Climate Governance Project Report

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Purpose and Background

PURPOSE

The purpose of this project is to conduct research that contributes to policy development supporting the implementation of the City of Kamloops' Community Climate Action Plan (CCAP) Strategy 7B: Climate Governance action: "Establish a carbon budget framework, internal carbon price, and/or other tools that apply a climate lens to budget planning and decision making and support accountability for meeting corporate emissions reduction targets".[1]

This report is divided into two chapters. Chapter 1 will discuss the available policy options, their strengths, shortcomings, and feasibility, and where these have been implemented or used already. Chapter 2 is in three sections. The first section will provide brief case studies of municipalities that have adopted GHG emissions reduction models. The second section discusses funding options for implementing climate initiatives. Finally, the third option provides an overview of sample policies for transitioning municipal fleet to zero-emissions vehicles, and for implementing building energy retrofit programs.

Note: The primary focus of these reports is to present options for reducing emissions in City of Kamloops operations and decision-making. Having city operations reach carbon neutral will not be enough to reach the climate targets for the city identified in the CCAP. Emissions will also need to be reduced among residents and private sector businesses.

BACKGROUND

Greenhouse gas (GHG) emissions linked to human activities are a driving force of global climate change. The impacts of global climate change are already being felt around the world. Increased frequency and severity of extreme weather events in recent years have been linked to climate change.[2] Some regions are experiencing global climate impacts at accelerated rates. Canada is experiencing warming at twice the rate of the global average.[3]

The Intergovernmental Panel on Climate Change (IPCC) has projected that the average global temperature increase must be limited to 1.5°C to avoid catastrophic environmental impacts.[4] Nearly 200 countries, including Canada, have pledged to drastically reduce GHG emissions, with an ultimate target of achieving net-zero emissions by 2050.[5]

Climate goals and targets cannot be accomplished by the Canadian federal government alone. The impacts of climate change are felt everywhere and impact all levels of government. Action from

[1] City of Kamloops. (June 29, 2021) "Community Climate Action Plan" (CCAP), online <https://www.kamloops.ca/sites/default/files/docs/cityofkamloops_communityclimateactionplan_june2021_final_0.pdf>, p. 59.
[2] IPCC, Working Group I. (2021) "Sixth Assessment Report, Chapter 11: Weather and climate extreme events in a changing climate", online: <https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter_11.pdf>
[3] *Supra,* CCAP, p. 3.
[4] IPCC. (2018) "Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C", online: <https://www.ipcc.ch/sr15/>
[5] Paris Agreement to the United Nations Framework Convention on Climate Change, December 12, 2015, T.I.A.S. No. 16-1104. Online: <https://unfccc.int/sites/default/files/english_paris_agreement.pdf>

municipalities and regional districts is essential to mitigate climate change and to increase adaptation and resilience to climate impacts.[6]

The southern interior region of British Columbia (BC) is semi-arid and prone to hot summers. Global climate impacts are expected to increase average temperatures and decrease precipitation in this region.[7] This report was written in August of 2021, the end of a summer where BC experienced record temperatures and dry spells, followed by a historic wildfire season in the Kamloops region and across the Interior.

CITY OF KAMLOOPS COMMUNITY CLIMATE ACTION PLAN (CCAP)

The City of Kamloops adopted the CCAP on June 29, 2021 - the hottest day ever recorded in Kamloops. The CCAP sets out emissions targets and deadlines and assesses the major sources of emissions in Kamloops.[8]

Kamloops' emissions targets are to reduce community GHG emissions to 30% below 2007 levels by 2030 and to reduce GHG emissions to 80% below 2007 levels by 2050.[9] The CCAP notes that a goal of net-zero community GHG emissions by 2050 is recommended by the IPCC and that the target for the City of Kamloops may be updated to be more ambitious in the future with new technology or policy changes.[10] The CCAP also set targets to reduce carbon emissions from municipal operations (i.e. fuel from City-owned vehicles and energy use in municipal buildings) by 40% by 2030 and 100% by 2050.

The CCAP identified that in 2017 the community sectors with the highest emissions in Kamloops are Transportation (66%), Buildings (29%), and Solid Waste (5%). It also indicated that in 2017, Kamloops' per capita emissions were 11% higher than the provincial average.[11]

Chapter 1: Policy Options

OVERARCHING CLIMATE POLICY APPROACHES

This section of the report will focus on different broad approaches to GHG emissions that could be implemented to guide City of Kamloops policies and decision-making across all sectors.

Declaration of Climate Emergency

A declaration of a climate emergency is a public acknowledgement of the severity of the current and future impacts of climate change. Over 2,000 governments and jurisdictions around the world have made

[6] Province of British Columbia. "Local Government Climate Action", online: <https://www2.gov.bc.ca/gov/content/governments/local-governments/climate-action>
[7] Daust, D. (2013) "Climate Change in B.C.", online: <https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/applied-science/2a_va_bc-climate-change-final-aug30.pdf>
[8] *Supra,* CCAP, p. 7.
[9] *Ibid,* p. 8.
[10] *Ibid*, p. 8.
[11] *Ibid*, p. 9.

declarations of a climate emergency, including over 500 Canadian municipalities and local authorities.[12] Nationally, the Canadian Parliament passed a resolution declaring a climate emergency on June 17, 2019.[13]

Advantages: A declaration of climate emergency is an inexpensive way to make a public commitment to address climate change, which increases the accountability of the declaring jurisdiction. Declaring a climate emergency is a good time to introduce new climate focussed initiatives. These declarations are often accompanied by commitments to reach climate targets and the announcement of new policies that will be taken to reach those commitments.[14]

Additionally, a declaration of climate emergency is relatively quick, simple, and inexpensive to accomplish, depending on the specific bylaws and processes governing the declaring jurisdiction.

Disadvantages: On its own, a declaration of climate emergency is only an acknowledgment, and does not make any steps towards a solution. Without taking other actions or implementing new policies a declaration of climate emergency is functionally meaningless.[15]

Some municipalities that have proposed declaring a climate emergency have been met with criticisms that attention should be focussed on taking actions to reduce emissions, rather than making empty statements.[16]

Examples of implementation: Municipalities in BC that have declared a climate emergency include Vancouver, North Vancouver, Richmond, the Capital Regional District, Burnaby, Smithers, Squamish, and Nanaimo.

Canada is one of a number of nations that have declared a climate emergency, including the United Kingdom, Vatican City, the Maldives, and New Zealand.

Several private corporations and organizations have also declared a climate emergency, including the University of British Columbia and the University of Waterloo.

Note: Some jurisdictions have made similar declarations but avoided the use of the term “emergency”. The Regional District of Kootenay Boundary declared a “Climate Action Imperative” in October 2019, and the city of Guelph, Ontario voted to “acknowledge a climate crisis” in May 2019.

The Kamloops City Council has not yet declared a Climate Emergency but did adopt the “Strategic Goal for Reducing Greenhouse Gas Emissions” on June 25, 2019, which states:

> Therefore be it resolved that Kamloops City Council:

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[12] “Climate emergency declarations in 2,012 jurisdictions and local governments cover 1 billion citizens”, online: <https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/>
[13] Parliament of Canada, 42nd Parliament, 1st Session, Vote No. 1366, (June 17, 2019). online: <https://www.ourcommons.ca/Members/en/votes/42/1/1366/>
[14] Sutherland, S. (October 17, 2019) “What is a climate emergency, and what does it mean?”, *The Weather Network*, online: <https://www.theweathernetwork.com/ca/news/article/toronto-declares-climate-emergency-what-does-this-mean>
[15] Levy, D. (August 13, 2021) “A simple declaration of climate emergency by itself isn’t enough: it’s time to act” *The Province*, online: <https://theprovince.com/opinion/david-levy-a-simple-declaration-of-a-climate-emergency-by-itself-isnt-enough-its-time-to-act>
[16] Carty, M. (May 28, 2019) “Guelph city council votes to “acknowledge a climate crisis”, not declare climate emergency”, *Global News,* online: <https://globalnews.ca/news/5325462/guelph-city-council-climate-crisis-emergency-vote/>

a) set a strategic goal for reducing community greenhouse gas emissions that is in line with Kamloops' portion of global efforts to keep global temperature rise to 1.5°C

b) mandate staff, through the work on the Community Climate Action Plan, to outline a series of actions that would reduce greenhouse gas emissions in Kamloops to align with the global efforts to keep global temperature rise to 1.5°C.[17]

Climate Lens

A climate lens is a commitment to consider the impacts that decisions and policies have on the climate.[18] Functionally, a climate lens approach means that a government or organization establishes an assessment framework and planning tool that mandates which environmental impacts need to be considered as part of decision making or policy implementation.

Climate lenses are developed for each government or organization that adopts them. They are not uniform in what assessments are required, or in which decisions the lens applies to. This means that a climate lens approach is flexible and can be crafted to reflect the importance of reducing climate impacts beyond simply measuring GHG emissions.

Most climate lenses require assessment of whether, and to what extent, a new project or policy contributes to or reduces GHG emissions over its lifetime.[19] The City of Victoria developed a climate lens that could also be used to assess whether existing policies align with climate targets.[20] A more comprehensive climate lens could also require an assessment of how resilient a project is to future climate change, or how a decision promotes equality or justice for groups most affected by the impacts of climate change.[21]

Advantages:

Developing a climate lens helps to ensure there is consistency within a government or organization for all decisions and policies.[22] A climate lens would be an opportunity to reflect the importance of the climate co-benefits set out in the CCAP in decision making.[23] Climate change adaptation, equity and climate justice considerations may be more easily incorporated than in other climate governance tools, such as carbon pricing, that are more focussed on financial metrics.

Formally adopting a climate lens is a way of increasing accountability to the public that the city's climate commitments are being considered in all decision making.

Disadvantages: It takes time and resources to develop and implement a climate lens.

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[17] City of Kamloops. (June 25, 2019) "Minute of a regular meeting of the Municipal Council of the City of Kamloops", p. 8, online: <https://kamloops.civicweb.net/document/101799>
[18] Federation of Canadian Municipalities. (2020) "Climate in Focus – Introduction", video, online: <https://fcm.ca/en/resources/mcip/video-climate-in-focus-introduction>
[19] Government of Canada. (2019) "Climate Lens – General Guidance", online: <https://www.infrastructure.gc.ca/pub/other-autre/cl-occ-eng.html>
[20] Work, F. (2019) "Report to City of Victoria Committee of the Whole Re: application and integration of climate lens", online: <https://pub-victoria.escribemeetings.com/filestream.ashx?DocumentId=47161>
[21] Assembly of First Nations Climate Gathering. (2020) "Framing a First Nations Climate Lens", online: <http://www.afn.ca/wp-content/uploads/2020/04/Plenary-AFN-Framing-a-Climate-Lens-PPT.pdf>
[22] Behan, K. (2020) "Climate lens for municipal decision making", *Clean Air Partnership*, online: <https://cleanairpartnership.org/cac/wp-content/uploads/2020/04/Climate-Lens-Jan-30.pdf>
[23] *Supra,* CCAP, p. 17.

Climate lens requirements could slow down proposals for new projects and decision-making processes.

Requiring that climate impacts be considered for all decision-making does not necessarily mean that the option that is most beneficial to the climate will be selected, particularly if the other options are less expensive or otherwise more attractive. To mitigate this, the climate lens could include guidance on how to balance climate considerations against other concerns, or the climate lens could be used in conjunction with other climate policies such as internal carbon pricing or a carbon budget.

Examples of where it has been applied: In BC, the City of Victoria has adopted a climate lens for all new and existing municipal policies, programs, and projects.

Adopting a climate lens approach to decision-making is becoming more common for municipalities and local governments, particularly in Ontario, with some examples including Windsor, London, and Caledon.

Additionally, the Canadian federal government has mandated the use of the Infrastructure Canada Climate Lens for all proponents of major public infrastructure projects that are seeking federal funding.[24]

Note: There are online climate lens tools, like the Clean Air Partnership tool for Ontario municipalities, that can be used to assess how a decision would affect GHG emissions.[25]

Internal Carbon Pricing

The concept of carbon pricing or carbon taxes is not new in BC, which has had a provincial carbon tax since 2008. The goal of a carbon price is to make organizations/firms/individuals internalize their carbon emissions into their decision-making. The price can be either set to achieve a carbon emissions reduction target or to reflect the future damages of these carbon emissions based on predicted climate change impacts.

BC's current carbon tax of $45 per tonne is slightly higher than the current federally mandated minimum of $40 per tonne; however, these costs are at the low end of the range of what many experts have submitted to be the true social cost of carbon. The social cost of carbon is a monetary estimate of the future damages from the emission of one additional tonne of GHGs in a particular year. The German government uses an estimate that the social cost of carbon in 2016 is the equivalent of 180 EUR per tonne.[26] The current estimates used by the Canadian federal government and the United States government in Regulatory Impact Analysis are much lower, but both are currently in the process of revising their estimates of the social cost of carbon.[27] Internal carbon pricing helps to make up for the gap between provincial or federal carbon taxes and the true social cost of carbon.

An internal carbon price is a decision-making tool where an organization sets a price per tonne of GHG emissions related to a project or policy and includes that price when comparing different options.[28] Carbon emissions are calculated for the lifetime of the project or policy. This carbon price is used to

[24] *Supra,* Government of Canada. (2019).
[25] Clean Air Partnership, "Climate Lens Tool", online: <https://www.cleanairpartnership.org/climate-lens/>
[26] Wagner, G., Anthof,, D., Cropper, M., Dietz, S. Gillingham, K.T., Groom, B., Kelleher, J.P., Moore, F.C., and Stock, J.H. (February 19, 2021) "Eight priorities for calculating the social cost of carbon", *Nature,* online: <https://www.nature.com/articles/d41586-021-00441-0>
[27] Chemnick, J. (March 1, 2020) "Cost of carbon ollution pegged at $51 a ton", *Scientific American,* online: <https://www.scientificamerican.com/article/cost-of-carbon-pollution-pegged-at-51-a-ton/>; Government of Canada. "Pricing Carbon Pollution", online: <https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/climate-plan/annex_pricing_carbon_pollution.pdf>
[28] World Bank. (2020) "State and Trends of Carbon Pricing 2020", online: <https://openknowledge.worldbank.org/handle/10986/33809>

adjust the total cost of the option, along with maintenance and operating costs for the lifetime of the option. This helps to balance the reality that low emissions options are often accompanied by higher upfront price tags.

For this approach to be effective, the price of carbon must be set high enough to align with climate targets, but not so high as to make the implementation of a carbon price prohibitive.[29] The City of Vancouver, for example, set an internal carbon price at $150 in 2018, with a yearly increase of 6%, net of provincial and federal carbon taxes.[30]

Shadow price vs. internal carbon fee: Shadow pricing carbon involves putting a theoretical price on emissions that is used as part of the cost calculation. With a shadow price, the cost exists only on paper and is not included in the actual expenditure for that decision.[31]

Another option is an internal carbon fee, where the organization "pays" the calculated carbon price, often to a fund or reserve set aside for emissions reduction initiatives.[32]

An internal carbon fee will likely have a greater effect on decision making than a shadow price, as needing to budget for the carbon cost of the higher emissions option is a more tangible motivator than a hypothetical future cost from climate impacts; however, it may be more difficult to set an internal carbon price if the municipality is planning to pay internal carbon fees, as concerns about the effect on the budget will likely result in a push for a lower carbon price.

Advantages: Implementing internal carbon pricing means the "true cost" that would otherwise be unquantified and left out is included when comparing options. This means an option that is better for the climate but with a higher upfront price might still be the most financially sound option once the lifetime emissions cost is examined.[33]

Including an internal carbon price or tax helps to build climate resiliency into decision-making processes.[34] Future costs are predicted from the outset including increasing carbon taxes paid on operating energy or maintenance.

Implementing a carbon tax or carbon price is a relatively efficient process once the price per tonne has been set. Having several precedents in BC may make it easier for the City of Kamloops to learn from other local governments about establishing an appropriate carbon price.

Disadvantages: Internal carbon pricing alone may not be enough to achieve climate targets, as it looks at GHG emissions for individual decisions (and generally only for new projects/purchasing decisions) rather than cumulative emissions.[35]

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[29] City of Vancouver Administrative Policy. (2019) "Internal Corporate Carbon Pricing", ADMIN-019, online: <https://policy.vancouver.ca/ADMIN019.pdf>
[30] *Ibid.*
[31] Addicott, E., Badahdah, A., Elder, L., and Tan, W. (2019) "Internal carbon pricing", *Policy Framework and Case Studies,* vol. 09, online: <https://cbey.yale.edu/sites/default/files/2019-09/Internal%20Carbon%20Pricing%20Report%20Feb%202019.pdf>
[32] *Supra,* Addicott *et al.,* 2019.
[33] *Supra,* City of Vancouver Administrative Policy, 2019.
[34] Carbon Pricing Leadership Coalition. (2021) "Carbon Pricing Leadership Report, 2020/2021", online <https://static1.squarespace.com/static/54ff9c5ce4b0a53decccfb4c/t/60ba4a7d2f4d4b6e0ace36c4/1622821505499/CPLC%2BReport%2B2021_Final.pdf>
[35] *Ibid.*

Internal carbon pricing as part of a cost calculation between options may also result in less accountability to the public than other GHG emissions reduction approaches. The solution would be to make the cost comparisons of the options publicly available.

Calculating the lifetime GHG costs for options could slow down some decision-making processes and project proposals.

Examples of where it has been applied: In BC, internal carbon pricing has been adopted in a number of municipalities including the City of Vancouver, the Metro Vancouver Regional District, and Burnaby, which all use shadow pricing, and Dawson Creek, which pays $100 per tonne into a carbon fund.[36]

Internal carbon pricing is also used widely by private corporations to achieve emissions targets and to promote climate resiliency.[37] Yale University, Microsoft, and Delta airlines are all using internal carbon pricing schemes.[38] Other corporations that are considering implementing internal carbon pricing include MEC and Arc'teryx.[39]

Carbon Budgeting

A carbon budget is similar to a financial budget. A municipality or other organization first calculates what their total carbon budget would be for a time frame. Budgeting is typically done by starting with the maximum amount of GHG emissions to meet the IPCC goal of limiting global warming to 1.5° and then calculating a city's fair share of that amount.[40]

Determining a fair share is based on per capita emissions for the projected population at the time of the target, which is typically set as net-zero emissions by 2050. A net-zero goal means a carbon budget represents all allowable emissions for a city for the future.[41]

Many cities are also taking into account equitable emissions, with areas that have a history of high carbon emissions having a goal to decrease emissions down to net-zero by 2050, while cities with a lower GDP in areas that have been historically low emitters are permitted to initially increase emissions, before decreasing them down to net zero.[42]

Municipalities would then have to make decisions to operate within their emissions budget. Emissions budgets are broken down into annual caps, with the expectation that yearly caps decrease as the municipality is expected to improve emissions efficiency. Going over the yearly emissions allowance would not simply be a missed target but would reduce the amount of allowed emissions for future years.[43]

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[36] Dawson Creek. (2015) "Carbon Fund Policy", online: <http://www.dawsoncreek.ca/wordpress/wp-content/uploads/news/proposed-policy-update-carbon-fund-policy/Carbon-Fund-Policy.pdf>
[37] *Supra,* Carbon Pricing Leadership Coalition, 2021.
[38] *Supra,* Addicott *et al.,* 2019.
[39] *Supra,* City of Vancouver Administrative Policy, 2019.
[40] Braun, M. and Hertzberg, K. (2020) *Creating a Carbon Budget,* recap of webinar presented by City of Edmonton and City of Oslo to Sustainable Waterloo Region, online: <https://www.sustainablewaterlooregion.ca/2020/10/14/webinar-recap-creating-a-carbon-budget/>
[41] City of Edmonton. (2019) "Information Brief: Carbon Budget and Accounting", online: <https://www.edmonton.ca/sites/default/files/public-files/assets/PDF/CarbonBudgetandAccountingInformation-PolicyBrief-2019-11.pdf>
[42] *Supra,*Braun & Hertzberg, 2020.
[43] *Ibid.*

Advantages: Carbon budgeting is a simple concept to understand, as it uses the same principles as a financial budget, including deficits and surpluses. Adopting a carbon budget increases accountability to the public, as carbon budgets should be published and updated similarly to municipal financial budgets.[44]

Carbon budgeting also aligns with climate science since the IPCC predictions are based on limiting cumulative GHG emissions rather than limiting annual emissions to a target level in a specific future year.[45]

Disadvantages: There is a lot of groundwork that goes into determining a carbon budget and setting the annual caps.[46] Similar to internal carbon pricing, calculating annual emissions may also slow down decision-making and project proposals.

A carbon budget presents all future allowable emissions as a depleting resource that will eventually run out. While this aligns with climate science, it is a more daunting idea than other emissions reduction strategies such as carbon pricing.[47] Consequently, it may be more difficult to obtain public support for a carbon budget.

Carbon budgets encompass all emissions for a jurisdiction, including those from residents and private corporations. As a result, municipal governments do not have decision-making power or regulatory control over all the emissions that are covered by the carbon budget.

Where it has been applied: Oslo, Norway is considered a pioneer for carbon budgeting. More locally, Edmonton recently adopted a carbon budget, becoming the first Canadian city to do so.[48]

Some countries have adopted nationwide carbon budgeting, including the United Kingdom and Sweden.

TRANSPORTATION SECTOR EMISSIONS REDUCTIONS POLICIES

Transportation is the sector that creates the most GHG emissions in Kamloops.[49] It will be impossible to reach climate targets without significantly lowering these emissions. This section of the report addresses policies and strategies that are aimed at reducing transportation emissions.

It is also important to reduce the number of trips taken, by implementing strategies to increase the walkability of neighbourhoods, like those included in the CCAP to promote densification and encourage access to amenities through mixed-use development.[50]

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[44] *Ibid.*
[45] Schleussner, C.-F., Tokarska, K.B., Stolpe, M., Fleiderer, P., Lejeune, Q., and Hare, B. (2018) "Carbon budgets for the 1.5°C limit", *Climate Analytics,* online: <https://climateanalytics.org/media/carbon_budgets_1o5c_updated18092018.pdf>
[46] *Supra,* Braun & Hertzberg, 2020.
[47] *Ibid.*
[48] City of Edmonton. (2021) "Edmonton's community energy transition strategy and action plan", online: <https://www.edmonton.ca/sites/default/files/public-files/assets/PDF/EnergyTransitionStrategy2021-04-20.pdf?cb=1630615491>
[49] *Supra,*CCAP, p. 9.
[50] *Ibid,* p. 21.

Zero Emissions Vehicles (ZEV) First Procurement

A zero-emissions vehicle (ZEV) is a vehicle that does not produce GHG emissions when operating, including fully electric vehicles and hydrogen fuel cell vehicles. To be a true ZEV, the electricity or hydrogen that powers the vehicle should also be produced in a manner that does not release GHG emissions. In BC, where most electricity is generated from hydropower, a fully electric vehicle would be a ZEV.[51]

There are also lower emissions vehicles, including plug-in hybrids which supplement electric power with gasoline or diesel, and vehicles that use low carbon biofuels including biodiesel, ethanol, and renewable natural gas reclaimed from decomposing waste. These lower emissions vehicles still produce GHG emissions when operating, but there are fewer emissions generated by the fuel production.[52]

When a government adopts a ZEV First Procurement Policy, they are mandating purchasing a ZEV over other options when acquiring new vehicles for the government fleet. These policies are often hierarchical, with a ZEV being prioritized over a hybrid, but a hybrid being prioritized over a gasoline-powered vehicle.[53]

A ZEV First Procurement Policy would specify which categories of vehicle it applies to, as well as when and how the government can justify the purchase of a non-ZEV, with a greater justification being needed to purchase a vehicle lower down on the policy hierarchy.[54]

Justifications for policy exemptions could include functionality concerns, such as range limitations or cargo limits, or procurement concerns such as long wait list times. As ZEVs tend to be more expensive than gasoline vehicles, allowing a lower cost to be an exemption would render the policy meaningless. This could be avoided by only allowing exemptions for prohibitively more expensive ZEVs, or by pairing the policy with internal carbon pricing or a similar tool to adjust the cost comparison to include lifecycle emissions and total fuel and maintenance costs.

Advantages: It will be impossible to reach climate targets without reducing transportation sector emissions, and transitioning the municipal fleet of vehicles to ZEVs is an essential step in that process.[55]

A municipal ZEV fleet can double as an awareness campaign on the importance of low emissions vehicles, and demonstrate that the city is taking action on climate targets. Additionally, increasing ZEV charging infrastructure to support a municipal fleet and making some of these stations also available for public use could encourage more residents to transition to ZEV options for personal vehicles.[56]

The federal government has mandated that by 2035, all new cars and passenger trucks being sold in Canada must be ZEVs.[57] Early adoption of a ZEV First Procurement Policy could ease the transition.

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[51] Metro Vancouver. (2021) "A pathway to carbon neutral transportation in Metro Vancouver", *Climate 2050 Roadmap,* online: <http://www.metrovancouver.org/services/air-quality/climate-action/climate2050/Climate2050Docs/Climate2050TransportationRoadmapMay2021.pdf>

[52] *Ibid.*.

[53] California Department of General Services. (2016) "ZEV and Hybrid first purchasing mandate", *4121.1,* online: <https://www.dgs.ca.gov/Resources/SAM/TOC/4100/4121-1>

[54] The Delphi Group, Pollution Probe. (2019) "Framework for municipal zero emission vehicle deployment", online: <https://www.pollutionprobe.org/wp-content/uploads/Probe-Delphi-Municipal-ZEV-Framework-Report.pdf>

[55] *Supra,* CCAP, p. 9.

[56] *Supra,* The Delphi Group, Pollution Probe, 2019.

[57] Transport Canada. (June 29, 2021) "Building a green economy: government of Canada to require 100% of car and passenger truck sales be zero-emission by 2035 in Canada", news release, online: <https://www.canada.ca/en/transport-canada/news/2021/06/building-a-green-economy-government-of-canada-to-require-100-of-car-and-passenger-truck-sales-be-zero-emission-by-2035-in-canada.html>

ZEVs also have lower lifetime fuel and maintenance costs than gasoline or diesel vehicles. Transitioning early will also decrease the amount of future carbon taxes paid on fuel, at a time when Provincial and Federal governments are increasing these carbon taxes.

Disadvantages: ZEVs are more expensive to purchase, particularly utility vehicles.[58]

Access to sufficient charging infrastructure is required to keep electric vehicles operational; for longer distance trips, charging may be needed en route to the destination.[59]

ZEVs are becoming more popular as passenger use vehicles, and supplies are limited. For some styles of vehicles, there are long wait lists.[60]

For many heavy-duty vehicles (e.g. garbage trucks), electric options are limited and the price premium is much higher than conventional vehicles. Other heavy-duty vehicle types do not yet have a ZEV alternative.

Where it has been applied: ZEV First Procurement policies have been adopted in several Canadian cities including Vancouver, North Vancouver, Edmonton, and Toronto.

Internationally, Oslo and London are among the major cities which have ZEV First Procurement Policies.

The state of California has also mandated ZEV First Procurement for all state agencies.

Car Sharing

Car sharing services allow their members to access a fleet of vehicles for personal use on a trip-by-trip basis more efficiently than traditional car rental services. Popular car sharing services in BC include MODO and Evo.

As part of the commitment to reach zero emissions from municipal transportation, the City of Vancouver has a contract with MODO to maintain a pool of cars near city hall that are available to municipal staff during work hours. This reduces vehicle ownership costs to the city. These vehicles are available to regular MODO members outside of work hours.[61]

Advantages: Car sharing services in Kamloops would mean that residents, including city staff, would have access to vehicles for individual trips without having to shoulder the cost of a personal vehicle or a fleet of passenger-type vehicles.

Car sharing provides an option between private vehicle ownership and reliance on public transportation for residents. Car sharing service MODO reports that their members own fewer vehicles than local averages and that nearly one-third of members have sold at least one vehicle since joining.[62]

There are two main types of car sharing services: i) stationary/round trip, where a vehicle must be returned to the designated station it was taken from, and ii) point to point, where a vehicle can be used for a one-way trip and parked at a different car sharing station.

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[58] *Supra,* The Delphi Group, Pollution Probe, 2019.
[59] *Supra,* Metro Vancouver, 2021.
[60] Marowits, R. (September 20, 2020) "Looking to buy an electric car? Here's why that may be harder than you think", *Global News,* online: <https://globalnews.ca/news/7347254/electric-vehicle-supply-canada/>
[61] City of Vancouver, "Greening the City's Fleet", online: <https://vancouver.ca/green-vancouver/green-fleets.aspx>
[62] MODO, "Our Impact", online: <https://www.modo.coop/why-modo/our-impact>

Disadvantages: Not all vehicles in car-share fleets are ZEVs, so it would not necessarily reduce per-trip emissions.

There is no guarantee that a vehicle would be available on short notice.

Given Kamloops' geography, there is a possibility that at certain times of day all vehicles would end up concentrated in the commercial core, or away from the commercial core in residential areas. This could affect the usefulness of these programs as replacements for personal vehicles. This would be more of an issue for point-to-point car sharing services.

These services are often private corporations. Implementation of these services cannot be mandated by a decision from the city, although the city could encourage the services to bring car sharing to Kamloops. An agreement could be proposed, similar to the one the city of Vancouver has with MODO.[63] Alternatively, implementing a publicly funded, or partially funded car sharing service is an option.[64] Europe has a history of public funding for car sharing services.[65]

Where it has been applied: In BC, large car sharing services operate in Vancouver, Kelowna, and Victoria. Smaller communities also have car sharing services. Smithers has the Go2 carshare program, and the Kooteney region has Kooteney carshare. Both of these models are member cooperatives rather than for-profit corporations.[66]

Some Universities have their own contracts with car share services. Zipcar, whose operations include the Universities of Toronto and Waterloo, used to operate at Thompson Rivers University. However, Zipcar ended all service in BC last year.[67]

Bike Sharing

Similar to car sharing, bike share programs exist in many municipalities to provide access to bicycles for quick trips, or for leisure rides. Bike sharing services provide access to a bike for a membership fee, or for an hourly rate.[68] The bike can be picked up from and returned to any of a number of stations that are often located near transportation hubs or recreational amenities.

Advantages: Increased availability to zero emissions transportation without having to shoulder the financial cost of a bike or having to risk theft of personal bikes.[69]

Bike sharing services can be used for commuting, or for recreational trips. They can provide a great option for tourists to explore more of the city without having to worry about parking.

Disadvantages: As with car sharing services, bike sharing services are typically private corporations and cannot be mandated by a decision from the city.

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[63] *Supra,* City of Vancouver, "Greening the City's Fleet".
[64] BC Climate Action ToolKit. "Community car share program", online: <https://toolkit.bc.ca/tool/community-car-share-program>
[65] Sperling, D., Shaheen, S., and Wagner, C. (2000) "Carsharing and mobility services: an updated overview", *Transportation Quarterly,* vol. 52, no. 3, online: <https://communauto.com/abonnes/SperlingShaheenW.html>
[66] *Supra,* BC Climate Action ToolKit. "Community car share program".
[67] Daily Hive Staff. (April 21, 2020) "Carshare company Zipcar to halt operations in BC", *DailyHive,* online: <https://dailyhive.com/vancouver/zipcar-cease-operations-bc-may-1-2020>
[68] Mobi. "How it works", online: <https://www.mobibikes.ca/en/how-it-works>
[69] *Ibid.*

Additionally, bike sharing services are not as successful as car shares, and bike sharing services have shut down operations in several Canadian cities, including Victoria and Edmonton.[70]

Where has it been applied: The city of Vancouver partnered with Shaw Go to administer the Mobi bike sharing program, which is operated by a private contractor.[71] The district of North Vancouver and the City of North Vancouver contracted with Lime to launch a pilot e-bike sharing service this spring.[72] A handful of other Canadian cities, including Hamilton, Toronto, and Montreal also have bike share services.[73]

Internationally, bike share programs are much more popular. For example, Lime operates in dozens of cities in the United States, and over twenty other countries.[74]

Rideable Communities

Increasing active transportation is another important part of reducing transportation emissions. The CCAP includes a strategy to increase the percentage of trips taken by bicycle by increasing bike friendly infrastructure.[75]

Advantages: Encouraging residents to use bicycles for trips rather than vehicles reduces GHG emissions. As a co-benefit, it could also promote healthy exercise, which could reduce overall health care costs.[76]

Disadvantages: Kamloops' cold winter weather and hilly topography can make biking as a means of transportation or commuting less desirable.

Bike thefts: Another major deterrent for relying on bicycles for transportation is the risk of bike theft.[77] Solutions are needed to increase public confidence that bicycles will not be stolen while working or running errands.

The RCMP already operate the 529 Garage anti-bike theft program. The program works by registering bicycle serial numbers in a database, which helps law enforcement identify the owners of recovered property. Anti-tamper decals are also issued, to be place on the bike frame and potentially deter theft.[78] However, currently these decals are only available from the North Shore Community Policing Office.[79] The North Shore may not be accessible for residents who rely on bikes for transportation. Expanding the locations to obtain the decals would make the program more accessible, which could increase enrollment.

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[70] Hansen-Gilis, L. (April 12, 2021) "Can you guess which Canadian city has the most affordable bike-share system?", *Canadian Cycling Magazine,* online: <https://cyclingmagazine.ca/sections/gear-reviews/bikesframes/bike-share-canaidan-cities/>
[71] Mobi. "Our company", online: <https://www.mobibikes.ca/en/our-company>
[72] District of North Vancouver. (2021) "E-bike share pilot program", online: <https://www.dnv.org/streets-transportation/e-bike-share-pilot-program>
[73] *Supra,* Hansen-Gilis, April 12, 2021.
[74] Lime. "Locations", online: <https://www.li.me/locations>
[75] *Supra,* CCAP, p. 28.
[76] *Ibid,* p. 28.
[77] Peters, J. (April 16, 2020) "RCMP says bicycle thefts are on the increase in Kamloops", *CFJC Today,* online: <https://cfjctoday.com/2020/04/16/rcmp-say-bicycle-thefts-are-on-the-increase-in-kamloops/>
[78] City of Kamloops. "529 Garage", online: <https://www.kamloops.ca/safety-bylaws/crime-prevention/crime-prevention-programs/529-garage>
[79] *Ibid.*

Another option to deter bicycle theft is to install bike lockers in public areas, particularly near transit hubs or retail areas where residents may wish to leave bikes for extended periods. These lockers are more secure than traditional bike racks. Vancouver has had on-demand bike lockers at TransLink hubs for years and is in the process of upgrading to more secure lockers.[80] These lockers are available on-demand, at a cost of 10 cents per hour. The City of Kamloops has bike lockers at the North Shore and Lansdowne transit exchanges that can be rented for $10 per month. Complimentary day use bike lockers are also available at the Tournament Capital Centre (TCC).[81] Expanding access to day use bike lockers could increase the number of trips made by active transportation, particularly for trips made to retail or commercial areas that residents might not make frequently enough to justify a monthly locker rental.

URBAN ECOSYSTEMS POLICIES

Climate sustainability is not solely a matter of decreasing GHG emissions. Promoting other aspects of environmental health can support climate target initiatives.[82] Healthy ecosystems help to store carbon and increase resilience to the impacts of climate change including flooding, erosion, and biodiversity loss.[83] Increasing shade cover and green spaces can also help to decrease urban heat island effects, which could in turn reduce the amount of energy expended on cooling buildings.[84] The City of Kamloops' CCAP Big Move #8 Healthy Urban Ecosystem includes actions such as increasing tree canopy cover, ecosystem restoration, and promoting the use of green infrastructure.

Urban water use and water conservation are also tied to energy use and GHG emissions.[85] Energy is expended in treating and pumping water for household use. Increased severity of droughts and storms from the impacts of climate change can also indirectly increase emissions caused by repairing or restoring property damaged by flooding or soil erosion.[86]

Reducing Turf Grass Coverage

Turf grass is one of the largest irrigated crops in North America.[87] Turf grass irrigation accounts for almost one third of residential water use in the United States.[88] Turf grass is not a native species to BC and provides little habitat or food sources for local biodiversity. Additionally, between irrigation and the high amount of maintenance and mowing, turf grass is not an efficient carbon sink compared to other land cover options.[89]

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[80] Hansen-Gilis, L. (June 20, 2021) "Vancouver is getting super secure "smart" bike lockers", *Canadian Cycling Magazine,* online: <https://cyclingmagazine.ca/uncategorized/vancouver-is-getting-super-secure-smart-bike-lockers/>
[81] City of Kamloops. "Active Transportation", online: <https://www.kamloops.ca/city-services/traffic-and-transportation/transportation-planning/active-transportation>
[82] *Supra,* CCAP, p. 64.
[83] *Ibid,* p. 64.
[84] *Ibid*, p. 67.
[85] Novotny, V. (2011) "Water and energy link in the cities of the future – achieving net zero carbon and pollution emissions footprint", *Water Science and Technology,* 63(1), online: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1083.2488&rep=rep1&type=pdf>
[86] *Ibid.*
[87] Milesi, C., Running, S.W., Elvidge, C.D., Dietz, J.B., Tuttle, B.T., and Nemani, R.R. (2005) "Mapping and modeling the biogeochemical cycling of turf grasses in the United States", *Environmental Management,* 36(3):426-38, online: <https://pubmed.ncbi.nlm.nih.gov/16086109/>
[88] United States Environmental Protection Agency. "Outdoor water use in the United States", online: <https://19january2017snapshot.epa.gov/www3/watersense/pubs/outdoor.html>
[89] Van Delden, L., Larsen, E., Rowlings, D., Scheer, C., and Grace, P. (2016) "Establishing turf grass increases soil greenhouse gas emissions in peri-urban environments", *Urban Ecosystems,* 19, 749-762, online: <https://link.springer.com/article/10.1007/s11252-016-0529-1>

Reducing turf grass coverage in the city could decrease water consumption and maintenance emissions and increase benefits to local species.[90] The City of Kamloops already promotes turf grass alternatives, including xeriscaping to provide drought-tolerant ground cover and using clover in place of traditional lawn turf, as it stays green using less water, requires little mowing, and attracts beneficial insects.[91] While much of the turfed area in the city is on private property, establishing a policy to restore city-owned turfed areas, where feasible (i.e. non sport turf), with local plant species or other low maintenance drought tolerant landscaping options would be a move towards meeting the urban ecosystem goals of the CCAP.

Advantages: Would require less water and maintenance, which would reduce emissions caused by maintenance equipment. Provides habitat for pollinators and local wildlife.

Disadvantages: Turf grass provides a surface for sports, recreation, and rest. Many turfed areas such as sports fields could not be adequately replaced with other plants. Solutions for lower trafficked areas could be to provide pathways and benches for resting amidst local plant species or to transition to clover lawns and other low maintenance and drought-tolerant ground-cover species.

"No Mow May": This is an initiative that promotes leaving lawns, boulevards, and other areas with turf grass un-mowed for the month of May to provide feeding sources to pollinators in the spring when those resources are harder to come by.[92]

The city could implement this initiative on select city-owned turfed areas, such as decorative borders or street meridians. The city could also encourage participation from private lawn owners through an information campaign.

Advantages: In addition to providing food sources, the advantages of "No Mow May" include increasing public awareness of the importance of healthy pollinator populations and reducing GHG emissions from turf grass maintenance during May.[93]

Disadvantages: The primary disadvantages of this initiative are linked to public perceptions that un-mowed turf grass is neglected or visually unappealing. This could be mitigated by posting signs that explain why a particular area is being left untended.

Un-mowed turf grass could be considered "unsightly" under the City of Kamloops Good Neighbour Bylaw, and the bylaw may need amending before promoting No Mow May as an initiative.[94]

"Golden lawns": The City of Kamloops has watering restrictions in place throughout the summer that only allow lawn irrigation every other day.[95] Metro Vancouver has taken their watering restrictions a step

[90] David Suzuki Foundation. "How to get your yard off grass", online: <https://davidsuzuki.org/queen-of-green/get-yard-off-grass/>
[91] City of Kamloops. "Healthy Lawns", online: <https://www.kamloops.ca/our-community/environment-sustainability/healthy-landscapes/healthy-lawns>
[92] Nature Conservancy of Canada. (May 3, 2021)"Nature Conservancy of Canada suggests leaving lawns alone in May", online: <https://www.natureconservancy.ca/en/where-we-work/saskatchewan/news/no-mow-may.html>
[93] Del Toro, I., Ribbons, R.R. (2020) "No Mow May lawns have higher pollinator richness and abundances: an engaged community provides floral resources for pollinators", *PeerJ* vol. 8, e10021.
[94] City of Kamloops. (2017) "Good Neighbour Bylaw", No. 49-1, online: <https://kamloops.civicweb.net/filepro/document/73376/Good%20Neighbour%20Byalw%20No.%2049-1.pdf>
[95] City of Kamloops. "Water Conservation", online: <https://www.kamloops.ca/our-community/environment-sustainability/water-conservation>

further, and only allows lawn irrigation twice a week.[96] Alongside these restrictions, Metro Vancouver has started a campaign encouraging residents to "go gold" with their lawns.[97] The campaign aims to change negative public perceptions about the colour of a well-tended lawn.[98] Kamloops could implement a similar information campaign alongside, and consider pairing it with increased watering restrictions or other conservation measures (i.e. increase water rates).

Advantages: Less frequent irrigation of turf grass means that residents will conserve water, and consequently will reduce emissions created by treating and pumping water.

Assigning a set number of days each week where irrigation is permitted rather than Kamloops' current odd or even numbered day system is more equitable and consistent. When two odd-numbered calendar days occur back-to-back at the end of May and July it can derail pre-programmed sprinkler systems. Additionally, residents with odd-numbered addresses can water two days in a row while even-numbered addresses must wait an additional day before watering.

Aversions to golden lawns caused by increased watering restrictions may encourage residents to transition to more-drought tolerant land cover.

Disadvantages: The primary disadvantages are linked to perceptions of lawn appearance, similar to those listed for a "No Mow May" initiative. Increased watering restrictions could be crafted to allow exemptions to alleviate concerns about water requirements for specific plants, particularly shade-providing trees and edible plants.

Stormwater Utility Billing and Rebates

Stormwater is water from precipitation or snowmelt. Large areas of impermeable surfaces increase harmful impacts from stormwater, such as flooding and pollution run-off. This can lead to increased GHG emissions from increased repair and maintenance needed for damaged property and overburdened stormwater drains. Increasing the amount of permeable surface area, using vegetation to soak up excess water and slow run-off, or preventing run-off through capturing mechanisms like rain gardens and rain barrels can reduce stormwater impacts.[99]

Stormwater management infrastructure is the jurisdiction of the municipality and is funded by property owners, often as a portion of property taxes. However, funding stormwater systems through a separate stormwater utility bill is becoming increasingly popular.[100]

The City of Victoria, for example, charges a separate stormwater utility bill based on the total impermeable surface area of the property, the street frontage of the property, and the type of property.[101] Rewards credits and rebates are offered to property owners that take steps to reduce run-off. Steps that qualify

[96] Metro Vancouver. "Lawn Watering Regulations", online: <http://www.metrovancouver.org/services/water/water-conservation/lawn-sprinkling/Pages/default.aspx>
[97] CTV News Vancouver Staff. (May 1, 2021) "Vancouver's lawn watering restricitons encourage residents to 'go gold' this summer", *CTV News,* online: <https://bc.ctvnews.ca/vancouver-s-lawn-watering-restrictions-encourage-residents-to-go-gold-this-summer-1.5410350>
[98] Metro Vancouver. (June 24, 2021) "Golden Lawn – We Love Water", online: <https://vimeo.com/567138387>
[99] City of Victoria. "Stormwater Utility FAQ", online: <https://www.victoria.ca/EN/main/residents/water-sewer-stormwater/stormwater/stormwater-utility/stormwater-utility-faq.html>
[100] Federation of Canadian Municipalities. (2004) "Dedicated funding – a best practice", *National Guide to Sustainable Municipal Infrastructure,* online: <https://fcm.ca/sites/default/files/documents/resources/guide/infraguide-dedicated-funding-mamp.pdf>
[101] *Supra,* City of Victoria, "Stormwater Utility FAQ".

for incentives include installing rain barrels or rain gardens, using permeable paving, and converting to green roofs.[102]

Advantages: Incentivises property owners to improve stormwater management, and to shift towards greener infrastructure.

An increased number of stormwater retention systems such as rain barrels would decrease water municipal water consumption during dry spells.

Disadvantages: Amendments to taxes or billing of residents need to be passed by city council procedures.

Kamloops has much less annual stormwater than Victoria, and any increase in stormwater management may not outweigh the costs of implementing a new billing program.

Chapter 2: Case Studies and Funding Options

GHG EMISSIONS REDUCTIONS MODELS: CASE STUDIES

The following section will give brief overviews of the impacts of adopting GHG emissions reduction models. These models - climate lens, internal carbon pricing, and carbon budgeting - were discussed in the interim report. There have been relatively few studies that have assessed the direct impacts of applying these emissions reduction strategies to government decision-making. Instead, I have looked for changes to reported GHG emissions since governments have committed to these models. However, as adoption of GHG emissions reductions has only recently accelerated, very few examples have had more than one year of reported GHG emissions, so it is not possible to discern trends.

Climate Lens

While climate lens adoption is becoming more common in Canadian municipalities, there are not many direct reports on how climate lens' affect GHG emissions. This is likely due in part to climate lens adoption being a recent phenomenon that has not had time to produce data. Additionally, the breadth of climate lens policies makes it difficult to identify where emissions have been reduced because of the climate lens.

Victoria, BC

Victoria adopted a climate lens for all municipal decision-making in 2018. Applying the climate lens was not immediate and the goal was to commence work in 2020 to complete priority work by 2021.[103] The

[102] *Ibid.*
[103] Work, F. (2019) "Report to City of Victoria Committee of the Whole Re: application and integration of climate lens", online: <https://pub-victoria.escribemeetings.com/filestream.ashx?DocumentId=47161>

plan included a large range of initiatives, including a project to retrofit City Hall to achieve net-zero emissions.

The most recent GHG emissions report for Victoria is from 2019. While community emissions were only slightly lower than 2018, 2019 emissions from city operations decreased by 151 tonnes compared to the previous year.[104]

Vancouver, BC

The City of Vancouver committed to integrating a climate change adaptation lens into municipal policies, strategies, and planning in 2018.[105] In 2020, Vancouver had completed or begun work on 65 out of 101 climate change adaptation actions.[106] However, the 2019 GHG emissions for Vancouver were 2,505,000 tonnes, up 65,000 tonnes over 2018 emissions.[107]

Vancouver also commissioned a study to examine climate change adaptation using an equity lens and presented recommendations from that report to be included in the next climate change adaptation strategy update.[108] The report emphasized that not all vulnerable and priority populations have the same concerns, and tailored adaptation solutions are needed for different groups to address adaptation equity. Some of the suggestions raised by the report, particularly those related to cooling stations, were implemented in the summer of 2020.[109]

Vernon, BC

Within their Climate Action Plan (April 2021), the City of Vernon committed to employing a climate lens across all government activities, including budgeting, procurement, and asset management.[110] This lens has not been in place long enough to speak to the impact it has on emissions. However, Vernon has employed a similar climate-focused lens' for projects on a smaller scale in the past.

In 2020, Vernon received the Federation of Canadian Municipalities (FCM) Asset Management Sustainable Communities Award for a project that employed a climate change lens to assess water drainage vulnerabilities.[111] To mitigate future damage caused by flooding that is predicted to become more frequent and severe due to climate change, the city developed a risk assessment framework that mapped and modelled all overland water flow paths for a hypothetical once-in-a-hundred-year rainfall

[104] City of Victoria. (November, 2020) "Climate leadership plan – progress report 2020", online: <https://www.victoria.ca/assets/Departments/Sustainability/Climate~Change/COV_Climate_Change%20Report%20Card%2020%20PROOF%2010.pdf>
[105] City of Vancouver. (2018) "Climate change adaptation strategy – 2018 update and action plan", City of Vancouver, online <https://vancouver.ca/files/cov/climate-change-adaptation-strategy.pdf>
[106] City of Vancouver, (2020) "Climate Change Adaptation Strategy – 2020 progress update", Council Meeting, online: <https://council.vancouver.ca/20201020/documents/P1-Presentation.pdf>
[107] City of Vancouver. "Climate and renewables", online: <https://vancouver.ca/green-vancouver/climate-and-renewables.aspx>
[108] Federation of Canadian Municipalities. "Climate change adaptation through an equity lens", online: <https://fcm.ca/en/resources/mcip/climate-change-adaptation-through-equity-lens>
[109] *Ibid.*
[110] City of Vernon. (April 12, 2021) "Climate Action Plan", online: <https://www.vernon.ca/sites/default/files/docs/Sustainability/Climate-Action/210408_cap_full_final.pdf>
[111] Federation of Canadian Municipalities. "Case study: understanding climate change impacts key to prioritizing drainage infrastructure projects in Vernon, BC", online: <https://fcm.ca/en/resources/gmf/case-study-understanding-climate-change-impacts-key-prioritizing-draining-infrastructure>

event. From the results, Vernon created a prioritized list of drainage projects to be incorporated in future municipal infrastructure planning.

Lessons Learned

It is difficult to assess how adopting a climate lens has affected GHG emissions. In addition to being a relatively novel approach, a climate lens is applied so broadly that the impacts are generally ambiguous. Victoria has seen a decrease in municipal corporate emissions for the one year that has been reported since the climate lens was adopted. Vancouver, conversely, has seen emissions increase since committing to a climate lens. Without data showing where decisions have been swayed by the climate lens, any GHG emissions changes could be coincidental.

Internal Carbon Pricing

As with the adoption of a climate lens, many municipal internal carbon pricing strategies are too recent to have produced observable data on how they have affected emissions. Even with carbon pricing schemes that are not internal, there are relatively few studies on the effects of emissions reductions. A recent literature review found that carbon pricing schemes produce an average annual GHG emission reduction of only 0% to 2%.[112]

Vancouver, BC

Vancouver only implemented their internal carbon pricing regime in 2019. GHG emissions data is not available for 2020 yet, so it is too early to tell whether the internal carbon pricing has taken effect. Vancouver's city operations are down 43% from a 2007 baseline, which amounts to 257,500 tonnes fewer emissions annually as of 2019. However, this number represents an increase of 65,000 tonnes over 2018 emissions.[113]

Dawson Creek, BC

Dawson Creek has used internal carbon pricing to finance a climate fund since 2015. GHG emissions for 2020 are not available, but corporate emissions for 2019 were 3,277 tonnes. This number is 367 tonnes higher than the 2016 corporate emissions, representing a 13% increase in emissions.[114]

Private Sector – Société Générale

Société Générale is a French investment bank. They have set an internal carbon price of 10 euros per tonne. Over three years from 2012 to 2015 when the internal carbon price was in effect, corporate GHG

[112] Green, J.F. (2021) "Does carbon pricing reduce emissions? A review of ex-post analyses", *Environmental Research Letters,* 16:4, online: <https://iopscience.iop.org/article/10.1088/1748-9326/abdae9/meta>
[113] *Supra,* City of Vancouver, "Climate and renewables"
[114] Municipality of Dawson Creek. (2019) "Climate Action Revenue Incentive Program (CARIP) Survey", online: <https://www.dawsoncreek.ca/wordpress/wp-content/uploads/news/2019-climate-action-revenue-incentive-program-report/2019-CARIP-REPORT.pdf>

emissions decreased by 11.4% compared to 2012, which was an average emissions reduction of 4,700 tonnes per year.[115]

Lessons Learned

The direct impact of internal carbon pricing on GHG emissions has not been well studied. Dawson Creek, the BC municipality that has employed internal carbon pricing for the longest has had an increase in municipal emissions since implementing the strategy. However, increases in emissions could reflect increased populations or changing energy requirements and may hide GHG emissions reductions that have taken place over that time frame. Without providing data that shows direct impacts on GHG emissions from internal carbon pricing it is difficult to assess how effective it is. Data from non-internal carbon pricing studies do suggest that the impact on GHG emissions from carbon pricing alone will likely be insufficient to reach climate targets.[116] See Appendix I for a suggested methodology to measure the GHG impacts of internal carbon pricing policies.

Carbon Budgeting

Carbon budgeting is a recent phenomenon in Canada, with the city of Edmonton being the only government body to have formally adopted a carbon budget. Edmonton only officially adopted a carbon budget earlier this year, so it is too early to observe how emissions will be affected.

United Kingdom (UK)

The UK has had a national carbon budget since 2008. As of 2020, total GHG emissions in the UK were 49% below 1990 levels. This includes an 8.9% decrease in emissions from 2019, which has largely been attributed to the COVID-19 pandemic. The UK expects emissions to rebound above 2020 levels in the next year or two. However, GHG emissions in 2020 were the lowest since 1879, and are a milestone of being halfway to the UK's target of net-zero emissions by 2050.[117]

Oslo, Norway

Oslo has had a carbon budget since 2016 and was the first municipality globally to adopt a carbon budget. Oslo has decreased direct GHG emissions every year since 2013. The city's internal reporting shows that in 2019, municipal emissions had reduced 70% since 2012.

Lessons Learned

As with the strategies above, it is difficult to assign GHG emissions reductions solely to the implementation of a carbon budget. The UK has seen dramatic reductions in GHG emissions since

[115] Addicott, E., Badahdah, A., Elder, L. and Tan, W. (2019) "Internal carbon pricing: policy framework and case studies", *Yale Center for Business and the Environment,* online: <https://cbey.yale.edu/programs/internal-carbon-pricing-policy-framework-and-case-studies>
[116] *Supra* Green 2021.
[117] Evans, S. (March 18, 2021) "Analysis: UK is now halfway to meeting its 'net-zero emissions' target'", *CarbonBrief,* online: <https://www.carbonbrief.org/analysis-uk-is-now-halfway-to-meeting-its-net-zero-emissions-target>

adopting a carbon budget model, but those reductions are largely attributable to major shifts in energy production in the country and could have occurred even without the carbon budget. Whether coincidence or otherwise, the carbon budget examples show a greater reduction in GHG emissions than the internal carbon pricing examples. What can be said for the carbon budget model is that it requires governments to holistically assess progress towards climate goals on a regular basis.

CLIMATE ACTION FUNDING OPTIONS

This section will look at different avenues for funding for climate action initiatives. Additional funding options and links to searchable grants databases can be found on the BC Climate Action Toolkit Page, linked here.[118]

Internal Climate Funds

Municipalities have set up dedicated funds and accounts for climate action. The funds can be used to invest in energy reduction projects, to provide micro-loans or grants to local environmental projects, or to pay for the difference in cost when choosing a more climate-friendly option as part of municipal decision-making. They can be used for regular project financing or set aside as emergency funds in the case of an unexpected climate expense.

Capital for these funds can be raised as part of the municipal budget, from external funding sources, or donations.

Advantages:

Internal climate funds and accounts allow municipalities flexibility to finance environmental projects that were not accounted for during the city budgeting process.

Disadvantages:

These accounts must be approved by city council, which could be difficult depending on the amount of capital requested, and the restrictions on how it can be employed.

Where it has been used:

Dawson Creek, BC

Dawson Creek has had an internal carbon pricing scheme since 2015. The price of carbon is set at $100 per tonne of emissions, and the cost is paid into a Carbon Fund. The fund is earmarked for emissions reduction projects. Carbon offsets cannot be purchased using the fund.[119]

[118] BC Climate Action Toolkit. "Funding for local government climate action initiatives", online: <http://toolkit.bc.ca/funding-local-government-climate-action-initiatives>
[119] Municipality Dawson Creek. (2015) "Carbon Fund Policy", online: <http://www.dawsoncreek.ca/wordpress/wp-content/uploads/news/proposed-policy-update-carbon-fund-policy/Carbon-Fund-Policy.pdf>

Kingston, ON

Kingston established a Community Climate Action Fund to help registered charities and non-profits raise capital for GHG-reducing projects. The city issues a call for applications and selects projects to move forward to the funding stage. Residents can then donate to the project of their choice through the fund.[120] The city does not provide the capital for the projects and instead contributes by leveraging a streamlined process to administrate the donations and oversee distribution.

Green Revolving Funds

A green revolving fund is a model of financing that is widely used in post-secondary education and is becoming more popular with governments and other corporations.[121] The organization provides the starting capital to the revolving fund, and the fund is used to finance projects that improve energy efficiency, reduce GHG emissions, or otherwise generate cost savings for energy use. The revolving fund recovers investment from the energy savings, and some or all the savings are reinvested in another project. This creates an internal pool of capital dedicated to funding sustainable projects.[122]

A 2013 study investigating the barriers to implementing energy efficiency in Canadian universities found that access to capital was the largest single barrier. Most of the responding universities agreed that a green revolving fund would be an effective method to improve access to capital, but at the time of the study, only seven Canadian universities were employing green revolving funds.[123]

In 2011, the Sustainable Endowments Institute launched the Billion Dollar Green Challenge to encourage universities and other institutions to invest a combined total of one billion dollars in revolving green funds.[124]

Advantages:

Beyond improving energy efficiency, green revolving funds provide co-benefits. They demonstrate the case for sustainability by showing a measurable return on investment and engaging and educating the community. The projects funded by green revolving funds catalyze a culture shift towards energy efficiency by creating a program of sustained environmental investment rather than individual projects.[125]

Disadvantages:

Because the initial capital for green revolving funds is typically financed by the organization, a major hurdle in setting up a green revolving fund is obtaining the support to dedicate a significant amount of money to set up the funds. Other sources of capital could include external funding through donations or grants, or divesting funds from fossil fuels to reinvest in the revolving fund.

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[120] City of Kingston. "Kingston Community Climate Action Fund", online: <https://www.cityofkingston.ca/city-hall/projects-construction/community-climate-action-fund>

[121] Indvik, J., Foley, R., Orlowski, M. (2013) "Green revolving funds: an introductory guide to implementation & management", *Sustainable Endowments Institute and the Association for the Advancement of Sustainability in Higher Education,* online: <https://files.eric.ed.gov/fulltext/ED539859.pdf>

[122] *Ibid.*

[123] Maiorano, J. and Savan, B. (2013) "Barriers to energy efficiency and the uptake of green revolving funds in Canadian universities", *International Journal of Sustainability in Higher Education,* 16.2:200-216, online: <https://www.emerald.com/insight/content/doi/10.1108/IJSHE-07-2012-0062/full/html>

[124] Billion Dollar Green Challenge. "About", online: <http://greenbillion.org/about/>

[125] *Supra,* Indvik.

Where it has been done:

Universities

Green revolving funds have been employed by many post-secondary institutions, including UBC, Carleton, and Harvard.[126]

Summerland, BC

Summerland adopted a green revolving fund in 2017 and was the first Canadian government to join the Billion Dollar Green Challenge.[127] Summerland used $50,000 from a Climate Action Reserve account as the starting capital for the revolving fund.[128]

Toronto, ON

In 2007, the City of Toronto monetized debt from Toronto Hydro to create a $62 million revolving fund to support building retrofits.[129] The city made interest-free loans to city agencies and non-profit groups that had difficulty accessing capital to retrofit buildings. By 2012, Toronto had loaned $28.6 million through this fund. In 2012 the city re-evaluated the program and created a low-interest loan program for sustainable energy project financing through the Better Buildings Partnership.[130]

Green Bonds

A green bond is any type of bond instrument where the proceeds are earmarked for green projects, primarily climate change adaptation or mitigation projects.[131] They are used to lower the capital cost for organizations that are looking to finance green projects. A green bond can be issued by any organization that has the power to issue regular bond instruments, including municipalities. The bonds are typically asset-linked and carry similar credit ratings as other debt obligations from the issuer.[132] The European Investment Bank issued the first green bond in 2007. Since then, the market for green bonds has grown exponentially, with over $1 trillion US Dollars issued in green bonds since 2015.[133]

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[126] University of British Columbia. "Sustainability revolving fund", online: <https://sustain.ubc.ca/get-involved/sustainability-funding-opportunities/sustainability-revolving-fund>; Carleton University. "Green fund program", online: <https://carleton.ca/fmp/energy-and-sustainability/get-involved/green-revolving-fund/>; Harvard University. "Green revolving fund", online: <https://green.harvard.edu/programs/green-revolving-fund>

[127] Billion Dollar Green Challenge. "District of Summerland", online: <http://greenbillion.org/participant/summerland/>

[128] Summerland. "Green Revolving Fund – Policy", *Policy Statement and Regulations, No. 200.9,* online: <https://www.summerland.ca/docs/default-source/default-document-library/200-9-green-revolving-fund-policy18099d5cf68d6e33909cff00007e7f94.pdf?sfvrsn=1a84f3fb_0>

[129] Hughes, S. (2017) "Reducing urban greenhouse gas emissions: effective steering strategies for city governments", *IMFG Perspectives,* 16/2017, online: <https://munkschool.utoronto.ca/imfg/uploads/371/imfgperspectives16_shughes_feb_2017.pdf>

[130] *Ibid.*

[131] Gianfrante, G. (2019) "The green advantage: exploring the convenience of issuing green bonds", *Journal of Cleaner Production,* vol. 219: 127-135, online: <https://www.sciencedirect.com/science/article/abs/pii/S0959652619304019>

[132] *Ibid.*

[133] Heine, D., Semmler, W., Mazzucato, M., Braga, J.P., Flaherty, M., Gevorkyan, A., Hayde, E. and Radpour, S. (2019) "Financing low-carbon transitions through carbon pricing and green bonds", *World Bank Policy Research Working Paper No. 8991,* online: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3440367>

Advantages:

Studies have found that green bonds are not only effective financial implements, but also have several co-benefits.[134] They signal a commitment to environmental action and diversify the investor base by attracting investors that value environmental protection.[135] Green bonds have a synergistic relationship when they are combined with carbon pricing. Carbon pricing incentivizes reducing emissions, while green bonds cater to climate adaptation and resiliency projects, which in turn further reduce emissions.[136]

One study suggested that green bonds with long maturity periods can also promote intergenerational climate equity, as future generations who would benefit from climate mitigation today share the financial burden of the mitigation effort.[137]

Disadvantages:

Green bonds may be more expensive than conventional bonds and are not recommended for areas with high existing debt ratios.[138]

For investors, green bonds are oversubscribed with higher demand than available supplies. For organizations seeking to issue green bonds, high demand is an advantage that could make the issued bond more desirable to investors.[139]

Where it has been done:

Ontario

The Province of Ontario was the first government in Canada to issue green bonds, beginning in 2014. There was a high demand, with Ontario receiving over $2.4 billion in orders for the initial green bond offering of $500 million.[140] Ontario is still the largest issuer of green bonds in Canada, with over $10 billion in green bonds currently outstanding.[141] Ontario has used these funds to finance public transit initiatives, climate-resilient infrastructure, and energy efficiency and conservation projects.

Ottawa

In 2017, Ottawa was the first Canadian municipality to issue green bonds to fund light rail transit.[142] Ottawa's initial issuance of $1 million had a lower cost of funding than a comparable non-green bond.[143]

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[134] *Ibid;* Flammer, C. (2018) "Corporate green bonds", *Journal of Financial Economics,* online: <https://corporate-sustainability.org/wp-content/uploads/Corporate-Green-Bonds.pdf>
[135] *Ibid,* Flammer, 2018.
[136] *Ibid.*
[137] *Supra* Heine *et al.,* 2019
[138] *Supra,* Flammer, 2018.
[139] *Ibid.*
[140] Ontario Newsroom. (October 9, 2014) "Strong demand for Ontario's first green bond", online: <https://news.ontario.ca/en/release/30630/strong-demand-for-ontarios-first-green-bond>
[141] Ontario, "Province of Ontario green Bonds", online: <https://www.ofina.on.ca/greenbonds/greenbonds.htm>
[142] Critchley, B. (November 3, 2017) "Ottawa becomes first municipality in Canada to issue green bonds", *Financial Post,* online: <https://financialpost.com/news/fp-street/ottawa-becomes-first-municipality-in-canada-to-issue-green-bonds>
[143] *Ibid.*

Since 2017, Ottawa has issued a further $500 million in green bonds through the City of Ottawa Green Debenture Framework.

Toronto

The city of Toronto has operated a Green Debenture Program since 2018, using the proceeds to fund projects to help the city reach a goal of net-zero emissions by 2050.[144]

Vancouver

Vancouver launched a Green Debenture Program in 2018, issuing $85 million to fund sustainability projects.[145]

Canada

The Government of Canada announced the first issuance of federal green bonds earlier this year.[146] A $5 billion issuance of green bonds is slated for 2021-2022.[147]

Carbon Credits / Carbon Offsets Sales

A carbon credit is a permit that allows the holder to emit a certain amount of GHG. Carbon credits are a market-oriented mechanism to reduce GHG emissions and are typically part of emissions trading programs. In a cap and trade system, organizations have a maximum allowable level of GHG emissions (the 'cap'). If an organization produces fewer GHG emissions than permitted, they can sell their remaining carbon credits, typically to an organization that has exceeded their allowed GHG emissions. The holder of a carbon credit certificate can "retire" the credit to claim the associated reduction against their actual emissions.[148]

Carbon offsets are similar, but instead of representing permitted emissions, they represent actions taken to counterbalance the use of fossil fuels. An organization that produces sustainable energy or invests in carbon recapture initiatives such as tree planting can have carbon offsets certified. These offsets can then be sold to other organizations, or sometimes individuals, to be claimed against GHG emissions targets. Because they represent actual reduced emissions, carbon offsets are not always paired with emissions trading programs.[149]

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[144] City of Toronto. "Green Debenture Program", online: <https://www.toronto.ca/city-government/budget-finances/city-finance/investor-relations/green-debenture-program/>
[145] City of Vancouver. "Investor Relations", online: <https://vancouver.ca/your-government/investor-relations.aspx>
[146] Federal green bonds this year <https://www.blg.com/en/insights/2021/04/canada-announces-first-federal-green-bonds>
[147] TD Canada Trust. (June 14, 2021) "Government of Canada selects TD Securities for first-ever issuance of Green Bonds", *TD Media Room,* online: <http://td.mediaroom.com/2021-06-14-Government-of-Canada-Selects-TD-Securities-for-First-Ever-Issuance-of-Green-Bonds>
[148] Kobayashi-Soloman, E. (March 13, 2020) "Want to understand carbon credits? Read this", *Forbes,* online: <https://www.forbes.com/sites/erikkobayashisolomon/2020/03/13/want-to-understand-carbon-credits-read-this/?sh=1d4357ae71aa>
[149] Carbon Fund. (May 30, 2012) "Is there a difference between carbon offsets and carbon credits?", online: <https://carbonfund.org/difference-carbon-offsets-carbon-credits/>

Advantages:

As GHG emissions affect the climate on a global scale, emissions reductions occurring anywhere can contribute to mitigating climate change. In some cases, it may be more cost-effective to provide funding for emissions to be reduced elsewhere. Heavy emitters can often reduce low-hanging emissions at comparatively low costs. The more emissions-efficient an organization is, the more difficult reducing remaining emissions becomes. As an example, in reducing emissions by 49% below 1990 levels, the UK made large emissions reductions early on by transitioning the economy away from coal, but GHG reductions are projected to level off going forward.[150]

Proponents of carbon credits argue that the programs take advantage of existing market forces to reduce emissions and that credit trading programs will encourage organizations to reduce emissions below their permitted levels to avoid sanctions but also to create a new source of revenue.[151] Some cap and trade systems reduce the allowable emissions cap on a schedule (e.g. annually), in order to ensure actual emissions reductions, rather than just trading.

Disadvantages:

Carbon credit programs have met with criticism from detractors who believe that the focus should be on cutting emissions across all sectors and that carbon trading is simply a distraction.[152] Carbon offset programs, conversely, can provide funding for initiatives to reduce GHG emissions beyond what would be possible without selling carbon offsets. This is particularly the case when offset revenue is dedicated to re-investing in the emissions-reducing program to generate future offsets.[153]

Where it has been used:

British Columbia

The Province of BC purchases carbon credits to offset emissions. Credit holders or owners of GHG-reducing projects can submit proposals to the province to have offsets purchased.[154]

Ontario

Ontario had a carbon offset credit purchase system as part of the provincial cap and trade program, but it was cancelled in 2018.[155]

Canada

[150] Evans, S. (March 18, 2021) "Analysis: UK is now halfway to meeting its 'net-zero emissions' target'", *CarbonBrief,* online: <https://www.carbonbrief.org/analysis-uk-is-now-halfway-to-meeting-its-net-zero-emissions-target>
[151] Williams, N. (March 5, 2021) "Canada unveils greenhouse gas reduction credits to boost carbon trading market" *Reuters,* online: <https://www.reuters.com/article/us-canada-carbon-offsets-idUSKCN2AX2B2>
[152] *Ibid.*
[153] *Ibid,* Carbon Fund, 2012
[154] British Columbia. "Selling carbon offsets to the Province", online: <https://www2.gov.bc.ca/gov/content/environment/climate-change/industry/selling-offsets>
[155] Ontario. "Ontario's carbon offset programs", online: <https://www.ontario.ca/page/ontarios-carbon-offsets-programs>

The Government of Canada unveiled a GHG Offset System earlier this year to support a domestic carbon trading market. Under the system, projects that reduce GHG emissions generate credits that can be sold to industrial corporations that exceed emissions limits to reduce their carbon tax debt. The price of carbon offsets under the program will be set by the open market, with the federal carbon tax expected to be the ceiling.[156] The final regulations have not been released.

Divestment from Carbon Production

Even if all emissions were eliminated, a municipality or organization could still be contributing to climate change by funding the production of emissions elsewhere. GHG emissions are not a localized problem and reducing emissions in one area by investing in emissions elsewhere is not a useful step for sustainability.[157] Many organizations are beginning to view divesting from heavy emitters as a necessary step towards climate action.[158]

Carbon divestment is becoming more common in all levels of government and private organizations. As of 2020, over 1,300 global institutions representing over $13 trillion US dollars had made commitments to divest from fossil fuels.[159] In September 2020, the Mayors of twelve major cities, including Vancouver, committed to divesting from fossil fuel companies, and re-investing those funds for sustainable and equitable recovery from COVID-19.[160] The pledge called for cities to:

> "[Take] all possible steps to divest city assets from fossil fuel companies and increasing financial investments in climate solutions to help promote decent jobs and a just and green economy. [Call] on pension funds to divest from fossil fuel companies and increasing financial investments in climate solutions to help promote decent jobs and a just and green economy. [Advocate] for fossil-free and sustainable finance by other investors and all levels of government, including by promoting the importance of strong, long-term climate policies ad demanding greater transparency."

Advantages:

In addition to aligning with climate targets, fossil fuel divestment can be a good business decision, and can align with a corporation's fiduciary duty.[161] The fossil fuel energy sector has been on the decline. Valuation of energy corporations is linked to their fossil fuel reserves. As even the least ambitious climate policies and targets will require a large percentage of unburned fossil-fuel reserves to remain in the ground, valuation of those energy companies is likely overstated. This has been termed the "carbon bubble", and it creates financial risk for any organization that is invested in those energy companies.[162] As of 2014, Alberta was carrying more carbon bubble risk than any other region globally.[163] Fossil fuel

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[156] *Supra,* Williams, 2021
[157] Ritchie, J., and Dowlatabadi, H. (2015) "Divest from the carbon bubble? Reviewing the implications and limitations of fossil fuel divestment for institutional investors", *Review of Economics & Finance,* 1923-7529-2015-02-59-22, online: <https://pics.uvic.ca/sites/default/files/Review%20of%20Economics%20and%20Finance.pdf>
[158] *Ibid.*
[159] Go Fossil Free. "1,200+ Divestment Commitments", online: <https://gofossilfree.org/divestment/commitments/>
[160] C40 Cities. (September 22, 2020) "Mayors of 12 major cities commit to divest from fossil fuel companies, invest in green and just recovery from COVID-19 crisis", online: <https://www.c40.org/press_releases/cities-commit-divest-invest>
[161] Hunt, C. and Weber, O. (2018) "Fossil fuel divestment strategies: financial and carbon-related consequences", *Organization & Environment,* Vol 32:1, 41-61, online: <https://journals.sagepub.com/doi/full/10.1177/1086026618773985>
[162] *Supra,* Ritchie & Dowlatabadi, 2015
[163] *Ibid.*

divestment helps to reduce the carbon risks of local governments.[164] Other benefits include attracting investors who are looking for green investments.

The climate benefits of divesting are amplified when municipalities or corporations take divested funds and re-invest them in climate-positive projects. Re-investment can be through market approaches by re-investing in clean technology or renewable energy projects. Another option for reinvestment is local impact investing or Economically Targeted Investments (ETIs), which are capital projects designed to provide collateral economic or social benefits to the local community in addition to generating returns on investments.[165] These collateral benefits could include stimulating the local economy through small business loans, filling a societal need such as low-income housing, or providing environmental benefits such as local solar farms. Other approaches include GHG reduction venture capital, small business loans, investing in improved energy efficiency for infrastructure.[166]

Disadvantages:

There are some concerns that divesting from fossil fuels will lead to lower rates of returns. Several sources have contradicted this concern and found that divesting does not significantly differ in terms of financial risk from other portfolios and may even increase when adjusting for carbon risk.[167]

Fossil fuel investments are typically with international oil companies (IOCs) such ExxonMobil, rather than national oil companies (NOCs) such as Saudi Aramco. IOCs have lower carbon footprints than NOCs on average and are more willing to reduce the carbon intensity of their operations. There are concerns that divestment from IOCs would increase carbon emissions as NOCs could take over the market share currently held by those IOCs.[168]

Where it has been done:

Vancouver, BC

The City of Vancouver passed a motion on January 21, 2020, to divest from fossil fuels.[169] Part of the motion includes a plan to define divestment and to look at divesting beyond fossil fuel extraction to other scopes of GHG emissions. Vancouver worked with the Municipal Finance Authority (MFA) of BC to develop a short-term bond, fossil fuel-free investment opportunities for BC municipalities.[170]

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[164] Rhodes-Conway, S., Irwin, J. and Braunginn, M. (2019) "A divest & invest guide for local governments", *Mayors Innovation Project,* online: <https://cows.org/wp-content/uploads/sites/1368/2020/04/2019-A-Divest-Invest-Guide-for-Local-Governments.pdf>

[165] Harvard Kennedy School. "A note on pension fund Economically Targeted Investments", *Trustee Leadership Forum for Retirement Security,* online: <https://iri.hks.harvard.edu/files/iri/files/ETIBrief.pdf>

[166] *Ibid.*

[167] Plantings, A. and Scholtens, B. (2020) "The financial impact of fossil fuel divestment", *Climate Policy,* 2:1, 107-119, online: <https://www.tandfonline.com/action/showCitFormats?doi=10.1080%2F14693062.2020.1806020 >; *Supra* Hunt, 2018

[168] Andreasson, S. (November 25, 2019) "Fossil fuel divestment will increase carbon emissions, not lower them – here's why" *TheConversation,* online: <https://theconversation.com/fossil-fuel-divestment-will-increase-carbon-emissions-not-lower-them-heres-why-126392>

[169] Impey, P. (February 21, 2020) "Motion – Divestment from fossil fuels", Memo to Mayor and Council, City of Vancouver, online: <https://vancouver.ca/files/cov/2020-02-25-motion-divestment-from-fossil-fuels.pdf>

[170] Municipal Authority of BC. (May 4, 2020) "Fossil fuel free short-term bond fund", *Mandate Profile,* online: <https://mfa.bc.ca/sites/default/files/Pooled%20Investments/mfa_mandate_profile_-_fossil_fuel_free_bond_fund_august_2021.pdf>

New York City, New York

In January 2018, the City of New York committed to divesting the pension plan from all direct holdings of fossil fuel reserve owners within five years. Divesting from public and private companies are included under this commitment, but investments with all levels of governments or sovereign entities were excluded.[171]

London, UK

The City of London has defined carbon divestment as eliminating municipal assets that are invested in companies that extract fossil fuels for energy and are contributing directly to climate change. London has created the "Responsible Investment Policy" that sets out principles to guide investment decisions for all cash investments. The Mayor of London does not have investment authority over the city's pension plan but has begun a discussion to divest the pension plan as well.[172]

Stockholm, Sweden

The City of Stockholm is one of the original investors in a pooled investment fund that excluded fossil fuel-intensive companies. The fund developed a methodological approach for assessing which companies are fossil fuel-intensive. Requirements include no production or distribution of fossil fuels, a carbon footprint to revenue threshold that must be met, and investment activity that provides solutions to climate change.[173]

Ireland

In December 2018, Ireland became the first nation to divest from carbon, by committing to divesting their sovereign fund of all fossil fuel holdings within five years.[174]

Harvard

Recently, Harvard University also committed to divesting its endowment fund from fossil fuels. The fund has eliminated all direct investment in fossil fuel exploration and development holdings as of June 2021.[175]

[171] *Supra* Impey, 2020.
[172] *Ibid.*
[173] *Ibid.*
[174] D'Aprile, A. (January 9, 2019) "Ireland is the first country to divest from fossil fuels", *Foresight,* online: <https://www.climateforesight.eu/global-policy/ireland-is-the-first-country-to-divest-from-fossil-fuels/>
[175] Kerber, R. (September 20, 2021) "Harvard University to end investment in fossil fuels", *Reuters,* online: <https://www.reuters.com/world/us/harvard-university-will-allow-fossil-fuel-investments-expire-2021-09-10/>

TRANSPORTATION AND BUILDINGS POLICIES AND PROGRAMS

The following section contains a brief overview of existing policies from other municipalities or governments for two major areas of GHG emissions: transportation and buildings. Links to sample policies are included in Appendix II and III at the end of the report.

ZEV First Procurement

The advantages and disadvantages of a Zero-Emission Vehicle First were discussed in the Interim Report. ZEV procurement policies work alongside commitments and policies to increase electric vehicle charging networks. The City of Kamloops has already committed to expanding access to ZEV charging, including by requiring that new off-street residential parking be ZEV-ready.[176]

While several Canadian municipalities have committed to transitioning their fleets to ZEVs, these commitments are relatively recent and for the most part policies and regulations are not publicly available at this time.

Edmonton, AB

Edmonton has committed to transitioning to a ZEV fleet. There is no ZEV-specific procurement policy. However, Edmonton does have a Sustainable Procurement policy for all municipal purchasing decisions.[177]

California

California has had policies requiring that new vehicle procurement include a mandated percentage of ZEVs since 2012.[178] Since then, the policy has been updated to require ZEV and hybrid vehicle first procurement for all vehicle purchases.[179]

[176] City of Kamloops. (August 20, 2020) "Electric vehicle & electric bike strategy", online: <https://www.kamloops.ca/sites/default/files/docs/city-hall/sus_2020.08.25_ev-e-bike_strat_final.pdf>
[177] City of Edmonton. "Sustainable procurement", online: <https://www.edmonton.ca/business_economy/selling_to_the_city/sustainable-purchasing-policy>
[178] State of California. (March 23, 2012) "Executive order B-16-2012", online: <https://www.ca.gov/archive/gov39/2012/03/23/news17472/index.html>
[179] State of California. "Green Fleet – major initiatives – chronological order", online: <https://www.green.ca.gov/fleet/about/initiatives/?web=1&wdLOR=c18F016D6-4B33-C64B-B5BF-9E07106DC4E5>

Sustainable Building Retrofits

Buildings make up a significant percentage of GHG emissions. In 2017 buildings accounted for 29% of emissions in Kamloops.[180] In some cities this percentage is even higher. Toronto estimates that 55% of total GHG emissions are from buildings.[181]

BC has adopted a new Energy Step Code that allows municipalities to progressively increase efficiency requirements for new building construction.[182] However, reducing emissions from existing infrastructure is a key step to achieving climate goals. Not all buildings produce emissions at the same rate. Older buildings typically require more energy to heat and operate, and consequently produce higher GHG emissions.[183] According to a study from the Association of Municipalities of Ontario, buildings built before 2000 are responsible for over 85% of building GHG emissions in Ontario.[184]

Many cities have committed to retrofitting municipal buildings to decrease energy use and GHG emissions. Additionally, several municipalities have launched programs to facilitate access to energy retrofits for property owners.

Municipal Building Retrofit Programs:

Funding Options

All the funding options discussed above could be used to finance municipal building retrofits. As an example, the City of Toronto monetized debt from Toronto Hydro to finance a revolving fund that was used to provide interest-free loans to municipal agencies for building retrofits (see above).[185]

There are additional grants and loans available to finance municipal retrofits. The FCM Green Municipal Fund offers low-interest loans and grants for retrofits that improve energy efficiency by at least 30% in municipal buildings. Project proposals can be submitted for loans of up to $5 or $10 million.[186]

Victoria, BC

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[180] *Supra,* City of Kamloops (CCAP)
[181] City of Toronto. (July 14, 2021) "City Council approves bold strategy to reduce emissions from existing buildings to net zero by 2050, updates Toronto Green Standard", *City of Toronto News Release*, online: <https://www.toronto.ca/news/city-council-approves-bold-strategy-to-reduce-emissions-from-existing-buildings-to-net-zero-by-2050-updates-toronto-green-standard/>
[182] Energy Step Code. "BC Energy Step Code requirements", online: <https://energystepcode.ca/requirements/>
[183] Association of Municipalities Ontario. (2021) "Retrofitting buildings for GHG reductions & deeper energy savings", *Climate Change Series Discussion Paper,* online: <https://www.amo.on.ca/sites/default/files/assets/DOCUMENTS/Reports/2021/RetrofittingBuildingsforGHGReductionDeeperEnergySavings20210430.pdf>
[184] *Ibid.*
[185] *Supra,* Hughes, 2017.
[186] Federation of Canadian Municipalities. "Capital project: retrofit of municipal facilities", online: <https://fcm.ca/en/funding/capital-project-retrofit-municipal-facilities>

The City of Victoria has a goal to retrofit the historic City Hall to achieve net-zero emissions. Part of the funding for the project came from a grant from the FCM Municipal Climate Innovation Program.[187]

Halton Hills, ON

In 2019, the town of Halton Hills committed to energy retrofits in 13 community buildings that made up 90% of community facility emissions.[188] Funding for the project was provided by the FCM Green Municipal Fund. The estimated impact of implementing all the recommended retrofits would save the town $4 million in energy and water costs.

Community Building Retrofit Programs:

Municipalities have implemented programs to provide loans to homeowners to make energy retrofits for their properties. These programs operate separately from provincial or federal renovation rebates. Retrofit programs increase access to emissions reductions by offsetting the high costs of retrofits for homeowners.

A common thread in retrofit programs outside of BC is to employ Property Assessed Clean Energy (PACE) or Local Improvement Charge (LIC) financing. These financing options attach the loans to the property that is retrofitted rather than the homeowner. Loans are typically paid back as an additional charge on property taxes. The benefits of this system are that homeowners receive the benefits of lessened energy bills much sooner. Additionally, if the homeowner sells before the loan is paid off the new homeowner is responsible for the remaining balance while also receiving the emissions reduction benefits.[189]

BC does not currently have PACE legislation, although municipalities have been supporting legislation development.[190] The BC Ministry of Environment and Climate Change Strategy has committed to preparing a roadmap for implementing PACE.[191] Some studies have suggested that residential PACE financing is possible using Local Area Service Charges.[192] The idea is that significant reductions in GHG emissions and risks of spills from residential oil heating systems would amount to direct community benefits and warrant LIC financing under the BC Community Charter.[193]

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[187] Federation of Canadian Municipalities. “Case study: Victoria shows leadership in GHG emissions reductions”, online: <https://fcm.ca/en/case-study/mcip/victoria-shows-leadership-in-ghg-emissions-reductions>
[188] Federation of Canadian Municipalities. “The case for retrofitting community buildings”, online: <https://fcm.ca/en/resources/gmf/the-case-retrofitting-community-buildings>
[189] BC Climate Leaders. “Retrofit Existing Buildings”, *Playbook,* online: <https://bcclimateleaders.ca/playbook/the-big-moves/where-we-live-and-work/retrofit-existing-buildings/>
[190] *Ibid.*
[191] Dunsky Energy. (January 12, 2021) “Dunsky to develop British Columbia PACE retrofit financing roadmap”, online: <https://www.dunsky.com/dunsky-to-develop-british-columbia-pace-retrofit-financing-roadmap/>
[192] *Supra,* Association of Ontario Municipalities, 2021.
[193] *Ibid.*

Toronto, ON

Toronto has two low-interest residential retrofit programs, the Home Energy Loan Program (HELP) and the High Rise Retrofit Support (HiRIS). The program provides PACE financed loans to install energy and water efficiency systems. The debt remains with the property, and loans are paid off over time on the owner's tax bill.[194] The programs are estimated to reduce GHG emissions by 4,900 tonnes annually.[195]

Halifax, NS

Halifax implemented the "Solar City" program in 2015, which provided homeowners LIC financed loans to install one or more of three solar energy systems.[196] As with Toronto's program, loans are attached to the property, not the homeowners. Homeowners can apply for loans to install solar electric, solar hot air, and solar hot water systems. The program was designed to exploit economies of scale by providing standardized systems and working with local businesses to provide job education for installation.[197] The program also aims to educate the public on the feasibility of solar-powered energy in a city known for having a foggy climate and included mapping solar potential for the entire city.[198] In the pilot year of the program, solar systems were installed in 400 homes.

Recently, Halifax has proposed a new retrofit program that will be available to commercial and residential building owners and will include financing for window replacements, insulation upgrades, and improved efficiency for heating and cooling systems. The city has a goal of retrofitting 5,000 buildings a year for the next 20 years.[199]

Saanich, BC

Relying on the idea that LIC financing is allowed in BC under the Community Charter, Saanich is launching a two-year pilot PACE financed home retrofit program.[200] The first PACE financing program in BC is aimed at replacing oil-based residential heating systems with electric heat pumps. Loans provided as part of the pilot program will have 0% interest financing.[201]

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[194] *Supra,* Hughes, 2017.
[195] Federation of Canadian Municipalities. "Residential energy programs overcome barriers to financing retrofits", online: <https://fcm.ca/en/case-study/case-study-2016-fcm-sustainable-communities-award-energy-program>
[196] City of Halifax. "About Solar City", online: <https://www.halifax.ca/home-property/solar-projects/about-solar-city>
[197] Federation of Canadian Municipalities. "Case study: 2015 FCM Sustainable Communities Award – Energy program", online: <https://fcm.ca/en/case-study/gmf/case-study-2015-fcm-sustainable-communities-award-energy-program>
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APPENDIX I: Municipal Internal Carbon Pricing Evaluation Methods

Data collection/records should be kept regarding:

- all decisions made under internal carbon pricing policies
- the projected GHG emissions resulting from each of the options that were available
- the option that was decided on for each decision.

Being able to add up the emissions avoided or not avoided over a specified timeframe would be relatively straightforward, but only if that information was available either through public minutes or provided by the municipality itself.

To evaluate whether some of those choices would have been made with or without the internal carbon pricing, meeting minutes or records of discussions could also be illuminating as to why those options were decided on.

For cases where the municipality elected to pay the internal price into a carbon fund you could get an inverse picture of emissions that were not avoided (assuming they only pay the fund the price for the difference in emissions, not for total emissions). That information could be compared to the total municipal emissions to get an idea of whether the internal pricing is having a deterrent effect on choosing higher emissions options.

Longer-term, total municipal emissions trends could be evaluated to see whether there is a significant change after implementing internal carbon pricing and whether this is sustained. Many of these policies are only a few years old meaning there is not enough data to get an idea of long-term trends. Note, depending on other emissions reductions policies and programs, the amount directly attributed to the internal carbon pricing policy would still be more accurately assessed using the first method described above.

A full analysis of emissions trends and avoided emissions is a valuable future research undertaking, especially once the governments that have just recently committed to various approaches have had time to implement them.

APPENDIX II: Sample ZEV First Procurement Policies

California Zero Emission Purchasing Mandate:

> *Zero Emission Purchasing Mandate,* (2016), State of California Executive Order B-16-12, Mandate-4121, online: <https://www.dgs.ca.gov/Resources/SAM/TOC/4100/4121>

Edmonton Sustainable Procurement Policy:

> *Sustainable Procurement,* (2019), Edmonton City Council, Policy C556A, online: <https://www.edmonton.ca/sites/default/files/public-files/assets/PoliciesDirectives/C556A.pdf?cb=1633095703>

APPENDIX III: Sample Community Building Retrofit Policies

Toronto Home Energy Loan Program (HELP) and the High Rise Retrofit Support (HiRIS) Regulation:

Proposed Energy and Water Efficiency Initiative for Residential Sector, (2013), Toronto City Council, EX33.22, online: <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.EX33.22>

Halifax Solar City Regulation:

Energy Equipment Bylaw, (2019), Halifax Regional Municipality, By-Law Number S-500, online: <https://www.halifax.ca/sites/default/files/documents/city-hall/legislation-by-laws/By-lawS-500.pdf>