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Sustainable and Affordable Housing:

Strategies, innovations, and policy directions

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Foreword

The Pacific Institute for Climate Solutions (PICS) was created in 2008 with an endowment from the Government of British Columbia to support evidence-based climate policy. This investment in our university-based network was groundbreaking and remains a core strength of the organization.

In fulfilment of PICS' mandate, this Insights Series elevates leading evidence at a pivotal moment for climate policy in B.C. Drawing on academic expertise from across the province, the series is designed to inform the 2025 independent review of CleanBC, British Columbia's plan to reduce greenhouse gas emissions and combat climate change.

When CleanBC was launched in 2018, climate action was a public and political priority. While concern about climate change remains widespread, it has increasingly been overshadowed by more immediate pressures, such as rising costs of living, strained public services, and growing geopolitical instability. Intensifying climate impacts exacerbate each of these challenges, which increases the complexity and opportunity for bold climate solutions. Now is not a time to retreat from ambition. Rather, it is a time for integrated solutions and public policy that unlock energy transformation, reduce climate risk, and increase prosperity at local, regional, and global scales.

The Insights Series highlights the deep connections between climate action and other top issues facing British Columbians: housing, affordability, economic competitiveness, Indigenous reconciliation, regional economic development, and fiscal efficiency.

B.C.'s climate leadership can be renewed—not by repeating the strategies of the past, but by evolving CleanBC to meet the realities of today.

Territory acknowledgement: At the University of Victoria, where the Pacific Institute for Climate Solutions (PICS) is hosted, we acknowledge and respect the Lək̓ʷəŋən (Songhees and Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ Peoples whose historical relationships with the land continue to this day.

PICS and its university network have campuses across the province known as British Columbia. We respect and acknowledge the many unceded traditional territories and Nations where PICS universities stand including: xʷməθkʷəy̓əm (Musqueam) • Sḵwx̱wú7mesh Úxwumixw (Squamish) • səl̓ilw̓ətaʔɬ (Tsleil-Waututh) • q̓íc̓əy̓ (Katzie) • kʷikʷəƛ̓əm (Kwikwetlem) • Qayqayt • Kwantlen • Semiahmoo • Tsawwassen • Stó:lō • Syilx (Okanagan) • Dakelh (Carrier) territory: Lheidli T'enneh, Lhtako, Nazko, Lhoosk'uz • ?Esdilagh, a Tsilhqot'in Nation • Dane-zaa territory: Doig River, Blueberry River, and Halfway River • Tsimshian territory: Kitsumkalum, Kitselas, Lax Kw'alaams, and Metlakatla • and Gitwinksihlkw, a Nisga'a Village.

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The homes built today will likely still be lived in 50 years from now, well into an era of intensified climate hazards and rapid technological change. *iStock*

Executive summary

British Columbians are facing a dual challenge: finding homes they can afford and ensuring those homes are safe in a changing climate. The province is now experiencing its largest wave of housing construction in decades, and the choices made in this moment, how and where new homes are built, will shape the health, costs, and security of households for generations. If these homes are not designed to be low-carbon, resilient, and future-ready, today's housing boom will only deepen tomorrow's problems, leaving families with dwellings that are unsafe, costly to operate, and difficult to upgrade.

> *"This construction surge is a once-in-a-generation opportunity to reshape housing for affordability, safety, and sustainability."*

Homes British Columbians live in are not on track to meet climate or affordability needs. Since 2018, heat pump adoption has surged and building codes have raised efficiency standards, but residential greenhouse gas emissions have barely budged; in fact, they remain higher than in 2007. At the same time, the 2021 heat dome showed how deadly it can be when homes are not designed for extreme heat, while the 2021 floods underscored the risks of building in hazard-prone areas. These gaps arrive just as thousands of new homes are being planned, making today's design choices decisive for both family well-being and the province's climate future.

This construction surge is a once-in-a-generation opportunity to reshape housing for affordability, safety, and sustainability. The homes built today will likely still be lived in 50 years from now, well into an era of intensified climate hazards and rapid technological change. To ensure homes serve British Columbians rather than burden them, new housing will need

to be climate-smart, climate-adaptable, and future-ready. That means homes designed with low-carbon materials and efficient systems, sited to avoid hazards, and built with the flexibility to integrate emerging technologies like solar, electric vehicle (EV) charging, and energy storage. Decisions made now will lock in not only emissions, but also household costs, resilience, and community well-being for generations.

B.C. has clear opportunities to align housing supply with climate ambition. These include scaling low-carbon and circular construction, mobilizing the forest sector and bio-based products, and accelerating adoption of new clean technologies. Recent housing reforms, such as small-scale multi-unit zoning and transit-oriented area frameworks, can also support more sustainable growth if paired with resilience standards and low-carbon requirements.

Meeting this moment requires more than incremental change. CleanBC can align B.C.'s housing boom with long-term affordability and resilience by embedding climate into the rules, investments, and partnerships that shape new construction.

This paper outlines four pathways forward:

- aligning codes and financing so the safest and cleanest homes are also the easiest to build
- scaling skills and supply chains for low-carbon construction
- deepening collaboration among governments, Indigenous communities, industry, and researchers
- expanding data and benchmarks to track progress

Together, these shifts can ensure that the homes British Columbians move into over the next decade are not only affordable today, but safe, efficient, and adaptable for the decades ahead.

British Columbians are witnessing the consequences of having a home that is not ready for climate impacts. *iStock*

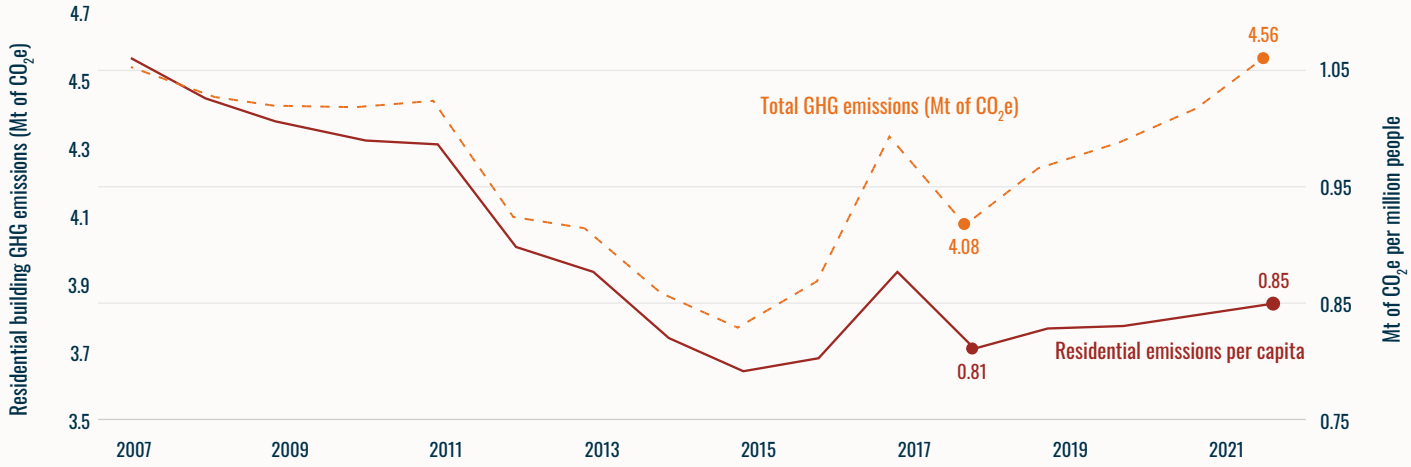
1. Convergence of housing and climate

Over the last five years, B.C. has experienced rapid population growth, sharp real-estate swings, and worsening housing availability. In response, the provincial and federal governments have committed to an unprecedented wave of residential construction. As this build-out accelerates, how homes are designed, and the energy they use, will determine whether B.C. meets its CleanBC targets. Since 2018, heat-pump adoption has surged, and the BC Building Code has raised efficiency standards. Yet residential emissions remain off track, even on a per-capita basis (Fig. 1).[1] At the same time, climate risks are intensifying.[2] These gaps arrive just as B.C. builds homes at a pace not seen in decades, making the nature of new construction decisive for climate outcomes.

> *"The 2021 heat dome demonstrated just how deadly it is when homes are not designed for B.C.'s climate changing risks."*

Simultaneously, British Columbians are witnessing the consequences of having a home that is not ready for climate impacts. The 2021 heat dome demonstrated just how deadly it is when homes are not designed for B.C.'s climate changing risks. And, major successes, like the record number of heat pumps installed in 2023, have also highlighted that it is far easier to plan for new technologies during initial construction than down the road.

FIG 1: RESIDENTIAL GREENHOUSE GAS EMISSIONS HAVE RISEN SINCE 2018 IN BRITISH COLUMBIA



Residential greenhouse gas emissions in British Columbia. In 2021, the Government of B.C. set the target to reach a 59 per cent to 64 per cent reduction in residential and community emissions by 2030 from 2007 levels. Residential building emissions are the largest source of emissions in this category. As of 2022, residential building emissions were up one per cent compared to 2007.

These climate and performance gaps are emerging just as B.C. begins its largest housing construction in decades—making the methods and locations of building crucial for both climate goals and safety of residents.

Rapid growth in new construction

Since the launch of CleanBC in 2018, rapid population growth—driven by immigration and interprovincial migration—has collided with the need to expand housing supply.[3] Governments have responded with faster approvals, zoning reforms, and infrastructure investment. Still, labour and materials constraints, higher borrowing costs, and limited municipal capacity slow delivery. Fragmented roles across provincial, federal, local, and Indigenous governments, and apatchwork of incentives further diffuse effort.

Financing situations remain a central factor shaping the nature of new builds. Higher interest rates, high permitting fees, and rising construction and insurance costs have eroded project viability and increased project risk. In this environment, low-carbon and resilient designs can be sidelined if the upfront costs are perceived as a barrier, particularly when appraisal and underwriting models fail to fully recognize their long-term value. Without deliberate policy alignment, market pressures risk locking in high-emissions systems and putting homes in hazard-prone areas, creating costly retrofits and climate risks for decades to come.

> *"Without deliberate policy alignment, market pressures risk locking in high-emissions systems and putting homes in hazard-prone areas."*

In 2023, B.C. experienced its worst wildfire season on record, with 2.84 million hectares burned, significantly exceeding the 20-year average and the previous record from 2018.[4] This emphasizes the necessity for enhanced resilience to address the challenges posed by climate-induced fires on housing.

Decisions made today about housing will influence the affordability, safety, and climate emissions for decades to come. Homes built in 2025 will likely be relied upon for the next 50 years or more—well into an era of intensified climate

hazards, technological advances, and demographic shifts. With so much new supply in the pipeline, design choices now will lock in operating emissions, resilience, and retrofit costs for generations.

Adaptable and dependable homes for a changing climate

To meet affordability and sustainability concerns, British Columbians need new housing to be climate smart, climate adaptable, and future ready.

- **Climate-smart:** Low-carbon performance across the life cycle, lower embodied carbon in materials, tight envelopes, and electrified space/water heating and cooling. Residential buildings account for ~4.5 per cent of B.C.'s GHGs;[5] scaling high-efficiency, all-electric systems is essential to meet CleanBC targets while lowering bills.
- **Climate-adaptable:** Sited and designed for extreme heat, wildfire smoke, floods, and landslides. Without hazard-informed land use, growth at riverbanks and the wildland–urban interface raises exposure and recovery costs.
- **Future-ready:** Built for tomorrow's systems, solar-ready roofs, EV-ready parking, heat-pump-ready electrical capacity, battery-ready space, and district-energy-ready connections, to avoid stranded assets and expensive retrofits.

Meeting climate, safety, and future-readiness needs requires deliberate shifts in construction methods, materials, and technologies. *iStock*

B.C. has a pivotal opportunity to align housing supply with climate goals. Recent reforms, such as Bill 44's small-scale multi-unit upzoning and Bill 47's transit oriented area framework, can reshape where and how we build.[6] But without hazard informed land use and resilience standards, and clear low carbon requirements, there is risk that B.C. will worsen affordability and climate issues by building a generation of homes that are unsafe, inefficient, and expensive to upgrade.[7]

Meeting these climate, safety, and future-readiness needs requires more than incremental change; it calls for deliberate shifts in construction methods, materials, and technologies. In this paper, we draw the connections between housing and climate policy and outline the key opportunities that could get B.C. back on track to meet its housing and climate goals.

Townley Place in Victoria was redeveloped into a multi-generational community of seniors' apartments and family townhouses. The rezoned wood-frame project emphasizes affordability and sustainability, integrating passive design, walkability, urban gardening, and energy efficiency while enhancing neighborhood diversity, vitality, and environmental stewardship. Source

2. Housing for a sustainable future

A sustainable house is climate-smart, climate-adaptable, and future ready. Expanding British Columbia's sustainable housing stock is core to addressing long-term housing affordability needs.

This section outlines three opportunities to accelerate sustainable housing in B.C. These opportunities are:

- Low-carbon and circular construction
- Forest sector, clean economy, and bio-based products
- New technologies

> *"The circular construction principle focuses on extending the life of materials, reducing construction and demolition waste."*

Low-carbon and circular construction

An eco-friendly approach to building design emphasizes using sustainable materials that produce fewer GHGs and reducing energy consumption during construction and in daily use. This results in efficient housing that contributes to environmental protection. The circular construction principle focuses on extending the life of materials by designing for adaptable use, disassembly, and reuse, thereby reducing construction and demolition waste. Below, we outline key low-carbon and circular construction methods that are emerging and relevant to B.C.

i. Material passports, life cycle assessment requirements

Material passports are a digital tool used to track critical data about construction materials, including origin, manufacturing date, durability, recyclability, environmental footprint, and potential for reuse or recycling.[v] Material passports can help companies adapt to dynamic trade policies; to change practices from a traditional approach in which materials are used and then discarded; and to a circular principle in which materials are reused or recycled. The method aims to identify and reclaim valuable materials at the end of a building's lifecycle.

Life Cycle Assessment (LCA) is used to systematically evaluate the environmental impacts of a building throughout its life cycle.[9] LCAs are increasingly used in design choices, comparing alternative materials, and meeting regulatory or certification requirements, such as LEED and the emerging net-zero carbon frameworks. Governments and industries are increasingly using LCAs at the design stage of new buildings or major retrofits to address climate policy goals. Some jurisdictions have set benchmarks on embodied carbon consideration that must be verified through LCA.[10]

> *"Reducing embodied carbon is equally important to reducing the emissions associated with B.C.'s new homes."*

Materials passports and LCAs enable a data-driven, transparent, and circular approach to construction, aligning the building sector with environmental and climate goals. Many European countries are at the forefront of incorporating the idea of material passports and LCAs into building construction, operation, and end-of-life management. Pioneering initiatives like Concular (Germany),[11] BAMB (Belgium),[12] and Madaster (Netherlands)[13] demonstrate the critical role of digital tools in tracking materials across their entire lifecycle. These efforts are further strengthened by EU-wide policies, including the Circular Economy Action Plan[14] and the European Green Deal,[15] which promote sustainable materials use, design for disassembly, and recycling.

British Columbia has not formally implemented digital material passports in the construction industry; however, several initiatives, such as the Vienna House project,[16] are actively spreading the foundation for their future adoption. Additionally, many progressive building projects across the province are incorporating design for disassembly, LCA carbon analysis, and the selection of low-impact materials. Although fully standardized digital passports are currently in the initial phases, these initiatives collectively show an increasing willingness in B.C.'s construction industry to adopt circular economy principles.[17]

Left: Rendering of Vienna House, in Vancouver, Canada. **Right:** Rendering of Vancouver House, in Vienna, Austria. The Vienna House project aims to prove that affordable housing can be highly livable, near zero-carbon, and cost-effective to both build and operate. This project is part of a multi-year sustainable-building collaboration between the two cities. Source

ii. Embodied carbon consideration (e.g., Vancouver/Nelson pilot programs)

Embodied carbon is the total carbon dioxide emissions from building materials, including extraction, transportation, manufacturing, and disposal. In B.C., embodied carbon is responsible for a growing share of a building's total lifecycle emissions, especially in new and energy-efficient buildings. While operational emissions (from heating, cooling, lighting, etc.) have declined due to high efficiency standards and cleaner technologies, the emissions embedded in construction materials remain significant.

Reducing embodied carbon is equally important to reducing the emissions associated with B.C.'s new homes. This has led to a focus on using low-carbon materials, reusing building materials, and applying LCA carbon analysis throughout the construction process. The City of Vancouver's Green Building

Policy[10] introduced an incentive program in 2022 for homes with low embodied carbon emissions. Vancouver mandated reporting and limiting embodied carbon in new Part 3 buildings. Recently, a 10 per cent reduction in embodied carbon will be required for all new Part 3 city buildings and a 20 per cent reduction for low-rise buildings using wood or mass timber.

The City of Nelson, B.C., created a framework to include embodied carbon considerations into city buildings in its material procurement policy.[18] The initiative focuses on reducing the emissions of materials used in buildings within the city. It seeks to make more eco-friendly choices when purchasing materials. The plan includes finding ways to cut down on carbon during materials procurement, educating city workers and suppliers about embodied carbon, and creating easy-to-use material guidelines. The strategy is still in the early stages of implementation.

A modular housing development manufactured by Lindbäcks Bygg, Sweden's premier modular home manufacturer. Source

iii. Modular and prefabrication construction as low-waste and efficient methods

Modular and prefabricated construction is an off-site manufacturing process that occurs at a specialized facility, where various materials are combined to form components or parts of a larger final onsite assembly. Modular and prefabricated construction methods present several advantages in terms of construction efficiency, housing affordability, and sustainability. They enhance quality and safety and reduce construction time, costs, material waste, and GHG emissions.[21]

Modular construction has steadily grown in Canada over the past decade as a solution to high costs, protracted construction, and labour shortages. In 2023, Canada's modular construction market was valued at approximately $7.1 billion, having grown at a rate of about 6.3 per cent annually since 2018.[19] Approximately 40 per cent of Canada's modular construction output is dedicated to the residential sector, primarily driven by the growing demand for affordable housing in urban centers such as Toronto, Vancouver, and Montreal.

“Modular construction has steadily grown in Canada over the past decade as a solution to high costs, protracted construction, and labour shortages.”

A notable example of the large-scale acceptance of modular construction is Sweden, with approximately 85 per cent of single-family homes made from prefabricated timber, driven by the abundance of local wood and harsh winter conditions.[20] Similar circumstances in B.C. suggest potential for widespread adoption of timber-based modular construction in the province.

These methods also encounter barriers, including the need for detailed planning, limited design flexibility, logistical issues in transporting large parts/components, building codes, and a lack of familiarity by permitting authorities. To promote the use of modular construction in B.C., it is essential for the CleanBC, industry leaders, regulators, educational institutions, and the research community to collaborate effectively. Key steps to improve modular construction in the province include aligning building regulations, streamlining approval processes, enhancing collaboration between universities and industry, investing in factories for modular components, and developing training programs/curricula for the workforce in these building design and construction strategies.

Forest sector, clean economy, and bio-based products

Forest products are becoming increasingly important in making B.C.'s economy greener and more environmentally friendly. Instead of using materials like concrete and steel, the wood and other forest products can be used to cost effectively build more sustainable homes. These eco-friendly materials can help reduce emissions and allow for faster construction. As more programs allow for sustainable housing options, the forest industry is playing a key role in supporting clean and green building progress. Below we outline some new approaches in the construction industry in B.C. and beyond.

i. Mass timber and engineered wood in construction

Canada claims 41 per cent of all certified forests globally, the highest of any country in the world. B.C. has been proactive in adopting forest certification standards from organizations such as the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), and the Canadian Standards Association (CSA). In B.C. more than 42.7 million hectares or 73 per cent of forest land have received certification from one of the above three organizations.[22] The certified forests in British Columbia are equivalent to the combined certified forests of Sweden (which is a leader in timber-based modular construction) and Australia.

B.C.'s extensive forests offer a distinctive opportunity to widely incorporate forest-based products into building construction, yielding both environmental and economic advantages. Mass timber products, such as cross-laminated timber and glued-laminated timber, are lightweight materials and easy to assemble and have excellent load-bearing capabilities, enabling their use in mid- and high-rise buildings. Adoption of mass timber significantly reduces embodied carbon, stores carbon for the lifetime, and supports faster, quieter, and cleaner construction. From an economic standpoint, mass timber supports rural and forest-based economies, creating jobs in forestry, manufacturing, and construction.

> *"Mass timber significantly reduces embodied carbon, stores carbon for the lifetime, and supports faster, quieter, and cleaner construction."*

The CleanBC Roadmap 2030[23] highlights B.C.'s commitment to reducing climate impacts by promoting the use of wood and forest products in construction. This shift to using more mass timber in both new and old buildings aims to reduce emissions, accelerate building construction, and boost the local economy. To support these goals, the Government of B.C. has introduced programs like the CleanBC Building Innovation Fund and the Mass Timber Action Plan.

RELEVANT POLICIES

The CleanBC Building Innovation Fund backs low-carbon construction technologies such as mass timber and passive house designs. This initiative represents a transition toward comprehensive provincial carbon management strategy, addressing both operational and embodied emissions to enhance the climate resilience of buildings.

B.C.'s Mass Timber Action Plan is a strategic initiative aimed at accelerating the use of mass timber construction to support a low-carbon, high-performance building sector.[24] Initiated in 2022 and updated in 2024, the program aims to stimulate economic growth, address climate change, and create jobs. It advocates for mass timber as a sustainable building material by simplifying regulations, supporting training, and promoting innovation. Mass timber can reduce carbon emissions by up to 45 per cent compared to conventional materials. The plan also focuses on establishing new manufacturing facilities, creating employment, and partnering with Indigenous communities. With support from multiple government ministries, industry stakeholders, and the Mass Timber Advisory Council, the plan positions B.C. as a North American leader in sustainable, prefabricated wood construction.

ii. Fire code advances and 18-storey allowance in B.C.

To encourage more use of wood in home construction, added investment is needed to develop fire-safe materials and improve responsible forest management. Wood and other products from forests have many benefits, but there are challenges like fire safety, access to high-quality timber, and durability.

The recent updates to the BC Building Code regarding mass timber are significant.[24] They now permit taller encapsulated mass-timber construction (EMTC) buildings, allowing for heights of up to 18 storeys for residential and office spaces, an increase from the earlier maximum of 12 storeys. Additionally, EMTC has been extended to include a wider range of building types, such as schools, libraries, retail spaces, light- and medium-industrial facilities, and care homes. There is also a provision for incorporating more exposed mass timber in the design of buildings, depending on their height and intended use, with residential structures being able to feature this up to eight storeys.

New technologies

Integrating new technologies into building design is key to improving a home's sustainability. Key technologies include solar panels, high-efficiency air and ground source heat pumps, heat pump water heaters, home digitalization systems, and technology for energy sharing between EVs and buildings, as well as between EVs and grids. Energy recovery ventilation systems are critical to improved indoor air quality (especially with increased wildfire smoke) and increasing energy efficiency. Finally, natural technologies, like living roofs and walls, can reduce energy use and improve climate resilience. Below we highlight rapidly emerging technologies being used in B.C.

i. Heat pumps, building automation, EV charging readiness

In recent years, heat pumps' heating and cooling systems have been implemented in buildings across B.C. In just five years, from 2017 to 2022, the number of homes using heat pumps jumped by about 80 per cent, rising from around 142,000 to 254,000.[25] Additionally, more heat pumps for homes were brought into the province than traditional natural gas furnaces in 2022 and 2023. This trend shows a big shift in how people are choosing to heat their homes.

> *"While other improvements in housing also help energy efficiency, all other options have less of an impact than switching to heat pumps."*

Furthermore, about 98 per cent of British Columbians live in homes connected to the hydroelectricity grid (a clean electricity source).[26] Using heat pumps in buildings where clean electricity is available provides enormous opportunities for reducing residential greenhouse gas emissions. In B.C., approximately 39 per cent of homes use forced air natural gas furnaces, while 30 per cent rely on inefficient electric baseboard heaters.[27] These heating options can be easily replaced with high-efficiency electric heat pumps. While other improvements in housing, such as improving insulation, reducing air leaks, and upgrading windows and doors also help energy efficiency, all these options have less of an impact than switching to heat pumps. CleanBC is presently offering rebates to some low-income household looking to upgrade their heating systems to heat pumps. Increasing uptake of all-electric heat pumps is critical for reducing residential emissions and reducing extreme heat exposure.

Building automation system (BAS) implies the centralized control of various systems such as heating, ventilation, air conditioning, lighting, security, and energy management.

The Hive, a 10-storey tall wood office building in Vancouver's False Creek Flats neighbourhood, features a honeycomb-shaped exterior, an expression of the mass timber building's perimeter-braced seismic system. *KK Law Photography.* Source

BAS uses sensors, controllers, and communication networks to monitor conditions in a building. BAS adjusts operations to keep people comfortable, improve energy efficiency, and reduce energy use. The system can automatically respond to building occupancy, activity level, and changes in the outside climatic conditions. This makes buildings more responsive to changing indoor and outdoor conditions. BAS will play a crucial role in achieving sustainability, supporting smart building development, and enhancing the overall performance of both new and existing buildings.

Moreover, avoiding outdated technologies in new building construction is crucial to ensuring long-term performance, economic value, and environmental responsibility. Buildings constructed today will likely remain in use for 50 to 100 years.[28] Investments in charging infrastructure in new buildings or retrofit upgrades are crucial for supporting the growth of the expanding EV adoptability. Pre-installing conduit for EV wiring/charging ensures that residents can adopt EVs without the need for expensive electrical upgrades later. Avoiding lock-in inefficiencies in building designs is not just an innovative design strategy; it is a necessary step toward building decarbonization.[29]

ii. Integration of photovoltaic (PV) systems, rainwater systems, and mechanical ventilation

Solar photovoltaic systems (e.g, solar panels) convert sunlight into electricity without emissions. They can be integrated into buildings as standalone or building-integrated photovoltaics, which can be connected to the electrical-grid or used off-grid, with or without storage systems. Solar panels can last up to 30 years, with minimal degradation in performance over time. Solar systems can give homeowners a degree of freedom of energy independence, an opportunity to earn income, and a reduced reliance on grid power. However, these systems come with some challenges, such as high upfront costs, the need for substantial space to generate enough electricity, the impact of shading, and the intermittent and unpredictable nature of solar energy. Many of these challenges can be addressed through appropriate design, site selection, adequate storage, and connectivity with the electrical grid. BC Hydro currently provides a rebate for residential solar panel and battery storage installations to increase adoption.[30]

> *"Solar systems can give homeowners a degree of freedom of energy independence, an opportunity to earn income, and a reduced reliance on grid power."*

Tank for harvesting rainwater. *iStock*

Rainwater harvesting in buildings is an eco-friendly method of collecting and storing rainwater from rooftops for non-drinking purposes, such as watering gardens and flushing toilets. This approach reduces reliance on city water supplies, lowers water bills and controls storm runoff. Using rainwater helps communities become more resilient to climate change and is becoming a common practice in green building designs and urban planning. While it has many advantages, some challenges can make it hard to adopt, especially in older buildings, such as high installation costs, the need for adequate space to collect and store the water, and the complexities involved in upgrading existing structures. Nevertheless, rainwater harvesting significantly contributes to sustainable water management and plays a crucial role in environmental preservation. In some regions of B.C., rainwater harvesting is being supported through incentives or regulatory requirements as part of broader climate adaptation and water conservation strategies.[31]

With people spending more than 90 per cent of their time indoors, the quality of the indoor air becomes a matter of concern for health, productivity, and well-being. Ventilation

systems that utilize outdated or inefficient filtration may be less effective in removing fine particulates, allergens, and pollutants, which can negatively impact air quality. Recent advancements in mechanical ventilation for buildings are centred around improving energy efficiency, enhancing indoor air quality, supporting sustainability goals, and digitalization. Demand-controlled ventilation adjusts airflow using sensors to optimize energy use based on occupancy or pollutant levels while maintaining air quality. Use of energy recovery ventilators and heat recovery ventilators is increasing. Hybrid ventilation systems are being enhanced with smart controllers for real-time adjustments. Decentralized ventilation units are becoming popular in retrofitting projects due to their compact and energy-efficient features.

Integrating new technologies into building design is key to improving a home's sustainability. *iStock*

3. Recommendations and discussion

Together, these approaches, innovative construction, sustainable materials, and advanced technologies form a toolkit for aligning B.C.'s housing boom with its climate commitments. The next step is jumpstarting these opportunities through key policy shifts.

To address the challenges and opportunities ahead, we propose four policy pathways under a renewed CleanBC. It is essential to develop and implement specific policies through authentic community engagement to ensure they are inclusive and meet the needs of Indigenous communities, low-income households, and people who are unhoused.

> *"The next step is jumpstarting opportunities through key policy shifts."*

Pathway 1: Code and financing alignment

Update code for future climate, prohibit building in high-risk areas, and align public financing with low-carbon, resilient design and technologies; streamline permitting for proven innovations.

Why it matters: Aligns rules and capital so the cheapest, fastest option is also the cleanest and safest.

Specific actions:

- The Government of B.C. could update the building code to reflect emerging climate hazards, evolving technologies, and long-term sustainability goals. This includes ensuring design standards draw from anticipated, not historic, climate conditions.

The Fort St. John 50-unit Passive House apartment project originated from a partnership between BC Housing, British Columbia's Housing Management Commission, and BC Hydro, to develop a highly energy-efficient affordable rental housing building in Fort St. John. Source

- The Government of B.C., local governments, and regional districts could ensure new housing developments are not built in high-risk areas, particularly places vulnerable to flooding, wildfires, and landslides.
- The Government of B.C., BC Housing, and the Canadian Mortgage and Housing Corporation could work together to ensure lending and public financing is focused on sustainably designed homes and that public dollars are not securing credit for emission-intensive homes.
- Governments could ease permitting and regulatory barriers for deployment of innovative technologies to speed up adoption and delivery (e.g., building information modelling, prefabrication, mass timber, heat pumps, green roofs/facades, and Passive House principles).
- The Government of B.C. and BC Hydro should double down on financial incentives to help homeowners and renters overcome upfront costs of retrofits and adoption of efficient technologies in new builds. This includes reinstating rebates to encourage fuel switching from natural gas to all electric heat pumps and expanding solar panel rebates.
- The Government of B.C. and BC Housing can focus on increasing public awareness about Passive House principles through targeted campaigns while offering financial incentives. The implementation of pilot projects across the province, such as Vienna House, would help in this campaign.

Pathway 2: Economic and skill development

Scale training for heat pumps, airtight envelope design, modular, solar PV system, and mass timber; reduce interprovincial barriers for low-carbon materials.

Why it matters: Delivery at scale hinges on people skills and supply chains.

Specific actions:

- The Government of B.C. could work with other provinces and the territories to reduce trade barriers for mass timber and other low-carbon wood-based materials.
- The Government of B.C. could invest in training and reskilling programs for sustainable building technologies, with an emphasis on inclusive, community-led initiatives that generate green jobs and support equity.
- The Government of B.C. could provide incentives for a community-run apprenticeship program for Indigenous community members to develop a skilled workforce and promote economic growth.
- The Government of B.C. could support heritage building retrofits in urban and rural municipalities seeking to align climate targets with historic preservation goals.

Pathway 3: Collaboration and engagement

Formalize partnerships among governments, Indigenous communities, industry, and researchers; co-develop a practical roadmap.

Why it matters: Shared standards and demand signals accelerate adoption and equity.

Specific actions:

- The Government of B.C. and the Government of Canada could promote more collaborations between governments,

industry, research community, and Indigenous communities to create inclusive and effective housing solutions that address a wide range of needs and priorities.

- The Government of B.C. could collaborate with builder associations on targeted education and outreach on embodied carbon and the benefits of low-carbon materials.
- The Government of B.C. and local governments could support collaborative projects (e.g., partnering with BC Housing, research community, governments, industry) to produce a practical roadmap that tackles the economic, technical, environmental, and social dimensions of housing.
- National partners like CMHC and NRCan can provide funding and alignment with provincial housing and climate goals.

> *"Meeting this moment requires bold, coordinated leadership that turns the housing boom into a driver of climate solutions."*

Pathway 4: Data, benchmarks, and adaptive management

Expand performance data sharing; embed CleanBC indicators for sustainability, affordability, and community well-being.

Why it matters: Measurement creates accountability and continuous improvement.

Specific actions:

- The Government of B.C. and BC Housing could encourage further collaboration between the research community and industry to generate robust evidence on the performance of sustainable housing strategies, materials, and technologies.
- CleanBC could include benchmarks and indicators that track sustainability, affordability, and community well-being.

Today's affordability challenges will only intensify if new homes are not built to be climate-smart, climate-adaptable, and future ready. Meeting this moment requires bold, coordinated leadership that turns the housing boom into a driver of climate solutions—realigning B.C.'s housing ambitions as a pathway to emissions reduction and resilience, not a trade-off between them.

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