Whitehorse

CLIMATE ACTION PLAN

2024

DRAFT – MAY 2024

Whitehorse
THE WILDERNESS CITY

FOREWORD

The City of Whitehorse, a unique and vibrant community, is often referred to as the ‘Wilderness City’. As the Yukon’s Capital City, Whitehorse plays a pivotal role in leading through innovation and action in the Territory. The City is home to diverse wildlife and breathtaking landscapes, and being located in the North, will be especially impacted by the most extreme of changes to the global climate.

The city's geographical location makes it particularly vulnerable to the impacts of climate change. Changes in temperature and precipitation patterns could alter the region's biodiversity, affecting the flora and fauna that form the basis of rare ecosystems. Warmer temperatures will lead to the thawing of permafrost, resulting in changes to the landscape that will impact the city's infrastructure.

Moreover, climate change will likely influence some of the City's socio-economic aspects. Changes in the local climate could affect outdoor recreational activities, a significant part of Whitehorse community's lifestyle and a contributor to the local economy. It will also impact the traditional ways of life of the Ta’an Kwäch’än Council and the Kwanlin Dün First Nation Peoples.

However, it's important to note that change does not necessarily signify catastrophe. Change encourages adaptation and innovation. As a community, Whitehorse has the opportunity to come together and proactively address these challenges. By understanding the potential impacts of climate change, the community can develop strategies to adapt and ensure the sustainability of Whitehorse.

In the City’s Official Community Plan 2040 (OCP), the City set the stage with the following vision:

“*Whitehorse in 2040 is a vibrant capital city. The city is an inclusive, innovative, entrepreneurial, and resourceful northern community. The growing community is diverse, liveable, and affordable. Whitehorse residents and visitors enjoy access to the land, some of the cleanest air in the country, and opportunities to gather for local, national, and international events.*

The City of Whitehorse is committed to providing equitable access to a range of residential, economic, social, cultural, recreational, mobility opportunities, and natural spaces. A vibrant social and cultural scene continues to strengthen the community’s social fabric. The City’s leadership is recognized across the country for its meaningful and continued efforts towards truth and reconciliation with First Nations, and its actions to mitigate negative impacts and adapt to climate change. The City remains committed to sustainable development and planning for future generations.”

This CAP will build on the work of the OCP recognizing that local actions form the fundamental solutions to international challenges. Climate change, a global phenomenon, has far-reaching impacts that are not confined to any geographical boundaries. It is a complex issue that affects various aspects of society, from the air we breathe, the water we drink, to the food we eat. For Whitehorse, a remote northern community, the effects of climate change could be profound and multifaceted.

This plan aims to provide a comprehensive yet accessible overview of how climate change might shape the future of Whitehorse. It is intended for City staff and for the residents of Whitehorse, to help foster understanding and inspire action towards climate change adaptation and GHG mitigation efforts.

In the following sections, this plan delves deeper into the projected changes for Whitehorse and discuss potential strategies that will help the City play its part in mitigating the causes of climate change (GHG emissions) and adapting to changes already underway and projected to occur. This Plan serves as a starting point for a broader conversation about the City's future in the face of climate change.

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TABLE OF CONTENTS

List of Tables

List of Figures

LAND ACKNOWLEDGEMENT

The City of Whitehorse (City) acknowledges that it is situated on the traditional territories of the Ta'an Kwäch'än Council and the Kwanlin Dün First Nation, as defined in the 2002 Ta'an Kwäch'än Council Final and Self-Governing Agreements and the 2005 Kwanlin Dün First Nation Final and Self-Governing Agreements.

We acknowledge that the Ta'an Kwäch'än Council and the Kwanlin Dün First Nation understand their history in what is now Whitehorse since time immemorial and that the two Nations have had, and continue to have, a spiritual, cultural, and economic connection to the land and resources of this area. We acknowledge that these governments and their citizens contribute significantly to city's social, cultural, spiritual, and economic prosperity. The City of Whitehorse has committed to strengthening its relationships with Kwanlin Dün First Nation and the Ta'an Kwäch'än Council through the 2018 Declaration of Commitment.

1 INTRODUCTION TO THE PLAN

1.1 The Time To Act Is Now

The relentless increase in greenhouse gas (GHG) emissions into Earth's atmosphere over the past century has triggered profound and unprecedented climate changes. These shifts have led to catastrophic events, claiming lives, displacing tens of thousands from their homes, disrupting livelihoods, and dampening economic potential. The lingering impact on mental health and overall well-being is substantial, and the financial toll for recovery efforts has reached billions of dollars. These climate-induced transformations are already amplifying existing stressors, such as aging infrastructure, and revealing gaps in emergency preparedness and response systems.

As the risks of more frequent and severe climate-related hazards escalate, the Intergovernmental Panel on Climate Change (IPCC) issued a special report in its sixth assessment detailing the substantial and more severe global consequences linked to increases in global temperature compared to a 1.5°C increase by the year 2100. The report examined 3 climate scenarios:

- Continuing business-as-usual (greater than a 4°C increase)
- Optimistic policy projections (a 3°C increase)
- Tracking towards a 'safe climate' (a 1.5°C increase)

The report's conclusion was that a swift transition to sustainable practices and aggressive GHG emission reductions is essential to avoid the most severe impacts of climate change (see Box 1).

While it may appear that there is a range of allowable temperatures, a two- or three-degree change is predicted to result in serious and catastrophic impacts. The report concluded that even a seemingly small difference of 0.5°C can significantly amplify extreme weather events. By missing the 1.5°C target by 0.5°C, the IPCC predicts drastic and **severe global implications**, including:

- Almost three times as many people exposed to severe heat at least once every five years;
- Higher risk to human health, including heat-related morbidity and mortality in urban areas;
- An additional 457 million people exposed to climate risks and related poverty;
- Habitat loss for twice as many plants and vertebrates and three times as many insects;
- Double the rate of ecosystem loss or change from one ecosystem to another;
- Double the decline in global fisheries;
- Ice-free summers in the Arctic Ocean every 10 years instead of every 100 years;
- Greater rise in sea levels and up to 79 million people exposed to flooding; and
- Greater economic losses resulting from extreme weather events.

To substantially reduce the risks and effects of climate change, and limit global warming to 1.5°C, the IPCC report indicates and policy makers have come to the agreement that global society must dramatically reduce greenhouse gas (GHG) emissions 50–60% by 2030, 80% by 2040, more than 90% by 2050 with the remaining emissions being offset or neutralized (e.g., direct air capture, reforestation, etc.) and be net-negative in the second half of the century. Net-negative GHG emissions involves getting to net-zero GHG emissions and then removing more GHG emissions through land use conservation and rehabilitation and direct capture technologies from the atmosphere than are emitted. Essentially, achieving net-negative emissions means not only halting the contribution to climate change but actively aiding in its reversal (Figure 1).

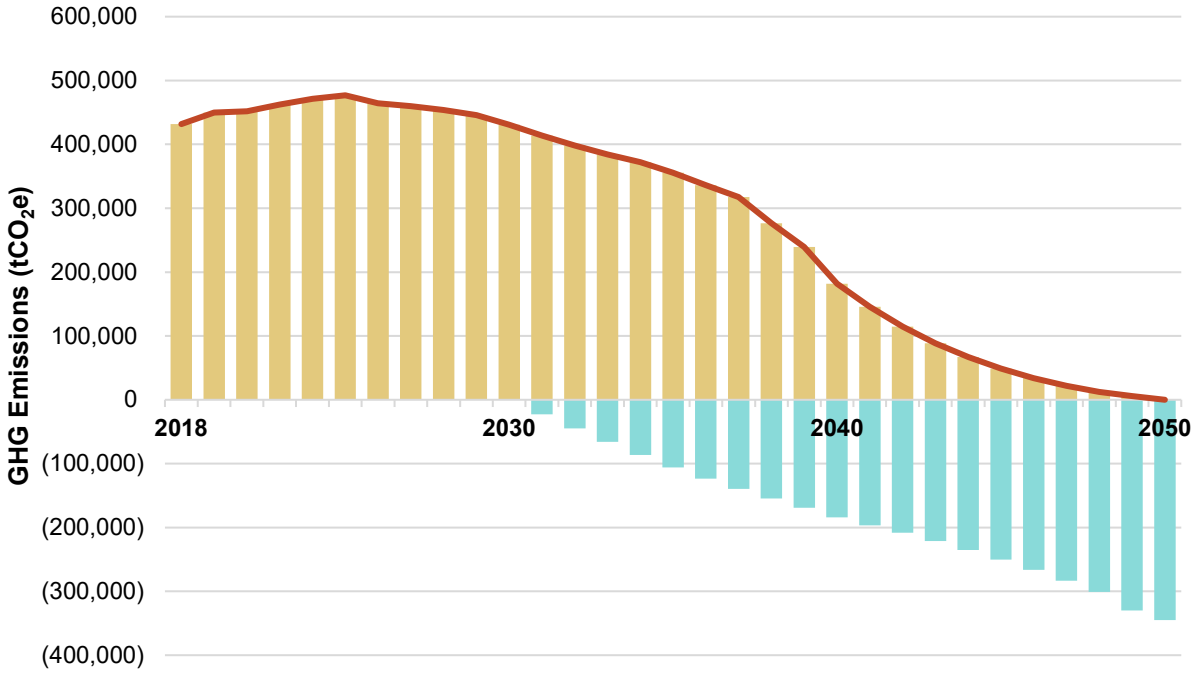
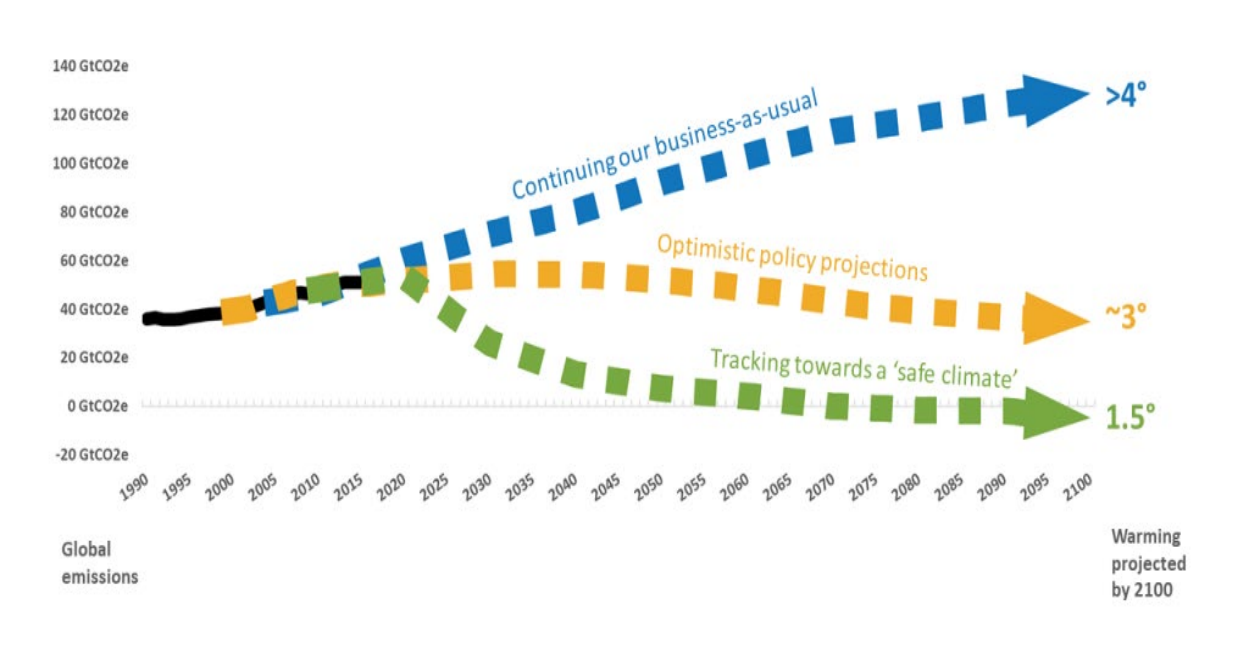


Figure 1 Example of Net-Zero to Net-Negative GHG Emissions for Whitehorse

Achieving these targets will involve decarbonizing agriculture, energy, transportation, buildings, and industrial systems at an unprecedented scale – it will require a reduction in energy consumption and a transition away from fossil fuels towards renewable energy and energy storage. Governments will need to incentivize clean technologies, invest in research for breakthrough technologies, foster collaboration between academia, industry, and startups and protect and support vulnerable communities and workers so that they are not penalized for not being able to transition away from fossil fuel energy sources or transition to clean energy jobs. In addition to emissions reductions, carbon dioxide removal from the atmosphere will be needed through measures such as reforestation, ecosystem restoration, and projects that capture and store carbon. Consumption and waste patterns must also change to reduce the GHG emissions and harmful effects on the environment and humans that material extraction, consumption and waste disposal can have. This will require a shift towards actions that achieve the long-term goal of becoming a circular economy.

Since the release of the IPCC Special Report and as the impacts of climate change become more prevalent (2022 was the hottest year on record and most costly in terms of weather-related insurance claims[1]), a growing number of municipalities and organizations representing more than $23 trillion in market capitalization across the globe have declared a climate emergency and set aggressive net-zero GHG reduction targets. Locally, City Council responded with a climate emergency declaration on September 24, 2019.

[1] 2022 confirmed as one of warmest years on record: WMO | UN News



The IPCC Special Report examined various scenarios related to global warming and their implications. Three key scenarios were explored in the report:

Continuing business-as-usual: **This scenario represents the trajectory if society persists with current material and fossil fuel consumption practices without significant changes. In this scenario, the temperature is projected to rise by over 4°C by the year 2100 and is projected to result in more frequent and intense heatwaves, rising sea levels, and disruptions to ecosystems.**

Optimistic policy projections: **In this scenario, decisive actions are taken to mitigate GHG emissions. It assumes ambitious policies, cleaner energy sources, and sustainable practices and is projected to limit temperature rise by 3°C by 2100. While better than the business-as-usual scenario, global society would still face extreme weather events, biodiversity loss, and challenges in adapting to changing conditions.**

Tracking towards a 'safe climate': **This scenario is the desirable outcome and involves aggressive GHG emission reductions and global cooperation. The outcome would be a 1.5°C increase in temperatures by 2100 and would minimize climate risks, preserve ecosystems, and protect vulnerable communities.**

1.2 Mitigating and Adapting to the Effects of Climate Change

Addressing climate change requires long-term efforts at the global and local scale to mitigate GHG emissions by reducing and/or eliminating sources of GHG emissions, known as climate mitigation, as well as efforts to prepare for changes locally that are irreversible and already underway, known as climate adaptation. The role of every community globally is important in innovating and demonstrating progress and possibility. Cities are centers of communication, commerce, and culture. While cities are a significant and growing source of energy consumption and GHG emissions, cities can affect considerable change on GHG emissions levels on a global scale as they may have influence on approximately 50% of emissions in Canada.

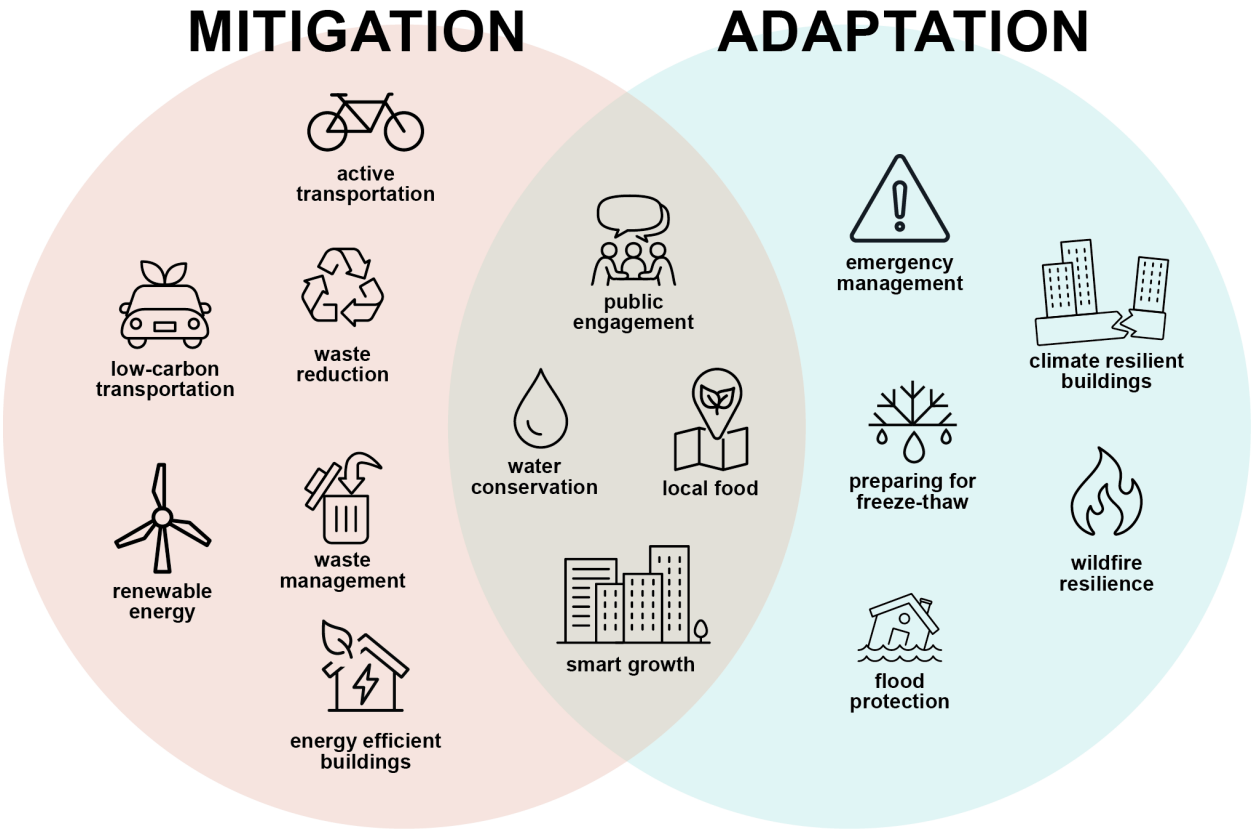


Figure 2 **Example of the Differences and Synergies between Climate Mitigation and Climate Adaptation Measures**

Focusing on the long-term means continuing strategies to reduce GHG emissions, acknowledging that the benefit accumulates globally over time before the warming trend stabilizes. However, GHG mitigation efforts are not futile, as immediate co-benefits – such as reduced energy costs, lower air pollution, etc. - from reducing GHG emissions are crucial. Climate change adaptation involves accepting that climate change is happening and adjusting to actual or expected effects in both the short and long term. Adaptation focuses on reducing the vulnerabilities to climate change, while increasing the ability to respond and recover when impacts do occur so that a sector or process has a wider range of tolerance to new or changing environments (see Figure 3).

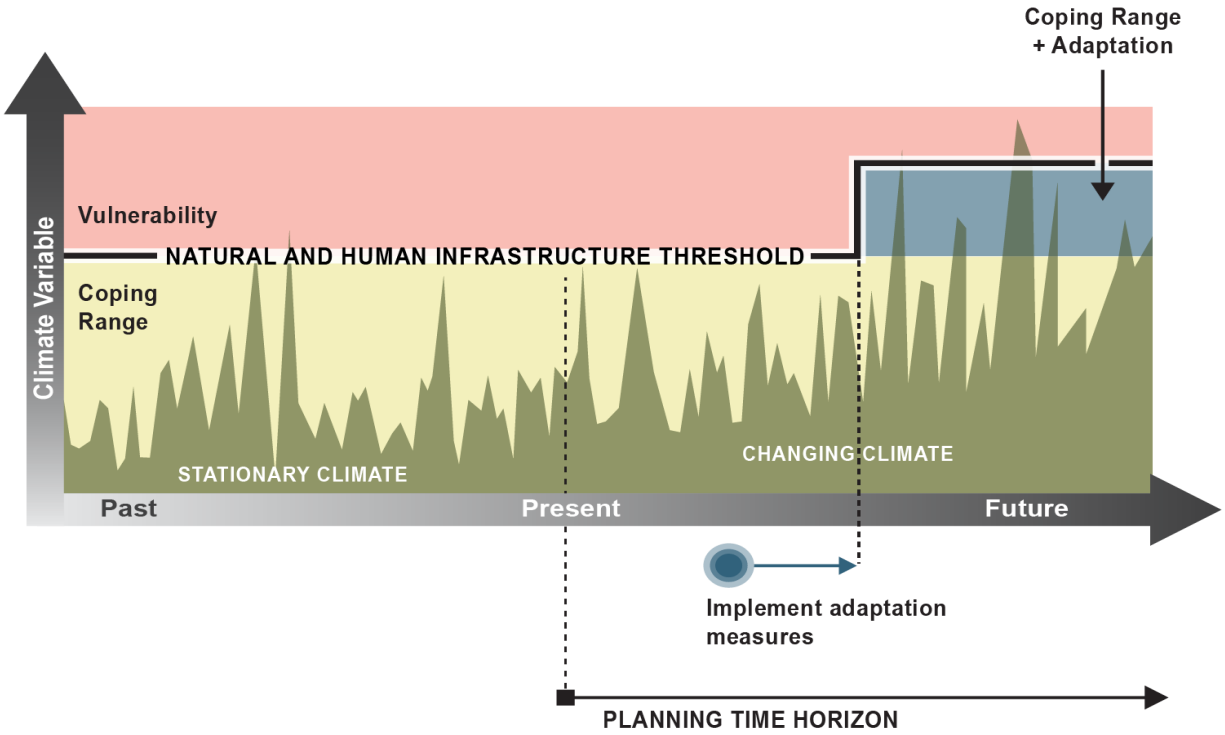


Figure 3 Adaptation Aims to Reduce Vulnerability by Increasing Coping Ranges[2]

Adaptation and mitigation are not mutually exclusive and can sometimes result in co-benefits and synergies when carefully considered and planned for. For instance, green roofs can improve on-site stormwater management, increase biodiversity in the area, improve the thermal retention of the roof and reduce summer cooling energy use, and reduce GHG emissions as a result. However, the window of opportunity for co-benefits is closing as the concentration of GHG emissions released into the atmosphere increase and the risk that climate events occur resulting in catastrophic damage to maladapted sectors.[3]

Reducing GHG emissions and increasing climate resilience has been an important area of concern for the City. In 2014, as part of the adoption of the Whitehorse Sustainability Plan 2015–2050, City Council endorsed a target of an 80% reduction in corporate GHG emissions and a 16% reduction in community GHG emissions by 2050 (from 2014 levels).[4] These targets reflected the City's priorities and where influence could be exerted at the time.

[2] www.erm.com/en/insights/feature-articles/a-changing-climate-for-the-extractives-sector/

[3] https://data.fcm.ca/documents/reports/investing-in-canadas-future-the-cost-of-climate-adaptation.pdf

[4] A corporate inventory focuses on GHG emissions under municipal operational control; the community GHG emissions inventory tracks emissions from activities within the geographic boundaries of the City.

Given the climate assessments in the IPCC Special Report, the City's climate emergency declaration, and the recent updates to the Yukon Government's GHG reduction commitments[5], this **Climate Action Plan proposes to update and align both corporate and community GHG emissions targets with the IPCC's recommended emissions reduction target to keep global temperatures from rising beyond 1.5ºC. This means that both corporate and community GHG emissions must be net-zero by 2050.**

Achieving net-zero means that little to no GHG emissions are being emitted by 2050 with any remaining GHG emissions being removed from the atmosphere. Corporately, this means that the City must reduce GHG emissions by at least 30% (below 2022 GHG emissions levels) by 2030. At the community scale, GHG emissions reductions will likely be slower over the next decade and then will accelerate as the community and personal assets (buildings, cars, etc.) are renewed and new no-/ low-emissions technologies, as well as renewable-technologies, are adopted (see Figure 4).

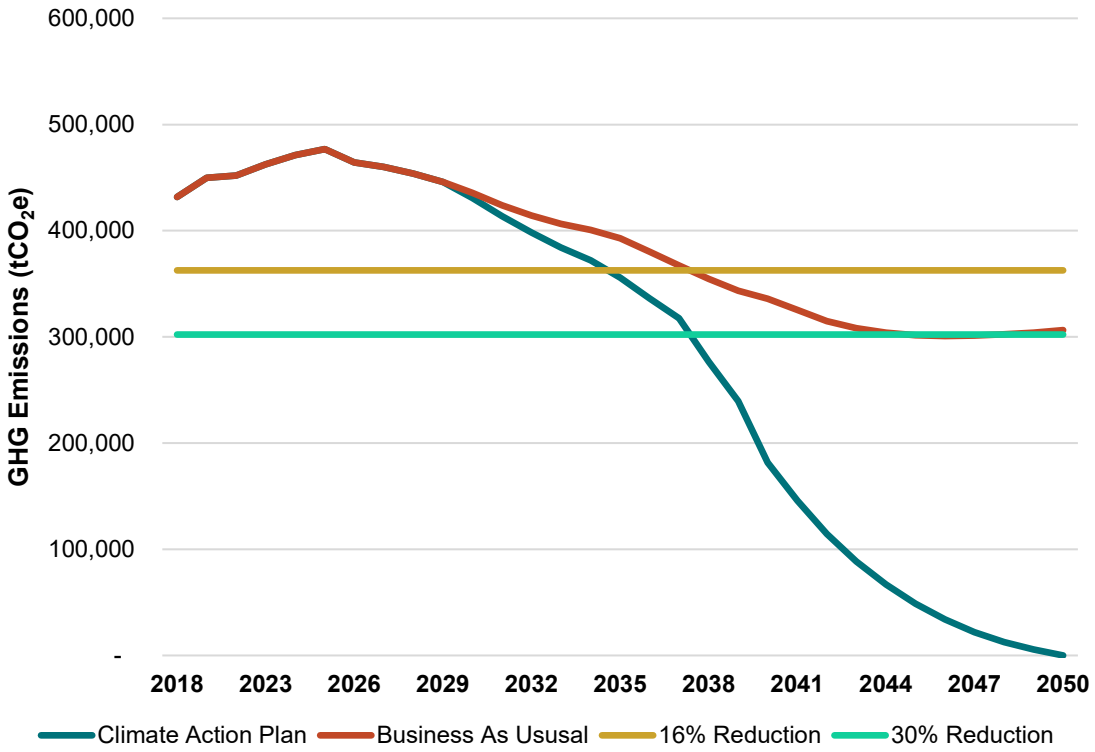


Figure 4 Business As Usual & New Climate Action Targets – Community Scale

[5] Climate change, energy and green economy strategy for Yukon announced | Government of Yukon

The good news is that proactive adaptive action can result in significant cost-benefits as reported by the National Round Table on the Environment and the Economy. They concluded that under a high GHG emissions scenario (i.e., RCP 8.5)[6], the benefit-to-cost ratio of proactive adaptation is 38:1 - meaning that for every $1 spent on adaptation measures, $38 is avoided in terms of climate related costs. Under a lower GHG emissions scenario (i.e., RCP 2.6), the same benefit-to-cost ratio is 9:1.[7] There are also additional co-benefits that work their way through the economy because of proactive investment. This is in addition to the protection benefits to ecosystems that provide valuable goods and services that are often not measured in capital frameworks (e.g., protection of habitat important for biodiversity and pollinator species but that doesn't have a traditional monetary value).

While the City has direct control over the investment, operation, and maintenance of its assets to reduce GHG emissions and increase community resilience (e.g., reducing the risk of flooding through improved stormwater design), it cannot control assets not owned by the City or manage behaviors of those within the community. To influence change within the community, the City will lead by example with its own operations, make changes to infrastructure systems to enable change, and partner with the Yukon government, local community organizations and First Nations to facilitate change in the community. In short, there is no shortage of pathways, technologies, policy levers, financing programs and strategies to enact and enable climate action in the community of Whitehorse. These climate action pathways also contribute to the achievement of many of the City's community goals and can result in numerous co-benefits including:

- Job creation related to renewable energy, industrial ecology, smart grid development, district energy development, and alternative transportation;
- Shorter commute times through improved access to active transportation systems;
- Reduced health risks due to lower air pollutants and wildfire smoke exposure;
- Lower energy bills due to energy use and water consumption reductions and more efficient buildings;
- Strengthened infrastructure, disaster preparedness, and social cohesion enhance resilience; and
- More resilient ecosystems and the continued provision of services like water purification, carbon sequestration, and habitat for biodiversity.

[6] The IPCC has established four Representative Concentration Pathways (RPCs) based on projected GHG emissions scenarios. RCP 8.5 is the internationally recognized most pessimistic - "business as usual" GHG emissions scenario – where the ambient concentrations of GHGs are the highest. Other GHG emissions scenarios, RCP 6, 4.5 and 2.6, represent more substantial and sustained reductions in GHG emissions. RCP 2.6 is representative of a scenario that aims to keep global warming below 1.5°C. RCP 4.5 is considered the 'medium stabilization' scenario where global mitigation efforts result in intermediate levels of GHG emissions.

[7] http://nrt-trn.ca/wp-content/uploads/2011/09/paying-the-price.pdf

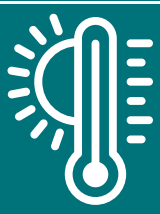
1.3 Climate Change Impacts to Whitehorse

The North is among the regions experiencing the greatest warming in Canada at an estimated three times the global rate, particularly during winter months[8]. Climate models project that this warming trend will materialize as an increase of precipitation, including the frequency and intensity of extreme rainfall, more extreme heat events that last longer in duration, increase potential for severe weather events, and increase frequency and magnitude of wildfires. At the local level, if climate change remains unabated, the City is projected to experience an increase in extreme hot days, heatwaves, extreme rainfall, and high winds. This means an increase in heat related exposure and health conditions, an increase in the incidence of local and regional wildfires and related risks, damages and health related impacts, and an increase in the risk of overland and riverine flooding and associated damages.

While the models project that cold days, cold snaps, and annual freeze-thaw cycles will decrease in the future, there is likely to be more variability. The variability is expected to show up in the spring and fall seasons which will increase the risk that rain-on-snow and freezing rain events occur which can result in flooding, power outages, and other health related risks (e.g., slips and falls, accidents, etc.). A snapshot of Whitehorse's recent historical climate and projected changes under a business-as-usual GHG emissions scenario[9] is presented below.

[8] https://changingclimate.ca/CCCR2019/chapter/8-0/
[9] Shared Socioeconomic Pathway SSP5-8.5

Snapshot of Whitehorse Historical and Projected Climate

Climate Variable		Historical (1991-2020)	2050s (2041-2070)	2080s (2071-2100)
	Annual mean temperature	**0.2°C**	**3.3°C**	**5.8°C**
	Number of days with a maximum temperature greater than 30°C	**0.9 days/year**	**6.3 days/year**	**21.1 days/year**
	Heat wave of 2 or more consecutive days with a maximum temperature greater than 28°C and minimum temperature greater than 13°C	**0.1 events/year**	**1.3 events/year**	**3.8 events/year**
	Number of days with a minimum temperature colder than -30°C	**13 days/year**	**3.6 days/year**	**~0 days/year**
	Annual total precipitation	**279.6 mm**	**335.0 mm**	**378.6 mm**
	1-day maximum precipitation	**18.5 mm**	**22.8 mm**	**27.0 mm**
	Extreme rainfall (45 mm in 24 hours)	**1-in-50-year storm**	**~1-in-18-year storm**	**~1-in-7-year storm**
	Annual number of freeze-thaw cycles	**86.8 cycles**	**69.0 cycles**	**56.8 cycles**
	Frost-free season (growing season) length	**85 days**	**123.8 days**	**152.9 days**
	Wildfire annual occurrence (Southwestern Yukon)[10]	**5 to 10 fires per 10^6 km^2**	**~2-fold increase in fire occurrence**	**~3-fold increase in fire occurrence**
	Wildfire annual area burned (Southwestern Yukon)[10]	**0.5 to 1.0% per year**	**~2-fold increase in area burned**	**~3-fold increase in area burned**
	Average wildfire season length (Whitehorse region)	**150 to 175 days**	**165 to 190 days**	**180 to 205 days**

[10] Historical wildfire data for the 1961-1990 period

A high-level climate vulnerability assessment (CVA) was completed for infrastructure in Whitehorse to provide guidance for climate action and adaptation measures to build the City's resilience to climate change. The CVA considered various climate parameters including but not limited to those listed in the Snapshot of Whitehorse Historical and Projected Climate and both City-owned and externally owned infrastructure. By examining climate-related hazards and possible interactions (exposure and sensitivity) with assets, infrastructure systems, and services as well as the ability to respond (adaptive capacity), the overall vulnerability to climate-related hazards can be determined. The top 10 climate-related hazards, based on the number of infrastructure categories exposed to the hazard, as identified in the CVA is presented in Figure 5.

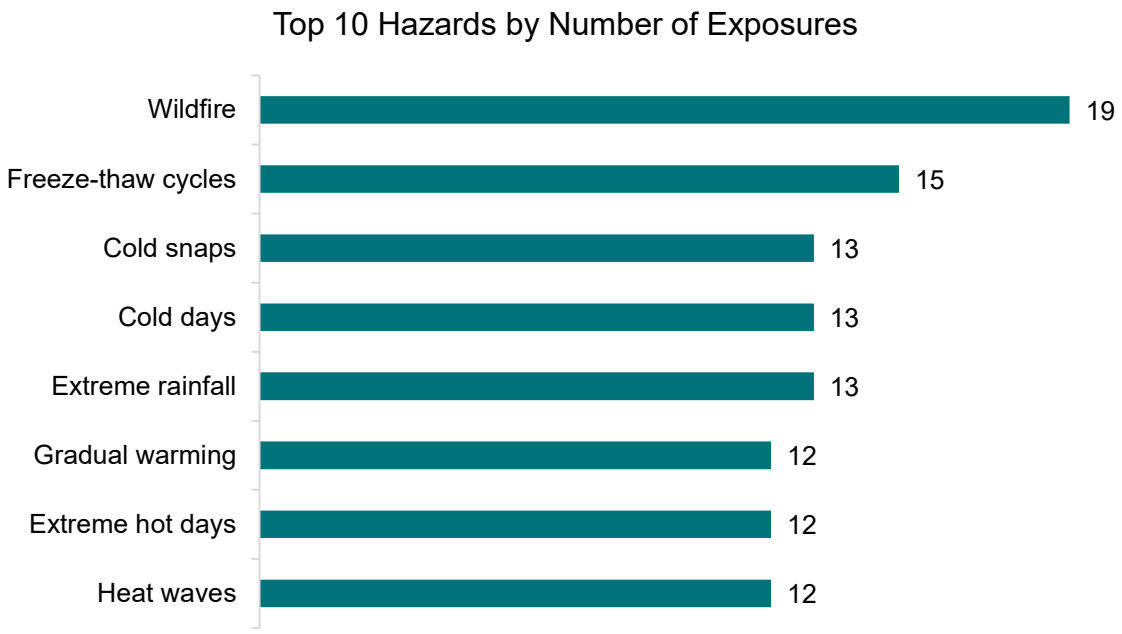


Figure 5. Top 10 Climate Hazards by Number of Infrastructure Categories Exposed

Table 1 presents the overall vulnerability ratings for Whitehorse infrastructure. The infrastructure with high vulnerability generally tends to be:

- older or near end of life;
- in fair to poor condition;
- have a high sensitivity to climate-related hazards;
- have high criticality (e.g., Robert Campbell Bridge); and/or
- have had notable impacts to previous events (e.g., escarpment).

Adaptive capacity is consistently rated as low to medium across all infrastructure recognising the challenges of accessing materials, labour, and skills due to Whitehorse's remoteness.

Table 1. Vulnerability of Infrastructure in Whitehorse

ADAPTIVE CAPACITY \ SENSITIVITY TO CLIMATE HAZARDS	Low	Medium	High
High			
Medium	• Land use • Organics processing and compost production facility • LNG plant*	• Stormwater • Waste management facility • Whitehorse General Hospital*	• Roads/transportation • Water treatment plant and distribution network • Wastewater treatment plant and network • Parks • Recreational facilities and associated equipment • City-owned administrative/operational buildings • Commercial/industrial buildings • Residential buildings • Eric Nielsen International Airport* • Whitehorse Rapids Generating Station*
Low			• Robert Campbell Bridge/Robert Service Way adjacent to escarpment • Power supply • Telecommunications and IT network* • Escarpment

Vulnerability Rating: Low Medium High

*Note: * Assets are not owned by Whitehorse. However, the City relies on them.*

Without additional measures to reduce the impacts, climate change is likely to worsen the City's vulnerability and introduce new challenges. The impacts climate-related hazards have on communities are not only caused by the hazard events, but also by how physical, environmental, and social and governance systems work together. Vulnerability describes how intensely a community may be affected, e.g., a forest experiencing long-term drought may be more easily damaged by a windstorm. Impacts from climate hazards are also worsened by inadequate social support systems, including housing affordability, equity, and the socioeconomic status of vulnerable populations. For instance, after intense storms or flooding, affordable housing for low-income renters becomes scarcer, especially since these units are often situated in vulnerable areas. Additionally, the availability of emergency-response systems and accessible transportation networks plays a pivotal role in mitigating climate-related impacts on communities.

To address these interconnected factors, collaborative partnerships at all levels are essential. While the investments in climate change mitigation and adaptation span various domains, including infrastructure, active transportation, buildings, waste recovery, emergency systems, and renewable energy technologies, the investments will yield tremendous co-benefits.

1.4 Scope of the Plan

The CAP provides an overview of actions that relate to both the Corporation (the City of Whitehorse as a municipal or local government entity) and the Community (which is composed of both the Corporation and all its businesses, residents, and their assets).

Given the ability of the City to **control** only those assets and processes which it owns and/or operates independently of others, this CAP has a heavy focus on Corporate Actions that are directly within its control.

Community Actions that are greatly influenced by authorities such as the Yukon government (YG), the First Nation governments, Federal regulations, third-party service providers (e.g., utility companies), or the City are included in this plan, however these are often difficult for the City to control.

The City, however, can **influence** Community actions (e.g., by supporting them through funding initiatives or providing alternative transportation solutions), or **advocate** with other governments and partners to support the development or progress of Community actions (e.g., lobbying at the Territorial level for increased electric vehicle charging infrastructure).

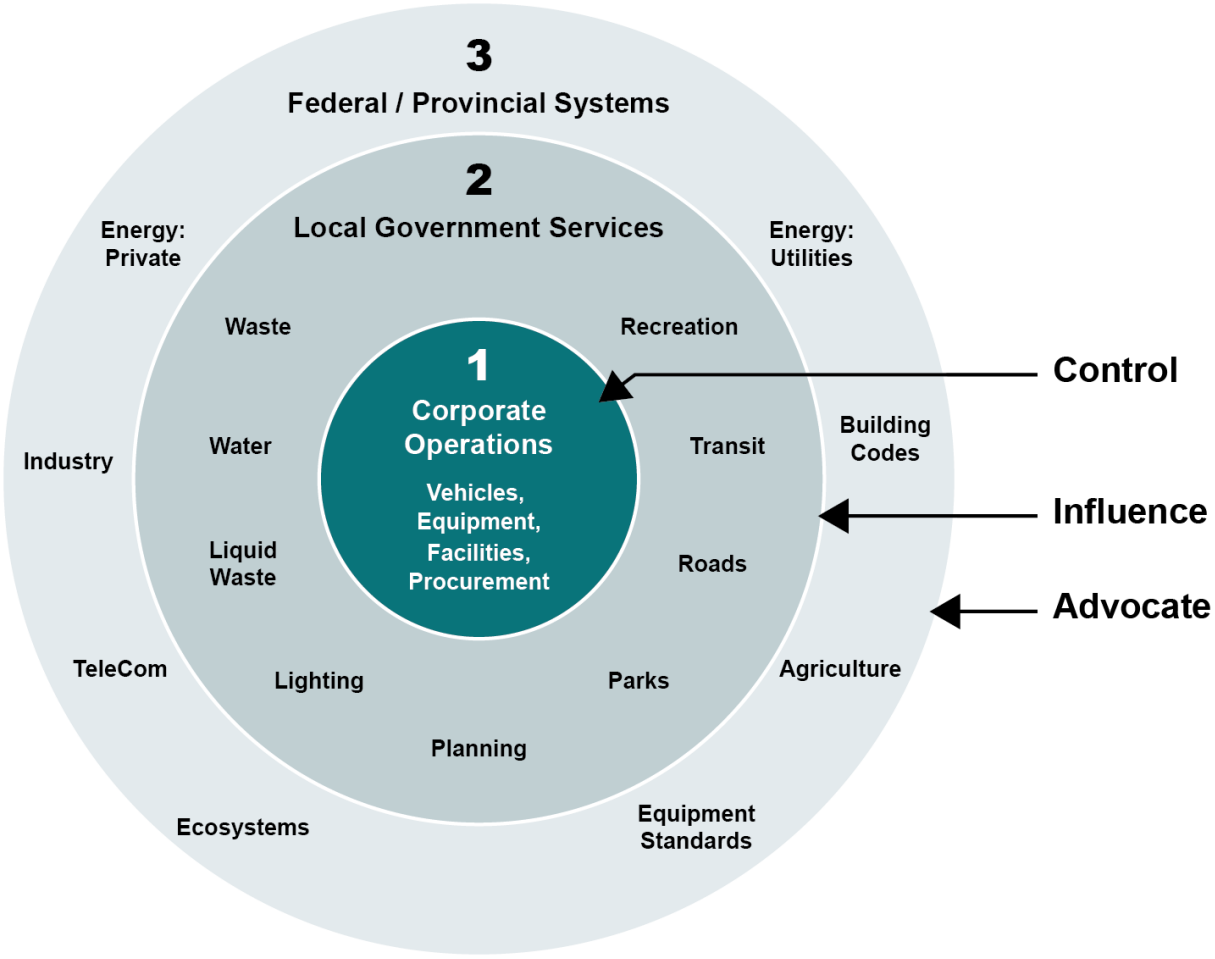


Figure 6 **Focus of the Whitehorse Climate Action Plan**

1.5 A Call To Action For All In the Yukon

Municipal actions to reduce Whitehorse's contribution to climate change and to increase resilience are necessary but insufficient on their own. Scientists have determined that the world only has approximately ten years to change its current trajectory of GHG emissions. For the City and all who call it home, this timeline is probably shorter as the impacts are already being felt and the consequences of the risks increase as time goes on. Achieving net-zero GHG emissions and increasing resilience to climate change while providing support to those most vulnerable and are going to be impacted from the transition will require this community to band together and support one another. It will require action from everyone who lives and works in the City, and strong and steady action and ongoing support from Yukon and Federal Governments. This Climate Action Plan is an important first step for the City to reduce GHG emissions and increase City and community resilience. While several impacts from a changing climate may be unavoidable, the City has an opportunity now to avoid the most dangerous impacts of climate change this century. By making proactive shifts in how residents live, work, and move in local communities, the City can help mitigate climate change by reducing energy consumption and associated GHG emissions.

2 WHITEHORSE CLIMATE ACTION PLAN

2.1 Objective

The City has a crucial role to play in significantly reducing its impact on global climate change and in adapting the Whitehorse community to inevitable transformations. This Climate Action Plan integrates efforts to mitigate climate change by achieving zero greenhouse gas (GHG) emissions by 2050, while also preparing for anticipated climate-related shifts and impacts in the Yukon. The Climate Action Plan serves as both an action plan and a strategic roadmap, outlining specific initiatives that the City will undertake over the next six years to meet the 2030 GHG reduction target and to continue a path towards net-zero GHG emissions by 2050. As a strategic document, the vision and goals presented provide overarching direction for future decision-making regarding which climate action initiatives to pursue. This strategic vision is essential for evaluating innovative ideas and proposals that may arise in the future, even if they were not fully conceived or developed at the time of this Climate Action Plan. As no plan or strategy can operate in isolation, the Climate Action Plan purposely complements and supports key City plans including the:

- Official Community Plan 2040 (2023);
- Sustainability Plan 2015 – 2050 (2015);
- Transportation Master Plan (2024);
- Transit Master Plan (2018);
- Transportation Demand Management Plan (2014);
- Emergency Management Plan (2022);
- Solid Waste Action Plan (2013);
- Energy Management Plan (2012); and
- Wildfire Risk Reduction Strategy and Action Plan 2021-2024 (2020)

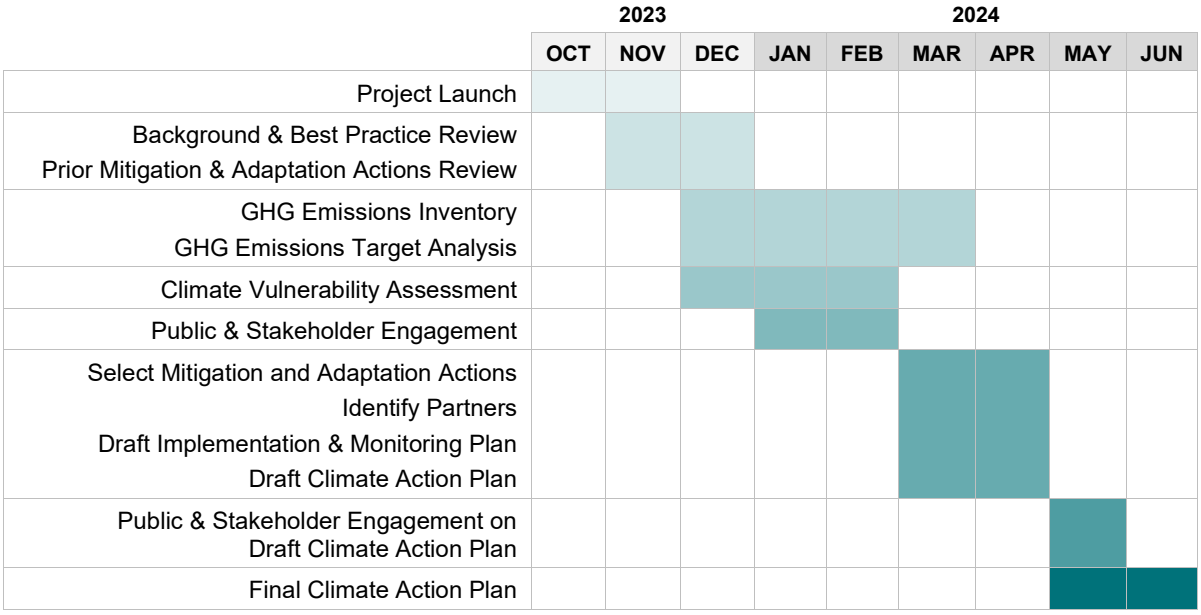
The Climate Action Plan aims to meet the following objectives:

- **Measure**: Define accurate community GHG and energy-use (baselines, modelling, and forecasts) to inform all planning and priority decision making;
- **Plan**: Establish effective plans and implement actions to achieve the City's GHG reduction target of net-zero by 2050 (below 2018 levels) to achieve the necessary level of community resilience to reduce climate related risks across human and natural systems;
- **Mitigate**: Take aggressive and proactive action to tackle the most important GHG mitigation and adaptation priorities and programs;
- **Adapt**: To provide a strategy and action plan to minimize Whitehorse's financial, social, and environmental impacts due to climate change; and
- **Monitor and Improve**: Track progress towards the Climate Action Plan goals and objectives and inform future programs and initiatives.

2.2 Climate Action Plan Development Process

The development of the Climate Action Plan began in November 2023 and moved into more fulsome City staff and broader engagement in February 2024. The Plan's development involved a combination of research on policy and best practices, completion of Whitehorse's GHG inventory and forecast of GHGs out to 2050, completion of the climate vulnerability assessment for infrastructure in Whitehorse, and engagement and input from City staff, stakeholders, and the public. Numerous stakeholders, YG, and First Nations were invited to participate in a series of engagement sessions in early 2024 to provide input into the goals and help identify key actions and partners. An online survey was also hosted in early 2024 to assess public concern regarding climate change and climate-related hazards and thoughts on climate mitigation and adaptation actions. A second online survey was hosted to assess public support for the various mitigation and adaptation actions put forth in the draft Climate Action Plan. The Climate Action Plan development process is outlined below.

Climate Action Plan Development Process



2.2.1 What We Heard – Public, NGO, Yukon Government, and Whitehorse Technical Staff Engagement

During the engagement sessions, the following were common themes discussed by the public and various stakeholders:

- Communication on what the City is doing to prepare for a changing climate, reports or updates on the status of actions set out in the Climate Action Plan, and transparency about how actions are funded.
- Climate Action Plan resiliency to withstand changes in government.
- Emergency preparedness planning, including disaster mitigation plans, evacuation plans, opportunities to practice, and information about emergency kits and how to be prepared.

- Investment in and promotion of active transportation.
- Improved public transportation service.
- Education and information on climate action options available to businesses and residents, including funding sources, to help them prepare for the impacts of a climate change.
- Collaboration on climate action on multiple levels from community and neighbourhood, to city-wide, to different levels of government.
- Build climate action into policies and bylaws.
- Financial incentives or support would help businesses and residents prepare for the impacts of a changing climate.
- Concerns of wildfire impacts and the importance of FireSmarting especially when implemented on a community level.
- Municipal efforts to reduce greenhouse gas / carbon emissions on a corporate level for City-owned vehicles, facilities, and services, including the landfill.
- Concerns regarding population growth and its impacts on existing infrastructure and services as well as climate change-related impacts.
- Local food security and food sovereignty.

The main takeaways from the engagement sessions are that communication, education, and collaboration are key to creating an effective Climate Action Plan for Whitehorse.

As part of the City's engagement efforts on the Climate Action Plan, it released a survey to the community to help us better understand:

- How climate change is affecting residents and businesses.
- The future impacts of climate change residents and businesses are most concerned about.
- How best to prepare the City to be resilient to the impacts and reduce GHG emissions.
- What residents are doing to adapt to current and future climate change.

The majority of participants were very concerned about the impacts of climate change in Whitehorse, and they were most concerned about an increased occurrence of wildfires and disruption of power supply. Freeze-thaw cycles followed by landslides are the climate hazards that have most impacted residents. Almost half of participants said they are somewhat prepared in their residence or business for the impacts of climate change and the rest were divided between very prepared and not prepared.

The top three actions that participants have already taken to prepare for current and future impacts of a changing climate are using active and/or public transportation instead of driving, switching to LED lightbulbs, and doing laundry with cold water. Many participants also shared that they would use active transportation but that they do not feel the current infrastructure or maintenance makes it a safe option. Active transportation was among the top three actions that participants are planning to take as well as developing an emergency preparedness plan and kit, and FireSmarting their property.

Participants chose financial incentives/grants as what would help them most to take action to prepare for the impacts of a changing climate and they would like most to learn more about what the City is doing to prepare for a changing climate.

2.3 Initiatives Underway

The City has been implementing several initiatives that will provide future energy and GHG reductions, including facilities energy management assessments, vehicle fleet electrification and waste reduction programs. The success of these actions is important – they give the City a head start on climate action so that it can more efficiently achieve its vision and climate action commitments. Some of the initiatives proposed or being implemented by the City are presented below:

- Upgrading the City's fleet to hybrid or electric vehicles.
- Exploring feasibility of low-carbon transportation options, e.g., bike-share, on-demand transit.
- Expanding active transportation availability.
- Developing new Stormwater Management Plan, Groundwater Protection, and Source Water Protection Plans.
- Expanding organic waste collection and composting.
- Monitoring landfill gas emissions.
- Including climate projects in budget submissions.
- Reviewing the 2012 Zoning Bylaw.
- Hiring an Emergency Management Coordinator and FireSmart staff in 2023 and 2024.
- FireSmarting of City-owned facilities is being planned and is anticipated to be expanded in the future.
- Partnering with the Yukon government to lead power outage awareness building.
- Establishing a comprehensive Asset Management Program.
- Increasing renewable energy use.
- Developing green building and infrastructure strategies.
- Implementing a Transportation Demand Management plan.
- Increasing the renewable fuel mix.
- Adhering to Federal standards for the purchase of electric vehicles.
- New subdivisions are to include two access routes, FireSmarting, and densification.

3 WHITEHORSE ENERGY & GHG EMISSIONS

Energy and GHG emissions inventories are the primary means of how the City can monitor and report progress towards GHG emission-reduction goals. Using this information, the City can better grasp where the City and the community uses the most energy, how much energy is used, and how much GHG emissions are being released from providing services to the community and how much GHG emissions are being released as the community goes on about its day-to-day activities.

The sections below describe how the City and community is consuming energy, the major sources of GHG emissions, and how the City is already acting to reduce both energy consumption and the generation of GHG emissions in the community.

3.1 Municipal (Corporate) & Community GHG Emissions Inventories

To monitor the impact on energy and greenhouse gas emissions, as well as track progress toward related targets, the City maintains and oversees two types of inventories: municipal (corporate) and community (Table 2).

Table 2 Overview of Corporate & Community Energy & GHG Emissions Inventories

Corporate	Community
2022 GHG Emissions: 63,840 tCO_2e	2022 GHG Emissions: 451,901 tCO_2e
The municipal (corporate) inventory tracks energy and GHG emissions from major facilities owned, leased, and operated by the City. The municipal inventory includes the following energy and GHG emission sources: • **Transit Fleet**: The City manages a transit fleet to provide transportation services to Whitehorse residents and visitors. GHG emissions from this category are the result of diesel fuel combustion. • **City Buildings**: The City's facilities consume electricity and natural gas to heat, cool, ventilate, and illuminate administrative buildings, recreation centers, etc. • **Non-Transit Fleet**: The City's non-transit fleet vehicles include light duty vehicles for corporate use. Most non-transit fleet vehicles consume gasoline. • **Water and Wastewater:** The treatment and movement of water and wastewater is accomplished largely by electrically driven pumps and processes. Diesel fuel used for backup electricity generation and natural gas used in conditioned spaces constitute a smaller proportion of	The community inventory tracks energy and GHG emissions from activities taking place within the geographic boundaries of the City of Whitehorse. The community inventory includes the following energy and GHG emission sources: • **Municipal (Corporate)** – GHG emissions from Corporate Operations and the services delivered to the community of Whitehorse. • **Waste** – GHG emissions related to solid waste disposal at the landfill, composting, and wastewater treatment. • **Commercial** – GHG emissions related to the operation of commercial and institutional buildings within City of Whitehorse. • **Residential** – GHG emissions related to the operation of all residential buildings within City of Whitehorse. • **Transportation** – GHG emissions related to the use of on-road, off-road, waterborne, and aviation vehicles and equipment within City of Whitehorse.

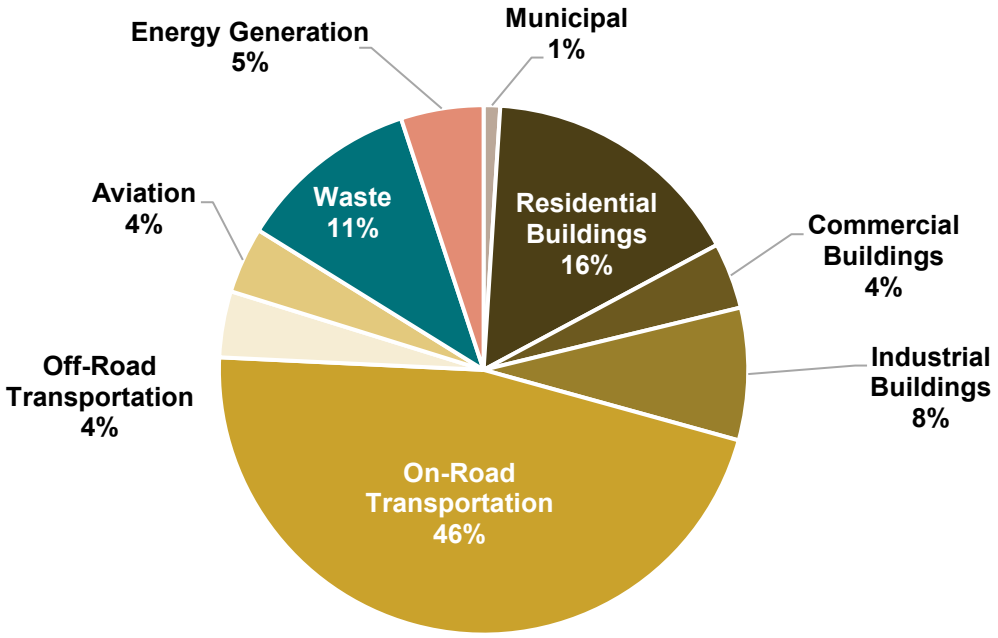
Corporate	Community
GHG emissions. Wastewater processing and treatment also results in the release of methane and nitrous oxide emissions to the atmosphere. • **Landfill:** Waste does not directly consume energy, but when deposited into landfills or composted it decomposes and releases methane gas which is a potent GHG emissions source. • **Streetlights and Traffic Signals:** These items are all powered exclusively by electricity.	• **Industrial** – GHG emissions related to the operation of industrial (energy generation) and related activities within City of Whitehorse. • **Land Sequestration** – GHG emissions related to the conservation, maintenance, and conversion of all types of land uses within the City of Whitehorse.

While the community GHG emissions are much higher than the municipal (corporate) GHG emissions, the Climate Action Plan is focused on reducing both sources of GHG emissions. The following section provides a breakdown of the 2022 community energy and GHG emissions, which encompasses municipal (corporate) energy and GHG emissions.

3.2 GHG Emissions Snapshot

The inventory for the 2022 reporting year shows that residents and businesses consumed over 6.7 million Gigajoules (GJ) of energy – mostly in the form of natural gas, heating oil, electricity, gasoline, and diesel fuel. This led to the release of approximately 451,901 tonnes of carbon emissions (tCO_2e) or about 15.7 tonnes per person.

The 2022 GHG emissions inventory breaks down as follows (Figure 7):



Note: ■ Land -6% (GHG emissions reduction)

Figure 7 GHG Emissions By Source

- **Municipal:**
  Excluding the treatment of solid and liquid waste, which is a corporate responsibility, 1% of the community's GHG emissions are related to the operation of City owned and managed buildings, fleet, and streetlights.

- **Residential Buildings:**
  16% of community GHG emissions come from heating, cooling, and powering of residential buildings. The majority of these GHG emissions are from the consumption of natural gas and fuel oil with the remainder coming from electricity, propane, and wood.

- **Commercial & Industrial Buildings:**
  4% of community GHG emissions come from heating, cooling, and powering commercial buildings. 8% of GHG emissions in the community is related to industrial activities, like energy generation. The majority of these GHG emissions are from the consumption of natural gas and electricity.

- **Transportation**:
  54% of GHG emissions come from using fossil fuels in on-road, off-road, waterborne and aviation vehicles. 93% of these transportation GHG emissions are related to on-road vehicle fuel consumption which is directly related to moving people and goods for businesses.

- **Waste**:
  The landfill contributes to 11% of the communities GHG emissions. Other sources of waste GHG emissions include wastewater treatment and composting of materials like yard waste.

- **Land Sequestration**:
  The community's GHG emissions are reduced by nearly 6% due to natural assets like urban trees, wetlands, managed and unmanaged parkland and greenspace storing and sequestering carbon.

3.3 Energy Consumption in Whitehorse

Building-related GHG emissions come primarily from consumption of natural gas and heating oil (approximately 74% of building energy GHG emissions). Other secondary building heating energy sources are much smaller contributors to the community GHG emissions profile and include electricity, propane, and wood (Figure 8). The transportation sector produces GHGs mainly by burning gasoline, diesel, and to a much smaller extent propane fuels in passenger vehicles and accounts for the largest amount of GHG emissions.

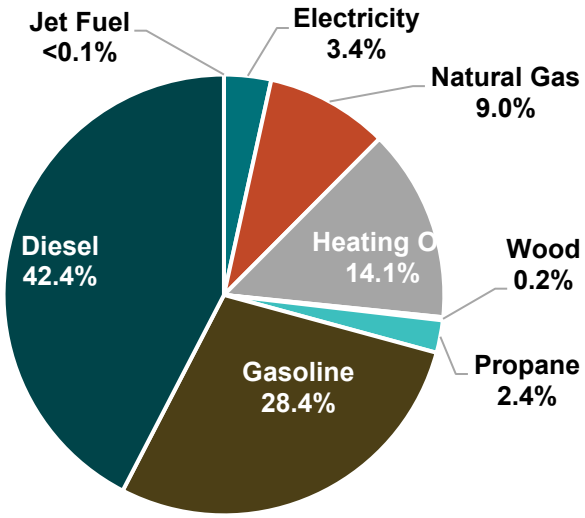


Figure 8 Community GHG Emissions from Different Fuel Sources

3.4 Business As Usual GHG Emissions Forecast

Whitehorse's population is expected to grow substantially by the year 2050 and so will the demand for energy and the release of GHG emissions. The growth in GHGs will largely be tempered by actions of the Yukon and Federal government and will include the greening of the electrical grid, improvements to the building code, building energy efficiency improvements and the shift to electric vehicles. Based on the actions by the Yukon and Federal governments, projected business as usual GHG emissions are expected to decline by up to 30% (Figure 9). While this forecasted decline in GHG emissions can be celebrated, it is not enough to meet global targets and aggressive changes will still need to be made.

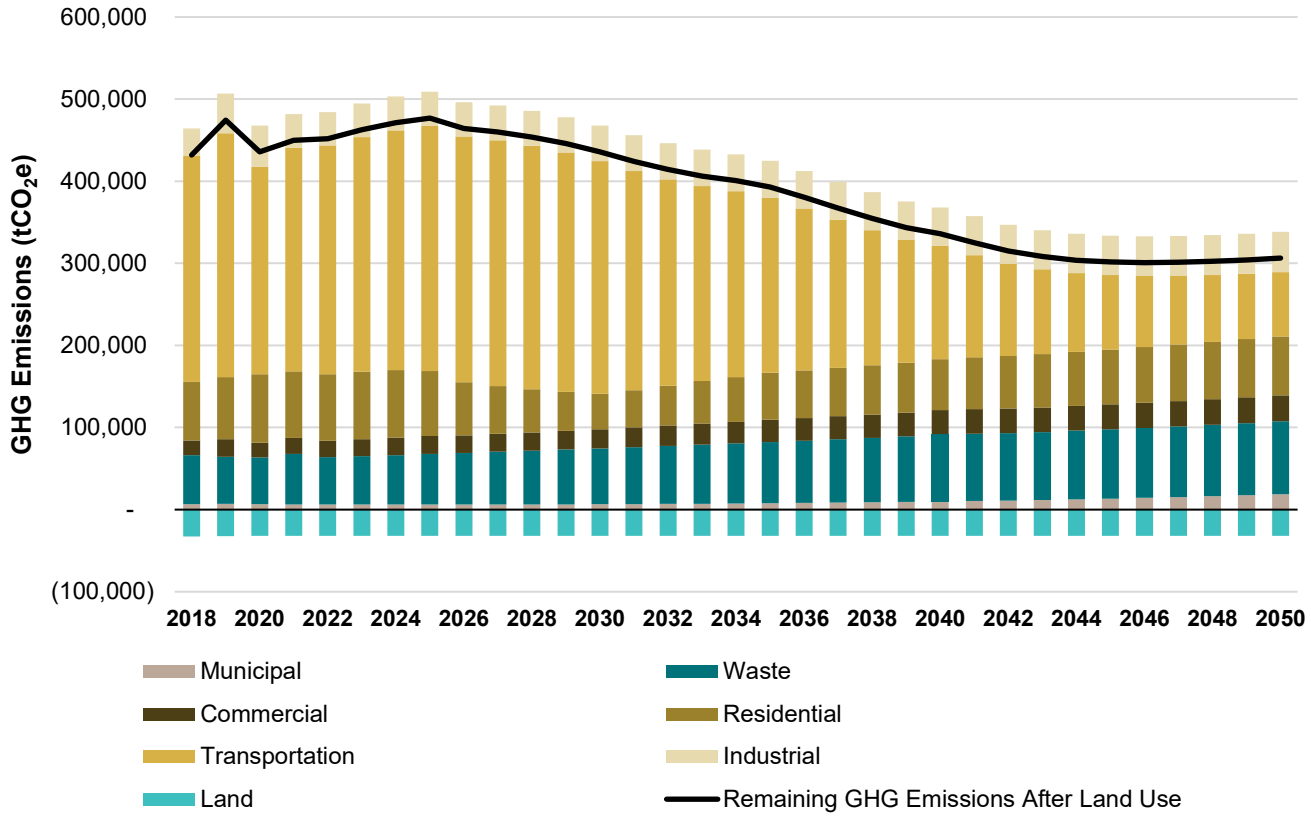


Figure 9 Business as Usual GHG Emissions Forecast

4 DEFINING WHITEHORSE'S FUTURE

4.1 One Pathway to 2050

Many factors will influence the behavior and actions of the Whitehorse community over the next 30+years – and ultimately the trajectory of the community's GHG emissions. However, to achieve net-zero emissions by 2050, the path is clear in what needs to be done. By 2050, energy generation organizations will have adopted new, low-carbon technologies to power their processes, most homes and businesses will have been retrofitted to use less energy, many will have rooftop solar, and all heating will be produced by clean electricity, or green/blue hydrogen. By mid-century, all new buildings will be constructed to be net-zero GHG emissions and very few will be single family dwellings. By 2050, more people will be taking transit and active modes of transportation and almost all cars on the road will be electric. The landfill will have a beneficial capture and reuse system, and waste will follow a circular process with most waste streams being recovered and reused with minimal quantities entering the landfill. The City will have more greenspace and trees to increase the resilience to the impacts of climate change and to store and sequester atmospheric carbon. Any remaining carbon will be addressed in future Climate Action Plan iterations via new technological developments, regulations, or policies, including consideration of carbon credit purchases. And lastly, because some parts of climate change are locked in, the City will have a robust backup and response system available to support critical infrastructure and activities when climate impacts do occur. A potential pathway to net-zero is depicted in Figure 10.

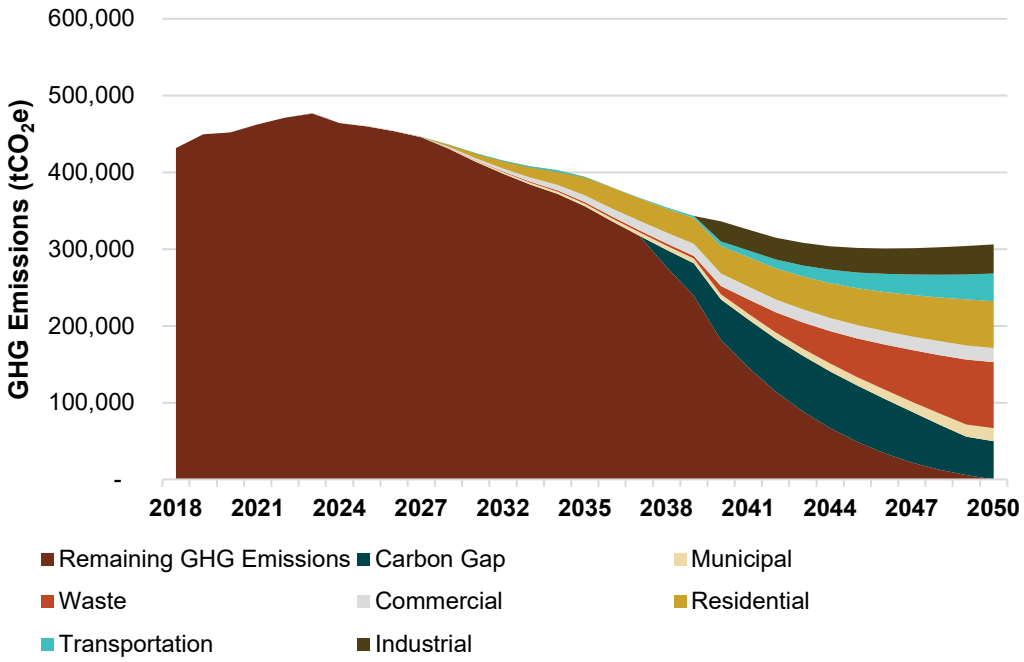


Figure 10 GHG Emissions Forecast

Exact prediction of the future is not possible. It is very important to note that the modelled pathway represents only one of many possible community-informed, evidence-based GHG-reduction pathways for the City. The achievement of net-zero GHG emissions is ambitious and will not be without challenges – achieving deep reductions in GHG emissions will require strong leadership and collaborative action by the City, senior levels of government and local businesses and organizations, as well as lifestyle changes by Whitehorse residents. There are also unknowns as to how residual or hard to reduce GHG emissions, like landfill fugitive gas, will be reduced by 2050 – known as the carbon gap – over time, new technologies and processes will be needed and deployed to reduce these GHG emissions sources.

Although specific actions are defined in this Climate Action Plan, it is anticipated that they will be prioritized and implemented opportunistically (e.g., certain circumstances may accelerate a particular action, like new funding becoming available) and will be regularly reviewed and updated. Any actions with financial implications will be reviewed and approved by senior staff and Council.

4.2 Community Carbon Budget

To support the implementation of the Climate Action Plan, a community carbon budget is proposed. A community carbon budget is a strategic approach to managing and reducing GHG by setting a limit on the total annual GHG emissions the City of Whitehorse can produce over a given period. A carbon budget establishes the maximum amount of cumulative amount of GHG emissions that the City can release to keep its contribution to limiting global warming to no more than 1.5°C. A carbon budget is like a household budget – just as a household would allocate a certain amount of money for different expenses, a carbon budget allocates a specific amount of GHG emissions that can be "spent" to stay within global temperature limits. The carbon budget can also be used to establish short term GHG reduction targets as the goal is to stay within this budget while transitioning towards the 2030 and 2050 GHG reduction targets. Based on the estimated trajectory of the community's business as usual GHG emissions and the net-zero GHG reduction target, the City will deplete its carbon budget by 2039 (Figure 11).

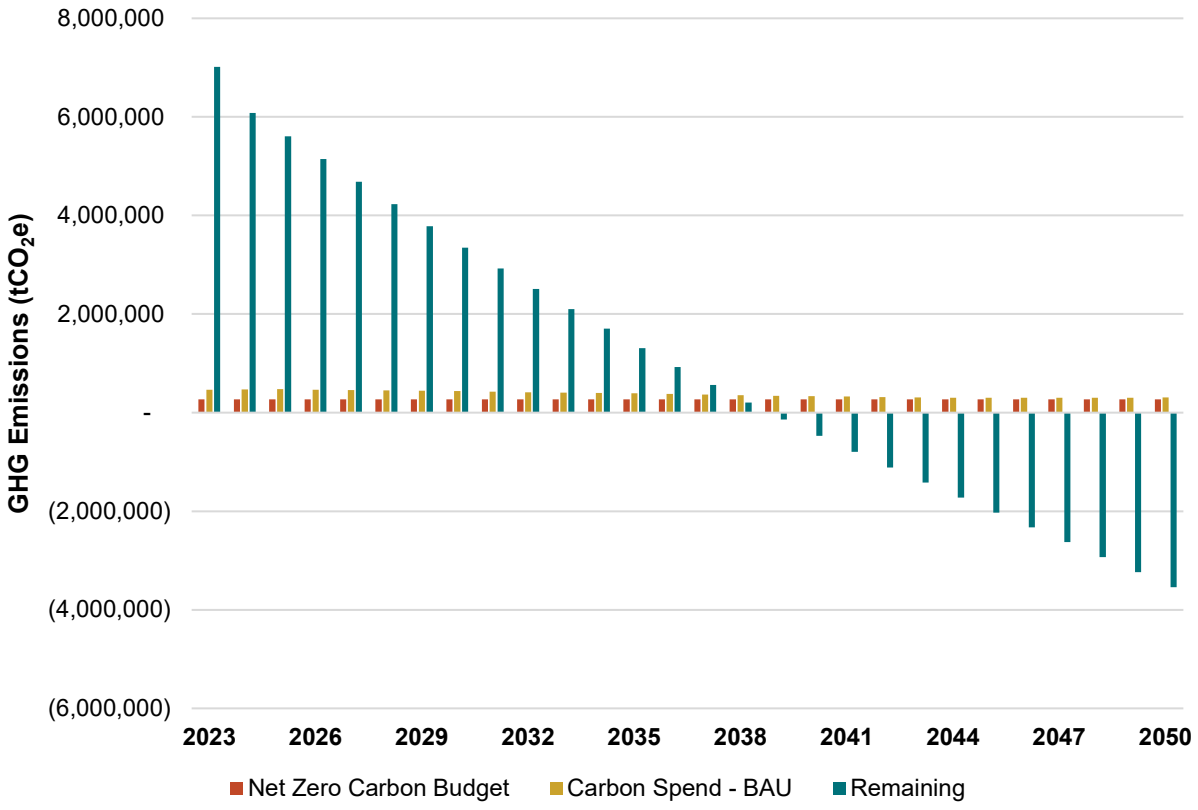
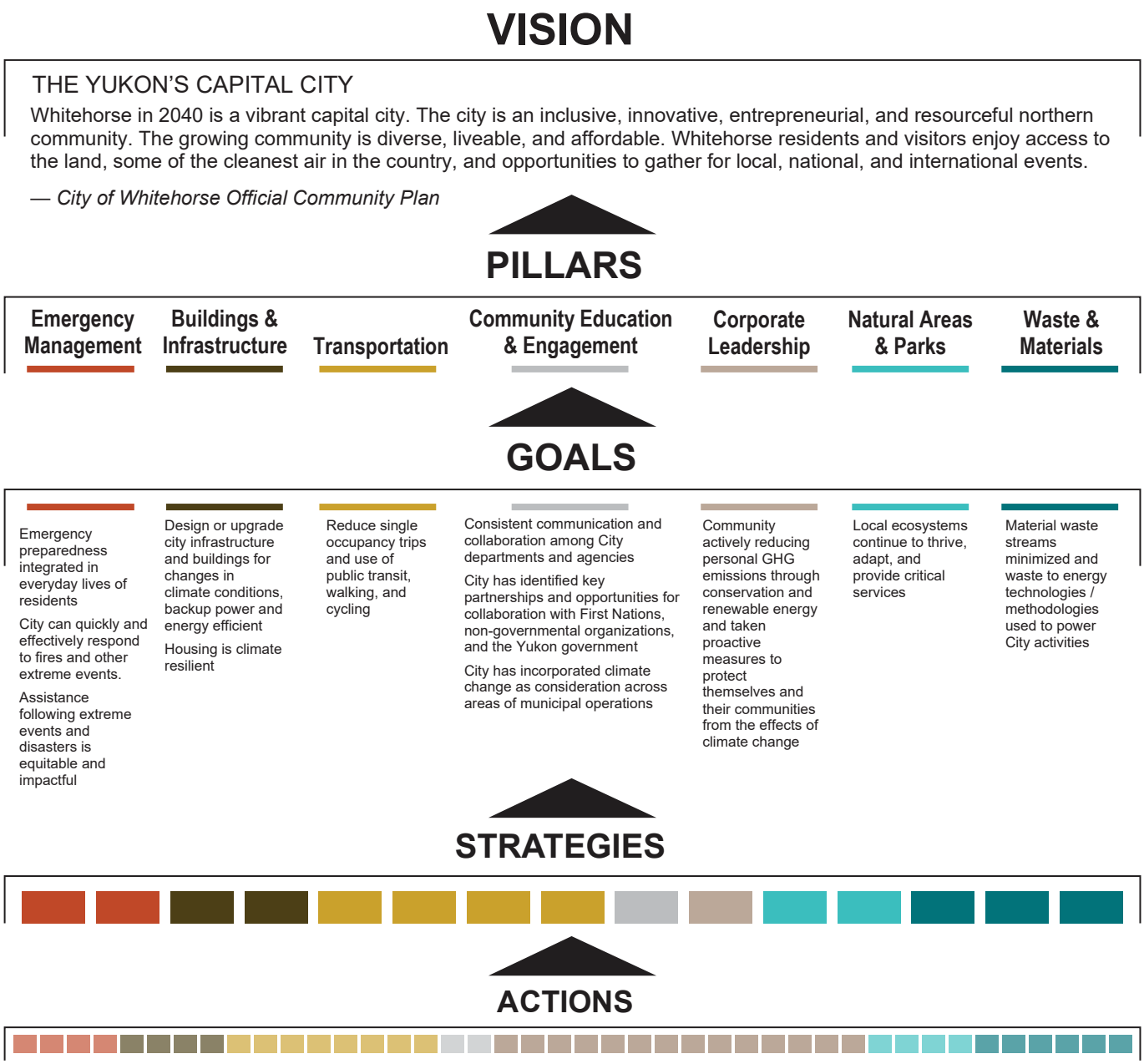


Figure 11 City of Whitehorse Carbon Budget

To keep within the Whitehorse's carbon budget, the community will need to not exceed 267,000 tCO_2e per year. To put this into context, this would require an 31% reduction in 2022 GHG emissions.

4.3 Climate Action Plan Structure

This Climate Action Plan is structured based on the City's Vision from the OCP, and is supported by 7 *pillars*, 12 *goals*, 15 *strategies*, and a suite of *actions*. A visual structure of the plan is shown below.



4.4 Climate Action Plan Vision

The Vision is based on the City's Official Community Plan 2040 (OCP):

"*Whitehorse in 2040 is a vibrant capital city. The city is an inclusive, innovative, entrepreneurial, and resourceful northern community. The growing community is diverse, liveable, and affordable. Whitehorse residents and visitors enjoy access to the land, some of the cleanest air in the country, and opportunities to gather for local, national, and international events.*

The City of Whitehorse is committed to providing equitable access to a range of residential, economic, social, cultural, recreational, mobility opportunities, and natural spaces. A vibrant social and cultural scene continues to strengthen the community's social fabric. The City's leadership is recognized across the country for its meaningful and continued efforts towards truth and reconciliation with First Nations, and its actions to mitigate negative impacts and adapt to climate change. The City remains committed to sustainable development and planning for future generations."

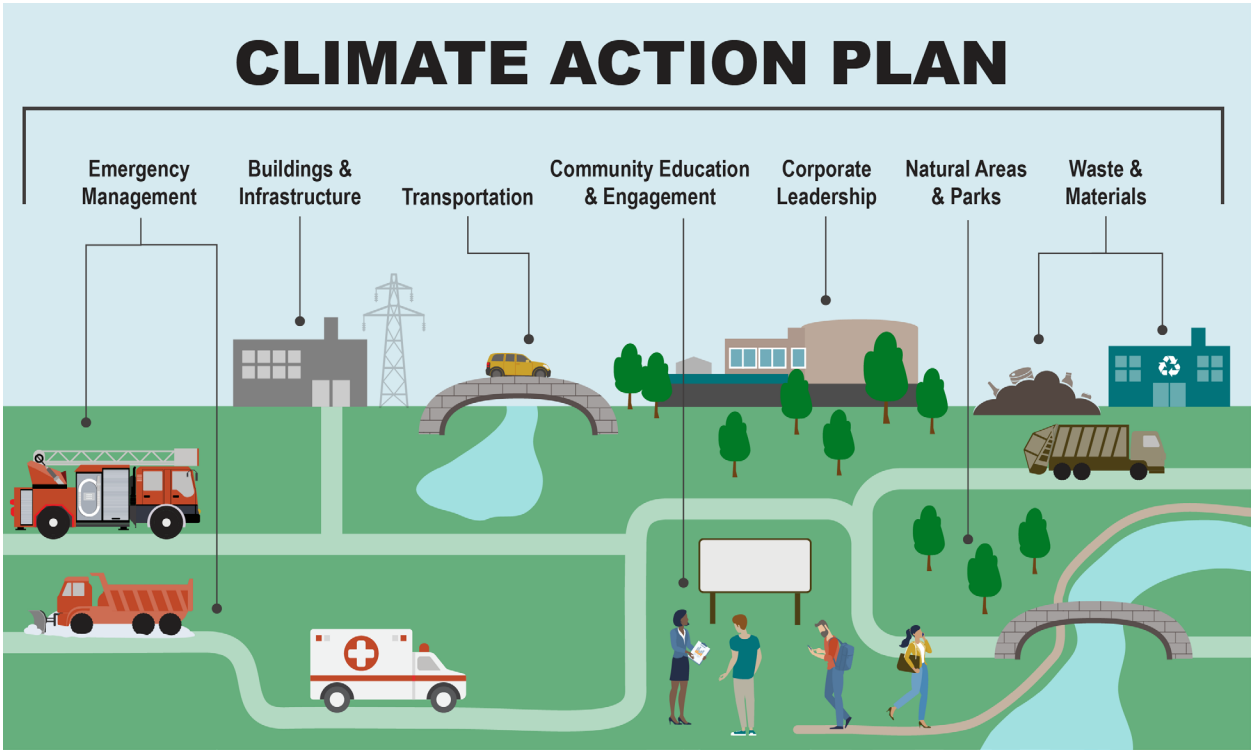
Strategies and actions included in this Climate Action Plan have been derived from best practices demonstrated by cities across the globe working to reduce their GHG emissions. Through meetings with key stakeholders and City staff as well as a community survey, the final suite of strategies and actions includes those with the most support and those that the City is most likely able to accomplish. Strategies and actions also reflect current market forces, such as increases in the number of electric vehicles and in the production of electricity from solar power. The GHG Emissions inventory also accounts for the growth of Whitehorse and its population.

Whitehorse's role in realizing this vision is to help the community manage its energy consumption and reduce its contributions to climate change. To this end, the City is a motivator, collaborator, facilitator, partner, planner, instigator, educator, and leader. The City cannot succeed on its own. Residents, businesses, community organizations and institutions also have key roles in realizing this vision.

This first version of the Climate Action Plan has a heavier emphasis on strategies and actions that is heavily focused on corporate actions as the City looks forward and works to demonstrate what is possible for the Community. Future versions of the plan will work towards actions with more impact upon and more influence from the community.

4.5 Climate Action Plan Pillars

To put the City on a track towards net-zero by 2050 and increase resilience to the impacts of climate change, the City has identified the following seven pillars (Figure 12).



a

Figure 12 Climate Action Plan Pillars

4.6 Climate Action Plan Goals

For each of the Climate Action Plan Pillars, goal statements have been developed to complement and encapsulate the intent of the goals and policies set out within the City's Official Community Plan (OCP) and the Sustainability Plan. Supporting the goal statements are a series of climate action strategies and actions that the City will work to implement over the next 5 years. The Climate Action Plan goals will be implemented through future Council and operational decisions such as annual budgeting and policy reviews.

5 IMPLEMENTATION GUIDE

The following section presents an implementation guide which supports the remainder of the Climate Action Plan.

5.1 Potential GHG Impact

The GHG reduction potential of the different actions is indicated by the icons (uppercase C) shown below. These attributes and/or estimates represent the approximate magnitude of GHG reductions if an action is fully implemented. As several actions are based upon other actions, the estimated GHG reduction potential of all actions, denoted using the legend below, should not be treated as cumulative. Rather, these are just indicators of the total possible GHG reductions as it relates to the action described.

C Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably.

CC Reduces total annual GHG emissions by 0 to 2,500 tonnes CO_2e.

CCC Reduces total annual GHG emissions by 2,500 to 10,000 tonnes CO_2e.

CCCC Reduces total annual GHG emissions by more than 10,000 tonnes CO_2e.

5.2 Co-Benefits

Although the actions described in this Climate Action Plan are mainly mitigation and/or adaptation focused, several actions that reduce GHGs or increase resiliency will be driven by the co-benefits to the broader community and environment. For example, increasing the number of bike lanes results in only small GHG reductions, but has numerous co-benefits like reducing air pollution, increasing health and well-being, improving the livability and sustainability of Whitehorse, and reducing the indirect impacts to water ways through a reduction in non-point source pollution. To reflect these other co-benefits, the following icons are used to identify the potential co-benefits each action could provide to the City and the Whitehorse community.

High potential to support jobs and prosperity

High potential to advance equity

High potential to improve the resilience of the natural environment

High potential to improve health and wellbeing

High potential to reduce the consequences of climate impacts

5.3 Department Leads

To assist with implementation and accountability, City departments have been assigned to each of the actions identified. The lead department is responsible for initiating the implementation of the action and reporting on progress.

5.4 Timelines

This Climate Action Plan outlines actions to be considered to 2030. Some of the actions are underway whereas others will require time to plan and implement. The following indicators are used to indicate the timing / phase to which the action should be implemented.

 Ongoing

 Initiate by 2026

 Initiate by 2030

5.5 Financial Resources Required

For each of the actions, an estimated level of effort is provided to help with financial and resource planning. These are as follows:

 Staff Time

 $0–$20,000

 $20,000–$100,000

 $100,000–$500,000

 Over $500,000

6 TRANSPORTATION

GOAL: The City has reduced the number of single occupancy trips and there is a significant increase in residents who are choosing to use public transit, walking, and cycling (over pre-defined levels).

GHG emissions resulting from transportation are closely tied to land use policies and planning decisions. The configuration of urban environments significantly influences driving behaviors, and the distances people need to travel to reach workplaces, recreational facilities, schools, and other key destinations. Additionally, transportation GHG emissions are impacted by the availability of appealing public transit options and alternative modes of transportation, such as cycling and walking trails. Supportive policies and infrastructure for carpooling and electric vehicle adoption play a crucial role in shaping how residents of Whitehorse choose to travel, and the types of fuels used for their trips.

Managing the City's transportation network presents a dual challenge: accommodating population growth while striving for substantial reductions in GHG emissions. Several transportation trends, both global and local, contribute to achieving emission reductions. Two major factors affecting transportation and energy consumption are the types and densities of land use within a community. Urban developments that prioritize compactness and walkability (e.g., co-location of residential buildings in the vicinity of commercial workplaces and retail opportunities), along with investments in pedestrian and cycling infrastructure (such as sidewalks, crosswalks, cycling lanes, and bicycle parking), tend to promote higher rates of walking, cycling, and public transit usage. By reducing the overall dependence on vehicles for shorter duration trips, the local transportation network can increase its redundancy through alternative modalities.

Technological trends play a pivotal role in reducing greenhouse gas (GHG) emissions. Factors such as low-carbon fuels, vehicle efficiency improvements, and the electrification of vehicles all contribute to this positive impact. Furthermore, the growth of car-sharing and ride-sharing services holds promise for substantial future emissions reductions.

STRATEGIES

In alignment with this, the City has identified the following climate action strategies:

6.1 Improve accessibility to public and active transportation options.

6.2 Enhance operations and maintenance procedures to increase the monitoring and documentation of the condition of critical and high-risk infrastructure, especially after extreme events.

6.3 Enhance energy efficiency of streetlights.

6.4 Reduce corporate fleet GHG emissions.

6.1 Improve Accessibility to Public & Active Transportation Options

To increase the resilience of transportation systems to climate change, and reduce GHG emissions, a comprehensive set of strategies and actions is necessary. Resilience actions include incorporating highly reflective and permeable paving materials to reduce impacts of extreme heat and precipitation, policy and planning environments that enable decision-makers and engineers to account for climate vulnerability in transportation infrastructure planning, and inclusive spatial mapping that identifies likely risks of climate hazards to communities and infrastructure.

Actions to reduce GHG emissions tend to include:

- reducing the frequency and duration of fossil fuel-powered vehicle trips;
- improving and increasing access to public and active transportation;
- increasing the occupancy rate per vehicle;
- promoting the adoption of zero-emission vehicles on the roads; and
- compact development through land use planning and complete communities.

By expanding the active transportation network, enhancing the transit system, and encouraging compact community development through land use planning, the City can significantly mitigate the climate impact of its transportation system. Additionally, the City can incentivize low or zero-carbon transportation behaviors, such as car-sharing programs, while discouraging single-occupancy vehicle trips (e.g., by raising parking costs).

However, certain aspects of transportation lie beyond the City's direct control. These external factors include fuel prices, vehicle fuel efficiency standards, and advancements in technology.

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Continue to improve public transportation options to make public transportation options more convenient to users.	C C	TBD		
Conduct studies to determine the resources required to increase the City's EV charging capacity and install EV infrastructure at all relevant City buildings & facilities - for City vehicles. This does not include public charging.	C C C C	TBD		$ $
Consider implementing a preferential parking permit program for car-sharing/EV programs once the necessary infrastructure has been installed and changes to the Zoning Bylaw to support Electric Vehicles.	C C	TBD		$

Action	Impact	Lead Department	Time Frame	Resources Needed
Work with local businesses / organizations to promote or implement commute trip reduction programs (e.g., parking cash out, transit allowances, rideshare, end-of-trip facilities, compressed or flexible work weeks, telecommuting, incentives and programs to reduce single occupant vehicle use, etc.).		TBD		
Continue to implement sidewalk, pedestrian, transit, roadway, and bikeway investment projects and policies that encourage the shift to active transportation modes.		TBD		
Develop active transportation campaigns, e.g., winter cycling week.		TBD		

6.2 Enhance Operations & Maintenance Procedures for High-Risk Transportation Infrastructure

Critical transportation systems are vital to the functioning of the City and the economy especially when there is an emergency or environmental disaster. However, due to its exposure to the impacts of climate change, the City's transportation systems are at a heightened risk to changes in future climate. To safeguard public safety, prevent disruptions, and ensure its resilience, it is imperative to conduct comprehensive vulnerability and risk assessments on critical infrastructure components and to implement more frequent inspections post-extreme weather events. To enhance operations and maintenance procedures for high-risk transportation infrastructure, the following actions are proposed.

Recognizing again that not all transportation assets are within the City's control, there is a need for multi-jurisdictional planning and coordination to support long-term resilience goals.

Table 3 Enhance Operations & Maintenance Procedures For High-Risk Transportation Infrastructure – Actions

Action	Impact	Lead Department	Time Frame	Resources Needed
Continue to conduct regular inspections of trails, bridges, roadways, stormwater grates, and overland flow routes for signs of stress, damage, or blockage (e.g., following spring freshet).		TBD		
Track weather related trends and costs over time (e.g., potholes, increased snow clearing) and review budgets accordingly.		TBD		

6.3 Enhance Energy Efficiency of Streetlights

While streetlights do not contribute a significant amount of GHG emissions to the overall community GHG emissions inventory, new LED streetlights will significantly reduce maintenance costs, which will also result in energy and GHG reductions. The City can explore converting its existing street lighting to LED which includes both retrofitting and installing LED in all new fixtures.

Table 4 Enhance Energy Efficiency of Streetlights - Actions

Action	Impact	Lead Department	Time Frame	Resources Needed
Assess the feasibility and return on investment of contributing to retrofit conversion of streetlights to light emitting diode (LED) illumination.	CC	TBD		$

6.4 Reduce Corporate Fleet GHG Emissions

The City manages a corporate fleet of vehicles and equipment to provide a range of services to the community that results in the release of GHG emissions. No single measure – such as the procurement of electric vehicles - can reduce fleet and equipment's GHG emissions to meet the net-zero target. Rather, a suite of strategies and actions will be required to set the City on a path towards more aggressive fuel switching and GHG reductions. Having a diverse fleet of vehicles using various fuel sources will also increase the Corporation's climate resilience in the face of future fuel shortages or power outages, by increasing redundancy and allowing for alternatives in times of need.

To reduce corporate fleet GHG emissions, the following actions are proposed.

Table 5 Reduce Corporate Fleet GHG Emissions - Actions

Action	Impact	Lead Department	Time Frame	Resources Needed
As non-emergency light to medium duty fleet vehicles reach their end of life, replace them with corporate electric vehicles (including Plug-In Hybrid and hybrid technologies).	CC	TBD		$$$
Pilot the use of electric off-road and hand-held equipment. Share the results and lessons learned from the pilots with staff.	CC	TBD		$
Explore sources of funding to capitalize on opportunities to adopt new technologies in a temporary pilot capacity, partnering with manufacturers for real world testing.	CC	TBD		
Continue to monitor what is available in the industry and seek out experiences from other municipalities and commercial operators who may have been early adopters of electric vehicle units (e.g., Edmonton EV Transit Fleet).	CC	TBD		

7 BUILDINGS & INFRASTRUCTURE

Goal: Critical city infrastructure and buildings are designed or upgraded to account for projected changes in climate conditions, has backup power (as applicable), and is energy efficient.

Goal: All housing is climate resilient.

Buildings emissions account for 23% of the City's GHG emissions. Currently, over half of dwellings in Whitehorse are single detached homes, while the next most prevalent dwelling type is single family dwellings, comprising approximately half of the housing stock.[11] The remaining dwellings are a mix of apartments, semi-detached homes, and row houses. The energy mix in the City's building stock is also varied, with a blend of electricity, propane, wood, and heating oil as energy sources with residential buildings contributing the largest proportion of community GHG emissions (Figure 13). Many buildings still rely on oil furnaces, which produce significant GHG emissions.

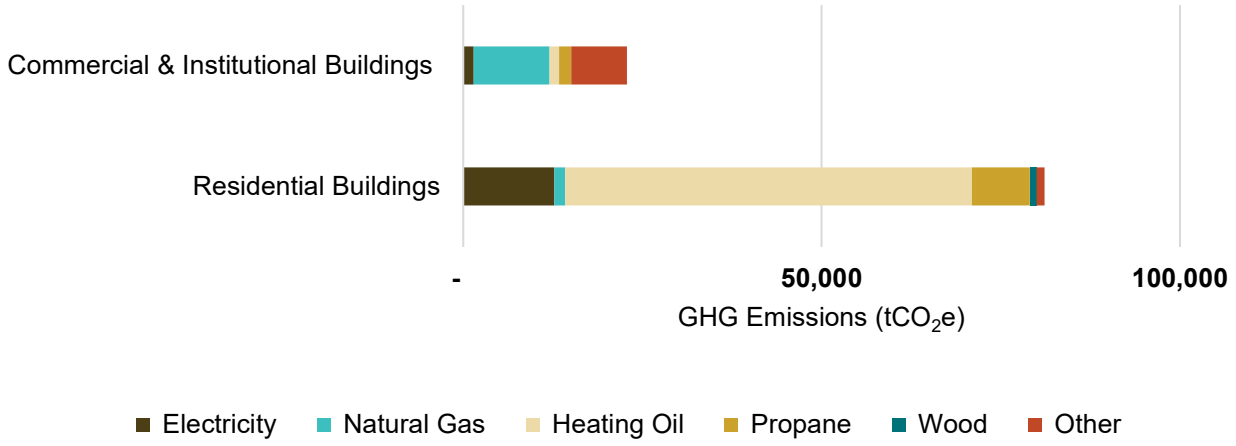


Figure 13 GHG Emissions From Buildings In Whitehorse

[11] RCAN Profile table, Census Profile, 2021 Census of Population - Whitehorse, City (CY) [Census subdivision], Yukon (statcan.gc.ca)

Aging building conditions also contribute to poor energy performance and tend to be more vulnerable to the impacts of climate change. The majority of Whitehorse's current building stock was built before any energy efficiency requirements existed (i.e., before 1990) and thus were designed to a past climate that has now changed. While newer buildings are designed and constructed in accordance with the current Yukon Government Building Code which is more energy efficient, they too are exposed and at risk to the impacts of climate change. Because buildings last for many decades, most of the buildings in the City in operation today will still be in operation in 2050. This means that retrofitting existing buildings to improve efficiency and heating systems will be an important action to substantially reduce overall community GHG emissions and increase resilience to the impacts of climate change.

The replacement or upgrading existing buildings is a gradual process and remains largely outside of the City's sphere of influence – the City can share information on upgrades and incentives and update development permit / major retrofit permit requirements to factor in energy conservation, fuel switching and resilience measures but cannot accelerate the speed to which existing buildings are retrofitted. In this regard, the City can work with the Yukon and Federal Governments to encourage ways to update existing buildings so that they are more climate resilient and adopt new standards that align with net-zero goals and passive designs. This can be done by promoting energy efficiency upgrades, providing guidance materials (e.g., information on regulations about heat pumps to ensure they are installed properly and providing oversight to make sure noise levels are acceptable) and incentive programs and advocating for further subsidizing retrofits for low-income residents. As community plans come up for renewal, the City can adopt and incorporate nature-based solutions (e.g., street trees, raingardens, bioswales, stormwater wetlands within developments, etc.) and porous and reflective surfaces (green and cool roofs, cool parking lots with Solar PV shading structures, etc.) in community design to reduce the impacts related to climate change.

STRATEGIES

To reduce GHG emissions and increase resilience of buildings in Whitehorse, the City has identified the following climate action strategies:

7.1 Reduce the City's building GHG emissions footprint while increasing resilience.

7.2 Encourage building owners to adopt renewable energy and energy conservation technologies.

7.1 Reduce the City's Building GHG Emissions Footprint while Increasing Resilience

To encourage building owners in the community to upgrade their buildings to be low-carbon and/or net-zero and climate resilient, the City will take a leadership role and implement several actions to drastically reduce energy and GHG emissions within its own building stock the City will implement the following actions:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Update City building asset management plans and policies to include the objective of investing in and upgrading assets to mitigate and adapt to climate change.		TBD		
Complete building condition assessments and ASHRAE Level III energy audits on all major City buildings and facilities.		TBD		
Review opportunities for decarbonization and develop a plan for all major City buildings and facilities.		TBD		
Explore funding sources to increase resources and staff capacity for conducting BCAs on all major City buildings and facilities.		TBD		
Continue to incorporate and improve climate adjusted design criteria for the construction or renovation of City assets and infrastructure.		TBD		

7.2 Encourage Building Owners to Adopt Renewable Energy and Energy Conservation Technologies

While the City has various policy tools at its disposal to incentivize homeowners, landlords, commercial building owners, and property managers to retrofit their buildings for improved energy performance, education and engagement play a pivotal role. Achieving this goal necessitates updating bylaws, disseminating information on retrofit best practices, sharing lessons learned, offering incentives, and actively encouraging the industry to adapt training programs to incorporate renewable energy systems and net-zero / zero-emission buildings. To support achieving the proposed climate action priority, the following actions are proposed:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Partner to support YG Energy Solutions in disseminating information and developing tools and guidelines to help property owners and managers undertake deep energy and GHG emissions retrofits of existing buildings (e.g., green roofs, white roofs, renewable energy systems)	 Heart	TBD		
Consider a bylaw review to update the City's building bylaw requirements to enhance climate change resilience and increase energy efficiency.		TBD		
Advocate for a pilot residential energy labeling program (at the time of sale) for residential homes and explore options for multifamily buildings. Based on the pilot study, develop recommendations to better support the local market, whilst supporting the retention of older homes.		TBD		
Package and communicate information on existing programs and opportunities around alternative and renewable energy. Distribute via the building permitting process.		TBD		
Encourage local educational institutions to adopt training and development program on renewable energy systems and net-zero / zero-emission buildings.		TBD		

8 WASTE & MATERIALS

Goal: Material waste streams are minimized and waste to energy technologies / methodologies are used to power City activities.

Waste constitutes approximately 11% of GHG emissions in the City which includes the treatment of wastewater, solid waste, and the composting of organic waste materials. While these systems are not a major contributor to community GHG emissions, they are critical pieces of infrastructure that consume energy and release GHG emissions and are also exposed and vulnerable to climate change impacts.

To enhance alleviate the strain on the City's landfill, the City must reduce waste generation. This entails designing or utilizing discarded materials—such as food waste, electronics, and clothing—as inputs for other processes, embracing the principles of the circular economy (see text box). For instance, companies are recycling old clothes into new ones or repurposing them as stuffing for new products. As the City's population grows, additional practices to minimize waste during product purchase, use, and disposal will need to be implemented which includes supporting rental and sharing economies, repairing, and reusing items, and selecting products and services with lower GHG emissions across their entire lifecycle. Home composting of organic waste and reducing food waste are vital to lowering GHG emissions while adhering to circular economy principles. Further opportunities lie in transforming consumer and business behaviors and implementing better design and planning. In parallel with these initiatives, the City will also need to increase the resilience of these systems to the effects of climate change by opportunistically upgrading these systems using climate adjusted design criteria.

STRATEGIES

As it relates to reducing waste related GHG emissions, while increasing resilience, the following climate action strategies have been established:

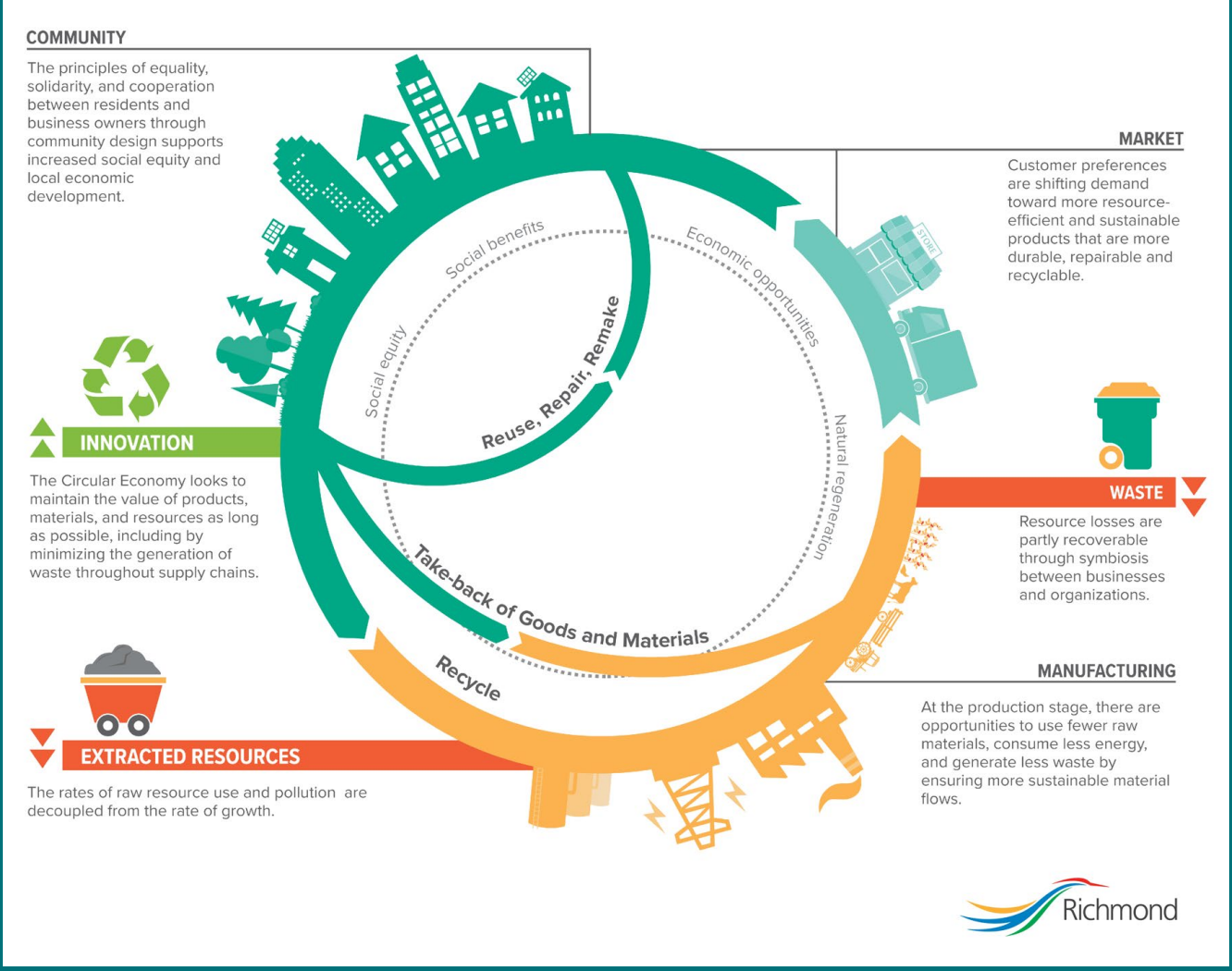
8.1 Develop and implement a comprehensive waste management program aimed at reducing GHG emissions.

8.2 Increase the resilience of the solid waste infrastructure system.

8.3 Reduce GHG emissions from water and wastewater systems through demand management and system efficiency.

What is the Circular Economy?

Instead of the "take, make and dispose" model typically used for producing goods, a circular economy approach reduces waste and avoids pollution by maximizing design and use of materials. It is a model that embodies principles such as "cradle to cradle" and biomimicry to reduce or avoid the creation of waste. Reducing production materials and waste materials is now a financial benefit.



from: https://www.richmond.ca/sustainability/circulareconomy.htm

8.1 Develop and Implement a Comprehensive Waste Management Program Aimed at Reducing GHG Emissions

Reducing the amount of waste created is a critical first step to reduce the burden on the landfill and reducing GHG emissions throughout a product's lifecycle from extraction to disposal. By reducing and eliminating waste, GHG emissions can be avoided not only in the landfill, but through a product's life cycle. Since the landfill has been active for many years, the bulk of the community's waste GHG emissions are currently from the breakdown of organic materials in landfill. To reduce these GHG emissions, many local governments capture the landfill gas, and utilize it to generate electricity or renewable natural gas. Since the City does not have a landfill gas capture and utilization system in place, there is an opportunity to reduce landfill GHG emissions significantly and generate renewable energy source.

The following actions seek to reduce waste from entering the landfill and reducing landfill related GHG emissions:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Continue to investigate options to reduce waste generated within the City and increase diversion of waste from the landfill.		TBD		
Continue to work with haulers to improve opportunities for source separation.		TBD		
Incorporate criteria related to the management of wastes from demolition, land clearing and construction activities into a Sustainable Development Checklist.		TBD		
Explore the use of community-based social marketing (CBSM) to improve outreach of campaigns focused on waste reduction (e.g. Promote product exchange / resale networks, no junk mail, smart purchasing, reducing contamination in recycling, etc.).		TBD		
Explore findings from the landfill gas assessment and conduct a feasibility study on developing a system to capture and utilize LFG. Accompany this with an evaluation of best practices implemented in other municipalities.		TBD		

8.2 Increase the Resilience of the Solid Waste Infrastructure System

Landfills tend to be at risk and exposed to climate related impacts both directly and indirectly. Direct impacts like precipitation and extreme heat can result in increased site management, increased risk of fires, damage and failure of electrical equipment and extreme rainfall can result in a large volume of landfill leachate being generated which can overwhelm the current treatment systems. Indirect impacts tend to be related to the volume of waste generated in the community because of an environmental disaster. If no plan or strategy is in place for such an event, the management of waste systems can be compromised and result in other issues. To increase the resilience of the solid waste infrastructure system, the following actions are proposed:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Develop a plan to handle and divert waste post-disaster events and to adapt to climate change.		TBD		
Complete an engineering level climate vulnerability and risk assessment on the landfill containment systems and implement the recommendations.		TBD		

8.3 Reduce GHG Emissions from Water and Wastewater Systems Through Demand Management and System Efficiency

Approximately 90% of the energy used in water and wastewater facilities is from electricity. The remaining use of energy is from diesel consumption for monthly emergency generators testing. Wastewater facilities have potential for on-site energy generation and heat recovery by capturing energy and heat within the system. Water conservation, and sanitary sewer inflow and infiltration reduction initiatives can reduce both the demand for water and the amount of wastewater that needs to be treated. These programs in turn reduce the amount of energy consumed and GHG emissions released. In support of increasing GHG resilience and reducing GHG emissions from water and wastewater systems, the following actions are proposed:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Consider developing a water conservation, and sanitary sewer inflow and infiltration reduction initiatives to reduce both the demand for water and the amount of wastewater that needs to be treated (i.e., reduce the emissions associated with pumping and treatment regardless of current water availability).		TBD		
Conduct a feasibility study on the cost of achieving net-zero carbon emissions from water and wastewater conveyance, treatment, and byproduct management.		TBD		

9 NATURAL AREAS & PARKS

Goal: Local ecosystems continue to thrive, adapt, and provide critical services.

Natural assets are natural resources and/or ecosystems that contribute to health, well-being and long-term sustainability of Whitehorse and its residents. These include urban trees and forests, wetlands, water bodies, and wilderness corridors, which can act as carbon sinks, help prevent flooding and act as habitats and means for travel for native wildlife.

Reducing the risk of climate related impacts to natural assets requires re-thinking how cities are planned, constructed, and renovated / retrofitted and a mind-set that the climate risks cannot be defeated, but rather accepted and mitigated as much as possible. Many cities are now recognizing the importance of protecting and rehabilitating existing ecosystems, incorporating natural assets into infrastructure projects, are recognizing the value of natural assets in accounting and capital planning frameworks, and are incorporating the GHG benefits in GHG emissions inventories to neutralize GHG emissions and progress towards GHG reduction targets.

While the City seeks to achieve net-zero GHG emissions by 2050, there will be some residual GHG emissions that cannot be eliminated. These GHG emissions will need to be neutralized through the adoption of direct air capture technologies or through land conservation projects, the rehabilitation of riparian ecosystems and wetlands, the construction, and the maintenance of wetland-based stormwater systems. These investments can act as green infrastructure systems thereby replacing grey infrastructure and provide both ecosystem and GHG sequestration benefits.

STRATEGIES

To be able to recognize the benefits from these systems, and to properly account and manage them in such a manner to maximize their co-benefits, the City has established the following climate action strategies:

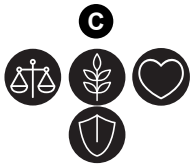
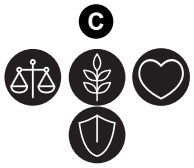
9.1 Incorporate green infrastructure into stormwater management plan.

9.2 Develop plans and policies for natural asset management to increase spread of natural areas and green infrastructure.

9.1 Incorporate Green Infrastructure into Stormwater Management Plan

Stormwater is now being recognized as an important resource to be effectively managed in that it can be harnessed to make communities safer and improve quality of life and biodiversity through open space features like wetlands and other aspects of green infrastructure (e.g., engineered wetlands, bioswales, raingardens, etc.). There is an opportunity to incorporate green infrastructure into the City's stormwater management plan to facilitate on-the-ground implementation of various green infrastructure components, including guidelines for green stormwater infrastructure, recommendations for green roofs, landscape specifications, and restoration protocols. In support of incorporating green infrastructure into stormwater management plan, the following actions are proposed:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Conduct studies on how nature-based stormwater management (as a means to improve water quality) is implemented in other jurisdictions and identify options that may be appropriate for both new and existing developments within the City.		TBD		
Continue incorporating climate change considerations and climate adaptive measures into the stormwater management plan to improve water detention, conveyance, and ground permeability and reduce maintenance requirements.		TBD		

9.2 Develop Plans and Policies for Natural Asset Management to Increase Spread Of Natural Areas and Green Infrastructure

To be able to increase the amount of natural areas and green infrastructure, the City will first need to measure these systems in a replicable way, and then seek opportunities to increase and preserve greenspace as new developments and infill development occurs. To support these initiatives, it will be important for the City to measure and recognize the benefits from these systems, and to properly account and manage them in such a manner to maximize the co-benefits. Current best practice suggests defining and recognizing natural assets as an asset class in the financial accounting and capital planning systems. This will also require the establishment of obligations to operate, maintain, and replace natural assets alongside traditional capital assets. There are now several examples of local governments exploring and undertaking such initiatives (e.g., Town of Gibson's, City of Surrey, City of Prince George, City of West Kelowna, etc.). In support of developing plans and policies for natural asset management to increase spread of natural areas and green infrastructure, the following actions are proposed:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Develop an inventory of the City's natural assets and share this with staff and the public to inform and educate as to the value and services these spaces provide.	C Res	TBD		
Develop a mechanism to value green infrastructure assets and the benefits of these assets to the community.	C	TBD		
Look for opportunities to increase the tree canopy, particularly in Downtown.	C C	TBD		
Conduct a neighborhood level analysis of parks and greenspaces to understand baselines data (e.g., recreational opportunities, community access, heat islands, demands on stormwater), and set and monitor targets.	C	TBD		

10 EMERGENCY MANAGEMENT

Goal: Emergency preparedness is integrated in the everyday lives of Whitehorse residents.

Goal: The City can quickly and effectively respond to fires and other extreme events.

Goal: Assistance following extreme events and disasters is equitable and impactful.

As climate-related events become more frequent and severe, emergency management becomes increasingly crucial. Over the past decade, the City has witnessed rising average temperatures, increased precipitation, and extreme weather phenomena. Given the accelerated pace of climatic changes and the growing frequency of extreme events, it is imperative to establish robust emergency response systems capable of swift and effective action. These systems should provide essential resources and support to the community and vulnerable populations. Climate readiness extends to the community level, involving anticipation, preparation, adaptation, resilience, response, and recovery in the face of climate-related disasters.

STRATEGIES

The City and its partners have been proactively working to incorporate climate change considerations into emergency management with the objective to reduce the effects of climate change. To further support this work, the City has established the following climate action strategies:

10.1 Continue advancing the wildfire risk reduction strategy to improve wildfire protection, prevention, detection, and preparedness and to help mitigate wildfire risk.

10.2 Increase the City's capacity to maintain services during emergencies.

10.1 Continue Advancing the Wildfire Risk Reduction Strategy to Improve Wildfire Protection, Prevention, Detection, and Preparedness and to Help Mitigate Wildfire Risk

The risk posed by wildfires to the City is anticipated to escalate in the coming decades due to ongoing development and the impacts of climate change. While it is impossible to eliminate the risk of wildfires, the City can proactively prepare for wildland fires by reducing the spread into the community. While the City is implementing a pilot FireSmarting program, much more can be done which include actions, including but not limited to:

- Promote community involvement in planning and implementing actions to mitigate wildfire risks.
- Educate residents about fire-safe practices, defensible space, and evacuation procedures.
- Collaborate with YG, Ta'an Kwäch'än Council (TKC), and Kwanlin Dün First Nation (KDFN) to raise awareness and foster a sense of shared responsibility.

To advance the wildfire risk reduction strategy to improve wildfire protection, prevention, detection, and preparedness and to help mitigate wildfire risk, the following actions are proposed:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Continue to develop public education materials on the City's current emergency / disaster mitigation. Enhance support of community FireSmarting by empowering residents through incentives and education to FireSmart their properties as a means to potentially avoid future shortfall with insurance and loss of home.		TBD		
Encourage new developments to use fire resilient materials and to incorporate adequate egress routes. Consider supplementing this by offering loans for use of non-combustible building materials (e.g., metal roofs, siding).		TBD		
Focus emergency management actions on emergency mitigation e.g., through permanent FireSmart program.		TBD		

10.2 Increase the City's Capacity to Maintain Services During Emergencies

While it is impossible to eliminate the risks and consequences of climate change, the City can enhance its preparedness and response mechanisms (e.g., increasing backup power, cross training staff, additional communication systems, etc.) to mitigate impacts and expedite recovery during climate-related emergencies, by implementing the following actions:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Continue to review and increase the City's emergency management capacity.		TBD		
Complete an all-hazards vulnerability and risk assessment on critical City infrastructure. The objective is to identify gaps to these systems and opportunities to improve the quality and resilience of this infrastructure.		TBD		
Develop Asset Management Plans for the City's critical infrastructure according to results of the condition and all-hazards vulnerability and risk assessments.		TBD		
Integrate emergency planning into City departments and update business continuity plans to reflect the risks and impacts of climate change.		TBD		
Develop evacuation plans for the events identified in the Hazard Identification and Risk Analysis (HIRA; 2017) and develop engagement materials to re-direct residents to evacuation resources including shelter-in-place.		TBD		
Establish facility specific emergency plans that include impacts/actions to address consequences of extreme heat, wildfires, wildfire smoke and other extreme events.		TBD		
Continue development of a secondary/emergency communication system not dependent on the telecommunications network (e.g., walkie-talkie, satellite) to allow communications during emergency response situations, including development of the communications capacity of the EOC and alternate EOC for staff in the field.		TBD		

Action	Impact	Lead Department	Time Frame	Resources Needed
Develop a plan to prioritize and distribute fuel for City-owned backup generators during power outages. Consider adding hybrid or solar powered generators to critical facilities to reduce dependence on diesel. Establish facility specific emergency plans that include impacts/actions to address consequences of extreme heat, wildfires, wildfire smoke and other extreme events.		TBD		

11 COMMUNITY EDUCATION & ENGAGEMENT

> **Goal:** The Whitehorse community is actively reducing personal GHG emissions through conservation and renewable energy and has taken proactive measures to protect themselves and their communities from the effects of climate change.

While the Climate Action Plan identifies actions that fall within the City's sphere of control, it also identifies actions that can only succeed with the help of partners and the broader community. In this sense, the Climate Action Plan relies on a three-part partnership between the City, its community partners, and residents. These partnerships include universities, businesses, developers, community groups, and other organizations working in and across the City.

This joint responsibility poses a challenge for implementation in that the City does not fully control the actions of residents and community partners. The City can try to influence others by raising awareness about climate risks and solutions and empowering people to take proactive measures for self-protection and community well-being. The City can help to facilitate this by sharing best practices, clarifying roles (such as landlord versus lessee or individual versus government), offering services to priority populations, advocating for regulatory changes, and fostering innovation. The community's willingness and ability to act will determine the overall pace, scale, and success of how quickly Whitehorse reduces GHG emissions and increases its climate resilience.

There are also some key actions that lie beyond the City's jurisdictional powers. The City's role here will be to work with partners and advocate for these changes.

STRATEGY

To advance energy efficiency, emergency preparedness, and adaptation planning in the community, the City has developed the following climate action strategy:

11.1 Increase availability of climate-related training and public education.

11.1 Increase Availability of Climate-Related Training And Public Education within the Community

To increase availability of climate-related training and public education within the community to improve energy efficiency, emergency preparedness, and adaptation planning, the following actions are proposed:

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Utilize the City's website to provide information on climate related programming, actions and opportunities occurring within the community.		TBD		
Develop an environmental public awareness program to inform the public of the importance of green spaces / natural areas, and the differences between green built infrastructure and protected areas.		TBD		
Explore opportunities to support community gardens and local food sources/production, in the context of local bylaws and wildlife management.		TBD		
Continue engaging with and support local non-profit organization(s) on increasing awareness of climate related programs / information sessions for children and youth.		TBD		
Develop public education materials on emergency preparedness and planning (e.g., emergency kits) for the City and communities.		TBD		
Consider developing an annual environmental recognition program for businesses, institutions, and residents.		TBD		

12 CORPORATE LEADERSHIP

Goal: There is consistent communication and collaboration among City departments and agencies.

Goal: The City has identified key partnerships and opportunities for collaboration with First Nations, non-governmental organizations, and the Yukon government.

Goal: The City has incorporated climate change as a consideration across all areas of municipal operations.

As the center of GHG emissions production, the City has an opportunity to act now to avoid the most dangerous impacts of radical climate change this century. By setting aggressive GHG emissions reductions, the City takes an important leadership step in curbing GHG emissions by strategically managing its own assets and processes while also reducing community GHG emissions and increasing resilience to the impacts of climate change. Achieving the 2030 and 2050 GHG reduction targets requires both conservation-first actions like the building decarbonization plans, but also a change in how the City internalizes and prioritizes climate-related actions. The City will rely on solid evidence and best practices to identify climate risks due to aging infrastructure, environmental degradation, or social inequity, and to prioritize actions. By being proactive and continuing to build climate adaptation into the city's business, the City will work towards protecting and enhancing its social, natural, and built infrastructure.

STRATEGY

To support consistent communication and improved cross-collaboration, as well as inspire the community:

12.1 The city is a leader in taking action on climate change.

12.1 The City is a Leader in Taking Action on Climate Change

To work towards this strategic objective, the following actions are proposed.

ACTIONS

Action	Impact	Lead Department	Time Frame	Resources Needed
Establish a CAP governance committee to oversee implementation of the actions developed.	C	TBD		
Explore opportunities for disclosing information to the public within the City's annual report about the opportunities and risks presented by climate change.	C	TBD		
Consider development of contract requirements for third-party service providers to include an estimate of energy use and greenhouse gas emissions associated with their offered services, where possible.	C	TBD		
Explore funding opportunities for financing the costs associated with the CAP.	C	TBD		
Monitor changes in regulations and best practices developed by other governments.	C	TBD		
Explore opportunities for collaboration with other governments, institutions, private sector, and non-for-profits.	C	TBD		
Continue to explore opportunities to advance climate adaptation and mitigation through City budgeting process.	C	TBD		

13 IMPLEMENTATION FRAMEWORK

The preparation of this Climate Action Plan is the City's first step towards reducing community GHG emissions to net-zero by 2050. It is a forward-looking vision for GHG emission reductions in Whitehorse and must be considered a living document with the intent to be updated continuously, as approaches and technologies change. Ongoing measurement and review will be beneficial to reframe and refocus City efforts when new insights emerge because of ongoing stakeholder collaboration, new research and studies, new technologies, and changes to the political and economic landscape.

It is envisioned that the Climate Action Plan will be updated every five years. The following implementation framework focuses primarily on the five-year planning horizon. Changes to federal and provincial legislation and regulations, as well as technological advances are anticipated over the next decade that will impact the adoption and implementation of longer-term actions. The following are the framework's core elements:

- Governance and collaboration
- Funding opportunities and challenges
- Enabling change in the community
- Monitoring progress
- Indicators

13.1 Governance & Collaboration

The Climate Action Plan will be championed by the City's Sustainability Unit and governed by a team of corporate stakeholders, called the Climate Action Plan Governance Committee, with the mandate of ensuring that the Climate Action Plan remains a priority within the City. The structure of the Climate Action Plan Governance Committee enables for a more direct integration of energy and GHG emissions management City's systems while creating the necessary culture of change within the City. The Climate Action Plan is coordinated by the Sustainability Program Manager who serves as a communication liaison for the Climate Action Plan Governance Committee, and a resource for sustainability efforts. Departmental level actions are led by departmental subject matter experts (SME) who are also responsible for energy and GHG tracking, engagement, and communication. With the commitment of the SMEs, each department can take a more active role in managing energy consumption and demand within the City and have an influence on the community.

Success of the Climate Action Plan relies on ongoing collaboration and participation across departments and divisions. Staff from all departments are required to use the Climate Action Plan as a guide for decision-making, as is contains actions that will help bring the City closer towards the net-zero by 2050 target.

The roles and responsibilities of the Climate Action Plan organizational structure are presented in Table 6.

Table 6 Climate Action Plan Roles & Responsibilities

Role	Responsibility
Council / Senior Management	Provide leadership with authority to approve actions and allocate financial resources to those commitments
Climate Action Plan Governance Committee	Meet regularly to discuss trends and advise on the implementation of current and proposed actions. Recommend strategies and practices that progress the City towards the net-zero target with consideration to the City's principles. Conduct management reviews to make sure that the necessary human, technology, and financial resources are available to meet the long-term net-zero target.
Sustainability Program Manager	Serve as communication liaison with Climate Action Plan Governance Committee, a resource for departmental SMEs, and a resource for other City- and community-wide climate change efforts. Responsible for the management of the Climate Action Plan, and the preparation of the bi-annual Climate Action Plan Progress Report.
Departmental Subject Matter Experts (SME)	Development of departmental-level actions including implementation, reporting, engagement, and communication.

As part the Climate Action Plan, the implemented processes improvements, program implementation and projects will continue to be documented and reviewed bi-annually to update consumption savings. By regularly monitoring and reporting consumption and dollar savings and/or avoidance to each department. the outcomes of their participation in energy management actions can be demonstrated, and feedback can be obtained for any new ideas. Reporting on the overall corporate GHG inventory, progress towards the net-zero target, and Climate Action Plan actions will continue to be reviewed bi-annually. Along with the preparation of a bi-annual Corporate Energy and GHG Emissions Report, these activities will be rolled up into an bi-annual Climate Action Plan work plan, which will be reviewed with Climate Action Plan Chair and reported to Council.

The Climate Action Plan should be updated every 5 years with the next update to occur in 2030.

13.2 Funding Opportunities & Challenges

Wherever possible, the City should take advantage of funds to speed up the implementation of project initiatives. A list of available funding opportunities has been presented in Table 7.

Table 7 Possible External Funding Sources

Funding Source	Funding Snapshot
Disaster Mitigation and Adaptation Fund (Infrastructure Canada - Government of Canada) https://www.infrastructure.gc.ca/dmaf-faac/index-eng.html	Community funding (for small-scale and large-scale project streams) to invest in structural and natural infrastructure projects that increase the resilience of communities that are impacted by natural disasters triggered by climate change.
Community, Culture and Recreation Fund (Infrastructure Canada - Government of Canada) https://www.infrastructure.gc.ca/plan/icp-pic-INFC-eng.html	This fund supports energy projects that can help transition the City's highest emitting buildings to net-zero emissions.
Public Transit Funding (Government of Canada) https://www.infrastructure.gc.ca/transit-transport/index-eng.html	Provides funding to promote reliable, fast, affordable, and clean public transit. The program is divided into three categories: zero-emission transit fund, active transportation fund and rural transit solutions fund.

Funding Source	Funding Snapshot
Green Municipal Fund (Federation of Canadian Municipalities) https://www.fcm.ca/en/programs/green-municipal-fund	Grants for sustainable municipal environmental projects including plans, studies, pilot projects, and capital projects, and municipal asset management. Loans are also available to municipalities at competitive rates. The FCM Green Initiative Funds often has grants available to support sustainability and climate action planning efforts and offset low-interest loans to support capital projects that reduce energy and greenhouse gas emissions.
Incentives for Medium- and Heavy-Duty Zero-Emission Vehicles (iMHZEV) Program (Government of Canada) https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles/incentives-medium-heavy-duty-zero-emission-vehicles	Federal incentive program providing funding for purchase/lease of medium- and heavy-duty zero-emission vehicles (ZEVs), including battery-electric, plug-in hybrid electric, and fuel cell electric.
Infrastructure for Housing Initiative (Canada Infrastructure Bank) https://cib-bic.ca/en/work-with-us/infrastructure-for-housing-initiative/	Loan initiative for municipalities to build housing infrastructure in response to or anticipation of population growth. Eligible projects may include water, transportation, transit, and clean power. The program is designed to work alongside federal funding supports.
Northern Responsible Energy Approach for Community Heat and Electricity (REACHE) Program/ Wah-ila-toos (Crown Indigenous Relations and Northern Affairs Canada) https://rcaanc-cirnac.gc.ca/eng/1481305379258/1594737453888#h2-3	Provides funding support for northern and Indigenous communities to transition from reliance on diesel to clean energy. Funding is available for renewable energy projects and capacity building. The program prioritizes projects that are Indigenous-owned/led or involve community partnerships.
Green and Inclusive Community Buildings (Infrastructure Canada) https://www.infrastructure.gc.ca/gicb-bcvi/index-eng.html	Provides funding for green retrofits, repairs, and upgrades of existing community buildings and construction of new accessible community buildings for high-needs communities. The program is currently closed, but planning for the next round of applications is underway.
Jobs and Growth Fund (Government of Canada) https://www.cannor.gc.ca/eng/1626088661324/1626088710357	Provides funding for jobs that support transition to a green economy and increase capacity for recovery and growth.
Natural Climate Solutions Fund (Government of Canada) https://www.canada.ca/en/campaign/natural-climate-solutions.html	Provides funding for nature-based climate adaptation solutions through three programs: Natural Resources Canada's (NRCan) 2 Billion Trees program, Environment and Climate Change Canada's (ECCC) Nature Smart Climate Solutions Fund, and Agriculture and Agri-Food Canada's (AAFC) Agricultural Climate Solutions Program.
Climate Change Preparedness in the North Program (Crown Indigenous Relations and Northern Affairs Canada) https://www.rcaanc-cirnac.gc.ca/eng/1481305554936/1594738066665#h2-1	Provides funding for climate change adaptation in northern and Indigenous communities. Eligible projects include climate vulnerability and risk assessments, development of hazard maps and adaptation plans/options, and implementation of non-structural and structural adaptation measures.

These programs are subject to Council Priorities. Regardless of external funding availability, the proposed actions will require further business case development, are contingent on future Council approval, and future

staff and budget (capital and operating) availability. As part of the implementation of the actions in this Plan, the following risks would need to be considered and addressed:

- Increasing capital and operating costs, as well as lower than expected saving and revenues.
- Regulatory barriers and compliance issues that impede the implementation of the actions (e.g., taxes on wind turbines within the City).
- Competing Council and departmental priorities including current operational mandates of impacted services and how mandates must change to achieve the energy and greenhouse gas reductions.

13.3 Monitoring Progress

The City will need to dedicate staff time and annual funding for the Climate Action Plan to be successful in its implementation. It will also need to collaborate with the community and stakeholders to ensure that the identified vision, goals, and 2050 GHG reduction target are reached. Progress on these activities will need to be monitored, reported, and reviewed regularly so that they can be adjusted as necessary to improve the outcomes. To this end, the City will strive to:

- Review and remain apprised of best practice climate science, trends, technologies, and best practices.
    - Foster and develop a tri-disciplinary collaboration between the City and research centers (e.g. the University), and the private sector to stimulate the creation and piloting of emergent energy and sustainable technologies.
    - Re-examine and update the Climate Action Plan every 5 years.
    - Report through a bi-annual report on progress toward implementing the actions outlined in the Climate Action Plan.
    - Provide ongoing opportunities for the public to receive information, as well as to provide input as the Climate Action Plan implementation process proceeds.

13.4 Indicators

Because the City will be monitoring and reporting its progress bi-annually, City staff can learn from observations and improve the granularity and focus of actions going forward. On this basis, some of the more successful actions are likely to be continued and expanded, while unsuccessful ones will be dropped, or reconfigured. Other unforeseen changes, such as technological advancements, energy price changes, grant funding, the use of carbon offsets, etc. will be considered in future updates as well.

To gauge and monitor CAP progress, the City will use a mix of primary and secondary indicators to track and measure the overall impact of implemented actions. Primary indicators directly track progress towards the desired reduction outcome of energy consumption and GHG emission levels. Secondary indicators provide an additional method of understanding whether progress is being made towards increasing climate resilience which is a challenging concept to measure with much certainty. A series of indicators is presented in Table 8 and Table 9.

Table 8 List of Primary Indicators

Goal / Metric	Indicator	Measurement Units
Community Net-Zero GHG Emissions by 2050	Total GHG emissions from buildings in the community	Tonnes of carbon dioxide equivalent (tCO_2e)
	Total GHG emissions from transportation in the community	Tonnes of carbon dioxide equivalent (tCO_2e)
	Total GHG emission from waste in the community	Tonnes of carbon dioxide equivalent (tCO_2e)
	Total GHG emissions per resident	Tonnes of carbon dioxide equivalent (tCO_2e)
	Total renewable energy consumption in the community	Gigajoules (GJ)
Corporate Net-Zero GHG Emissions by 2050	Total GHG emissions from Corporate buildings operations	Tonnes of carbon dioxide equivalent (tCO_2e)
	Total GHG emissions from Corporate transportation operations	Tonnes of carbon dioxide equivalent (tCO_2e)
	Total GHG emission from Corporate waste operations	Tonnes of carbon dioxide equivalent (tCO_2e)

Table 9 List of Secondary Indicators

Indicator	Measurement Units
GDP per capita is maintained or increases	Change in Gross Domestic Product (GDP)
Incidents of weather related infrastructure and service delivery failure do not increase.	Number of infrastructure service delivery incidents (electrical, water) that are longer than 12 hours in duration per annum
Hazard, risk and vulnerability assessments are performed every five years or when new climate information indicates risks have changed.	Completion of hazard and vulnerability assessment
Tree canopy cover remains stable or increases and ecological diversity remains stable or increases.	Tree cover (percentage)
Total area of greenway network	Total area of greenway network
Total area of green infrastructure	Total area of green infrastructure
Rate of avoidable injuries and property damages due to extreme weather events remains stable or declines on a per capita basis.	Cost of damages because of climate events
The number of people who have used one or more emergency shelters due to climate related events at least one time over the preceding year	Number of people
Total commercial building energy use by square meter	Gigajoules (GJ) / m^2
Total commercial building energy spend per square meter	CAD$ / m^2
Percentage of commercial buildings registered in voluntary building energy benchmarking program.	Percent (%)
Percentage of commercial buildings exceeding an Energy Score of 80.	Percent (%)
Percentage of residential buildings exceeding an Energy Score of 80.	Percent (%)
Average household spend on energy usage per year	CAD$/Household/Annum

Indicator	Measurement Units
Residential per capita natural gas consumption	Gigajoules (GJ) / resident / year
Residential per capita propane consumption	Gigajoules (GJ) / resident / year
Residential per capita heating oil consumption	Gigajoules (GJ) / resident / year
Residential per capita electricity consumption	Gigajoules (GJ) / resident / year
Percentage of buildings operating on renewable energy	Percent (%)
Total GJ of net renewable energy generated per annum	Gigajoules (GJ)
Number of net-zero ready buildings	Number of net-zero ready buildings
Number of heating oil systems removed per annum	Total number removals / year
Ratio of renewable energy generated in the community to total energy used in the community	Percent (%)
Number of building scale renewable energy systems installed	Total number of systems installed
Percentage of food waste diverted by sector	Percent (%)
Total organics per capita	Tonnes / capita / year
Percentage of food waste converted into renewable natural gas	Percent (%)
Total percentage of construction waste diverted from landfill	Percent (%)
Total material recycled per capita	Tonnes / capita / year
Total percentage of material recycled in waste stream	Percent (%)
Total material sent to landfill per capita	Tonnes / capita / year
Percent of City facilities that are renewably powered	Percent (%)
Percent of City fleet that is renewably powered	Percent (%)
Percentage of City staff that have attended education sessions on climate change, energy and GHG management	Percent (%)
Number of City plans and policies that address GHG emission reductions and climate risks	Qualitative response
Percent of registered electric vehicles in City Fleet	Percent (%)
Ratio of EV-infrastructure capacity to actual use	Percent (%)
Kilometers of sidewalk, designated bicycle facilities / amenities, and multi-use trails	Kilometers (km)
Number of car share vehicles available for use in the City	Number of car share vehicles in the City
Commuting distance	Kilometers (km)
Percent of trips by mode of transportation for journey-to-work, or journey-to-school trips	Percent (%)
The average number of vehicles owned per household by type (car, truck, motorcycle, bicycle)	Number of vehicles per household
Ambient Air Quality	Ambient Air Quality Index AQI
Dwelling Unit Density	Units / hectare (ha)
Transit ridership	Average annual number of transit-rider trips per capita

FINAL PAGE