Existing Buildings Renewal Strategy

Engagement Summary

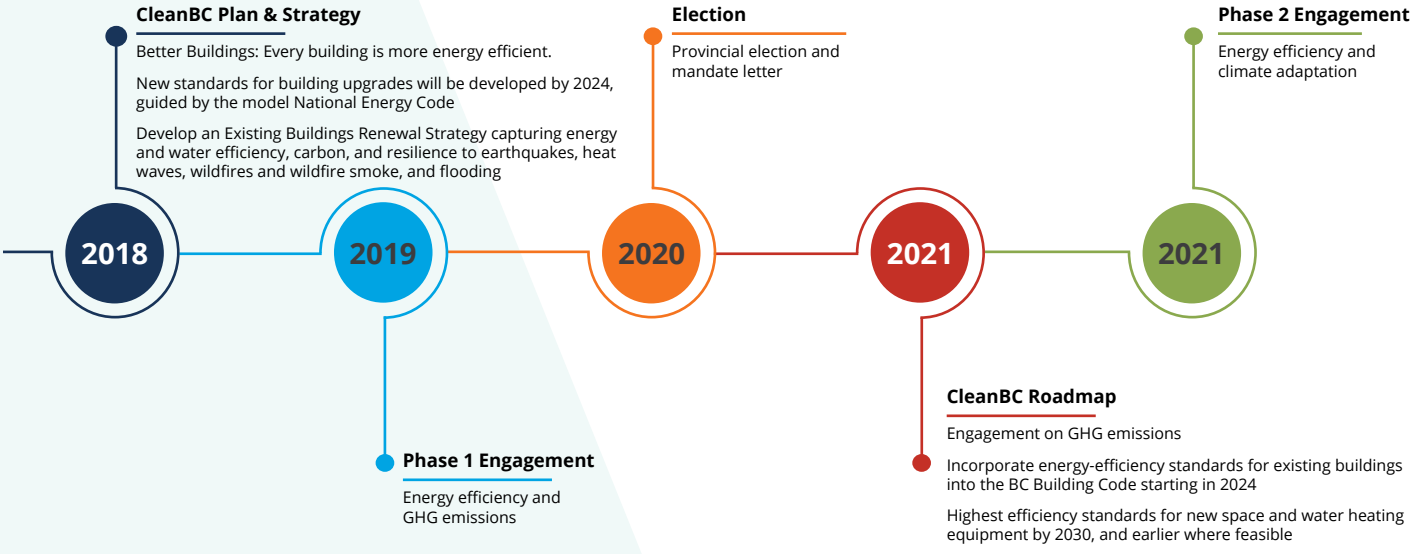
Table of Contents

Introduction

Through the 2018 CleanBC Plan, the Province of British Columbia committed to developing an energy efficiency code for existing buildings (Alterations Code) by 2024. The Alterations Code will establish upgrade requirements that will help bring existing buildings up to more modern standards for efficiency and comfort. The Province leveraged the CleanBC commitment to regulate existing buildings as an opportunity to develop a broader strategy, the Existing Buildings Renewal Strategy, that will create a path for today's buildings to become more energy and water efficient, cleaner, and safer for British Columbians during events like earthquakes, wildfires and wildfire smoke, heat waves, and floods.

The Building and Safety Standards Branch (BSSB) conducted the first phase of engagement in 2019.[1] During this phase, external partners provided early input on policy preferences for regulating energy efficiency and carbon emissions in existing buildings. In 2021, a second phase of engagement was conducted to build on the first by seeking more detailed feedback on the regulatory approach and supporting measures to increase energy efficiency in existing buildings. This second phase also explored potential opportunities to increase the climate resilience of existing buildings. This report summarizes participant feedback during BSSB's second phase of engagement.

In October 2021, the Province released the CleanBC Roadmap to 2030. The Roadmap outlines actions that will be undertaken to reduce the province's emissions. One key action to address carbon emissions in existing buildings is to set highest efficiency standards for new space and hot water heating equipment. The Province is currently working to develop and implement the efficiency standards for equipment which will include future engagement in the coming years. This future engagement will capture the role of codes in supporting implementation. Because future engagement is planned for equipment standards, BSSB's phase two engagement did not focus on reducing emissions in existing buildings.



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1 Government of British Columbia. Stakeholder Consultation Report: Alterations to Existing Buildings Project - Fall 2019 (2019). https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/reports/wwh_alterations_to_existing_buildings_web_final_may2020.pdf

Engagement Approach

The second phase of engagement on the Existing Buildings Renewal Strategy, including the Alterations Code, comprised a series of seven online engagement sessions between September 2021 and January 2022. BSSB invited over 300 individuals across multiple sectors to ensure a broad and diverse range of participants.

Each session included a presentation with an overview of the existing policy landscape, BSSB's current approach and authority, and identification of key alteration measures. Two distinct approaches to engaging external partners on climate resilience and energy efficiency topics were necessary because of the scope of the phase one engagement. The four sessions on climate resilience discussed climate hazard impacts, barriers to increasing existing building resilience, and solicited feedback on a range of regulatory and non-regulatory opportunities. The two sessions on energy efficiency built on phase one engagement by soliciting technical feedback on the design of a prescriptive Alterations Code, triggered at the time of alteration, and policies to support the prescriptive code.

At the final engagement session, BSSB presented the findings from the climate resilience and energy efficiency sessions. BSSB sought feedback on identifying potential conflicts, and opportunities to synergistically integrate energy efficiency and resilience actions.

The use of facilitated breakout groups allowed attendees to provide written or verbal feedback in small group discussions, with additional opportunities to submit written feedback after each session. Feedback received during the engagement will help inform the actions that will be included within BSSB's Existing Buildings Renewal Strategy. While the engagement was intended to inform actions under the purview of BSSB, the breadth of the discussion led to the identification of actions for both BSSB and other relevant government agencies with authority over existing buildings.

Engagement Sessions

- Flood Hazards (September 28th, 2021)
- Water Conservation (October 6th, 2021)
- Wildfire Events (October 19th, 2021)
- Energy Efficiency Regulations (November 30th, 2021)
- Overheating and Air Quality (December 2nd, 2021)
- Energy Efficiency Supporting Measures (December 8th, 2021)
- Integrating Energy Efficiency and Resilience (January 18th, 2022)

Across the seven sessions, BSSB received over 2,500 comments and nine email submissions. A total of 108 organizations participated.[2]

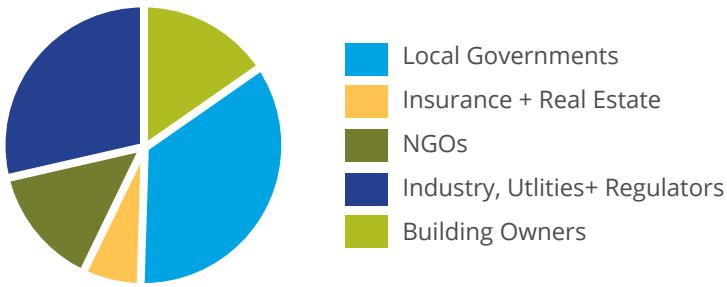


Figure 1: Sectors represented during Phase 2 engagement

2 See Appendix A for full list of organizations.

What We Heard:
Increasing Climate Resilience in Existing Buildings

The following section provides an overview of the feedback received from participants during four sessions dedicated to exploring key climate-related hazards facing B.C.'s existing buildings: flooding, drought (water conservation), wildfire, wildfire smoke (indoor air quality), and overheating. Without a pre-determined decision on the best way to address the climate resilience of existing buildings, BSSB had the opportunity to explore a range of actions from light-touch options to full regulation within the BC Building Code (BCBC). Each sub-section below outlines the risk and mitigation measures for existing buildings and summarizes external partners' feedback on key challenges and actions to enhance the climate resilience of existing buildings. As noted above, some of the actions that external partners suggested fall under BSSB's jurisdiction, while others will require leadership from other ministries, levels of governments, or organizations.

FLOODING

Flooding is a common occurrence in B.C. and can have a broad array of potentially significant impacts to buildings, ranging from minimal water damage on basement floors, to complete structural collapse. These impacts can be costly to address and can pose significant health impacts to occupants, including respiratory impacts from dampness and mold, and injury from flooding.[3] Each of the three types of flooding facing B.C. communities – pluvial, riverine, and coastal – is driven by a different source and has a unique dynamic, but all three can cause injury or illness to occupants, and significant damage to community infrastructure, properties, and buildings. The most recent demonstration of such impacts occurred in late 2021, when B.C. suffered a devastating and costly flood.[4]

These impacts have led to the development of many well-established flood management strategies and programs at the building, site, community, and regional scales. Building scale actions can include relocation, elevation, dry-proofing, and wet-proofing.

3 British Columbia, Preliminary Strategic Climate Risk Assessment for British Columbia, (2019). https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/prelim-strat-climate-risk-assessment.pdf
4 Note: this session was completed before the November 2021 floods in B.C.

Identified Barriers

External partners identified a number of key challenges preventing the successful adoption of floodproofing measures for existing buildings.

- **Education/Awareness:** Limited awareness of both flood risk and mitigation measures. Many building owners are not aware of their flood risk until they have experienced flooding. Even after experiencing a flood, many buildings are repaired/reconstructed without additional floodproofing measures, either due to cost or limited knowledge of options available.

- **Financial:** The cost and lack of incentives for floodproofing provides a financial barrier to proactive flood protection. Likewise, the high cost of insurance and the limited range of coverage options often result in insufficient flood coverage. This leads to heavy reliance on government relief funding following a flood event.

- **Regulatory:** Local government flood mitigation action varies significantly by jurisdiction. Local bylaws such as flood construction levels (FCL), development permit areas, and covenants are often unclear and inconsistently applied. In many communities, critical information such as flood plain maps are unavailable, of poor quality, or out of date. Smaller communities, in particular, often lack the resources to update flood information and policy.

- **Technical:** Technical challenges to implementing more intensive floodproofing in some buildings, and tensions between competing priorities (e.g., accessibility and flood protection measures), present significant challenges. At the community level, poorly maintained drainage systems can significantly increase flood risk for existing buildings.

Suggested Actions

External partners were asked to suggest actions to mitigate flood risk in existing buildings. Key actions that were identified are noted below.

Regulation	• Requiring a minimum level of floodproofing for existing buildings in the BCBC and Alterations Code.* • Creating a standard to ensure buildings that undergo repairs from flood damage are rebuilt with a minimum level of flood resilience. • Working with local governments and Technical Safety BC to require mechanical equipment to be above the FCL at time of permit.*
Local Government Action	• Creating provincial guidance for local governments with specific criteria for when floodproofing should be required as a condition of a building permit for alterations. • Supporting the alignment of local government FCL requirements, including removing exemptions for additions and extensions to existing buildings.
Technical Guidelines	• Working with Ministry of Forests to update the Flood Hazard Area Land Use Management Guidelines (FHALUMG) with respect to existing buildings.[5] • Supporting up-to-date and accurate floodplain mapping by providing technical guidelines to local governments.
Financing and Incentives	• Increasing financing and incentives for floodproofing and, where feasible, integrating with existing alteration financing and incentive programs. • Creating a provincial program to initiate land buyouts and relocation for buildings with the highest flood risk – acknowledging that some areas may no longer be safe to inhabit.
Education and Capacity Building	• Supporting the creation of clear, plain language, and accessible information for building owners on flood risk and mitigation actions (using the FireSmart program as a model). • Creating a strategy for dissemination of this information to building owners. • Supporting capacity building among planners, building officials, contractors, building operators, and building managers to increase awareness of flood risk and opportunities for mitigation measures. • Coordinating action among key actors to better align existing and planned flood programs.
Data and Transparency	• Updating floodplain mapping by the Province to create consistent quality and access. • Supporting smaller communities with limited resources to develop and maintain flood maps. • Creating better tools to engage and educate building owners (e.g., creating an online portal that allows property owners to determine their buildings' flood risk). • Creating a mandatory risk rating and disclosure program for existing buildings.

* Indicates an action that was prioritized by participants as one of the top regulatory actions for resilience for BSSB to explore in the near term.

5 The FHALUMG was last updated in 2018 and provides guidance for local governments in managing flood risk.

DROUGHT (WATER CONSERVATION)

B.C. is experiencing increasing drought in the summer months due to warmer temperatures, changing surface, groundwater and snowshed storage, and changing precipitation patterns.[6] More severe and longer-lasting drought can have significant impacts on ecological health and lead local governments to restrict drinking water use, particularly for outdoor uses such as fountains and irrigation.[7] Water conservation is essential for protecting drinking water supply and fortunately, there are a range of measures that can be taken to reduce water consumption in existing buildings, including behavior modification, high-efficiency plumbing fixtures and appliances, rainwater harvesting, and greywater and blackwater diversion and reuse.[8]

Identified Barriers

External partners identified several key challenges preventing the successful adoption of water conservation measures for existing buildings.

- **Education/Awareness:** A perception amongst building owners and occupants that water is plentiful and that high-efficiency fixtures lead to an inferior user experience. Residential landlords sometimes receive complaints about high-efficiency fixtures and even see tenants replace high-efficiency with more conventional fixtures. This is exacerbated by the limited access to in-suite and building-level water consumption data, as a result of limited submetering and the lack of detailed water utility data.

- **Financial:** A lack of financial payback for water conservation measures due to a combination of the capital costs of the measures and the low cost of water. This is compounded by the fact that most multi-unit residential households do not have submeters, and many municipalities use flat rates for water consumption (as opposed to tiered or consumption-based rates).

- **Regulatory:** Limits in the *Residential Tenancy Act* on the use of submetering in existing buildings, and the prohibition of in-suite water metering in the *Strata Property Act*. Additionally, water restrictions typically only limit outdoor water use and do not address indoor flows.

- **Technical:** Insufficient piping slopes to accommodate high-efficiency fixtures and water stagnation due to reduced flow. This is coupled with the technical challenge, cost, and occupant disruption associated with existing buildings alterations.

6 British Columbia, Preliminary Strategic Climate Risk Assessment for British Columbia, (2019). https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/prelim-strat-climate-risk-assessment.pdf
7 The total average per capita potable water use in Canada in 2017 was 427 litres per day. The residential average daily per capita potable water use in 2017 was 220 litres per day. Source: Statistics Canada, Infographic 1 Potable Water Use in Canada. https://www150.statcan.gc.ca/n1/daily-quotidien/190611/g-b001-eng.htm
8 National Renewable Energy Laboratory (NREL), Saving Energy in Commercial Buildings, (2011). https://www.nrel.gov/docs/gen/fy11/50133.pdf

Suggested Actions

External partners reported a range of actions that BSSB and other organizations could take to drive water conservation in existing buildings. Due to the technical challenges with implementing black and greywater systems in existing buildings, these measures predominantly focus on behavior change, and high-efficiency fixtures and appliances. Key actions that were identified are noted below.

Regulation	• Requiring high efficiency fixtures and rainwater harvesting for existing buildings through the BCBC and Alterations Code.* • Banning conventional (i.e., non-high efficiency) fixtures and appliances. • Requiring water metering for residential and commercial tenants. • Amending the *Residential Tenancy Act* and *Strata Property Act* to allow submetering for existing tenants and unit owners.* • Banning the use of unnecessary once-through cooling systems.
Local Government Action	• Supporting local governments to develop consistent bylaws that require high efficiency fixtures and appliances, and rainwater capture. • Supporting local governments with conservation-based water rate restructuring and mandatory water metering.
Technical Guidelines	• Partnering with other organizations (e.g., BC Water & Waste Association) to develop and adopt guidelines for rainwater harvesting and grey/ black water systems.
Financing and Incentives	• Creating targeted incentives for water conservation measures (e.g., high efficiency fixtures and rainwater harvesting).
Education and Capacity Building	• Supporting the creation of clear, plain language, and accessible information for building owners on water conservation measures. • Supporting industry capacity building for contractors, irrigation installers, and landscapers on opportunities for water conservation and proper installation techniques. • Supporting pilot projects and public sector leadership for innovative solutions for grey and black water systems in existing buildings.
Data and Transparency	• Requiring benchmarking for water consumption using a normalized water use intensity metric.

* Indicates an action that was prioritized by participants as one of the top regulatory actions for resilience for BSSB to explore in the near term.

WILDFIRE

Wildfire risk and burn area has increased over the past 30 years in B.C., and wildfire risk is expected to become more severe under future climate conditions.[9] Drier summers are projected to increase wildfire fuel loads in B.C. forests and the number of fire starts could increase during extreme heat waves and be exacerbated by the potential for more frequent lightning and windstorms.[10] Indeed, the Province of B.C.'s 2019 Preliminary Strategic Climate Risk Assessment identified "severe wildfire seasons" as the single highest climate change risk facing the province.[11] Notably, B.C. experienced its worst fire season on record in 2018, with a previous record set in 2017.[12]

Wildfire events pose a major risk of building damage, loss of life and a catastrophic risk of injury or hospitalization. Unmitigated buildings can also provide additional fuel that can intensify a wildfire and contribute to a wildfire's transition to nearby urbanized areas.[13] There are a number of factors that contribute to a building's ability to withstand wildfire, including landscaping and vegetation management, fire-resistant building materials and design, and proactive building maintenance.[14]

Identified Barriers

External partners identified several key challenges preventing the successful adoption of measures to mitigate wildfire risk in existing buildings.

- **Education/Awareness:** Limited awareness of wildfire risks and mitigation measures, even in high-risk areas. Despite the range of available educational materials on fire risk mitigation measures, they are not being accessed by those in need. For those who are aware of the risk, there can be limited perceived benefit from fireproofing as few actions can be taken to protect buildings in high-risk areas. Finally, there are few knowledgeable contractors to implement or market fireproofing measures to building owners.

- **Financial:** The capital cost and few incentives limit the implementation of fireproofing measures. Many buildings located in the wildland-urban interface (WUI) also have limited or no insurance for wildfire due to high insurance costs.

- **Regulatory:** The BCBC does not address wildfire risk directly, making the incorporation of wildfire mitigation measures into new construction requirements an important first step. Many local governments also do not require fireproofing measures in the WUI.

- **Technical:** FireSmart requirements can conflict with other resilience or decarbonization measures. For example, green roofs and using trees for shading can help prevent overheating but increase a building's risk from wildfire.

9 Jennie Wang and Katherine Strong, Environmental Fact Sheets: British Columbia's forest fires, 2018, (Statistics Canada, 2019). https://www150.statcan.gc.ca/n1/pub/16-508-x/16-508-x2019002-eng.htm
10 British Columbia, Preliminary Strategic Climate Risk Assessment for British Columbia, (2019).
11 Ibid.
12 British Columbia, Wildfire Averages. https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-statistics/wildfire-averages
13 FireSmart Canada, Wildland Urban Interface. https://firesmartcanada.ca/about-firesmart/#WUI
14 British Columbia, British Columbia FireSmart: FireSmart Begins at Home Manual. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/prevention-home-community/bcws_homeowner_firesmart_manual.pdf

Suggested Actions

The key actions suggested to support wildfire risk mitigation are noted below.

Regulation	• Requiring minimum levels of wildfire mitigation for existing buildings through the Alterations Code.* • Establishing a minimum requirement for roof coverings in high-risk areas.
Local Government Action	• Supporting local governments to implement National WUI Guide/FireSmart through development permits.
Financing and Incentives	• Creating financing and incentive programs to fund wildfire mitigation measures. • Working with the insurance industry to incentivize action through preferential rates. • Supporting communities to implement wildfire mitigation measures in the aftermath of a fire.
Education and Capacity Building	• Creating education and outreach campaigns to engage building owners before and after the wildfire season. • Providing training for builders and contractors on FireSmart principles. • Providing guidance for building code officials on WUI fire risk reduction. • Creating a training program for Realtors on the impacts of wildfire and mitigation measures for buildings. • Providing FireSmart case studies to demonstrate the value of wildfire mitigation measures.
Data and Transparency	• Creating a web-based tool that provides a risk index for building owners to understand their wildfire risk. • Including wildfire risk information to homeowners with EnerGuide Home Energy Assessments

* Indicates an action that was prioritized by participants as one of the top regulatory actions for resilience for BSSB to explore in the near term.

INDOOR AIR QUALITY

As the risk of wildfires in B.C. increases, so too does the prevalence of wildfire smoke and associated air quality impacts. Wildfire smoke is characterized by a high concentration of fine particulate matter (or PM2.5), which can infiltrate building envelopes and cause severe respiratory impacts when inhaled.[15] In 2018, air quality advisories lasted for more than 40 days in some regions of B.C., resulting in poor air quality in buildings without filtration or proper airtightness.[16] Air quality conditions can become more severe when wildfire smoke events compound with other sources of pollution, such as vehicle emissions or increased concentrations of ground-level ozone during hot summer days.[17] Extreme poor air quality events can have significant and broad-reaching impacts on human health, particularly among those with pre-existing respiratory conditions or other co-morbidities.[18]

Fortunately, there are a number of measures that can protect residents from poor indoor air quality, including increasing airtightness, outfitting mechanical systems with higher-rated filters (e.g., MERV 13 filters), providing mechanical cooling to allow windows and doors to stay closed during heat waves, and designating clean air refuge spaces with advanced filtration systems.

Identified Barriers

External partners identified several key challenges preventing the successful adoption of measures to address poor indoor air quality in existing buildings.

- **Education/Awareness:** Home and building owners do not routinely measure indoor air quality, and there is limited awareness of the associated health risks, and mitigation measures. HVAC contractors also have limited awareness of the value of heat recovery ventilator (HRV) systems, and the focus on energy efficiency may have the unintended consequence of exacerbating indoor air quality issues.

- **Financial:** The capital and operating costs of adding increased ventilation, filtration, and air sealing to existing buildings are prohibitive, and incentives are limited for implementing these measures.

- **Technical:** A lack of baseline data on indoor air quality and few standards for adequate ventilation levels in existing buildings. Incorporating whole building mechanical ventilation into older multi-unit residential buildings (MURB) is also technically very difficult, and causes significant costs and disruptions to residents.

- **Regulatory:** Enforcing indoor air quality standards is challenging for building officials.

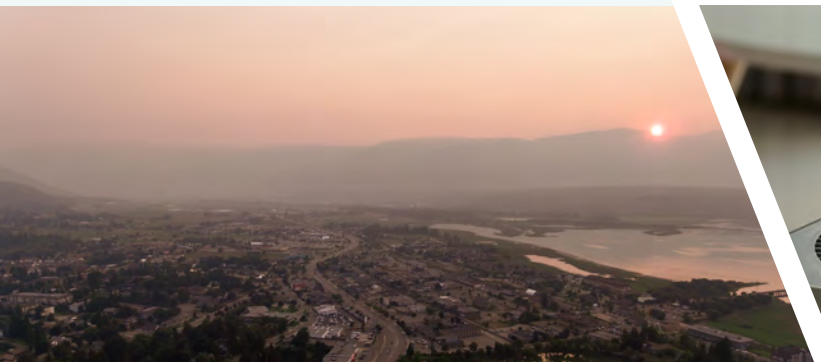
15 BC Lung Association, State of the Air Report 2021. https://bclung.ca/sites/default/files/1142-State%20Of%20The%20Air%202021_Final_Web.pdf
16 Climate Preparedness and Adaptation Strategy: Draft Strategy and Phase 1 Actions for 2021- 2022. https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/cpas_2021.pdf
17 British Columbia, *Preliminary Strategic Climate Risk Assessment for British Columbia*.
18 Ibid.

Suggested Actions

The key actions suggested to address poor indoor air quality are noted below.

Regulation	• Requiring indoor air quality monitors, controls, and/or filtration systems through the Alterations Code.* • Creating a clean air quality requirement that can be enforced by occupants. • Revising BCBC requirements for fire and smoke dampers (e.g., by offering an alternative compliance path).
Local Government Action	• Supporting local governments in bulk-buying room air purifiers that can be distributed during wildfire smoke events.
Technical Guidelines	• Developing a methodology to consistently define indoor air quality targets. • Supporting the development of best practices for alterations with heat pumps and ventilation systems for MURBs. • Supporting the development of guidelines for ventilation specifications for indoor air quality for commercial buildings. • Creating integrated guidelines for addressing energy efficiency, emissions, overheating, and air quality.
Financing and Incentives	• Creating incentives for air quality improvements, with a focus on vulnerable populations. • Integrating incentives for indoor air quality with overheating, energy efficiency, and carbon objectives.
Education and Capacity Building	• Providing education for homeowners on the benefits and co-benefits of renovations to address indoor air quality. • Providing education and licensing for renovation contractors on filtration and ventilation. • Supporting pilot projects that evaluate ventilation solutions.
Data and Transparency	• Improving data and monitoring of indoor air quality, including real-time data.

* Indicates an action that was prioritized by participants as one of the top regulatory actions for resilience for BSSB to explore in the near term.



OVERHEATING

Over the past century, B.C.'s average annual air temperatures have increased by 1.2°C. Under future climate change conditions, annual average temperatures are projected to increase to 3.2°C by 2050 and 5.4°C by 2080, with warmer winters, hotter summers, and more frequent and severe heat waves.[19] These warmer temperatures will have broad-reaching impacts, including overheating in buildings, significant impacts to human health due to heat stress and co-morbidities, and changes to growing seasons and plant and animal species.[20] In summer 2021, B.C. experienced a heat dome that had severe impacts on human health across the province. Many related deaths were among people aged 70 and older, and occurred inside a building, such as a home or hotel.[21]

As B.C. experiences warmer temperatures and more frequent and severe heat waves, there are several strategies that can be incorporated into existing buildings to manage overheating. Buildings can be cooled through a range of material and design choices (i.e., passive cooling) or through mechanical systems (i.e., active cooling). Cool roofs, high-performance window glazing, exterior shading, and passive ventilation are all examples of passive cooling. Mechanical ventilation, air conditioning, and heat pumps are examples of active cooling.

Identified Barriers

External partners identified several key challenges preventing the successful adoption of measures to address overheating in existing buildings, including the following:

- **Financial:** The capital and operation costs of cooling measures, which can be compounded by the need for electrical service upgrades for some buildings. Financing and incentive programs that exist are often complex and difficult to access (especially for electric buildings), and often don't align with an 'envelope first' approach.

- **Education/Capacity Building:** Low consumer and industry awareness of passive cooling measures, and a preference for short-term active solutions.

- **Technical:** A lack of baseline data on the number of buildings that experience overheating, or vulnerable populations who are at the greatest risk of experiencing heat related health issues. Passive measures can be technically challenging as they can be invasive and disruptive to occupants in a building. HOT2000, a popular energy modelling software program made by Natural Resources Canada, also has limitations for measuring indoor temperatures and cooling loads for Part 9 buildings.[22]

- **Regulatory:** The BCBC does not require new buildings to meet future cooling needs. There is also no standard for 'thermal safety or survivability' to ensure the safety of building occupants.

19 Pacific Climate Impacts Consortium, Plan2Adapt. https://services.pacificclimate.org/plan2adapt/app/
20 British Columbia, *Preliminary Strategic Climate Risk Assessment for British Columbia.*
21 British Columbia, BC Coroners Service (BCCS) Heat-Related Deaths – Knowledge Update, (Ministry of Public Safety & Solicitor General, 2021). https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/statistical/heat_related_deaths_in_bc_knowledge_update.pdf
22 The BC Building Code has two main categories of buildings, Part 9 (simple buildings) and Part 3 (complex buildings). Part 9 buildings are generally three stories or less, and under 600 square metres. Some examples include houses and duplexes, small apartment buildings, and small commercial buildings. Part 3 buildings are generally over three stories and more than 600 square metres. Some examples include shopping malls, office buildings, condos, apartment buildings, schools, theatres, and care facilities.

Suggested Actions

The key actions suggested to address overheating are noted below.

Regulation	• Requiring buildings to meet future cooling needs, defining maximum solar heat gain co-efficient (SHGC), adopting CSA EXP17: Guidance on the Best Practices for Mechanical Systems, and setting minimum indoor temperatures through the Alterations Code.* • Changing strata depreciation report requirements to include passive and active cooling improvements.*
Local Government Action	• Supporting local governments to reduce permit times for passive shading and heat pumps. • Supporting and aligning design guidelines revisions to address bylaw barriers to passive shading and heat pumps.
Technical Guidelines	• Creating guidelines for modeling overheating. • Expanding existing work on thermal comfort to Part 9 buildings. • Integrating overheating analysis into home energy audits.
Financing and Incentives	• Creating incentive programs for passive and active cooling measures, with a focus on vulnerable populations. • Requiring rental unit protection and establishing limits on rent increases to access financing and incentives.
Education and Capacity Building	• Providing education and toolkits for building owners and occupants. • Supporting pilot projects, competitions, and innovation hubs, including a focus on developing suitable exterior shading technologies.
Data and Transparency	• Creating requirements and strategies for modelling overheating. • Creating a modelling tool for Part 9 buildings for cooling and overheating analysis. • Including overheating information to homeowners with EnerGuide Home Energy Assessments.

* Indicates an action that was prioritized by participants as one of the top regulatory actions for resilience for BSSB to explore in the near term.

CROSS-CUTTING THEMES

At the final engagement session, attendees were asked to prioritize regulatory actions that were proposed throughout the climate resilience sessions because of the absence of a pre-determination on the best way to address the climate resilience of existing buildings. Through this exercise participants highlighted requiring buildings to meet indoor air temperature requirements, requiring minimum flood proofing, and requiring filtration systems to address indoor air quality as the top three regulatory priorities respectively.[23]

Several cross-cutting themes emerged through analyzing the feedback through the four resilience sessions. These are summarized below.

- **Role for regulatory requirements:** Attendees noted the benefits of regulation as a means of improving existing building climate resilience and protecting British Columbians' health and safety. Participants emphasized that incentives and education will likely not be enough to make significant improvements in existing building resilience. Throughout the discussion and prioritization process, participants highlighted the greater need for regulation to address certain hazards over others.

- **Address BCBC gaps for new construction:** Participants emphasized that ensuring that new buildings are resilient to future climate risks is critical for developing industry capacity and establishing a standard for meeting the same requirement for existing buildings.

- **Increase incentives:** The cost and payback periods for resilience measures were noted as a key challenge keeping building owners from taking action. Participants suggested increasing incentives across the board and creating targeted incentives for low-income residents.

- **Address barriers in the *Residential Tenancy Act* and *Strata Property Act*:** Participants noted that the *Residential Tenancy Act* and the *Strata Property Act* limit building owners' ability to implement some resilience measures. The *Residential Tenancy Act* restricts residential landlords' ability to pass alteration costs on to tenants, either directly or through submetering, even where tenants will incur savings through decreased utility costs. This is compounded by the cost pressures residential landlords are facing, including aging buildings needing non-energy efficient repairs, the new rental rate increase structure, rising property taxes, mortgage renewal requirements, and insurance requirements.

- **Empower tenants to take action to protect health and safety:** Attendees noted a need for increased tenant protections, noting their limited ability to protect themselves against climate risks. Again, this exacerbates the health and safety risk for lower-income and vulnerable residents.

- **Prioritize actions:** Building owners face a multitude of competing priorities and have limited resources to address them. Participants noted that building owners need individual guidance to prioritize short, medium, and long-term resilience and energy efficiency actions.

23 All priority actions are identified with an asterisk in the 'Summary Action' tables for each of the climate risks.

- **Effectively disseminate information to homeowners:** While there is an abundance of information on climate risks and mitigation measures, it is often too technical or inaccessible. Creating outreach campaigns that provide concise and plain language information that is disseminated through existing channels would help increase awareness.

- **Enhance industry capacity:** Attendees noted a need for more contractors and improved industry knowledge and experience for addressing climate risk and resilience. Contractor certification was noted repeatedly as one way to train industry and improve the quality of work.

- **Leverage energy efficiency programs and tools:** Existing or planned energy efficiency tools (e.g., home energy labeling, incentive, and financing programs) can be leveraged for climate resilience. External partners emphasized that this would simplify the process for building owners and enable the identification of synergistic measures.

What We Heard:
Increasing Energy Efficiency in Existing Buildings

REGULATING ENERGY EFFICIENCY

B.C. signed onto the Construction Codes Reconciliation Agreement which aims to reduce variations in provincial and territorial construction codes through adoption of model national codes. The Federal Government is also working to develop a model code for existing building energy efficiency upgrades, as committed in the Pan-Canadian Framework on Clean Growth and Climate Change. With the commitment to harmonize with national model codes, BSSB's energy efficiency engagement focused on the prescriptive approach proposed in the Joint Task Group on Alterations to Existing Buildings April 2020 recommended framework.[24] This approach would require building owners to make prescriptive energy efficiency improvements at the time of alteration or upgrade based on the scope of the project being undertaken.

As such, one of the seven engagement sessions was used to test a high-level framework for categorizing alteration triggers and energy efficiency upgrade requirements that would eventually guide the energy efficiency measures required by the Alterations Code (see Table 1). External partners were led through case studies and asked to provide feedback on the feasibility, limitations, and challenges of meeting these requirements.

24 https://nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/codes-canada-publications/final-report-alterations-existing-buildings

Table 1: Proposed framework for triggering upgrades[25]

	Maintenance, Repair or Replace with Similar	Minor Alteration	Major Alteration
Description	• Repair or replacement of any part or component for the purpose of its maintenance or to correct damage or failure • Removal and replacement of any existing part, component, equipment, or fixture using a new part, component, equipment, or fixture that serves the same purpose • Involves no more than one damaged or failed component of an assembly or system	• A standalone project – isolated and small in scope or building area • Does not: » Involve modification to structural elements » Impact other systems in other areas of the building » Add risk to the adjacent property » Render the active life safety system inoperative » Make the means of egress unusable	• Applies to everything else • Other systems need to be considered
Upgrade Requirement	• Exempt from requirement	• Energy efficiency improvements apply to project areas only and default to the current code requirements (unless relaxations are provided)	• Energy efficiency improvements apply to all directly affected systems • Other areas/elements that are indirectly impacted by the alteration in the building need to be determined. These areas need to at least comply with 'minimum mandatory alteration requirements' (to be determined).

Participant feedback on the regulatory approach is summarized below.

- **Regulation:** Some attendees noted that this would be an effective approach for incrementally improving the energy performance of buildings. Other participants expressed concern that this approach excludes carbon metrics and as such would be insufficient to meet B.C.'s sectoral climate targets.[26] Furthermore, attendees noted limitations with the prescriptive approach requiring piecemeal improvements to building components. Many participants favoured a whole building performance-based approach to guide building owners through a deep or stepwise alteration project.

  Participants noted that key terms used to interpret the regulation – including 'major and minor renovations' and 'like-for-like replacements' – need to be clarified to effectively ensure compliance. They also noted the

25 The Canadian Commission on Building and Fire Codes, Final Report – Alterations to Existing Buildings: Joint CCBFC/PTPACC Task Group on Alterations to Existing Buildings, (Natural Research Council of Canada, 2020). https://nrc.canada.ca/sites/default/files/2020-07/final_report_alterations_to_existing_buildings_joint_CCBFC_PTPACC_task.pdf

26 The Province has set climate targets for different sectors of the economy, including transportation, industry, oil and gas, and buildings and communities. The latter category has a 59 to 64% reduction target by 2030.

compliance pathways and the application of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1 or National Energy Code for Buildings (NECB) needed to be defined.

Attendees shared that the regulatory approach would need to be designed to be simple, flexible, be phased with advanced notice for building owners, and well-aligned with existing and upcoming regulatory requirements. Specifically, addressing the potential overlap with the Province's highest efficiency space and water heating equipment requirement and the City of Vancouver's Building Performance Standards.

Finally, participants representing residential landlords highlighted the need for distinct consideration for the purpose-built rental sector given the already restrictive legislative environment landlords operate within. It was noted that additional regulation may disincentivize actions that landlords are already taking.

- **Supporting local governments:** Participants noted that many potential Alterations Code requirements discussed do not currently require local government permits and expressed concern that local governments would not have the capacity to enforce the associated requirements. Participants also noted a need to clarify Technical Safety BC's role in enforcement via electrical permits.

- **Education and capacity building:** Attendees suggested that potential requirements could be challenging for building owners to understand, and that education and decision-making assistance will be necessary to help building owners understand the scope and implications of the Alterations Code.

- **Financial:** Participants cautioned triggering a prescriptive requirement could snowball into a much larger alteration project because of issues like asbestos or mold. Furthermore, alteration requirements may accelerate timelines for demolition, sale, and redevelopment of existing buildings; potentially displacing tenants, reducing the number of affordable rental units, increasing the consolidation of property ownership among large corporate landlords, and increasing embodied carbon. Some of the energy efficiency measures were also viewed as costly, with long payback periods and little energy or carbon savings.

- **Data and transparency:** Participants suggested that the Alterations Code be supported by long-term planning and decision-making tools for building owners to support more holistic planning for building performance and resilience.

Attendees explored 12 case studies, three of which are summarized below to provide an overview of the type of technical feedback received.

Envelope Case Study: Single-Family Dwelling – Window and Wall Cladding

Building Description	Example Alteration
• Single-family home • Built in the 1960s • Located in Kamloops • Climate Zone 5	• Replacement of original single-pane, non-thermally broken aluminum framed windows. • Replacement of original cladding with new lapped wood cladding.

Questions	Response
Which trigger do you think best applies to this type of alteration?	**Selection:** System Upgrade **Rationale:** • It could be considered a repair from a homeowner's perspective. • It could be considered a system upgrade—especially if we're trying to improve the efficiency of the building. • This could also be considered maintenance as these are components that will fail over time. Alternatively, it could be considered preventative maintenance to avoid larger failures later. • Without performance improvements, there will not be another opportunity to improve the envelope before 2050 (without replacing components before the end of life).
Would this alteration be considered exempt, minor, or major?	**Group 1 Selection:** Major Upgrade **Rationale:** • It could start minor and turn into major. It will depend on the house itself and how it was built (e.g., asbestos). • It is a major upgrade, because it is a significant project that costs a lot of money. **Group 2 Selection:** Minor Alterations **Rationale:** • It is reasonable to require improvements in thermal performance. • Package may be overwhelming for a homeowner. • Not clear why minor alternations are not mandatory.

What are the potential implications of characterizing the alteration in this way?

Technical

- Require thermal-protected windows and air tightness testing.
- Triple pane windows should be required (especially for new construction).
- Not all manufacturers have a frame that supports triple-panes. This could eliminate some manufacturers. Additional structural upgrades may be needed to support triple pane windows.
- Air sealing for recessed lights could reduce heat loss; however, it may be overly intrusive as a requirement.
- Need to consider geographical construction practices (e.g., rain screens are not needed in Kelowna).
- Minor interior renovations should not trigger upgrade requirements.
- Crawlspaces should be considered, as 22% of heat loss is from unprotected ductwork.

Cost-Effectiveness

- Without a performance target, there may be a significant costs to building owners with minimal energy efficiency gain.*
- Making piecemeal upgrades, and not considering the whole building, may be more costly and create unintended consequences in the long term.*
- There is a significant cost to not taking action. Business owners need to be supported in preparing for the new economy.
- Consider the labour costs and marginal material costs for an energy efficiency requirement (i.e., what is the cost differential between one inch and three inches of wall and insulation?)

Enforcement

- Enforcement (i.e., permits/inspections) is a significant challenge, particularly for smaller local governments.
- Not enough oversight of Energy Efficiency Act.
- There are challenges with point-of-sale enforcement.

*Indicates points that were raised multiple times throughout the breakout group.

Envelope Case Study: Commercial – Comprehensive Envelope Alteration

Building Description	Example Alteration
• Four-storey commercial • Built in 1982 • Located in Victoria • Climate Zone 4	• Aging envelope systems. • Updating above-grade walls and windows and the main flat roof, which consists of a built-up roof system. • Punched windows are non-thermally broken aluminum framed double-pane. • Cladding consists of metal panel installed over a water resistive barrier, gypsum sheathing and 2x4 steel stud infill walls and concrete.

Question	Response
Which trigger do you think best applies to this type of alteration?	**Selection:** System Upgrade **Rationale:** • The term 'updating' needs to be clarified. • There is not enough information to determine the trigger. It would depend on if this alteration was the result of leaking or mold issues. • Trigger: » System upgrade if the whole wall was upgraded. » Replacement with similar if only replacing some components (i.e., over 25%). » Repair if only replacing a small portion of the wall (e.g., due to leak).
Would this alteration be considered exempt, minor, or major?	**Selection:** Major Upgrade **Rationale:** • This upgrade has implications for multiple envelope components and could have implications for HVAC (e.g., sizing). • The scale of the project is unclear. Measuring the proposed change from a baseline is a clearer and preferable trigger.

What are the potential implications of characterizing the alteration in this way?	**Technical** • Redeveloping may be a better alternative. • There are many safety considerations, including asbestos, etc. • There is an opportunity to build resilience into these upgrades. • Cladding is not an energy measure and should be exempt unless the renovation affects insulation. • Opportunity for re/retro commissioning. **Cost-effectiveness** • Costs are substantial for this kind of alteration, especially if tenants are not relocated. • If the tenant needs to relocate this would present a large challenge. • Consider what the owners can afford.

*Indicates points that were raised multiple times throughout the breakout group.

Envelope Case Study: Multi-Unit Residential Building – Conversion from Residential to Office Space

Building Description	Example Alteration
• Rental apartment – reinforced concrete • Built in the 1970s (pre-dates NECB/ASHRAE 90.1) • Located in Burnaby • Climate Zone 4	• Converting apartment building to a doctor's office—each office to occupy what was previously an apartment. • Removal and replacement of existing unitized curtain wall system with a new unitized curtain wall system with low-E glazing. • Curtain wall system has a window to wall ratio of 60%.

Questions	Response
Which trigger do you think best applies to this type of alteration?	**Selection:** Change of Occupancy (primary)/ System Upgrade (secondary) **Rationale:** • Space reconfiguration is a possibility in this scenario. • Based on the definition provided by BSSB, the envelope work would be considered like-for-like. • If the upgrade focused on energy, this could be considered a system upgrade. • Change of occupancy does not necessarily affect the extent of energy upgrades.
Would this alteration be considered exempt, minor, or major?	**Selection:** Major Upgrade **Rationale:** • Replacing an entire building envelope would constitute a major upgrade.
What are the potential implications of characterizing the alteration in this way?	**Technical** • Like-for-like is not acceptable from an energy perspective. Like-for-like should not lead to an exemption. Even if there is just a curtain wall upgrade, there should be performance requirements associated with it. • Ventilation requirements need to be considered. • Energy and structural assessments may be required to find out the extent of the upgrade required. • Consider: » The airtightness and HVAC implications of replacing the building envelope » Change of occupancy triggers for filtering and/or ventilation upgrade requirements » Location-specific climate risks are assessed in this envelope/HVAC upgrade. **Cost-effectiveness** • Cost of this upgrade can be major. • Cost and benefit analysis should be included within the scope. Consider the extent of reasonable projected future costs (i.e., carbon tax, utility costs). Also consider the cost of inaction (i.e., not upgrading to a higher standard could create a climate liability). • Cost should be considered in light of the value created (e.g., new occupancy and greater rents) **Enforcement** • Step Code is not an appropriate compliance method for existing buildings.

*Indicates points that were raised multiple times throughout the breakout group.

SUPPORTING ENERGY EFFICIENCY

To complement a focus on the Alterations Code, participants were asked in a second session about supporting programs necessary to ensure the effectiveness and ease the implementation of the regulation. External partners provided insights on the potential barriers that could prevent building owners from meeting the potential requirements outlined in an Alterations Code.

Identified Barriers

Key challenges facing energy efficiency regulation through the Alterations Code are summarized below:

- **Regulation:** Rent control policies in the *Residential Tenancy Act* do not allow landlords to pass any of the costs of energy efficiency improvements to tenants. Likewise, the *Strata Property Act* does not mandate long-term capital planning and depreciation reports typically focus on like-for-like replacement.

- **Local Government:** Many local governments will have limited capacity to enforce these requirements as many of the upgrades under consideration for the Alterations Code do not currently require permits. Local governments already have long permitting timelines that are causing construction delays.

- **Education and Capacity:** Education is needed for building owners, Realtors and building officials, and training is needed for the industry to meet the increased renovation demand. There are also currently (as of Winter 2021) supply chain limitations that are causing long delays in receiving equipment and materials.

- **Financial:** The cost of alterations prevents building owners from implementing alterations. The cost barriers are driven by the upfront and operating costs of measures, the low cost of natural gas compared to electricity, tiered electricity rates, and the cost of electricity service upgrades. Additionally, there is a lack of incentives for certain building types and the administrative requirements for incentives can limit uptake.

- **Data and Transparency.** There is limited access to building-level energy efficiency and carbon data.

Suggested Actions

To help manage the challenges noted above, the following suggestions were made for the design and implementation of supporting measures. As noted earlier, some of the actions that external partners suggested fall under BSSB's jurisdiction, while others will require leadership from other ministries, levels of governments, or organizations.

Regulation	• Amending the *Residential Tenancy Act* to allow landlords to recoup alteration costs. • Providing more lead time to phase in the requirements for residential rental buildings. • Amending the *Strata Property Act* to include energy efficiency improvements in strata depreciation report requirements. • Amending the *Utilities Commission Act* to remove barriers to low-carbon and equitable energy. • Creating a licensing program for renovation contractors. • Assessing the Alterations Code requirements using an updated Social Cost Test.
Local Government Action	• Aligning the Alterations Code compliance process with local government permitting requirements. • Granting local governments authority to implement building performance standards. • Granting local governments authority to implement the highest efficiency space and water heating equipment requirement in advance of the Province's 2030 implementation timeline.
Technical Guidelines	• Creating guidelines for energy efficiency alterations by building systems.
Financing and Incentives	• Providing funding for electrical capacity upgrades. • Changing BC Hydro two-tiered rate structure to remove barriers to electrification. • Accelerating the implementation of a Property Assessed Clean Energy (PACE) financing program. • Creating targeted incentives for strata. • Creating a concierge service to support single-family homeowners through the alteration process.
Education and Capacity Building	• Providing education on carbon and energy efficiency alterations for all sectors. • Creating one comprehensive online resource for building owners. • Increasing the number of qualified contractors. • Creating a system for quality assurance and monitoring. • Pilot deep energy and emissions renovations on residential rental buildings to better understand the challenges and opportunities for this sector.
Data and Transparency	• Creating a mandatory energy benchmarking and disclosure program. • Accelerating the implementation of the mandatory home energy labelling program.

Integrating Energy Efficiency, Decarbonization, and Climate Resilience

The final session solicited feedback on the integration of climate resilience, energy efficiency, and carbon priorities for existing buildings. There are many potential synergies and conflicts in achieving mitigation and resilience objectives through a single project or alteration. Thinking holistically and striving to integrate programs and resources will support building owners to cost-effectively address building performance and climate resilience without unintended consequences. To help achieve this integration, external partners suggested the following actions.

Regulation	• Creating airtightness requirements for existing buildings to address indoor air quality and energy efficiency. • Requiring passive cooling to reduce total building energy use in summer months while reducing overheating risk. • Requiring heat pumps to improve indoor air quality, reduce overheating risk and lower energy use and carbon emissions. • Allowing flexibility in the Alterations Code requirements to ensure alteration measures are feasible for the financial capacity of specific communities. This flexibility is critical for financially constrained rural, remote, and Indigenous communities.
Technical Guidelines	• Ensuring a holistic approach to alterations that assesses both risks and opportunities. • Providing technical guidance by building systems (e.g., mechanical and envelope) on all resilience and energy efficiency considerations for an alteration. • Focusing on envelope improvements to address overheating, indoor air quality and energy efficiency. • Supporting diverse examples of synergistic solutions, through demonstration projects and public sector leadership.
Financing and Incentives	• Developing incentives that address both resilience and energy efficiency. • Providing additional incentives or top-ups for passive design measures. • Creating incentives and decision-support tools for stratas and rental buildings that address emissions, cooling, and air filtration. • Expanding low-income and affordable housing programs to address existing gaps.

Education and Capacity Building	• Ensuring that education and communication materials bring together energy efficiency, resilience, and co-benefits. • Creating an education campaign for building owners on the benefits of envelope upgrades for energy efficiency and resilience. • Building up the social value of energy efficiency to make homeowners value environmental improvements as much or more than aesthetic changes. • Training energy advisors to also evaluate a building's vulnerability and resilience to climate risks. • Creating more standardized accreditations for trades throughout B.C. and Canada.
Data and Transparency	• Benchmarking both water and energy use in large buildings. • Creating a time-of-sale home labeling requirement for resilience, energy efficiency, and carbon. • Creating long-term planning and decision-making tools for carbon and resilience. • Requiring the use of projected future climate files in designing and renovating buildings to ensure resilience, thermal comfort, and efficiency. • Creating an easy-to-understand metric to quantify the resilience of existing buildings (i.e., a 1-10 rating).

Next Steps

BSSB will use the feedback received during this engagement to determine appropriate climate resilience actions and to refine the Alterations Code approach for energy efficiency in concert with the Joint Task Group on Alterations to Existing Buildings. BSSB's actions will be communicated through the Fall 2022 release of the Existing Buildings Renewal Strategy.

Preliminary Research	Policy Development	Final Strategy	Prepare Requirements	Adoption
2019	2020	2022	2022-2024	2024
Develop Policy and Technical Stratgy			**Codes & Standards**	**Implementation**
Fall 2019	Fall 2021	2022	2022-2024	2024
Engagement #1 Listen & Learn	Engagement #2 Discuss Draft Strategy & Options	Engagement #3 Share & Refine	Industry Collaboration	Build Capacity

APPENDIX A: List of Participating Organizations

- 3West Building Energy Consultants Inc.
- Aboriginal Housing Management Association (AHMA)
- AME Group
- Aviva Canada
- B.A. Blackwell & Associates Ltd.
- Baptist Housing - Seniors Living
- BC Construction Association – Vancouver Island
- BC Housing
- BC Hydro
- BC Non-Profit Housing Association (BCNHPA)
- BC Real Estate Association
- Bernhardt Contracting
- Building Officials' Association of BC (BOABC)
- Building Owners and Managers Association of BC (BOMA BC)
- Canada Green Building Council (CaGBC)
- Canadian Green Building Council
- Canadian Home Builders Association (CHBA) – BC
- Canadian Home Builders Association (CHBA) – Central Interior
- Canadian Home Builders Association (CHBA) – Vancouver Island
- Canadian Interagency Forest Fire Centre
- Canadian Urban Sustainability Practitioners
- Capital Regional District
- Cariboo Regional District
- City of Campbell River
- City of Grand Forks
- City of Kamloops
- City of Kelowna
- City of Maple Ridge
- City of Nelson
- City of North Vancouver
- City of Penticton
- City of Prince George
- City of Richmond
- City of Surrey
- City of Terrace
- City of Vancouver
- City of Vernon
- City of Victoria
- City of Williams Lake
- City Green Solutions
- Community Energy Association
- Concert Properties
- Condominium Homeowners Association (CHOA)
- Co-operative Housing Federation of BC
- Co-Operators
- Diamond Head Consulting
- District of Lantzville
- District of North Vancouver
- District of Saanich
- District of Squamish
- District of Summerland
- District of Tofino
- EcoTrust Canada
- Enerlytics Building Performance Ltd.
- Engineers and Geoscientists BC (EGBC)

- Fenestration BC
- Fenestration Canada
- Focal Engineering
- FortisBC
- Government of Nova Scotia
- Green Shores
- HCMA Architecture + Design
- HDR Architect
- Heritage BC
- Hollyburn Properties
- Institute for Catastrophic Loss Reduction (ICLR)
- Insurance Bureau of Canada
- Insurance Council of BC
- Intact Centre on Climate Adaptation
- LandlordBC
- Metro Vancouver
- Natural Resources Canada
- Natural Resources Canada - CanmetENERGY
- Okanagan Basin Water Board
- Pembina Institute
- Planning Institute of BC
- Professional Association of Managing Agents
- Providence Health Care
- Pry Science Consulting
- QuadReal Property Group
- RDH Building Science
- Real Estate Foundation of BC
- Regional District of Central Kootenay
- Regional District of East Kootenay
- Regional District of Kootenay Boundary
- Resort Municipality of Whistler
- Simon Fraser University Action on Climate Team
- Stewardship Centre BC
- Technical Safety BC
- Thermal Environmental Comfort Association (TECA)
- Thrive Consulting
- Township of Langley
- Turnleaf Consulting Inc.
- Union of BC Municipalities
- University of British Columbia (UBC)
- Urban Development Institute (UDI)
- Vancouver Island Strata Owners Association
- Zero Emissions Building Exchange (ZEBx)