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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Housing Committee

From: Leigh Rollins, Senior Project Engineer, Metro Vancouver Housing

Date: December 17, 2021 Meeting Date: January 13, 2022

Subject: **Metro Vancouver Housing and Sustainable Building Design and Operations**

RECOMMENDATION

That the Housing Committee receive for information the report titled "Metro Vancouver Housing and Sustainable Building Design and Operations", dated December 17, 2021.

EXECUTIVE SUMMARY

Metro Vancouver Housing strives to enhance environmental and energy sustainability in its affordable rental housing development while balancing financial sustainability and affordability. This requires alignment with provincial and municipal building standards, Corporate Building Standards, MVH 10-Year Plan objectives, and funding partner requirements. As an evolving industry, MVH is continually exploring best practices, codes, and standards including: BC Building Code, Vancouver Building Bylaw, BC Energy Step Code, Passive House, LEED, and the National Energy Code for Buildings. This report provides an overview of these standards and some key elements that impact sustainable building design and operations.

PURPOSE

To inform the Housing Committee about considerations guiding sustainable building design and operations for Metro Vancouver Housing. Staff will provide an accompanying presentation to this report.

BACKGROUND

The *Metro Vancouver Housing 10-Year Plan* endorsed by the Board in 2019 sets key targets to enhance energy efficiency and reduce greenhouse gas (GHG) emissions. This report provides the Housing Committee with information about various considerations for Metro Vancouver Housing with regards to sustainable building for new (re)development projects.

OVERVIEW OF APPROACHES TO SUSTAINABLE DEVELOPMENT

Metro Vancouver Housing strives to enhance environmental and energy sustainability in its affordable rental housing development while balancing financial sustainability and affordability for tenants. MVH's new development must align with provincial and municipal building codes and standards, Corporate Building Standards, MVH 10-Year Plan objectives, and funding partner requirements (including BC Housing Design Guidelines and CMHC Co-Investment minimum design requirements for energy and GHG emission reductions).

As an evolving industry, MVH is continually exploring best practices, codes, and standards including: BC Building Code, Vancouver Building Bylaw, BC Energy Step Code, Passive House, LEED, and the National Energy Code for Buildings. While MVH has minimum design standards for sustainable building, specifics

are assessed on a project-by-project basis depending on the context, municipal requirements, and potential funding partners.

Relevant Codes in BC

There are two main provincial/municipal codes guiding all development in the province:

- Vancouver Building Bylaw (VBBL 2019) – City of Vancouver
- Building Columbia Building Code (BCBC 2018) – all of BC, aside from City of Vancouver

Relevant Standards

There are also several relevant standards that may be used to comply with energy and environmental requirements set out in building codes, or to guide sustainable building:

- **BC Energy Step Code:** Part of the BC Building Code, this provincial standard is being implemented over time to work towards all buildings being Net Zero Ready by 2032. For Part 3 buildings (multi-family wood-frame residential), there are four steps. Select municipalities across Metro Vancouver have implemented various minimum standards ranging from Step 2, Step 2 with a low carbon system, to Step 3. Generally, the BC Energy Step Code levels can be described as follows:
    - Step 1: required by the BC Building Code
    - Step 2: 20-40% better energy efficiency
    - Step 3: 50% better
    - Step 4: Net Zero Ready

- **Vancouver Building Bylaw (VBBL)**: The VBBL is similar to Step 4 with additional GHG reduction requirements. In some cases, buildings seeking permits in the City of Vancouver may be designed to the Passive House Standard.

  Both the BCBC and VBBL program require energy modeling during the design process to confirm:
    - TEDI – Thermal Energy Demand Intensity: The amount of annual space conditioning energy to maintain a stable interior building temperature. Measures the efficiency of the building envelope systems and form/orientation of the building.
    - TEUI – Total Energy Usage Intensity: The total amount of energy used per square meter in a year. Measures the total operational energy usage of the building including heating, lighting, air conditioning, and hot water.

  Once the building is constructed, air tightness testing must be performed to validate the energy model and associated energy performance.

- **Passive House:** An Austrian-based standard widely used in Europe and increasingly in North America. Passive House Canada was originally founded in 2013 as the Canadian Passive House Institute West. With energy performance targets similar to BC Energy Code Step 4, this standard focuses on efficient design to reduce the operational energy demand of the building.

- **LEED (Leadership in Energy & Environmental Design):** A points-based rating system that covers design, construction, operation, and maintenance including the following categories: location and transportation, sustainable sites, water efficiency, energy & atmosphere, material & resources, indoor environmental quality, innovation, regional priority, and integrative process.

Metro Vancouver Policies and Targets

- Metro Vancouver Sustainable Infrastructure and Buildings Policy: Outlines priority performance objectives related to energy efficiency and GHG emissions, materials and resource allocation, and ecological health while balancing fiscal responsibility.
- *Metro Vancouver Housing 10-Year Plan:*
    - Energy efficient: Reduce energy consumption by 25% for new construction (from 2015 NECB)
    - Low carbon: Reduce GHG emissions in housing portfolio by 45% (from 2010 levels) over the next 10 years to work towards the region's goal of being carbon neutral by 2050.

Funding Program Requirements

As MVH is also seeking provincial and federal funding partnerships, (re)development projects must also align with potential funder requirements:

- BC Housing Design Guidelines & Construction Standards
- Canada Mortgage & Housing Corporation (CMHC) National Housing Co-Investment Fund: Minimum environmental requirements for new construction - 25% decrease in energy consumption and GHG emissions compared to 2015 NECB, or a 15% decrease relative to the 2017 NECB.

Key Design Elements for Sustainable Building

Some of the key design considerations for MVH development include:

- Building Form: A simple building form reduces heat losses through thermal bridges at building corners and projections while also simplifying building envelope detailing, the likelihood of air leakage at transitions as well as construction costs.
- Air Tightness: An airtight building envelope can significantly reduce energy losses and support tenant comfort by reducing heat loss and improving building acoustics.
- Insulation: Increased insulation at building envelope assemblies reduces heat losses and gains through the building envelope and is one of the most efficient ways to control energy efficiency in buildings.
- Windows
    - Window to Wall Ratio: Reducing the window to wall ratio reduces heat gains and losses through the window assemblies. Building designs must consider the need for both natural lighting as well as thermal gains and losses experienced through the window assemblies.
    - Window performance: Incorporating high efficiency double/triple paned vinyl or fiberglass windows with specialized coatings can have a significant impact on tenant comfort and energy efficiency. High performing windows help reduce heat losses in winter and reduce heat gains in summer.

- Mechanical Systems
    - Heat Recovery Ventilation (HRV) systems provide fresh air to the interior of the building. These systems incorporate a heat exchange system to heat the incoming outdoor air with the heat from the exhaust air. These systems can be either centralized systems or in-suite systems.
    - Domestic Hot Water Heating systems can incorporate high efficiency boilers/heaters or heat pumps to provide hot water to the building occupants.

ALTERNATIVES
This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS
There are no financial implications to this report. Financial implications for new development are assessed on a project-by-project basis. MVH assesses the cost-benefit analysis of specific sustainable building approaches and standards within the context of each project and potential funding programs, balancing performance with tenant comfort and overall financial viability.

CONCLUSION
Metro Vancouver Housing strives to enhance environmental and energy sustainability in its affordable rental housing development while balancing financial sustainability and affordability. This requires alignment with provincial and municipal building standards, Corporate Building Standards, MVH 10-Year Plan objectives, and funding partner requirements. This report provides an overview of relevant codes and standards that guide MVH's approach to sustainable building design and operations. Staff will provide an accompanying presentation to this report.

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