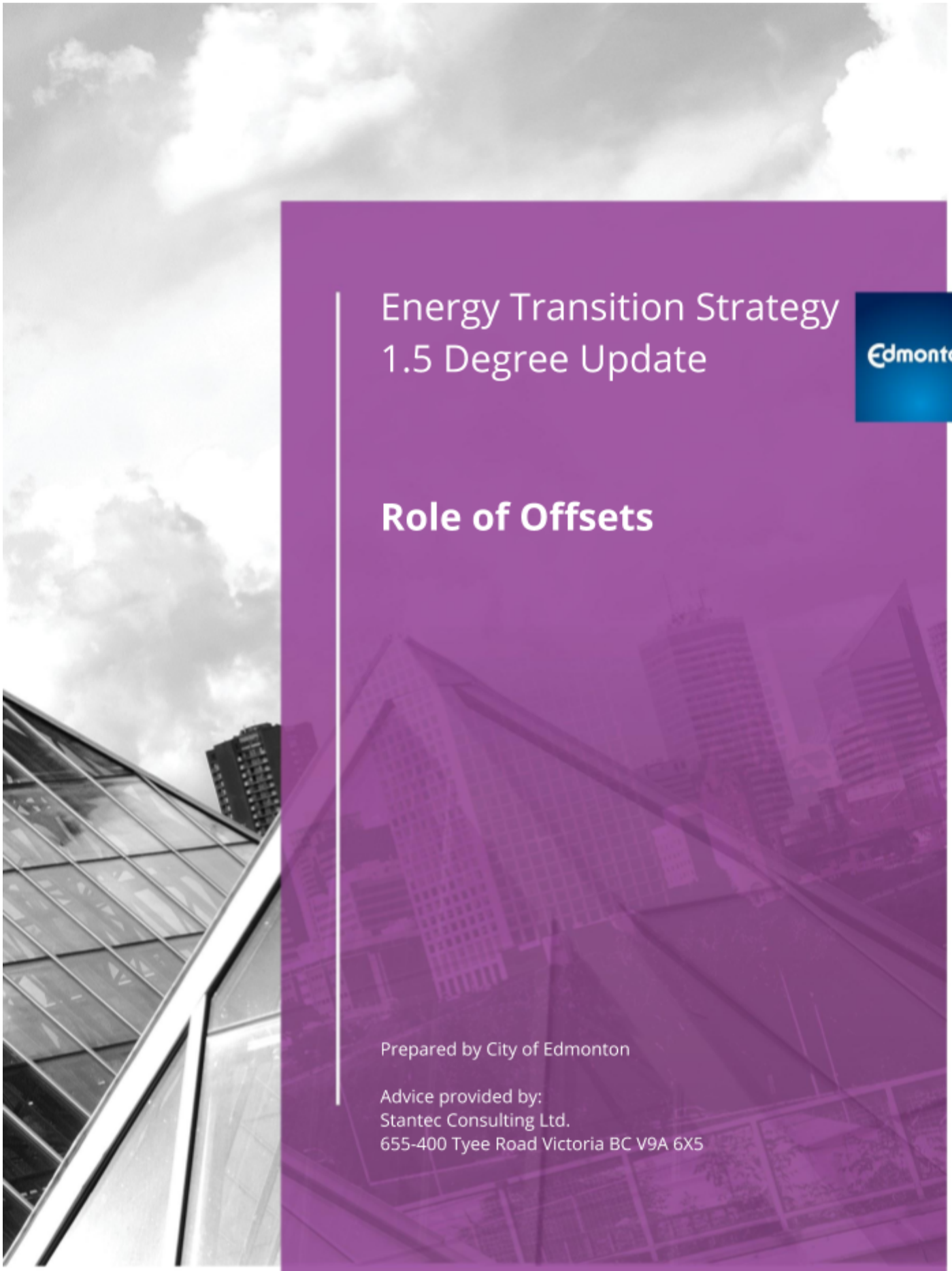

Energy Transition Strategy 1.5 Degree Update

Role of Offsets

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Issue Identification

On August 26th, 2019, City of Edmonton (the City) Council Declared a Climate Emergency and requested that City administration take steps to bring back a revised Community Energy Transition Strategy (CETS) by the end of third Quarter 2020 that aligns the current GHG emissions targets and actions with the local carbon budget for City Council's approval. The requested work involved the City modelling a 2050 carbon neutral scenario which showed that even with interventions and aggressive adoption of renewable energy technologies, the City will not be able to reduce enough GHG emissions to stay within its carbon budget developed under a 1.5°C scenario. The work concluded that the City will need to utilize GHG mitigation mechanisms like carbon offsets to mitigate the residual GHG emissions to remain within it 155 MT carbon budget.

A 2050 carbon neutral scenario showed that even with interventions and aggressive adoption of renewable energy technologies, the City will not be able to reduce enough GHG emissions to stay within its carbon budget developed under a 1.5°C scenario.

The objective of this policy brief is to examine key questions and provide recommendations related to the City's involvement in purchasing, generating, and using carbon credits to meet its community carbon budget. The key questions being posed by the City are presented in Table 1.

Table 1. Policy Brief Questions

Aspect	Policy Questions
Purchasing Strategy	• When does the City buy carbon credits? • What volume should be purchased? • What requirements should be met?
Generating Strategy	• Should the City generate carbon credits? • How would the City develop carbon credits? • Should the City sell carbon credits?
Usage Strategy	• Should the City retire carbon credits? • Should the City bank carbon credits? • What should be the objective of a usage stra (maximize reductions or minimize costs?)

Carbon Credits Overview

A carbon credit represents one tonne of carbon dioxide equivalent greenhouse gas (tCO_2e) that has not been emitted into the atmosphere or that has been removed from the atmosphere. These are tradable commodities that are the direct result of a reduction in GHG emissions from a change of an operation, or the development of a project that is additional to any existing voluntary or compliance requirement.

Carbon credits can be generated under compliance programs, such as a cap and trade systems, or voluntary programs, and can be banked, retired, or transacted.[1] Carbon credits are typically third-party verified, serialized and tracked through environmental registries like IHS Markit, or the Alberta CSA Carbon Credit Registry. In compliance markets, such as the Alberta *Carbon Competitiveness Incentive Regulation* (CCIR), the regulatory body sets the rules about what types of carbon credits are allowed and under what circumstances they can be generated. Voluntary carbon markets follow rules prescribed by one of a handful of voluntary standard bodies, such as the Verified Carbon Standard (VCS), Gold Standard, Climate Action Reserve (CAR), American Carbon Standard (ACS), or Clean Development Mechanism (CDM). Voluntary GHG markets enable individuals or organizations that are unable to participate in the compliance market to either purchase or develop carbon credits.

Edmonton will need to use GHG mitigation mechanisms like carbon credits to reduce the 65 megatonnes (MT) of residual GHG emissions to remain within it 155 MT carbon budget

Carbon credits are "created" when a project or activity reduces or removes a measurable amount of GHG emissions that would otherwise have been released to the atmosphere. To formally recognize carbon credits, a project must follow a GHG quantification protocol and standard set by the compliance / voluntary market regulatory body. These standards differ by which project activities and types are allowed, where projects may be located, and what regulations projects must adhere to. However, all standards require that carbon credits be:

- **Real**. There is evidence that the project or activity actually removes or prevents the release of GHG emissions.
- **Measurable.** The volume of GHG emission reductions have been accurately measured, are ex-post, and at a minimum follow the ISO14064-2 standard.

[1] Banking a carbon credit generally refers to holding a carbon credit for future use. Retiring a carbon credit refers to applying a carbon credit against a GHG inventory and discontinuing its use permanently. Transacting a carbon credit refers transferring legal and/or beneficial ownership of a carbon credit for a medium of exchange.

- **Additional**. The project would not have occurred under normal business as usual practices or required by a regulation and that the extra revenue from the sale of the project offsets was an element of the financial viability of the project.
- **Leakage.** The reduction of GHG emissions through a project does not simply shift the GHG release to another location or activity.
- **Permanent.** The GHG emission reductions are permanent and will not be released at another point in time intentionally or unintentionally.
- **Clear Ownership.** There is clear ownership rights of GHG reductions and any other environmental attributes,[2] to ensure that the accounting of reductions is accurate and there is no double counting of any of the environmental attributes.
- **Verified.** The carbon credits have been verified in accordance with the GHG program requirements, by an ISO14065 accredited entity.

Although compliance and voluntary markets differ in standards, rigor, and eligibility requirements, the offset types can be grouped into eight categories (Table 2). The ability of a project developer to create and innovate new project types, through the development of new protocols, is dependent on the standard and the requirements of the specific carbon market.

Carbon credits should be viewed as one of many tools to achieve climate related goals to which there are several key strategies to their use. Some of the common offetting strategies are shown in Table 3.

Table 2. Typical Carbon Credit Project Types

Category	Type
Efficiency And Fuel Switching	• Energy efficiency—community-focused (targeting individuals / communities / housing / campuses) • Energy efficiency—industrial-focused (targeting corporations / industrial processes) • Fuel switching • Waste Heat Recovery

[2] Environmental Attributes refers to a broad range of rights and benefits associated with the GHG emission reductions including, but not limited to the environmental rights and benefits that may take the form of carbon credits, renewable energy certificates, green tags, white tags, labelled/certified "green" power, negawatts, water conservation credits, and related attributes.

Forestry And Land Use	• Afforestation / reforestation • Agroforestry • Grassland / rangeland management • Improved forest management • No-till/low-till agriculture • REDD+—Avoided planned deforestation • REDD+—Avoided unplanned deforestation • Rice cultivation/management • Soil carbon • Sustainable agricultural land management • Urban forestry • Wetland restoration / management
Gases	• N_2O abatement • Ozone—depleting substances (Article 5) • Ozone—depleting substances (US-based)
Household Device	• Clean cookstove distribution • Water purification device distribution
Methane	• Coal mine methane • Landfill methane • Livestock methane • Wastewater methane
Transportation	• Transportation—private (cars/trucks) • Transportation—bikes/public transit
Renewables	• Biogas • Biomass/biochar • Geothermal • Large hydro • Run-of-river hydro • Solar

Table 3. Summary of Carbon Offsetting Strategies

Approach	Description
Least-Cost	The approach evaluates the cost of carbon credits alongside the marginal cost of abatement of GHG mitigation projects, comparing the cost-per-ton from projects to the price-per-ton of a carbon credit. Above a certain cost threshold for internal reductions, investments in carbon credits are more effective in terms of overall tons reduced per dollar invested. This approach often relies on the establishment of a social / shadow cost of carbon.
Neutrality First	The strategy involves using carbon credits to achieve climate goals before beginning other GHG reduction efforts. This approach is often implemented by organizations with a small and manageable carbon footprint.
Reductions by Scope	This strategy involves reducing GHG emissions by Scope using a portfolio style approach. For example, an organization focuses GHG mitigation actions on Scope 1 and 2 GHG emissions and uses carbon credits to address Scope 3 GHG emissions.
Targeted Reduction	This strategy uses carbon credits to achieve specific goals. For example, an organization may use carbon credits to mitigate the impact from business travel.
Credit Generation & Revenue Reinvestment	This strategy generates carbon credits for sale and the use of carbon reserve fund which is used fund other internal GHG emission reduction projects.

RISKS, COSTS AND BENEFITS

Carbon Markets

Those developing, selling or trading carbon credits often characterize the carbon market as an opportunity to generate additional revenue. By placing a dollar value on GHG emissions, carbon markets are able to provide an additional source of financing for carbon reduction projects that may not have occurred without the additional revenue stream. The additional revenue

is intended to compensate for the better environmental performance of the project, an externality that isn't traditionally included in project finances but provides broad societal benefits. However, the process to access the money generated from the sale of carbon credits is cumbersome and compared to other revenues, incremental. In many instances, waiting for the revenue generated from the sale of carbon credits is not suitable for project financing and the project type may be too risky for an organization. This risk is compounded further if the project developer has to create a quantification protocol which requires additional resources, takes years to develop, with no guarantee that it will be approved. The costs and risks to commoditization the carbon credits are often one of the greatest barriers as it is an additional overhead cost to the overall project. These activities generally include feasibility studies, protocol development, creation of an Offset Project Plan and Report, monitoring and data collection, validation and verification. Due to the costs associated with commoditization, it is estimated that a carbon-offset project should generate at least 5,000 – 10,000 carbon credits per annum in order to justify protocol development and crediting.

As with any market, supply, demand, risk and the quality of the GHG program will set market prices for carbon credits. For example, the 2017 voluntary buyers' market had more voluntary carbon credits being generated than those being sold resulting in the average price being paid for carbon credits ranging from $4.00 to $8.00/tCO2e (CAD) with 56.2 megatons (MT) remaining unsold and 10.4 MT in development. With the Paris Agreement making climate change a particularly high-profile issue, this excess supply of voluntary carbon credits is likely to decline over the next few years as cities and organizations implement their new climate commitments. This also means a rise in prices over the long-term. In terms of compliance-based carbon credits in Alberta, in 2017 the Alberta government reported having generated more than 12 MT of carbon credits with nearly 50% being derived from no-till/low-till agriculture and wind power projects. In 2017, the CCIR program had the highest ever use of carbon credits for compliance purposes: 9 MT as compared to an average 2.4 MT per year in historical periods. Such a significant increase in adoption of carbon credits as compared to historical years insinuates that the prices of carbon credits in Alberta have not reached the current cost of compliance ($30/t$CO_2$e). The Alberta government has also

forecasted that the volume of carbon credits available (using a 2017 / 2018 vintage) will decline to 10 MT by 2030.[3] Without the development of new projects and given the increase in demand for compliance-based carbon credits, there is likely to be limited opportunities for organizations like the City to cost-effectively acquire Alberta based carbon credits. Although market risk can be somewhat mitigated through the development of long-term contracts with carbon credit suppliers, as the market matures more expensive sources of GHG emissions abatement will need to be pursued.

Despite the growing popularity of carbon markets, most organizations find participation in these systems a challenging arena when engaging on their own. Compliance carbon markets are fraught with complex instruments like auctions, forwards, options, and derivatives. The voluntary carbon markets are fragmented at best, have numerous standards associated, of which some are verifiable and others not, and a global supply chain that is not always transparent. Additionally, both markets are subject to asymmetric information, where the information on trading volumes, prices, environmental integrity of the carbon credits is not clear.

Offset Project Development

There is a perception that carbon credits alone can generate revenues in excess of the cost of an offset project, and financially validate the investment necessary. However, carbon offset revenues typically are not adequate to motivate investment alone and only assist those projects that are close to being financially viable. Ultimately, the carbon credit revenues are only a small part of a much larger financial picture. For instance, the energy savings arising from an energy efficiency project would be the key financial driver for implementing a project, not the incremental revenues from developing carbon credits. The same applies to forest-based carbon credits – the driver is typically the preservation of forested lands; the incremental revenues from carbon credits only contribute marginally to the management costs for the lands. In fact, the cost of carbon abatement for many carbon credit projects can be quite high, or the cost of commoditization and serialization of the carbon credits exceed the incremental revenue generated from the sale of carbon credits. This is typical with building energy efficiency projects which do

[3] https://www.alberta.ca/assets/documents/aeos-2018-ccir-compliance-offset-workshop-presentation.pdf

not generate enough GHG reductions per building to meet the offset generation viability threshold. This requires aggregation of multiple projects to achieve the scale required. For example, the City of Toronto generated, but did not serialize, ~47,000 carbon credits from 117 building over a ten-year period which works out to ~40 carbon credits per building per year.[4]

Carbon Credit Price

The level of risk and the levels of community and environmental benefits can influence the price of the carbon credit. Projects that are deemed to be high-risk will often command a low carbon price point, compared to low-risk project where there is less risk that the carbon benefit could be reversed. There can be various kinds of high-risk projects, but typically they include forestry, soil conservation, geological carbon storage, behavioral change that results in energy reductions, and projects that deploy new and novel technologies. These project types tend to rely on technical assumptions (i.e. land GHG factors) or have the potential to release GHGs due to technical problems (i.e. geological carbon storage). For example, low- / no- tillage agricultural projects generate a large volume of carbon credits in Alberta but are deemed to be high risk due to a higher potential for quantification errors and thus command a lower price as compared to other project types. In 2016, farmers were being offered $13 per carbon credit even when the set compliance rate for large emitters was $20 per tCO_2e.[5] This can be contrasted with a landfill gas capture system that is generally considered low-risk. Since a landfill gas capture system measures the amount of methane combusted, and that reaction cannot be reversed naturally there is little to no risk of credits being rescinded.

High community profile projects, such as one that has multiple spin-off benefits, such as improved biodiversity, First Nation cultural heritage benefits, or improvement in living conditions (weatherization of low-income homes) can also help a project demand a higher carbon price. For example, the First Nations Great Bear Rainforest Carbon Credit Projects received $12 per carbon credit in 2018, as compared to a range of $1 - $8 for afforestation / reforestation carbon credits in Africa and other less developed countries.[6] In

[4] https://www.csaregistries.ca/reductions/masterprojectdetails_e.cfm?pid=822
[5] https://www.albertafarmexpress.ca/2017/09/11/carbon-credit-program-aint-what-it-used-to-be/
[6] https://www2.gov.bc.ca/gov/content/environment/climate-change/industry/selling-offsets

any case, all project types and the value of their carbon will be subject to the broader supply and demand conditions of the local and if voluntary, global carbon market at that time.

PURCHASING, GENERATING, AND USING CREDITS

Edmonton's CETS currently recommends that the City prioritize actions that:

- avoid creating additional GHG emissions
- reduce GHG emissions, and
- replace GHG emission sources with low- or no-GHG emission sources.

It has been recommended that the City update its CETS to also utilize carbon credits in order to keep within its carbon budget.

The use of carbon credits should be considered as part of an integrated energy and GHG management strategy to achieve different goals. For example, carbon credits can be retired against more challenging GHG emissions sectors, like Scope 3 transportation, while the City implements a series of GHG reduction projects to reduce Scope 1 and 2 emissions funded by a carbon reserve fund to accelerate adoption. The City's priority should first be to reduce the base GHG emissions as quickly and as cost-effectively as possible. Offsets should only be used to address residual GHG emissions that cannot be reduced through policy measures or cost-effectively.

Purchasing Carbon Credits

When buying carbon credits, the risks with respect to ownership, and the potential for double-counting, are effectively addressed by ensuring the carbon credits being developed and traded or retired, are first registered in a credible carbon registry. It should be noted that although the purposes of registries is to reduce double counting, it is still a buyer-beware market as many registries are not linked to one central database and thus not designed to capture fraud. When purchasing carbon credits, the character and integrity of management (in addition to other factors, such as environmental integrity of the project) should also be evaluated. Buyers can protect themselves to some extent by deploying due diligence activities and through strong contractual agreements. Independent third-party verification by an accredited organization, to a reasonable level of assurance, can also provide buyers with

increased confidence that the emission reduction or removals are real, within scope, measurable, additional, have been counted once and have established contractual ownership over the carbon credits. Under most voluntary markets, the verification body must be ISO14065 accredited. For the 2023 vintage years and later, Alberta will require all verification entities to be ISO14065 accredited.

Vintage is also an important element for consideration when purchasing carbon credits. Every carbon credit has a vintage year, which is the year in which the GHG emission reduction actually occurred. For example, a carbon credit created through the destruction of landfill gas in 2018 is deemed to be a vintage 2018 credit. Best practice suggests that organizations should procure carbon credits that were generated in a similar timeframe, or vintage, to the GHG emissions being mitigated. The challenge with this approach is that some projects will issue carbon credits every year, while some will issue carbon credits in multi-year increments which can result in supply issues. To get around this issue, organizations like Google, will apply a window of up to three years between the footprint year and the year the reduction occurs on the basis that the global warming potential (GWP) of GHG emissions is calculated over one hundred years or more, making the three year variance insignificant.[7]

"it is still a buyer-beware market as many registries are not linked to one central database and thus not designed to capture fraud"

As it relates to contracting, the most common risks are counterparty and price risk. Counterparty risk is where a carbon credit provider defaults on their delivery obligation prior to the expiry date of the contract, leaving their liability unanswered and the buyer open to compliance and/or price risk. Carbon prices can also be subject to changes in "stable" financial markets as was noted in the voluntary carbon markets in past economic downturns. Since carbon credit project revenue streams are based on the volume of credits generated and the length of the purchase agreement, poor price signals and price volatility adds additional risk to projects with long payback-periods. Further, a flood of credits onto the market, due to a global change in the price of carbon, can also have a considerable impact on demand and price. Therefore, contracts that do not have price floor or ceiling mechanisms leave purchasers and suppliers at risk. When developing contracts with carbon credit suppliers, it is also important to include provisions for the right of first refusal for additional carbon credits, remedies

[7] https://static.googleusercontent.com/media/www.google.com/en//green/pdfs/google-carbon-offsets.pdf

for disallowed carbon credits, and ability for either party to terminate the agreement. Undertaking "due diligence", vis-à-vis credit worthiness, reputation, offset registration, and qualifications of parties, and ensuring Term Sheets, Carbon Rights Agreements, and Offset Sales Agreements have been vetted by reputable 3rd party legal counsel are key best practices. Regardless of the contract structure, an Emission Reduction Purchase Agreement (ERPA), which establishes the terms and conditions would need to be negotiated and executed.

Purchasing Recommendation

The City should employ a portfolio style investment approach to minimize risk while investing in the sectors where the City needs to reduce GHG emissions in its inventory to further fund and encourage the adoption and development of low- or no-carbon technologies in that specific sector. For example, a portion of the City's residential GHG emissions will result from fugitive methane at landfills, so the City could prioritize the procurement or investment in landfill-based carbon credits.

From an internal standpoint, a GHG abatement cost analysis, which compares the marginal cost of additional internal reductions versus purchasing carbon credits should be deployed. This will allow the City to clearly identify what GHG reduction opportunities are available and what acceptable price the City would be willing to pay for carbon credits. The analysis should consider not only the monetary savings it would directly generate, but also other factors such as the effective amount of GHG emission reductions, avoided emissions, potential co-benefits and risks so that equity issues can be considered, and avoided. In instances where all factors between options are considered to be equal, preference should be given to projects that have lower overall unit cost to purchase.

As it relates to procurement volumes, it is recommended that the City set three (3) five-year carbon budgets which would place a restriction on the total amount of GHG emissions the City can emit over each five-year period. This approach is based on existing laws with a proven track record – from the United Kingdom's *Climate Change Act*, which has seen that country successfully meet several successive GHG reduction targets.[8] This approach

[8] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

would enable the City to track performance towards its 2030 GHG reduction target, identify the volume of carbon credits required for each carbon budget period, provide adequate time for the City to reduce GHG emissions, and time to procure the carbon credits required to meet each 5-year carbon budget.

There are two general options for consideration in determining the volume of carbon credits required in each budget period, each with distinct cost implications and risks. The first option is to only purchase offset credit once the carbon budget has been consumed. This option effectively delays the purchase of offsets to a later time, potentially allowing for technological advancements to present new opportunities to directly reduce emissions instead of relying on offsets. However, if these opportunities do not arise this approach can result in higher total costs due to future carbon price increases. Figure 1 illustrates this option and the allocation of the carbon budget and volumes of offset purchases that would be necessary.

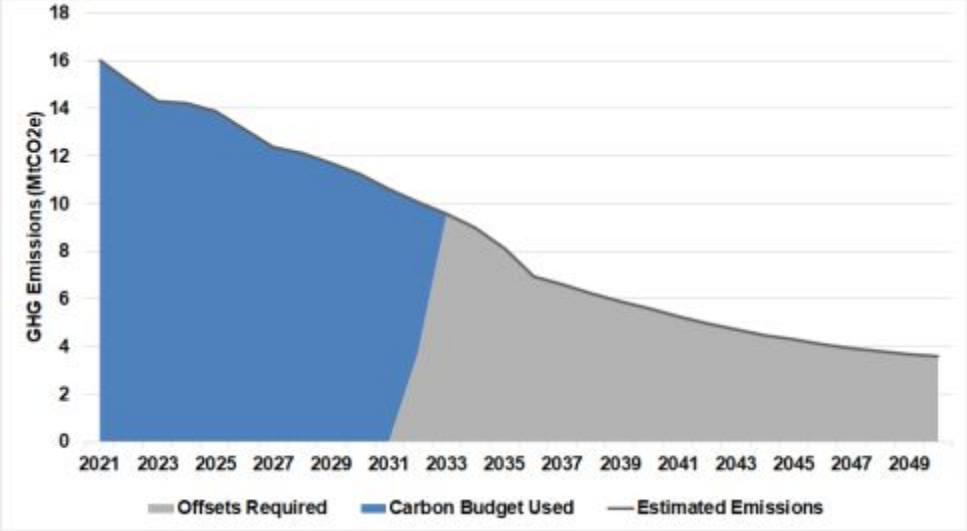

Figure 1: Offset volume determination based on usage of carbon budget first and offset credits purchased when budget is exhausted.

The second approach would involve allocating a defined proportion of the carbon budget in each year from 2021 to 2050 and purchase offsets for any residual emissions above that amount. This approach requires purchases of offsets starting as early as 2021, but these offsets are expected to be less expensive than offsets purchased later and have the potential to reduce the overall cost of offset purchases by 2050. Figure 2 illustrates this option.

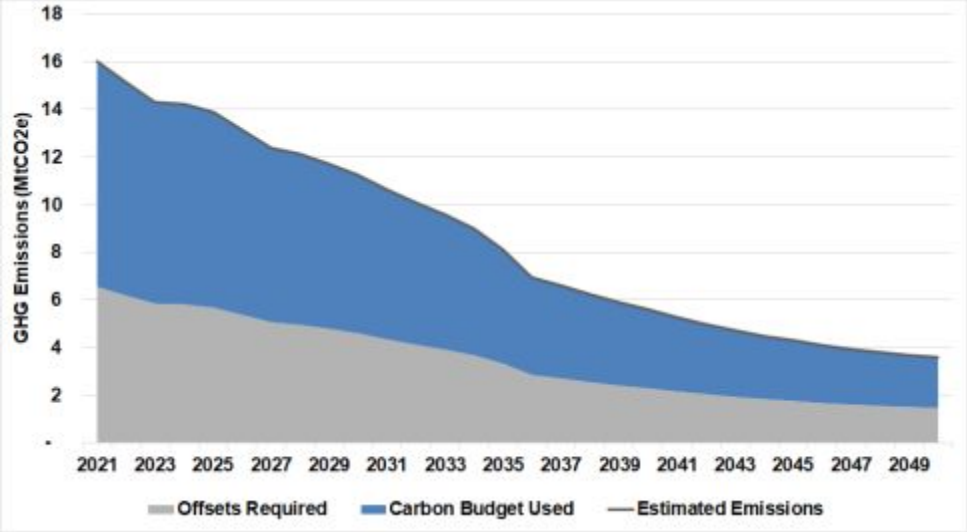

Figure 2: Offset volume determination based on proportional allocation of carbon budget across all years from 2021 to 2050.

"the total cost of offsets between 2020 and 2050 could range from $5.2 to $1.0 billion. By purchasing offset credits earlier and extending the City's carbon budget, this cost can potentially be reduced to a range of $2.5 to $0.5 billion over the same period."

Table 4 provides an estimate of what the City's carbon budget and offset purchases would look like over the next 15 years under both options. If relying on the use of the carbon budget first before purchasing offsets, the total cost of offsets between 2020 and 2050 could range from $5.2 to $1.0 billion. By purchasing offset credits earlier and extending the City's carbon budget, this cost can potentially be reduced to a range of $2.5 to $0.5 billion over the same period. It is important to note that these are nominal values and the analysis does not consider inflation or any discounting. The analysis is intended to demonstrate the cost implication of different purchasing strategies, while further detailed economic analysis would be necessary to better evaluate the risk and determine the best offset purchasing strategy for minimizing cost.

Table 4. Estimated City Carbon Budget And Carbon Credit Requirement

Year	2020-2025	2026-2030	2031-2050
Option 1			
Estimated GHG Releases (MT)	74	61	122

Carbon Budget Used (MT)	74	61	17
Offset Requirements (MT)	-	-	105
Estimated Cost (Million CAD$)[9]	-	-	$5,226 - $1,045
Option 2			
Estimated GHG Releases (MT)	74	61	122
Carbon Budget Used (MT)	44	36	72
Offset Requirements (MT)	30	25	50
Estimated Cost (Million CAD$)	$902 - $180	$1,239 - $248	$2,483 - $497

When offsets are required, the City should prioritize the procurement of Alberta-based carbon credits, generated outside of Edmonton, that have been serialized under the Alberta carbon registry. However, it is unlikely that there will be adequate supply to meet the City's needs and thus the City will need to look to North American and international markets. As such, the City may wish to deploy a 1/3 purchasing split between the Alberta, North America, and International carbon markets to invest in a broad range of project types, minimize market risk, and generate a wide range of co-benefits.[10]

In all cases, the City will need to evaluate what carbon standards, and project-types it is willing to accept - current best practice standards include VCS, Gold Standard, CAR, and ACR. In addition to the typical criteria set by carbon standards (listed previously), the following criteria should be considered:

- **Equitable.** Carbon finance revenues result in a positive social impact which could include people with disabilities and other traditionally underrepresented groups.

[9] The low estimate assumes that less expensive international carbon credits are acquired, whereas the higher estimate assumes that Alberta-based offset credits are purchased at the current expectations of Canadian carbon prices ($30 per tonne rising to $50 per tonne in 2026).
[10] It should be noted that carbon credit purchases occurring outside of Canada will not assist Canada in meeting its GHG reduction objectives.

- **Tax Treatment.** Tax implications is a key issue in selecting the right carbon credit provider. For example, some non-profit carbon credit providers categorize the purchase of carbon credits as charitable donations, which could make it difficult or impossible for the City to purchase them, depending on existing charitable giving and purchasing policies.
- **Politically Feasible.** The project should be acceptable to the general public and citizen climate activists.
- **Local.** Support local offset projects first, and as a second priority supports AB based projects where it is cost-effective to do so.
- **Sectoral.** Carbon credits are generated from the same sector where the City needs to reduce its GHG emissions (e.g., waste related carbon credits are purchased to reduce waste related GHG emissions).
- **Vintage.** The carbon credits have been generated in the same reporting period (or as close to as possible – i.e., within a 3-year vintage window) that the City needs to reduce its GHG emissions.

The City should consider purchasing carbon credits that are tracked on a public exchange and have been serialized. Not only does this support transparency, the use of a registry will enable the City to retire the carbon credits after they have been applied to its GHG inventory.

In terms of contracting, the City will need to work with its legal department and take into consideration the following when developing carbon credit procurement contracts:

- The terms of the contract will depend on the nature of the carbon credits generated.
- Timing and delivery of the carbon credits is important – setting clear guidelines for verification, delivery, registration, and deadlines is key.
- Remedies and/or damages are often a sticking point in contract negotiations. However, they must be clear as there needs to be clear compensation requirements for failing to deliver carbon credits.
- The legal contract should account for, or adjust to, changes in related regulations or legislation.
- Terms of delivery and payment.
- Right to first refusal for additional carbon credits.
- Ability to terminate the agreement.

It is important to consider whether the delivery of the carbon credits are synchronous with the timing of the City's targets as the contracts can involve prompt delivery, forward delivery, or forward crediting, each with its own pricing and risk implications.

Generating Carbon Credits

Compliance carbon markets have their own criteria for offset projects. To develop a carbon credit that is third-party verified, an organization must first identify the registry and protocol to be used. Protocols outline the requirements that the carbon credit project must meet in order to qualify for registration and serialization. It is important to review protocols carefully as multiple protocols can apply to the same project type and can differ in the way they measure and calculate offsets. For example, the CAR forestry protocols use a 100-year timespan to show permanence, whereas the ACR uses a 40-year timespan. This can have a significant impact on the project design, cost, and operational requirements.

Specific to Alberta, the CCIR establishes the rules and requirements for developing and recognizing carbon credits generated and serialized within the Province. The CCIR follows a criteria approach in which the project developer documents the methodology and assumptions used, known as the Project Plan and Project Report, which are each evaluated by a third-party verification entity. The CCIR requires all carbon credits projects follow approved GHG protocols which adhere to the ISO 14064-2 standard.

To minimize risks, all AB-based offsets to be used for compliance must meet the requirements of the CCIR, which establishes the following eligibility criteria:

- **Within Scope**. The project commenced after January 1, 2002 within Alberta. Note that the CCIR does not recognize historical vintage credits prior to 2017. This is also likely to shift to 2020 when the *Technology Innovation and Emissions Reductions* (TIER) *Regulation* comes into effect January 1, 2020.
- **Real**. The project results in a quantifiable emission reduction that is a result of a specific action or decision after January 1, 2002.
- **Measurable**. The GHG reductions are accurate, conservative and can be measured (i.e. there is a mechanism to verify and prove that the results were achieved).
- **Not Required By Law**. The Project is not required by any current or proposed law.
- **Verifiable**. The project is verified by an independent qualified third party.
- **Counted Once**. The carbon credits have not been used in any other GHG Program or have been sold to another party.
- **Clear Ownership**. The carbon credits are backed by legal instruments that demonstrate a clear chain of custody around ownership. Establishing ownership can be a significant legal barrier if the GHG reductions are occurring downstream, or there are multiple parties or grants involved in a project. For example, in the case of forest management on private or

Crown lands, there may be a number of competing claims to the title of the GHG emission removals.

In Alberta, if a GHG reduction project type does not have a protocol that applies, a project can submit a "Request to Develop" or a "Request to Revise" to the Alberta government. The Alberta government selects which protocols will be developed and/or revised each year to which the development process can take one to two years. Some protocols can take even longer to develop in cases where additional technical information is required, or significant quantification issues must be overcome. The protocol development process involves engagement of experts and stakeholders, a review of the science and technical methodologies, the development of best practice guidance, public comment periods, documentation of the process, and review and approval by the Regulator. Protocol development is at the financial burden, and risk, of the project developer and can cost upwards of $50,000.

Once a protocol is approved, a project can use it to develop and verify carbon credits for up to 8 years. At the 8-year point, the project has to apply for a 5-year credit extension approval which will be based on the Alberta government's assessment as to whether the project activity is still additional in the Province.

Generating Recommendation

The City's ultimate objective is to achieve its carbon budget in a cost-effective and equitable manner. Therefore, it is recommended that the City prioritize the implementation of projects and activities within its geographical boundary that result in the direct reduction of its community GHG emissions.

In light of the 2015 Paris Agreement and current discussions on the accounting treatment, it was recognized that double counting may occur when a project level GHG emissions reduction occurs that also gets captured in a national inventory.[11] While on-going discussions are occurring regarding the treatment and mechanisms for oversight on internationally traded GHG emissions reductions, it is recommended as a best practice that any project located within the City's geographic boundaries that receives funding by the City does not generate carbon credits, and that the funding agreement clearly states that all environmental benefits remain with the City. This will avoid any

11 https://www.goldstandard.org/sites/default/files/documents/2015_12_double_counting_guideline_published_v1.pdf

potential double counting of GHG emissions reductions that are directly captured and reported within the City's annual community GHG inventory.

It is recommended that the City continue to monitor discussions around GHG accounting and double-counting treatment methods and align with best practices as they emerge.

Using Carbon Credits

One carbon credit represents all rights and benefits associated with one tonne of GHG gas emissions reductions and when purchased, can be applied to any GHG inventory and GHG emissions scope at the purchaser's discretion. When the carbon credit is applied to a GHG inventory, however, best practice is to have it retired immediately to avoid double counting, and to recognize the GHG reduction in, or as close to the year that the reduction occurred. Carbon credit registries are important in this aspect as they serialize, and track the generation, sale and retirement of carbon credits. Given the City's public commitment to climate change, establishment of GHG targets, and the volume of GHG reductions required, it will be important for the City to utilize registries to track carbon credit purchases and retirements.

Using Recommendation

It is recommended that the City recognize and retire the GHG benefits from purchased carbon credits within, or as close to the year that the benefit occurred. As such, banking carbon credits is not a recommended strategy for the City.

The accounting and reporting treatment of carbon credits is generally straightforward, the City purchases and retires carbon credits on a registry and prepares an addendum to its annual GHG report that discloses the reductions achieved through the purchase of carbon credits. The document should then identify the total carbon credits purchased and retired broken down by project type, location of project, and serial number. As with best reporting practices, the carbon credits should be separately reported and not "netted" or deducted from the reported inventory results.[12]

In cases where the City has been provided funds or grants to implement GHG reduction projects, or when independent organizations implement GHG

[12] http://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf

reduction projects within the City's geographic boundaries, the City does not need to make any accounting changes to the GHG inventory in light of the fact that these projects have reduced the City's community GHG emissions and will be captured in the calculation of the community inventory. The rationale is that although the City has benefited from the projects in terms of a reduction in GHG emissions, it has not claimed the commodifiable environmental benefits that can arise (e.g. RECs, or carbon credits, etc.) and applied these against its community GHG inventory.

APPLYING THE EQUITY LENS

Simply due to the global nature of climate change and the global dispersion of GHG emissions into the atmosphere, there are several equity implications to be considered as it relates to the purchase and use of offset credits. For example, the average Edmontonian is responsible for more than 4 times the GHG emissions as compared to the global average.[13] For the City to mitigate some of these GHG emissions through the purchase and retirement of carbon credits may imply that Edmontonians have a right to produce more GHG emissions than those with a lower carbon footprint. However, it is recommended that the City prioritize local GHG emission reductions first and only use offsets to mitigate GHG emissions that are outside of the City's control, or where the City has limited influence in reducing such GHG emissions. In addition, carbon credits can reduce more carbon per dollar invested in the short-term and enable the City to meet its annual carbon budget requirements.

The purchase of carbon credits also sends financial signals to internalize the social cost of carbon to further incentivize GHG emissions reductions. Equity issues can largely be addressed by focused investment in GHG reduction projects or carbon credits that have co-benefits that improve equity conditions such as access to services, household incomes, economic opportunities, job creation, or investment in infrastructure. This is particularly important since current actions have focused on providing incentives to address the investment hurdle for retrofits and upgrades that reduce GHG emissions, but such programs remain inaccessible to low-income households and results in their exclusion from the energy transition. This highlights the importance of the City assessing GHG reduction projects and carbon credits

[13] https://data.worldbank.org/indicator/EN.ATM.CO2E.PC

on a dollar per ton basis as well as the co-benefits that accrue to the City and Edmontonians broadly.

MUNICIPAL CONTROL AND LEVERS

The key to the City achieving its carbon budget will be in its ability to leverage emissions sources within the City's control and influence decisions, investments, and behaviors in the community that result in GHG emissions reductions. Priority must be first given to the investment into projects that reduce GHG emissions within the City's geographic boundary or as a result of City activities before considering offsets. This will require the consideration and deployment of a wide range of policies that are likely to include regulation of carbon intensive activities and incentivizing behavior change through grants, property-assessed financing, low-interest loans, energy performance contract, fee waivers, pre-zoning, property tax changes, tired permit fees, and user fees. Each policy option will need to be examined for the GHG reduction potential, risks and benefits, and if the policy option is within the City's legal authority under the City of Edmonton Charter, 2018 Regulation.[14]

There are no regulatory limitations for the City to purchase offset credits, which can be evaluated and selected through standard internal procurement procedures to ensure competitive pricing and compliance with trade agreements. The City would need to define the requirements and volume of offsets to be purchased, request offset sales proposals, and select suppliers that meet the defined criteria.

FORESEEABLE ISSUES AND MITIGATION STRATEGY

Without direct action to reduce GHG emissions locally and the appetite to meet goals, the City could face increasing carbon credit costs over the next 15 years which would need to be either diverted from departmental budgets, or through some form of debt financing like green bonds. Financial tools like green bonds can work for City owned property and infrastructure GHG reduction projects, but not residential or commercially owned property. The City could offer incentive funds to address capital cost hurdles like switching from natural gas furnace to heat pumps, but such actions will not be

[14] http://www.qp.alberta.ca/documents/Regs/2018_039.pdf

equitable as low-income households would not be able to participate. One intriguing approach endorsed by the UK Parliamentary Committee is a carbon quota system that would allocate a share of an annual carbon budget which would have an associated cost of carbon that would be collected through property taxes. The funds collected could be fed into a carbon reserve fund which would be used to invest in local GHG reduction programs that address low-income barriers. The City will need to explore which policy options are the most cost effective and equitable.

Due to their potential value, carbon credits will need to be considered as public assets that need to be protected and integrated into corporate accounting. For example, if the City will need to ensure that grant and loan arrangements have a clear right and claim ownership of the environmental benefits.

By incorporating carbon management into corporate strategy through the internalization of the cost of carbon, and the development of procurement criteria the risk associated with participation in compliance/voluntary carbon markets can be reduced significantly. Further, by actively participating in these markets, the City can:

- Use carbon credits to meet GHG targets when local GHG production projects are not feasible or cost effective.
- Use high quality carbon credits to enhance brand image, particularly in light of increasing awareness of risks associated with a carbon-constrained global economy.
- Use the cost of carbon credits to internalize the social cost of carbon, thus enabling the City to have a clear understanding of the GHG impact of a range of available GHG reduction projects.
- Gain carbon market experience in order to understand and influence Alberta and Federal policy decisions around carbon credits.

Transparency is key to ensuring that the City is accountable. This includes ensuring that processes and documentation are accessible to all and utilizing open decision-making processes. Consulting with internal and external stakeholders will not only improve climate literacy, but could help mitigate policy or investment risks, and develop an understanding of where the GHG reduction opportunities lie. As it relates to the purchase of carbon credits, a key aspect of reporting should include the “how” and “why’s” certain projects

were selected over others, as well as the projects respective benefits to internal and external stakeholders.

The transition to a low carbon future requires embedding the low carbon objective in all aspects of community planning, policy, and infrastructure investments. This will require the City to internalize the cost of carbon into all decision-making frameworks.

CONCLUSION WITH RECOMMENDED POLICY STATEMENT(S)

A summary of the policy questions, and high-level recommendations are provided in Table 5.

Table 5. Summary of Purchasing Strategy Recommendations

Aspect	Policy Questions	Summary Recommendation
Purchasing Strategy	When does the City buy carbon credits?	Carbon credits should only be purchased and retired against residual GHG emissions that could not be reduced to reach the City's targets. This approach is deployed when the nature of the GHG emission makes it hard to control and/or eliminate, such as scope 3 transportation transboundary GHG emissions.
	What volume should be purchased?	It is recommended that the City set three (3) five-year carbon budgets which would place a restriction on the total amount of GHG emissions the City can emit over each five-year period. This approach would enable the City to track performance towards its 2030 GHG reduction target, identity the volume of carbon credits required for each budget period, provide adequate time for the City to reduce GHG emissions, and time to procure the carbon credits required to meet each 5-year carbon budget.
	What requirements should be met?	It is recommended that the City deploy a portfolio style investment approach to minimize risk and to invest either directly, or indirectly in the sectors where the City needs to reduce GHG emissions in

		its inventory to further fund and encourage the adoption and development of low- or no-carbon technologies in that specific sector. When purchasing carbon credits, it is recommended that the City develop its own procurement based upon the suggested criteria.
Generating Strategy	Should the City generate carbon credits?	In cases where there is an adequate return on investment, ownership of the environmental benefits can be clearly assigned to the City, it is recommended that the City develop the project(s) to develop carbon credits with the specific intent of maintaining and claiming ownership of all environmental attributes.
	How would the City develop carbon credits?	The City should not seek to develop carbon credits from GHG emission reductions within its geographic boundary due to issues with double counting. The GHG reductions that occur will be captured directly in the City's annual community GHG inventory.
	Should the City sell carbon credits?	The City should not sell carbon credits and should retain all reductions within the City GHG Inventory to maximize the potential for success in meeting the 2030 target.
Usage Strategy	Should the City retire carbon credits?	The City should recognize and retire the GHG benefits from purchased carbon credits within, or as close to the year that the benefit occurred.
	Should the City bank carbon credits?	Banking of credits is not recommended. The City should endeavor to strategically procure enough carbon credits to meet each of the proposed 5-year carbon budget targets.
	What is the objective of the usage strategy? (maximize reductions or minimize costs?)	The City should first prioritize the implementation of projects and activities within its geographical boundary that result in the reduction of GHG emissions, the generation of renewable energy credits, or any other environmental attributes. The

		usage strategy should be a hybrid approach in that it evaluates co-benefits and the marginal cost of abatement of City-led GHG mitigation projects to the benefits and the cost of carbon credits being generated in similar sectors.

Based on this policy brief, the following policy statements are presented for the City's consideration.

1. The City will establish five-year carbon budgets targets.
2. The City will review projects and activities that result in the reduction of GHG emissions, the generation of renewable energy, the conservation of electricity, natural gas, or water, or any other environmental attributes to determine whether such attributes are eligible for designation as carbon credits, renewable energy certificates, conservation credits, or other similar attributes and products, respectively.
3. The City will procure and retire carbon credits against residual GHG emissions that could not be reduced to reach the City's carbon budget targets.
4. When purchasing carbon credits, the City will claim the ownership of all environmental attributes as a general provision in its procurement processes.
5. On an annual basis, the City will track and report projects and activities for which carbon credits or other environmental attributes exist or potentially exist and that the City owns or potentially owns, in whole or in part.
6. The City will establish a carbon reserve fund and a terms of reference for the strategic investment in City-led GHG reduction projects and programs in the community.