Final Draft
City of Delta
Community Energy & Emissions Plan

October 2023

Delta

Prepared by:

Community Energy Association

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Glossary

AAA	All Ages and Abilities
BAU	Business as Usual
CEEI	Community Energy and Emissions Inventory
CEEP	Community Energy and Emissions Plan
CSMI	Commercial and Small Medium Industrial
DCFC	Direct Current Fast Charge
EV	Electric Vehicle
GHG	Greenhouse Gas
GJ	Giga Joule
GWh	Gigawatt hour
ha	Hectare
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt hour
MURB	Multi Unit Residential Building
MVRD	Metro Vancouver Regional District
OCP	Official Community Plan
tCO_2e	Tonnes of carbon dioxide equivalent
VKT	Vehicle Kilometers Travelled

1. Executive Summary

The City of Delta Community Energy and Emissions Plan (CEEP) outlines a path towards a low carbon future: A future where City residents experience the benefits of a connected, healthy and economically prosperous community while taking action on climate change and adapting to climate impacts.

The climate is changing in British Columbia (BC) as it is around the world. The average global temperature has already increased by 1 degree Celsius (°C) above pre-industrial levels. The United Nations Intergovernmental Panel on Climate Change (IPCC) is urging a limit of 1.5°C warming, which would require global emissions to be net-zero by 2050.

45% reduction in emissions below 2007 levels by 2030
Net zero carbon by 2050

The City of Delta is responding to the urgent call by IPCC to reach the goal of net zero emissions by 2050, and an interim goal of 45% reduction below 2007 emissions by 2030. The CEEP lays out actions for transportation, buildings, waste, green space & ecosystems, and organizational readiness to help reach the emissions reduction goal while building benefits for the community along the way.

This icon identifies actions and targets that were influenced directly from community feedback during the engagement process. Look for it throughout the report. Also see Appendix D for detailed engagement results.

Actions fall into three categories:

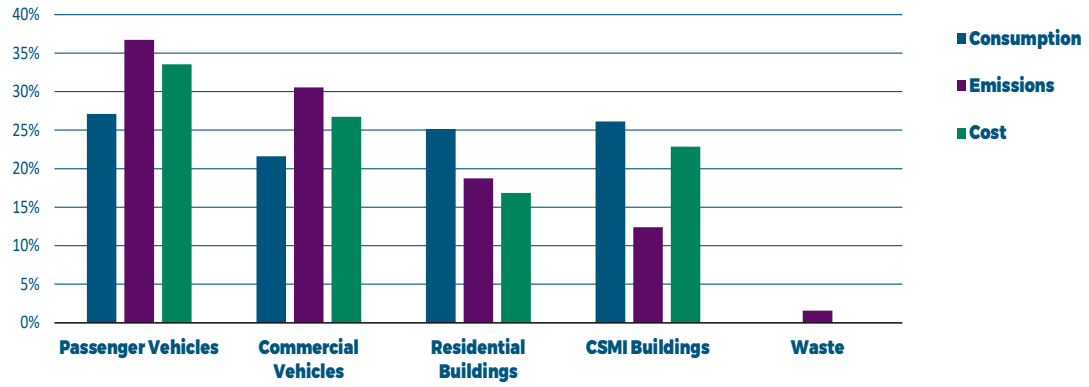
- **Infrastructure**: Investments into the City of Delta-owned infrastructure that enable residents to make lower-emissions choices such as active transportation networks and public charging stations
- **Policy**: Changes to City of Delta policy and regulation that lead to energy and emission reductions in the community such as requirements and incentives for enhanced energy efficiency in new buildings.
- **Engagement:** Outreach, education and incentives that inspire residents and businesses to make choices to reduce emissions and energy use, and prepare for a low carbon future.

The process to develop the CEEP included two phases of public engagement to ensure the plan reflects local values and priorities. Phase 1 of public engagement was designed to better understand resident values, their vision of the future and their perception of the current state of transportation, buildings and waste. Phase 2 was designed to gather feedback on what climate-related actions residents feel are most important to reduce emissions and build benefits for the community.

Current Energy Consumption, Emissions and Costs by Sector

The current state of energy and emissions is shown in the graph below for each sector in 2019. In Delta, passenger vehicles contribute the largest proportion of emissions at 37%. Commercial vehicles followed closely in emissions at 31%, which is unusually high compared to other Metro Vancouver communities but can be explained by the Port of Delta being a hub for commercial goods and higher percent of heavy-duty vehicles registered in Delta. Residential buildings (19%) followed next for emissions, then commercial and small-medium industrial buildings (12%). Lastly, waste comprises only 2% of emissions. Total GHG emissions from these sources were 773,210,000 tonnes of CO2e.

2019 Energy, Emissions, and Expenditures by Sector (%)

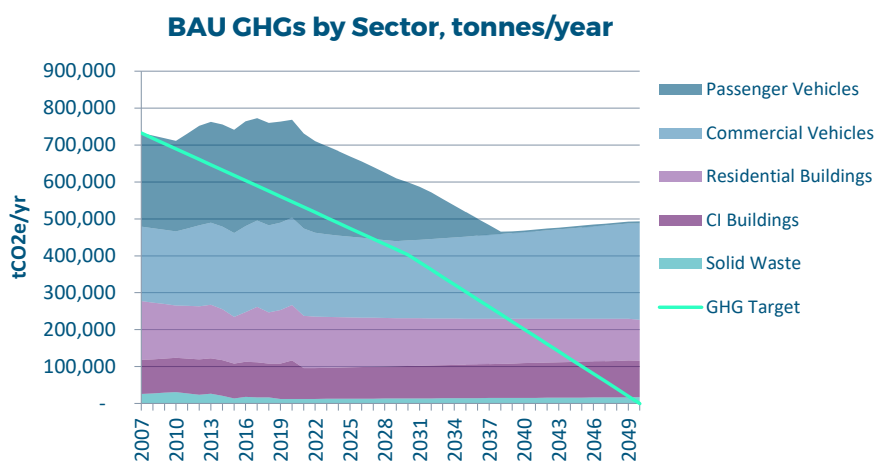


Note that the emissions listed do not include large industrial emitters such as the cement plant, various greenhouse farms, wood products and/or other industries on the Annacis Island. According to the Province's Large BC Industrial Facilities database, the total emissions associated with these large emitters was 973,000 tCO_2e in 2019. This plan does not comprehensively address emissions from large industrial operations (e.g., cement plant, sawmill), embodied carbon (the emissions associated with producing something), or life cycle emissions (how many GHGs are emitted over the lifetime of an energy source or object). This is outside of the scope of what municipalities can meaningfully address currently but is an important factor for everyone to consider when they are buying goods or services.

Working Towards A Future Vision and Targets

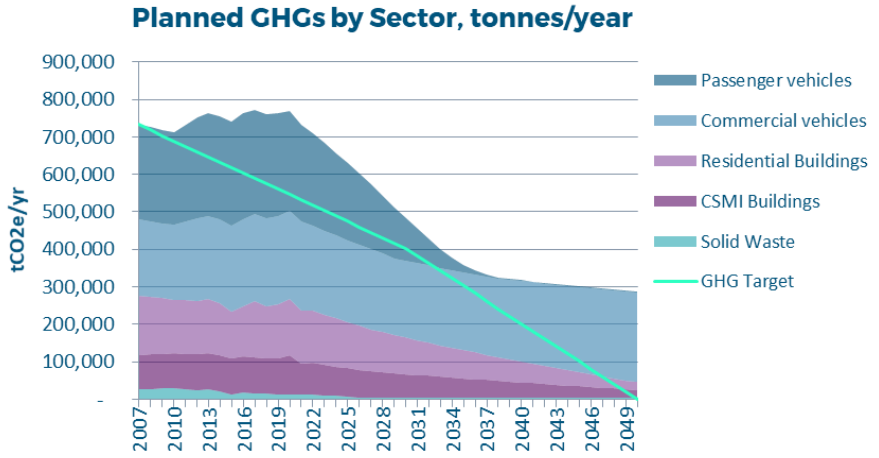
This CEEP outlines a pathway toward Delta's low carbon vision and emissions reduction target of 45% below 2007 levels by 2030, and net zero by 2050. The two graphs below compare the business-as-usual scenario with the fully implemented plan scenario. Note that the 2030 and 2050 targets will not be met by the fully implemented plan, but this is due to the contribution of commercial vehicles for which electric and other low-carbon options are still in their infancy and over which the City has limited control.

Business as Usual

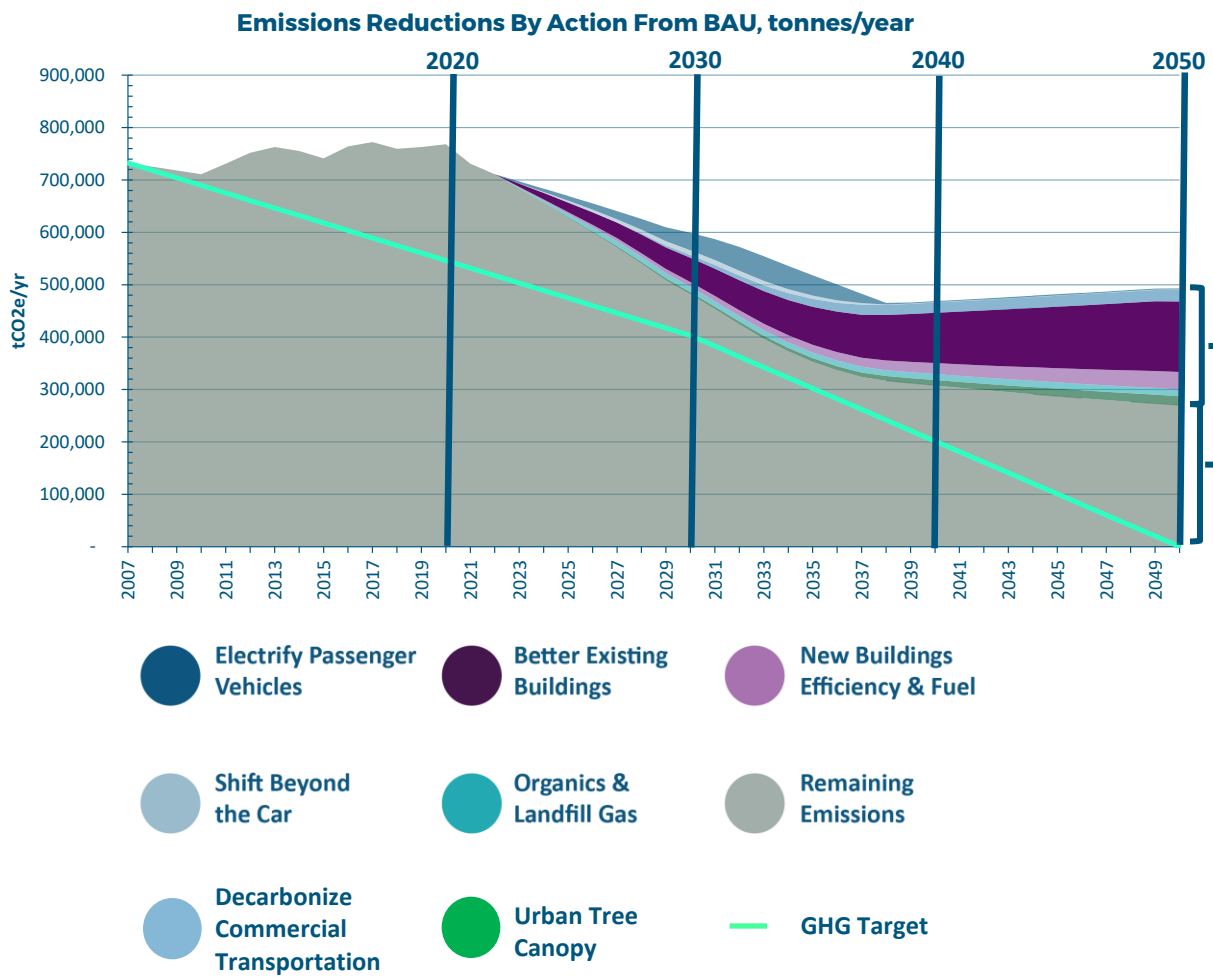


The Business as Usual (BAU) scenario shows anticipated GHG emissions reductions due to policy commitments made by the Government of Canada and Province of BC.

Plan Implementation



By implementing this CEEP, Delta can reduce its emissions by 34% below 2007 levels by 2030, and 63% by 2050. Though these fall short of the respective targets, it's important to note that over 30% of emissions are due to commercial vehicles, for which the City has very few levers to manage emissions. See the following page for a description of how each major action contributes to the reduction in emissions.



Emissions reductions over time

Eliminating fossil fuels from transportation and heating are key actions moving forward, with actions to reduce emissions from community buildings having the biggest impact on reaching targets.

Remaining Emissions

Tackling remaining emissions between 2040 and 2050 will come from added support at a provincial and federal level and technological improvements. The solutions and technology to reduce emissions in our community will grow and become more sophisticated over time. This will include new and innovative nature-based and other solutions to capture and store carbon and offsetting emissions.

What's important is that we get started now implementing proven solutions like the Big Moves to ensure we are well positioned to take advantage of emerging opportunities.

Shift Beyond the Car	Electrify Passenger Transportation	Decarbonize Commercial Transportation	Step Up New Buildings	Decarbonize Existing Buildings	Close the Loop on Waste	Organizational Leadership	Green Space

Key Action Categories and Strategies

This plan lays out key actions across seven categories for transportation, buildings, waste, green space & ecosystems, and organizational readiness:

Transportation

- Shift Beyond the Car
  - Optimize land-use planning for compact community growth
  - Increase walking, cycling and other forms of zero emission mobility
  - Increase transit ridership and a support a transition to a zero emissions transit network
- Electrify Passenger Transportation
  - Enable charging on-the-go
  - Enable charging at home and at work
  - Encourage electric vehicles through outreach and supportive policies
- Decarbonize Commercial Transportation
  - Accelerate the adoption of zero emission vehicles and low carbon fuels for commercial fleets
  - Lead by example by transitioning municipal fleet

The majority of respondents feel concerned about the effects of climate change on Delta. Respondents also believe the City has a role to play to assist the community to both mitigate and adapt to climate change.

Buildings

- Step Up New Buildings
  - Adopt the BC Energy Step Code and Zero Carbon Step Code
  - Build industry capacity
- Decarbonize Existing Buildings
  - Increase energy efficiency
  - Encourage and enable fuel switching
  - Build industry capacity and increase market demand for low carbon buildings

Waste

- Close the Loop on Waste
  - Divert organics and wood waste from landfill
  - Promote and incentivize circular economy
  - Maximize landfill gas capture and explore other resource recovery/utilization technologies for waste

Green Space & Ecosystems

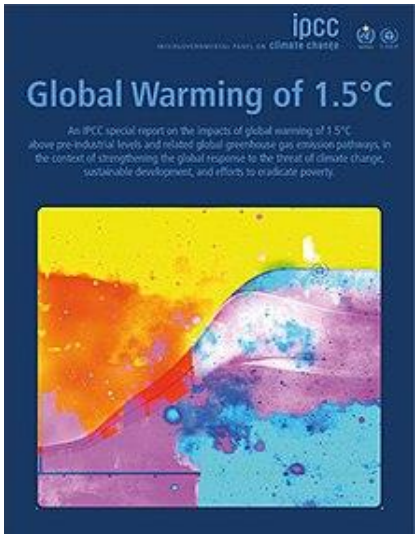
- Protect and Enhance Green Space and Ecosystems
  - Preserve Sensitive Ecosystems and Sequester Carbon
  - Promote and Incentivise Low Carbon Agriculture Practices and Local Food Production.

Youth who participated in the engagement were particularly concerned about the preservation of natural spaces. In the survey for youth, 97.8% indicated it was important for the City to add more trees, and create protections for trees as natural assets.

2. Introduction

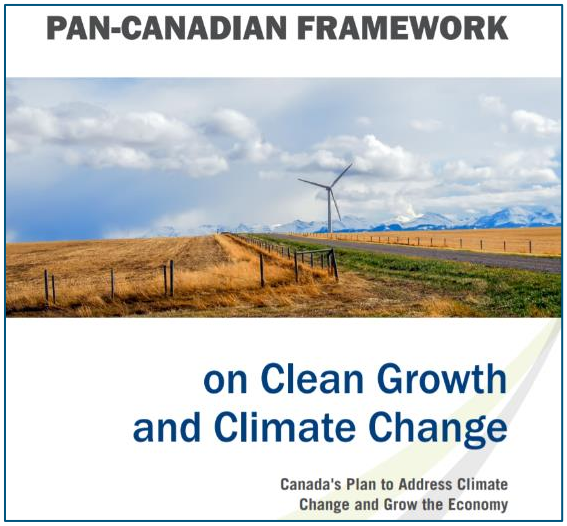
Climate Change: Urgency & Challenge

In October 2018, the United Nations Intergovernmental Panel on Climate Change (IPCC) released a major report that emphasized the dramatic difference in consequences between a 1.5°C and 2°C world. Every degree of warming beyond this threshold will lead to increased impacts of extreme weather, more wildfires and floods, increases in sea-level rise, and severe threats to human health and well-being.



The key finding of the IPCC report is that limiting warming to 1.5°C is possible, but requires deep emissions reductions across all areas of society – reducing global emissions by 45% from 2010 levels by 2030 and reaching net zero emissions by 2050.

IPCC's most recent Synthesis Report of the Sixth Assessment Report (AR6) indicates that we have reached a 1.1 degree C rise in global temperatures, which is resulting in very severe impacts, and in some cases irreversible changes. The report indicates that to limit global warming to 1.5 degrees C will require even deeper GHG emissions reductions in the near-term. It is critical to limit these impacts for a healthy environment, economy and society for ourselves and future generations. While it is not too late, time is of the essence.



National Action – In 2016, the Government of Canada released its Pan-Canadian Framework on Clean Growth and Climate Change. The framework sets out the federal government's strategy to meet its commitment under the Paris Agreement to reduce national greenhouse gas (GHG) emissions 30% below 2005 levels by the year 2030. More recently, the Government of Canada has established a target of net-zero emissions by 2050, requiring an acceleration of action by all levels of government.

Provincial Action – In December 2018, the Province of British Columbia released its *CleanBC* climate plan. The plan reaffirmed the province's previous target to reduce emissions 80 per cent below 2007 levels by the year 2050, and established a new interim target to reduce emissions 40 per cent by 2030. *CleanBC* builds on a history of climate actions and outlines a path to meeting the 2030 targets. These actions include sourcing clean and renewable electricity, incremental increases in building-energy performance in the BC Building Code, tailpipe emissions standards, and measures to reduce emissions from industry. The *CleanBC* climate plan was strengthened by the 2030 Roadmap which is a complementary plan to achieve 100% of B.C.'s GHG emission targets.

Regional Action – In September 2018, Metro Vancouver adopted a climate strategy, *Climate 2050*, for the Metro Vancouver region. *Climate 2050* commits the region to pursue a carbon neutral region by 2050, with an interim target of reducing greenhouse gas emissions by 45% from 2010 levels by 2030, which are consistent with the IPCC recommended targets. The goals of the strategy also align well with the federal and provincial targets, and the emission goals of many of its member jurisdictions.

Delta's Climate Leadership and Actions

Delta has demonstrated leadership in implementing climate action and reducing greenhouse gas emissions from its corporate operations and its community within the last two decades. Delta has been carbon neutral in municipal operations since 2012. The City is a member of the national Partners for Climate Protection (PCP) program and a signatory of the BC Climate Action Charter, as well as the Mexico City Pact. Delta has been actively implementing its Community Energy and Emissions Plan (CEEP), which was endorsed by its Council in 2013, to support commitments and targets made under the Mexico City Pact, BC Climate Action Charter and Delta's Official Community Plan. The following are some of the relevant plans and strategies that Delta has created and implemented in recent years:

Electric Vehicle Strategy – Transportation comprises more than 60% of Delta's greenhouse gas emissions. Delta adopted an Electric Vehicle Strategy in 2020 to remove barriers to EV ownership by increasing access to charging infrastructure and providing public education about EVs and EV charging to reduce emissions from the transportation sector. The EV Strategy includes actions related to charging infrastructure in new and existing buildings; public charging network; municipal fleet; and education & outreach.

Cycling Master Plan – As part of its commitment to improve cycling, walking and other active mobility options, Delta created the Cycling Master Plan to develop a well-connected and complete cycling network that is safe, convenient, and comfortable for people of all ages and abilities. This plan outlines strategies and recommends infrastructure, policies, and education to help enable and encourage cycling as a practical and convenient form of active transportation that can play an important role in enhancing the environment, community health, and economy, while ensuring that the community members can safely move in and around Delta.

Urban Forest Strategy – Delta's Urban Forest Strategy was developed in 2020 to enhance the urban forest and add to tree canopy cover in the City. This strategy provides an action plan for 2020-2030 to achieve a robust and sustainable urban forest. A number of steps have been taken to date including Trees for Tomorrow, the Urban Reforestation Project, and the Trees for Change Award. Trees help sequester carbon by absorbing carbon dioxide from the atmosphere, improve air and water quality, improve water retention including stormwater, and they also provide shade and reduce exposure to ultraviolet radiation from the sun.

Agricultural Plan – Agriculture is one of the main economic activities in Delta that results in the emission of greenhouse gases, and at the same time agricultural activities also provide opportunities for emission reduction and carbon sequestration. Delta updated the Agricultural Plan in 2023. Goal 4 of the 2023 Agricultural Plan is "Promoting Sustainable and Regenerative Agricultural Practices" which is accompanied by several recommendations focused on climate change policy and reducing emissions.

CEEP Update & Climate Targets

In response to the report from the Intergovernmental Panel on Climate Change (IPCC), which found that it is necessary to limit global warming to 1.5 degrees Celsius, rather than 2 degrees, in October 2019, Delta Council unanimously adopted a Notice of Motion introduced by Mayor George V. Harvie. Recognizing that there is a greater sense of urgency and level of commitment to take additional measures to reduce Delta's contribution to climate change, Council directed staff to initiate a process for updating the City's community GHG reduction targets within the Official Community Plan to be consistent with IPCC targets, meaning a 45% reduction by 2030 and net zero emissions by 2050.

Delta's new community targets show the urgency of the challenge and the call to action to reduce GHG emissions. To meet the 2030 target of 45% reduction, Delta needs to produce approximately 330,000 fewer tonnes of greenhouse gasses in 2030 (relative to 2007 levels). The planned actions are projected to achieve annual emission reductions of 251,400 tonnes CO_2e (or 34% reduction) relative to 2007. Details of modelled emission reductions can be found under *Forecast: Action Plan Projection* in Section 7.

Provincial legislation – *the Local Government (Green Communities) Statutes Amendment Act (*Bill 27, 2008) – also requires that each local government establish targets, plans, and strategies to do their part to mitigate climate change. Having an up-to-date plan such as this Community Energy and Emissions Plan (CEEP) helps with this, and also makes the City of Delta ready to apply for funding from the Federal or Provincial governments and other funders to implement strategies in the plan. Implementing the plan would also result in numerous social, economic and environmental benefits to the community.

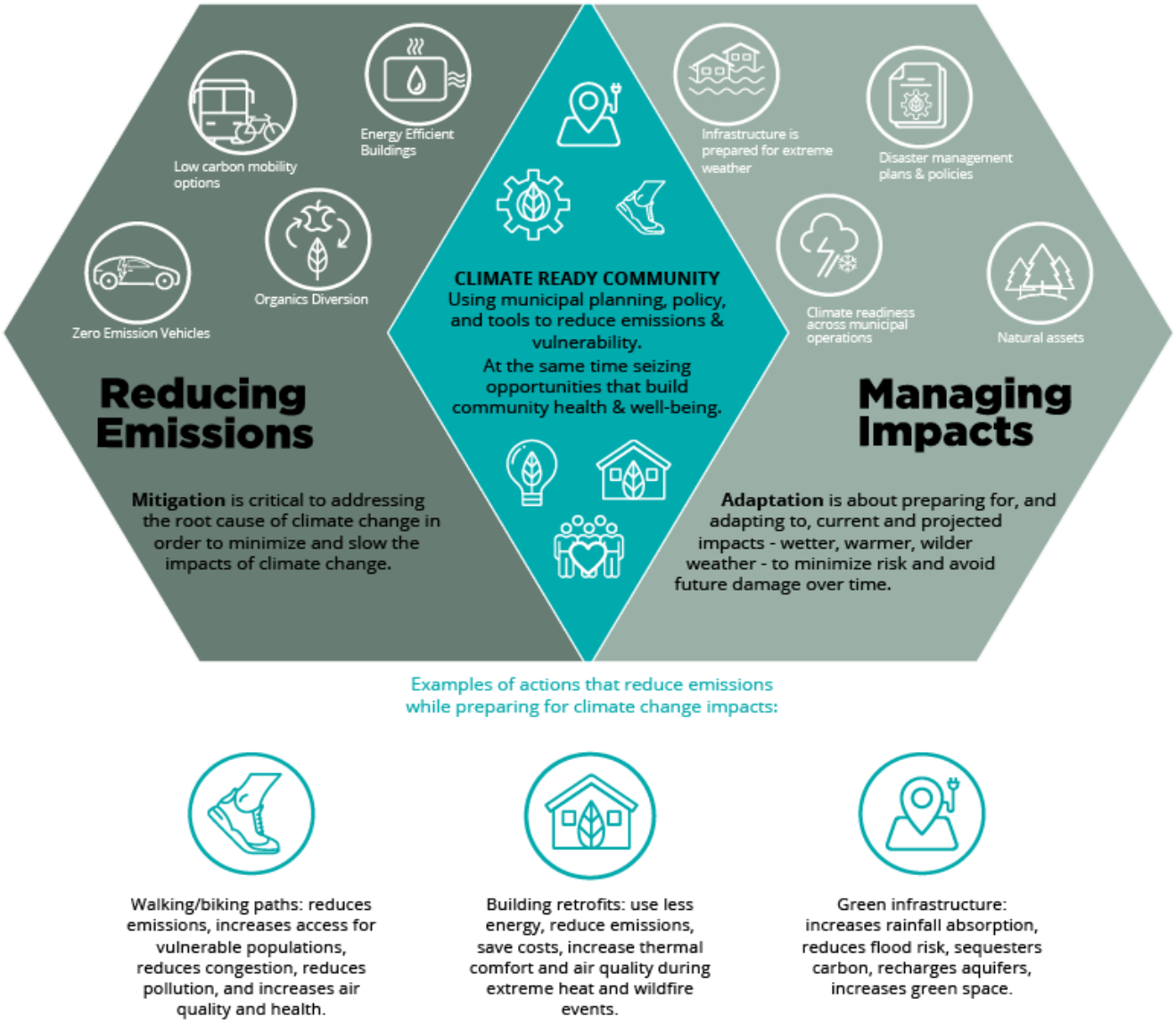


Figure 1 – Climate Action Co-Benefits

Ways Local Governments Can Take Climate Action

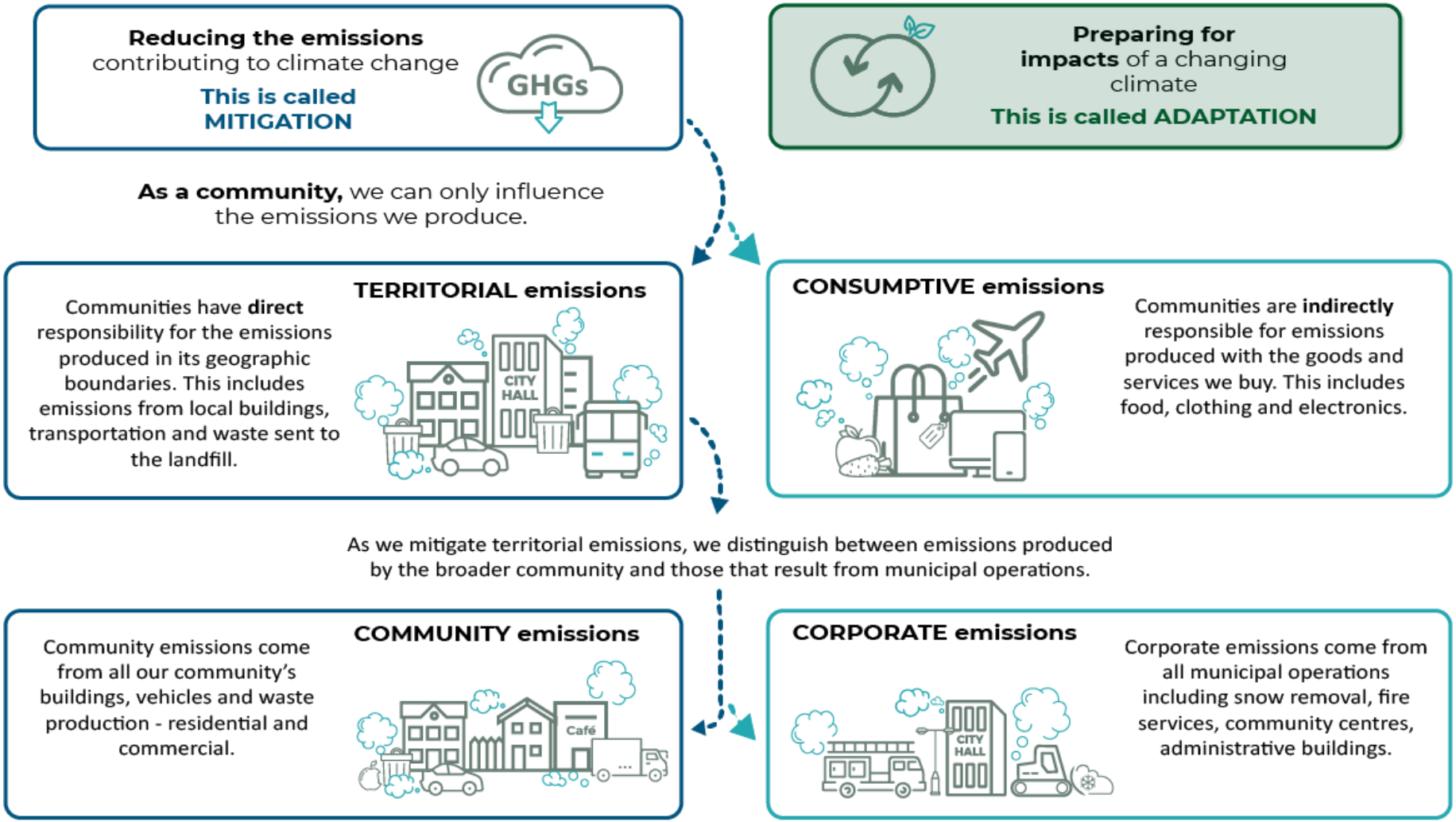


*Figure 2 – Local Government Climate Action**

*The scope of this plan includes the elements on the left: mitigation, territorial emissions, and community emissions.

What is the Community Energy and Emissions Plan?

Climate action consists of both reducing emissions, or *mitigation*, and preparing for the impacts of a changing climate, *or adaptation*. A CEEP is an important component of any local government's overall climate action strategy, which should also include a plan to address emissions from the local government's own operations and a climate adaptation plan.

The City of Delta's CEEP focuses on leveraging municipal powers to help residents and businesses save energy, emissions, and money. While municipal actions are necessary to achieve the climate goals, they are insufficient on their own. Significantly reducing our community greenhouse gas (GHG) emissions requires everyone to take action and make individual choices about how to get around, where to live, and how to handle food waste and yard material.

As a local government, there are numerous ways to help residents and businesses sort through low carbon choices and show how those choices contribute to a collective success. There are also many ways the City can lead by example. This CEEP is a plan to reach the emissions reduction goal while building benefits for the community along the way.

The actions in the plan fall into three categories of municipal powers:

Infrastructure

Investments into infrastructure owned by the City of Delta that enable residents to make lower-emissions choices, such as active transportation networks and public charging stations.

Policy & Regulation

Changes to City of Delta policy and regulation that lead to energy and emission reductions in the community, such as requirements and incentives for enhanced energy efficiency in new buildings.

Engagement & Outreach

Outreach, education and incentives that inspire residents and businesses to make choices to reduce energy and emissions and prepare for a low carbon future.

CEEP Process

In general, a CEEP process consists of four steps: Modelling & Analysis, Engagement, Recommending Actions and Draft Plan, and the Final Plan. See *Figure 3* below for more details.

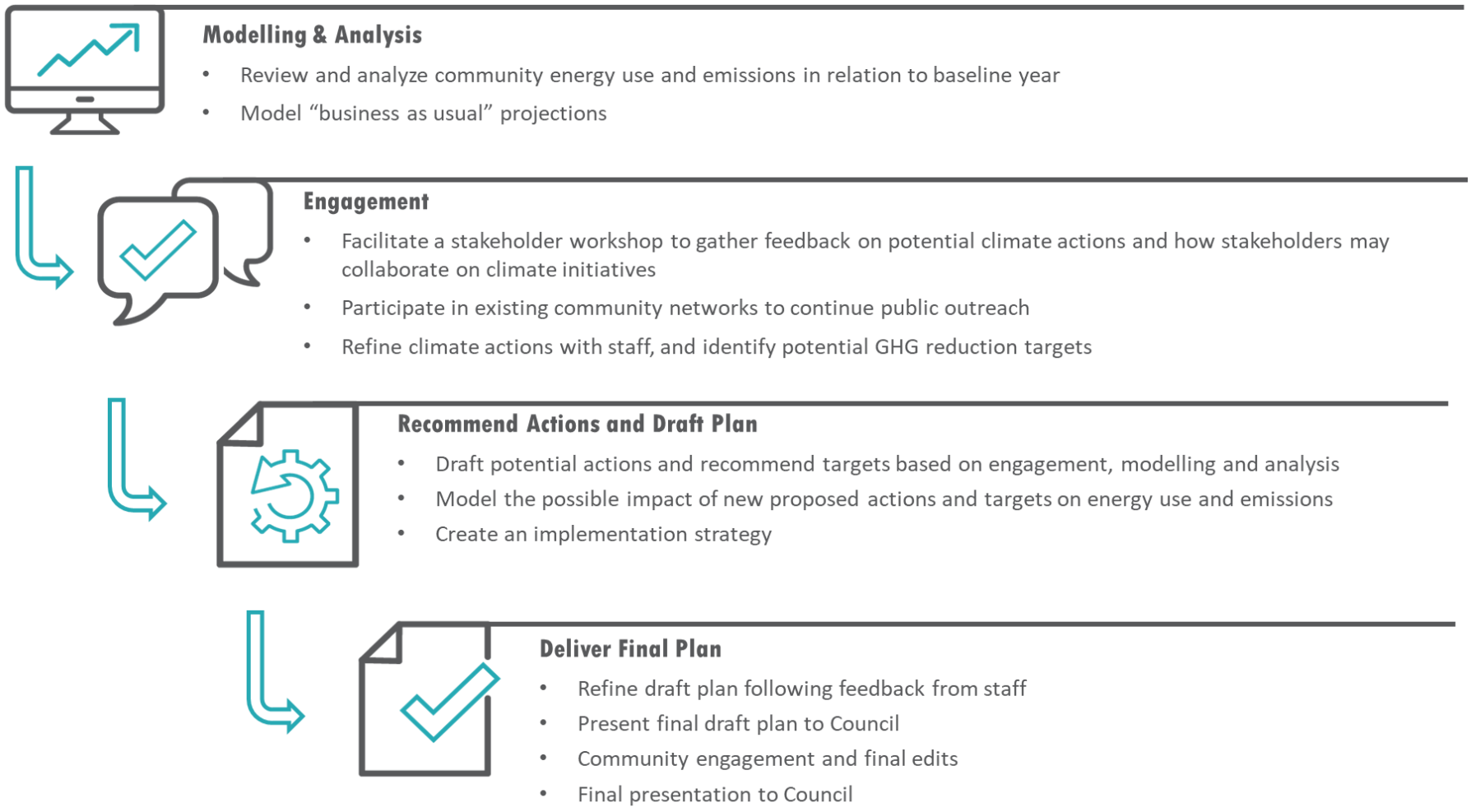


Figure 3 – CEEP Process

3. Inventories: What is measured in this plan?

Local governments have varying degrees of influence over different sources of emissions within their boundaries. **Delta's emissions come from both 'local' sources (emissions that are created here) and 'global' sources from local consumption (emissions that include everything from the extraction of raw materials through to processing and transport as well as emissions that may be counted elsewhere but are still ultimately our emissions).**

Delta's GHG reduction target references only local (territorial) emissions. These emissions are measured in the Energy and Emissions Inventory using the BC Methodological Guidance for Quantifying GHG Emissions. The major categories of emissions included in this inventory are: buildings (residential and commercial), transportation (passenger and commercial) and waste.

This plan does not comprehensively address emissions from **large industrial operations (e.g. cement plant, sawmill),** embodied carbon (the emissions associated with creating something), or life cycle emissions (how many GHGs are emitted over the lifetime of an energy source or object). This is outside of the scope of what municipalities can meaningfully address currently, but is an important factor for everyone to consider when they are buying goods or services. How was your item created, how far did it travel, how is it packaged? These are all important questions to consider when buying consumer goods.

Current Energy, Emissions and Costs by Sector and Fuel Type

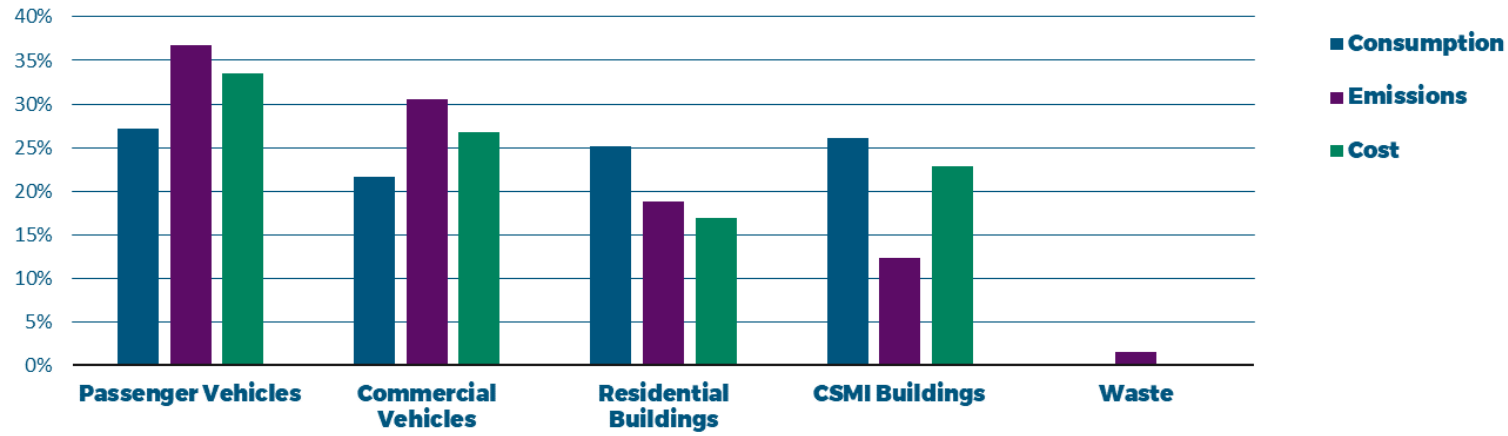


Figure 2–- Current Energy, Emissions and Costs by Sector and Fuel Type

Figure 2 shows how much energy was used (measured in gigajoules or "GJ"), the GHG emissions produced (measured in tonnes of carbon dioxide or "tCO_2e") and how much that energy cost (estimated dollar amount) for each key sector in 2019.

The sectors are:

- Passenger vehicles
- Commercial vehicles
- Residential buildings
- Commercial and small-medium industrial buildings
- Waste

In 2019, for the whole community of Delta (excluding large industry and large greenhouse farms):

- Total energy consumption was 15,500,000 GJ
- Total GHG emissions were 773,000 tonnes of CO_2e
- Total energy expenditure was $478,000,000

Passenger vehicles contribute the largest proportion of emissions (37%), costs (34%), and consumption (27%). Commercial vehicles followed closely in emissions at 31% and costs at 27%, which is unusually high compared to other Metro Vancouver communities but can be explained by the Delta Port being a hub for commercial goods and BC Ferries operations. Residential buildings (19%) followed next for emissions, then commercial and small-medium industrial buildings (12%). Lastly, waste comprises only 2% of emissions. City of Delta's total GHG emissions, excluding large industry and large greenhouse farm emissions, was approximately 1.1% of B.C.'s total GHG emissions in 2019.

It should be noted that the emissions, energy use and costs listed above do not include non-combustion sources from large industrial emitters such as the cement plant, various greenhouse farms, wood products and other industries on Annacis Island. This is to ensure consistency with Province of BC's GHG Inventory scope. According to the Province's Large BC Industrial Facilities database, the total emissions associated with these large industries were 973,000 tCO2e, combined for all other facilities, in 2019. Approximately 440,000 tCO2e is attributed to natural gas combustion and is included later in further analysis. An additional 533,000 tCO2e is from non-combustion sources (e.g. carbon dioxide from cement production) and is therefore not included in this analysis. City of Delta's total GHG emissions in 2019 (including large industry and large greenhouse farms) were 1.746 million tonnes of CO2e, which was approximately 2.6% of B.C.'s total GHG emissions.

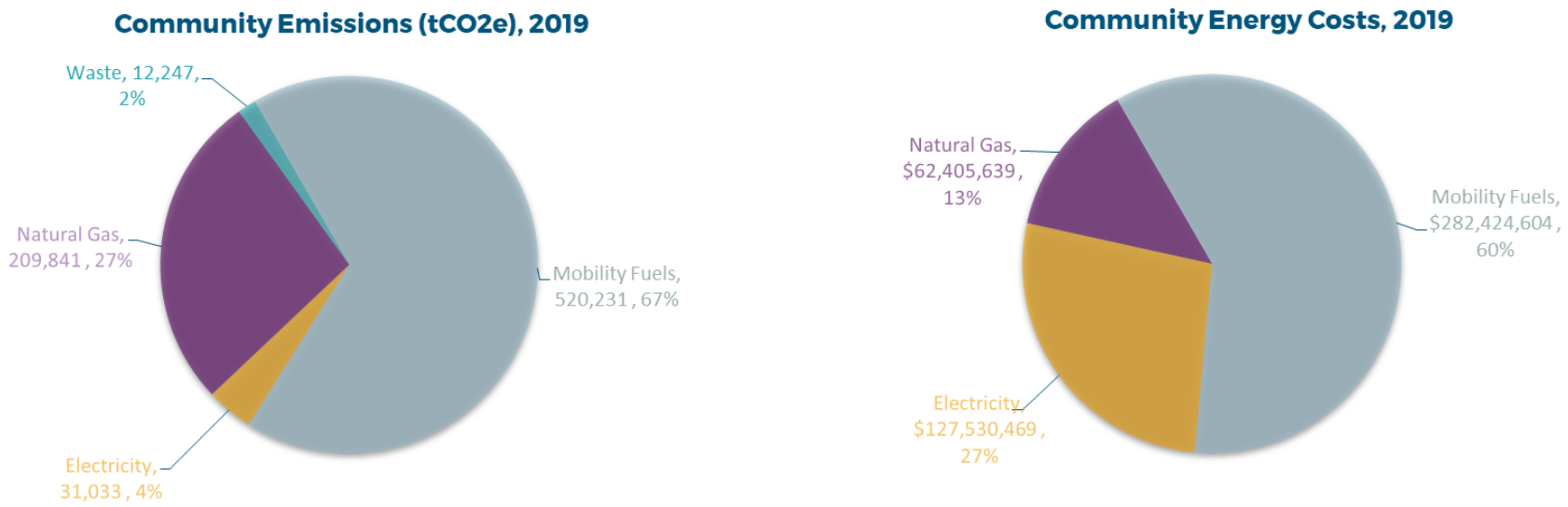


Figure 3 – Emissions (tonnes CO2e) and Energy Expenditure ($) by Fuel Source

Figure 3 shows Delta's emissions and energy expenditure in terms of fuel source rather than sector. Looking at emissions and expenditure in this way can reveal some interesting trends.

Mobility fuels are comprised of gasoline and diesel emissions from passenger and commercial vehicles. They make up a large majority of community emissions and energy costs, at 67% and 60%, respectively. With respect to buildings, natural gas heating is a significant emission source in Delta at 27% of all community emissions, however it only contributes 13% of costs. Electricity on the other hand, contributes 27% of community costs, yet only 4% of emissions. This is because electricity used in Delta has very low emissions associated with it, but it is more expensive per unit of energy that natural gas. Electricity is primarily used in buildings, but small amounts may be used in other sectors, such as passenger vehicles (electricity for EVs). Heating oil, propane and wood are not statistically significant sources of emissions in Delta, and thus were not included in the inventory.[1] The decomposition of waste in landfill contributes only 2% of total emissions in Delta; however, there is no energy/fuel cost associated with waste.

[1] Per the Province of BC GHG Inventory, where heating oil, propane, and wood together are estimated to comprise <5% of emissions, their specific values are withheld as accuracy in assessing these values is already low, and at such low levels, would be within the margin of error.

4. Forecasting & Backcasting

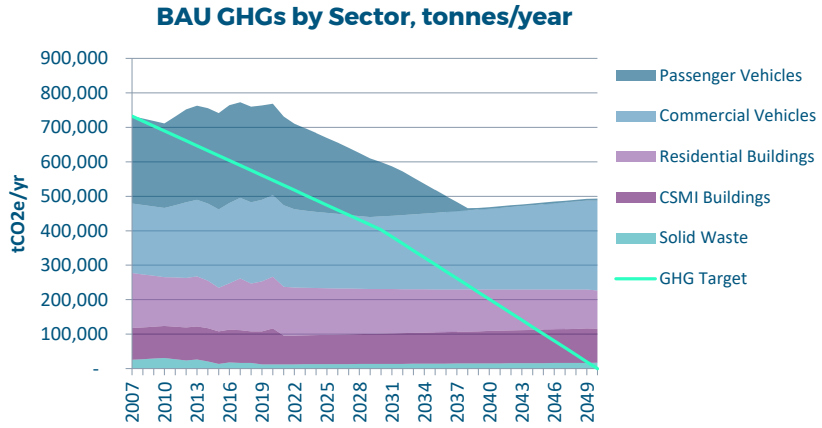


Figure 5 – Business as Usual GHG Emissions by Sector

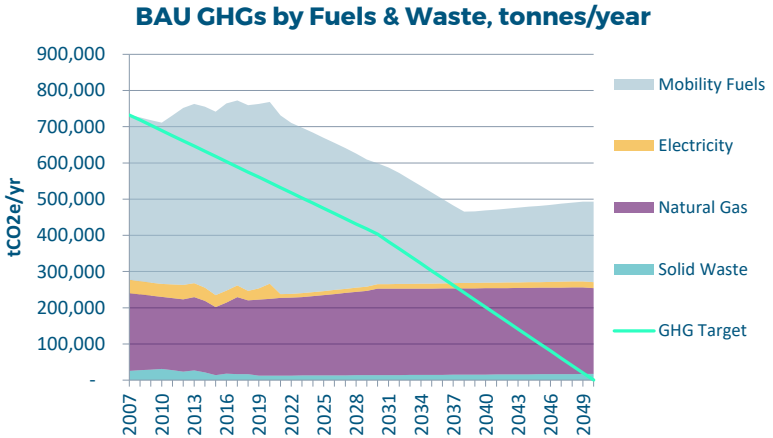


Figure 4 – Business as Usual GHG Emissions by Fuel Type

There were two different approaches used in the development of the Delta's CEEP: Forecasting and Backcasting. Forecasting is a common approach used to create estimates of future emissions using current inventory data and projections. Backcasting, on the other hand, starts by imagining the desired future scenario that is not limited by current projections or past experience. Used in combination, these two approaches provide us with a clear positive vision of the future and a measurable plan to start us on the pathway to our destination.

What does 'Business As Usual' mean?

Business As Usual, or BAU, is a way of describing what is estimated to happen to Delta's emissions if the City takes no further action to decrease emissions beyond what they are already doing and plan to do. A number of factors are taken into account to develop BAU emissions scenarios, population growth being one of the most important considerations. As the number of people increase in a community, more buildings are needed/used and more vehicles are driven on roads.

Other considerations that were taken into account to develop City of Delta's BAU emissions scenario for this report include the following:

- Changing climate patterns— as warmer winters and hotter summers occur, they are and will continue to change the way that energy is consumed in buildings
- Likely future impacts of policies already adopted by other orders of government, such as:
    - Renewable and low carbon fuel standards
    - Vehicle tailpipe emissions standards
    - Provincial and Federal Zero-Emission Vehicle (ZEV) mandates requiring 10% of new passenger vehicle purchases by 2025 as ZEVs, 30% by 2030, and 100% by 2035 as ZEVs
    - The greening of the BC Building Code by 2032 (progressive steps towards net zero energy).

Forecasting Approach: BAU Projections

Figure 4 and *Figure 5* show Delta's GHG emissions inventory from 2007 to 2019 and its business-as-usual forecast from 2020 to 2050. *Figure 4* shows emissions by fuel type (note that propane and heating oil are not visible on the graph due to low emissions contribution). *Figure 5* shows emissions from the five sectors stacked on top of one another to show total emissions. Between 2007 and 2019 there was an increase in emissions of 4.2%, with some annual fluctuations in between. Emissions are expected to decline from 2021 onwards. It is anticipated that the biggest reductions will come from passenger vehicles/mobility fuels. This is due to Provincial climate policy such as the *Zero Emission Vehicles Act* in British Columbia. The green line indicates Delta's reduction target. In a business-as-usual scenario, Delta will fall well short of the new targets for both 2030 and 2050.

Backcasting Approach: Envisioning our Future

Backcasting is a planning approach that starts by defining the future vision, examining the current state, and identifying a path to achieve the vision. The concept of "backcasting" as used in this planning processes was developed by the Natural Step, as seen in *Figure 6*.

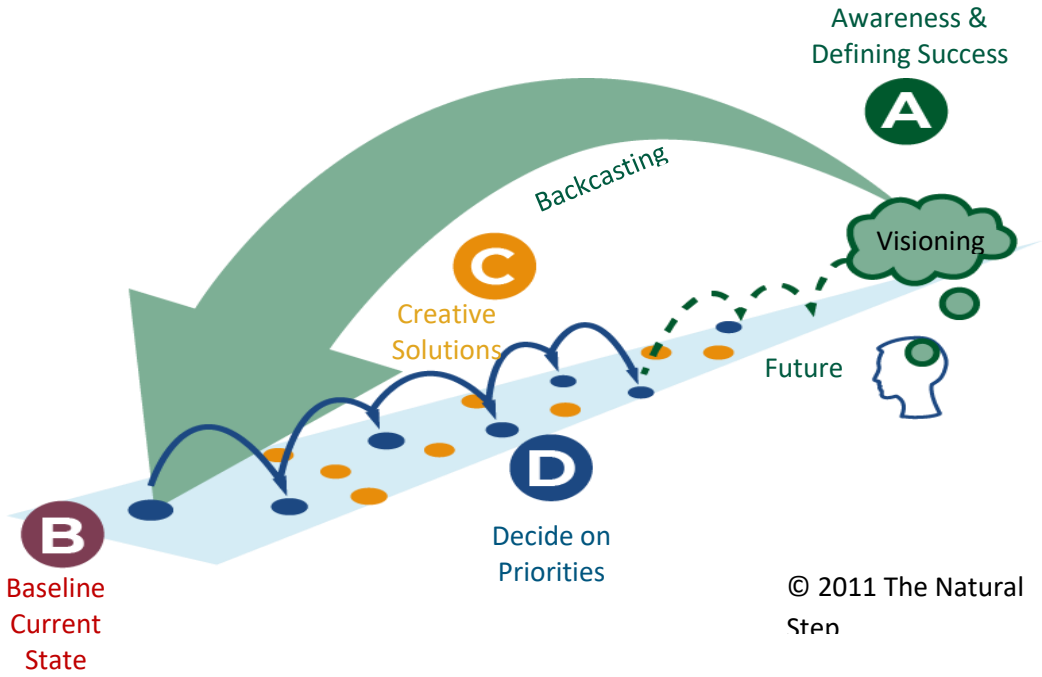


Figure 6 – Backcasting Approach. Source: The Natural Step

Over the course of two workshops, City of Delta staff and stakeholders:

- Developed a vision of their desired low carbon future, focusing on three sectors: transportation, buildings, and waste
- Identified the current state of the sectors
- Brainstormed creative solutions to complement the Key Actions, and
- Prioritized the solutions

See Appendix A for action details and lead departments to carry out implementation, and for a summary of the workshop content, and post-workshop survey results.

5. Public Engagement – Informing the Plan

Engagement Summary

The process to develop the CEEP included two phases of public engagement to ensure the plan reflects local values and priorities. Phase 1 of public engagement was designed to better understand resident values, their vision of the future and their perception of the current state of transportation, buildings and waste. Phase 2 was designed to gather feedback on what climate-related actions residents feel are most important to reduce emissions and build benefits for the community.

Engagement Activities

	Stakeholder Workshops	Public Survey	Youth Survey
Phase 1 **Completed Spring 2022**	Workshop 1– Members of Committees of Council	350 Responses	N/A
	Workshop 2 – City of Delta staff	Responses from North Delta, Ladner and Tsawwassen	
Phase 2 **Completed Fall 2022**	Workshop 1–- Members of Committees of Council	311 Responses	50+ Responses
	Workshop 2 – City of Delta staff	Responses from North Delta, Ladner and Tsawwassen	Distributed to elementary and high schools in School District #37.

A fulsome summary of both phases of engagement can be found in Appendix D, but the following are some key takeaways.

Phase 1 – Vision and values related to climate change

Transportation

Current challenges:

- Air and noise pollution
- No care share programs
- Unsafe cycling routes
- Unreliable transit schedules
- Lack of EV charging in multi-unit buildings or in rental properties

Future Vision:

A variety of transit options that are reliable, convenient, and electrified to help residents who need improved transit to move in and through Delta and its industrial areas.

A network of cycling routes and sidewalk infrastructure encourages active transportation; bikes, e-bikes, and walking are safe options for getting to school, commuting, and recreation.

A culture where personal vehicle use is reduced or replaced with zero emission options with more fast charging infrastructure and affordable EV options.

Buildings & Communities

Current challenges:

- High expense to retrofit older homes and multi-unit buildings
- Removal of trees for new development
- Distance between amenities and residential areas

Future Vision

Communities have a dense mix of services and amenities that include schools, stores, and workplaces within walking distance from home.

Green assets, like the tree canopy and Burns Bog, are protected and expanded as climate adaptation assets (providing cooling during heatwaves and reducing flooding by absorbing storm water).

Community access to nature within walking distance provides improved lifestyle and mental health benefits.

New buildings utilize energy efficient heating and cooling systems and are built with low embodied emissions.

Existing buildings including schools and homes are retrofitted to be energy efficient with healthy indoor air.

Waste

Current challenges:

- Difficult for people in multi-unit residential buildings to properly recycle or compost
- Illegal dumping
- Over-use of plastic and Styrofoam containers

Future Vision

All homes, including multi-unit residential buildings, can easily and effectively recycle and divert organics.

Landfill lifespan is extended as waste is diverted.

Collection services transition to zero emissions.

From the survey:

80% feel it is important for the City of Delta to assist residents and businesses to prepare for the impacts of a changing climate.

82% agreed with the statement, "I am concerned about the effects of climate change on Delta".

Over **70%** show support for actions that address equitable access to climate solutions.

> ***"Action on climate change needed now. For a suburban area where transportation amounts to a large amount of GHG emissions, things like car share programs in neighbourhoods, increased transit to get downtown are needed."***
>
> ***- Survey Respondent***

Phase 2 – Community priorities

From the survey:

83% agree it is important for the City to do more to ensure new buildings are energy efficient and have low carbon heating systems.

The top two most-supported actions in this category were: encourage the preservation of natural assets like trees to offer cooling during hot weather (74%), and adopt the BC Energy Step Code to require energy efficiency in new buildings (69%).

83% agreed it is important for the City to support active and assisted transportation (walking, cycling, rolling, etc.).

The top two most-supported actions in this category were: build safe routes for walking (69%), and build safe routes for cycling (68%).

With opportunity to add short answers, many respondents articulated broad concerns around affordability and the potential high cost of taking climate action.

Some noted that even though they agreed the actions were important, they were concerned about the impact on cost alongside rising prices.

"My neighbourhood is a bit of a commuter suburb and mostly single-family housing with daily shops outside of walking distance. More residential density near existing retail areas would work well here as well as more mixed use and medium density in single family neighbourhoods." **- Survey Respondent**

"Make sure that public transit is aligned with future developments." **- Survey Respondent**

Phase 2 – Youth priorities

From the survey:

69% feel hopeful when they hear about solutions to environmental problems.

61.5% feel worried about how climate change will affect their future.

98% feel it is important for the City to add more trees, and create protections for trees as natural assets.

97% feel it is important for the City to help residents reduce garbage that goes to landfills.

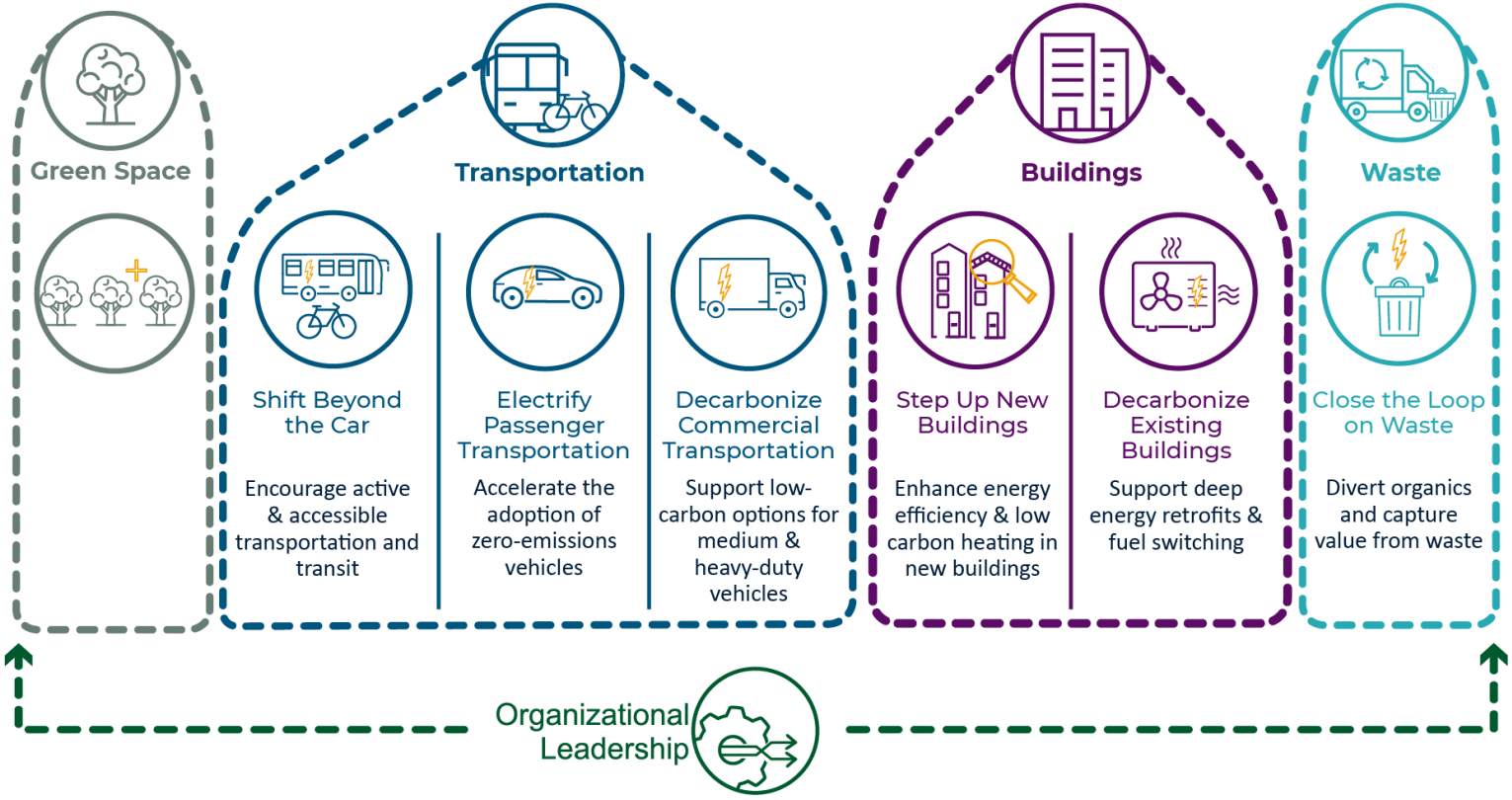
"[citizens in Delta] need to know why a community free of emissions, a community that supports its ecosystem to the same extent as it's economy, and a community that offers greater support for fish and wildlife, is a NECESSITY." **– Grade 10 student**

"A healthy Delta looks like lots of trees, good parks, and no violence." **- Grade 6 student**

"A healthy Delta would have NO trash and there would be more people walking or biking. I feel like we really need to start doing more about climate change. I want more people to bike and walk instead of driving." **- Grade 6 student**

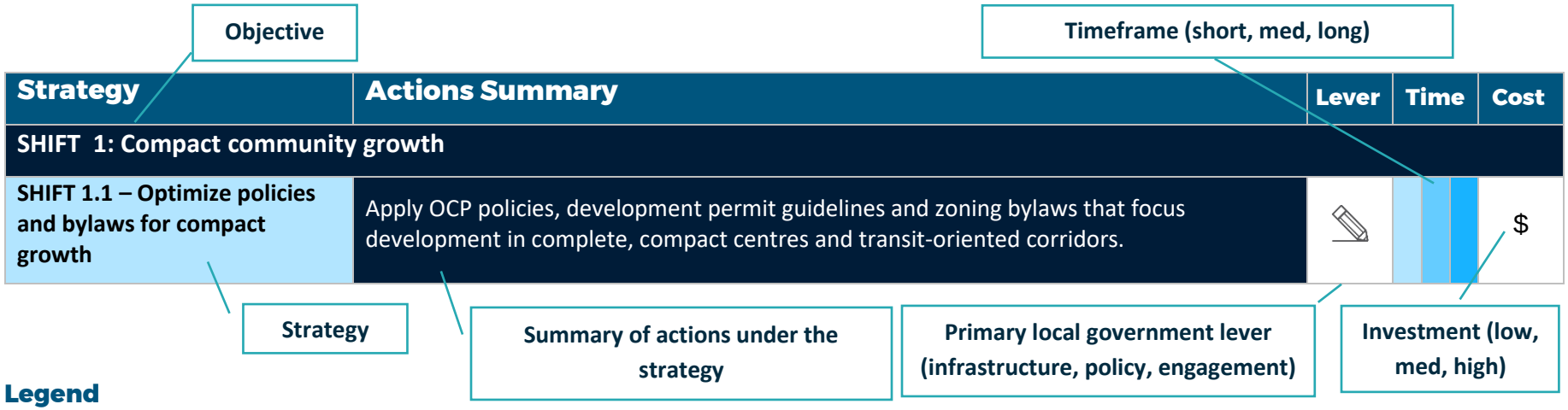
6. Action Plan

The CEEP is organized into six "Action Categories" to address the *way we move*, *where we live and work*, and *what we do with waste*. These six action categories tackle the biggest sources of community emissions (i.e., Transportation, Buildings and Waste). Most importantly, the implementation of most of these actions is in control of local governments. Each "Action Category" has a vision and objectives as well as specific actions the City can take to lay the foundation for individuals and businesses to make clearer choices. For this particular action plan, an additional action for Urban Tree Canopy has been included to recognize Delta's commitment to 40% land area coverage by 2050.



Action Plan Guide

The following pages outline each of the six key action categories – and their associated objectives, strategies and actions – organized by sector (transportation, buildings, and waste). Below is an example of a strategy from Shift Beyond the Car, showing the types of information displayed.



Legend

Lever		Timeframe				Cost	Definition	
Infrastructure		Short (1-2 years)				Low	<$25,000	$
Policy & Regulation		Medium (3-5 years)				Med	$25,000 - $100,000	$$
Engagement & Outreach		Long (5+ years)				High	>$100,000	$$$

Notes:

- Lever: Many strategies utilize more than one local government lever. The following tables show only the primary lever; however, Appendix 1: Implementation Plan Details, indicates all levers involved.
- Timeframe: Many strategies span more than one timeframe, with some actions starting in the short term and full deployment of the strategy occuring in the longer term.

Costs and Benefits of Actions

Cost of actions (low/medium/high) are meant to reflect the City's costs for implementing a specific action, and not necessarily costs for the residents, property owners and/or businesses, which would likely be different than the City's costs. It is also important to note that implementing climate actions would also have significant benefits for the community and businesses, including air quality/health benefits and long-term cost savings that would accumulate over the years.

Transportation – The Way We Move

Vision:

A complete zero-emission transportation system that connects our community and region.

Current State:

Vehicles are responsible for 67% of the greenhouse gas emissions generated from residents and businesses in Delta. Transportation fuels such as gasoline and diesel are the largest expenditure on energy in the community at $282 million per year.

Key Actions for Transportation

Shift Beyond the Car	Electrify Passenger Transportation	Decarbonize Commercial Transportation
		
Encourage active and accessible transportation and transit.	Accelerate the adoption of zero-emission vehicles.	Support low carbon options for medium and heavy-duty vehicles.

The Way We Move

Shift Beyond the Car

Encourage active and accessible transportation and transit.

Overview

Walking and cycling are not just weekend recreational activities – they are viable, beneficial, economical and environmentally-friendly modes of transportation. Delta can design and build well-connected, accessible, safe and enjoyable routes, which are already being considered as part of the Downtown Revitalization Plan. This will encourage residents and visitors to choose an active mode of travel such as walking and cycling. Good sidewalks, bike lanes, and trails make active transportation a viable choice when traveling through neighbourhoods, communities, and town centres. The same infrastructure also affords access for those who use mobility aids, such as scooters and wheelchairs.

Planning for a zero-carbon transportation system requires a paradigm shift. Rather than solve traffic and infrastructure problems by expanding roads or building more of them, communities can support all transportation options and facilitate alternative travel choices that reduce the need for more, or bigger roads. Not only does this reduce transportation-related emissions, but this shift can also result in reduced infrastructure and maintenance costs down the road.

Looking Forward to 2030 – An Aspirational Target

- 13 commutes per person-year removed through more accessible active transportation, transit, and shifts in land use, (equivalent to 7.3 million vehicle kilometres travelled (VKTs) each year), building to 105 commutes per person by 2030.
- Streets have been reimagined to prioritize active, public and low carbon transportation options.
- New neighbourhoods are designed to maximize car-free options, and are fully connected via bike paths and transit options.
- Appropriate facilities for bike storage and e-bike charging are located in strategic hubs to support emission-free commuting.

Objectives

1. Optimize land use planning tools to enable compact community growth
2. Enable walking, cycling and other forms of zero emission mobility
3. Promote transit ridership and support a zero emissions transit network

Provincial Action

As part of the Province of British Columbia's commitment through **CleanBC** to embrace clean and renewable energy across the board, the government developed **Move Commute Connect – B.C.'s Active Transportation Strategy.** The strategy established a new target for active and assisted transportation:

> *By 2030, double the percentage of trips taken with active transportation*

Federal Action

The Government of Canada's **Pan Canadian Framework on Clean Growth and Climate Change** commits to supporting a shift from higher- to lower-emitting modes of transportation as well was investing in infrastructure.

Strategies for Shifting Beyond the Car

Strategy	Actions Summary	Lever	Time	Cost
SHIFT 1: Optimize land-use planning for compact community growth				
SHIFT 1.1 – Optimize policies and bylaws for compact growth	-Update and develop OCP policies, development permit guidelines, and zoning bylaws that focus development in complete, compact centres and transit-oriented corridors.			$
SHIFT 2: Increase walking, cycling and other forms of zero emission mobility				
SHIFT 2.1 – Encourage active transportation through plans and policies	-Update Sidewalk Master Plan and identify gaps in the network. Implement supportive policies such as a Complete Streets Policy and updated Subdivision and Development Standards Bylaw and others to increase AAA (All Ages and Abilities) infrastructure.			$
SHIFT 2.2 – Build safe routes for walking, cycling and other forms of zero emission mobility	-Continuously improve active transportation infrastructure including reconfiguring existing streets and building safe and convenient active transportation paths to connect all neighbourhoods through implementation of Cycling Master Plan and related initiatives.			$$$
SHIFT 2.3 – Deliver an active transportation outreach strategy	-Connect with community members, including youth, to learn about their active transportation needs. Dedicate staff time for promotion and education around active transportation.			$
SHIFT 2.4 – Normalize car-free and zero-emission zones	-Explore implementation of car-free zones in areas that main community events are held to provide safe, clean and healthy environment for public enjoyment.			$$
SHIFT 2.5 – Promote micro e-mobility and on-demand mobility services	-Explore when and where on-demand services are most useful, remove policy barriers and update bylaws. -Host awareness events for e-bikes (and other forms of micro mobility) and work with vendors.			$
SHIFT 3: Increase transit ridership and support a transition to a zero emissions transit network				
SHIFT 3.1 – Collaborate with transit providers to improve and promote transit ridership	-Continue to work with Translink to increase the frequency of reliable bus services. Promote transit ridership by offering free transit days and celebrating new routes. -Expand promotion of Delta's Seniors Bus, which is free for senior citizens. Ultimately explore safe, universal free transit for all students.			$$
SHIFT 3.2 – Collaborate with transit providers to transition	-Work with Translink and neighbouring communities to accelerate transition to zero emission vehicles (e.g. electric buses and shuttles).			$

to a zero-emissions transit network and services	-Work with school districts and service providers to transition all school buses to electric/zero-emission buses.					
Total annual GHG emissions reductions for this action category: 9,100 $tCO2_e$ in 2030						

Safety was the highest ranked action to encourage use of non-vehicle transportation.

The Way We Move

Electrify Passenger Transportation

Accelerate the adoption of zero-emission vehicles

Overview

Zero-emission vehicles (ZEVs) are clean, efficient, and cost-effective. In British Columbia, where at least 94% of all electricity is renewable and non-emitting, electric vehicles (EVs) are already a viable near zero-emission option.

Local governments can make zero-emission vehicles an easier choice for residents and businesses by investing in infrastructure, enacting supportive policies, and by engaging with companies and organizations that operate large fleets, such as car-sharing and ride-hailing providers. Local governments also deliver community outreach and education on zero-emission transportation choices.

If every British Columbia local government implemented this Key Action, by 2030 they would collectively reduce the province's total greenhouse gas emission inventory by 1.5 to 2 million tonnes because it would be equivalent to removing half a million internal combustion engine (ICE) vehicles from our roads. At the Delta level, this move could remove 21% of emissions by 2030, or 20,800 ICEs from the road.

Looking Forward to 2030 – An Aspirational Target

- 2,600 passenger vehicles each year are switched to zero-emission, 20,800 by 2030.
- New buildings are required to provide an electrified, dedicated service for EV charging.
- A robust and strategically designed charging network ensures infrastructure is available at workplaces and public parking spaces.
- City of Delta continues to demonstrate leadership by prioritizing electric for their fleet replacement policy and all service contracts require low emission vehicles as part of municipal contracts.

Objectives

1. Enable charging on-the-go
2. Enable charging at home and work
3. Encourage EVs through outreach and supportive policies

Provincial Action

In May 2019, the Province enacted the ***Zero-Emission Vehicles Act*** to follow through on the transportation commitments in its **CleanBC** climate plan. The legislation requires 100% of all new light-duty cars and trucks sold or leased in British Columbia to be zero-emission by 2040. In 2023, the Province updated this requirement to align with the federal regulation.

The Province established its **Clean Energy Vehicle Program** to support the transition. The program provides incentives to reduce the price of new zero-emissions vehicles and charging stations, and works to raise awareness of the benefits of such vehicles. businesses.

Federal Action

In June 2021, the Government of Canada mandated 100% of passenger cars and trucks to be zero-emission by 2035.

Strategies for Electrifying Passenger Transportation

Strategy	Actions Summary	Lever	Time	Cost
ELECTRIFY 1: Enable charging on-the-go				
ELECTRIFY 1.1 – Design, fund and build a public EV charging network	-Collaborate with other local governments on a regional charging network strategy. -Leverage grant opportunities to install EV charging stations at key locations throughout the community.			$$$
ELECTRIFY 2: Enable charging at home and work				
ELECTRIFY 2.1 – Adopt EV-ready building requirements	Revise the Zoning Bylaw to extend EV ready requirement to include visitor and car-share parking stalls.			$
ELECTRIFY 2.2 – Enable EV charging in existing residential and commercial buildings	-Work with utilities, community partners, stratas and property management companies on navigating the process to retrofit existing parking stalls with EV charging equipment. -Explore incentives and rebate opportunities that complement provincial EV charging rebate programs			$
ELECTRIFY 3: Encourage EVs through outreach and supportive policies				
ELECTRIFY 3.1 – Expand existing EV outreach strategy	-Accelerate EV adoption within the community through incentives/perks and awareness campaigns. -Partner with other organizations to host engagement events such as test-drives and ride-alongs. -Continue to educate builders and developers on EV charging requirements through open houses and workshops.			$
ELECTRIFY 3.2 – Accelerate EV adoption through supportive policies and incentives	Educate and incent ride hailing, taxi operators and other fleet operators to switch to EV's.			$
Total annual GHG emissions reductions for this key action category: 33,700 $tCO2_e$ in 2030				

The Way We Move

Decarbonize Commercial Transportation

Accelerate the transition to zero emission medium and heavy-duty vehicles

Overview

Local government impact on this sector is currently limited due to lack of availability of commercial-sized electric vehicles, and commercial fleets being owned and operated either privately or from other orders of government.

Looking Forward to 2030 – An Aspirational Target

- Commercial fleets have leveraged their investment in charging infrastructure to establish high-powered charging hubs.
- Transit buses and school buses are electric, providing clean, emission-free travel options for the young and old.

Objective

1. Accelerate the adoption of zero-emission vehicles for commercial fleets
2. Lead by example by transitioning municipal fleet

Provincial Action

10% of heavy-duty vehicles electric by 2030

94% of buses electric by 2030

16% of heavy-duty vehicles run on LNG

Provincial low carbon fuel standard

Federal Action

Tailpipe reduction standards – 40% reduction in tailpipe emission intensity by 2025 from 2015 levels

Strategies for Decarbonizing Commercial Transportation

Strategy	Actions Summary	Lever	Time			Cost
COMMERCIAL 1: Accelerate the adoption of ZEVs for commercial fleets						
COMMERCIAL 1.1 – Develop a community vision and strategy for commercial ZEV infrastructure	- Work with Metro Vancouver to develop a long-term strategy and set zero-emission sales targets for medium and heavy-duty trucks. Work with BC Hydro and key stakeholders to carry out a needs assessment for commercial/institutional areas to ensure that the need for appropriate infrastructure and electrical supply for future demand is addressed.					$
COMMERCIAL 1.2 – Engage commercial and industrial stakeholders	-Support a pilot fleet electrification program with a commercial/industrial partner. -Work with Port of Vancouver and other stakeholders to decarbonize Heavy Duty Vehicles serving the Delta Port.					$$
COMMERCIAL 2: Lead by example by transitioning municipal fleet						
COMMERCIAL 2.1 – Update corporate policies to prioritize low carbon options	-Review and integrate contractual requirements for municipal services to require lower emissions vehicles, increasing over time; -Update purchasing guidelines to require life cycle cost analysis for new vehicle purchases including price of carbon for the analyses of options.					$$$
Total annual GHG emissions reductions for this key action category: 5,300 $tCO2_e$ by 2030						

Electrification of the municipal fleet was selected by 76% of the public.

Buildings – Where We Live and Work

Vision:

Our community's buildings are exceptionally energy efficient, and powered, heated and cooled with 100% renewable energy.

Current State:

Our homes and commercial buildings are responsible for 31% of the greenhouse gas emissions generated in City of Delta. The main source of emissions is natural gas used for space and water heating, responsible for 95-100% of all emissions.

Key Actions for Buildings

Step Up New Buildings	Decarbonize Existing Buildings
Enhance energy efficiency and low carbon heating in new buildings	Support deep energy retrofits and fuel switching

Where We Live and Work

Step Up New Buildings

Enhance energy efficiency and low carbon heating in new buildings

Overview

While existing buildings generate the majority of building-related greenhouse gas emissions, local governments have greater authority to influence new construction. They can do so via the *BC Energy Step Code and BC Zero Carbon Step Code*, a section of the *BC Building Code* that local governments may use to require or incentivize better-than-code energy and emissions performance in new construction. The Energy Step Code is a great tool for improving overall building energy performance, while the Zero Carbon Step Code explicitly address emissions from new buildings.

City of Delta's population is growing at a rate of 0.98%. Every new building built to minimum code standards is a lost opportunity for improved energy efficiency and reduced carbon emissions and is one more building that will have to be retrofitted down the road.

Looking Forward to 2030 – An Aspirational Target

- All new buildings (~450/year, 3,600 by 2030) will be built to Step 4 of the Energy Step Code (40% more efficient), and 90% of our community's new buildings (400/year, 3,200 by 2030) will use only zero carbon energy sources for space and water heating. The building industry is now focused on whole building performance, as opposed to prescriptive code requirements.
- Energy performance is quantified and verified, so homeowners and buyers now have a better understanding of the long-term operationing cost of the home.
- Homes are quiet, comfortable and durable. Energy costs are minimized through efficient design that reduces demand.

Objectives

1. Enhance Energy Step Code adoption to include Zero Carbon Step Code
2. Build industry capacity

Provincial Action

The province's CleanBC climate plan outlines the dates when the base *BC Building Code* will adopt BC Energy Step Code performance targets:

- In 2022, all new buildings will be 20% more energy efficient than those built to meet today's minimum code requirements.
- By 2027, all new buildings will be 40% more energy efficient
- By 2032, all new buildings will be "net zero energy ready".

CleanBC **Better Homes** links homeowners and residential builders to rebates and resources, and CleanBC **Better Buildings** provides funding and capital incentives to encourage energy efficient design, construction and renovation in larger buildings.

Federal Action

Natural Resources Canada's ***Build Smart: Canada's Buildings Strategy*** establishes the goal that all provinces and territories will adopt a net-zero energy-ready model building code by 2030.

Strategies for Stepping Up New Buildings

Strategy	Actions Summary	Lever	Time	Cost
NEW BUILDINGS 1: Adopt the Energy Step Code with a Low Carbon Approach				
NEW BUILD 1.1 – Adopt the Energy Step Code	-Adopt policies such as High Performance Buildings Policy and programs to require and incentivize (e.g., density bonus, reduced fees) adoption of higher steps than what is required by the base code. -Develop incentives for all new buildings to meet the top performance level of BC Building Code in advance of the requirement coming into force in 2030.			$
NEW BUILD 1.2 – Adopt Zero-Carbon Step Code	-Review options to implement Provincial zero-carbon step code for new buildings -Incentivize and/or require moderate, strong, or zero carbon performance in new construction (e.g., Step 3 with low carbon energy system).			$
NEW BUILDINGS 2: Build Industry Capacity				
NEW BUILD 2.1 – Provide outreach and incentives	-Promote existing Clean BC new construction incentives and provide additional incentives to subsidize costs of working with an Energy Advisor and/or mid-construction testing. -Educate builders and support training for construction of high performance buildings. -Raise awareness about the benefits of electrification and low carbon approaches.			$$
NEW BUILD 2.2 - Adopt Bylaws to minimize embodied emissions in building materials NEW BUILD 2.3 – Provide training and coordination	-Work with industry and neighbouring local governments to implement low carbon building materials while ensuring no impact to housing affordability. -Collaborate across the region to provide relevant training to the building industry and realtors. Assemble a list of local or regional Energy Advisors*.			$
Total annual GHG emissions reductions for this key action category: 8,900 $tCO2_e$ by 2030				

*https://energystepcode.ca/energy-advisors/#find

Adoption of the BC Energy Step Code was the most endorsed action, selected by 84% of the public.

Where We Live and Work

Decarbonize Existing Buildings

Support deep energy retrofits and fuel switching

Objectives

1. Improve energy efficiency
2. Encourage and enable fuel switching
3. Build industry capacity and increase demand

Overview

In 2030, 90% of all the buildings in the City of Delta will be ones that are already standing today. Many buildings use more energy than is necessary. Owners of 20-year-old gas-heated homes can lower their energy bills by as much as 30% through energy efficiency retrofits and reduce about 1.8 tonnes of greenhouse gas emissions per year. Homeowners can pursue various degrees of building energy retrofits— from replacing individual pieces of equipment to comprehensive overhauls of the whole building, known as deep energy retrofits.

Deep energy retrofits involve changes to the entire building, including insulation, windows and doors, and air barrier, as well as ventilation and space and water heating equipment. To ensure emissions reductions as well as energy reductions, the energy retrofit must include fuel switching, from fossil fuel sources to zero-carbon sources such as electricity and low carbon gases. Such projects usually rely on the expertise of an energy advisor, who conducts energy modelling and airtightness testing.

City of Delta has limited jurisdiction over requirements for existing building retrofits but has an opportunity to influence and enable building owners to make investments in the energy efficiency of their buildings.

Provincial Action

CleanBC **Better Homes** links homeowners and renovators to rebates and resources, and CleanBC **Better Buildings** provides funding and capital incentives to encourage energy efficient renovation in larger buildings. The Province is currently working on an Existing Buildings Renewal Strategy, which will enable increased energy efficiency retrofits in the existing building stock.

Federal Action

The **Canada Greener Homes Grant** provides grants for energy efficiency upgrades and up to $600 for pre- and post-retrofit EnerGuide assessments. The program also supports training Energy Advisors across Canada to meet increasing demand.

Looking Forward to 2030 – An Aspirational Target

- 1,100 homes and 150 businesses (3%) each year will undergo deep retrofits (8,800 homes and 1,200 businesses by 2030).
- 570 fossil fuel-heated homes and 60 businesses (2%) each year will convert their fossil-fuel heating and hot water systems to zero emissions, powered by either electricity or locally sourced renewable gas (4,550 homes and 480 businesses by 2030).

Strategies for Decarbonizing Existing Buildings

Strategy	Actions Summary	Lever	Time	Cost
EXISTING BUILDINGS 1: Improve Energy Efficiency				
EXISTING BUILD 1.1 – Encourage and enable deep energy retrofits.	- Work with Metro Vancouver and other regional and community partners to jointly implement regional building retrofit programs where appropriate, including low-interest financing. - Educate building owners about how to make their home or business more energy efficient and the benefits of doing so, including resources such as *Better Homes* and *Better Buildings BC*. Help building owners to understand the rebates and incentives available. -Advocate for financing options such as Property Assessed Clean Energy (PACE) to assist homeowners with implementation of energy retrofits. -Work with Metro Vancouver and other partners to advance energy and emissions performance reporting and disclosure requirements for existing buildings. -Review options to require energy benchmarking and home energy labelling for new and existing buildings offered by the province.			$-$$
EXISTING BUILDINGS 2: Encourage and Enable Fuel Switching				
EXISTING BUILD 2.1 – Encourage and enable building electrification	-Work with partners to improve building electrification awareness, coordination, and advocacy among key stakeholders. -Identify and remove barriers to heat pump installation, including streamlining permitting processes, optimizing noise regulations, and restructuring permit fees. -Review options to further promote Provincial air source heat pump incentives and potential municipal incentives.			$
EXISTING BUILDINGS 3: Build Industry Capacity and Increase Market Demand				
EXISTING BUILD 3.1 – Establish a long-term marketing campaign	Establish a 10-year program for a community-wide marketing campaign to encourage deep energy retrofits (e.g., building envelope improvements), electrification or other low carbon fuel sources.			$$
EXISTING BUILD 3.2 – Build industry capacity	Educate renovators and realtors on energy efficiency and low carbon choices for space and water heating.			$
Total annual GHG emissions reductions for this key action category: 46,500 $tCO2_e$ by 2030				

Waste – How We Manage 'Waste'

Vision:
Our community diverts all of our organic waste, such as food scraps and yard trimmings, from landfills and recovers value from everything that enters the waste stream.

Current State:

Organic landfill waste accounts for 1% of our community's GHG emissions. Curbside residential organic and yard waste pick up already exists, and residents can collect 1 cubic metre of compost from the Vancouver Landfill each year.

Key Action for Waste

Close the Loop on Waste

Divert organics and capture value from waste

How We Manage Waste

Close the Loop on Waste

Divert organics and capture value from waste

Overview

Emissions from waste occur when organic waste mixed in with garbage decomposes in the landfill and produces methane, a potent greenhouse gas that is released into the atmosphere. Organic waste makes up about 30-40% of landfill waste, and includes food waste from homes and businesses, yard and garden waste, wood waste, and paper that cannot be recycled, such as food-soiled paper. Organic material decomposes over approximately 10 years in the local landfill. Organics diversion reduces or eliminates the new waste added every year but the waste that is already in place at the landfill continues its decomposition process. Because of this, it takes a number of years for the emissions reductions from organics diversion to scale up. Of course, how much waste is diverted (the diversion rate) is key to emissions savings.

The City of Delta already diverts organic waste from the landfill through curbside compost pickup, and offers residents one cubic metre of free compost per year. Nevertheless, multi-family buildings and commercial buildings (e.g. restaurants) are not included as part of this program, however some have contracts with private haulers for collection. There are also other technologies such as landfill gas capture, biogas digesters, gasification plants, and waste heat recovery systems which the City can explore. This key action investigates opportunities for these technologies regionally.

Objectives

1. Divert organics from the landfill
2. Explore other resource recovery technologies
3. Reduce waste by promoting circular economy practices

Provincial Action

The Province of British Columbia has committed to ensuring that, by 2030, 95% of organic waste will be diverted from landfills, and 75% of landfill gas will captured. The province has also committed to fund workforce training.

Federal Action

The Government of Canada, through its Investing in Canada Infrastructure Program (ICIP) provides funding for infrastructure that enables resource recovery, such as generating renewable fuel from waste.

Looking Forward to 2030 – An Aspirational Target

- All multi-family buildings and commercial establishments are included in organics diversion, either through curbside or private haulers
- All compost created is repurposed into high quality soil for use in local farms and gardens – This is already occurring for residential organics.

Strategies for Closing the Loop on Waste

Strategy	Actions Summary	Lever	Time	Cost
WASTE 1: Divert Organics and Wood Waste from Landfill				
WASTE 1.1 – Adopt policies that increase organics diversion	-Adopt organics diversion targets for the community to ramp up organics diversion from residential and commercial buildings.			$
WASTE 1.2 – Implement enhanced organics collection and processing	-Evaluate local opportunities for enhanced organic handling and diversion. -Explore opportunities to improve organic waste diversion from multi-family, such as installing central collection points that are regularly picked up for multi-family units.			$
WASTE 1.3 – Divert construction, demolition, and industrial wood waste	-Work with the City of Vancouver to continue to evaluate and implement options to recover wood waste at the landfill from demolition waste processing and clean wood diversion.			$
WASTE 1.4 – Develop and deliver a comprehensive zero-waste outreach program	-Work with Metro Vancouver to expand on zero-waste outreach program to include community-led composting projects, school programs, participation in Regional “Love Food Hate Waste” campaign and education around source-separation requirements. -Educate and inspire residents and private sector to participate in “Circular Economy” and reduce waste by accelerating demand for circular process.			$$
WASTE 2: Maximize Landfill Gas Capture and Explore Other Resource Recovery/Utilization Technologies				
WASTE 2.1 – Evaluate and implement landfill gas utilization opportunities generation and local use of renewable natural gas	-Work with the City of Vancouver and other partners to explore opportunities to maximize landfill gas capture at the Vancouver Landfill. -Continue to work with the City of Vancouver, Metro Vancouver and Fortis BC to accelerate and maximize the renewable natural gas production at the Vancouver Landfill in Delta. -Encourage/promote the use of renewable natural gas locally in greenhouses, industrial facilities and residential/commercial buildings in Delta.			$$
WASTE 2.2 – Evaluate and implement other resource recovery opportunities	-Explore the opportunities for local generation and use of renewable natural gas from household organic waste.			$
Total annual GHG emissions reductions for this key action category: 10,300 $tCO2_e$ by 2030				

Additional Action: Green Space and Ecosystems

Green Space and Ecosystems

Capture Value from Natural Assets

Objectives

1. Expand Urban Tree Canopy
2. Continue Burns Bog Restoration
3. Promote Low Carbon Agriculture and Local Food Production

Overview

Natural assets can range from wetlands, forests, water bodies, and clean air, to people animals, and plants. Each municipality has their own unique natural asset inventory which, when strategically managed through land use policies and resource allocation, can be used to improve resilience against climate change, sequester carbon, enhance health and well-being of residents, and foster diverse ecosystems, potentially at a cost savings vs. prevailing asset management policies.

The City of Delta is intent on expanding its Urban Tree Canopy program to meet its 2050 goal of 40% coverage. This will help to reduce heat island effect, provide shelter from extreme heat events, sequester carbon, remove pollutants from air, and improve overall health of residents. As of this report, canopy coverage averaged across Delta's three urban centres is approximately 26%.

The City updated its agricultural plan in 2023. Goal 4 of the Delta Agricultural Plan 2023 has several recommendations focused on climate change policy and reducing emissions.

Provincial Action

The Province of British Columbia has developed the *Integrating Natural Assets into Asset Management* Primer to assist BC local governments in recognizing the value of natural assets to the overall well-being of a community and its members, along with untapped financial co-benefits.

Federal Action

The Government of Canada, through its Investing in Canada Infrastructure Program (ICIP) – Green Infrastructure Stream provides funding for infrastructure that utilizes or enhances natural assets.

Looking Forward to 2030 – An Aspirational Target

Delta's Urban Tree Canopy coverage increases from 26% to 32% in the City's three urban centres.

Strategies for Green Space and Ecosystems

Strategy	Actions Summary	Lever	Time	Cost
GREEN 1: Preserve Sensitive Ecosystems and Sequester Carbon				
GREEN 1.1 – Preserve ecologically sensitive areas within municipal boundaries	- Work with Metro Vancouver and other partners to further enhance and quantify the GHG reduction potential of the Burns Bog Ecological Conservancy Area.			$$
GREEN 1.2 – Protect green space and enhance the ability of natural systems to sequester carbon	- Develop and implement strategies to protect the carbon stored by natural systems and enhance their ability to increase carbon storage.			$$
GREEN 1.3 – Continue to implement Urban Forest Strategy	- Grow the urban forest by continued tree planting throughout the community as per Delta's Urban Forest Strategy. - Form strong partnership with Delta School District to engage youth in protection and expansion of urban forest tree canopy. - Enhance community awareness of the value of Delta's urban forest			$
Total annual GHG emissions reductions for this key action category: 7,100 $tCO2_e$ by 2030				

Strategies for Low Carbon Agriculture and Local Food Production

Strategy	Actions Summary	Lever	Time	Cost
AGRIC 1: Promote and Incentivize Low Carbon Agriculture Practices and Local Food Production				
AGRIC 1.1 – Support low carbon agriculture practices	-Work with the agriculture industry to encourage adoption of low-carbon agricultural practices. -Implement recommendations (specifically Goal 4) in Delta Agricultural Plan 2023.			$

AGRIC 1.2 – Adopt policies to further protect agricultural land and expand local food production.	-Recommend changes to Delta's current Official Community Plan policies and zoning bylaw as needed to support and protect the long-term viability of local agriculture and expansion of local food production					$
AGRIC 2: Support Sustainable Management Practices to Store Carbon and Recover Resources						
AGRIC 2.1 – Support use of renewable natural gas and carbon dioxide from Vancouver landfill in greenhouses.	-Explore opportunities for maximum utilization of Renewable Natural Gas (RNG) and CO_2 from the landfill and other anaerobic processes that may offer significant greenhouse gas reduction benefits and growth enhancement in greenhouses.					$
AGRIC 2.2 – Explore sustainable management practices for agricultural waste/biomass	-Encourage use of agricultural residues/biomass as a source of bioenergy to minimize waste disposal and/or uncontrolled environmental discharges (e.g., open burning).					$$
AGRIC 2.3 – Encourage expansion of anaerobic digestion and production of biogas/renewable natural gas from animal and other agricultural waste.	-Facilitate and incentivize the expansion of the RNG production capacity for anaerobic digestion of animal waste from livestock.					$$
AGRIC 2.4 –Encourage best management practices to increase carbon storage potential of agricultural land.	-Continue to work with the Delta Farmland and Wildlife Trust to implement best management practices for soil management in agricultural land.				x	$
Total annual GHG emissions reductions for this key action category: 15,000-25,000 $tCO2_e$ by 2030*						

* A range of potential GHG emission reductions provided due to large uncertainties in GHG benefits of key actions in the agricultural sector.

7. Organizational Leadership

Implementation for Success

Several key factors are important for the successful implementation of community energy and emission reduction plans based on research conducted by CEA, QUEST, and Smart Prosperity.[2] Among others, they include establishing broad support for implementation, building staff and financial capacity for implementation, and institutionalizing the plan in order to withstand political and staff turnover.

With regards to institutionalization, ideas on how this can be done are shown in the table below.

Table 1 – Institutionalizing Climate Change at the Local Level

Incorporate	Embed climate action into other planning documents such as the OCP, bylaws and policies, departmental/master plans, as well as development proposals. A Corporate Climate Action Plan is an effective way for the City to demonstrate leadership by taking action on its own assets; the City of Delta will be renewing its Corporate Plan, and has been carbon neutral since 2012. Climate action could also be incorporated into City staff job descriptions.
Budget	Embed climate action into the budgeting process.
Monitor	Monitor indicators as outlined in the Monitoring and Evaluation section.
Convene	Host regular meetings to discuss implementation, innovative technology and methods, new legislation, and necessary pivots with internal and/or external stakeholders.
Report	The City already reports to Council annually on climate action progress and accomplishments.
Renew	Prepare for plan review and update approximately every five years.

Monitoring and Evaluation

Monitoring and evaluating the implementation of the CEEP is critical for its success. Key Performance Indicators (KPIs) enable communities to measure the outcomes of a plan's implementation. When KPIs are monitored regularly, communities can determine how to best allocate resources to support implementation, and what success different actions are having.

Suggested indicators can be found in Appendix C.

[2] Community Energy Implementation Framework, https://questcanada.org/project/getting-to-implementation-in-canada/?dc=framework

Funding

Funding sources that communities have used for climate action are shown in the table below.

Internal Funding Sources	External Funding Sources
1. LGCAP (Local Government Climate Action Program) 2. Allocation from operating budget 3. Revolving energy efficiency fund (from corporate projects) 4. Forgone revenue (charge less for a municipal service to use the difference to fund a climate initiative) 5. General revenue (e.g. property taxes) 6. Recycling and solid waste user fees 7. Building permit fees and other service fees charged by Development Services 8. Electrical utility and water user fees	1. UBCM Gas Tax Agreement Funds 2. FCM's Green Municipal Fund supports plans, studies, capital projects and pilot projects for environmental initiatives in a number of focus areas 3. FCM Community Efficiency Financing Program for financing community-scale retrofit infrastructure 4. Federal government programs such as the Greener Homes Grant, Low Carbon Economy Challenge, and Clean Energy Innovation Program 5. Provincial government programs such as the Clean Energy Vehicle Program, BikeBC Program, and CleanBC Communities Fund 6. Emotive grants for EV educational events to foster greater EV adoption 7. CleanBC and FortisBC energy efficiency incentives for new home construction and for increasing energy efficiency in existing buildings 8. BC Housing and FortisBC for education or demonstration projects to encourage the building industry to construct low energy and GHG emission homes. 9. FortisBC free energy grants for municipal buildings, and subsequent rebates for retrofits

Forecasting: Action Plan Projections

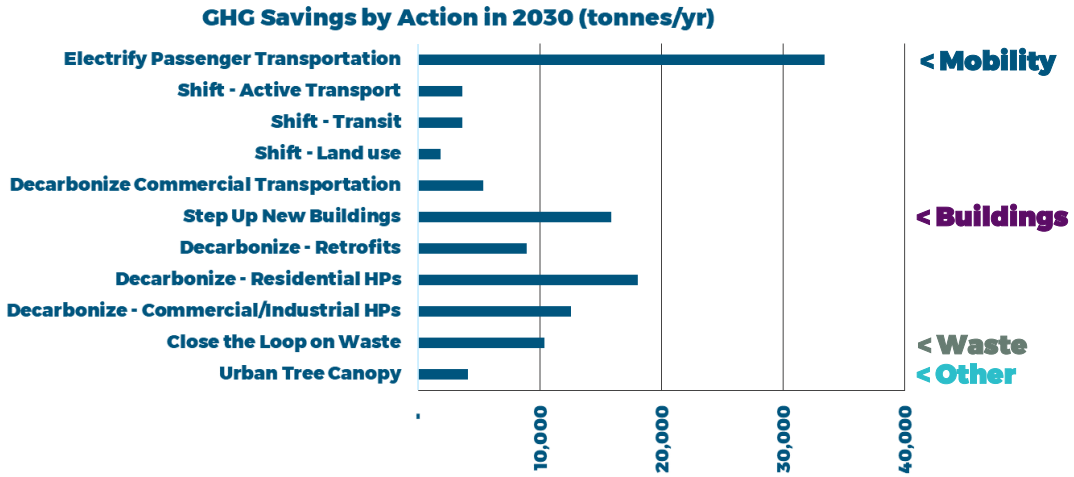


Figure 7 – GHG Savings By Action, tonnes/yr

Figure 7 shows the modelled emissions reduction by Key Action for the year 2030, relative to BAU projections.

If all Key Actions are implemented in Delta to the degree outlined in this Plan, GHG emissions in 2030 could be reduced by approximately 251,000 tonnes of CO_2e below 2007 levels, a total reduction of 34%, which is still short of the 45% reduction target. Delta's high proportion of commercial transportation, combined with the lack of mature low-carbon options for this sector, accounts for most of this gap. As more low-carbon technologies become available for the commercial transportation sector, the emissions gab is expected to diminish rapidly.

Whilst the BAU scenario assumes a certain level of passenger vehicle electrification, this Key Action still presents the highest emission reductions at 33,400 tonnes CO_2e of mobility fuels, primarily gasoline, while the collective actions from Shift Beyond the Car reduce an additional 9,100 tonnes. Retrofitting the existing building stock by fuel switching and improving energy efficiency presents savings of 15,900 and 30,600 tonnes respectively, or 46,500 tonnes in total. Zero-carbon new buildings, combined with accelerated Step Code adoption, add an additional 8,900 tonnes.

Figure 8 shows the emissions reduction by Key Action to 2050 relative to the BAU. By 2050, the Key Actions are expected to reduce emissions by 223,300 tonnes CO_2e vs. the 2050 BAU, for a net reduction from 2007 levels of 463,300 tonnes CO_2e, resulting in a 73% reduction vs. 2007 baseline. Note that although the 2050 emission reduction target is not met, it is anticipated that new technologies and levers will become available in the future which will enable Delta to achieve the target.

The modelling methodology is described in detail in 0.

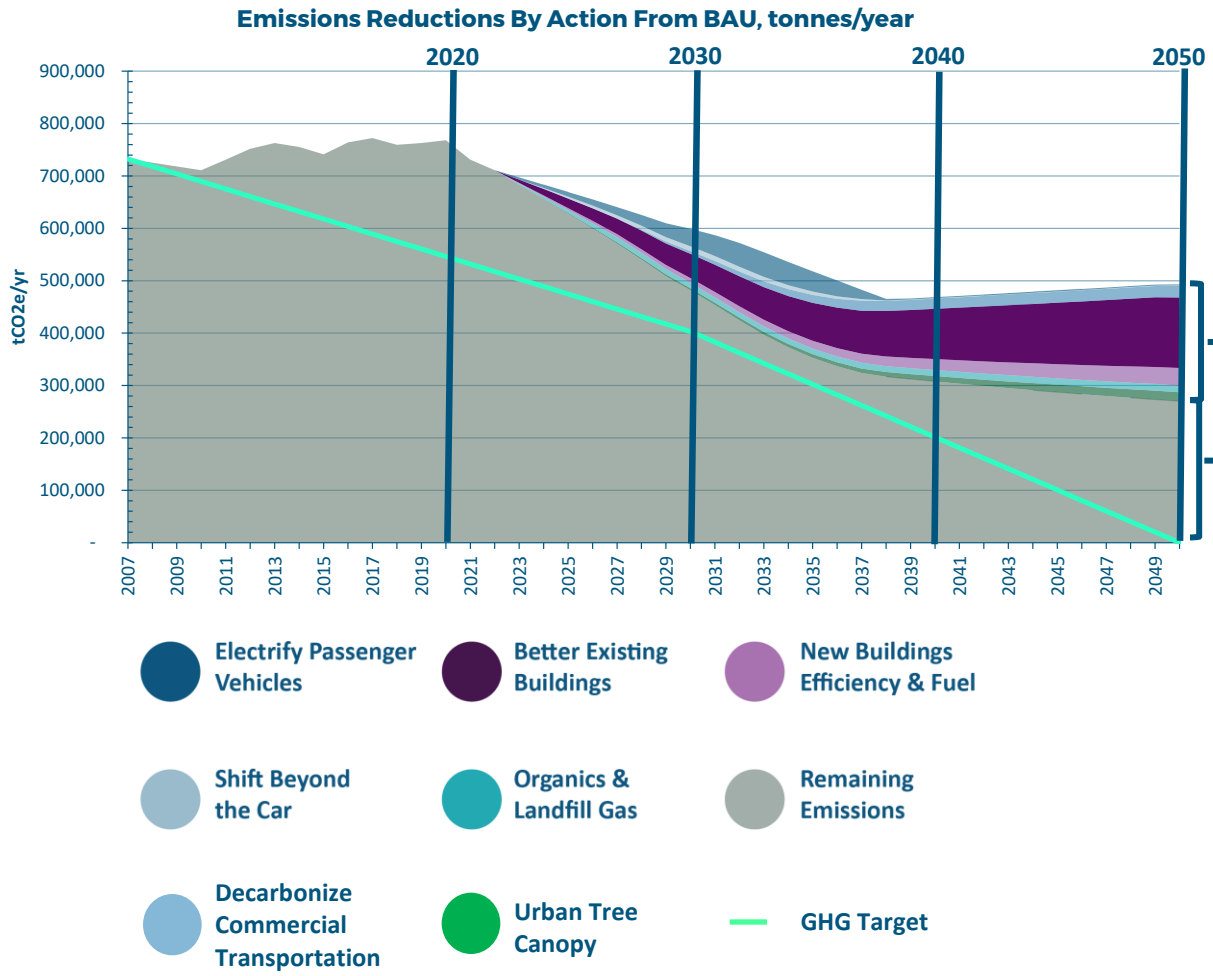


Figure 8 – Emission Reductions by Key Action to 2050

Emissions reductions over time

Eliminating fossil fuels from transportation and heating are key actions moving forward, with actions to reduce emissions from community buildings having the biggest impact on reaching targets.

Remaining Emissions

Tackling remaining emissions between 2040 and 2050 will come from added support at a provincial and federal level and technological improvements. The solutions and technology to reduce emissions in our community will grow and become more sophisticated over time. This will include new and innovative nature-based solutions to capture and store carbon and offsetting emissions.

What's important is that we get started now implementing proven solutions like the Key Actions to ensure we are well positioned to take advantage of emerging technology.

8. Climate Change Risks and Adaptation Considerations

Delta, like communities across Canada and across the planet, is expected to see changes in its climate. These changes will be experienced by residents as extreme weather and shifting seasons. Temperatures are expected to rise in each season and precipitation levels are expected to decline in summer and increase in other seasons. Thus, more extreme temperatures, wildfires, and droughts could occur in summer months. Storms, flooding, landslides and storm surges may also happen more frequently, and with greater severity. The City of Delta has recently been affected by climate change, particularly extreme weather events that resulted in wildfires, extreme heat and deteriorated air quality.

Increasing Delta's Resiliency to Climate Change Impacts

While the City of Delta is doing its best to reduce emissions, the City is also planning to increase its resilience to climate change impacts in order to adapt. A number of initiatives are already underway. Delta was one of three cities in Canada chosen by ICLEI Canada to take part in a pilot adaptation study to address corporate and community adaptation issues.

One of the key issues for Delta is *Flood Risk Management*. Low-lying communities and farmland located in South Delta are protected by more than 60 kilometers of dikes. Sea level rise and other extreme weather events are increasing the risk for flooding these areas. Designing and building robust flood control infrastructure has been a priority for Delta, and extensive research and planning efforts are executed to gather information for dike design and floodplain development planning.

Protection and Restoration/Enhancement of Natural Assets is another priority area for Delta. Burns Bog is one of the sensitive ecosystems that Delta has been working with a number of partners to conserve, restore and reduce the risk of fire. There are also significant efforts to increase the urban tree canopy. These efforts in urban areas not only help to reduce greenhouse gas emissions through carbon sequestration but also help increase a community's resilience to extreme heat and rainfall events.

Although this CEEP is focused primarily on mitigating greenhouse gas emissions that cause climate change, it is equally critical to properly prepare for climate impacts that are already happening. As highlighted in the previous section, the climate is changing and will continue to change in the future, and Delta will experience a variety of local impacts including community buildings and infrastructure, human safety and health, natural resource sectors (e.g. agriculture), and the water supply in Delta. Fortunately, many actions can accomplish both mitigation and adaptation, as shown in *Figure 9*. Evaluating adaptation strategies now and, where possible, complementary low emissions strategies, will help advance the City's overall resiliency and ability to respond and thrive over the short and long-term.

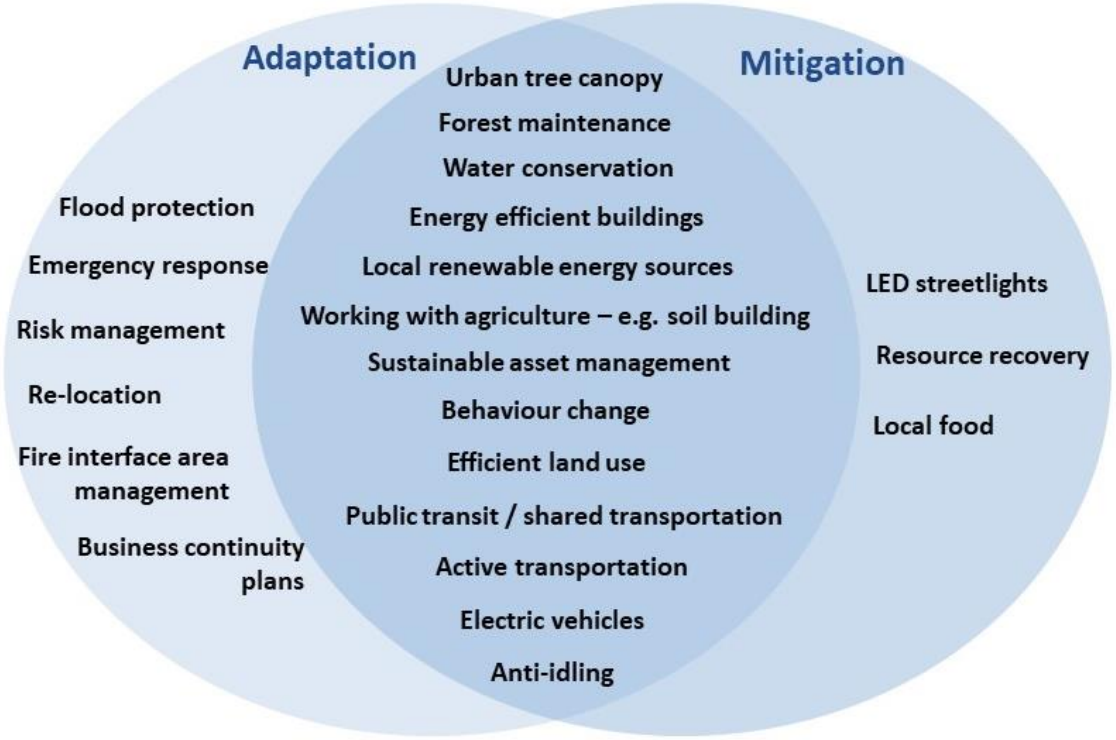


Figure 9 – Intersection between Climate Change Mitigation and Adaptation Actions

In addition to the adaptation measures being implemented, a wide range of strategies can be instituted by Delta and its partners to enhance resiliency and adapt to potential impacts, such as:

- Defining land-uses and bylaws to better protect buildings from sea level rise, storm surge, river flooding, hard stabilization structures (e.g. walls), soft measures (e.g. wetland restoration), vertical or lateral setbacks, and flood-proofing of buildings can be adopted. Higher building standards and maintenance also safeguard against extreme weather and weathering processes.
- Diversification or upgrading community infrastructure like drinking water, storm water and wastewater systems helps to withstand heavy precipitation and extreme weather events. Natural assets like wetland restoration can also minimize storm water run off. Storing excess water during heavy precipitation and instituting water conservation or water efficient technologies can address increased water stress.
- Encouraging the use of sustainable agricultural practices such as planting climate tolerant species and increasing the carbon content of soil (e.g. by promoting compost produced through organics diversion) could improve production levels considering changes in temperature and precipitation levels.

- The addition of more and strategically planned natural vegetation can help to cool communities.
- Early warning systems and emergency response plans alert residents to extreme heat, poor air quality, wildfires, and floods in advance in order to move them to safer locations. This also helps to minimize stress and anxiety and possible injuries or illnesses.

A National Roundtable on the Environment and the Economy report* explains that the climate change costs for Canada could rise from $5 billion/year in 2020 to $21-43 billion/year by the 2050s, or higher. Finding ways to adapt to climate change will help to reduce these costs.

Paying the Price: The Economic Impacts of Climate Change for Canada, http://nrt-trn.ca/climate/climate-prosperity/the-economic-impacts-of-climate-change-for-canada/paying-the-price

Appendices

Appendix A: Implementation Details

The following pages include *template* detailed actions for each of the key strategies. The actions are presented in four tiers: Tier 1 represents foundational actions that any community can begin with and Tier 4 represents full deployment of the strategy. The key actions would be considered fully deployed when all four tiers are complete. Highlighted columns indicate the level of implementation modelled in the City of Delta CEEP. Note that although some actions may not be specifically applicable to Delta, they are standard for representative communities in BC.

Municipal levers are noted for each strategy:

Infrastructure	Policy & Regulation	Engagement & Outreach
 Investments into the City of Delta owned infrastructure that enable residents to make lower-emissions choices, such as active transportation networks and public charging stations	 Changes to City of Delta policy and regulation that lead to energy and emission reductions in the community, such as requirements and incentives for enhanced energy efficiency in new buildings.	 Outreach, education and incentives that inspire residents and businesses to make choices to reduce energy and emissions and prepare for a low carbon future.

Transportation – Shift Beyond the Car

The combination of land use (being near where you need to go daily) and infrastructure (active and accessible paths & prioritization, transit) and policy (parking pricing) combine to shift from fossil vehicles to active accessible and transit. Land use policy effects are long term rather than short term partly due to the long time-scale of development.

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
SHIFT 1.1 **Optimize policies and bylaws for compact growth**  Lead: Development and Planning	✓ Review OCP and planned development to identify opportunities to further incent or require infill development ☐ Review employment locations and link location/land use to local economic development strategy ☐ Add mixed-use neighborhood commercial as a permitted use in the OCP for specified locations such as corner lots and centrally located larger properties	☐ Leverage CLIC (Community Lifecycle Infrastructure Costing) tool to assess financial impacts of development proposals ☐ Increase density along core Transit Network	✓ Create a density bonus structure for development within short walking distance of the core transit network ☐ Increase Density for neighbourhood node viability	☐ Require all new multi-family developments to have walk-scores greater than the community average and expected transportation emissions below the community average
SHIFT 2.1 **Enable active transportation through plans and policies**  Lead: Development, Planning, and Engineering	☐ Develop Active Transportation Plan ✓ Survey the community on travel habits and what services / opportunities are needed within the community to reduce out-of-community travel ☐ Link to local economic development strategy	✓ (In progress) Develop a Complete Streets Policy to formalize hierarchy (pedestrian - bike - transit - truck - car) ☐ Apply trip-end facility requirements to all commercial and industrial buildings regardless of gross floor area	☐ Update Subdivision Servicing bylaw to require any new subdivisions to include active transportation infrastructure ☐	

SHIFT 2.2 **Build safe routes for walking, cycling and other forms of zero emission mobility**  Lead: Engineering	☐ Continuously improve active transportation infrastructure per existing plans	✓ (In progress) Implement 'complete streets' as streets are regularly scheduled for resurfacing / reconstruction for pavement maintenance or installation of utilities. If new streets are required, design to support connectivity	✓ (In progress) Prioritize budgeting for key AAA transportation infrastructure that will connect major destinations (schools, shopping) to main residential areas ☐ Invest in enhanced transit	☐ Initiate a 10-year program to connect all neighborhoods to safe and convenient active transportation paths
SHIFT 2.3 **Develop and deliver an active transportation outreach strategy**  Lead: Communications and Engineering	✓ Promote new routes and end of trip facilities ✓ Promote events such as Bike to Work Week	☐ Expand active transportation promotion. E.g. education events for new 'all ages and abilities' routes (e.g. priority for disabled users, etiquette when passing others)	☐ Contract dedicated, permanent, part-time outreach capacity to engage the community on active transportation and transit	☐ Collaborate with communities in the region on shared outreach capacity
SHIFT 2.4 **Normalize car-free and zero-emission zones**  Lead:	✓ Establish car free days on a key street - 1 day a year ✓ Combine with a special event and create a festival experience	✓ Expand car free days on a key street to more days of the year / more streets ✓ Consider car free days once a week during warmer seasons (e.g. combined with weekly farmers market)	☐ Establish high-profile car-free areas within the community	
SHIFT 2.5 **Promote micro e-mobility and on-demand mobility services**  Lead: Corporate Services	✓ Host awareness events for e-bikes, e-scooters and EV golf carts, including demonstrations	☐ Conduct an analysis to understand when and where on-demand service will be most useful	☐ Collaborate with a technology vendor to bring e-mobility on demand solutions to the community, such as electric kick-scooters or e-bikes available for rent through an app	

SHIFT 3.1 **Collaborate with transit providers to promote transit ridership**  Lead: Engineering	☐ Encourage transit providers to promote transit ridership by celebrating new routes and offering free transit days	☐ Collaborate with transit providers to enable free transit programs for children/seniors, and during bad air quality or very cold weather		☐ Explore universal free transit with transit providers
SHIFT 3.2 **Transition to a zero-emission transit network**  Lead: Engineering		✓ Collaborate with neighboring communities on safe and convenient inter-community transit that is safe and responsive to the needs of the communities	☐ Start working with transit providers and neighbouring communities to ensure that transit shifts to zero emission vehicles (e.g. electric)	☐ Initiate a 10-year transit investment program to connect all neighborhoods and connect to other communities with zero emissions transit

	Tier 1	Tier 2	Tier 3	Tier 4
Cost				
Uncertainty				
Difficulty				
Impact				

Transportation – Electrify Passenger Vehicles

Switching to an EV from a fossil fuel vehicle eliminates almost 100% of the passenger vehicle emissions in BC. The more that people can walk, cycle and take transit in the community and between communities may reduce the % of EV's required for the first target year. In 2019, 10% of car sales (not including trucks and SUVs) were EV's, though this is not even across BC. Provincial ZEV mandates do not require even portions of sales regionally so City of Delta can help influence local EV adoption.

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
ELECTRIFY 1.1 **Design, fund and build a public EV charging network**  Lead: Climate Action & Environment	✓ Install public Level 2 charging at one municipally owned parking lot to demonstrate leadership. Consider up to 4 Level 2s as a demonstration at that location	✓ (In progress) Develop a community EV charging infrastructure strategy (current/future demand for L2 and DCFC, cars that park on the street) ✓ (In progress) Through engagement and network design, consider opportunities to leverage public institution (or other Part 3) charging infrastructure to address garage orphans	☐ Collaborate with other local and regional governments on a regional charging network strategy	✓ Leverage grants to implement community EV charging infrastructure strategy ☐ Consider implementation to focus on supporting other actions, such as integrated transportation hubs (connectivity of charging infrastructure to e-bike shares, transit options, etc.)
ELECTRIFY 2.1 **Adopt EV-ready building requirements**  Lead: Development	✓ Initiate consultation on Part 9 and Part 3 new construction charging infrastructure requirements	✓ Draft building bylaw amendment to integrate Part 9 EV readiness requirement for 100% of all new non-street parking ☐ For Part 3, consider requiring smart chargers, to facilitate load management in the future	✓ Implement Part 3 EV charger readiness policy (i.e. 100% electrified, EV-ready stalls for new MURBs (energized outlet capable of supporting Level 2 charger - integrate load management); 25% of stalls at new, non-residential Part 3 buildings)	☐ Require EV readiness reflective of new Part 3 construction for rezoning or development permits for major redevelopment / renovation
ELECTRIFY 2.2 **Enable EV charging in existing residential and commercial buildings**	✓ Provide information to homeowners about Provincial EV charging incentives	☐ Work with stratas and property management companies on navigating the process to retrofit existing	☐ Top up provincial residential/MURB and workplace L2 retrofit incentives	☐ Provide or advocate for Tier 2 exemptions or kWh allowances to protect EV

  Lead: Climate Action & Environment; Development		parking stalls with EV charging equipment		owners against increased electricity prices
ELECTRIFY 3.1 **Expand existing EV outreach strategy**   Lead: Climate Action & Environment; Development	✓ Advise local groups of EV outreach incentives from Emotive ☐ Create a communications plan to support engagement ☐ Deliver builder/developer education on EV charging requirement for Part 9 and Part 3 such as an Open House for electrical trades to engage on EV charging readiness requirement	☐ Continue outreach to builders, public, auto dealers including workshops and stakeholder engagement ☐ Partner with other organizations to host engagement events such as test-drives and ride-alongs	☐ Facilitate a regional workshop to identify opportunities to leverage community EV charging network implementation to support regional travel ☐ Partner with neighboring communities on ongoing active outreach to public and car dealers, implementing the communications plan (Tier 1) to support community identity around EVs	☐ Create a community or regional brand around electric vehicle adoption, reflective of the local priorities and context to encourage adoption
ELECTRIFY 3.2 **Accelerate EV adoption through supportive policies and incentives**   Lead: Corporate Services			☐ Leverage Provincial decal program (EV-OK) to provide a suite of EV priority parking	☐ Incent taxi operators and other fleet operators to switch to EV's (e.g. priority parking for EV taxis, business permit reduction for electrified fleets) ☐

	Tier 1	Tier 2	Tier 3	Tier 4
Cost				
Uncertainty				
Difficulty				
Impact				

Transportation – Decarbonize Commercial Transportation

Commercial transportation is one of the most difficult segments of community emissions to address, since communities have minimal control over private and provincial commercial fleets. Additionally, commercial-size electric vehicles are limited in availability, although there has been considerable progress in the past 2-3 years, with trucks from Ford, Tesla, Bollinger, and Rivian. Communities, however, can convert their own corporate fleets as products become available.

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
COMMERCIAL 1.1 **Develop a community vision and strategy for commercial ZEV infrastructure**  Lead: Collaborate with region and BC Hydro	✓ Conduct a needs assessment for fleet charging requirements, through to 2040	☐ Design a non-municipal commercial/institutional EV charging network strategy, with emphasis on hub-style charging to leverage fleet needs and electrification of delivery bays	☐ Support a pilot fleet electrification initiative with one commercial/institutional partner. (e.g., land use/zoning change to allow for transit charging hub, or electric school bus parking zone, etc.) OR: ☐ (Renewable) Natural gas vehicle collaboration for heavy duty vehicles. (Collaborating with other local return-to-base fleets such as Translink, Port Vancouver, school board, waste haulers, and industry / commercial operators)	☐ Facilitate joint procurement/joint funding in coordination with commercial fleet operators for the implementation of the commercial/institutional EV charging network strategy
COMMERCIAL 1.2 **Engage commercial and industrial stakeholders**  Lead: Collaborate with region and BC Hydro	☐ Develop communications strategy to support outreach/engagement with commercial sector ☐ Advocate to provincial government for commercial decarbonization legislation, leveraging collaborations with	☐ Convene a Commercial & Industrial fleet operators workshop to discuss current and future opportunities around low emissions/electrification of fleets ☐ Engage with Translink and School District to identify early	☐ Engage with stakeholders on design of the commercial EV charging network. Integrate as much as possible with public and municipal charging strategies)	☐ Host an emerging and future technology workshop for MD/HD fleet operators, and facilitation of driver training courses on emission-reducing techniques

	commercial sector and regional districts	adoption opportunities of electric bus and transit options (recognizing 100% electric transit target for Translink, and currently available school bus funding for School Districts)		
COMMERCIAL 2.1 **Update corporate policies to prioritize low carbon options**  Lead: Finance; Climate Action & Environment	✓ (In progress) Review and integrate contractual requirements for municipal services to require low emission vehicles, increasing over time with 100% requirement by 2040. (applies to commercial entities that are contracted for municipal services)		✓ Revise Corporate fleet policy to electrify and switch to low-carbon options that are available for replacement vehicles	☐ Corporate fleet electrification policy fully implemented (to extent that available technology allows) for 100% EV

	Tier 1	Tier 2	Tier 3	Tier 4
Cost				
Uncertainty				
Difficulty				
Impact				

Buildings – Step Up New Buildings

Step Code is an efficiency code, not a GHG code. Efficiency is a good first step, but to get deep emissions reductions the heating fuel must be low/no emissions. Electricity is nearly emissions-free in BC and heat pumps use 1/2 to 1/4 the energy of a home heated by baseboard heaters, saving energy and money over the long run. Each new building that is inefficient and has a fossil heating system is one more building that will need to be retrofitted at some point.

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
NEW BUILD 1.1 **Adopt the Energy Step Code**  Lead: Development	✓ Designate departments and individuals to attend the local government Step Code Peer Network and start working on an implementation strategy	✓ Adopt the Energy Step Code with a community-wide requirement for one of the lower steps for Part 9 ✓ Adopt the Energy Step Code with a community-wide requirement for one of the lower steps for Part 3 ✓ Adopt policies and programs to incentivize adoption of higher steps	✓ Determine timelines for adopting upper steps ☐ Consider adopting a rezoning policy to require upper steps for new developments that add significant density	☐ Adopt upper steps of the Energy Step Code community-wide at the earliest opportunity, and signal intent require top step in advance of 2032
NEW BUILD 1.2 **Adopt Zero Carbon Step Code**   Lead: Development	☐ Conduct consultation with the local building industry about low carbon approaches to the Zero Carbon Step Code	☐ Adopt a tiered approach encouraging low carbon energy systems (e.g. Step 3 community wide, Step 2 if they connect their project to a district energy system or implement a low carbon energy system	☐ Adopt the Provincial GHG metrics	☐ Investigate opportunities to address embodied carbon in the construction sector
NEW BUILD 2.1 **Provide outreach and incentives**  	☐ Promote existing incentives for building more efficient new homes via Better Homes BC	☐ Leverage utility and government funding to provide subsidies to builders that offset the additional cost of Energy Advisors and/or provide incentives for mid-	☐ Top up provincial incentives (betterhomesbc.ca) for heat pumps to replace fossil heating systems in new buildings	

Lead: Communications, Development		construction air tightness testing ☐ Fee rebates could also be considered for new homes that install solar or electric vehicle charging stations		
NEW BUILD 2.2 **Build industry capacity through training and coordination**  Lead: Development	✓ (In progress) Collaborate across the region to provide relevant training to building industry and realtors ✓ Assemble and promote list of local or regional Energy Advisors	☐ Continue providing locally relevant training ☐ Work with building industry partners to accelerate Energy Advisor training ☐ Develop quota for minimum number of local Energy Advisors by 2022	☐ Continue partnering to provide training to building industry, focusing on meeting Upper Steps	

	Tier 1	Tier 2	Tier 3	Tier 4
Cost				
Uncertainty				
Difficulty				
Impact				

Buildings – Retrofit Existing Buildings

Building envelope improvements reduce energy needed to heat the building. An average retrofit can save 10% to 20% of energy while a deep retrofit ($80,000-$100,000) can save 50% to 60%. Heat pumps use 1/2 to 1/4 of the energy of a home heated by baseboard heaters. Electricity has less than 1/5 of the emissions from natural gas. Perpetual locked-in renewable gas contracts (buying the environmental benefits of renewable gas produced somewhere) may be an option in the future.

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
EXISTING BUILD 1.1 **Encourage and enable deep energy retrofits.**  Lead: Development	✓ Promote *Better Buildings, Better Homes BC*, and *Greener Homes Grant* at front counter and in property tax mailings as well as business license renewal mailings		☐ Require EnerGuide assessments (Part 9 buildings) and building energy benchmarking (Part 3 buildings) as a condition of a renovation permit over a value threshold	☐ Require minimum energy performance standards aligning with the Province's upcoming retrofit code (*as more information becomes available)
EXISTING BUILD 1.2 **Encourage and enable building electrification**  Lead: Development	☐ Provide information about heat pumps to renovators and homeowners at time of permit	☐ Identify and remove barriers to heat pump installation, including streamlining permitting process, optimizing noise regulations, restructuring permitting fees, and others	☐ Top up Provincial (*Better Buildings* and *Better Homes BC*) heat pump incentives	☐ Create a new funding source to finance heat pumps to replace fossil fuel heating. Also assure quality and manage installers
EXISTING BUILD 2.1 **Establish a long-term marketing campaign**  Lead: Communications, Development		☐ Establish a 10-year program for a community-wide marketing campaign (based on 'energy diets') to encourage building envelope improvements, electrification or other low carbon fuel sources	☐ Collaborate with the Tsawwassen First Nation and local governments in the region on a coordinated 10-year campaign to market deep energy retrofits and fuel-switching from fossil fuel to heat pumps	
EXISTING BUILD 2.2 **Build industry capacity**	☐ Educate renovators and realtors on energy efficiency and low carbon choices for space and water heating	☐ Provide a building energy benchmarking workshop to large portfolio operators	☐ As part of the 10-year marketing campaign, collaborate with others to provide extensive training and	☐ Signal intention to adopt 'retrofit code' when it becomes available (outreach

 Lead: Development, Communications			development for heat pump system designers and installers	to public, retailers, realtors, trades)
	Tier 1	**Tier 2**	**Tier 3**	**Tier 4**
Cost				
Uncertainty				
Difficulty				
Impact				

Waste – Close the Loop on Waste

Waste emissions account for a very small portion of Delta's greenhouse gas emissions. However, having a very large landfill (i.e., Vancouver Landfill) within the municipal boundaries of the City of Delta offers significant utilization and GHG offset opportunities for the City.

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
WASTE 1.1 **Adopt policies that increase organics diversion**  Lead: Engineering	☐ (In progress) Collaborate with the Regional District to initiate consultation on organics, processes & targets	☐ Adopt organics diversion targets for community and corporate operations	☐ Collaborate with MVRD to facilitate diversion (away from landfill) for all residential and commercial organic waste ☐ Require organics diversion for event permitting	☐ Ban all city (residential, commercial, institutional) organics (food waste, yard waste, etc.) from going to garbage stream
WASTE 1.2 **Implement (or enhance) organics collection and processing**  Lead: Engineering	✓ (In progress or complete) Work with MVRD to complete assessment (inventory) of community organic waste volumes and feasibility of landfill diversion	✓ Collaborate with MVRD to evaluate local opportunities for organic handling and composting ✓ Consider partnering with Regional District and neighboring communities ✓ Implement curbside kitchen waste collection for single-family homes	☐ Require having dedicated areas for organics/recycling pickup in new multi-family buildings	☐ Incentivise commercial pickup of organic waste from multi-family and commercial buildings ☐ Integrate organics collection in streetscapes, where appropriate
WASTE 1.3 **Divert construction, demolition, agricultural and industrial wood waste**  Lead: Engineering			☐ Support MVRD in identifying and pursuing options to support and grow the market for salvaged deconstruction materials	☐ Support MVRD in identifying circular economy opportunities to salvage surplus and used construction materials, and promote reuse, donation, repair, and sharing opportunities

WASTE 1.4 **Develop and deliver a comprehensive zero-waste outreach program**  Lead: Communications, Engineering	☐ Support (funding or land donation) community-led composting projects ☐ Support existing and new capacity for reusable resources, including Free Swaps, Share Sheds, free-store for unwanted goods, and building materials depot ☐ Provide funding to School District to implement programs on educating about waste reduction/diversion	☐ Collaborate with MVRD and explore opportunities to fund/support a part or full-time position dedicated to organic diversion (and waste reduction) to support implementation ☐ Conduct annual community zero-waste drives to enhance awareness, streamline with school and business programs	☐ Educate and communicate the source-separation requirements	☐ Establish a waste reduction working group consisting of key staff across the organizational structure that institutionalizes support for organic diversion and zero waste initiatives, include external organizations where possible
WASTE 2.1 **Evaluate and implement landfill gas utilization opportunities for generation and local use of renewable natural gas (or low carbon gas)**  Lead: Engineering; Climate Action & Environment	✓ Work with the City of Vancouver and MVRD to assess the generation potential and maximum GHG impacts of various LFG utilization options	☐ Support efforts to accelerate and maximize the renewable natural gas production at the Vancouver landfill	☐ Establish targets for renewable natural gas use in greenhouses, industrial facilities/buildings	☐ Advocate for local use of renewable natural gas in greenhouses, industrial facilities, and residential/commercial buildings in Delta

WASTE 2.2 **Evaluate and implement other resources recovery opportunities**  Lead: Climate Action & Environment	See implementation details under AGRIC 2.3			
	Tier 1	**Tier 2**	**Tier 3**	**Tier 4**
Cost				
Uncertainty				
Difficulty				
Impact				

Green Space and Ecosystems

Protection of green space and enhancement of natural systems offer opportunities to sequester carbon and reduce the impacts of climate change.

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
GREEN 1.1 **Preserve ecologically sensitive areas within municipal boundaries**  Lead: Climate Action & Environment	✓ Collaborate with the MVRD and other partners to assess the GHG sequestration potential of Burns Bog Ecological Conservancy Area (BBECA)	☐ Develop and implement strategies to further enhance the carbon sequestration potential of BBECA	☐ Collaborate with MVRD to explore funding opportunities that would accelerate the bog recovery and carbon sequestration efforts.	☐ Create new funding source (e.g., raising funds through short term carbon credit transaction opportunities) to accelerate implementation and/or further enhance carbon storage at the Bog
GREEN 1.2 **Protect green space and enhance natural systems ability to sequester carbon**  Lead: Climate Action & Environment; Development	☐ Assess the carbon storage potential of natural systems in Delta's green space ☐ Use development permit areas in combination with the amended bylaws such as the Tree bylaw to protect more trees (e.g., amend Riparian Development Permit Area to include wetland and other sensitive areas)	✓ Develop and implement strategies to protect the stored carbon by natural systems (e.g., parklands, wetlands, etc.) and enhance their ability to increase stored carbon.	☐ Explore partnership and funding opportunities that will accelerate the implementation of developed strategies	☐ Create sustainable funding sources to expand existing programs and introducing new programs
GREEN 1.3 **Continue to implement Urban Forest Strategy** 	✓ Amend the existing tree protection Bylaw to include regulations/requirements for both public and private properties ✓ Form strong partnership with Delta School Board and	☐ (in progress) Select trees that are fire and drought resistant to adapt to current and future changes in climate ☐ Consider planting heat tolerant trees in locations impacted by urban heat	☐ Conduct LIDAR and GPS surveys to assess existing canopy and measure change in canopy cover in public and private land	☐ Tap into funding options for implementing the Urban Forest Strategy (e.g. Tree Canada Urban Tree Grants, 2 Billion Trees Program, Urban Tree Sales)

Lead: Climate Action & Environment	engage youth in protection and expansion of urban forest tree canopy	islands (e.g., in parking lots or town centres)		

	Tier 1	Tier 2	Tier 3	Tier 4
Cost				
Uncertainty				
Difficulty				
Impact				

Low Carbon Agriculture and Local Food Production

Strategy	Tier 1	Tier 2	Tier 3	Tier 4
AGRIC 1.1 **Support low carbon agriculture practices**  Lead: Planning	✓ Work with MVRD and other partners in the region to develop strategies for low carbon agricultural practices	☐ Explore opportunities to introduce clean/renewable or low carbon fuel agricultural industry to reduce emissions from farm equipment and greenhouse farm operations	☐ Collaborate with Provincial ministries and local agric. industry to accelerate introduction/piloting of new technology ☐ Explore funding opportunities to further introduction of low carbon fuels/technologies	☐ Support businesses involved in the Agritech Grant Program in British Columbia that are providing insight into how farming can evolve
AGRIC 1.2 **Adopt policies to further protect agricultural land and expand local food production** 	✓ Adopt policies and regulations to protect agricultural land from the impacts of land development	☐ Work with MVRD and other regional partners to update the Regional Food System Strategy and implement actions that enable investment in agricultural lands and support local food	☐ Work with the local/regional partners and the BC Government to reduce barriers and incentivise local farming for young and new farmers	☐ Develop programs that would provide financial support for farmers that adopt new/innovative farming practices that would help expand/enhance local food production

Lead: Planning		production		
AGRIC 2.1 **Support use of renewable natural gas and carbon dioxide from Vancouver landfill in greenhouse farms**  Lead: Planning	☐ Work with the City of Vancouver, Fortis BC, greenhouse farm operators to assess the potential for utilizing renewable natural gas (RNG) (and carbon dioxide as by-product or RNG generation) in greenhouse farms	☐ Support/incentivise local use of RNG and maximum utilization of carbon dioxide in greenhouse farms to reduce reliance on natural gas	☐ Encourage improving energy performance by switching to cleaner fuels (and utilizing supplemental carbon dioxide) to substantially reduce GHG emissions in greenhouses farm operations	

AGRIC 2.2 **Explore sustainable management practices for agricultural waste/biomass**  Lead: Planning	✓ Develop/amend bylaws to restrict open burning and encourage sustainable management practices for agricultural residues/biomass	☐ Assess the energy generation and GHG reduction potential of agricultural residues and explore energy utilization options as a renewable feedstock	☐ Educate farmers on the environmental impacts and benefits of sustainable management practices for agricultural waste/biomass	
AGRIC 2.3 **Encourage expansion of anaerobic digestion and production of biogas/renewable natural gas from animal waste/biomass**  Lead: Planning	☐ Work with dairy farmers, Fortis BC and other partners to assess the RNG/biogas generation potential as well as the GHG reduction/offset potential of animal waste	☐ Develop a vision and a strategy to make the City of Delta a major RNG hub in the Metro Vancouver region	☐ Support local use of renewable natural gas in, farms, greenhouses farms, and residential/commercial buildings in Delta ☐ Encourage local use of renewable gas at industrial facilities	☐ Advocate to senior levels of government to provide financial incentives to help expand the anaerobic digestion facilities that process manure and agricultural waste
AGRIC 2.4 **Encourage best management practices to increase carbon storage potential of agricultural land**  Lead: Planning	☐ Educate farmers on benefits of soil health for long term viability of farming, and best management practices that increase carbon storage at agricultural lands	☐ Support data collection and measurement of soil carbon to determine carbon storage and sequestration in agricultural land	☐ Work with the BC Government and MVRD to establish a network of farmers that provides an opportunity for knowledge sharing, sharing resources for research and other learning opportunities	

	Tier 1	Tier 2	Tier 3	Tier 4
Cost				
Uncertainty				
Difficulty				
Impact				

Appendix B: Recommended Key Performance Indicators

Two types of indicators are recommended. Primary indicators measure community energy consumption and GHG emissions, while secondary indicators can quantify the indirect success of various actions. The following table provides a description of these indicators, the measures of success, data sources for each indicator, and frequency of reporting. Annual progress reporting to City Council should continue.

	Indicators	Measures of Success	Data Sources
Primary	1. Community GHG emissions	45% reduction in emissions from 2007 levels by 2030 100% reduction in emissions from 2007 levels by 2050	Provincial energy & emissions data at the community level, and Kalibrate fuel sales data for area gas stations converted into emissions using latest factors from the Province
Transportation	2. Gas station fuel sales data	Decrease in sales of fossil fuels	Kalibrate fuel sales data for the area gas stations
	3. kWh/year used recharging EVs at public charging stations	Increase in kWh/year delivered by EV stations	Usage data already available to the City (other charging station providers may also be able to provide data)
	4. # of public EV charging stations	Increase in number of EV stations, L2's and L3's	Websites e.g. https://www.plugshare.com/
	5. # and % of EVs registered in the community	Increase in # and %	ICBC data
	6. Infrastructure to promote active transportation	Progress towards outcomes of the following plans: • Official Community Plan • Electric Vehicle Strategy • Cycling Master Plan	Planning; Engineering; Climate Action & Environment

	Indicators	Measures of Success	Data Sources
	7. Commuting / personal travel mode split	Increase in travel around Delta and between Delta and other cities within Metro Vancouver by ride share, public transit, walking or cycling	Transit ridership data, and Census
Existing buildings	8. # of energy efficiency incentives distributed for building efficiency upgrades	Average increase in incentive use	Summary data from FortisBC, BC Hydro (and other entities as applicable, e.g. Province), NRCan EnerGuide D and E evaluations
New buildings	9. # of buildings at each level of the BC Energy Step Code	Increase in number or percentage of new buildings constructed to various levels of the Step Code	Permit applications *(Notes: suggest setting this up in advance for GIS; Some builders may currently be building to Step Code and getting FortisBC rebates without the City knowing, by following the prescriptive pathway. Advising local builders and front counter staff of the Step Code compliance pathway in the building code should solve this.)*
Waste	10. Amount of organics diverted from landfill	Increase in organics at composting facility	Delta & MVRD
	11. Recycling rates	Increase in recycling rates	Delta and MVRD
	12. Tonnes of waste per capita to landfill	Decrease in waste per capita sent to landfill	Delta and MVRD
Other	13. Urban tree canopy cover	Increase in canopy	GIS estimates of tree canopy cover; Development applications; Municipal tree planting data
	14. Per capita water consumption	Decline in water use	Usage data on water utility bills / metering system
	15. # of participants at building community & citizen educational events / workshops	High participation levels at events	Registration/Attendee lists for events

Appendix C: Inventory and Modelling Methodology

Inventory

Delta's inventories were created using data for buildings, transportation and waste obtained from the Province of BC. Full inventory years for buildings and waste are: 2007, 2010, and 2012-2019. Full inventory years for transportation are 2007, 2010, and 2012.

Emissions factors for inventory years are shown in the following table, and are sourced from the Province of BC.

Table 2 – Emissions factors used for inventory years

GHG/GJ, by Year	2007	2010	2012	2013	2014	2015	2016	2017	2018	2019
Passenger Vehicles	0.067	0.067	0.069	0.069	0.069	0.069	0.070	0.068	0.068	0.068
Commercial Vehicles	0.071	0.070	0.071	0.071	0.071	0.071	0.072	0.071	0.071	0.071
Electricity	0.010	0.010	0.011	0.011	0.010	0.010	0.009	0.009	0.007	0.008
Natural Gas	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050

As can be seen, some of the emission factors have changed over time. The emission factors for gasoline have decreased as a result of the Renewable and Low Carbon Fuel Requirements Regulation. The emissions factor for electricity has decreased as a result of ongoing efforts to decarbonise the electricity grid. However, please read the textbox below regarding changes in emissions factors for electricity.

Transportation data were sourced from a previous release of the Province of BC's Community Energy & Emissions Inventory (CEEI) data,[3] and building energy and landfill waste data were sourced from the latest CEEI data and the Province's release of Provincial Inventory data at the community level.[4]

[3] https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei
[4] https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory

Changes to electricity emission factors

Information received from the Province of BC in December 2020 and January 2021 stated that the methodology for calculating electricity emissions factor used for electricity consumption across BC would change, effective for reporting for the 2021 year. This change is mandated by the Greenhouse Gas Industrial Reporting and Control Act (GGIRCA), and referenced on the Province's Electricity emission intensity factors for grid-connected entities page.

Previously, emissions from electricity use were calculated using a three-year rolling average of emissions from BC utility owned and operated facilities, and did not include emissions associated with importing electricity from outside of BC. Those emissions were retroactively included back to 2007 as "gross imports". (Note that no credit was then made for clean electricity generated in BC used to displace electricity generated in other jurisdictions.)

Under the old methodology the Province calculated City of Delta's electricity emissions factor to be 10.7 tCO_2e/GWh for 2018. Based on the GGIRCA, the new emission factor for the 2018 year is 25.3 tCO_2e/GWh, approximately 2.5 times higher. This new methodology was kept in place until 2020, with emission factors of 29.9 tCO_2e/GWh in 2019, and 40.1 tCO_2e/GWh in 2020.

As of 2021, electricity emission factors were again recalculated based on "net imports"; that is, the total balance of imported vs. exported electricity is calculated, with the difference, and the associated emissions, factored into the overall emission factor for the Province (factoring in some of the impact of clean electricity generated in BC being exported). Under this calculation, the electricity emission factor was 9.7 tCO_2e/GWh in 2021. This number will be used for projecting future electricity emissions.

Assumptions made with respect to the inventories are as follows:

- The Province of BC made a series of standard assumptions in the creation of the CEEI data, which are outlined on the CEEI webpage: https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei. The CEEI inventory years in the preceding charts are 2007, 2010, and 2012.
- The Province of BC made assumptions for buildings and landfill waste emissions information, which are outlined in the community level spreadsheets on the Provincial Inventory webpage: https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory
- In creating the inventories, CEA made other assumptions in addition to these:
    - Because the Province removed transportation data from its most recent release of the 2007 and 2010 CEEI data, and has not provided this data for any other year, CEA has used population data to extrapolate transportation data for any year post-2010.

The following are not included in the inventory:

- Emissions from Agriculture, Forestry and Other Land Use (AFOLU)
- Emissions from large industry
- Consumptive emissions (e.g. food, services, consumer goods)

Business As Usual Projection

CEA's QuickStart model was used both to calculate the BAU trajectory, and to estimate the potential GHG reductions that could be achieved. Developed in 2010 on behalf of BC Hydro and used by approximately 70 communities to date, the model builds on information including population and community energy and emissions inventory data.

The model uses formulas both to calculate the BAU trajectory, and to estimate the impacts of implementing each Big Move.

The BAU trajectory was calculated by using available inventory data, and then projecting forwards using a population forecast provided based on census data.

There are full or partial inventory years that describe the community's emissions profile from 2007-2019. From 2020 onwards, all of the data is an estimate as a BAU projection.

For the BAU projection modelling, the assumption is that energy consumption and emissions will increase proportionally with increases to population, although the impact of policies from higher levels of government are also incorporated, and other assumptions. Only policies that have already been adopted and that will have quantifiable impacts are incorporated. Assumptions are:

- The Province's incremental steps to net zero energy ready buildings by 2032.
- Federal Tailpipe emissions standards.
- Provincial Renewable & low carbon transportation fuel standards.
- BC Zero-Emissions Vehicle Act and new Federal mandate, requiring every new LDV sold in B.C. to be a zero-emission vehicle by 2035 (with a ramp up in advance of that date).
- Reductions in public sector commercial building emissions as per Provincial CleanBC mandate of 80% reduction in emissions by 2050
- An annual decrease in natural gas consumption per residential connection is included, as per Fortis BC 2017 Long Term Gas Resource Plan: https://fbcdotcomprod.blob.core.windows.net/libraries/docs/default-source/about-us-documents/regulatory-affairs-documents/gas-utility/171214_fei_2017_ltgrp_ff.pdf
- How the impacts of a changing climate will affect building energy consumption, as outlined below.

The final assumption had the following methodology:

- Climate change data for the region obtained from ClimateData.ca.
- Projected global emissions to 2030 currently places the world in the range for the IPCC's Fifth Assessment Report's Representative Concentration Pathway (RCP) 6.0 scenario.
- RCP 6.0 scenario not available on ClimateData.ca, therefore RCP 4.5 (median impact scenario) used as a (conservative) proxy.
- Decreases in residential heating oil and propane consumption assumed to be proportional to projected decreases in Heating Degree Days (HDDs).
- Decreases in residential and commercial natural gas consumption assumed to be proportional to decreases in HDDs and the proportions of natural gas consumed for space heating for each sector, and that proportion obtained from the Navigant 2017 Conservation Potential Review for FortisBC Gas.
- Decreases in residential and commercial electricity consumption assumed to be proportional to decreases in HDDs and the proportions of electricity consumed for space heating for each sector. However, proportions of electricity consumed for space cooling for each sector and how this will increase proportional to projected increases to Cooling Degree Days (CDDs) also included. These proportions obtained from the Navigant 2016 Conservation Potential Review for BC Hydro.

Although CEA's model assumes that projections will be linear, there will be annual variability due to factors such as economic conditions (on mobility fuels and building energy consumption) and climatic variations (particularly on building energy consumption). These variations mean that it may often be necessary to collect several years of data before one can see the success or lack of it in implementation of an action, in the primary indicators.

Modelling the Key Actions

The QuickStart model estimates the impacts of the Key Action compared to the BAU trajectory. The impacts of the Key Actions can vary greatly between communities, and depend on the assumptions made. The assumptions made for each Key Action are based on research that CEA has conducted and can be tailored for individual communities.

GHG emission reductions by Key Action are described in the main body of this report in section 6 "Action Plan".

The QuickStart model allows Key Action implementation at five levels; 0%, 25%, 50%, 75% and 100%. This allows for varying levels of ambition within each Key Action. The model also requires an implementation start year.

The QuickStart model makes the following assumptions based on full implementation (100% ambition level).

Key Actions	Modelling Assumptions – Full Implementation	
Step Up New Buildings	90%	New homes with zero-carbon heating
Decarbonize Existing Buildings	3%	Homes retrofit per year
	33%	Energy reduction per retrofit
	2%	Homes replacing fossil fuel heating with heat pumps
Shift Beyond the Car	1 year	Lag time from implementation for initial impact
	20 years	Full implementation takes 20 years
	17%	Maximum VKT reduction after 20 years from Active Transportation, Transit and Land Use
	40%	Attribution of VKT reduction to Active Transportation
	40%	Attribution of VKT reduction to Transit
	20%	Attribution of VKT reduction to Land Use
Electrify Passenger Vehicles	9%	Current % of vehicle sales as EV
	20%	Compound Annual Growth Rate of new car purchases as EV in year 1
	40%	Compound Annual Growth Rate of new car purchases as EV in year 5
Decarbonize Commercial Transportation	1%	Percentage GHG reduction per year
	10%	Maximum GHG reduction after 10 years
	5	Lag time from implementation for initial impact
Waste	75%	Percentage GHG reduction from organics diversion or landfill gas capture
	5	5 years until full implementation
Urban Tree Canopy	13.5%	Increase in urban tree canopy coverage to 2050
	17,966	Total land area of Delta (ha)
	5.75	tCO_2e avoided per ha of forested area
	27	Years until 40% coverage target realized (2050)

If a lower level of ambition is selected, then that would be applied in the model. For example, if a community selects a 50% ambition level for Waste, then the GHG reduction would be 50% of 75% (or 37.5%) but would still take 5 years to ramp up to that diversion level.

Delta's ambition levels for each Key Action and the modelled assumptions therein are illustrated in the table below.

Key Actions	Implementation Year	Ambition Level	Modelling Assumptions - Delta	
Step Up New Buildings	2023	4	90%	New homes with zero-carbon heating
Decarbonize Existing Buildings	2023	4 (retrofits) 4 (heat pumps)	3%	Homes retrofit per year
			33%	Energy reduction per retrofit
			2%	Homes replacing fossil fuel heating with heat pumps
Shift Beyond the Car	--	--	1 year	Lag time from implementation for initial impact
			20 years	Full implementation takes 20 years
			17%	Maximum VKT reduction after 20 years from Active Transportation, Transit and Land Use
	2023	4	50%	Attribution of VKT reduction to Active Transportation
	2023	4	25%	Attribution of VKT reduction to Transit
	2023	4	25%	Attribution of VKT reduction to Land Use
Electrify Passenger Vehicles	--	--	9%	Current % of vehicle sales as EV
	2023	4	40%	Compound Annual Growth Rate of new car purchases as EV in year 1
			40%	Compound Annual Growth Rate of new car purchases as EV in year 5
Decarbonize Commercial Transportation	2023	4	1%	Percentage GHG reduction per year
			10%	Maximum GHG reduction after 10 years
	--	--	5	Lag time from implementation for initial impact
Waste	2023	4	75%	Percentage GHG reduction from organics diversion or landfill gas capture
	--	--	5	Implementation takes 5 years
Urban Tree Canopy	2023	4	0.5%	Annual areal increase in urban tree canopy coverage

Appendix D: City of Delta Phase 1 and Phase 2 Engagement Summary Reports