



Increasing Plant-Based Purchasing at the Municipal Level

A COST-BENEFIT ANALYSIS

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June 2021



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EXECUTIVE SUMMARY

As concerns over climate change mount, it has become increasingly evident that changes to the global food system must be included in the solutions that look to mitigate anthropogenic (human-caused) impacts of the climate crisis. Animal agriculture is an incredibly resource-intensive industry and a leading contributor to land, fuel and freshwater use. Livestock production's footprint is estimated to take up around 30% of the earth's surface and contribute 18% of all global greenhouse gas emissions. One of the reasons for this is due to society's overconsumption of animal-based food products, which has been trending upwards for decades in North America. Animal food products are any food items that are derived from the body of an animal, such as meat, eggs, milk, cheese, honey, etc. Current and projected livestock production levels outpace any type of supply that could reasonably be expected from natural, ecologically sustainable production practices. This trend has led to a system which often employs practices that are equally reckless towards the environment (such as mass deforestation and irresponsible runoff management), animal welfare (such as extreme and unnatural confinement and unnecessary antibiotics and hormones), and human health (by increasing saturated fat intake and second-hand exposure to hormones and antibiotics).

Because of these plights, the Vancouver

Humane Society (VHS) is proposing that the City of Vancouver implement a policy wherein all food purchasing activities facilitated by the City replace 20% of animal-based food items with plant-based alternatives. 20% is being recommended as a minimum benchmark, as it is effective in demonstrating the impact of the policy change, while remaining attainable in the short-term. Plant-based foods do not contain any ingredients that come from animals, but are instead derived from plant sources.

As outlined in both the EAT-Lancet Commission Report and the recent report published by the WWF and United Nations on food's role in national sustainability policy, the onus is not only on industry and consumers to take action that reduces the impact of the current food system, but it falls to policy and decision makers, at every level, to take definitive action. VHS is calling on the City of Vancouver to act on expert advice and incorporate meat-reduction efforts into the City's greater ecological objectives.

VHS conducted an analysis of the City's current food purchasing activities which fall into five distinct streams: Vancouver Civic Theatres concessions, City event catering contracts, low-cost meal programs, Parks Board concession services and golf course foodservice, and the Vancouver School Board's Food4School program.

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Purchasing data for each of these streams was analyzed (where available) to determine annual cost and greenhouse gas emissions associated with differing food types.

VHS then conducted a similar analysis for three proposed alternative procurement models that saw either:

- 20% of all animal-based products replaced with plant-based alternatives (*Proposal 1*),
- 20% of the most carbon-intensive animal-based products replaced with plant-based alternatives (*Proposal 2*). The most carbon-intensive products are defined as those wherein the difference of carbon emissions is the most significant between the animal-based and the plant-based versions of the same item.
- 20% of the most cost-intensive animal-based products replaced with plant-based alternatives (*Proposal 3*). The most cost-intensive products are defined as those wherein the difference in price per kilogram is the most significant between the animal-based and plant-based versions of the same item.

RESULTS

Upon comparing the City's current purchasing strategy and the three proposed alternative models for each food activity (where data was available), VHS found that should the City of Vancouver implement one of the proposed policy recommendations, it can expect to **save up to \$99 000 in procurement costs, reduce greenhouse gas emissions by more than 500**

tonnes, and save the equivalent of nearly 400 farmed animal lives on an annual basis.

Additionally, with these policy changes, it is projected that the City can experience a **14% growth in sales revenue** (with a 4% erosion rate annually which can be seen in detail in Appendix A[iii]) in food activity streams involving foodservice operations equating to over **\$400 000** in additional revenue the first year alone.

RECOMMENDATIONS

Whether the City's greatest influencing factor on policy change reflects social responsibility, sustainability or financial efficiency, both **Proposal 2** and **Proposal 3** will pose a positive impact on City objectives.

CONSIDERATIONS

VHS also identifies additional considerations for the implementation of a policy change regarding the City's food purchasing strategies. The considerations include: the costs associated with analyzing current purchasing trends, coordinating policy with third-party program facilitators (as seen with the low-cost meal programs and the Food4School program), and considering the dietary needs and cultural relevance of foods delivered through any of these programs to structurally-vulnerable populations. A related consideration is that increasing the offering of appropriate plant-based options will improve accessibility and inclusivity for those who wish to opt for plant-based meals for health, environmental, animal welfare or personal reasons.





01 INTRODUCTION

This document outlines the responsibility of decision makers at the municipal level to actively participate in the creation of policy-based solutions to the growing climate crisis and how food plays a role in these solutions.

VHS proposes a novel food purchasing policy that the City of Vancouver should implement to positively affect its ecological footprint, social responsibility outcomes and financial objectives. 20% is being recommended as

a minimum benchmark, as it is effective in demonstrating the impact of the policy change, while remaining attainable in the short-term. This document presents a cost benefit analysis of various food purchasing policy options. The results of this analysis are outlined and utilized to make a number of policy recommendations to the City of Vancouver which vary to prioritize various objectives held by the City.



02 BACKGROUND

CLIMATE

Climate change is drastically altering our economic, political and ecological landscapes. In September 2020 [Enhancing NDCs for Food Systems: Recommendations for Policy Makers](#), a collaboration between the World Wildlife Fund and the United Nations Environment Program (UNEP), was published. The report indicates that global leaders and policymakers have the potential to mitigate climate change 25% more effectively with some emphasis placed on the remodelling of the current food system¹. Given that 37% of all global emissions are linked to the global food system, as is 80% of all biodiversity loss, 80% of deforestation, and 70% of all freshwater use, finding efficiencies and reducing redundancies and waste is critical in addressing our food system's contribution to climate change².

The Enhancing NDC's for Food Systems report emphasises that without reconstructing the food system as it stands now, we, as a global population, have no hope in attaining any climate objectives we set for ourselves. This is reflected in the fact that agriculture alone currently takes up about one quarter of the global emissions budget and without serious remodeling of the global food system, including dietary change, objectives of limiting global warming below 2°C are unattainable³.

Recommendations that are found in this report include reducing food waste, shifting to regenerative, carbon-absorbing production methods, and transitioning to plant-based diets as meat and dairy production implicate the food industry's climate impact far beyond any other product type.

The David Suzuki Foundation found that livestock production accounts for 70% of all agricultural land use and occupies 30% of the planet's land surface⁴. Livestock production is also considered to be one of the more inefficient food production sectors as typically the input energy (calories) required to produce animal products for consumption outweigh the amount of calories available in the end product itself. This is due to the large amounts of water, grain and electricity used to house, feed and maintain



Without reconstructing the wasteful and inefficient food system as it stands now, we, as a global population, have no hope in attaining any climate objectives we set for ourselves.

¹ I. Shulte, et al, Enhancing NDCs for Food Systems: Recommendations for Decision Makers. (Sept, 2020)

² Ibid

³ Ibid

⁴ "Food and Climate Change," David Suzuki Foundation, accessed Nov 25, 2020, <https://david Suzuki.org/queen-of-green/food-climate-change/>

the animals. Because of the complex system required to produce meat for human consumption, it is calculated that livestock production is responsible for 18% of all global greenhouse gas emissions⁵.

In 2018, an expansive meta-analysis published in the journal *Science* evaluated hundreds of studies that looked to discern accurate emission contributions of specific food products. The authors, Poore and Nemecek, found beef and lamb to be the most carbon-intensive of any food products available on the market, while items like nuts, beans and pulses carried a drastically reduced carbon output as a protein alternative⁶.

ANIMAL WELFARE

Western society's over-consumption of animal products drives demand for meat. This perpetuates the industrialization of animal production, which has been the subject of a number of undercover investigations revealing widespread animal cruelty in recent years^{7,8}. A concern for animal welfare has been a key driver in recent behaviour exhibited by Canadians to adopt plant-centric diets⁹. An American consumer behaviour research institute found that nearly half of consumers that purchase plant-based food and drink items do so out of concern for animal welfare¹⁰. Research also suggests that Canadian consumption of meat is trending downwards at a faster rate than seen in America¹¹.

PUBLIC HEALTH

The main motivator that has more than 50% of Canadians looking to consume less animal products are health concerns¹². Excessive meat consumption has been shown to increase saturated fat intake and is linked to obesity and non-communicable diseases such as heart disease, stroke, diabetes and certain types of cancer in North America¹³. Additionally, the consumption of growth hormones by proxy

livestock production accounts for

70% of all agricultural land use

and occupies **30%** of the planet's land surface

of meat consumption is linked to heightened susceptibility to certain types of cancer, deficiencies in biological growth and development, heart complications and neurobiological disruptions¹⁴. Furthermore, the use of antibiotics in the livestock industry also raises concerns about the growing threat of antibiotic resistance in humans and our ability to treat illnesses¹⁵.



⁵ Ibid

⁶ J. Poore & T. Nemecek, "Reducing food's environmental impacts through producers and consumers," *Science* 360, no.3692, (Jun 2018), 987-992.

⁷ National Post, "Undercover investigation reveals horrific cruelty at B.C. dairy farm, SPCA recommending charges," June 10, 2014, <https://nationalpost.com/news/canada/undercover-investigation-reveals-horrific-cruelty-at-b-c-dairy-farm-spc-a-recommending-charges>

⁸ P. Henderson, "Undercover video shows alleged animal abuse at Abbotsford egg farm," *The Abbotsford News*, Aug 14, 2020, <https://www.abbynews.com/news/undercover-video-shows-alleged-animal-abuse-at-abbotsford-egg-farm/>

⁹ L. Young, "More than half of Canadians want to eat less meat, study finds," *Global News*, Oct 2018,

¹⁰ Health Focus International, USA Trend Study: 2019 Shopper Study. (2019).

¹¹ M. von Massow, A. Weeksink, M. Gallant, "Meat consumption is changing, but not because of vegans," *The Conversation*, March 11, 2019, <https://theconversation.com/meat-consumption-is-changing-but-its-not-because-of-vegans-112332>

¹² B. Slabakova, "The age of veganism: vegan statistics for 2020," *Health Careers*, Jan 7, 2020, <https://healthcareers.co/vegan-statistics/>

¹³ A. Stathopoulos, "You are what your food eats: How regulation of factory farm conditions could" improve human health and animal welfare alike, *New York University Journal of Legislation and Public Policy* 13, No 2, 407-444

¹⁴ Ibid

¹⁵ Ibid



03 MARKET RESPONSE

With health, environmental and animal welfare concerns informing consumer choices, the market has adapted, making it easier than ever to transition from carbon-intensive, animal-based proteins to plant-based alternatives. The Good Food Institute revealed that plant-based sales that directly replaced animal-based food sales (for example - plant-based burgers or nut-based cheeses) went up 29% in the last two years alone making for a \$5B industry in America¹⁶. Similar trends have been found in Canada in the last five years with the plant-based market growing to \$1.5B in 2017 and trending rapidly upwards since¹⁷. This trend is projected to continue upwards by Acumen Research and Consulting. They predict a global increase in plant-based revenue generation at 10% every year, resulting in a \$24.3B global industry by 2026¹⁸.

As concerns for health and the climate rise during the Covid-19 pandemic, the trend towards plant-based has also risen. Market research showed that plant-based sales in March of 2020 increased by 90% when compared to March of 2019¹⁹. Plant-based food sales continued to outpace previous year sales even after the initial "panic buying" phase - where grocery stores struggled to meet the demand of most food types - demonstrating the staying power of consumers' evolving preferences²⁰.

British Columbian residents have been found to have adopted plant-based diets on a wider scale than residents of any other province²¹. Vancouver food service businesses are looking to adapt and cater to this trend. In our discussions with a number of catering companies that have previously supplied City-run events or meetings, all considered their plant-based offerings to be critical in maintaining competitiveness within the Vancouver market. Some of the caterers stated that they initially incorporated plant-based offerings into their menus for their own personal values related to health, the environment or animal welfare, but all five companies acknowledge plant-based options as a necessity in meeting consumer demands. All agreed that they could easily provide 100% plant-based menu options if requested.

Plant-based sales that directly replaced animal-based food sales went up

29%

in the last two years alone.

¹⁶ The Good Food Institute, "Plant-Based Market Overview," accessed Nov 25, 2020, <https://www.gfi.org/marketresearch>

¹⁷ The Good Food Institute, "Growing Demand, Better Supply: Plant-Based Proteins Offer Greater Sales," MENU, Jan 8, 2019, <https://www.menumag.ca/2019/01/08/growing-demand-better-supply-plant-based-protein-offers-greater-sales/>

¹⁸ Acumen Research and Consulting, Vegan Food Market: Global Industry Analysis, Market Size, Opportunities and Forecast, 2019 - 2026, (2019)

¹⁹ A. Starostinetskaya, "During height of pandemic, plant-based food sales increase by 90%", Vegnews, May 26, 2020, <https://vegnews.com/2020/5/during-height-of-pandemic-plant-based-food-sales-increase-by-90-percent>

²⁰ Ibid

²¹ C. Kearny, "B.C. embracing plant-based diets more than any other province", CBC News, Aug 15, 2019, <https://www.cbc.ca/news/canada/british-columbia/b-c-embracing-plant-based-diets-over-the-rest-of-canada-1.5248623>



04 FINANCIAL CONSIDERATIONS

Not only would prioritizing plant-based food items by the City of Vancouver improve its overall ecological footprint, but it may also carry budgetary benefits. A Canadian study conducted in 2019 found that selecting plant-based proteins over those sourced from animals more regularly, as recommended in the updated Canadian Food Guide, can provide significant cost savings. The study found that the average family of four could

reduce their annual grocery spending by about 7% if they followed the new Canadian Food Guide strategy²². Another study showed that American grocery shoppers save an average of \$23USD per shopping trip when choosing plant-based meat alternatives²³. Predictions reveal that plant-based eating costs will continue to go down as production and processing ramps up to meet growing demand²⁴.

05 THE CITY OF VANCOUVER'S ROLE

Decisions to transition away from a heavily animal-based food system should not just be restricted to end consumers. Governments and policymakers at all levels have the ability to facilitate these necessary food system changes.

The [EAT-Lancet Commission Report](#) on food, planet and health outlines how cities are instrumental in creating sustainable food systems. The document emphasizes the importance of governing bodies, and specifically municipal governments, in developing comprehensive food strategies and policies that foster a "planetary health diet: a global reference diet that is healthy for humans and the planet and that recommends limiting animal and processed food sources, while increasing consumption of plant-based foods²⁵.

While cities may not produce large amounts of food within their boundaries, they can utilize their purchasing power and set policies that reduce the volume of food waste, support ecologically-responsible food producers and reduce the amount of carbon-intensive products purchased. Animal-based products, with their high carbon impact and negative welfare consequences are a good starting place. Municipal governments can also encourage and incentivize others within the community, including post-secondary schools, school districts, health care institutions, food service providers, businesses and restaurants to take similar action.

The City of Vancouver already looks to reduce its ecological footprint through food purchasing

²² S. Charlebois, Canada's Food Guide: Awareness, Understanding, Affordability, and Barriers to Adoption, (2019)

²³ Sous Vide Guy, Exploring Opinions on Plant-Based Eating, accessed Nov 25, 2020, <https://sousvideguy.com/exploring-opinions-plant-based-eating/>

²⁴ M. Allen, Big meat is giving plant protein a go, June 14, 2020, <https://www.gfi.org/big-meat-is-giving-plant-protein-a-go>

²⁵ EAT-Lancet Commission, Food in The Anthropocene: the EAT-Lancet Commission on Healthy Diets From Sustainable Food Systems, (Jan, 2019)

activities in a number of established policies and objectives, including the Greenest City Action Plan; the Climate Emergency Action Plan; the Climate Change Adaptation Strategy; the Vancouver Food Strategy; and the Healthy City Strategy. However, the emphasis in each of these policies is placed on the procurement of local food. Though prioritizing local food certainly brings ecological and economic benefits to both the purchaser and the producer, the method of production plays a larger role in a food's overall carbon footprint than the distance it travels²⁶. The resources employed in plant-based food production pales in comparison to those used for livestock production²⁷.

In Vancouver, the consumption of food makes up nearly half of the City's ecological footprint, with 98% of this food footprint being associated with the land and energy used for food production, particularly meat and dairy products, while only 2% is from transportation²⁸. Based on these figures, it may be prudent for the City to consider the types of food procured along with their origin in order to best achieve ecological objectives.

06 PROPOSED POLICY CHANGE

VHS proposes that the City of Vancouver transition 20% of animal-based food items currently procured or funded by the City to plant-based food items.

This policy will affect each of the distinct food activity streams facilitated by the City (listed in the section below) and will require cooperation from those responsible for purchasing in each individual stream.

The resources (financial, carbon and animal life) required to implement the three proposed alternative models (all of which align with VHS's proposed policy change), were assessed and ultimately compared with the current model of each stream. This process was completed to determine the most favourable purchasing policy for the City of Vancouver.

The three proposed alternative models are as follows:

- 1. Proposal 1** - 20% of the volume of **each** animal-based product replaced with a suitable, available plant-based alternative.
- 2. Proposal 2** - 20% of the volume of the **most**

carbon-intensive animal-based products replaced with a suitable, available plant-based alternative. The "most carbon-intensive" animal-based products were defined as the products where the difference of carbon emissions was the most significant between the animal-based and the plant-based versions of the same item. For example: plant-based cream produces only 11% of the GHG emissions generated by the same weight of dairy-based cream, while plant-based milk produces only 21% of the GHG emissions of dairy milk. In this example dairy-based cream would be considered to be the more carbon-intensive product²⁹.

- 3. Proposal 3** - 20% of the volume of the **most cost-intensive** animal-based products replaced with a suitable, available plant-based alternative. The "most cost-intensive" products were chosen similarly to the carbon-intensive products of Proposal 2, where the plant-based and animal-based counterparts were compared based on price per kilogram and those with the most significant cost differences were selected for replacement^{30 31}.

²⁶ "Food and Climate Change", David Suzuki Foundation, accessed Nov 25, 2020, <https://david Suzuki.org/queen-of-green/food-climate-change/>

²⁷ Ibid

²⁸ City of Vancouver, Greenest City 2020 Action Plan, (2020), p. 44 <https://vancouver.ca/files/cov/greenest-city-action-plan-implementation-update-2018-2019.pdf>

²⁹ Carbon outputs associated with many food items can be found using BBC's food emissions calculator: <https://www.bbc.com/news/science-environment-46459714>

³⁰ Prices for City catering were based on pricing found on menus provided by the key caterers listed in the City budget.

³¹ Prices for City catering were based on pricing found on menus provided by the key caterers listed in the City budget.

07 OVERVIEW OF CURRENT CITY FOOD ACTIVITIES

The City of Vancouver currently facilitates, to varying degrees, food purchasing activities in five distinct streams. These five streams include:

1. **Vancouver Civic Theatres**
2. **General Catering Services**
3. **Low Cost Meal Providers**
4. **The Parks Board**
5. **The School Board**

In this section, the key purchasing activities for each stream are detailed and the data that was supplied by relevant stakeholders in each stream is outlined and explained.



VANCOUVER CIVIC THEATRES:

Vancouver Civic Theatres (VCT) procure food items to sell through concession facilities in three city-run theatres: the Queen Elizabeth Theatre, the Orpheum, and the Vancouver Playhouse. The food produced and sold through theatre concession services is predominantly processed and packaged items such as ice cream, chocolate bars and chips.

VCT recorded a revenue generated from food and beverage of \$3.58M in 2019, with an estimated total of \$550K generated by food sales³².

VCT's Inventory Planner/Buyer provided VHS with data regarding all food purchases made for theatre concession services in 2019. The data provided, as seen in Appendix A, was cross-referenced with Sysco's website, as Sysco was identified as the primary supplier for VCT.

It was estimated that approximately \$26,267 was spent by VCT on animal-based food products in 2019, accounting for approximately 17 086 kilograms of greenhouse gas emissions - the equivalent of powering nearly 2000 homes for a year³³.

As the remainder of the products ordered and sold by VCT are highly processed, they were not considered in the calculations. None of the remaining items contained more than 10% animal-based ingredients and therefore their substitution would not have generated significant enough environmental or animal welfare impacts to be included in the proposed alternative models.

From the data provided, the three proposed alternative models mentioned above were assessed.

The results of this assessment can be found in Appendix A(i) and Appendix A(ii), and will be discussed in the Comparative Cost-Benefit Analysis section.

³² Email with Food and Beverage Manager at Vancouver Vancouver Civic Theatres, Nov 3, 2020

³³ United States Environmental Protection Agency greenhouse gas equivalencies calculator <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

GENERAL CATERING SERVICES:

The City of Vancouver procures food through various catering contracts to supply food for city-run events and meetings on a regular basis. City staff were contacted and confirmed that all City catering service providers are contracted through a decentralized system, unique to each department. The decentralized nature of this food procurement stream made collection of coherent, streamlined data an impossibility. The City employees, however, were able to provide the names of the five catering companies most often used by most City departments³⁴.

The identified catering businesses were verified upon evaluation of the City of Vancouver's 2019 Statement of Financial Information published for public record on March 10, 2020³⁵. Of the five identified caterers, four remain in operation and were contacted to confirm their past contracts with the City of Vancouver. All four confirmed their past business with the City and each catering business shared a menu that is typically provided to the City for orders. Each caterer also identified a typical order placed by the City. All four of the catering businesses considered twenty-five people to be the average number of people served through a typical order by the City. Some businesses were also able to provide past orders made by the City to establish what a "typical" contract looks like.

With all of this information considered, the caterer that appears to have the most significant and frequent relationship with the City of Vancouver (based on the total expenditures reflected in the City's 2019 financial statement), was identified as Potluck Catering³⁶. Potluck Catering was able to provide a typical order from the City of Vancouver which was used to model what other city orders might look like and the likely impacts of VHS's proposed changes³⁷. Based on the total amount the City paid Potluck Catering over the course of 2019, it was determined that this order likely took place approximately 197 times. The costs and benefits of the proposed alternative models will be discussed in the Comparative Cost-Benefit Analysis section.

LOW-COST MEAL PROGRAMS

The City of Vancouver funds and assists in the facilitation of free or low-cost meal programs across various neighbourhoods in the city. There is a map available on the City's website that outlines eighty-six programs, their location, hours, contact information, and their target recipients, which includes those that identify as youth, sex worker, LGBTQ2+, HIV+, senior, family, and indigenous populations³⁸.

For the purposes of this proposal, one low-cost meal provider was selected and their food procurement orders are used as a model for other low-cost meal programs.

The Strathcona Community Centre meal program was selected to model for all low-cost meal programs as it was described in a motion submitted by City Councillor Pete Fry in 2019 as an especially cost-effective program in comparison to others, distributing meals at \$3.54 per plate³⁹. The Strathcona Community Centre meal program is a breakfast program that targets youth and receives \$80 000 per year from the City of Vancouver⁴⁰.

The Food Security Coordinator at Strathcona Community Centre was contacted and provided data that reflected how monthly spending on the breakfast program typically looks⁴¹. This data can be seen in Appendix C. The Food Security Coordinator also detailed what types of food products typically fall into the

³⁴ Email with Sustainability Specialist at City of Vancouver, Sept 23, 2020

³⁵ City of Vancouver Director of Finance, 2019 Statement of Financial Information, (Jan 30, 2020)

³⁶ Ibid

³⁷ Phone communication with Potluck Catering owner, Oct 14, 2020

³⁸ Vancouver Food Policy Council, Free and Low Cost Meal Providers, (Oct 29, 2020), <https://vancouver.ca/files/cov/emergency-meal-program-map.pdf>

³⁹ Pete Fry, "Interim funding for school meal program," Motion on Notice, S-6, Feb 12, 2019

⁴⁰ Ibid

⁴¹ Email communication with Food Security Coordinator at Strathcona Community Centre, Oct 20, 2020

⁴² Email communication with Food Security Coordinator at Strathcona Community Centre, Oct 21, 2020

broader food categories that appear in the supplied data⁴². The more specific food products are listed and accounted for in VHS's calculations as seen in the Food Description columns in Appendix C(i). It was calculated that the Strathcona Community Centre breakfast program spends around \$38 000 per year on food costs and is responsible for an estimated 13 954 Kg of greenhouse gas emissions on an annual basis - which is the equivalent to the emissions produced by over 3000 cars driven annually⁴³.

The costs and benefits of the proposed alternative models will be discussed in the Comparative Cost-Benefit Analysis section.

THE PARKS BOARD

The Parks Board procures food items to sell at the thirteen city-run concessions and three city golf courses.

Concessions:

Though VHS was unable to obtain procurement data for these food establishments run by the Parks Board in time for the release of this report, costs and benefits were calculated based on the total revenue that these establishments bring in each year. These calculations were modelled off of the 2019 restated budget found in the Parks and Recreation 2020 Operating & Capital Budgets Report published for public access on December 2nd, 2019⁴⁴.

Golf Course

The City operates three full-size golf courses. These golf courses provide food offerings through club house food services, however, neither the procurement data or the sales revenue were able to be obtained in time for the release of this report. The sales revenue is not distinguished from all revenue generated from the city-run golf courses in the Parks and Recreation 2020 Operating & Capital Budgets Report, so VHS was not able to estimate impacts of the proposed policy on this branch of the City's food activities.

THE VANCOUVER SCHOOL BOARD

The City of Vancouver provides funding for a meal program that is currently facilitated by the Vancouver School Board (VSB): Food4School (F4S). F4S provides students with daily take-away lunch or a weekly student lunch kit. The program has changed significantly in 2020 due to the COVID-19 pandemic in efforts to minimize food exposure to those other than the end recipient.

VHS was unable to obtain any F4S operational data, as this information is not public, and the VSB was unable to share this information in keeping with privacy policies.

In correspondence with the Senior Manager of Purchasing and Administrative Services at the VSB, VHS has understood the F4S program to have implemented recent menu changes to reflect recommendations made in the 2019 Canadian Food Guide. The VSB indicated that these menu changes directly involve the inclusion of more plant-based proteins and vegetarian options, in response to a growing demand for vegetarian options seen across the school district⁴⁵.

As data was not available for this stream of the City's food activity, VHS was not able to estimate impacts of the proposed alternative models on this branch of the City's food activities.

⁴³ United States Environmental Protection Agency greenhouse gas equivalencies calculator <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

⁴⁴ Vancouver Board of Parks and Recreation, 2020 Service Plan and Operating & Capital Budgets - Parks & Recreation, (Nov 26, 2019), <https://parkboardmeetings.vancouver.ca/2019/20191202/REPORT-2020ServicePlanOperatingCapitalBudgets-ParksRec-20191202.pdf>

⁴⁵ Email communication with Senior Manager, Purchasing and Administrative Services at the VBS, Sept 23, 2020

07 COMPARATIVE COST-BENEFIT ANALYSIS

Costs and benefits were assessed for each of the City’s streams of food activity. The outcomes expressed in each stream were markedly diverse due to broad differences in program details including program recipients, methods of distribution and program facilitators. Additionally, the pronounced differences in the types of data subsets available required differing approaches to assessing the relevant cost and benefits of each stream.

The Cost Benefit Analysis (CBA) will be presented and discussed for each of the five streams of food activity the City of Vancouver currently facilitates.

VANCOUVER CIVIC THEATRES

The most economical and comprehensive CBA was conducted for Vancouver Civic Theatres (VCT) due to the detail of the data available and the model that VCT utilizes; there are clear costs (expenses) and clear benefits (revenues) that are easily calculated and compared in an economical CBA.

VHS found the following ratios to exist between the four assessed models (the current model and the three proposed alternative models discussed in the previous section):

Proposal	CBA Ratio
Current	2.1589
Proposal 1	2.1659
Proposal 2	2.2031
Proposal 3	2.2143

With any number greater than one expected to generate financially profitable results, it can be seen that while the City stands to profit from the procurement model currently in place, it stands to profit more significantly with any of the three proposed alternative models.

The details of these CBA calculations can be found in Appendix A (iii).

It is also worth noting that the City would experience a significant reduction in greenhouse gas emissions, up to **4445 kg of greenhouse gases per year**, should the City follow the recommended purchasing guidelines found in *Proposal 2*. These saved emissions could be used, instead, towards **powering over 750 homes** for a year⁴⁶. The comparative emissions can be seen in the following chart:

Proposal	GHG Emissions (kg of CO2e)
Current	17086.29
Proposal 1	14228.61
Proposal 2	12641.51
Proposal 3	14427.40

⁴⁶ United States Environmental Protection Agency greenhouse gas equivalencies calculator <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Key benefits: in transitioning towards more plant-based purchasing, VCT can expect to raise its cost-benefit ratio by up to 0.06 (which accounts for \$5000 in annual cost savings and 14% of additional revenue growth [detailed in Appendix A (iii)]) while also reducing greenhouse gas emissions by up to 4445kg per year.

Additional costs: should VCT make any changes to their current offerings, an assessment of procurement data would need to be done to determine which items require replacement in accordance with the proposed policy change. This assessment would entail determining the menu items that are the most carbon-intensive or the most cost-intensive (depending on the procurement policy being implemented) and their appropriate replacements. VHS hired a consultant that was able to complete a similar assessment of VCT’s procurement data at a cost of approximately \$300.

CITY CATERING

As there is no revenue-generating venture associated with the food procured as part of City meetings and events, a straightforward CBA, similar to the one conducted for VCT was not possible. A standard CBA would also not be appropriate in assessing the catering stream, as profitability is not the core objective in this particular stream of food activity.

Costs can be easily compared between the current food model as it stands now and the three proposed alternatives:

Model	Costs	Saving
Current	\$47,346.98	0
Proposal 1	\$47,294.53	\$52.45
Proposal 2	\$47,212.82	\$134.16
Proposal 3	\$47,212.82	\$134.16 ^{*1}

*1-Proposals 2 and 3 are identical due to the pricing structure of the catering menu. As pricing for plant-based sandwiches and animal-based sandwiches from Potluck Catering have the same price point, there were no items considered to be the most cost-intensive. Therefore, both proposals were based on the carbon emissions of the products offered and the costs associated with these. Details can be found in Appendix B(ii).

The savings can be expected to be expressed on a much larger scale as they are based solely on the contracts between the City and one caterer that makes up approximately 6% of the total City dollars spent on catering. Should the entire city catering budget experience the cost-savings found in *Proposals 2 and 3*, the city could expect to save closer to **\$2100** on an annual basis.

Greenhouse gas emissions also displayed a significant reduction in the proposal analysis:

Proposal	GHG Emissions (kg of CO2e)
Current	4177
Proposal 1	3477
Proposal 2	2388
Proposal 3	2388

Beyond expressing the greatest financial savings potential, *Proposals 2 and 3* display the most significant reduction in greenhouse gases as well. Based on the one annual catering contract utilized for these calculations, the City could reduce their carbon output by nearly **1800 kg of greenhouse gases**. This is the equivalent of saving just over **800 000 litres of gasoline**, or closer to **13M litres of gasoline** should all city catering contracts be considered⁴⁷.



The proposed alternative models also saw a reduction in the number of animal lives consumed. Proposals 2 and 3 saw the greatest numbers of animals saved, at **2.6 lives** on an annual basis. If this number were to be extrapolated to consider the potential impact of transitioning all City catering orders to follow the ordering guidelines recommended in *Proposals 2 or 3*, it could be expected that the City would save around **forty animal lives on an annual basis**.

Additional benefits that are unique to the City's catering stream of food purchasing activities include a rise in employee satisfaction and productivity. Studies have revealed that office workers who transitioned to plant-based (or vegan) diets not only displayed improved physical health measures, such as reduced cholesterol and lowered BMI, but there were also notable improvements in reported increases in overall productivity compared to workers who maintained diets that incorporated animal-based items⁴⁸. This same study also saw improvements in anxiety, depression, fatigue and general health in vegan workers compared to non-vegan workers. These effects are desirable and can convert to tangible, monetizable outcomes as, in the USA, health issues such as obesity and depression lead to billions of dollars in loss of productivity annually⁴⁹.

Research also shows heightened productivity amongst workers that believe their employers are participating in sustainable practices. One study found that productivity improved by 16% amongst workers who believed their workplaces to be environmentally and socially responsible⁵⁰.

Lastly, market research has found that providing any kind of food or meals to employees improves morale and therefore productivity⁵¹. However, providing healthful options and options that reflect the desires of the workers render greater results⁵². Given the conversations held with city staff and the various catering companies typically contracted by the city, plant-based options are increasingly in demand.

Key benefits: by adopting more plant-based options when ordering through the City's various catering contracts, the City can expect to save upwards of \$2000, reduce emissions by nearly 28 000 kilograms of CO2e and save approximately forty animal lives on an annual basis.

Additional costs: the expressed financial savings would be offset by an additional, undetermined cost associated with educating and training staff members responsible for ordering. While other streams of food activity require a full assessment of procurement data in order to determine where replacements are required (as seen with VCT above and in Appendices A[i] and A[ii]), all catering activities will need to be assessed on an ad-hoc basis as each order typically differs from the next. Therefore, it would be necessary that all staff members responsible for catering orders be informed of the items to avoid and their suitable replacements. Training and education could entail an in-person training session by a food sustainability expert or simply a document supplied to staff members that outlines this information.

48 S. Mishra, et al., "A multicenter randomized controlled trial of a plant-based nutrition program to reduce body weight and cardiovascular risk in the corporate setting: the GEICO study," *European Journal of Clinical Nutrition* 67, No. 7, (May 2013), 718-724

49 Ibid

50 M. Delmas & S. Pekovic, "Environmental standards and labor productivity: Understanding the mechanisms that sustain sustainability," *Journal of Organizational Behaviour* 34, No. 2, (Feb, 2013) 230-252

51 T. Moitra, "Startling facts about the munchies: the pros and cons of office food," *Cake*, Feb 19, 2017, <https://blog.cake.hr/pros-and-cons-of-office-food/>

52 Ibid

LOW COST MEAL PROGRAMS

This stream of food activity, again, does not prioritize profitability in its model, but its targets, instead, reflect social responsibility. This model, however, also has clear costs (expenses) and benefits (community members served) that have been compared between each proposed model.

The benefits of this model have been expressed through two metrics.

i. Number of recipients served

Proposal	Cost	+/- of annual recipients (relative to current number of recipients)
Current	\$38,770.71	0 *1
Proposal 1	\$42,419.98	-1031
Proposal 2	\$38,980.81	-59
Proposal 3	\$37,047.39	487

*1- based on the meal cost of \$3.54/recipient <https://council.vancouver.ca/20190212/documents/motionb2.pdf>

ii. Cost per meal

Proposal	Cost	Cost Per Meal
Current	\$38,770.71	\$3.54 *1
Proposal 1	\$42,419.98	\$3.87 *2
Proposal 2	\$38,980.81	\$3.56
Proposal 3	\$37,047.39	\$3.38

*1- based on cost outlined in COV's Motion <https://council.vancouver.ca/20190212/documents/motionb2.pdf>

*2 - the budget divisible by the number of recipients served (10952) as determined by the meal cost and budget of Current data

These numbers can be expected to be experienced on a much larger scale given that they are based solely on the budget and data of one low-cost meal provider out of many provided by the City. Each low-cost food service program has unique objectives and, therefore, methods of program delivery, so VHS is reluctant to extrapolate these numbers to apply to the other low-cost food service programs listed on the City's website. However, of the eighty-six low-cost food service programs listed on the program map, forty are identified as "meal programs," the same as Strathcona⁵³. These programs typically prepare and serve meals to attendees that qualify for their particular program. In some circumstances, particularly during the pandemic, these programs provide take-out meals to attendees. If the calculated benefits are expected to apply to all other similarly designed meal programs, the City could potentially expect to serve over **19 000 more meals** on an annual basis.

Greenhouse gas emissions also displayed a significant reduction in the proposal analysis, particularly *Proposal 2* that saw annual emissions cut back by one third:

Proposal	GHG Emissions (kg of CO2e)
Current	13953.98
Proposal 1	12195.52
Proposal 2	9326.25
Proposal 3	10081.82

Should *Proposal 2* be implemented, this low-cost meal provider could save **4628 kg of CO₂e** annually which equals the carbon savings of nearly **200 000 bags of garbage recycled rather than sent to landfill** or around **8M bags of garbage diverted** if all other similarly designed meal programs are considered⁵⁴.

The proposed alternative models also saw a reduction in the number animal lives used to fulfil the orders. While *Proposal 1* saw a reduction of three lives per year from the current order (which consumes fifteen animal lives), *Proposals 2 and 3* would each save **nine animal lives**. If similar results were experienced with the thirty-nine other "meal programs" listed on the City's website, **351 animal lives** could be spared on an annual basis.

Key benefits: with a transition towards increased plant-based procurement, the low-cost meal programs could reduce meal costs by \$0.16 per plate and could potentially supply an additional 19 000 meals per year. In accounting for all meal programs with a similar design to that of Strathcona, the City could experience a cost savings of nearly \$100 000. Increased plant-based procurement could also lead to a savings of 185 109 kg of CO₂e annually and up to 351 animal lives if applied to all forty "meal programs" currently offered within the City.

Additional Costs: The assessment conducted was only for one low-cost meal provider. In order to determine how to appropriately implement the proposed policy change, the City would need to conduct (or hire a consultant to conduct) an assessment of all the low-cost meal programs. Again, this assessment would involve determining the most carbon-intensive or the most cost-intensive menu items (depending on the procurement policy being implemented). This cost is difficult to predict as it's highly contingent on the types of data available and the ease of acquiring the relevant data. VHS hired a consultant that was able to assess the procurement data of Strathcona's meal program for approximately \$500. This assessment would likely be the most resource-consuming of all City food activity streams as there are over 80 low-cost meal programs in the city. These programs are facilitated by a variety of organizations which likely means each program procurement strategies differ from one another. The facilitation of these programs resting with third-party organizations would likely lead to a more intricate process in tracking down data sets when compared to the food activity streams that are facilitated by City staff.

PARKS BOARD

Concessions

VHS was unable to obtain procurement data from the Parks Board in time for the release of this report, so proposed procurement changes were not calculated for the Parks Board current ordering trends. However, VHS was able to determine the potential for an increase in revenue generation through concession sales based on market research conducted on similar quick service business models.

The Parks and Recreation 2020 Operating & Capital Budgets Report states that \$2 988 000 was generated through concession services in 2019 which reflects a 2% increase in revenues compared to those reported for 2018⁵⁵. The report projects a 12% increase in sales for 2020. The report accounts for these increases as a result of the Concession Strategy which saw a change in concession offerings in 2019. The Concession Strategy aims to enhance the sustainability of concession services and entailed an increased offering of vegetarian, plant-based and sustainably sourced products (e.g. Ocean Wise seafood). These changes were reported to have caused a "noted improvement in satisfaction in services to enhance parks and recreation experiences"⁵⁶.

VHS's proposal aligns with the Concession Strategy already in place. Our research also supports the projections for a 12% increase in sales revenue as found in the Parks and Recreation 2020 Operating & Capital Budgets Report. Studies have found that sales revenues have increased from 10-1000% in

⁵⁴ United States Environmental Protection Agency greenhouse gas equivalencies calculator <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

⁵⁵ Vancouver Board of Parks and Recreation, 2020 Service Plan and Operating & Capital Budgets - Parks & Recreation, (Nov 26, 2019), <https://parkboardmeetings.vancouver.ca/2019/20191202/REPORT-2020ServicePlanOperatingCapitalBudgets-ParksRec-20191202.pdf>

⁵⁶ Ibid, p.4

food services establishments that have either expanded their plant-based offerings or have completely overhauled their menu to offer an exclusively plant-based selection⁵⁷. Quick-service establishments that most similarly reflect the City of Vancouver concession services and have implemented a handful of plant-based menu items experienced revenue growth from 10-18%^{58 59}. The City's projected gains in revenues of 12% fit accurately into these findings.

However, it is noted that these projections will be massively impacted by the Covid-19 pandemic and will not be expected to be realized by 2020 year-end. Barring unforeseen residual implications of the pandemic, it is expected that enhanced sales revenues from plant-based offerings will be realized once concession services return to pre-pandemic operations. In fact, studies suggest that interest and consumption in plant-based food items have increased since the pandemic struck North American in March 2020⁶⁰.

Given the information available, VHS predicts that a **14% increase in revenue** generation following implementation of the Concession Strategy. This number falls comfortably and conservatively in the middle of the market research findings that expressed 10-18% increases in revenue. It also takes into account the expected 12% sales increases projected by the City of Vancouver prior to the global pandemic, which appears to have enhanced consumer interest in plant-based eating.

With this forecast, the Parks Board can expect to generate around **\$3.4M** in concession revenue upon the first year of implementation of the Concession Strategy (under pre-COVID-19 conditions), which is approximately **\$420 000** over 2019 revenue.

Golf Courses

With no information available on the food sale revenues generated by the city-run golf courses, VHS was unable to calculate potential profit growth with a transition towards a more plant-based menu offering. However, it is reasonable to expect that should the golf courses implement one of the proposed alternative models, they could expect to experience revenue growth in a similar range that is forecasted for the concessions.

57 K. Fox, "These restaurants removed animal products from their menus and went vegan: here are the results," Forbes, April 4, 2018, <https://www.forbes.com/sites/katrinafox/2018/04/04/these-restaurants-removed-animal-products-from-their-menus-and-went-vegan-here-are-the-results/?sh=580e6fd2db0>

58 A. Sagan, "A&W looks to more innovation to drive continued growth after Beyond Meat success," CTV News, July 24, 2019, <https://www.ctvnews.ca/business/a-w-looks-to-more-innovation-to-drive-continued-growth-after-beyond-meat-success-14522347>

59 Y. Shen & H. Chen, "Exploring Consumers' Purchase Intention of an Innovation of the Agri-Food Industry: A Case of Artificial Meat," Foods 9, No. 6, (June 2020), 745

60 Plant Based Foods Association, New data shows plant-based food outpacing total food sales during COVID-19, (May, 2020), <https://plantbasedfoods.org/plant-based-food-outpaces-total-food-sales-during-covid19/>





Key benefits: a transition towards plant-based procurement could lead to a growth in revenue of around 14% for both concession and golf course food services which equates to \$420 000 for concession services alone.

Additional costs: the City would need to conduct an analysis of the Parks Board's current procurement data in order to determine how to appropriately implement the proposed policy change. This analysis would entail assessing which menu items are the most carbon-intensive or the most cost-intensive (depending on the procurement policy being implemented). Again, the cost associated with the task is difficult to determine as it is highly contingent on the data sets available. This assessment would most closely resemble the assessment done for VCT's data which cost VHS approximately \$300 to conduct.

SCHOOL BOARD

Due to the nature of the privacy policies at the Vancouver School Board (VSB), VHS was unable to obtain any operational data relating to the F4S programs. However, a case study of the Oakland Unified School District (OUSD) can provide key insights into the expected results should the VSB adopt VHS's purchasing policy proposal⁶¹.

The OUSD is comprised of 85 schools (ranging from grades K-12) and 37,000 students, which is approximately thirty-two schools and 15 000 students less than the VSB⁶². The OUSD reduced all animal-based food purchasing by nearly 30% for two years. The OUSD reduced its entire carbon footprint by 14%, measuring at an output of 600 000 kg of CO₂e. The energy saved was equivalent to the energy that would have been generated by solar panels covering the roofs of all OUSD buildings over the same period⁶³. The OUSD was also able to reduce the cost per meal by 1% which saved the school board a total of \$42 000 over the course of the two year program⁶⁴. It is likely that the VSB would experience similar results should a program that reflects the same scale be implemented.

Key benefits: a transition towards plant-based procurement could lead to tens of thousands of dollars in savings and a significantly reduced carbon output of hundreds of thousands of kilograms of greenhouse gases annually.

Additional costs: as seen in other streams, the City would need to conduct an analysis of the School Board's Food4Schools current food purchasing data in order to determine how to appropriately implement the proposed policy change. Again, the cost associated with the task is difficult to determine as it is highly contingent on the data sets available and the VSB's willingness to share purchasing data.

⁶¹ K. Hamerschlag & J. Kraus-Polk, Shrinking the Carbon and Water Footprint of School Food: A Recipe for Combating Climate Change. A pilot analysis of Oakland Unified School District's Food Programs, (February 2017)

⁶² Vancouver School Board, Schools Overview, Nov 21, 2019, <https://www.vsb.bc.ca/School/Pages/default.aspx>

⁶³ K. Hamerschlag & J. Kraus-Polk, Shrinking the Carbon and Water Footprint of School Food: A Recipe for Combating Climate Change. A pilot analysis of Oakland Unified School District's Food Programs, (February 2017)

⁶⁴ Ibid



08 SUMMARY OF RESULTS

Based on the data available, cumulative results were calculated for the cost savings, emission reduction, revenue growth and reduction of animal lives consumed experienced with each proposed alternative model. The numbers expressed in the charts below reflect the total results that can be expected for each stream. In the case of food activity streams where only one provider was examined, such as the low-cost meal programs where one out of forty similar programs was examined and the city catering activities where one catering contract representing only 6% of the total catering budget was evaluated, the results were extrapolated to apply to the entirety of the food activity stream.

PROPOSAL 1

	Estimated Annual Savings	Estimated Annual Emissions Reduction	Estimated Revenue Growth (for first year of implementation)	Estimated Animal Lives Saved Annually
Vancouver Civic Theatres	\$879	2858 kg	\$7800	N/A ^{*1}
City Catering	\$818	10 924 kg	N/A ^{*2}	16
Low-Cost Meal Programs	(\$145 971)	70 339 kg	N/A ^{*3}	119
Parks Board	Data not available	Data not available	\$420 000	Data not available
School Board	\$21 000	300 000 kg	N/A ^{*4}	Data not available
TOTAL	(\$123 274)	384 121 kg	\$427 800	135

*1 - The VCT does not procure or sell any products that utilize animal lives. All animal-based products are dairy-based and therefore this numerical value is not applicable

*2 - City catering activities do not generate revenue

*3 - Low-cost meal providers do not generate revenue

*4 - The VSB meal programs do not generate revenue

PROPOSAL 2

	Estimated Annual Savings	Estimated Annual Emissions Reduction	Estimated Revenue Growth (for first year of implementation)	Estimated Animal Lives Saved Annually
Vancouver Civic Theatres	\$5175	4445 kg	\$7800	N/A
City Catering	\$2093	27 906 kg	N/A	41
Low-Cost Meal Programs	(\$8404)	185 109 kg	N/A	351
Parks Board	Data not available	Data not available	\$420 000	Data not available
School Board	\$21 000	300 000 kg	N/A	Data not available
TOTAL	\$19 864	517 460 kg	\$427 800	392

PROPOSAL 3

	Estimated Annual Savings	Estimated Annual Emissions Reduction	Estimated Revenue Growth (for first year of implementation)	Estimated Animal Lives Saved Annually
Vancouver Civic Theatres	\$6443	2659 kg	\$7800	N/A
City Catering	\$2093	27 906 kg	N/A	41
Low-Cost Meal Programs	\$68 937	154 886 kg	N/A	351
Parks Board	Data not available	Data not available	\$420 000	Data not available
School Board	\$21 000	300 000 kg	N/A	Data not available
TOTAL	\$98 473	485 451 kg	\$427 800	392

09 CRITERIA AND ANALYSIS

Based on the cost-benefit analysis conducted for each stream of City food purchasing, VHS proposes a number of policy recommendations for the City of Vancouver to consider, which vary depending on the objectives the City is prioritizing in the near future:

Sustainability

As the City of Vancouver has instituted a number of sustainability policies and goals, should the City follow the food purchasing guidelines that apply to **Proposal 2**, where 20% of the most carbon-intensive animal-based products are replaced by plant-based alternatives for each branch of food purchasing, the City could look to save around 500 tonnes of greenhouse gas emissions each year. This savings in emissions also equates to financial savings as well, with each kilogram of carbon projected to cost "society" and, therefore, the institutions that support it, \$75/tonne⁶⁵. By reducing the City's impact by up to 500 tonnes of carbon emissions, the City could look to save nearly \$40 000 each year on the costs of its carbon output based on this \$75/tonne estimate.

Financial Efficiency

To facilitate City programming efficiently, the City can reduce costs while achieving the same outcomes. **Proposal 3**, which suggests a replacement of 20% of the most cost-intensive animal-based products with plant-based alternatives in all food activity streams, has the potential to save the City of Vancouver up to nearly \$100 000 on an annual basis. Proposal 3 would likely best align with the City's financial objectives.

Social Responsibility

In an effort to meet social responsibility objectives, the City might also consider that **Proposals 2 & 3** have the added benefit of reducing the number of animal lives consumed through City food activities. The impact could be up to nearly 400 animal lives on an annual basis. Additionally, **Proposal 3** could allow for nearly 19 000 more meals to be provided to at-risk populations in the Vancouver area.

Whether the City's greatest influencing factor on policy change reflects social responsibility, sustainability or financial efficiency, both **Proposal 2 and Proposal 3** will pose a positive impact on City objectives. Both proposed policy changes reflect a reduction in emissions and in most instances, both achieve financial savings - except in the instance of the low-cost meal providers where a \$0.02 increase per meal is experienced with Proposal 2. Both proposals also reflect a reduction in animal lives consumed. In addition, there is an added social benefit related to improved public access to plant-based options. The general



public is increasingly opting for plant-based meals for a variety of social reasons, including health, animal welfare, environmental and other personal motivations. Ensuring accessibility to appropriate plant-based options will help to create more inclusive public menus and policy.

09 RECOMMENDATION

Therefore, it is VHS's recommendation that the City of Vancouver institute the policy that all food purchasing activities associated with, or facilitated by, the municipality replace 20% of the most carbon-intensive animal-based products (**Proposal 2**), or, 20% of the most cost-intensive animal-based products (**Proposal 3**) currently procured with the appropriate plant-based alternatives.

10 CONSIDERATIONS

VHS is aware that there are additional factors that must be considered in the implementation of a novel policy. Without intimate working knowledge of policy implementation procedure or internal objectives within the City of Vancouver, VHS understands that should the City adopt our policy recommendations, there are other factors that must be considered for implementation.

VHS recommends the following considerations when implementing a policy that affects food procurement within the municipality:

- As mentioned in the "additional cost" sections listed in the Comparative Cost-Benefit Analysis section of this report, the City would need to facilitate assessments of the current food purchasing strategies and data for the food activity streams in order to implement the recommended policy change. This is particularly important for the other low-cost meal programs, the VSB's Food4School program and the concession and golf course food sales facilitated by the Parks board. Vancouver Civic Theatres' (VCT) food procurement would only need further assessment, should offerings change before the policy change is implemented. Assessing all past City catering orders would also not be necessary as such an assessment would not provide useful information in changing future ordering strategies. City staff responsible for catering orders would need to be educated and trained on how to order effectively within policy parameters which would carry its own additional costs. The costs of assessment for the other three food activity streams are difficult to predict as they are highly contingent on the data available and ease of acquiring the relevant data. VHS was able to contract a consultant that conducted the analysis of the VCT, catering and low-cost meal

provider procurement data for approximately \$2000. Much of this cost was associated with tracking down data. Given that the analysis would be internally directed, it would be expected that data acquisition would be a more direct and streamlined process. However, the breadth of the analysis would be greater, particularly for the Food4School program and the low-cost meal provider, as VHS only assessed one of these programs out of the many currently in operation.

- In implementing purchasing requirements, both the ordering processes for the School Board food activities and the low-cost meal programs are not facilitated by City staff directly, which may make a policy change more difficult to enact and enforce. The procurement for both of these programs is carried out by staff affiliated with either the VSB or with grassroots organizations.
- Both the low-cost meal programs and the Food4School programs serve low-income and in some circumstances, at-risk populations. Though it is reasonable to expect a plant-based diet to meet the dietary needs of many meal recipients, the City of Vancouver must take into account the nutritional significance and the cultural appropriateness of the meal items offered through these programs. Before instituting policies surrounding procurement for the programs, the City should construct meaningful partnerships with involved stakeholders in order to understand how best to achieve financial, sustainability and social responsibility outcomes while providing equitable, accessible and appropriate food choices to the recipients of these programs.
- On a related note, the City should also consider the benefits, in terms of equity and inclusivity, of improving public access to appropriate plant-based options. Polling in recent years has consistently reflected growing support for diet change toward less meat consumption. A 2018 Dalhousie University study found that 6.4 million Canadians have dietary preferences that reduce or eliminate meat consumption and British Columbians are about 35 per cent more likely to go meat-free than the average Canadian⁶⁶. A separate survey, following the release of the updated Canada Food Guide, found that 53 per cent of British Columbians saw consuming less meat as a protein source as a positive choice⁶⁷. As the public becomes increasingly interested in plant-based foods and diets, whether for personal, health, animal welfare, sustainability or other reasons, it's important to support equitable access for all.

Research done by Food Secure Canada examined the perspectives and experiences of consumers living with low-income in regards to sustainably-grown food⁶⁸. Definitions of sustainably-grown food noted by participants included descriptions such as those which don't harm the environment or deplete future resources, along with food that is local, certified organic and pesticide-free. In addition to this, Canadians across income groups most value foods grown in ways that treat animals humanely and use fair labour practices for farm workers. The research found strong support for sustainably-grown food across income groups and recommendations included addressing barriers to sustainable food access.



66 S. Charlebois, S. Somogyi, J. Music, "Plant-based dieting and meat attachment: Protein wars and the changing Canadian consumer (Preliminary Results)", <https://cdn.dal.ca/content/dam/dalhousie/pdf/management/News/News%20%26%20Events/Charlebois%20Somogyi%20Music%20EN%20Plant-Based%20Study.pdf>

67 Angus Reid Institute, "Amid rising food costs, half of low-income households say the new Canada Food Guide diet is unaffordable", <https://angusreid.org/canada-food-guide-prices/> (April 2019)

68 Food Secure Canada, "Sustainable Consumption For All", <https://foodsecurecanada.org/sustainable-consumption-for-all> (May 2019)

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APPENDICES

Appendix A - Vancouver Civic Theatres Procurement Data

Material Description	Unit of Entry	Sum of Qty in Un. of Entry
DRINKS, KOMBUCHA	CAS	47
FOOD, CHIPS, PRINGLES, BBQ	CAS	311
FOOD, CHIPS, PRINGLES, ORIGINAL	CAS	552
FOOD, CHIPS, PRINGLES, SOUR CREAM & ONION	CAS	422
FOOD, CHOCOLATE BAR, KIT KAT 48/BX	BOX	351
FOOD, HAAGEN-DAZS, SALTED CARAMEL 24/CAS	CAS	55
FOOD, HAAGEN-DAZS, VANILLA/ALMOND 24/CAS	CAS	75
JUICE, CRANBERRY 24/CAS	CAS	123
JUICE, ORANGE 24X355ML	CAS	166
PEANUTS SALTED, 60GR, 12/BOX	BOX	516
SOFT DRINK, 7-UP 24/CAS	CAS	155
SOFT DRINK, CLUB SODA 12/CAS	CAS	243
SOFT DRINK, DIET PEPSI 24/CAS	CAS	170
SOFT DRINK, GINGER ALE 12/CAS	CAS	349
SOFT DRINK, LEMON ICED TEA, PURE LEAF	CAS	619
SOFT DRINK, PEPSI 24/CAS	CAS	364
SOFT DRINK, TONIC WATER 12/CAS	CAS	221
WATER, BOTTLED, AQUAFINA 24/CAS	CAS	2884
WATER, BOTTLED, MONTELLIER SPARK 24/CAS	CAS	918
(blank)	(blank)	
Grand Total		8541
Frozen Pretzels	CASE	50
MILK 2L	CARTON	1800
CREAMO 1L	CARTON	1700
TEA	BOX	100

Appendix A (i) - Vancouver Civic Theatres GHG Calculations with Sources

VANCOUVER CIVIC THEATRES	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Author	Animals Consumed	Regional Reference	Original Source
Current	Cow's Milk	2%	Raw	3384	8121.6		Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Dairy Cream	Half and Half	Raw	1666	7830.2		Harwatt	N/A	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Ice Cream	Bars	Raw	2414	1134.5		Harwatt	N/A	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Processed snack/drinks			N/A	N/A					
			TOTAL	5291.4	17086.3					

Proposed 1 (20% replacement of all animal-based items)	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Author	Animals Consumed	Regional Reference	Original Source
	Cow's Milk	2%	Raw	2707.2	6497.3	80% of current milk order	Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Plant-based Milk	Nut or Soy	Raw	676.8	338.4	20% of current milk order	Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Dairy Cream	Half and Half	Raw	1332.8	6264.2	80% of current cream order	Harwatt	N/A	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Plant-based Creamer	Nut or Soy	Raw	333.2	166.6	20% of current cream order	Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Ice Cream	Bars	Raw	193.1	907.6	80% of current ice cream order	Harwatt	N/A	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Plant-based Ice Cream	Bars	Raw	48.3	54.6	20% of current ice cream order	Heller & Rose	N/A	USA	McCarty et al (2012)
	Processed snack/drinks			N/A	N/A					
			TOTAL	5291.4	14228.6					

Proposed 2 (20% replacement with least carbon intensive products)	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Author	Animals Consumed	Regional Reference	Original Source
	Plant Based Creamer	Nut or Soy or Oat	Raw	1058.28	529.1	64% of current cream offering	Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Dairy Cream	Half and Half	Raw	6077	2856.3	36% of current cream offering	Harwatt	N/A	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Ice Cream	Dairy	Raw	2414	1134.5	100% of current ice cream offering	Harwatt	N/A	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Cow's Milk	2%	Raw	3384	812.6	100% of current milk offering	Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Processed snack/drinks			N/A	N/A					
			TOTAL	5291.4	12641.5					

Proposed 3 (20% replacement with the most cost-efficient items)	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Author	Animals Consumed	Regional Reference	Original Source
	Plant based ice cream			2414	272.8	100% of current ice cream offering	Heller & Rose	N/A	USA	McCarty et al (2012)
	Plant-based Milk			816.9	163.38	24% of current milk offering	Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Cow's Milk			2567.1	6161.04	76% of current milk offering	Emery	N/A	North America	Poore & Nemecek 2018: North American subset
	Dairy Cream			1666	7830.2	100% of current cream offering	Harwatt	N/A	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Processed snack/drinks			N/A	N/A					
			TOTAL	5291.4	14427.4					

Appendix A (ii) - Vancouver Civic Theatres Financial Calculations

VANCOUVER CIVIC THEATRES									
Current	Food Costs	Food type	Food description	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre-tax)	% of Product Type Ordered	Data Notes
		Cow's Milk	2%	Raw	3600L	\$2.40/L	\$8,668.80	100.00%	
		Dairy Cream	Half and Half	Raw	1700L	\$3.63/L	\$6,168.17	100.00%	
		Ice Cream	Bars	Raw	130 Cases	\$87.92/case	\$11,429.60	100.00%	
		Processed snack/drinks				Various	\$226,222.00	100.00%	
							\$252,488.57		
	Social Costs	Item		Data Type	Total quantity	Cost/Unit	Financial Cost (pre tax)		
		GHG emissions		CO2e	17089.3 kg	\$75/Tonne	\$1,281.70		as per the IMF's (international monetary fund) assessment in 2019
	Operational Costs	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
		Delivery fee			52	\$20/delivery	\$1,040.00		Delivery estimates based on data provided by VCT
	TOTAL						\$254,810.27		

Proposed 1 (20% replacement of all animal-based items)	Food Costs	Food type	Food description	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	% of Product Type Ordered	Data Notes
		Cow's Milk	2%	Raw	2880L	\$2.40/L	\$6,912.00	80.00%	
		Plant-based Milk	Nut, Soy, Oat or	Raw	720L	\$2.45/L	\$1,764.00	20.00%	Cost/unit - ave of soy and nut milks
		Dairy Cream	Half and Half	Raw	1360L	\$3.63/L	\$4,936.80	80.00%	
		Plant-based Creamer	Nut, Soy, Oat or	Raw	340L	\$5.33/L	\$1,812.20	20.00%	Pricing not available on Sysco - an average price from products found on Walmart.ca (comparable pricing) was used
		Ice Cream	Bars	Raw	104 Cases	\$87.92/Case	\$9,143.68	80.00%	
		Plant-based Ice Cream	Bars	Raw	26 Cases	\$39.76/Case	\$1,033.76	20.00%	Pricing not available on Sysco - Walmart (comparable pricing) was used
		Processed snack/drinks				Various	\$226,222.00	100.00%	
							\$251,824.44		
	Social Costs	Item		Data Type	Total quantity	Cost/Unit	Financial Cost (pre tax)		
		GHG emissions		CO2e	14228.6 kg	\$75/Tonne	\$1,067.15		as per the IMF's (international monetary fund) assessment in 2019
	Operational C	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
		Delivery fee			52	\$20/delivery	\$1,040.00		Delivery estimates based on data provided by VCT
	TOTAL					Total Costs	\$253,931.59		

Proposed 2 (20% replacement with least carbon intensive products)	Food Costs	Food type	Food description	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	% of Product Type Ordered	Data Notes
		Plant Based Ice Cream	Bars	Raw	130 Cases	\$39.76/Case	\$5,168.80	100.00%	Pricing not available on Sysco - Walmart (comparable pricing) was used
		Plant Based Creamer	Nut, Soy, Oat or	Raw	833L	\$5.33/L	\$4,439.89	49.00%	Pricing not available on Sysco - Walmart (comparable pricing) was used
		Dairy Cream	Half and Half	Raw	867L	\$3.63/L	\$3,147.21	51.00%	
		Cow's Milk	2%	Raw	3600L	\$2.40/L	\$8,668.80	100.00%	
		Processed snack/drinks				Various	\$226,222.00	100.00%	
							\$247,646.70		
	Social Costs	Item		Data Type	Total quantity	Cost/Unit	Financial Cost (pre tax)		
		GHG emissions		CO2e	12641.5 kg	\$75/Tonne	\$948.11		as per the IMF's (international monetary fund) assessment in 2019
	Operational C	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
		Delivery fee			52	\$20/delivery	\$1,040.00		Delivery estimates based on data provided by VCT
	TOTAL					Total Costs	\$249,634.81		

Proposed 3 (20% replacement with the most cost-efficient items)	Food Costs	Food type	Food description	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	% of Product Type Ordered	Data Notes
		Plant based ice cream	Bars	Raw	130 cases	\$39.76/Case	5168.8	100.00%	Pricing not available on Sysco - Walmart (comparable pricing) was used
		Plant-based Milk	Nut, Soy, Oat or	Raw	864L	\$2.45/L	2116.8	24.00%	
		Cow Milk	2%	Raw	2736L	\$2.40/L	6566.4	76.00%	
		Dairy Cream	Half and Half	Raw	1700L	\$3.63/L	6171	100.00%	
		Processed snack/drinks				Various	\$226,222.00	100.00%	
							\$246,245.00		
	Social Costs	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
		GHG emissions		CO2e	14427.4 kg	\$75/Tonne	\$1,082.06		as per the IMF's (international monetary fund) assessment in 2019
	Operational C	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
		Delivery fee			52	\$20/delivery	\$1,040.00		Delivery estimates based on data provided by VCT
	TOTAL					Total Costs	\$248,367.06		

Appendix A (iii) - Vancouver Civic Theatres Cost-Benefit Ratio Calculations

Current			
Year	Revenue	Expense	
2020	\$484,050.00	\$224,211.96	*1*2*3
2021	\$491,850.00	\$227,824.92	
2022	\$499,658.00	\$231,441.59	
2023	\$507,600.00	\$235,120.32	
2024	\$515,850.00	\$238,941.72	
Total	\$2,499,008.00	\$1,157,540.51	
@2.45% discount rate applied	\$2,323,551.97	\$1,076,269.66	*4
Cost-Benefit Ratio =	2.1589		

*1 - revenue estimated at 1.6% growth per year, based on 2019 data, as per the city's predicted revenue growth

*2 - total expense calculated as 46.32% of total food revenue, as experienced in 2019 data

*3 - total food revenue is calculated at 15% of all VCT Concession revenue as indicated by Food and Beverage Manager at the Vancouver Civic Theatre Board.

*4 - Calculated at 2.45% discount rate: 2020's Canadian prime discount rate as per forecasted by the Canadian Big Six Banks
<https://rates.ca/mortgage-rates/prime-rate-canada#:~:text=Based%20on%20an%20average%20of,Year%2Dend%202021%3A%202.45%25>

Proposal 2			
Year	Revenue	Expense	
2020	\$484,050.00	\$219,710.30	*1
2021	\$559,561.80	\$253,985.10	
2022	\$624,470.97	\$283,447.37	
2023	\$671,930.76	\$304,989.37	
2024	\$696,120.27	\$315,968.99	
Total	\$3,036,133.80	\$1,378,101.13	
@2.45% discount rate applied	\$2,813,023.23	\$1,276,831.24	
Cost-Benefit Ratio =	2.2031		

*1 - total expense calculated as 45.39% of total food revenue as calculated for Proposal 2 based on 2019 data

Proposal 1			
Year	Revenue	Expense	
2020	\$484,050.00	\$223,485.89	*1*2
2021	\$559,561.80	\$258,349.68	*3
2022	\$624,470.97	\$288,318.25	
2023	\$671,930.76	\$310,230.43	
2024	\$696,120.27	\$321,398.73	
Total	\$3,036,133.80	\$1,401,782.98	
@2.45% discount rate applied	\$2,813,023.23	\$1,298,772.83	
Cost-Benefit Ratio =	2.1659		

*1 - revenue estimated at 15.6% growth to represent the City's typical 1.6% growth plus the 14% growth per year as shown in plant-based sales research indicated in report

*2 - total expense calculated as 46.17% of total food revenue as calculated for Proposal 1 based on 2019 data

*3 - revenue growth drops by 4% per year as was experienced by similar quickservice restaurant that experienced initial revenue surge as a result of introducing plant-based items

<http://awincofund.mediaroom.com/2020-04-29-A-W-Revenue-Royalties-Income-Fund-Announces-First-Quarter-2020-Results>

Proposal 3			
Year	Revenue	Expense	
2020	\$484,050.00	\$218,596.98	
2021	\$559,561.80	\$252,698.11	
2022	\$624,470.97	\$282,011.09	
2023	\$671,930.76	\$303,443.93	
2024	\$696,120.27	\$314,367.91	
Total	\$3,036,133.80	\$1,371,118.02	
@2.45% discount rate applied	\$2,813,023.23	\$1,270,361.29	
Cost-Benefit Ratio =	2.2143		

*1 - total expense calculated as 45.16% of total food revenue as calculated for Proposal 3 based on 2019 data

Appendix B (i) - City Catering GHG Calculations with sources

CITY CATERING	Caterer	Food type	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source
Current	Potluck Catering	Bread	Raw	2	3.2	100 g/ sandwich	N/A	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset
		Bacon	Cooked	0.34	2.53	42 g/sandwich	0.00476	Emery	USA	Pelletier et al. (2010)
		Lettuce	Raw	0.35	0.08	35 g (0.5 cup)/sandwich - in BLT & Falafel	N/A	Emery	USA	Emery & Brown (2016)
		Tomato	Raw	0.52	0.24	40g/sandwich - in BLT, Falafel & Veggie	N/A	Emery	North America	Multiple
		Mayo	Raw	0.29	0.49	14.4g/Sandwich - in BLT, Ham, Egg	N/A	Emery	USA	Pelletier et al. (2014)
		Cheese	Raw	0.17	2.82	28g/sandwich - in ham and cheese	N/A	Emery	USA	Poore & Nemecek 2018: North American subset
		Ham	Cooked	1.4	10.41	226g/sandwich - in the ham and cheese	0.0196	Emery	USA	Pelletier et al. (2010)
		Egg	Cooked	0.3	0.76	(50g/sandwich) - in the egg	0.00108	Emery	USA	Pelletier et al. (2014)
		Eggplant	Cooked	0.11	0.06	35g/sandwich - in veggie	N/A	Heller & Rose		Heller & Rose (2019): Field data
		Bell Pepper	Cooked	0.11	0.06	35g/sandwich - veggie	N/A	Heller & Rose		Heller & Rose (2019): Field data
		Tortilla	Raw	0.26	0.408	51g/sandwich - veggie and falafel	N/A	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset
		Chickpea	Cooked	0.3	0.147	100g/sandwich	N/A	Heller & Rose	Canada	Gan et al. (2011)
				TOTAL		6.15	21.20		0.02544	
										x 197 for annual order
		ANNUAL TOTAL		1210.57	4177.33		5.01			

Proposed 1 (20% replacement of all animal-based meal items)	Caterer	Food type	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source		
	Potluck Catering	Bread	Raw	1.6	2.56	100 g/ sandwich	0	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset		
		Bacon	Cooked	0.25	1.86	42 g/sandwich	0.0035	Emery	USA	Pelletier et al. (2010)		
		Lettuce	Raw	0.35	0.08	35 g (0.5 cup)/sandwich - in BLT & Falafel	0	Emery	USA			
		Tomato	Raw	0.6	0.28	40g/sandwich - in BLT, Falafel & Veggie	0	Emery	North America	Multiple		
		Mayo	Raw	0.23	0.39	14.4g/Sandwich - in BLT, Ham, Egg	0	Emery	USA	Pelletier et al. (2014)		
		Cheese	Raw	0.14	2.32	28g/sandwich - in ham and cheese	0	Emery	USA	Poore & Nemecek 2018: North American subset		
		Ham	Cooked	1.13	8.40	226g/sandwich - in the ham and cheese	0.01582	Emery	USA	Pelletier et al. (2010)		
		Egg	Cooked	0.25	0.63	(50g/sandwich) - in the egg	0.0009	Emery	USA	Pelletier et al. (2014)		
		Eggplant	Cooked	0.18	0.10	35g/sandwich - in veggie	0	Heller & Rose		Heller & Rose (2019): Field data		
		Bell Pepper	Cooked	0.18	0.10	35g/sandwich - veggie	0	Heller & Rose		Heller & Rose (2019): Field data		
		Tortilla	Raw	0.46	0.736	51g/sandwich - veggie and falafel	0	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset		
		Chickpea	Cooked	0.4	0.196	100g/sandwich	0	Heller & Rose	Canada	Gan et al. (2011)		
		TOTAL		5.77	17.65		0.02022					
				x 197 for annual order								
		ANNUAL TOTAL		1136.69	3477.09					3.98		

Proposed 2 (20% replacement with most carbon intensive meal items with the least carbon intensive)	Caterer	Food type	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source		
	Potluck Catering	Bread	Raw	1.6	2.56	100 g/ sandwich	0	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset		
		Bacon	Cooked	0.34	2.53	42 g/sandwich	0.00476	Emery	USA	Pelletier et al. (2010)		
		Lettuce	Raw	0.35	0.08	35 g (0.5 cup)/sandwich - in BLT & Falafel	0	Emery	USA			
		Tomato	Raw	0.68	0.32	40g/sandwich - in BLT, Falafel & Veggie	0	Emery	North America	Multiple		
		Mayo	Raw	0.23	0.39	14.4g/Sandwich - in BLT, Ham, Egg	0	Emery	USA	Pelletier et al. (2014)		
		Cheese	Raw	0.06	1.00	28g/sandwich - in ham and cheese	0	Emery	USA	Poore & Nemecek 2018: North American subset		
		Ham	Cooked	0.45	3.35	226g/sandwich - in the ham and cheese	0.0063	Emery	USA	Pelletier et al. (2010)		
		Egg	Cooked	0.3	0.76	(50g/sandwich) - in the egg	0.00108	Emery	USA	Pelletier et al. (2014)		
		Eggplant	Cooked	0.25	0.13	35g/sandwich - in veggie	0	Heller & Rose		Heller & Rose (2019): Field data		
		Bell Pepper	Cooked	0.25	0.13	35g/sandwich - veggie	0	Heller & Rose		Heller & Rose (2019): Field data		
		Tortilla	Raw	0.46	0.736	51g/sandwich - veggie and falafel	0	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset		
		Chickpea	Cooked	0.3	0.147	100g/sandwich	0	Heller & Rose	Canada	Gan et al. (2011)		
		TOTAL		5.27	12.12		0.01214					
				x 197 for annual order								
		ANNUAL TOTAL		1038.19	2388.47					2.39		

Proposed 3 (20% replacement with the most cost-efficient meal items)	Caterer	Food type	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source		
	Potluck Catering	Bread	Raw	1.6	2.56	100 g/ sandwich	0	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset		
		Bacon	Cooked	0.34	2.53	42 g/sandwich	0.00476	Emery	USA	Pelletier et al. (2010)		
		Lettuce	Raw	0.35	0.08	35 g (0.5 cup)/sandwich - in BLT & Falafel	0	Emery	USA			
		Tomato	Raw	0.68	0.32	40g/sandwich - in BLT, Falafel & Veggie	0	Emery	North America	Multiple		
		Mayo	Raw	0.23	0.39	14.4g/Sandwich - in BLT, Ham, Egg	0	Emery	USA	Pelletier et al. (2014)		
		Cheese	Raw	0.06	1.00	28g/sandwich - in ham and cheese	0	Emery	USA	Poore & Nemecek 2018: North American subset		
		Ham	Cooked	0.45	3.35	226g/sandwich - in the ham and cheese	0.0063	Emery	USA	Pelletier et al. (2010)		
		Egg	Cooked	0.3	0.76	(50g/sandwich) - in the egg	0.00108	Emery	USA	Pelletier et al. (2014)		
		Eggplant	Cooked	0.25	0.13	35g/sandwich - in veggie	0	Heller & Rose		Heller & Rose (2019): Field data		
		Bell Pepper	Cooked	0.25	0.13	35g/sandwich - veggie	0	Heller & Rose		Heller & Rose (2019): Field data		
		Tortilla	Raw	0.46	0.736	51g/sandwich - veggie and falafel	0	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset		
		Chickpea	Cooked	0.3	0.147	100g/sandwich	0	Heller & Rose	Canada	Gan et al. (2011)		
		TOTAL		5.27	12.12		0.01214					
				x 197 for annual order								
		ANNUAL TOTAL		1038.19	2388.47					2.39		

Appendix B (ii) - City Catering Financial Calculations

CITY CATERING	Food Costs	Food Type	State	Total Quantity	Cost/Unit (\$)	Financial Cost (pr % of Product T	Data Notes
Current		BLT Sandwich	Prepared	8	\$8.75	\$70.00	100.00%
Potluck Catering		Ham & Cheese Sandwich	Prepared	6	\$8.75	\$52.50	100.00%
		Egg Salad Sandwich	Prepared	6	\$8.75	\$52.50	100.00%
		Falafel Wrap	Prepared	2	\$8.75	\$17.50	100.00%
		Grilled Veggie Wrap	Prepared	3	\$8.75	\$26.25	100.00%
				25		\$218.75	
	Social Costs	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes
		GHG emissions	CO2e	212	\$75/Tonne	\$1.59	as per the IMF's (international monetary fund) assessment in 2019
	Operational C	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes
		Delivery fee	N/A	1	\$20.00	\$20.00	as per Potluck Catering's delivery policy
	TOTAL						
					Total Costs	\$240.34	
					X 197 for annual order		
						\$47,346.98	

Proposed 1 (20% replacement of all animal-based items)	Food Costs	Food Type	State	Total Quantity	Cost/Unit (\$)	Financial Cost (pr % of Product T	Data Notes
Potluck Catering		BLT Sandwich	Prepared	6	\$8.75	\$52.50	75.00%
		Ham & Cheese Sandwich	Prepared	5	\$8.75	\$43.75	83.00%
		Egg Salad Sandwich	Prepared	5	\$8.75	\$43.75	83.00%
		Falafel Wrap	Prepared	4	\$8.75	\$35.00	200.00%
		Grilled Veggie Wrap	Prepared	5	\$8.75	\$43.75	167.00%
				25		\$218.75	
	Social Costs	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes
		GHG emissions	CO2e	1765	\$75/Tonne	\$1.32	as per the IMF's (international monetary fund) assessment in 2019
	Operational C	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes
		Delivery fee	N/A	1	\$20.00	\$20.00	as per Potluck Catering's delivery policy
	TOTAL						
					Total Costs	\$240.07	
					X 197 for annual order		
						\$47,294.53	

Proposed 2 (20% replacement with most carbon intensive meal items with the least carbon intensive)	Food Costs	Food Type	State	Total Quantity	Cost/Unit (\$)	Financial Cost (pr % of Product T	Data Notes
Potluck Catering		BLT Sandwich	Prepared	8	\$8.75	\$70.00	100.00%
		Ham & Cheese Sandwich	Prepared	2	\$8.75	\$17.50	0.33%
		Egg Salad Sandwich	Prepared	6	\$8.75	\$52.50	100.00%
		Falafel Wrap	Prepared	2	\$8.75	\$17.50	100.00%
		Grilled Veggie Wrap	Prepared	7	\$8.75	\$61.25	230.00%
				25		\$218.75	
	Social Costs	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes
		GHG emissions	CO2e	12.12	\$75/Tonne	\$0.91	as per the IMF's (international monetary fund) assessment in 2019
	Operational C	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes
		Delivery fee	N/A	1	\$20.00	\$20.00	as per Potluck Catering's delivery policy
	TOTAL						
					Total Costs	\$239.66	
					X 197 for annual order		
						\$47,212.82	

Proposed 3 (20% replacement with the most cost-efficient meal items)	Food Costs	Food Type	State	Total Quantity	Cost/Unit (\$)	Financial Cost (pre tax)	% of Product T	Data Notes
		BLT Sandwich	Prepared	8	\$8.75	\$70.00	100.00%	
		Ham & Cheese Sandwich	Prepared	2	\$8.75	\$17.50	0.33%	
		Egg Salad Sandwich	Prepared	6	\$8.75	\$52.50	100.00%	
		Falafel Wrap	Prepared	2	\$8.75	\$17.50	100.00%	
		Grilled Veggie Wrap	Prepared	7	\$8.75	\$61.25	230.00%	
				25		\$218.75		
Social Costs	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes		
	GHG emissions	CO2e	12.12	\$75/Tonne	\$0.91	as per the IMF's (international monetary fund) assessment in 2019		
Operational C	Item	Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)	Data Notes		
	Delivery fee	N/A	1	\$20.00	\$20.00	as per Potluck Catering's delivery policy		
TOTAL					Total Costs	\$239.66		
					X 197 for annual order			
						\$47,212.82		

Appendix C - Strathcona Community Centre Meal Program Procurement Data

							total
Totals:	348.46	1208.82	206.56	665.55	17.94	696.35	3143.68
	50% cheese	80% produce	Dairy	Bread	Misc	Eggs	
	50 % meat	20% dairy					

Appendix C (i) - Low-Cost Meal Provider GHG Calculations with Sources

LOW COST MEAL PROVIDER	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source
Current	Cheese	All Types	Raw	9.12	151.39	based on \$174.23 spent	0	Emery	North America	Poore & Nemecek 2018: North American subset
	Milk	Dairy	Raw	105.51	253.22	based on \$241.76 spent	0	Emery	North America	Poore & Nemecek 2018: North American subset
	Butter	Dairy	Raw	9.22	90.36	based on \$103.28 estimate	0	Harwatt	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Yogurt	Dairy	Raw	18.52	53.71	based on \$103.28 estimate	0	Harwatt	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Meat	Turkey	Cooked	6.09	26.19	based on \$174.23 spent	0.73	Emery	Canada	Vergé, X., et al. (2009)
	Eggs	Medium	Cooked	139.66	352.99	Based on \$696.35 spent	0.50	Emery	USA	Pelletier et al. (2014)
	Produce	Apples, bananas, oranges, carrots, lettuce, tomatoes, cucumbers	Raw	221.80	64.32	based on \$967.06 spent	0	Various	Various	Various
	Bread	White or Whole Wheat	Raw	106.66	170.66	Based on \$665.55 spent	0	Poore & Nemecek	North America	Poore & Nemecek 2018: North American subset
	Misc	N/A		N/A	N/A			N/A		
			TOTAL	616.58	1162.83			1.23		
			ANNUAL TOTAL	7398.96	13953.98			14.80		

Proposed 1 (20% replacement of all animal-based meal items)	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source
	Cheese	All Types	Raw	7.3	121.18	80% of current cheese order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Soy Cheese	Cheddar	Raw	1.82	1.09	20% current cheese order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Milk	Dairy	Raw	84.41	202.58	80% of current milk order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Plant-Based Milk	Oat, Soy, Nut	Raw	2.11	10.55	20% of current milk order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Butter	Dairy	Raw	7.38	72.32	80% of current butter order	N/A	Harwatt	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Plant-Based Butter	Oil Based	Raw	1.84	6.26	20% of current butter order	N/A	Emery	Global	Poore & Nemecek 218 : Global (w/o losses)
	Yogurt	Dairy	Raw	14.82	42.98	80% of current yogurt order	N/A	Harwatt	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Plant-Based Yogurt	Almond	Raw	3.7	1.48	20% of current yogurt order	N/A	Emery		Clune, S., Crossin, E., Vergheese, K., (2016).
	Meat	Turkey	Cooked	4.87	20.94	80% of current meat order	0.58	Emery	Canada	Vergé, X., et al. (2009)
	Falafel	Chickpea	Cooked	1.22	0.60	20% of current meat order	N/A	Heller & Ros	Canada	Gan et al. (2011)
	Eggs	Medium	Cooked	111.72	282.37	80% of current egg order	0.40	Emery	USA	Pelletier et al. (2014)
	Vegan Egg Replacement	Mung Bean Protein	Cooked	27.94	18.96	20% of current egg order	N/A	Heller & Ros	Thailand	Heller & Rose (2019): Field data
	Produce	Apples, bananas, oranges, carrots, lettuce, tomatoes, cucumbers	Raw	221.80	64.32	100% of current produce order	N/A	Various	Various	Various
	Bread	White or Whole Wheat	Raw	106.66	170.66	100% of current bread order	N/A	Poore & Ner	North America	Poore & Nemecek 2018: North American subset
	Misc	N/A		N/A	N/A		N/A			
			TOTAL	616.58	1016.29		0.99			
			x12 (for annual projection)							
			ANNUAL TOTAL	7398.96	12195.52		11.84			

Proposed 2 (20% replacement with most carbon intensive meal items with the least carbon intensive)	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source
	Soy Cheese	Cheddar	Raw	9.12	5.47	100% of current cheese order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Plant-based yogurt	Almond	Raw	18.52	7.41	100% of current butter order	N/A	Emery	Global	Poore & Nemecek 218 : Global (w/o losses)
	Falafel	Chickpea	Cooked	6.09	2.98	100% of current meat order	N/A	Heller & Ros	Canada	Gan et al. (2011)
	Plant-based Milk	Oat, soy, nut	Raw	89.59	44.80	85% of current milk order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Milk	Dairy	Raw	15.92	38.21	15% of current milk order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Butter	Dairy	Raw	9.22	90.36	100% of current butter order	N/A	Harwatt	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Eggs	Medium	Cooked	139.66	352.99	100% of current egg order	0.50	Emery	USA	Pelletier et al. (2014)
	Produce	Apples, bananas, oranges, carrots, lettuce, tomatoes, cucumbers	Raw	221.80	64.32	100% of current produce order	N/A	Various	Various	Various
	Bread	White or Whole Wheat	Raw	106.66	170.66	100% of current produce order	N/A	Poore & Ner	North America	Poore & Nemecek 2018: North American subset
	Misc	N/A		N/A	N/A	100% of current misc order	N/A			
			TOTAL	616.58	777.19		0.50			
			x12 (for annual projection)							
			ANNUAL TOTAL	7398.96	9326.25		6.03			

Proposed 3 (20% replacement with the most cost-efficient meal items)	Food type	Food description	State	Total weight (kg)	CO2e (kg)	Data Notes	Animals Consumed	Author	Regional Reference	Original Source
	Falafel	Vegan, gluten free	Cooked	6.09	2.98	100% of current meat order	N/A	Heller & Ros	Canada	Gan et al. (2011)
	Plant-based Butter	Oil based	Raw	9.22	31.348	100% of current butter order	N/A	Emery	Global	Poore & Nemecek 2018 : Global (w/o losses)
	Plant-based Milk	Oat, Nut or Soy	Raw	105.51	52.755	100% of current milk order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Soy cheese	Cheddar	Raw	2.5	1.5	27% of current cheese order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Cheese	Dairy	Raw	6.62	109.892	73% of current cheese order	N/A	Emery	North America	Poore & Nemecek 2018: North American subset
	Yogurt	Dairy		18.52	53.708	100% of current yogurt order	N/A	Harwatt	UK	TUCO, https://tuco.ac.uk/ghgcalculator/
	Eggs	Medium		139.66	352.99	100% of current egg order	0.50	Emery	USA	Pelletier et al. (2014)
	Produce	Various	Raw	221.80	64.32	100% of current produce order	N/A	Various	Various	Various
	Bread	White or Wholewheat	Raw	106.66	170.66	100% of current bread order	N/A	Poore & Ner	North America	Poore & Nemecek 2018: North American subset
	Misc	N/A	N/A	N/A	N/A	100% of current misc order				
			TOTAL	616.58	840.15		0.50			
			x 12 (for annual projection)							
			ANNUAL TOTAL	7398.96	10081.82		6.03			

Appendix C (ii) - Low-cost Meal Provider Financial Calculations

Current	Food Costs	Food type	Food description	Data Type	Total Quantity (kg)	Cost/Unit	Financial Cost (pre tax)	% of Product Type Order	Data Notes
		Cheese	Dairy	Raw	9.12	\$19.10/kg	\$174.23	100.00%	Based on the average cost of a kg of cheese in Vancouver per https://www.numbeo.com/food-prices/in/Vancouver
		Milk	2%	Raw	105.51	\$2.29/kg	\$241.76	100.00%	Based on the average cost of milk from https://www.numbeo.com/food-prices/in/Vancouver for 396.32 L
		Butter	Dairy	Raw	9.22	\$11.20/kg	\$103.28	100.00%	Based on the average cost of butter in Canada https://www.statista.com/statistics/443604/average-retail-price-for-butter-in-canada/#:~:text=The%20average%20retail%20price%20for,454%20grams%20in%20June%202020
		Yogurt	Dairy	Raw	18.52	\$5.58/kg	\$103.28	100.00%	https://www.statista.com/statistics/1016194/retail-price-of-yogurt-by-region-canada/
		Turkey	Turkey	Cooked	6.09	\$28.61/kg	\$174.23	100.00%	Based on the cost of turkey cold cuts at Walmart.ca
		Eggs	Medium	Cooked	139.66	\$4.98/kg	\$696.35	100.00%	Based on the average cost for a dozen eggs in Canada with the average egg weighing 60g https://www.statista.com/statistics/443642/average-retail-price-for-eggs-in-canada/
		Produce	Apples, bananas, oranges, carrots, lettuce, tomatoes, cucumbers	Raw	221.80	\$4.36/kg	\$967.06	100.00%	Based on the average cost per kg between the 7 listed items as per https://www.numbeo.com/food-prices/in/Vancouver and calculated based on the average CO2e/kg based on Emery, Heller-Rose and Poore and Nemecek
		Bread	White or Whole Wheat	Raw	106.66	6.24/kg	\$665.55	100.00%	Based on the average cost of bread in Vancouver https://www.numbeo.com/food-prices/in/Vancouver
		Misc	N/A	Varied	N/A	Varied	\$17.94	100.00%	
						TOTAL	\$3,143.68		
	Social Costs	Item		Data Type	Total Quantity (kg)	Cost/Unit	Financial Cost (pre tax)		Data Notes
		GHG emissions		CO2e	1162.83	\$75/Tonne	\$87.21		as per the IMF's (international monetary fund) assessment in 2019
	TOTAL								
						Total Costs	\$3,230.89		
						x 12 for annual order			
							\$38,770.71		

Proposed 1 (20% replacement of all animal-based items)	Food Costs	Food type	Food description	Data Type	Total Quantity (kg)	Cost/Unit	Financial Cost (pre tax)	% of Product Type Order	Data Notes
		Cheese	Cheddar	Raw	7.3	\$19.10/kg	\$139.43	80.00%	
		Soy Cheese	Cheddar	Raw	1.82	\$27.15/kg	\$49.41	20.00%	
		Milk	2%	Raw	84.41	\$2.29/kg	\$193.30	80.00%	
		Plant-Based Milk	Oat, Soy, Nut	Raw	21.10	\$2.45/kg	\$51.70	20.00%	
		Butter	Dairy	Raw	7.38	\$11.20/kg	\$82.66	80.00%	
		Plant-Based Butter	Oil Based	Raw	1.84	\$6.25/kg	\$11.50	20.00%	
		Yogurt	Dairy	Raw	14.82	\$5.58/kg	\$82.70	80.00%	
		Plant-Based Yogurt	Almond	Raw	3.7	\$9.33/kg	\$34.521	20.00%	
		Turkey	Turkey	Cooked	4.87	\$28.61/kg	\$139.33	80.00%	
		Falafel	Vegan, Gluten Free	Cooked	1.22	\$10.44/kg	\$12.74	20.00%	
		Eggs	Medium	Cooked	111.72	\$4.98/kg	\$556.37	80.00%	
		Vegan Egg Replacement	Mung Bean Protein	Cooked	27.94	\$16.27/kg	\$454.58	20.00%	
		Produce	Apples, bananas, oranges, carrots, lettuce, tomatoes, cucumbers	Raw	221.80	\$4.36/kg	\$967.06	100.00%	
		Bread	White or Whole Wheat	Raw	106.66	6.24/kg	\$665.55	100.00%	
		Misc	N/A	Varied	N/A	Varied	\$17.94	100.00%	
						TOTAL	\$3,458.78		
	Social Costs	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
		GHG emissions		CO2e	1016.29	\$75/Tonne	\$76.22		as per the IMF's (international monetary fund) assessment in 2019
	TOTAL								
						Total Costs	\$3,535.00		
						x 12 for annual order			
							\$42,419.98		

Proposed 2 (20% replacement with most carbon intensive meal items with the least carbon intensive)								
Food Costs	Food Type		State	Total Quantity (kg)	Cost/Unit (\$)	Financial Cost (pre tax)	% of Product Type Order	Data Notes
	Soy Cheese	Cheddar	Raw	9.12	\$2715/kg	\$247.61	100%	
	Plant-based yogurt	Almond	Raw	18.52	\$9.33/kg	\$172.79	100%	
	Falafel	Vegan, gluten free	Cooked	6.09	\$10.44/kg	\$63.58	100%	
	Plant-based Milk	Oat, Soy or Nut	Raw	89.59	\$2.45/kg	\$219.50	85%	
	Milk	2%	Raw	15.92	\$2.29/kg	\$36.46	15%	
	Butter	Dairy	Raw	9.22	\$11.20/kg	\$103.28	100%	
	Eggs	Medium	Cooked	139.66	\$4.98/kg	\$696.35	100%	
	Produce	Various	Raw	221.80	\$4.36/kg	\$967.06	100%	
	Bread	White or Whole Wheat	Raw	106.66	6.24/kg	\$665.55	100%	
	Misc	N/A	N/A	N/A	Varied	\$17.94	100%	
					Total	\$3,190.11		
Social Costs	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
	GHG emissions		CO2e	777.19	\$75/Tonne	\$58.29		as per the IMF's (international monetary fund) assessment in 2019
TOTAL								
					Total Costs	\$3,248.40		
					x 12 for annual order			
						\$38,980.81		

Proposed 3 (20% replacement with the most cost-efficient meal items)								
Food Costs	Food Type		State	Total Quantity (kg)	Cost/Unit (\$)	Financial Cost (pre tax)	% of Product Type Order	Data Notes
	Falafel	Vegan, gluten free	Cooked	6.09	\$10.44/kg	\$63.58	100	
	Plant-based Butter	Oil based	Raw	9.22	\$6.25/kg	\$57.63	100	
	Plant-based Milk	Oat, Nut or Soy	Raw	105.51	\$2.45/kg	\$258.50	100	
	Soy cheese	Cheddar	Raw	2.5	\$2715/kg	\$67.88	27	
	Cheese	Dairy	Raw	6.62	\$19.10/kg	\$126.44	73	
	Yogurt	Dairy		18.52	\$5.58/kg	\$103.34	100	
	Eggs	Medium		139.66	\$4.98/kg	\$696.35	100	
	Produce	Various	Raw	221.80	\$4.36/kg	\$967.06	100	
	Bread	White or Wholewheat	Raw	106.66	6.24/kg	\$665.55	100	
	Misc	N/A	N/A	N/A	Varied	\$17.94	100	
					TOTAL	\$3,024.26		
Social Costs	Item		Data Type	Total Quantity	Cost/Unit	Financial Cost (pre tax)		Data Notes
	GHG emissions		CO2e	840.15	\$75/Tonne	\$63.01		as per the IMF's (international monetary fund) assessment in 2019
TOTAL								
					Total Costs	\$3,087.27		
					x 12 for annual order			
						\$37,047.29		