DEVELOPMENT OF A BUILDING RETROFIT TOOLKIT TO ADDRESS EXTREME HEAT EVENTS (CITY OF BURNABY)

EXECUTIVE SUMMARY

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Disclaimer

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organizations in support of providing graduate students with opportunities to do applied research on projects that advance sustainability across the region.

This project was conducted under the mentorship of The City of Burnaby staff. The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of The City of Burnaby or the University of British Columbia.

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Project Overview

The City of Burnaby declared a Climate Emergency in 2019, creating a set of seven big moves to meet the following carbon reduction targets:

1. 45% reduction by 2030.
2. 75% reduction by 2040.
3. Carbon neutral by 2050.

The city recognized that existing buildings contributed to a third of its carbon emissions, forming a path to unlocking decarbonization in Burnaby. This was why Zero-Emission Buildings through retrofits was one of the City's Big Moves (Big Move 7).[1] The city believes that retrofitting acts as a pathway to decarbonization and it also has the co-benefit of improving the thermal comfort, wellness, and health of its residents.

Background

In the summer of 2021, the province of British Columbia was affected by an unprecedented extreme heat event (heat dome), leading to 619 heat-related deaths. 98% of deaths occurred indoors with most of the deceased being seniors and members of disadvantaged communities (DACs). A lack of cooling and pre-existing health conditions was identified by The BC Coroners Service (BCCS) as a major contributor.[2] The City of Burnaby and the Metro Vancouver region have been experiencing an increased number of extreme weather events at a greater intensity and in a bid to prepare for the future, retrofitting is viewed as a means of bolstering the resilience of the built environment.

[1] City of Burnaby. (2020, July 06). *Climate Action Framework*. Retrieved from https://pub-burnaby.escribemeetings.com/filestream.ashx?DocumentId=47477.

[2] BC Coroner Service. (2022). *Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021.*

The aim of this project is to develop a building retrofit toolkit, in alignment with The City's Climate Action Framework, to help building owners & managers understand how to retrofit their buildings, addressing the need for an age-friendly, resilient, and sustainable built environment for all members of the community.

The toolkit was developed in conjunction with City staff and is intended to be used by building owners and operators. The main goal of this toolkit is to create an easy-to-use guide that encourages the reader to consider sustainable approaches to retrofitting in order to combat overheating and improve the resilience of their buildings to extreme weather events.

Research Approach

To generate this Building Retrofit Toolkit, the following steps were completed.

1) Review of Existing Documentation
    - Documents provided by the Climate Action & Energy team and other relevant sources were reviewed.
2) Interviews
    - A list of interviewees was identified in conjunction with the Climate Action and Energy Team, representing a diverse mix of stakeholders.
    - Semi-structured interviews were completed, some in-person and others online via Zoom and email. Interviewees include.
        a. A building performance consultant
        b. An executive at a non-profit housing organization
        c. Community and social planners
        d. A graduate researcher
    - Findings and recommendations from interviewees were reviewed.
3) Brainstorming Toolkit Content.
    - A mind map of the toolkit content was created, based on the audience and theme of the toolkit.
4) Development of Toolkit.
    - A draft of the toolkit was created, and subsequently reviewed.

Summary

A major target for this building retrofit toolkit is owners of 3-story walkups. These multi-unit residential buildings (MURBs) which lack an elevator with vertical movement through a staircase, form a significant source of lower-middle-income affordable rental housing in the region.[3]These buildings are generally older and house members of the community most vulnerable to extreme heat events and overheating in a building. Due to the age of these buildings and the fact that different components of the building such as heating equipment, insulation, doors, and windows may be due for replacement or remediation, this presents a huge opportunity to conduct retrofitting activities.

Although there is documentation available on carrying out retrofits, it can be a daunting process for some building owners due to the financial investment and the technical nature of retrofitting a multi-unit residential building. The toolkit aims to help simplify the concept of retrofitting with a focus on easy-to-apply strategies that building owners can implement to improve the thermal comfort and well-being of their tenants.

Key findings while working on the toolkit are as follows.

1. There is a need for evidence-based information that emphasizes the physical and financial benefits of retrofitting a building.[4]
2. Taking the housing as a system approach, bundling and phasing retrofitting activities, can streamline the retrofitting process, is cost-effective and saves time.[5]
3. Some upgrades to older buildings may require huge initial financial investments with a negative net present value which may deter the landlords from considering them.
4. There is a shortage of contractors who can carry out some retrofitting activities, notably installing heat pumps, and this has led to higher fees.[6]
5. There is still skepticism about the performance of heat pumps especially in cold weather despite the ability of heat pumps to work in winter, and the availability of cold climate heat pumps.[7]

[3] Price, G. (2006). The three-storey story. Retrieved from https://viewpointvancouver.ca/2006/11/21/236/.

[4] FRESCo Building Efficiency. (2023, March). *MURB Electrification Retrofits Phase 2: Understanding Electrification Retrofit Opportunities and Challenges in BC Apartment Buildings.* Fisher Resource Efficiency Solutions Company Ltd.

[5] Home Performance Stakeholders Council. (2019). House-as-a-System Webinar. Home Performance Stakeholders Council.

[6] FRESCo Building Efficiency. (2023, March*). MURB Electrification Retrofits Phase 2: Understanding Electrification Retrofit Opportunities and Challenges in BC Apartment Buildings.* Fisher Resource Efficiency Solutions Company Ltd.

[7] Home Performance Stakeholders Council. (n.d.). Heat Pump Best Practices Installation Guide for Existing Homes. Home Performance Stakeholders Council.

6. Renovictions and the increase in rents after building retrofits are a concern for some stakeholders in the building industry (this includes equitable access to affordable housing that does not lead to energy poverty and its associated problems).
7. There is a need for MURB-targeted incentive programs with additional support fromThe City.[8]
8. There is a need to remove bottlenecks related to permitting and approvals for some retrofitting activities with greater support for willing building owners.[9]

Conclusion

The City of Burnaby should consider the following indicators to identify at-risk buildings.

1. Age of the building
2. Presence of a cooling system
3. Demographics of tenants
4. Age/Level of wear of the existing HVAC system
5. State of the building envelope
6. Presence/Level of insulation

The following strategies were also recommended to the Climate Action and EnergyTeam as a retrofit accelerator.

1. The addition of a comprehensive retrofit program to the proposed City of Burnaby Retrofit strategy that offers support to landlords in the form of rebates, concierge services, expedited permission and approvals, and potentially a Property Assessed Clean Energy (PACE) program targeting at-risk MURBs.
2. Creating a pilot program that retrofits an at-risk MURB, preferably social housing, accompanied by a detailed report – financial data inclusive- to function as a case study for other building owners.

[8] FRESCo Building Efficiency. (2023, March). *MURB Electrification Retrofits Phase 2: Understanding Electrification Retrofit Opportunities and Challenges in BC Apartment Buildings.* Fisher Resource Efficiency Solutions Company Ltd.

[9] ibid.