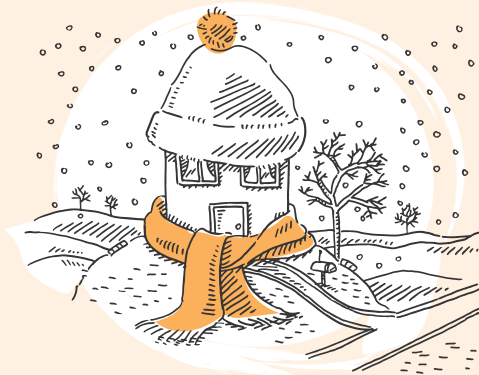




# Invest in building retrofits to create healthy, green and just communities

In Canada, buildings use about one third of the energy that is produced<sup>1</sup> and generate about 13% of greenhouse gas (GHG) emissions in Canada.<sup>2</sup> The International Energy Agency has identified building retrofits as an important opportunity for energy savings. Improving the energy efficiency of



buildings contributes to health by improving the indoor environment, reducing air pollution, and reducing the GHG emissions that contribute to climate change. This backgrounder focuses on retrofits in residential buildings.

## **BUILDING RETROFITS PROMISE MULTIPLE BENEFITS**

We spend nearly 90% of our time indoors – inside our homes, and in schools, offices and workplaces.<sup>3</sup> This means that it is important to maintain good quality indoor environments to promote health.

This is a good time to be considering improvements in the energy efficiency of existing buildings because the federal government is making significant investments in

programs and policies to kick-start the economy and get people back to work. Post-COVID-19 pandemic investments provide an opportunity to address climate change, foster a transition away from fossil fuels, build communities that are more resilient, improve public health and reduce health inequities.

## **CLIMATE CHANGE IS ALREADY HARMING CANADIANS**

On a global scale, climate change is already having a catastrophic

impact on human health. In 2018, nearly 300,000 people around the world died prematurely because of hotter temperatures resulting from climate change.<sup>4</sup> And yet, increasing temperatures is only one of the many risk factors presented by climate change.

In different parts of Canada, climate change has contributed to an increase in the frequency and intensity of floods, wildfires, hurricanes, ice storms and heat

# 3

## Building Retrofits BACKGROUND



A Healthy, Green and Just Recovery



waves, over the last several decades.<sup>5</sup> These events have exposed millions of people to extremely high levels of toxic wildfire smoke,<sup>6</sup> forced hundreds of thousands to evacuate their homes, and left hundreds of thousands without power for extended periods. Climate change is also melting permafrost in the far north, increasing sea levels on three coast lines, and extending the range of vector-borne diseases such as Lyme disease.<sup>7</sup>

While climate change can harm the health of everyone, it has a greater impact on some. Young children, older people, and people with pre-existing health conditions are more sensitive to heat waves and wildfire smoke. Indigenous Peoples in Northern communities can experience increased food insecurity as melting permafrost and shifting plant and animal populations disrupt their access to traditional foods. In addition, people who live on lower incomes may not have the resources to protect themselves or recover from extreme weather events.<sup>8</sup>

The costs of weather-related disasters fuelled by global warming are considerable. The number of disastrous events has more than tripled since the 1980s. Over the last nine years, these events have

resulted in \$14 billion in insurance costs in Canada, an increase of 1,250% since the 1970s.<sup>9</sup>

### A CALL FOR EXTENSIVE INVESTMENTS IN BUILDING RETROFITS

Building retrofits are among the most promising measures that can achieve GHG emission reductions relatively quickly with the added bonus of creating jobs.<sup>10</sup> In the report *Building Back Better*,<sup>11</sup> energy analysts Torrie, Bak and Heaps set out a way forward for Canada's COVID-19 recovery efforts. As a priority, they recommend the implementation of extensive energy retrofits of buildings to reduce GHG emissions and strengthen climate resilience. Under such a plan, retrofit measures would include upgrading insulation and windows, improving basement flood protection, and making greater use of heat pumps and renewable energies.

Torrie, Bak and Heaps suggest that a major program of loans and grants, with federal investments of \$21 billion over 10 years could make it possible to retrofit 60% of existing Canadian homes and 60% of commercial and institutional workspaces (based on floor area) by 2030. Homeowners, businesses and municipalities would apply for grants or interest-free loans to undertake retrofits of residential,

## Building retrofits can achieve GHG emission reductions relatively quickly

commercial and public buildings. To qualify, applicants would have to commit to efficiency standards and verify upgrades through a formal building energy audit.

Torrie, Bak and Heaps calculate that such measures could create three million person-years of work and reduce GHG emissions by an estimated 58 million tonnes (Mt) annually by 2030.

### BUILDING RETROFITS CAN REDUCE HEAT-RELATED HEALTH IMPACTS

Canada is warming at twice the global rate and Canada's North is warming even faster.<sup>12</sup> Between 1948 and 2016, the annual average temperature in Canada has increased 1.7°C with the greatest increase in the North (2.3°C).<sup>13</sup> While this shift in temperature will decrease the number of cold weather-related deaths in Canada, it will also increase the number

# 3

## Building Retrofits BACKGROUND



A Healthy, Green and Just Recovery



of premature deaths related to warmer temperatures.<sup>14</sup>

Hot weather puts a strain on the body's ability to control its internal temperature,<sup>15</sup> a physical stress that can aggravate chronic health conditions including respiratory and cerebrovascular diseases. Extreme temperatures can produce heat exhaustion and heat stroke, and increase hospital emergency visits and admissions, and premature deaths, particularly among older people.<sup>16</sup>

Rapid warming across Canada has seen the average annual heat-related deaths for people over 65 years increase by nearly 60% between 2000-04 and 2014-18. In 2018, over 2,700 people over 65 years in Canada died prematurely because of heat.<sup>17</sup> Studies have also found that social and inter-personal violence, including domestic violence, can increase during periods of extreme heat.<sup>18</sup> Building retrofits, such as insulation and heat pumps, can cool homes and reduce the adverse health impacts that can result from increasing temperatures.

### **BUILDING RETROFITS CAN IMPROVE INDOOR ENVIRONMENTS AND HEALTH**

Extreme heat, cold, mould and dampness in indoor environments

are associated with increases in cardiovascular diseases, strokes, premature deaths, asthma and other respiratory diseases. Studies have found that interventions that improve the comfort and quality of indoor environments can improve overall health, respiratory health, and mental health with particular benefits for those with pre-existing respiratory conditions.<sup>19</sup>

Building retrofits such as improved insulation, energy efficient windows, modern heating and cooling systems, and better ventilation, can improve health by keeping occupants warmer in winter, cooler in summer, and improving indoor air quality year round. Fossil fuel consumption can be reduced and indoor environments can be improved by using heat pumps and renewable energies, as well as insulation and energy efficient products.

### **BUILDING RETROFITS CAN REDUCE AIR POLLUTION**

Air pollution continues to be a significant source of illness, chronic disease and premature deaths in Canada. It is responsible for an estimated 14,600 premature deaths each year from conditions such as heart disease, stroke, lung cancer and chronic obstructive pulmonary disease.<sup>20</sup> Buildings that are heated by fossil fuels (such as oil and

## **A program of extensive retrofits could reduce emissions of air pollutants and GHGs from buildings by as much as 45% by 2030**

natural gas) can release significant quantities of pollution into the air.<sup>21</sup> Such pollution is especially problematic in urban areas where there is additional air pollution from traffic and industry.

Torrie, Bak and Heaps, the authors of the *Building Back Better* report, calculate that a program of extensive retrofits could reduce emissions of air pollutants and GHGs from buildings by as much as 45% by 2030.<sup>22</sup> In addition, the resulting improvements in air quality would produce substantial health benefits, decrease health care costs, and reduce the number of premature deaths.

# 3

## Building Retrofits BACKGROUND



A Healthy, Green and Just Recovery



### **BUILDING RETROFITS CAN STRENGTHEN CLIMATE RESILIENCE**

Building retrofits can include upgrades that protect people and buildings against extreme weather events such as floods and wildfires. An overall goal of a retrofit program should be to strengthen climate resilience, that is to minimize the adverse impacts of climate change-related extreme weather events and/or support recovery from those events.

In areas prone to floods, backflow valves can be installed in basement drains to prevent water backup through sewers. This helps prevent flooded basements and the potential exposure to mould, which can aggravate asthma and other respiratory conditions. Where appropriate, fire resistant roofing materials can be used to help protect people and property from wildfires. Such measures can help avert adverse health impacts, costs, disruption and mental health stresses that can result from climate change-related property damage.<sup>23</sup>

### **BUILDING RETROFITS CAN REDUCE HEALTH INEQUITIES**

A number of groups within Canada – such as lower-income populations, newcomers, racial

minorities, Indigenous Peoples, and people with pre-existing health conditions – experience higher rates of illness and premature deaths because of social disadvantages.<sup>24</sup> Consequently, these groups can experience increased health risks from climate-related events such as extreme heat and wildfire smoke. These groups may also lack the resources to protect themselves or recover from extreme events.

Retrofitted buildings can produce health benefits for these higher-risk populations. Retrofits can reduce adverse health impacts and time lost for sickness and medical appointments by improving indoor environments and modulating temperatures. By reducing energy use, retrofits can cut energy bills and leave people with more money to spend on healthy food, clothing and other necessities.<sup>25</sup> By protecting homes from floods and wildfires, retrofits can reduce the health risks and costs associated with extreme weather events.

Social inequities can be reduced by prioritizing lower-income households and housing for retrofit funding and ensuring that grants are of sufficient size to support the required retrofits. In addition, programs that strategically target

## **Retrofitted buildings can produce health benefits for higher-risk populations**

people from disadvantaged populations<sup>26</sup> for training in the field of building retrofits can help reduce health inequities in communities across the country.<sup>27</sup>

### **BUILDING RETROFITS CREATE JOBS AND SAVE PEOPLE MONEY**

Energy retrofits of residential, commercial and public buildings undertaken at substantial scale as suggested in the *Building Back Better* report, could create 3 million person-years of employment up to 2030.<sup>28</sup> Because such a program could be launched relatively quickly, the economic benefits could be realized in the short term and could contribute to a healthy and sustainable economic recovery. Retrofits also stimulate demand for related goods and services, and establish local markets for green materials and technologies.<sup>29</sup>

# 3

## Building Retrofits BACKGROUND



A Healthy, Green and Just Recovery



Although Canadians already spend an estimated \$60 billion annually on home renovations,<sup>30</sup> many buildings go unrepaired and many owners do not benefit from savings that would result from energy retrofits. Overall, the initiatives proposed in the *Building Back Better* report could save people an estimated \$12.5 billion in residential energy costs each year by 2030.<sup>31</sup> Savings for individual households would depend on energy prices and the extent of the retrofits undertaken.

### INVEST IN BUILDING RETROFITS FOR A HEALTHY, GREEN AND JUST RECOVERY

In December 2020, the federal government announced a revised climate action plan for Canada.<sup>32</sup> The plan includes five pillars aimed at achieving GHG reductions and post-pandemic economic growth. The first of these pillars is a series of initiatives to improve the energy efficiency of homes and buildings. It includes:

- a program of small grants (up to \$5,000) for home retrofits;
- free EnerGuide assessments for houses;
- hiring and training of home energy auditors;
- resources for community, commercial and municipal building upgrades;
- plans for a future low-cost loan program; and

- commitments to work with Indigenous communities, provinces, territories, and industry on further plans to expand skill training programs, boost innovation in new efficiency technologies, and upgrade national building codes to set new efficiency standards for retrofits and new construction.

The plan identifies significant and commendable steps toward increased climate resilience and promises welcome progress toward the achievement of Canada’s climate change goals. The program proposes new investments of \$2.6 billion in residential upgrades, \$2 billion in commercial buildings, and \$1.5 billion in community buildings – totalling \$6.1 billion over 10 years, in addition to previously announced commitments in the range of \$5.6 billion.

Though impressive, these investments fall short of what is recommended in the *Building Back Better* report that proposes financial commitments amounting to \$20.7 billion over the same period. To achieve optimal uptake and benefits, the federal program should offer grants worth more than the currently proposed maximum of \$5,000 and should prioritize lower-income households and housing for grants.

## More investments will be needed and lower income households should be prioritized for retrofits

A program of extensive building retrofits could result in measurable and achievable reductions in GHG emissions, improvements in climate resilience, jobs in construction, energy cost savings, innovations in technology, a cleaner environment (both outdoors and indoors), improved social equity, and multiple health benefits for Canadians.

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# 4

## Building Retrofits BACKGROUND



A Healthy, Green and Just Recovery



### REFERENCES

- 1 International Energy Agency. 2018. Energy Efficiency Potential in Canada to 2050. Paris.
- 2 Torrie R, Bak C, Heaps T. 2020. Building Back Better with a Bold Green Recovery. Synthesis Report, p 21.
- 3 Matz CJ, Stieb DM, Davis K, Egyed M, Rose A, Chou B, Brion O. 2014. Effects of Age, Season, Gender and Urban-Rural Status on Time-Activity: Canadian Human Activity Pattern Survey 2 (CHAPS 2). *Int J Environ Res Public Health*. 2014 Feb; 11(2): 2108-2124.
- 4 Watts Nick et al. 2020. The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. Review. *The Lancet*.
- 5 Bush, E. and Lemmen, D.S., editors (2019). Canada's Changing Climate Report; Government of Canada, Ottawa, ON. 444 p
- 6 Schmunk Rhianna. 2020. Smoked in: A look back at B.C.'s haziest wildfire seasons over the past 20 years. CBC News, September 19
- 7 Doyle Helen Marie. 2019. Module 3: Climate Change Health Impacts Across Canada. Kim Perrotta (Ed). Climate Change Toolkit for Health Professionals. 240 p. Canadian Association of Physicians for the Environment (CAPE).
- 8 Berry P, Clarke K, Fleury MD & Parker S. 2014. Human Health in Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation. Editors: Warren FJ and Lemmen DS. Government of Canada, Ottawa, Ontario.
- 9 Canadian Institute for Climate Choices. 2020. The Tip of the Iceberg: Navigating the Known and Unknown Costs of Climate Change for Canada,
- 10 Torrie et al. pp. 18, 21
- 11 Torrie et al. pp. 18-23.
- 12 Bush, E. and Lemmen, D.S., eds. 2019. Canada's Changing Climate Report. Government of Canada. p. 5.
- 13 Zhang X. et al. 2019. Changes in Temperature and Precipitation Across Canada; Chapter 4 in Bush, E. and Lemmen, D.S. (Eds.) Canada's Changing Climate Report. Government of Canada, Ottawa, Ontario, pp 112-193.
- 14 Gasparrini A. et al. 2015 Mortality risk attributable to high and low ambient temperature: a multicountry observational study. *The Lancet*.
- 15 World Health Organization. (n.d.). Heat and Health. Protecting health from rising temperatures and extreme heat.
- 16 World Health Organization. (n.d.). Heat and Health. Protecting health from rising temperatures and extreme heat.
- 17 Watts N, et al. The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. *Lancet* 2020, as cited by the 2020 Lancet Countdown Policy Report for Canada
- 18 Whitmore-Williams, CS. 2017. Mental Health and Our Changing Climate: Impacts, Implications, and Guidance. Washington, D.C.: American Psychological Association, and ecoAmerica.
- 19 Macfarlane R, Perrotta, K. 2019. Module 5: Climate Change Solutions with Immediate Health Benefits. Kim Perrotta (Ed). Climate Change Toolkit for Health Professionals. 240 p. Canadian Association of Physicians for the Environment (CAPE).
- 20 Health Canada. 2019. Health Impacts of Air Pollution in Canada.
- 21 World Green Building Council. Air quality in the built environment. <https://worldgbc.org/clean-air-buildings/causes>
- 22 Torrie et al. p. 21.
- 23 Mee Carol. 2019. Module 7: Preparing for Climate Change in our Communities. Kim Perrotta (Ed). Climate Change Toolkit for Health Professionals. 240 p. Canadian Association of Physicians for the Environment (CAPE).
- 24 Public Health Agency of Canada, Pan-Canadian Public Health Network, Statistics Canada, and the Canadian Institute for Health Information. 2018. Key Health Inequalities in Canada report/Pan-Canadian Health Inequalities Data Tool.
- 25 Macfarlane R, Perrotta, K. 2019. Op. cit.
- 26 See Torrie et al. p. 21
- 27 See, for example, Winnipeg's BUILD program, a social enterprise focused on building renovation, that trains unemployed workers who have little experience in the formal labour market.
- 28 Torrie et al. p. 18.
- 29 Torrie et al. pp. 18-19
- 30 Statistics Canada. Residential construction investment, 2017-18.
- 31 Torrie et al. p. 21.
- 32 Government of Canada. 2020. A Healthy Environment and a Healthy Economy: Canada's strengthened climate plan to create jobs and support people, communities and the planet. Environment and Climate Change Canada. December. 79 pages.

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