and trigger innovation to reduce costs, minimize disturbance, and increase value to residents.”⁷⁴ The lack of co-ordination amongst community housing providers means that retrofit projects are often needlessly inconvenient to residents or simply too expensive.

4.3 – Use social impact bonds to fund climate resilient community housing

In many cases, there is no difference between municipal bonds and social impact bonds, other than the labelling. The main benefit of repackaging a municipal bond as a social impact bond is the ability to sell the bond to Environment, Social, and Governance (ESG) investors and therefore access new sources of capital.

Many large financial institutions are getting into the business of raising private capital to support affordable housing projects. Though affordable housing finance has been an important part of the “E” in environmental, social, and governance (ESG) investing for over 15 years, the “S” is emerging as an additional driver of demand.⁷⁵ In 2021, ESG bonds going to support affordable housing projects increased by 288% year on year, to a total of \$14.5 billion USD.⁷⁶ In Fall 2022, The City of New York raised \$400 million USD to finance the construction of 3,000 affordable housing units. In Canada, Toronto Community Housing Corporation was the first organization to raise a \$100 million social bond from investors to fund community housing.

Policymakers should issue social impact bonds that enable the development of community housing units that protect residents from the impact of extreme heat. In the United States, many municipalities raise funds for affordable housing via social impact bonds. The rise of the ESG investing movement means that more institutional investors are looking for financial instruments that also generate significant positive impact for communities. Social impact bonds focused on supporting the adaptation or construction of climate resilient community housing could appeal to investors interested in generating social and environmental impact. Social impact bonds are generally better suited to large community housing providers, as they have the scale and in-house capabilities to issue large bonds, which are more attractive to institutional investors.

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social bond from investors to fund community housing.

4.4 – Leverage community bonds to fund climate resilient affordable housing

Community bonds can be sold to both retail and institutional investors. Like municipal bonds, these financial instruments can have varying interest rates and maturity dates. Unlike municipal bonds, community bonds are largely purchased by individuals or local small businesses. Tapestry Community Capital provides a compelling example. As a leader in the Canadian social financing space, Tapestry supports community housing providers to structure community bonds. Tapestry's additional services include community bond feasibility studies, as well as supporting the development of community bond sales campaigns.

For very large community housing providers, like TCHC, social impact bonds, which target large institutional investors, are a better fit. However, for smaller non-profit community housing associations, community bonds can be a great way to leverage organizational social capital into financial capital. Policymakers should consider how to scale up the work of organizations such as Tapestry and further promote capacity building in small community housing providers, so that they can effectively raise this kind of capital.

4.5 – Create social impact focused Real Estate Investment Trusts

Canadian community housing providers should collaborate to create social impact real estate investment trusts (REITs) focused on the development of sustainable, climate resilient affordable housing. There is an opportunity for Canadian philanthropic foundations to direct billions of dollars to funding these kinds of projects, and there is the potential that foundations could invest much of the initial startup capital.



Case Study: The Housing Partnership Equity Trust

In the United States, community housing providers collaborate to gain access to low cost, long-term capital. The Housing Partnership Equity Trust (HPET) is a social-purpose REIT sponsored by a Boston-based membership organization of non-profits focused on housing.⁷⁷ HPET partners with 14 non-profit housing developers, offering them low-cost, long-term capital to acquire multifamily residences across the country. The trust is capitalized with funding from a mixture of banks and family foundations.

4.6 – Leverage Energy Service Companies to retrofit community housing

Policymakers should fund further research on best practices for how community housing providers can work with Energy Service Companies (ESCOs) in the Canadian context to support retrofits that protect residents from extreme heat.

ESCOs develop, design, build, and arrange financing for projects that save energy, reduce energy costs, and decrease operations and maintenance costs at their customers' facilities.⁷⁸ In most cases, ESCOs finance

their projects by receiving compensation for the energy savings they create. By working with ESCOs, community housing providers can complete retrofits while incurring minimal direct expenses.

While ESCOs are generally thought of as a tool to reduce carbon emissions, they can also support the adaptation of buildings to climate change. If an ESCo completes a project that reduces the temperatures in a building without the use of air conditioning, this could save energy costs as well as protect residents from extreme heat.





Case Study: Toronto Atmospheric Fund Retrofit Accelerator

The Toronto Atmospheric Fund's (TAF) Retrofit Accelerator is a model that could be replicated in other jurisdictions.⁷⁹ TAF provides expert services to deliver deep energy retrofits in the multi-family building sector in the Greater Toronto and Hamilton Area through collaboration with building owners, utilities, governments, residents and other stakeholders to maximize the health, social, environmental and economic outcomes of retrofits. An example is the retrofit of a townhouse

complex at 66 Walpole Avenue in Toronto.⁸⁰ TAF put in heat pumps and replaced the electric baseboard heaters. The retrofit resulted in a 28-41% reduction in electricity usage. Moreover, before the retrofit, 70% of residents indicated that it was too hot in their units during the summer. After the retrofit, 97% of residents indicated that they were satisfied with the summer temperature of their units, as heat pumps also provide residents with access to cooling.

“

We know how to build climate resilient housing. The challenge for policymakers is how to catalyze the sufficient investments to protect Canadians from the impact of extreme heat.”

Ted Kesik,

*Professor at the John H. Daniels Faculty of Architecture,
Landscape and Design at the University of Toronto*



CONCLUSION

Extreme heat is one of the direst climate change challenges facing Canada. This is especially true for individuals living in community housing in urban areas due to intersecting vulnerabilities and reduced adaptive capacity. Climate resilient community housing will prevent unnecessary death and suffering in the face of increasingly frequent and severe extreme heat events. It is imperative that all levels of government take on the challenge of heat-proofing community housing.

The recent focus by the federal government on climate change adaptation through the NAS is heartening. However, gaps in relation to extreme heat adaptation remain. The policy recommendations proposed here are designed to complement and fill the gaps

in existing and proposed government policy regarding extreme heat, specifically in the context of community housing. Even with the focus on community housing, they can be applied in other contexts and will benefit Canadians as a whole.

**Extreme heat adaptation requires a multi-faceted approach.
We believe that community housing can be heat-proofed by:**

- 1** Creating co-ordinated heat responses plans to protect community housing tenants from extreme heat;
- 2** Adjusting government policy, code, funding and programs to protect community housing tenants;
- 3** Leveraging holistic land use and urban design practices to reduce the impact of urban heat islands on community housing in the mid- to long-term; and
- 4** Generating more private investment to support the development of climate resilient community housing through replicating and scaling up proven approaches.

These actions, taken together, will save lives and improve the living conditions of those residing in our nation's community housing. **We call on all orders of government to take immediate action before more lives are lost** as extreme heat becomes more frequent and more severe.

APPENDIX A: INTERVIEWEES

Below are the individuals who we interviewed as part of our research. We thank them for sharing their time and valuable insights with us. Please note that professional affiliations are based on these individuals' respective roles as of Jan. 29, 2023.

Alex Ferguson, Researcher, CanmetENERGY

Amy Bolt, Specialist, Initiatives, Canada Mortgage and Housing Corporation (CMHC)

Carolyn Tateishi, Director, Climate Change and Innovation Bureau, Health Canada

Chris Ballard, CEO, Passive House Canada

Chris Guddingham, Director, Program Design and Operational Policy, The Government of Saskatchewan

Chris Rootsart, Program Manager, Community Housing Transformation Centre

Craig Stewart, Vice-President, Climate Change and Federal Issues, Insurance Bureau of Canada

Dave Slater, Manager, Community Well-Being, City of Regina

Don Iveson, Executive Advisor, Climate Investing and Community Resilience, The Co-Operators

James Irvine, Professor Emeritus, University of Saskatchewan's Department of Academic Family Medicine

Gokce Somay, Senior Strategic Advisor, Health Canada

Heather McDiarmid, Founder and Climate Change Consultant, McDiarmid Climate Consulting

Heather Tremain, CEO, Options for Homes

Irène Cloutier, Advisor, Bureau de la transition écologique et de la résilience, Ville de Montréal

Jake McEwan, Managing Director, Gracorp

Janet Neves, Senior Manager, Government Relations, Canada Mortgage and Housing Corporation (CMHC)

Joanna Eyquem, Managing Director, Climate-Resilient Infrastructure, Intact Centre on Climate Adaptation

Joël Courchesne, Architect, Division de la transition écologique et de l'innovation, Ville de Montréal

Justin Marchand, CEO, Ontario Aboriginal Housing Services

Kathryn Bakos, Director, Climate Finance and Science, Intact Centre on Climate Adaptation

Kelly Husack, Policy Analyst, Community Wellbeing, City of Regina

Kerri Klein, Co-Founder & Director, SHIFT Collaborative

Lance Jakubec, Advisor, Municipal Relations, Canada Mortgage and Housing Corporation (CMHC)

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Below are the individuals who we interviewed as part of our research. We thank them for sharing their time and valuable insights with us. Please note that professional affiliations are based on these individuals' respective roles as of Jan. 29, 2023.

Leah Rosenkrantz, Environmental Health & Knowledge Translation Scientist, National Collaborating Centre for Environmental Health

Marianne Touchie, Associate Professor, Department of Civil and Mineral Engineering, and Department of Mechanical and Industrial Engineering, University of Toronto

Melissa Gorman, Acting Senior Science Advisor, Health Canada

Melissa Lem, President, Canadian Association of Physicians for the Environment - Association canadienne des médecins pour l'environnement (CAPE-ACME)

Paddy Enright, Policy Analyst, Climate Change and Innovation Bureau, Health Canada

Peter Zimmerman, Senior Director, Development, Toronto Community Housing Corporation

Ray Sullivan, Executive Director, Canadian Housing Renewal Association

Ryan Collins Swartz, Co-Executive Director, Tapestry Community Capital

Sara Brown, CEO, Northwest Territories Association of Communities

Sarah Henderson, Scientific Director of Environmental Health Services, British Columbia Centre for Disease Control

Sean Campbell, Executive Director, Union Cooperative

Shoshanna Saxe, Associate Professor, Department of Civil & Mineral Engineering, University of Toronto

Simone Swail, Senior Manager, Government Relations, Ontario Region of The Co-operative Housing Federation of Canada

Steve Mennill, Planning, housing finance and policy consultant | previous Chief Climate Officer for Canada Mortgage and Housing Corporation (CMHC)

Ted Kesik, Professor, John H. Daniels Faculty of Architecture, Landscape and Design, University of Toronto

Teddy Clark, Chief, Clearwater River Dene Nation

Thom Armstrong, CEO, Co-operative Housing Federation of British Columbia

Ute Maya-Giambattista, Principal, Urban Design, Fotenn Planning + Design

Zakaria Abdulle, Policy Consultant with the Centre for Advancing the Interests of Black Peoples, Toronto Community Housing Corporation

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The word "Canada" in a black serif font, with a small red and white Canadian flag icon above the 'a'.



The logo for Johnson & Johnson, featuring the brand name in a red, cursive font, with "FAMILY OF COMPANIES IN CANADA" in a smaller, black, sans-serif font below it.

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