The State of Existing Building Decarbonization Policies and Programs around Surrey, BC

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Introduction

Project Description

As existing buildings make up the largest percentage of the built environment, they present significant policy and implementation challenges for greenhouse gas (GHG) emissions reduction. In Canada, buildings are sources of 17 percent of GHG emissions.[1] As such, there is a growing realization and policy response towards energy efficiency and GHG emissions from existing buildings at all levels of government.

In the City of Surrey, buildings are responsible for 37 percent of GHG emissions and 56 percent of the City's energy consumption.[2] By 2040, existing buildings are estimated to make up around 70 percent of the expected total building carbon emissions. [3] As a result, similar to cities elsewhere in the world, developing and implementing effective policies and programs to improve the energy efficiency of existing buildings and thereby reducing GHG emissions has been a challenge for the City of Surrey. To strategically decarbonize existing buildings over time and achieve the City's 80 percent GHG emissions reduction target by 2050, the City of Surrey plans to develop an Existing Building Strategy ("Strategy") that will provide clear policy and implementation guidance.

Project Objective

The goal of this project is to support the development of the Strategy by providing summary information of the current state of existing buildings, and energy efficiency and GHG reduction policies and programs adopted and implemented by five nearby local governments. The five nearby local governments are the Township of Langley, the City of New Westminster, the District of Saanich, the City of Vancouver, and the City of Victoria. The project supervisor selected the case study local governments to gain an understanding of the policy ecosystem from local governments that operate within a similar context as Surrey, but also have different features in terms of housing stocks, energy sources, policy progress, and regulatory power, to name a few.

The project builds on the work of a 2018 UBC Sustainability Scholar focused on investigating the policy ecosystems of six international local governments leading the way on existing building decarbonization, then characterizing the findings according to Market Transformation Framework. The resulting report is titled "*Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities*". Accordingly, this project adopts the same conceptual framework to analyze the findings of this project.

Methodology

The data for the project was collected through extensive online desk research and semi-structured interviews with energy and green buildings experts of the five local governments. To analyze the current policy ecosystem, relevant policies and programs of the five local governments were reviewed and evaluated based on the Market Transformation Framework, and in relation to the best practices of global leading cities in existing buildings policies and programs. Additionally, relevant policies and programs of the Federal government, Provincial

[1] https://sencanada.ca/en/newsroom/enev-reducing-ghg-canada-buildings/

[2] City of Surrey: Building Sector Energy and Emissions Backgrounder (internal report, unpublished).

[3] City of Surrey (2013). Community Energy Emissions Plan. https://www.surrey.ca/files/CommunityEnergyEmissionsPlan.pdf

government, and utilities were reviewed and briefly analyzed to identify the available resources for the City of Surrey. To complement the desk review, eight interviews were conducted to collect information on retrofit strategies and programs of the case study local governments.

As Surrey has a large stock of detached single-family homes that accounts for 85% of the City's residential buildings,[4] the focus of the project, as well as most of the interviews conducted, was with local government experts working on single-family homes. However, some reference is made regarding large and commercial buildings and multi-family residential units as some policies and programs cover all types of buildings.

Market Transformation Framework

Figure 1 adapted from "Clean Energy DC: Climate Energy Plan" summarizes the Market Transformation Framework. For a detailed explanation of the framework, refer to the 2018's UBC Sustainability Scholar report on "Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities."

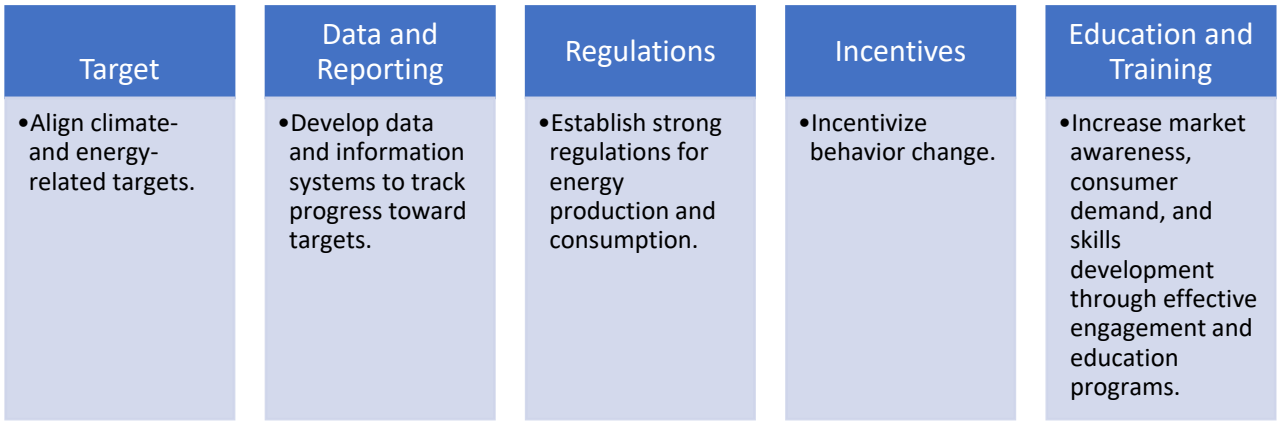

Figure 1: Market Transformation Framework[5]

As per the recommendation of the above-mentioned report, this report has considered and analyzed financing as an additional pillar in the Market Transformation Framework. Financing refers to supporting homeowners to cover the high upfront capital cost of energy upgrades. Various models of financing are implemented globally that allows home and building owners to access funds for deep energy upgrades from municipalities, utilities, and financial institutions, among others. Figure 2 summarizes the major models of energy financing used globally.

[4] City of Surrey: Building Sector Energy and Emissions Backgrounder (internal report, unpublished).

[5]Adapted from: District of Columbia (2018).Clean Energy DC: Climate and Energy Plan. https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Clean%20Energy%20DC%20-%20Full%20 Report_0.pdf

Mucnipality Adminstered/PACE Financing	On-Bill Financing	Third Party/Debt Financing
•Financing offered by municipalities and repayment made through additional charges in property tax bills.	•Financing administered and provided by utilities and repayment made through utility bills.	•Financing provided by traditional financial institutions based on standard procedures.

Figure 2 Types of Financing for Clean Energy Upgrades [6]

Available Decarbonization Policies and Programs for Existing Buildings

Federal and provincial governments set the foundation for policies and activities of local governments. Currently, both levels of governments have policies and funding programs that local governments can access to address GHG emissions from existing buildings. Appendix 1 summarizes the current and upcoming policies and/or programs of the Federal and Provincial governments as well as utilities.

Federal Government

The 2016 Pan-Canadian Framework on Clean Growth and Climate Change (PCF)[7] recognizes existing buildings as sources of GHG emissions and provides action points to be undertaken at all levels of government. The PCF focuses on retrofitting existing buildings, fuel switching, and increasing appliance and equipment's energy efficiency to reduce GHG emission from buildings. The PCF provides financial support and incentives to assist provinces and territorial governments to undertake energy efficiency initiatives in relation to existing buildings. Through the Low Carbon Economy Fund, 2 billion dollars is provided to support Canada's climate change policy initiatives and activities.[8]

The PCF provides the following policy directions to address energy efficiency and emissions from existing buildings:

1) Develop a national model code for existing buildings by 2022.
2) Develop building energy labelling requirements as early as 2019.
3) Affordable financing for retrofits.

Provincial Government

Clean BC Plan sets out British Columbia's strategy to reduce GHG emissions in the Province and existing buildings are identified as a key sector requiring a concerted effort in the path to a cleaner environment.[9] The Plan encourages energy efficiency alterations and renovations of existing homes and buildings. The following policy directions are adopted in the plan:

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[6] Natural Resources Canada (2016). Financing Energy Efficiency Retrofits in the Built Environment https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/Financing%20Report-acc_en.pdf

[7] Pan-Canadian Framework on Clean Growth and Climate Change (2016) http://publications.gc.ca/collections/collection_2017/eccc/En4-294-2016-eng.pdf

[8] Natural Resources Canada (2018). Building Canada's Energy Future Together https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/2018/en/BuildingCanadas_EnergyFutureTogether_en.pdf

[9] Province of British Columbia (2018). Clean BC: Our Nature. Our Power. Our Future. https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_2018-bc-climate-strategy.pdf

1) Develop new standards for building upgrades by 2024.
2) Set new energy efficiency standards for space and water heaters and residential windows between 2022 and 2025.
3) Consideration in requiring energy rating for homes and buildings at the time of rent or sale.

Energy Utilities

Energy utilities in BC, particularly BC Hydro and FortisBC, provide various incentives to motivate homeowners and businesses to use energy-efficient technologies to reduce energy demand and GHG emissions from homes and buildings. BC Hydro and FortisBC provide incentives for retrofitting existing buildings through the Province as well as independently.

Existing Buildings Decarbonization Policies and Programs in Nearby Local Governments

As key stakeholders responsible for addressing climate change, local governments develop policies and programs tailored to their particular context to deal with the ever-increasing challenge. In relation to existing buildings, local governments have adopted and implemented several policies and programs to advance building energy retrofits. This section summarizes the context, policy approach, and major policies and programs of the surveyed local governments.

It is worthy to note that, for the last few years, the focus of the Province and consequently local governments' have been on decarbonizing new buildings. Thus, a significant portion of this report concerns analysis of future policy direction of the surveyed local governments in addition to analysis of implemented and on-going programs to decarbonize existing buildings. It should also be noted that declaration of climate emergencies nationally as well as by some of the surveyed local governments namely; cities of Vancouver and Victoria is leading to the adoption of aggressive GHG emissions reduction targets and adoption of programs to tackle climate change. The declaration of climate emergencies is expected to result in increased political support and consequently financial support to enable local governments to adopt and implement policies and programs to significantly reduce carbon emissions.

City of New Westminster

Buildings are responsible for 41 percent of the City's GHG emissions. Residential and commercial buildings contribute 16 percent and 25 percent of GHG emissions respectively.[10] The City targets to reduce 15 percent of its community-wide GHG emissions by 2030 from 2007 levels.[11] Guided by its 2011 Community and Emissions Plan that sets existing building action plans, the City of New Westminster has a long-running building energy-efficiency and GHG emission reduction program.

The *Energy Save New West* program, launched in 2013, offers subsidized EnerGuide energy evaluations, free technical advice on energy upgrades, and assistance to homeowners to make use of available incentives and rebates for both new and existing buildings.[12] By primarily

[10] City of New Westminster (2017). Official Community Plan. https://www.newwestcity.ca/database/files/library/Official_Community_Plan_(Consolidated_August_2018).pdf
[11] City of New Westminster (2011). Community Energy & Emissions Plan. https://www.newwestcity.ca/database/rte/files/NewWest%20CEEP%20Final.pdf
[12] http://www.energysavenewwest.ca/about/

offering discounted energy audit, the program serves as a central point of contact to homeowners by providing assistance to get customized home energy performance and improvement information, facilitate access to available incentives and provide overall support in undertaking home energy improvements.[13] Since its launch over 600 existing homes have participated in the program.[14]

City of Vancouver

There are approximately 77,000 detached houses in the City out of which, more than 50 percent are estimated to be built pre-1960.[15] Guided by its Greenest City Action Plan 2020, the City of Vancouver targets to reduce 20 percent of GHG emissions from existing buildings by 2020 from 2007 levels and to-date has achieved 11 percent GHG emissions reductions from existing buildings.[16] The City adopted a retrofit strategy in 2014 that provided guidance in de-carbonizing existing buildings in the City.

To achieve its targets, the City has implemented several incentive programs and adopted regulations to improve energy efficiency and reduce GHG emissions from existing buildings. In terms of regulations, the City of Vancouver is the only city in Canada that made EnerGuide energy evaluation a mandatory requirement for undertaking home renovations.[17] It also requires energy upgrades for renovations based on the amount and type of renovation.[18] Additionally, the City has implemented various incentive programs independently and in collaboration with the Province, utilities and other stakeholders to support residents to undertake home energy upgrades. For instance, between 2014 to 2017, the City successfully implemented the *Green Landlord Program* for rental apartments and provided support for 60 buildings to conduct energy audits and undertake energy retrofits.[19] As a climate action leader in the region, the City is developing a new retrofit strategy and incentive programs as well as regulations to accelerate the implementation of deep energy retrofits in the City.[20]

City of Victoria

The City of Victoria has set a target to retrofit 2 percent of existing buildings each year with a specific focus on energy upgrades to achieve its 80 percent GHG emissions reduction target by 2050.[21] The City is currently developing a retrofit strategy for each of the building archetypes in the City. With the highest percentage of rental households in the region, the City has completed its retrofit strategy for rental multi-unit residential buildings.[22] For single-family homes, the City's Climate Leadership Plan commits to initiate actions to develop and offer energy retrofit

[13] Interview with Ryan Coleman, Project Coordinator, City of New Westminster, July 2019
[14] http://www.energysavenewwest.ca/about/
[15] City of Vancouver (2014). Energy Retrofit Strategy for Existing Buildings. https://vancouver.ca/files/cov/Energy-Retrofit-Strategy-for-Buildings-Presentation-for-Council-June-2014.pdf
[16] City of Vancouver (2019). Greenest City Action Plan 2020 Action Plan: 2018-2019 Implementation Update. https://vancouver.ca/files/cov/greenest-city-action-plan-implementation-update-2018-2019.pdf
[17] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019
[18] City of Vancouver (2017). Council Presentation: Update on Energy Retrofits for Existing Buildings. https://council.vancouver.ca/20170207/documents/rr4Presentation.pdf
[19] Interview with Micah Lang, Senior Green Building Planner, City of Vancouver, July 2019
[20] City of Vancouver (2019). Council Report: Building Retrofits for Deep Carbon Reductions. https://council.vancouver.ca/20190424/documents/cfsc3.pdf
[21] City of Victoria (2018). Climate Leadership Plan. https://www.victoria.ca/assets/Departments/Engineering~Public~Works/Documents/City%20of%20Victoria%20Climate%20Leadership%20Plan%20(1805).pdf
[22] Interview with John Ho, Community Energy Specialist, City of Victoria, July 2019

programs, deliver a voluntary energy disclosure program and in collaboration develop incentive and financing tools for energy upgrades by 2020.

The City promotes and facilitates access to available provincial and regional incentive programs including the Oil to Heat Pump rebates program and the *Better Homes BC* incentives and rebates program. Furthermore, the City works to raise community and industry awareness on energy efficiency upgrades and available support through direct community engagement and by collaborating with the City's networks and partnerships, including the Federation of Canadian Municipalities Transition 2050 network and Home Performance Stakeholder Council.[23]

District of Saanich

Buildings account for 28 percent of the District's GHG emissions. Oil heated homes contribute 6 percent to the total GHG emissions in the District.[24] To guide its 80% GHG emissions target by 2050, the District is currently developing a retrofit approach within its Climate Plan. Through retrofitting existing buildings, existing buildings are estimated to account for 17 percent reduction in community-wide GHG emissions by 2050.[25]

In order to support energy upgrades, the District promotes and facilitates access to available incentive and rebate programs. For instance, the District had the highest number of participants in the Province in the *Oil to Heat Pump* provincial rebate program that offered support for replacing oil-heating systems with heat pumps. Through the program, Saanich was able to eliminate over 1,000 tonnes of household GHG emissions annually.[26] As deep energy upgrades are costly, the District has designed and proposed a financing scheme to support homeowners with the upfront cost associated with energy upgrades.[27] To raise public awareness on energy efficiency, the District engages with the community among others using web-based platforms and makes use of networks such as the Federation of Canadian Municipalities' Transition 2050 network to educate and train industry.[28]

Township of Langley

The Township has a target to reduce GHG emissions by 10 percent on per capita terms in 2021.[29] Buildings represent 37% of total emissions in Langley.[30] The City is currently revising its Community and Energy Emissions Plan, which will provide detailed strategies and actions plans concerning energy efficiency and emissions reduction from existing buildings.[31]

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[23] Interview with John Ho, Community Energy Specialist, City of Victoria, July 2019

[24] District of Saanich (2019) Council Report on Home Energy Retrofit Municipal Financing Pilot. http://saanich.ca.granicus.com/MetaViewer.php?view_id=1&clip_id=241&meta_id=13403

[25] District of Saanich and C2MP (2019). 80% GHG Reduction Scenario https://www.saanich.ca/assets/Community/Documents/Planning/sustainability/CANtool-ghg-pathway.pdf

[26] District of Saanich (2018). Climate Action Revenue Incentive (CARIP) Public Report for 2017. https://www.saanich.ca/assets/Community/Documents/Environment/CARIP%20REPORT_2017.pdf

[27] District of Saanich (2019). Council Report on Home Energy Retrofit Municipal Financing Pilot. http://saanich.ca.granicus.com/MetaViewer.php?view_id=1&clip_id=241&meta_id=13403

[28] Interview with Maggie Baynham, Senior Sustainability Planner, District of Saanich, June 2019

[29] Township of Langley (2019). Climate Action Revenue Incentive (CARIP) Public Report for 2018. https://webfiles.tol.ca/Engineering/2018%20CARIP%20Survey.pdf

[30] https://webfiles.tol.ca/Engineering/2010%20Community%20Energy%20and%20Emissions%20Inventory%20(CEEI)%20report.pdf

[31] Interview with Tess Rouse Manager, Energy programs, Township of Langley, June 2019

In addition to promoting existing incentive and rebate programs, since 2012, the Township has its *Green Building Rebate Program* that offers capital incentives for energy upgrades as well as subsidized pre and post-retrofit energy assessments for single-family dwellings.[32] Since the launch of the program in 2012, 200 successful applications have been processed. Most of the program participants are new building owners and the uptake of the program from existing homes and buildings have been low.[33]

Key Findings: Current State of Existing Buildings Policies and Programs in nearby Local Governments

Targets

As required by the Province,[34] all surveyed local governments have set Council mandated community GHG emissions reduction targets mainly through their Official Community Plans, Community Energy and Emissions Plans, and other climate action related plans. Some of the surveyed local governments such as Cities of Vancouver and Victoria have both long-term and interim GHG emissions reduction targets. In the long-term, both cities target to reduce GHG emissions by 80 percent from 2007 levels by 2050. In the short-term, the City of Victoria[35] targets to reduce GHG emissions by 50 percent by 2030 while the City of Vancouver[36] targets to reduce GHG emissions by 33 percent by 2020. City of Vancouver and District of Saanich[37] have additional targets to become 100% renewable energy community by 2050 and accordingly phase out the use of fossil fuels.

The adoption of sector-specific targets guide the policies and actions of local governments concerning the level and scale of required retrofits. As shown in Table 1, City of Vancouver and District of Saanich have set building-specific GHG emissions targets presented in different formats. Through its Greenest City Action Plan, the City of Vancouver has set specific existing building target to reduce energy use and GHG emissions by 20 percent from 2007 levels by 2020. In the District of Saanich, existing buildings emission reduction targets are set in relation to planned retrofit and upgrade actions and its contribution to the total community-wide GHG emissions reduction target. Accordingly, planned retrofits are estimated to contribute a 17 percent GHG emissions reduction in community-wide emissions by 2050.[38] Saanich further details its target in terms of the type of retrofits and their contribution to the overall reduction

[32] Township of Langley: Green Building Rebate Program: Renovations. https://webfiles.tol.ca/Engineering/GreenBuilding_Additions%20and%20alterations%20brochure.pdf

[33] Interview with Tess Rouse, Energy Programs Manager, Township of Langley, June 2019

[34] Local Government Act (2015). http://www.bclaws.ca/civix/document/id/ complete/statreg/r15001_14#section473

[35] City of Victoria (2018). Climate Leadership Plan: Strategies and Actions for a Prosperous, Low Carbon Future. https://www.victoria.ca/assets/Departments/Engineering~Public~Works/Documents/City%20of%20Victoria%20Climate%20Leadership%20Plan%20(1805).pdf

[36] City of Vancouver (2012). Greenest City 2020 Action Plan. https://vancouver.ca/files/cov/Greenest-city-action-plan.pdf

[37] District of Saanich (2018). 100% Renewable and Resilient Saanich: Climate Change Backgrounder. https://www.saanich.ca/assets/Community/Documents/Planning/Sustainability/Climate%20Plan%20Backgrounder%20Document%20November%2019%202018%20smaller.pdf#page=15

[38] District of Saanich and C2MP (2019). 80% GHG Reduction Scenario. https://www.saanich.ca/assets/Community/Documents/Planning/sustainability/CANtool-ghg-pathway.pdf

target by categorizing in terms of retrofit types as well as the percentage of retrofits to be undertaken over time.

Table 1: Local Governments GHG Emission Targets

Local government		Community-wide Target		Building-specific Target
City of New Westminster	•	15% by 2030		
City of Vancouver	•	33% by 2020 & 80% by 2050	•	20% by 2020
City of Victoria	•	50% by 2030 & 80% by 2050		
District of Saanich	•	80% by 2050	•	17% by 2050[39]
Township of Langley	•	20% by 2020		

Globally, cities with leading policies and actions towards existing buildings further adopt voluntary energy conservation targets for homes, institutions, and businesses to promote and encourage energy conservation and upgrades, which is missing in the surveyed local governments.[40] For instance, the City of Chicago through the *Retrofit Chicago Energy Challenge* encourages commercial buildings, nonprofits, and non-market housing developments to reduce 20 percent energy consumption within five years of program membership. [41]

Data and Reporting

Data and reporting in relation to decarbonizing existing buildings encompasses tracking GHG emissions, gathering energy data and setting regulations for energy rating and disclosure.

Community GHG Emission Inventories

Global leading cities such as New York City have requirements to report and disclose their community-wide emissions. The City tracks carbon reduction progress and report sector-specific and source-specific GHG emissions inventories annually.[42] This practice allows local governments to track their progress towards reducing their community emissions and accordingly make policy and action adjustments.

[39]District of Saanich (2017). Climate Action Plan: Progress Report. https://www.saanich.ca/assets/Community/Documents/Planning/2017%20FINAL%20Climate%20Action%20Plan%20Progress%20Report_26June2017.pdf

[40]Li, Jiaxin (2018). Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-17%20Initiating%20an%20Existing%20Building%20Policy%20Ecosystem%20for%20Surrey_Li.pdf

[41] https://www.burnhamnationwide.com/final-review-blog/retrofit-chicago-energy-challenge-promotes-sustainability

[42] https://nyc-ghg-inventory.cusp.nyu.edu/

In British Columbia, local governments are required to establish GHG emissions inventories.[43] All the surveyed local governments through the Provincial Community Energy and Emissions Inventory (CEEI) framework are committed to track and report their community GHG emissions.[44] For instance, the City of Vancouver tracks and reports energy use and GHG emissions reduction data including emissions from existing buildings as part of the Greenest City 2020 Action Plan Implementation Update Report.[45]

From the available data, Cities of Vancouver and Victoria, and the District of Saanich track GHG emissions mainly using the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC). The City of Victoria through its 2018 Climate Leadership Plan further aims to collaborate and develop an open-access "Energy and GHG Information Management System (EGIMS) to track, analyze, and report energy use and GHG emissions from all sources by 2022".[46]

Data Sources

Different data sources are used to inform existing building strategies, policies, and actions. Surveyed local governments gather energy consumption data collected by federal and provincial governments, city records and utilities to develop existing building policies and programs. Local governments such as the cities of New Westminster and Vancouver mainly use energy modelling for various building archetypes to inform their existing buildings and retrofit activities due to limited access to energy utility data.[47]

In addition to using energy modelling for various building archetypes, the City of Vancouver is considering expanding the Canadian Urban Sustainability Practitioners (CUSP) [48] equity metrics to target low-income residents for energy retrofits. The City of Victoria undertook a retrofit analysis based on data from Natural Resources Canada of all EnerGuide evaluations undertaken since 1990. The data includes the types of retrofits undertaken and the carbon reduction results of the retrofits in the City.[49] The data was analyzed by the University of Victoria and has become a key reference document for the City in informing its retrofit strategy development for single-family homes.[50]

The City of Vancouver is considering developing a Data Mapping and Analysis Tool that gathers data on home energy usage and characteristics as well as household attributes and energy efficiency targets from city records, utilities, and directly from homeowners. Using this data, an

[43] Province of BC and UBCM (2014). Becoming Carbon Neutral: A Guidebook for Local Governments in British Columbia. http://www.toolkit.bc.ca/sites/default/files/BecomingCarbonNeutralGuideV3. pdf

[44]District of Saanich (2017). Climate Action Plan: Progress Report. https://www.saanich.ca/assets/ Community/ Documents/Planning/2017%20FINAL%20Climate%20Action%20Plan%20Progress%20Report_26June2017.pdf

[45] City of Vancouver (2018) Greenest City 2020 Action Plan: 2017-18 Implementation Update. https://vancouver.ca/files/cov/greenest-city-action-plan-implementation-update-2017-2018.pdf

[46]City of Victoria (2018). Climate Leadership Plan. https://www.victoria.ca/assets/Departments/ Engineering~Public~Works/Documents/City%20of%20Victoria%20Climate%20Leadership%20Plan%20(1805).pdf

[47] Interview with Ryan Coleman, Project Coordinator, City of New Westminster July 2019, and Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019.

[48] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019.
See also: http://cusp-mapping.herokuapp.com/

[49] Interview with John Ho, Community Energy Specialist, City of Victoria, July 2019

[50] City of Victoria (2019). Climate Action Revenue Incentive (CARIP) Public Report for 2018. https://www.victoria.ca/assets/Departments/Sustainability/Documents/2018_CARIP_SurveyReport_Final.pdf

online Decision Assistance Tool will be developed that builds proposed energy upgrade package for homeowners.[51] The tool will recommend the type of upgrade required, cost of the upgrade, and payback from energy savings. The City considers linking the tool with *Better Homes BC* program and implementing it province-wide in collaboration with the Province and other stakeholders. The information gathered will also be used to identify and target homes that have a high tendency to undertake energy upgrades by developing targeted marketing initiatives.[52]

Energy Labelling and Building Benchmarking

Energy labelling, as well as building benchmarking, have increasingly become key tools to inform the energy performance of buildings. Energy labelling provides energy performance rating for homes and buildings while benchmarking involves continuous energy assessment and comparisons of energy efficiency of buildings. Through energy disclosure, local governments publicly report energy performance of buildings. These data and reporting tools by providing foundational information on energy performance, among others, raise public awareness on energy efficiency as well as facilitate local governments' access to energy data to inform policymaking and program development.[53]

Leading cities like New York City and Boulder have regulations mandating energy labelling and building benchmarking for existing buildings.[54] No surveyed local government except the City of Vancouver has mandatory regulations for energy labelling for existing buildings. The City of Vancouver mandates energy audit and labelling as a precondition for attaining renovation permits for existing buildings.[55] Homeowners are required to complete energy assessments for home renovations. For other surveyed local governments, energy labelling is voluntary and is tied to provincial, utilities, and/or local government incentive programs. Through some incentive programs, local governments receive copies of the home energy audit reports.

Cities like Seattle and Boston publicly disclose energy data on their municipal websites. These cities go further and try to make the available information accessible by using visualizations and mapping tools to show energy consumption in buildings.[56] However, disclosing energy information is a challenge faced by the surveyed local governments, as they do not have the authority to publicly disclose the energy performance data gathered from existing energy rating

[51] Interview with Brady Faught, City of Vancouver, Green Buildings Engineer, July 2019
[52] City of Vancouver: Data Model and Decision Assistance Tool (internal report, unpublished).
[53] City Green Solutions (2018). Put a Label on it: BC Energy Step Code & Home Energy Labelling Disclosure. http://energystepcode.ca/app/uploads/sites/257/2018/08/PutALabelOnIt-Final.pdf
[54] Li, Jiaxin (2018). Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-17%20Initiating%20an%20Existing%20Building%20Policy%20Ecosystem%20for%20Surrey_Li.pdf
[55] https://vancouver.ca/home-property-development/energy-requirements-for-single-family-home-renovations.aspx
[56] Li, Jiaxin (2018). Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-17%20Initiating%20an%20Existing%20Building%20Policy%20Ecosystem%20for%20Surrey_Li.pdf

and labelling programs.[57] To encourage disclosure, for instance, the City of New Westminster promotes Metro Vancouver's "*rateourhome.ca*" for disclosure of home energy performance.[58]

Leading cities use energy benchmarking regulations and voluntary leadership programs to gather energy data from buildings. Local governments such as Township of Langley, City of Victoria and District of Saanich, are advocating and lobbying for the development of province-wide energy labelling and/or benchmarking program. The City of Vancouver is currently working with other local governments and stakeholders in the Province to develop a common system for energy benchmarking and reporting requirements and in the interim considers launching a voluntary benchmarking program.[59]

Table 2: Data and Reporting of Local Governments

Local government	Home Energy Labelling	Energy Benchmarking	Program tied Voluntary Home Energy Labelling
City of New Westminster			●
City of Vancouver	●		●
City of Victoria			●
District of Saanich			●
Township of Langley			●

Regulations

Leading cities use existing buildings regulations including regulations to enforce energy assessments, benchmarking, retro-commissioning, and mandatory lighting upgrades to accelerate market transformation.[60] Local governments use the Provincial BC Building Code to govern alterations and improvements of existing buildings. The Code requires homeowners to meet energy Code requirements when renovations, additions and/or alterations take place to an existing building.[61] Complying with Building Code requirements only applies to parts of the existing building affected by the renovation or alteration.

The City of Vancouver, as a charter city, has its own Building Bylaw that applies to both new and existing buildings. Other local governments have a limited regulatory power to influence

[57] Interview with Ryan Coleman, Program Coordinator, City of New Westminster, July 2019
[58] http://www.energysavenewwest.ca/existing-homes/
[59] City of Vancouver (2019). Council Report: Building Retrofits for Deep Carbon Reductions. https://council.vancouver.ca/20190424/documents/cfsc3.pdf
[60] Li, Jiaxin (2018). Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-17%20Initiating%20an%20Existing%20Building%20Policy%20Ecosystem%20for%20Surrey_Li.pdf
[61] Province of British Columbia (2015). Building Act Series Section A1: Understanding BC's Building Regulatory System. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/guides/buildingactguide_sectiona1_june2015_web.pdf

existing buildings retrofits. The 2014 Vancouver Building By-Law requires EnerGuide energy assessment and energy efficiency upgrades as preconditions for home and building renovation permit. [62] The law requires homeowners to meet the energy efficiency requirements of the BC Building Code when undertaking alterations or renovations to existing buildings.[63] For buildings classified as detached one and two-family houses, the Bylaw requires EnerGuide energy assessment as a precondition to get a renovation permit. Homeowners, however, are not required to undertake any of the recommended energy upgrades.

The City of Vancouver adopted a time of renovation trigger for existing buildings energy upgrades. Based on the value of the renovation, the law requires homeowners to undertake energy efficiency improvements during home renovations. As shown in Table 3, the requirements include weather sealing and attic insulation upgrades based on the value of the renovation.

Table 3: City of Vancouver Home Renovation Requirements[64]

Value of renovation	Required action/upgrade
>$5,000	EnerGuide Energy Assessment
>$25,000	EnerGuide Energy Assessment + Weather Sealing
>$50,000	EnerGuide Energy Assessment + Weather Sealing + Attic Insulation

Compliance is one of the challenges in adopting a regulatory path for existing buildings. Similar to other local governments in the Province, underground renovation and retrofit activities are widespread in the City.[65] The system is a complaint-based system and homeowners who are caught undertaking renovation without permit pay double the permit fee ($400) as a penalty. [66] Affordability is also another barrier, as the law requires homeowners to pay more for home renovation.

The City of Vancouver is further considering adopting a regulation to significantly reduce the energy and GHG emissions from existing buildings. The City has proposed to Council to make all new and replacement heating and hot water systems zero emissions by 2025.[67] Accordingly, the City plans to regulate the replacement of all gas systems with zero emissions systems by 2025.

[62] City of Vancouver (2014). Council Report: Energy Retrofit Strategy for Existing Buildings. https://council.vancouver.ca/20140625/documents/ptec1.pdf
[63] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019
[64] City of Vancouver (2017). Council Presentation: Update on Energy Retrofits for Existing Buildings. https://council.vancouver.ca/20170207/documents/rr4Presentation.pdf
[65] Interview with Micah Lang, Senior Green Building Planner, City of Vancouver, July 2019
[66] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019
[67] City of Vancouver (2019). Council Administrative Report: Climate Emergency Response. https://council.vancouver.ca/20190424/documents/cfsc1.pdf https://vancouver.ca/green-vancouver/renewable-city.aspx

Incentives

As summarized in Table 4, all the surveyed local governments have incentive programs and/or promote and facilitate access to incentive programs offered by the Province and utilities to encourage residents to undertake home energy improvements. The incentives provided by the surveyed local governments are mainly financial and open to new and existing buildings as well as businesses. The financial incentives are mainly in the form of rebates and discounts. Some of the surveyed local governments also provide non-financial incentives in the form of technical assistance and other support services.

Prescriptive and Performance-based Incentives

The two types of incentive application methods used by the surveyed local governments' are prescriptive incentives and performance-based incentives.[68] Most local governments use prescriptive incentives as they offer a fixed amount for services such as energy audits or installation of energy-efficient equipment and appliances. For instance, the City of New Westminster through its *Energy Save New West* program currently offers a subsidized energy audit for $75 for a home EnerGuide energy assessment.[69] The Township of Langley's *Green Building Rebate Program* uses performance-based rebate system that targets energy savings. The Township's program offers $15 per GJ/Year reduction achieved between pre and post-retrofit EnerGuide energy assessment.[70]

Local government incentives programs like *Energy Save New West* and *Green Building Rebate Program* try to make their program eligibility requirements consistent with the incentives offered by the Province and utilities so that residents can access additional support through these programs. The City of New Westminster through its *Energy Save New West* program focuses on enhancing existing incentive programs by providing extra services or introducing services not offered by existing programs to provide a better benefit to residents.[71]

Similar to the practices of leading cities like New York City and Boulder, some local government incentive programs provide time-limited offers and varying incentive/rebate amount at different times. For instance, although there is no deadline to apply to the City of New Westminster's *Energy Save New West* program, a limited number of discounted pre-upgrade energy evaluations are currently offered.[72]

Top-Up Funding

This was noted to be a common approach by the surveyed local governments whereby they promote and provide top-up funding to existing provincial, regional and utilities incentive programs.[73] For instance, the City of Vancouver currently offers a $2,000 top-up funding for

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[68] Li, Jiaxin (2018). Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-17%20Initiating%20an%20Existing%20Building%20Policy%20Ecosystem%20for%20Surrey_Li.pdf

[69] http://www.energysavenewwest.ca/existing-homes/

[70] Township of Langley: Green Building Rebate Program: Renovations https://webfiles.tol.ca/Engineering/GreenBuilding_Additions%20and%20alterations%20brochure.pdf

[71] Interview with Ryan Coleman and Norm Connolly, City of New Westminster, July 2019

[72] http://www.energysavenewwest.ca/existing-homes/

[73] https://betterhomesbc.ca/municipal-offers/

electric air-source heat pumps through *Better Homes BC*. Similarly, the City of New Westminster through the *Rental Apartment Efficiency Program* provided a top-up funding that allowed the program implementing partner to provide additional support to the City's participant property owners.[74] This has seen the City achieve a higher participation rate per capita in the region and eliminate more 500 tonnes of carbon emissions.[75]

Table 4: Current Local Government Incentive Programs

Local government	Local government incentive program		Support existing incentives
	Prescriptive-based	Performance-based	
City of New Westminster	●		●
City of Vancouver			●
City of Victoria			●
District of Saanich			●
Township of Langley		●	●

With increasing focus on existing buildings, various incentive-based programs are being considered and developed in the surveyed local governments. For instance, the City of Vancouver plans to implement a Deep Emissions Retrofit Program that will identify and support the transition to full electrification of poor energy performing and high-energy bill buildings over the next three years.[76] The program will cover all types of residential buildings. Additionally, non-financial incentives such as streamlining and expediting the permit process is being considered by local governments including the City of Vancouver and Township of Langley to ease the time and administrative burden associated with home energy upgrades.

Energy Efficiency Financing

Deep energy retrofits require homeowners to invest in high upfront costs, which is a barrier to deep energy upgrades. Overall, as part of the Clean BC Plan, local governments are expecting policy guidance from the Province regarding province-wide financing tool for clean energy upgrades. The District of Saanich is leading in developing a financing tool to support deep energy upgrades.[77] The District has submitted a *Home Energy Retrofit Municipal Financing Pilot* proposal to Council in February 2019 to introduce a pilot heat pump financing program. The pilot program will support 50 income-qualified households to upgrade from oil heating system

[74] Interview with Ryan Coleman and Norm Connolly, City of New Westminster, July 2019
[75] https://www.newwestcity.ca/2017/06/05/city-of-new-westminsters-energy-save-new-west-program-receives-efficiency-in-action-award-from-fortisbc.php
[76] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019
[77] District of Saanich (2019). Climate Action Revenue Incentive (CARIP) Public Report for 2018. https://www.saanich.ca/assets/Community/Images/Planning/Sustainability/2018-Saanich-CARIP-Report.pdf

to air source heat pump by providing up to $12,000 with a 0 percent interest rate financing to be repaid in 10 years. [78] Property Accessed Clean Energy (PACE) or municipal financing is the proposed tool that will tie the financing with the property and homeowners will repay through their annual property tax. The program plans to prioritize low-income residents as they have relatively limited access to traditional financing options.[79]

Education and Training

By adopting various approaches, local governments use education and training to accelerate market transformation. The education and training provided by the surveyed local governments can be categorized as public awareness and skills development.[80] Training on regulatory compliance in the surveyed local governments focuses on BC Energy Step Code and new buildings as most local governments do not have regulations regarding existing buildings.

Public Awareness

Local governments acknowledge that community understanding of energy use and efficiency is a major barrier in fostering market transformation. To address this knowledge gap, local governments use various platforms to educate the public on energy efficiency and available support and incentive programs for energy upgrades. Similar to the leading cities, they use social media, website and direct community engagement to educate the public. For instance, the District of Saanich, as shown in Figure 3, uses online info graphs to educate residents about heat pumps by comparing the operating cost of fossil fuels and heat pumps on the District's website along with information on available incentives for energy upgrades.[81] To raise residents' awareness about GHG emissions and their role in reducing emissions, the District also has an online Carbon Calculator. The online calculator has a section dedicated to homes and buildings.[82] An example of direct community engagement is the City of Victoria's "Climate Lens Council Workshops". [83] The City is hosting a series of workshops to inform the City's climate action policy and activities through community input. A session was dedicated to discussing deep energy retrofits for existing buildings.[84]

[78] District of Saanich (2019) Council Report on Home Energy Retrofit Municipal Financing Pilot. http://saanich.ca.granicus.com/MetaViewer.php?view_id=1&clip_id=241&meta_id=13403

[79] Interview with Maggie Baynham, Senior Sustainability Planner, District of Saanich, June 2019

[80] Li, Jiaxin (2018). Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-17%20Initiating%20an%20Existing%20Building%20Policy%20Ecosystem%20for%20Surrey_Li.pdf

[81] https://www.saanich.ca/assets/Community/Documents/Planning/sustainability/BetterHomesBC-HeatPumpPoster.pdf See also: https://www.saanich.ca/EN/main/community/sustainable-saanich/green-at-home/carbon-fund-calculator.html

[82] https://www.saanich.ca/EN/main/community/sustainable-saanich/green-at-home/carbon-fund-calculator.html

[83] City of Victoria (2019). Climate Action Revenue Incentive (CARIP) Public Report for 2018. https://www.victoria.ca/assets/Departments/Sustainability/Documents/2018_CARIP_SurveyReport_Final.pdf

[84] https://www.victoria.ca/EN/main/residents/climate-change/climate-leadership/climate-action-acceleration-town-halls.html

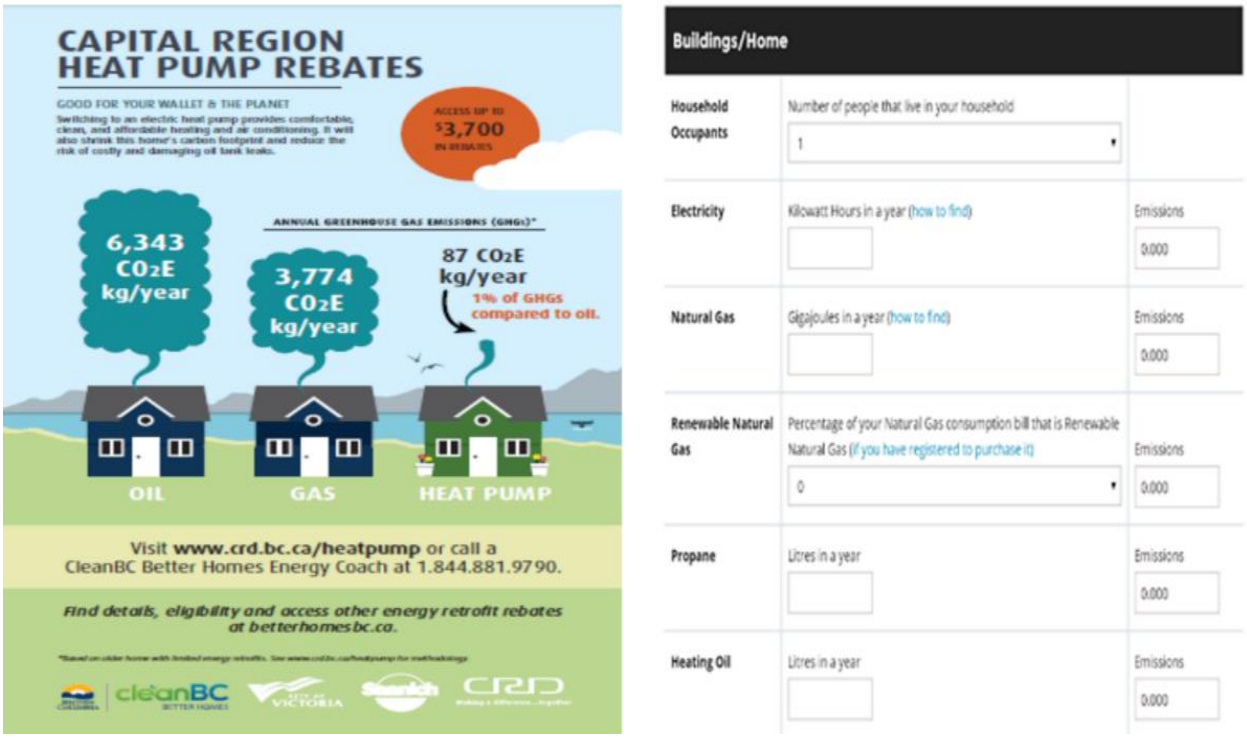

Figure 3: District of Saanich Info Graph and Carbon Calculator

To raise public awareness on climate issues and actions, the City of Vancouver is considering developing free short courses for residents to be delivered at community centers on various topics including home energy efficiency.[85] To leverage early adopters of energy efficiency, the City of Victoria is exploring ways to develop a grassroots community based social marketing program where community early adopters advocate for energy efficiency actions.[86] Among the leading cities, Chicago makes use of its incentive programs as a peer learning opportunity to educate the community about energy efficiency. The Retrofit Chicago Residential Partnership program offers single-family homeowners free energy audit if homeowners are willing to share their program experience with the community by hosting a post-audit house party.[87]

As directly engaging the public is resource-intensive, local governments such as the City of Vancouver and District of Saanich also focus on industry to educate and inform homeowners about energy efficiency improvements. For instance, the District of Saanich as member of the Federation of Canadian Municipalities' Transition 2050 Residential Retrofit Acceleration Project, works to better prepare industry on energy efficiency improvements to enable them to become informed and reliable partners to support building energy retrofits in the District.[88]

Skills Development

[85] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019
[86] Interview with John Ho, Community Energy Specialist, City of Victoria, June 2019
[87] Li, Jiaxin (2018). Initiating an Existing Building Policy Ecosystem for Surrey: A Review of Six Leading Cities. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-17%20Initiating%20an%20Existing%20Building%20Policy%20Ecosystem%20for%20Surrey_Li.pdf
[88] Interview with Maggie Baynham, Senior Sustainability Planner, District of Saanich, June 2019

Skills development for industry has been the focus of most of the surveyed local governments. Most skills development initiatives and programs by local governments have been done concerning the BC Energy Step Code for new buildings. However, some of the skills are transferable and applicable to retrofitting existing buildings. For instance, the City of New Westminster hosted more than 10 Builder Breakfast Sessions and has engaged over 500 builders, architects, and designers on Energy Step Code and green building practices.[89] Similarly, the Township of Langley makes use of its bi-monthly Builders' Breakfast Series to engage stakeholders about existing buildings and communicate about available incentive programs.[90] Local governments are also exploring other platforms to engage industry. For instance, the City for Vancouver will participate in the Buildex 2020 Trade Show to provide information and engage with stakeholders on building energy retrofits.[91]

Leading cities like New York City have training programs focused on existing buildings. Through its *NYC Retrofit Accelerator* program[92], the City provides short one and two-day courses on building energy efficiency systems to building managers and operators. The topics covered include heating systems, air sealing, and electrical energy efficiency of buildings.

To ensure fair market transformation, the City of Vancouver is developing a Job Transition Strategy aimed at training and certifying fossil fuel trained installers on heat pumps and other new energy-efficient technologies.[93] The City is working with stakeholders including the Home Performance Stakeholder Council, Thermal Environmental Comfort Association and manufacturers to develop the strategy, build the courses, and explore the certification process.[94]

Lessons Learned and Key-Takeaways

Though there is no one-size-fits-all policy approach that apples to all local governments, the following are key lessons that are drawn from policies and programs of the surveyed local governments that can be considered in the development and implementation of Surrey's retrofit strategy.

- *Developing building-specific GHG reduction and retrofit targets guide policies and actions towards decarbonizing existing buildings.* As is the case with the leading cities as well as the City of Vancouver, adopting building-specific targets enables local governments to develop customized policies and programs and track progress accordingly.

- *Adopting a collaborative approach to developing and implementing existing buildings policies and programs.* Local governments make use of the resources and funding opportunities available from the federal and provincial governments, utilities and other stakeholders to develop and implement their retrofit strategies. Strong collaboration with other local governments is also a key approach that enables local governments to advance existing buildings policies and programs.

[89] Interview with Ryan Coleman, Program Coordinator, City of New Westminster, July 2019
[90] Interview with Tess Rouse, Energy Programs Manager, Township of Langley, June 2019
[91] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019
[92] https://retrofitaccelerator.cityofnewyork.us/resources
[93] City of Vancouver (2019). Council Report on Building Retrofits for Deep Carbon Reductions. https://council.vancouver.ca/20190424/documents/cfsc3.pdf
[94] Interview with Brady Faught, Green Buildings Engineer, City of Vancouver, July 2019

- *Designing retrofit strategy and actions according to building types and/or technologies used in buildings.* Retrofit strategy and program development in the surveyed local governments is tailored according to building stock and energy sources. Local governments also adopt an equity approach to target low-income and vulnerable residents for energy retrofits.
- *Lobbying for the development of province-wide energy labelling and benchmarking program.* As a key tool to understand energy performance and GHG emissions reduction from buildings, local governments are pushing the Province to adopt energy labelling and benchmarking requirements for existing buildings while at the same time exploring options to develop robust voluntary data and reporting mechanisms.
- *Exploring targeted marketing to trigger energy upgrade at time of major renovations*. As most local governments in the Province, City of Surrey can consider using targeted marketing strategies including renovation-triggered upgrades to develop informative data mapping and analysis tools to prioritize retrofits within the City.
- *Expanding and contextualizing support for existing regional and provincial incentive programs.* Local governments leverage and enhance incentive programs offered by utilities and the Province. Surveyed local governments target their support to these programs according to their specific needs and gaps.

Appendix 1: Existing Buildings Policies &Programs

Policy/Program	Category	Jurisdiction	Description		Targeted Beneficiaries	Time Frame	Policy/Program Status
Pan- Canadian Framework on Clean Energy and Climate Change	Policy direction	Federal	Guides Canadian climate change actions. It plans to address GHG emissions from existing buildings through:	**National retrofit code:** Develop retrofits code/requirements to help guide energy efficiency improvements for building renovations.	Provinces and Territorial governments	2020	Under development[95]
				Energy benchmarking, labelling, and disclosure: develop requirements for energy benchmarking, mandatory labeling and disclosure of building energy performance.		2019	Under development
Low-Carbon Economy Fund	Incentive and financial support	Federal	$2 billion to support Canada's climate change activities. It has two components:	**Low-Carbon Economy Leadership Fund**: $1.4 billion provided by the Federal Government for climate actions for Provincial and Territorial governments.	Provinces and Territorial governments	2018-2023	In force
				Low Carbon Economy Challenge: $500 million allocated to support innovation to reduce greenhouse gas emissions.		2018-2023	In force
Clean BC	Policy direction	Provincial	Clean BC defines BC's plan to reduce GHG emissions. The plan identifies existing buildings as major GHG emissions sources and plans to address it through:	**Provincial retrofit code:** develop a new standard for building improvements and renovations.	BC local governments	2024	Under development
				Equipment and appliances standards: Set new energy efficiency standards for space heaters, water heaters, and residential windows		2022-25	Not available
				Energy labelling: Consider requiring energy labelling a requirement for homes and buildings at the time of rent or sale.		Not available	Not available
Better Homes BC	Incentive program	Provincial	The program supports BC's efforts in achieving its GHG reduction targets and retrofit programs. The program support homeowners who undertake energy-efficient renovations by providing information on rebates, financing, decision assistance tools, and energy coaching service in partnership with energy utilities and other stakeholders		BC local governments	2018-	In force
Utilities: BC Hydro FortisBC	Incentive program		Utilities provide several financial and non-financial support for home and building energy upgrades. The support provided by utilities is designed and implemented in collaboration with different stakeholders including the Province, local governments, and industry associations.		BC local governments, home & building owners, businesses	Ongoing	Ongoing

[95] Natural Resources Canada (2018). Canada's Buildings Strategy Update. https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/2018/en/18-00369-emmc-buildings-strategy-report-e.pdf

Appendix 2: List of Interviewees

Brady Faught, Green Buildings Engineer, City of Vancouver

John Ho, Community Energy Specialist, City of Victoria

Maggie Baynham, Senior Sustainability Planner, District of Saanich

Micah Lang, Senior Green Building Planner, City of Vancouver

Norm Connolly, Community Energy Manager, City of New Westminster

Ryan Coleman, Project Coordinator, City of New Westminster

Tess Rouse, Energy Programs Manager, Township of Langley