Project Report

CORPORATE ENERGY STEP CODE POLICY FOR NEW BUILDINGS AND MAJOR RENOVATIONS

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This is a report for the project titled "Corporate Energy Step Code Policy for New Buildings and Major Renovations." This project was completed as part of the Sustainability Scholar Program at the University of British Columbia.

The Township of Langley aims to develop a corporate building energy policy for new and major renovations for city-owned and operated buildings. The Township is specifically interested in the adoption of the BC Energy Step Code into this policy. To inform this process, the abovementioned sustainability scholar was hired to conduct an overview of the corporate building policies that have been or will be adopted by other local governments in the region and also to review the BC Energy Step Code related research for Part 3 buildings that have been completed to date. The results of this work are presented in this report, which entails two sections. The first section (Section I) presents the corporate building policies in select local governments in BC. The second section (Section II) provides a summary of the Energy Step Code studies for Part 3 buildings.

SECTION I: A REVIEW OF CORPORATE BUILDING POLICIES IN SELECT BC LOCAL GOVERNMENTS

Background

The Township of Langley's Sustainability Vision is to build a legacy for future generations by leading and committing the community to a lifestyle that is socially, culturally, economically and environmentally balanced[1]. Echoing this vision, the Township strives to be (1) energy efficient in the delivery of Township services, (2) to have a culture of energy conservation that is supported by Council and staff in all documents, (3) to be a leader in the community for energy conservation and emission reductions, and (4) to be accountable for these commitments in its corporate operations.

Creating energy efficient neighborhoods that are resilient when faced with uncertain energy costs and supply is believed to be important by the Township of Langley. Therefore, the Official Community Plan (OCP) and Sustainability Charter each prioritize energy efficiency. Moreover, the Township is a signatory to the Climate Action Charter, and is therefore committed to creating compact, complete, and more energy efficient rural and urban communities[2].

The Intent of the Project

The Township of Langley plans to develop a corporate building energy policy for new and major renovations for city-owned and operated buildings. The intent is to mainly focus on creating a corporate building policy that is centered on BC Energy Step Code adoption for Township Part 3 buildings. To generate this policy, the Township initiated a project first to understand what green building standards and certifications have been adopted into corporate operations of other municipalities in the region. Therefore, research was conducted to identify the corporate building policies of other local governments in British Columbia, and understand which type of facilities these policies apply to, what are the capital cost related implications of adopting these policies, and what are their associated benefits.

[1] Adopted from https://www.tol.ca/your-township/plans-reports-and-strategies/sustainability-charter/

[2] Adopted from https://www.tol.ca/at-your-service/sustainability/sustainable-community/energy/

BC Local Governments Included in the Research

As mentioned previously, the Township of Langley is specifically interested in focusing on creating a corporate building policy that is centered on the BC Energy Step Code. Therefore, those local governments in the region that have also shown interest in adopting BC Energy Step Code and have a weather profile similar to Township of Langley (Climate Zone 4) were identified and included in this research project.

There are 189 municipalities in BC in total. 27 (14.29%) of these local governments have shown interest in adopting BC Energy Step Code[3]. From these 27 local governments, nine have a similar weather profile to the Township of Langley (located in Climate Zone 4). Therefore, this research was focused on these nine local governments. Documents such as Council reports, policy documents, and Official Community Plans were reviewed, relevant departments were contacted, and individuals that were informed about corporate building policies in each of the selected local governments were interviewed to gather updated information. The results of these investigations are presented below:

City of Vancouver

Policy Statement

According to the City of Vancouver's Development and Building Policy Report (2016) and the Manager of Energy and Utilities at the Real Estate and Facilities Management department, the environmental performance requirement for all new facilities owned by the City is to be certified to the Passive House standard or alternative near zero emission building standard (e.g. International Living Building Institute's Net Zero Energy Building Certification, or the CaGBC's[4] Zero Carbon Building Standard), and use only low carbon fuel sources, in lieu of certifying to LEED[5] Gold unless it is deemed unviable by Real Estate and Facilities Management department.

Purpose of the Policy

In Vancouver, the aim is to assure that all City facilities are as sustainable as possible by (City of Vancouver, 2018a):

- Building new, high-efficiency facilities to strict environmental standards
- Upgrading existing City facilities to make them more energy efficient

The City of Vancouver plans to transition to zero emissions buildings in all new construction by 2030 to strengthen the local green economy and help reducing

[3] https://energystepcode.ca/implementation_updates/
[4] Canada Green Building Council
[5] Leadership in Energy and Environmental Design

climate change. The above-mentioned corporate building policy demonstrates the City's leadership toward zero emissions buildings (City of Vancouver, 2018b).

Vancouver's leadership in setting high environmental standards for the construction of new civic buildings and special development projects such as Southeast False Creek was demonstrated since July 2004 with the adoption of the *Green Building Strategy* (City of Vancouver, 2016).

Sunset Community Centre and Mount Pleasant Civic Centre are examples of City-owned facilities in Vancouver that are built to LEED Gold standards; Creekside Community Centre and VanDusen Botanical Garden Visitors Centre are examples of civic facilities built to LEED Platinum standards(City of Vancouver, 2018a).

Vancouver City Hall, Library Square, Vanier Park, National Yards, and Manitoba Works Yards are examples of City-owned facilities that have been upgraded to lower energy consumption and reduce GHG emissions (City of Vancouver, 2018a).

Application of the Policy

As noted in the City of Vancouver's Development and Building Policy Report (2016), obtaining Passive House Certification or meeting alternative near zero emissions building standard (e.g. International Living Building Institute's Net Zero Energy Building Certification, or the CaGBC's Zero Carbon Building Standard), and the use of only low carbon fuel sources apply to all new city-owned facilities.

Capital Cost Related Implications of the Policy

It was noted throughout the conversation with the Manager of Energy and Utilities at the Real Estate and Facilities Management department at City of Vancouver that there currently does not exist a summary information on capital cost implications of the aforementioned environmental performance standards for new city-owned facilities as the first few buildings meeting these set of standards have just entered construction phase.

Benefits Associated with Implementing the Policy

The City of Vancouver has developed progressive targets in the Greenest City Action Plan that will not be achieved without cooperation and participation of all of Vancouver's residents and businesses; however, the City Council understand that if they are going to look to residents to lower their energy consumption and take action toward the Greenest City goals, they must "walk the talk" in relation to City operations and facilities (City of Vancouver, 2018c). Therefore, the City has developed four high-priority actions for City operations to help reaching the Greenest City targets. One of these four actions applies to City-run buildings: "Plan and implement a program to significantly reduce greenhouse gas emissions and fossil fuel use in City-run buildings and vehicles" (City of Vancouver, 2018c).

Setting corporate green building policies helps the City of Vancouver lead by example in matters of sustainability in the built environment and test, on a smaller scale, the effectiveness and viability of various requirements that might later be incorporated in the larger scale in the private sector as part of the Vancouver Building By-Law (VBBL) (City of Vancouver, 2018c).

Other benefits of implementing the aforementioned policy with regard to city-owned facilities have been stated as: reducing the harmful carbon emissions that contribute to climate change, making facilities cheaper to operate, building staff capacity, testing innovative solutions, developing best practices, and providing experience for the local industry professionals, which all can catalyze broader action (City of Vancouver, 2018c).

Recent improvements to City facilities have reduced GHG emissions by 22% over 1990 levels as reported by the City of Vancouver (City of Vancouver, 2018c).

As noted earlier, the Manager of Energy and Utilities at the City of Vancouver said that there yet does not exist a city-owned building that has been built meeting the aforementioned policy which is now in the operation phase. Therefore, no data is available with regard to energy and operational cost performance implications of the aforesaid policy for city-owned buildings.

References

- City of Vancouver (2016). *Development and Building Policy Report RR-2: Zero emissions Building Plan, RTS No. 11195*, City of Vancouver.
- City of Vancouver (2018a). *Green City Facilities*. Retrieved from https://vancouver.ca/green-vancouver/green-city-facilities.aspx
- City of Vancouver (2018c). *Vancouver is becoming the greenest city, inside and out*. Retrieved from https://vancouver.ca/green-vancouver/how-we-are-greening-city-operations.aspx
- City of Vancouver (2018b). *Zero Emissions Buildings*. Retrieved from https://vancouver.ca/green-vancouver/zero-emissions-buildings.aspx

City of Richmond

Policy Statement

According to the City of Richmond Policy 2307 (2014), high-performance attributes need to be incorporated into new civic facilities at the City of Richmond and LEED Gold certification is the desired target of building performance for new City buildings. Moreover, according to this policy document, a minimum of 10 points from LEED Optimize Energy Performance criteria need to be targeted for corporate buildings where a lifecycle assessment demonstrates reductions in operational costs and/or payback periods are within acceptable levels. For other criteria of LEED for

New Construction (NC), consideration will be given to measures that reduce energy and water use, maintenance and operational costs, and greenhouse gas emissions, and also to those that optimize indoor environmental quality in city-owned facilities (City of Richmond Policy 2307, 2014).

Policy 2307 also explains that the target is to have no net increase in corporate building energy use and related greenhouse gas emissions compared to 2012 levels in the city. In order to achieve that, the City aims for no increase in energy demand or GHG emissions when constructing replacement infrastructure, and/or strives to offset energy demand and GHG emissions through reductions at other civic facilities. This policy document also points to the City's objective for constructing net-zero energy and carbon neutral corporate buildings by 2030.

The Sustainability Manager and the Corporate Energy Manager at the City of Richmond that were interviewed mentioned that the City is currently in the process of evaluating changes to Policy 2307 and may reference the BC Energy Step Code, Passive House, and/or CAGBC's Zero Carbon Building Framework standards in the future; likewise, reference to LEED may lessen in future policy documents. According to the interviewees, the City is currently evaluating different options regarding high-performance building policy for city-owned facilities and nothing is yet official on the direction that the City will pursue.

Purpose of the Policy

According to a study conducted in 2012, 72% of the City of Richmond's energy use and 67% of the City's GHG emissions were from corporate buildings. With anticipated population growth over the next 20 years, the City is expecting an increased demand for corporate infrastructure and services, which could lead to increased energy use and GHG emissions (City of Richmond, 2014).

Considering the anticipated growth in the City of Richmond, the increase in corporate building energy use and GHG emissions could reach 25% and 22%, respectively in 2020 compared to 2007 to 2009 levels (City of Richmond, 2014). Therefore, significant resources have been put towards the setting of specific management objectives and evaluation criteria for the development of City buildings. Development and adoption of the Sustainable "High Performance" Building Policy (HPBP) for City-Owned Facilities is one example of the efforts made by the City staff towards reducing corporate buildings' carbon footprint. This was done to set a clear direction for the sustainable construction of City buildings, targeting better than code construction (City of Richmond, 2014).

Community Safety building (a renovation project), Steveston Fire Hall No.2, Hamilton Community Centre, Richmond Olympic Oval, Sea Island Fire Hall No.4, and Hamilton Fire Hall No.5 are examples of projects at the City of Richmond that were implemented following the Sustainable High-Performance Building Policy.

Application of the Policy

Sustainable "High Performance" Building Policy (HPBP) for City-Owned Facilities applies to all newly constructed civic buildings or major renovations in the City of Richmond (City of Richmond Policy 2307, 2014).

Capital Cost Related Implications of the Policy

The Sustainability Manager at the City of Richmond mentioned during the interview that it is difficult to get reasonable assessments of benefits and cost data for policies like HPBP because realistically, they vary so much from building to building. That being said, the HPBP policy document explains that achieving energy-specific LEED points has a potential for impacting future corporate building planning, design, implementation, and operation budgets, either increasing or decreasing the total investments. Where capital costs are increased due to energy efficiency measures, lower operating costs would be anticipated, as compared to a building that does not implement Optimize Energy Performance criteria, thus creating payback opportunities for additional investments (City of Richmond Policy 2307, 2014).

City staff expects policy 2307 to have no additional financial impact on capital projects, as compared to how they are budgeted conventionally; this is because usually each building project at the City of Richmond will be evaluated on its own merits and circumstances, recognizing that the suite of energy management measures will be tailored to the project, its user groups, and the allocated budget (City of Richmond, 2014). City staff uses acceptable payback periods and life cycle costing during the planning and design process as a matter of regular business to optimize capital and operating expenditures (City of Richmond, 2014).

Benefits Associated with Implementing the Policy

City of Richmond Policy 2307 (2014) notes that HPBP allows the City of Richmond to continue to be proactive when it comes to energy efficiency at its new and existing corporate buildings. Moreover, in the context of the Council's adopted Community Energy and Emission Plan, HPBP has the potential to stand out as a model for pragmatic, but innovative, private development in the City.

References

- City of Richmond Policy 2307 (2014). *Sustainable "High performance" Building Policy-City Owned Facilities*, City of Richmond.
- City of Richmond (2014). *Sustainable High Performance Building Policy Update-Report to Committee*. City of Richmond. Retrieved from https://www.richmond.ca/__shared/assets/SustainablePolicy_CNCL_02241437967.pdf.

City of Surrey

There currently does not exist a formal corporate building policy at the City of Surrey. According to the Climate and Energy Manager, the City adopted the BC Energy Step Code in Summer 2018 but is waiting for the municipal building archetypes to be released before looking closely at a Step Code requirement for corporate buildings. That being said, it was mentioned during the interview that the Manager of Civic Facilities at the City of Surrey is continuously seeking opportunities to build energy efficient, water efficient, and low-GHG buildings. One of the most recent and extreme examples of this was noted to be the Clayton Community Hub.

The Climate and Energy Manager highlighted that members of the Sustainability Office have the plan to discuss corporate building priorities (from a sustainability perspective) starting in Fall 2018, in anticipation of the new Step Code metrics. The interviewee added that achieving the lowest GHG emissions possible is a major focus of the Sustainability Office's upcoming conversations with regard to corporate building priorities.

City of Victoria

Policy Statement

The Community Energy Planner at the City of Victoria noted that the corporate building policies at the City are out of date, still referencing to a policy document from 2007. According to the green building policy for civic facilities, all new civic facilities in the City of Victoria are required to be LEED Silver (with a goal of LEED Gold) (City of Victoria, 2007).

The Community Energy Planner at the City of Victoria mentioned during the interview that although meeting LEED Silver is formally known as the current policy for civic facilities, in several projects the City has tried to build beyond LEED Silver and achieve higher performance buildings. The Burnside Gorge Community Centre completed in 2007, which was built to a LEED Gold standard and the award-winning Dockside Green Development that was built to LEED Platinum standard are two examples of civic facilities in Victoria that were built beyond the minimum requirements. The interviewee noted that a fire hall and a recreational facility with pool are currently in the design phase, which are also aiming to achieve standards higher than LEED Silver.

City of Victoria's Community Energy Planner explained that the plan is to update the current policies and incorporate Energy Step Code targets into the corporate green building policies. The interviewee said that the City is waiting for the new Energy Step Code targets to be released by the Province of British Columbia before updating the current corporate building policies. It was also highlighted throughout the interview that as Energy Step Code is only focused on building's energy

performance, the City will be developing a customized approach to not only include Energy Step Code targets as requirements for corporate buildings, but also to include green building policies with regard to other aspects of sustainability such as stormwater management, onsite habitat, and recycled materials.

Purpose of the Policy

Green Buildings Policy for civic facilities owned and operated by the City of Victoria has been developed as part of the City's vision to be the most livable city in Canada. One of the objectives stated in the Corporate Strategic Plan (2007 to 2009) is: " The environment is sustained and enhanced through sound leadership and stewardship of natural resources." With this focus on the environment in City plans and practices, the policy on green municipal buildings (1) demonstrates the City's commitment to addressing social, economic, and environmental stewardship, (2) enables cost savings through reduced operating costs, and (3) provides a healthy environment for city's taxpayers (City of Victoria, 2007).

Application of the Policy

According to the Green Buildings Policy for Civic Facilities (2007), new construction or additions of 500 m2 or larger need to achieve LEED Silver as the minimum standard, with a goal of LEED Gold (or even LEED Platinum) where a LEED audit and/or lifecycle assessment warrants it. The 500m2 cutoff was noted to be consistent with the neighboring communities in the Cascadia region (BC, Washington, and Oregon). Moreover, the policy document explains that buildings of 500m2 or larger account for over 80% of City-owned and managed space in Victoria.

According to the City of Victoria (2007), the new buildings under 500m2 are recommended to use LEED as a guide in the planning, design, and execution of the project. The ability of a renovation project to incorporate green features was noted to be dependent on the character of the building or the nature of the renovation. Therefore, the feasibility of incorporating green features in such projects needs to be evaluated on a case-by-case basis (City of Victoria, 2007). The City is currently examining ways to increase the sustainability of existing civic buildings (City of Victoria, 2018).

Capital Cost Related Implications of the Policy

According to the City of Victoria's Green Buildings Policy for Civic Facilities, the cost of meeting the policy standard depends on a variety of factors such as building type, specification flexibility, project size, local green market maturity, climate conditions, and project team experience. The policy document explains that based on local B.C. conditions, the capital cost increase associated with LEED Silver is 1.2% (City of Victoria, 2007). It is important to mention that this policy document, which was published in 2007, used cost data from a 2005 report to indicate the capital cost increase associated with LEED Silver. Therefore, this cost related information might not be valid anymore due to the changes in the local green building industry since 2005; thus, this information needs to be used by cautious.

Benefits Associated with Implementing the Policy

The operating reductions with LEED Silver are stated as the following in the Green Buildings Policy for Civic Facilities (City of Victoria, 2007):

- Energy savings: 31%
- Water savings 22%

It is explained in the policy document that these figures apply to the general commercial construction industry; however, city construction projects include facilities such as fire stations, parking garages, maintenance buildings, pools and community centers, which may experience different operating reductions than those stated above. Moreover, it is important to highlight again that these figures are based on a study conducted in 2005 and may vary from the actual operating reductions at the present time.

References

- City of Victoria (2007). Civic Facilities: Green Buildings Policy. City of Victoria.
- City of Victoria (2018). *Green Buildings: Green Building Policy for Civic Properties*. Retrieved from https://www.victoria.ca/EN/main/residents/planning-development/development-services/green-buildings.html

City of New Westminster

Policy Statement

The Community Energy Manager and Environmental Coordinator at the City of New Westminster said the City's Corporate Energy and Emissions Plan is old and the City staff are currently working on a new 10-year plan to replace the existing one. The Environmental Coordinator added that the green building policy is also being updated.

The existing policies for civic buildings are currently referencing LEED Gold as the target. It was noted throughout the conversation with the Community Energy Manager that the City is currently reviewing alternate green building standards, with the view of potentially updating the default LEED Gold requirement in consideration of the BC Energy Step Code, the Passive House standard, and CaGBC's Zero Carbon Building Program. This interviewee noted that The City Council will review the proposals made by the staff after the completion of their review of other potential alternatives.

By acknowledging the role of green buildings in conserving natural resources, creating healthier environment for occupants, reducing GHG emissions, and lowering waste going to landfills, the New Westminster's City Council passed a resolution for staff in March 2009 to develop an environmental LEED standard policy for the construction of new civic facilities (City of New Westminster, 2009).

It is noted in the report from the Engineering Department at the City of New Westminster to the City Council titled as "LEED Standard for New Civic Buildings" published in August 2009 that: " the development of a green building policy is consistent with two strategies identified in the City of New Westminster's Corporate Strategic Plan: Climate Change and the Environment, and the Livable City Strategy. Actions from these strategies encourage the City to (1) show leadership by ensuring that new civic buildings are green buildings, (2) promote and encourage new development to be LEED certified. The abovementioned report also refers to the City's corporate Energy & Greenhouse Gas Emissions Management Plan, which outlines actions to meet a GHG reduction target of 15% within 10 years. One of these actions highlights the development of a policy for green buildings: " Adopt a high-performance building standard for new (civic) buildings that includes a recognized standard such as LEED" (City of New Westminster, 2009, p.2).

In the same report it is explained that at the Environment Advisory Committee Meeting held in June 2009, members expressed a strong desire for the City to adopt a green building standard and recommended the City to strive for the highest standard of LEED for new civic buildings. It is mentioned in this report that considering the small difference between the green premium associated with LEED Silver versus LEED Gold, and the Environment Committee members recommendation to strive for the highest standard, a civic green policy set to LEED Gold was created and submitted to the Council in 2009(City of New Westminster, 2009).

According to the Engineering Department report (City of New Westminster, 2009), adopting a LEED Gold standard shows strong environmental leadership to residents, the development community and the region. Achieving this rating was also found to be in alignment with the direction of the City's Corporate Energy & Greenhouse Gas Emissions Management Plan (City of New Westminster, 2009).

Purpose of the Policy

A LEED Gold standard policy for civic buildings will allow the City to show corporate environmental responsibility and leadership. This policy also supports actions noted in the Corporate Strategic Plan and is aligned to the suggestion from the City's Environmental Advisory Committee to attain the highest standard possible. Moreover, in 2009 that this policy was developed, it was anticipated that it will serve as a model for the development of high-performance green buildings by the construction community within the City of New Westminster (City of New Westminster, 2009).

Application of the Policy

The LEED Gold Standard policy applies to new buildings that are 500 m2 or larger (City of New Westminster, 2009).

Capital Cost Related Implications of the Policy

In 2009 that the recommendation of LEED Gold standard policy for the construction of new civic buildings was submitted to the Council, the understanding was that this policy results in capital cost premium of up to 6%. It is noted in the Engineering Department report (City of New Westminster, 2009) that the cost premiums can be justified in terms of yielding cost savings to taxpayers through reduced operating costs, energy savings and other non-tangible benefits such as enhanced worker productivity and reduced employee turnover, absenteeism, and illness related to enhanced day-lighting, natural ventilation and improved indoor air quality (City of New Westminster, 2009).

Benefits Associated with Implementing the Policy

The following environmental, social, and economic implications of adopting the aforementioned policy are listed in the "LEED Standard for New Civic Buildings" report (City of New Westminster, 2009):

- Environmental

Conservation of natural resources and reduced CO2 emissions released into the environment as a result of constructing, operating, and maintaining a green civic building

- Social

Creating a healthy ("livable") work environment for the occupants

- Economic

Cost savings throughout the building lifecycle, boosting media interest for a community and commanding a higher value in the marketplace

References

- City of New Westminster (2008). *Energy and Greenhouse Gas Emissions Management Plan.* City of New Westminster. Retrieved from: https://fcm.ca/Documents/reports/PCP/New_Westminster_GHG_emissions_management_action_plan_EN.pdf

- City of New Westminster (2009). *LEED Standard for New Civic Buildings, a report from the Engineering Department*. City of New Westminster. Retrieved from: https://www.newwestcity.ca/council_minutes/0831_Aug31/CW/Reports/CW%20Leed%20Standard%20for%20New%20Civic%20Bldgs.pdf

City of North Vancouver

Policy Statement

The City of North Vancouver plans to achieve LEED Gold accreditation for all new civic buildings greater than 900 square meters, and LEED Silver accreditation as the minimum acceptable building standard (City of North Vancouver, 2018).

Purpose of the Policy

Adoption of the LEED green building rating system is part of the ongoing sustainability program in the City of North Vancouver. This has been done with the aim of reducing environmental impacts, energy consumption, and operational costs, and also providing long-term benefits for the community. Conserving both water and materials, minimizing waste, maximizing air quality, protecting surrounding areas, and providing environmental and community benefits over the lifetime of a public building are examples of the key principles for new civic facilities at the City of North Vancouver (City of North Vancouver, 2018).

Adopting LEED for building the 35,000 square foot Library and Civic Centre demonstrates the City's commitment to the aforementioned policy.

Application of the Policy

LEED Gold is aimed for civic facilities larger than 900 square meters, and LEED Silver is the minimum acceptable standard for a public building in North Vancouver (City of North Vancouver, 2018).

Capital Cost Related Implications of the Policy

Achieving LEED Gold is estimated to result in between 2.5% and 3% additional capital investment, while the cost of achieving LEED Silver is estimated to be 1% of the total cost of construction (City of North Vancouver, 2018).

Benefits Associated with Implementing the Policy

To explain the benefits of adopting LEED standards, the City of North Vancouver gives references to studies that indicate life-cycle cost savings of approximately 20% when additional 2% has been invested in incorporating LEED features in new facilities. Other benefits such as reduction of energy expenditures and overall maintenance savings, together with employees' productivity enhancement have also been highlighted as benefits of implementing the aforementioned policies (City of North Vancouver, 2018).

References

- City of North Vancouver (2018). Building and Development: Leadership in Energy & Environmental Design (LEED). City of North Vancouver. Retrieved from: https://www.cnv.org/property-and-development/building-and-development/leadership-in-energy-and-environmental-design

District Municipality of West Vancouver

Reducing GHG emissions in daily operations as well as policies and procedures is one of the primary commitments made by the district of West Vancouver. The implications of this commitment can be observed in (1) the Strategic Energy Management Plan (SEMP) developed by the District which has led to improved management of electricity and natural gas use in the District's corporate buildings, (2) ongoing optimization of systems that control heating and cooling in buildings leading to significant decrease in energy consumption, (3) switching to LED lighting in several public buildings including the Seniors' Activity Centre, Operations Centre, and the Aquatic Centre, (4) enhanced tracking and reporting of corporate energy use, and (5) adoption of energy efficient technologies when replacing older equipment(District of West Vancouver, 2018).

Sustainable district operation is one of the key objectives of the District of West Vancouver; however, as noted by the Manager of Facilities and Assets, there currently does not exist a formal corporate building policy at this District. That being said, the most recent corporate facility that was built in West Vancouver, which is a police building, is LEED Gold. This building started operating in the first week of September 2018 (District of West Vancouver, 2018b). The Community Centre is another LEED Gold corporate building in the District of West Vancouver. This facility was built in 2009 (District of West Vancouver, 2018c).

The interviewee noted that following LEED Gold standard for the new police building is not only a result of the existing energy efficiency related policies at the District (that contains requirements which are aligned with LEED Gold standards), but it is also a result of the commitment that the District has made by joining the BC Climate Action Charter. This charter requires any new building built by the local governments that are signatories to the Climate Action Charter to follow LEED Gold standards (BC Climate Action Charter, 2011).

The Manager of Facilities and Assets mentioned throughout the interview that the incremental costs of following LEED Gold have been marginal. The interviewee noted that quantifying the benefits of following such standards is difficult. He added that comparing the old and the new police building in West Vancouver is not feasible as the two have very different features. For example, the old facility was not equipped with air conditioning equipment, but the new one is. This new feature will enhance the occupants' experience, comfort, and productivity level while causing an increase in utility bills.

The interviewee mentioned that the staff is currently reviewing the BC Energy Step Code references and the district is considering the development of a corporate building policy that may link to the BC Energy Step Code. Nothing is yet formal about the direction that the District will take in its future corporate policies.

References

- BC Climate Action Charter (2011). Retrieved from: https://www.toolkit.bc.ca/BC-Climate-Action-Charter
- District of West Vancouver (2018a). Facility Operations. Retrieved from: https://westvancouver.ca/environment/sustainable-district-operations/facility-operations
- District of West Vancouver (2018b). Police Services and Manual Hall Project. Retrieved from: https://westvancouver.ca/government/capital-projects/police-services-municipal-hall-project
- District of West Vancouver (2018c). West Vancouver Community Centre. Retrieved from: https://westvancouver.ca/parks-recreation/community-centres/west-vancouver-community-centre

District Municipality of Squamish

According to the Facilities Manager, there currently does not exist a formal policy for corporate buildings at the District of Squamish. However, as noted by the interviewee, Squamish is a member of the BC Climate Action Charter; therefore, any new building built by the local government, needs to follow LEED Gold standards. Local government signatories of the BC Climate Action Charter are committed to taking actions to become carbon neutral in their corporate operations and reduce community-wide emissions (BC Climate Action Charter, 2011).

It was mentioned throughout the conversation with the Facilities Manager that no new corporate building has been built in over ten years by the government of Squamish. The interviewee also noted that a new set of strategies are currently being developed for aging building replacement at the District; these strategies will not be implemented until the next one or two years, and the staff will review the building standards at that time.

References

- BC Climate Action Charter (2011). Retrieved from: https://www.toolkit.bc.ca/BC-Climate-Action-Charter

City of Duncan

The Manager of Planning at the City of Duncan that was interviewed pointed to the City Zoning Bylaw, Official Community Plan (OCP), and Integrated Community Sustainability Plan as sources of information for green building policies at City of Duncan. A review of these documents and Community Energy and Emissions Plan (CEEP) indicates that there currently does not exist a formal building policy specific to city-owned and operated buildings at the City of Duncan. However, it is important to mention that developing such policies was suggested at a workshop that was held in May 2015 with members of Council and staff from the City of

Duncan as well as representatives from Cowichan Valley Regional District, the Municipality of North Cowichan, and some other organizations in the region (City of Duncan, 2015).

The CEEP workshop group reviewed energy, emissions, and energy expenditure data for the community and decided on an action plan and timing for implementation of each item. According to CEEP, it was noted throughout the workshop that a municipal corporate green building policy or life cycle costing policy could be useful for the City to adopt. This could then be promoted to the community to demonstrate leading by example. According to CEEP Action Plan, 2017 has been identified as the year to implement this action or conduct further investigations on it (City of Duncan, 2015). No information was found with regard to any progress with this action item.

It was learned through the conversation with the Planning Department at the City that delays in setting corporate green building policies might have been due to other issues taking priorities such as the amalgamation vote or the scale of the City's operations not anticipating the need for new corporate facilities in the immediate future. While the City of Duncan has not implemented a corporate green building policy at this time, according to the conversation with the Planning Department, a new zoning bylaw has been implemented recently which allows for density bonusing if a development can achieve or exceed BC Energy Step Code Level 3.

It is important to highlight that achieving LEED/Built Green/ Cascadia Living Building Challenge Silver, Gold, or Platinum certification levels has been included in Green Building Certification features in City of Duncan's Community Sustainability Checklist, but no particular note has been stated with regard to city-owned and operated buildings (City of Duncan, 2015, 2018). Moreover, it was found that City of Duncan's OCP outlines the target of reducing average energy demand in commercial and institutional buildings by 30% in 2020 and by 70% in 2050 compared to 2007 levels (City of Duncan, 2018). A municipal corporate green building policy could potentially help in achieving these targets.

References

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Summary of the findings and next steps

A wide range of environmental performance requirements for civic buildings was found in the nine jurisdictions that were included in this research. Some such as the City of Surrey and the District of West Vancouver do not have any formal corporate building policy in place, while others like the City of Richmond and the City of New Westminster require LEED Gold accreditation for the city-owned and operated facilities. The City of Vancouver has the most progressive policies for public buildings, requiring Passive House Certification, or adoption of alternative near zero emission building standards. A number of local governments such as the City of Richmond, the City of Surrey, the City of Victoria, and the City of New Westminster are considering or are even already in the process of evaluating the adoption of BC Energy Step Code into their corporate building policies.
The capital cost implications of the corporate building policies that were described in this document were reported between 1% (for achieving LEED Silver) and 6% (for achieving LEED Gold) of the total project cost. In some cases, the capital cost related information was old; therefore, the actual cost of building to the aforementioned standards may vary in today's market. Moreover, several local governments did not have/were not able to share the information related to the additional cost of adopting their corporate green building policies for civic facilities.

Many highlighted improved indoor environmental quality, enhanced occupants experience and productivity, and reduced energy and water consumption, operational and maintenance costs, and amount of waste generated as the benefits of building to the above-mentioned standards. Furthermore, adopting corporate green building policies were found to be a strong demonstration of the local government's environmental stewardship to the residents and the development community in the region. Quantifying the benefits of adopting the building policies described in this report was found challenging by a number of participants.

The information collected from the studied local governments as well as the review of the BC Energy Step Code work completed to date will inform the development of the corporate building policy for the Township of Langley Part 3 city-owned and operated facilities.

SECTION II: A REVIEW OF BC ENERGY STEP CODE RESEARCH ON PART 3 BUILDINGS

Background

As explained in the first section of this report, the Township of Langley has a plan to develop a corporate energy policy centered on BC Energy Step Code for Part 3 city-owned and operated facilities. To inform the development of this policy and complement the information presented in the previous section, this section of the report is focused on summarizing the key takeaways of the Step Code related studies on Part 3 buildings completed to date.

Energy Step Code for Part 3 Buildings

According to the BC Building Code, Part 3 buildings are those classified as Group A, B or F-1 that exceed 600 m2 in building area or three storeys in building height and that have major occupancies. The Energy Step Code for Part 3 buildings involves a number of technical requirements (See Figure 1). The whole-building energy model of the design is used to assess the building envelope metrics and equipment and systems metrics as indicated in the design, while on-site airtightness testing is required to measure air leakage rate and assess which step a building achieves.

It is explained in the BC Energy Step Code Guide[6] that for Part 3 buildings, energy modeling and airtightness testing are more complex and require a larger investment than for Part 9 buildings; however, as the Energy Step Code does not require certification or paperwork that is typically associated with many green building programs, there is an opportunity to reduce "red tape" for Part 3 buildings adoption of the Step Code.

In 2016, BC Housing commissioned a costing assessment to better recognize the cost implications of the Step Code by understanding how the various steps may impact construction costs in various building types across different climate zones in the province. The results of the first round of this study were released in September 2017 – The Energy Step Code 2017 Metrics Research Report[7]. An Updated version of this report was released in September 2018.

[6] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/guides/bcenergystepcode_guide_v1.pdf
[7] https://www.bchousing.org/research-centre/library/residential-design-construction/energy-step-code-2017-full-report&sortType=sortByDate

BC Housing conducted another study – titled "Capacity Scan for the Energy Step Code in Select BC Communities"[8] – in 2017 to explore municipal and industry capacity and information needs for successful implementation of the Energy Step Code. The municipal staff participated in this research highlighted concerns about Step Code adoption cost impacts and consumer response. According to the findings of this study, these concerns are important to elected officials when deciding if and how to implement the Energy Step Code. Therefore, the results of the costing studies (e.g., 2017 and 2018 Energy Step Code Metrics Research) would be very valuable as they can help the industry actors better understand the costs and benefits of building to the Step Code. The results of the 2018 costing studies are briefly summarized in the following section.

	Energy Modelling & Airtightness Testing	Thermal Energy Demand Intensity Target (kWh/m²/yr)	Total Energy Use Intensity Target (kWh/m²/yr)	Estimated Annual Energy Savings (over BCBC Baseline)	Estimated Cost Impact (% Increase in Construction Costs)
Multifamily Residential (Group C)					
Step 1 Enhanced Compliance	Required	No target	No target	Up to 20%	0-2%
Step 2	Required	45	130	Up to 40%	2-5%
Step 3	Required	30	120	Up to 50%	5-10%
Step 4	Required	15	100	Up to 60%	Insufficient data
Hotels and Motels					
Step 1 Enhanced Compliance	Required	No target	No target	N/A	N/A
Step 2	Required	30	170	N/A	N/A
Step 3	Required	20	140	N/A	N/A
Step 4	Required	15	120	N/A	N/A
Commercial Office					
Step 1 Enhanced Compliance	Required	No target	No target	N/A	N/A
Step 2	Required	30	130	N/A	N/A
Step 3	Required	20	100	N/A	N/A
Other Commercial (Group D & E)					
Step 1 Enhanced Compliance	Required	No target	No target	N/A	N/A
Step 2	Required	30	170	N/A	N/A
Step 3	Required	20	120	N/A	N/A

Figure 1: Proposed Step Code targets - Part 3 Buildings (Reference: The Energy Step Code 2018 Metrics Research Report)

[8] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/reports/capacity_scan.pdf

BC Energy Step Code: the Costs and Benefits

In the Energy Step Code 2018 Metrics Research[9] led by BC Housing, analyses were conducted to identify potential design solutions and other technical responses to the Step Code, anticipate implementation impacts of the proposed metrics and targets, and identify any modifications to the Step Code necessary to ensure its efficacy. In this study, researchers selected and modeled five archetypes for Part 3 buildings: Low-Rise MURB, High-Rise MURB, Hotel, Commercial Office, and Retail (big box).

These archetypes that were initially defined by the Step Code framework were included in a large-scale parametric analysis to gain deeper insight into compliance with the Step Code. Details on the individual attributes used in modeling of these archetypes are provided in the 2018 Metrics Research report.

The costing studies for Part 3 buildings in 2018 Metrics Research were conducted using two primary costing sources: *Base construction costs* were developed by sourcing multiple projects available in the consultant team's database. These costs were vetted by industry members. *Base construction costs* were also sourced from the 2016 Altus Canadian Construction Guide.

In 2018 Metrics Research, the researchers adjusted the construction costs across the province using Regional Cost Multipliers to take into account a range of factors, including labor and materials availability and local economies of scale in different climate zones. The construction costs for Climate Zone 4, were considered as the baseline (using multiplier: 1, for Part 3 and Part 9 buildings) and the costs for other climate zones were adjusted accordingly.

The costing studies in 2018 Metrics Reseach sought to optimize results for capital costs, net present value (NPV), and costs per tonne of carbon abated. According to the results, all Part 3 building types across all climate zones (except Low-Rise MURB in Climate Zones 7a for Step 4, and Retail buildings in Climate Zone 7a for Steps 2 and 3) could achieve all levels of the Step Code for less than 4% incremental capital cost increase. Modeling results suggest that builders and designers can achieve Step 4 (the highest step for Part 3 buildings) and Step 3 for less than 3% and 2.4% capital cost premium, respectively (See Figure 2).

[9] http://energystepcode.ca/app/uploads/sites/257/2018/09/2018-Metrics_Research_Report_Update_2018-09-18.pdf

Archetype	Step	CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
High-Rise MURB *Electric BB Mid Occupancy 0.6 VFAR 62-2001*	1	0.0%	0.0%	0.0%	0.0%	--	--
	2	0.4%	1.0%	1.3%	2.0%	--	--
	3	0.8%	2.3%	1.8%	2.3%	--	--
	4	2.4%	3.2%	2.7%	2.7%*	--	--
Low-Rise MURB *Electric BB Mid Occupancy 0.6 VFAR 62-2001*	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2	0.5%	0.5%	0.4%	1.4%	2.7%	3.3%
	3	0.6%	2.2%	1.0%	1.6%	3.3%	3.3%*
	4	2.6%	3.3%	2.2%	4.1%	--	--
Hotel *50% WWR Common Area Fan Coils Heat Pump DHW Electric Laundry Load*	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2	-0.2%	-0.1%	1.1%	0.7%	0.9%	1.9%*
	3	0.0%	1.2%	2.3%	2.2%	2.3%*	--
	4	1.2%	2.1%	2.8%	2.7%*	--	--
Commercial Office *No IT Load Default Occupancy with ASHP*	1	0.0%	0.0%	0.0%	0.0%	--	--
	2	-0.2%	-0.1%	0.4%	1.6%	--	--
	3	0.0%	0.2%	1.4%	1.8%	--	--
Other Commercial *No IT Load Default Occupancy with ASHP*	1	0.0%	0.0%	0.0%	0.0%	--	--
	2	-0.2%	-0.1%	0.4%	1.6%	--	--
	3	0.0%	0.2%	1.4%	1.8%	--	--
Retail *Big Box with FC*	1	0.0%	0.0%	0.0%	0.0%	--	--
	2	0.8%	1.3%	2.8%	4.6%	--	--
	3	2.0%	3.7%	5.5%	6.6%	--	--

Figure 2: Lowest Incremental Capital Costs (% change) – Part 3 Buildings (Reference: The Energy Step Code 2018 Metrics Research Report)

To provide context for the findings presented in Figure 2, the researchers highlight that 2% a year variation of construction costs is not uncommon due to market forces. It is highlighted in the abovementioned report that the use of high-performance windows is a key cause of incremental capital cost increase at higher step levels, especially in higher climate zones.

To calculate potential profit or loss over time, 2018 Metrics research uses Net Present Value (NPV). Figure 3 and Figure 4 indicate the analyses results for costs per tonne of carbon abated, and the NPV analysis, respectively. These numbers should be interpreted carefully. The main takeaway from these two figures is that even the most unfavorable NPV numbers are small compared to the overall construction and operation cost of a building, and do not exceed 2%. There are only two exceptions, which are related to Low-Rise MURB in Climate Zone 7b, and Retail buildings in Climate Zones 6 and 7a.

The researchers highlighted that carbon savings are often associated with NPV savings, especially in Climate Zone 4, which would mean that Part 3 buildings can reduce GHG emissions while also reducing the total cost of building ownership. However, it is important to note that one of the major indicators of NPV and GHG outcomes is the fuel source, on which the code provides no explicit direction. In order to prevent the increase of GHG emissions which could even occur at the highest steps of the Step Code, 2018 Metrics Research report recommends adoption of the City of Vancouver's GHGI targets into the Step Code.

Archetype	Step	CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ8
High-Rise MURB *Electric BB Mid Occupancy 0.6 VFAR 62-2001*	1	--	--	--	--	--	--
	2	-332.1	0.7	-370.6	470.3	--	--
	3	-499.5	144.6	-509.4	314.8	--	--
	4	27.4	158.8	-240.5	368.4*	--	--
Low-Rise MURB *Electric BB Mid Occupancy 0.6 VFAR 62-2001*	1	--	--	--	--	--	--
	2	-731.6	-528.3	-1374.3	-1.7	193.1	12.2
	3	-897.5	-17.0	-1441.3	-250.3	151.5	123.7*
	4	-144.9	18.0	-1005.6	464.0	--	--
Hotel *50% WWR Common Area Fan Coils Heat Pump DHW Electric Laundry Load*	1	--	--	--	--	--	--
	2	-92.9	-90.4	3.1	-6.6	-16.1	64.9*
	3	-67.6	-14.1	60.6	93.0	56.0*	--
	4	-35.0	-19.1	51.5	121.6*	--	--
Commercial Office *No IT Load Default Occupancy with ASHP*	1	--	--	--	--	--	--
	2	-156.7	-98.4	-30.8	112.6	--	--
	3	-135.1	-65.9	116.0	141.9	--	--
Other Commercial *No IT Load Default Occupancy with ASHP*	1	--	--	--	--	--	--
	2	-156.7	-98.4	-30.8	112.6	--	--
	3	-135.1	-65.9	116.0	141.9	--	--
Retail *Big Box with FC*	1	--	--	--	--	--	--
	2	-225.3	-71.8	109.6	90.5	--	--
	3	-119.2	-15.0	161.0	107.8	--	--

Figure 3: Lowest Carbon Abatement Costs ($/tonneCO2e) – Part 3 Buildings (Reference: The Energy Step Code 2018 Metrics Research Report)

Archetype	Step	CZ4	CZ5	CZ6	CZ7a	CZ7b	CZ
High-Rise MURB *Electric BB Mid Occupancy 0.6 VFAR 62-2001*	1	--	--	--	--	--	--
	2	15.1	-0.1	18.6	-44.6	--	--
	3	21.0	-14.0	24.0	-30.2	--	--
	4	-2.7	-16.1	15.5	-28.9*	--	--
Low-Rise MURB *Electric BB Mid Occupancy 0.6 VFAR 62-2001*	1	--	--	--	--	--	--
	2	27.5	20.8	51.9	0.1	-20.0	-1.3
	3	33.5	1.3	57.3	14.6	-16.1	-13.1*
	4	10.8	-1.8	47.0	-47.5	--	--
Hotel *50% WWR Common Area Fan Coils Heat Pump DHW Electric Laundry Load*	1	--	--	--	--	--	--
	2	34.4	35.8	-1.4	2.7	6.7	-33.9*
	3	30.9	6.9	-32.7	-44.8	-27.4*	--
	4	16.1	9.5	-27.9	-58.6*	--	--
Commercial Office *No IT Load Default Occupancy with ASHP*	1	--	--	--	--	--	--
	2	25.8	16.2	6.0	-26.7	--	--
	3	22.3	10.7	-22.7	-33.7	--	--
Commercial *No IT Load Default Occupancy with ASHP*	1	--	--	--	--	--	--
	2	25.8	16.2	6.0	-26.7	--	--
	3	22.3	10.7	-22.7	-33.7	--	--
Retail *Big Box with FC*	1	--	--	--	--	--	--
	2	16.9	9.4	-24.3	-32.3	--	--
	3	12.6	-2.5	-43.1	-42.7	--	--

Figure 4: Highest Net Present Value ($/m2) – Part 3 Buildings (Reference: The Energy Step Code 2018 Metrics Research Report)

Policy Tools to Require, Incentivize, or Encourage Step Code Adoption for Part 3 Buildings

Another valuable Step Code focused study was conducted by Community Energy Association that administered a survey in March 2018 to help determine the current level of knowledge of the Step Code, its rate of adoption, and the number of units built to meet Step Code requirements. The results of this study are presented in a report titled "2018 BC Energy Step Code Local Government Survey."[10] A similar survey was also conducted one year before, in March 2017[11]. Interestingly, the response rate of the 2018 survey was similar to the 2017 survey (64 and 69 local governments, respectively).

Among the participants of the 2018 survey, 37 local governments indicated that they currently use or might use a variety of policy tool(s) to require, incentivize, or encourage adoption of BC Energy Step Code for Part 3 Buildings. According to the findings of this study, the policy tools that are currently being used or might be used to incentivize/require the adoption of Step Code include a bylaw requirement, a rezoning policy, or rezoning consideration. Tools such as builder forums and educational outreach for Part 3 buildings and checklists for use by building officials or the building community were identified as tools that are currently being used or might be used to encourage adoption of the Step Code for Part 3 buildings.

The 2018 BC Energy Step Code Local Government Survey also asked the respondents to identify the barriers to adoption of the Step Code (for both Part 3 and Part 9 buildings). Nine barriers were identified by the local governments; the top three are (1) lack of capacity to implement and enforce, (2) lack of information on local energy advisors, and (3) uncertainty around how to ensure compliance.

Closing Remarks

The results of the studies referenced in Section II of this report together with the information presented in Section I can be used in local consultations with stakeholders and in developing recommendations regarding potential policy regimes for Part 3 corporate buildings in the Township of Langley.

According to the studies presented in this report, the capital cost premium of building to Step 3 or even Step 4 (the highest step for Part 3 buildings) of the BC Energy Step Code in Climate Zone 4 is within the range of the capital cost premium that have been shown to be associated with building to LEED standards (between

[10]http://energystepcode.ca/app/uploads/sites/257/2018/08/lg_survey_report_aug2018.pdf

[11] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/reports/lg_survey_report_june2017.pdf

1% to 6%). Moreover, according to the reported benefits (NPV and carbon savings) of building Part 3 buildings to Step Code standards, it is possible to reduce the total cost of building ownership while reducing GHG emissions by following Step Code standards. However, as mentioned before, the fuel source is a key factor to consider when thinking about GHG emissions. Therefore, it is recommended that the Township of Langley includes requirements related to fuel choice in the policies for the corporate facilities.

Moreover, It is important to highlight that Energy Step Code sets standards related to the energy use of the facilities, but building sustainability entails many other aspects as well. Incorporating various aspects of sustainable buildings in the corporate building policies will help the Township of Langley to realize its sustainability vision. That being said, engagement of the local industry practitioners and understanding their technical and financial capacity to build to different levels of the Step Code or any other green building standard is recommended before performance requirements are finalized for corporate facilities in the Township of Langley.