



Climate Resilience Strategy and Action Plans

Annual Report 2020





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Executive summary

The Climate Resilience Strategy guides The City of Calgary's approach to climate change mitigation and adaptation. The action plans that support the delivery of the Climate Resilience Strategy include efforts to establish climate change governance; integrate and align climate change considerations and practices into City services and processes; implement outreach and education programs; reduce community and City GHG emissions (climate mitigation); and reduce climate-related risk to the community and in The City's infrastructure and operations (climate adaptation). This report provides an update on the progress of those action plans for the period January 1 – December 31, 2020.

Measuring progress

The City has made good progress on the action plans set out in the strategy. Most actions are underway, and many have already been embedded into business processes and programs. Out of a total of 244 actions, 41 actions are complete, 162 actions are in progress and 41 actions have not been started.

The key target in the Climate Mitigation Action Plan is to reduce city-wide GHG emissions by 80 per cent below 2005 levels by 2050. This target requires an overall reduction in total emissions even as we expect the population and economy to continue to grow. In 2020, Calgary's city-wide emissions were 15.73 megatonnes of carbon dioxide equivalent (CO₂e). This is a

decrease of 14 per cent compared to 2019 – which is an unprecedented change. The decrease in emissions happened for several reasons, including COVID-19 restrictions impacting energy use across all sectors, the provincial electricity supply becoming cleaner, and warmer-than-usual weather reducing the demand for heating. Despite the significant reduction in the last year, Calgary's 2020 emissions were still only 0.4 per cent below 2005 levels, thus we are not yet on track to meet our target.

The Adaptation Action Plan currently has no defined targets nor is it measurable by a specific reduction target. This challenge is not unique to The City of Calgary, as many municipalities in Canada and around the globe are still working to benchmark corporate and community climate-related risk, define the boundaries of climate risk assessment, and develop the appropriate indicators and performance measures to assess adaptation progress. Through a comprehensive best practices review conducted in 2020 of the most current methodology and practices to measure and evaluate climate adaptation, a measurement framework is being developed for Calgary. The framework will align with The City's Results-Based Accountability framework and includes a combination of climate-related risk indicators and program-based effort and effect-based performance measures.

Action implementation

Actions have been implemented in the Climate Mitigation Action Plan in five key theme areas: Buildings and energy systems, Transportation and land-use, Consumption and waste, Natural infrastructure – Carbon sinks and Leading by example.

Actions have been implemented in the Climate Adaptation Action Plan in five key theme areas: Climate adaptation reporting, People, Built infrastructure, Natural infrastructure and Watershed management.

Path forward

The success of the Climate Resiliency Strategy is dependent on active prioritization by Administration, including supportive funding and resourcing. Continued measurement, verification of targets, identification of external impacts and feedback-loops are also vital.

In addition to continuing to implement the Climate Mitigation and Adaptation Action Plans, key projects for 2021 include:

- Formalizing Climate Change Governance at The City of Calgary, in line with the administrative realignment.
- Updating the Climate Resilience Strategy and Action Plans to consider the resources and effort needed to achieve the 2050 Net-zero target, to be brought forward to Council in 2022.
- Establishing a city-wide carbon budget.
- Further developing and implementing the Growth and Development Climate Framework to integrate climate considerations throughout the planning approvals continuum.
- Exploring the integration of climate related financial disclosure into The City's Annual Financial Reporting utilizing the TCFD framework.





Introduction

Human activities are causing the earth's climate to change at a fast and accelerating rate. As the climate shifts, more frequent and severe climate-related hazards such as flooding, drought, damaging storms and heat waves are occurring, impacting our built environment, natural environment and community wellbeing. This continuing change requires The City of Calgary (The City) to respond by integrating climate action across the organization to maintain City services, minimize costs, reduce community vulnerability and do our part to curb greenhouse gas (GHG) emissions contributing to global climate change.

This report provides an update on The City of Calgary's Climate Resilience Strategy and Action Plans for the period January 1 – December 31, 2020. In partnership with business units and community partners, The City has begun implementing the actions identified in the Mitigation and Adaptation Action Plans for carbon and energy management and climate adaptation. These actions include efforts to establish climate change governance, integrate and align climate change considerations and practices into City services and processes,

implement outreach and education programs, reduce community and City GHG emissions (climate mitigation), and reduce climate-related risk to the community and in The City's infrastructure and operations (climate adaptation). Two years into implementation most actions are underway, with many actions now embedded into business processes and programs.

This report provides a high-level summary of The City of Calgary's progress-to-date. Additional details on The City of Calgary's climate actions can be found in the following appendices:

- Climate governance and outreach: Appendix 1
- Climate change mitigation: Appendix 2
- Climate change adaptation: Appendix 3

The City of Calgary Climate Panel, an external advisory network made up of representatives from 22 stakeholder organizations in the community, has provided their annual report in a separate attachment.

The context of climate change

The impacts of climate change are happening now, and are being felt in more severe ways around the globe. The year 2020 was tied with 2016 as the hottest year on record, and concluded the hottest decade on record. It was also another active year for climate-related disasters, including wildfires in Australia, Siberia, the United States West Coast and South America; a record number of Atlantic hurricanes; flooding in Africa and South East Asia, and record temperatures in the Arctic. The Northern Hemisphere saw its hottest year on record as well, at 1.28°C above the 20th-century average.

In Canada, climate change is happening at about double the rate of global warming, with northern Canada projected to continue to warm even faster. Canada has already seen significant and irreversible changes to our climate. The prairies have seen the strongest warming to date across southern Canada, particularly in the winter months.

We know that climate impacts, ranging from broad-scale ecosystem shifts, to an amplification of floods, droughts, and severe weather, will negatively affect the prairie region, including those people most vulnerable, and that adaptation measures can help to decrease the impacts of these changes. Highly populated

areas, including Calgary and Edmonton, will continue to see high costs of recovery following extreme weather events.

Calgary climate and weather extremes 2020

The costliest weather extreme experienced in Calgary in 2020 was the June 13 severe hail storm which resulted in significant hail damage and an estimated \$1.3 billion in insurance claims. Golf-ball-sized hail damaged buildings, shattered windows, cracked or shattered windshields and damaged vehicles. Street flooding and blackouts impacted several areas of the city. More vehicles were written off due to this one event than are bought in all of Alberta in an entire year.

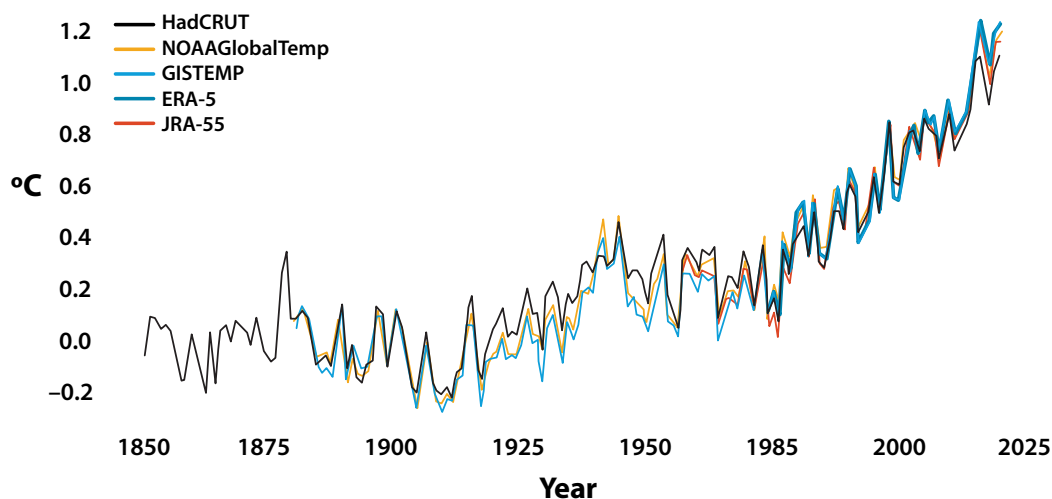
On December 21 and 22, a record-breaking 27 cm of snow was recorded at the Calgary Airport, topping the previous record snowfall for these two days at 8.4 cm and 12.7 cm respectively. The snow buried streets, resulting in vehicle collisions and City transit and emergency response vehicles being unable to provide critical services. Travel advisories were activated for many of the major highways leaving the city.

The annual average temperature in Canada has increased by 1.7°C between 1948 and 2016, while average winter temperature has increased by 3.3°C (2019 report).

By comparison, Alberta's mean temperature has increased by 1.4°C.

More information on the critical climate hazards for Calgary are outlined in the Climate Adaptation section of this report.

Global mean temperature difference from 1850 to 1900 (°C)



Source: Met Office

Global annual mean temperature difference from preindustrial conditions (1850-1900). The two reanalyses (ERA-5 and JRA-55) are aligned with the in situ datasets (HadCRUT, NOAA GlobalTemp and GISTEMP) over the reference period 1981-2010. Date for 2020 are from January to October.



Compounding impacts of COVID-19

The COVID-19 pandemic fundamentally changed governmental, societal and economic priorities in 2020, and has exposed and further exacerbated community vulnerabilities. This kind of large-scale shock combined with existing community stresses stretched the capacity of government and community systems to respond and adapt, and has reduced global resilience to further shocks and stressors, such as those that will continue to occur due to climate change. However, the global response to the pandemic has demonstrated the level of cooperation and participation that is possible from all levels of government, businesses, communities, non-governmental organizations and individuals when faced with a crisis that affects our safety and livelihoods. It has also brought to light the resistance to taking collective action that can arise.

Despite the reduction in economic activity, bans on international travel, and lock-downs in many countries around the world, the reduction in global GHG emissions in the first half of 2020 was only 8.8 per cent, which is far below

the 50 per cent reduction in global emissions needed by 2030 to limit global warming to 1.5°C. In order to be on track to meet our global emissions targets, and to prevent the most catastrophic effects of climate change, the emissions reductions we saw in 2020 will need to be maintained, and an additional eight per cent reduction will need to happen every year for the next ten years. This underlines the scale of mobilization that will be necessary to bend the curve on global emissions.

While the global COVID-19 pandemic has dominated international attention, climate change remains a leading issue that is central to the world's political, economic and policy conversations. As these two issues converged in 2020, the disproportionate impact on already vulnerable populations (such as racialized or low-income communities) has been reflected in the disproportionate burden of disease and higher mortality rates in these communities. The large-scale mobilization needed to address both the COVID-19 pandemic and the global climate crisis needs to ensure that equity is considered in the solutions implemented and that vulnerable populations are not left behind.



Governmental response

Federal government

The current global emissions targets set by countries that have signed the Paris Agreement will still result in a global temperature rise of 2.7°C by 2100. There is already at least a one in five chance of global temperatures exceeding 1.5°C above pre-industrial levels by 2024.

In response, over 120 countries have pledged to achieve net-zero emissions by 2050 or 2060, including China, Japan, Italy, Germany, the United Kingdom, the European Union, France and South Korea. In November 2020, the Canadian government joined these countries, and introduced the *Canadian Net-Zero Emissions Accountability Act* to achieve net-zero emissions by 2050. The Act legally binds the government to a process to achieve net-zero emissions by 2050, and sets rolling five-year emissions reduction targets. In order to support these emissions reductions, in addition to other policies and programs, the federal government has planned for the carbon tax to rise to \$50 per tonne in 2022, rising by \$15 per tonne annually to reach \$170 per tonne by 2030.

Provincial government

The provincial carbon levy was repealed in Alberta in May 2019. In response, the federal carbon price was implemented on January 1, 2020.

In 2020, the Province of Alberta, through federal Building Regional Adaptation Capacity Expertise (BRACE) funding, launched their Adaptation and Resilience Training (ART) Program. This program is focused on building the capacity of professionals in Alberta to integrate climate adaptation into their work. In 2020, The City of Calgary partnered in the BRACE Program, contributing expertise to the community planning, infrastructure and watershed management streams and received two funded limited-term ART Program Assistants in The City's Climate and Watershed Planning teams.

Municipal collaboration in Canada

The cities of Guelph, Vancouver, Hamilton, Toronto, Halifax, Quebec, Edmonton and the province of Newfoundland and Labrador have pledged to reach net-zero emissions in their communities by 2050. As well, the cities of Montreal, Toronto and Vancouver have signed the Net-Zero Carbon Buildings Declaration and have pledged to ensure all buildings in their cities, old or new, will meet net-zero carbon standards by 2050. In the Federation of Canadian Municipalities National Measures Report (2019), 65 member municipalities reported 420 initiatives to reduce GHG emissions. The top three most reported measures were: building retrofit programs; electric vehicle charging stations for public use; and enhanced walking and cycling infrastructure.

Throughout 2020, The City collaborated with other large Canadian municipalities, including Edmonton, Vancouver, Toronto, Montreal and Ottawa on a number of climate initiatives through the Canadian Urban Sustainability Practitioners (CUSP) network. These climate initiatives have focused on nationally-aligned municipal work that no one city can tackle alone, such as municipal climate related financial disclosure, carbon budget, science-based targets and the 'Race to Zero'. Through this collaborative approach, The City is ensuring it remains innovative, competitive and aligned with future regulatory requirements.

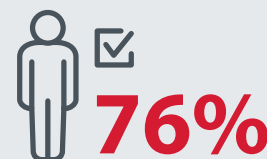
Public perception in Calgary

Support for climate action in Calgary continues to grow. In fall 2020, The City of Calgary annual citizen's satisfaction survey found that 80 per cent of respondents are concerned about climate change, and that 51 per cent believe that The City of Calgary should be doing more to address climate change (as compared to 34 per cent in 2019). Independent polling conducted in December 2020 also found that more than two-thirds of Calgarians (68 per cent) support the goal of achieving net-zero emissions by 2050.



80%

of Calgarians are concerned about climate change



76%

of Calgarians believe we need to act now to address climate change



51%

of Calgarians believe The City of Calgary should be doing more to address climate change (compared to 34% in 2019)



The Climate Resilience Strategy progress check

The City's role in addressing climate change

Climate-related hazards create risks to human health and safety, and have economic consequences and costs for Calgarians. Climate change has the potential to impact the ability of The City to provide cost-effective services, and maintain and operate public infrastructure. The City also has a responsibility to do our part to reduce greenhouse gas emissions in line with global and federal targets.

Under the requirements of the Calgary City Charter, The City must develop plans for mitigating the causes of climate change and adapting to the effects of climate change (sections 615.4 and 615.5 respectively). The Charter also stipulates that the plans must be reviewed no later than five years after being established and once every five years thereafter. The City therefore plans to revisit its Climate Resilience Strategy and Action Plans starting in 2021, with a goal of updating the overall Climate Resilience Strategy by the end of June 2022 in preparation for The City's next business cycle.

Actions implemented

To meet these responsibilities, The City's Mitigation and Adaptation Action Plans contain defined actions which identify The City's role in carbon and energy management and climate-related risk reduction over the next ten years, and outline actions to achieve our targets. Two years into implementation most actions are underway, with many on-going actions now embedded into business processes or programs, and actions not originally identified implemented as well. By the end of 2020, 41 actions were completed.

244 TOTAL ACTIONS

41 Actions completed

162 Actions in progress

41 Actions not started



Progress summary: Climate governance and outreach

Climate governance refers to decision making structures as well as The City's accountability and transparency on climate action. Achieving The City's climate targets and goals will require successful climate governance across the organization. There are five important areas of focus for successful organizational climate governance.



Progress summary: Climate change mitigation

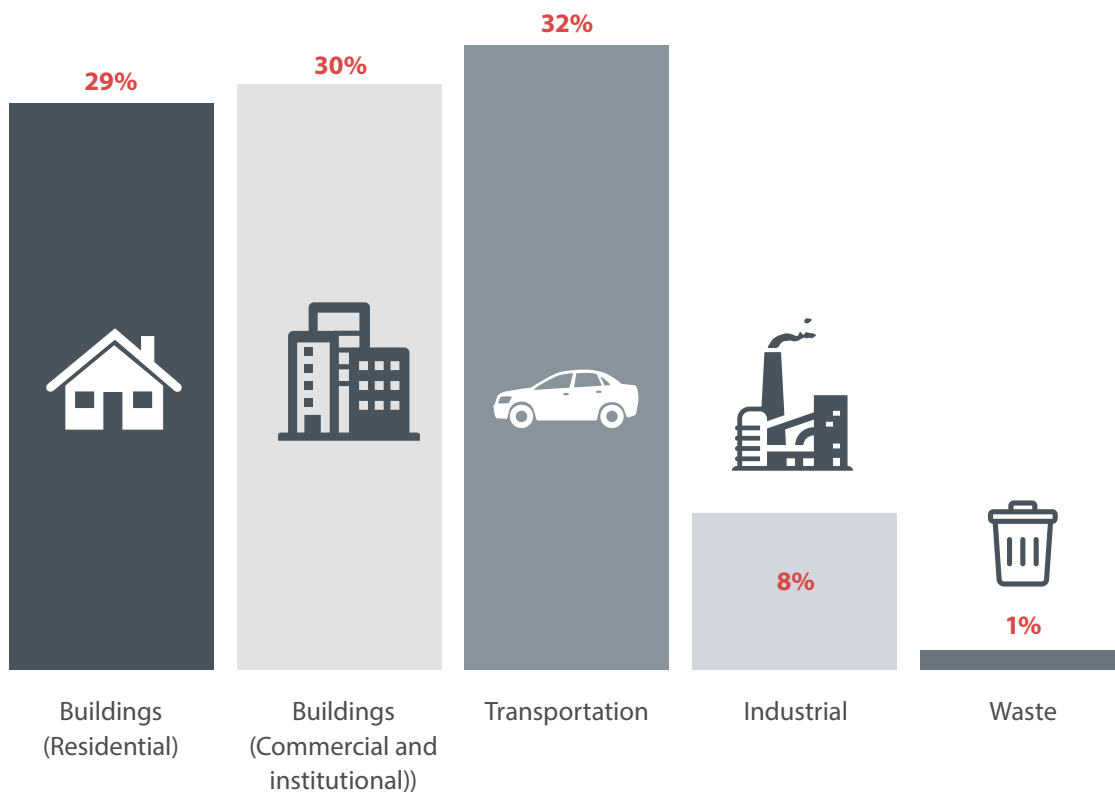
The City of Calgary has a target to reduce city-wide GHG emissions by 80 per cent below 2005 level by 2050. This target requires an overall reduction in emissions even as we expect the population and economy to continue to grow.

In 2020, Calgary's city-wide emissions were 15.73 megatonnes of carbon dioxide equivalent (CO₂e). The residential and commercial building sectors together contribute 59 per cent of Calgary's overall emissions, transportation from personal and fleet vehicles accounts for 32 per cent, industry for eight per cent, and methane emissions from our landfills and waste water treatment facilities represent one per cent. Calgary's GHG emissions decreased by 14 per cent in 2020, which was an unprecedented change. The decrease in emissions happened for several reasons, including the impact of COVID-19 restrictions on energy use across all sectors, the provincial electricity supply becoming

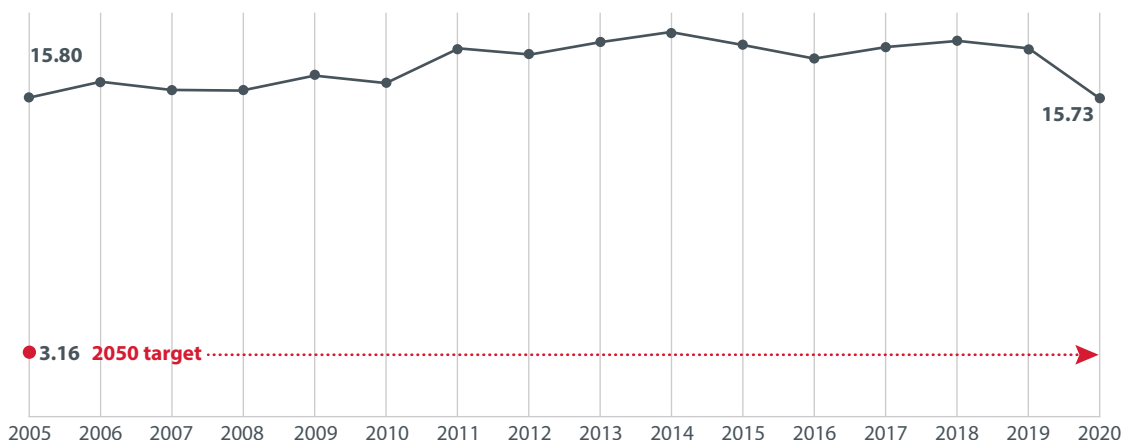
cleaner, and warm weather reducing the demand for heating. Even given this large decrease, Calgary's emissions were still only 0.4 per cent below 2005 levels last year; we are not yet on track to meet our target.

In 2020, electricity use decreased by three per cent compared to 2019, with increases in the residential and small commercial sectors but all larger users seeing a drop in demand. Meanwhile, as part of Alberta's phase-out of coal power generation, the average emission factor for Alberta's provincial electricity grid dropped to 620 grams per kWh from the previous year's 750 grams. This had a substantial impact: about half of Calgary's year-over-year GHG reduction was due to cleaner electricity. Natural gas use decreased by seven per cent compared to 2019, with a decrease in all sectors. This drop in natural gas usage can be explained by warmer than typical winter weather in 2020;

Total emissions by sector in 2020



Calgary community-wide GHG emissions (megatonnesCO₂e)



GHG reduction target: 80 per cent reduction below 2005 levels by 2050

after adjusting for weather, natural gas use was on par with 2019. Vehicle fuel use decreased by 14 per cent, which was due to both a drop in public transit and private vehicle-use due to COVID-19. Taken together, 2020 GHG emissions were 14 per cent lower than 2019. On a per capita basis, the trend continued downward in 2020 to 12 tonnes CO₂e per person, compared to 16.52 tonnes in 2005.

Providing enhanced energy consumption information is a key strategy of the Climate Mitigation Plan. Key initiatives in 2020 included the launch of a commercial building benchmarking program to encourage building owners and operators to measure and disclose energy consumption information. At the end of 2020, there were 170 properties signed up to the program from 12 different participants, including 72 City-owned buildings. The City also developed the Integrated City Energy Mapping tool that will allow The City and its utility partners to map where emissions come from today and also to model the trajectory as we move towards 2050.

Despite the overall upward trend, GHG emissions per capita have decreased since 2005

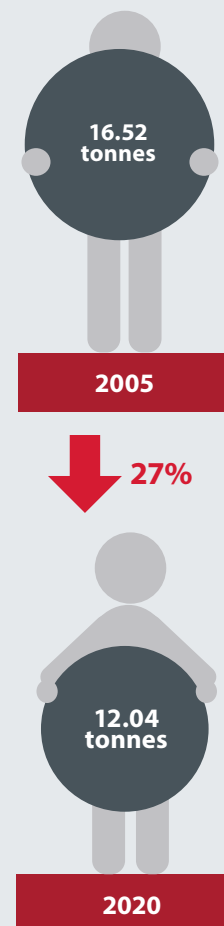
Climate Mitigation Action Plan implementation

Buildings and energy systems

Two thirds of Calgary’s GHG emissions come from energy use in buildings, primarily from the use of electricity for lighting, HVAC and plug loads, and natural gas for heating. In 2020, key programs were implemented to reduce emissions in the building sector in three program areas: energy performance standards, energy consumption information and on-site and neighbourhood-scale renewable energy systems.

The City also piloted assessment tools like renewable and low carbon energy studies to examine the feasibility of green building and low carbon energy supply options to deliver carbon reduction on large redevelopment sites. Finally, The City began development of a Solar Dashboard, a new mapping tool to help Calgarians assess the economics of implementing a solar photovoltaic (PV) system on their own homes (to be launched in 2021).

The City continued to participate in and advise federal building code committees responsible for writing tiered energy step codes and a retrofit building code. The City has also continued to develop a low carbon financing program to provide access to funds for improving energy performance of Calgary’s building stock.



Transportation and land use

Emissions from the transportation sector account for approximately one third of Calgary's city-wide greenhouse gas emissions, primarily due to the use of gasoline and diesel in personal vehicles and fleets. Reducing emissions from this sector relies primarily on switching to lower carbon-intensity fuels (such as biofuels or electricity), by switching to lower carbon-intensity modes of transportation (such as walking, cycling or transit) or by decreasing individual vehicle trips (through transit, shared use mobility services or working from home).

In 2020, ATCO and FLO (an operator of a comprehensive charging ecosystem in Canada) were hired to install, own and operate the Peaks to Prairies EV fast charging network on behalf of The City and other regional partners. The installation of 20 Direct Current Fast Charging (DCFC) and Level 2 charging stations was completed in autumn 2020, including three stations located in Calgary.

Implementation of The City's strategies to support active modes of transportation, including Step Forward, the Cycling Strategy and Complete Streets, continued in 2020. For Step Forward, around 20 per cent of actions are complete with a further 45 per cent underway; for the Cycling Strategy, 70 per cent of actions are complete with 20 per cent underway.

Calgary Transit also worked extensively in 2020 to continue implementation of the RouteAhead Strategic Plan, Green Line LRT and Regional Transit Coordination. However, budget reductions in 2019 and COVID-19 service reductions in 2020 have affected both transit service and RouteAhead targets and no transit priority work was completed in 2020. For Green Line, Phase 1 is in the design/analysis phase with Light Rail Vehicle (LRV) procurement in process. During this process, the project's GHG impacts were assessed through Climate Lens reporting to the federal government early in 2020.

In March 2020, the City supported the transition of around 5,000 employees to work from home due to the COVID-19 pandemic, which resulted in fewer employee commuter trips. CommunAuto carshare began operation in Calgary in 2020 with 150 vehicles available for

short-term rental. Shared-use mobility services involving e-bikes and e-scooters have also been piloted (October 2018 through October 2020), and a report and recommendations were brought forward to SPC on Transportation and Transit in December 2020.

Additional actions that relate to land use planning are also detailed in Appendix 1 – Climate governance and outreach.

Waste and consumption

The waste we create and how we dispose of it can have a significant impact on GHG emissions. Currently, our GHG inventory accounts for methane emissions from our waste and wastewater facilities, which accounts for about one per cent of the GHG emissions in Calgary. However, there are also GHG emissions that are embedded in the products that we use and dispose of in Calgary. We don't currently measure these emissions, but based on analysis from other cities, embedded emissions could double the total emissions that we account for in our inventory.

In 2020, work on consumption and waste moved ahead in several areas. Pay-As-You-Throw programs charge households based on the amount of garbage put out for collection. The core principle is that households that generate less waste pay less. On October 1, 2020, The City introduced a Tag-a-Bag program that requires residents to purchase garbage tags for extra bags that do not fit inside the black cart.

In October 2020, the federal government proposed a ban on six single-use plastic items: plastic checkout bags, stir sticks, six-pack rings, cutlery, straws and food service ware made from problematic plastics. The federal government is aiming to have regulations in place by the end of 2021, after consultation with Canadians. The City strategy for reducing waste from single-use items is being developed and will align with actions proposed by the federal government.

The City continues to advocate for Extended Producer Responsibility (EPR) regulations for paper and packaging products. A collaborative study between municipalities, government and industry was presented to Council in Q3 2020. Following from this advocacy work, the Government of Alberta is conducting



stakeholder engagement in 2021 to inform regulations that will enable EPR.

The Calgary Green Cart program is focused on appropriately managing the waste that is generated in Calgary to minimize greenhouse gas emissions from our landfills. This is achieved primarily by diverting organic materials from our landfills. City programs and the Waste Bylaw continue to support and encourage diversion of organic materials from landfill. The residential Green Cart program diverted more than 110,000 tonnes of food and yard waste from landfill in 2020, which reduced methane emissions and produced valuable compost.

Natural infrastructure – carbon sinks

Natural Infrastructure includes a range of assets, from natural to engineered, that rely on ecological and hydrological processes to provide municipal and ecosystem services that improve the resilience of the city and region. Natural infrastructure can also remove carbon from the atmosphere, and that is being valued as one of its key services. The integration

of climate change mitigation within project implementation is occurring across The City. For example, Parks has integrated climate change considerations into the implementation actions with the Biodiversity Action Plan, and uses the carbon sequestration potential of naturalized landscapes to inform their work. The City has also continued to engage with the province and external stakeholders on the potential for a carbon offset program for natural infrastructure.

In 2020, The City received \$2 million in funding from the federal government's Low Carbon Economy Fund for the expansion of our willow tree plantation. The willow tree plantation uses biosolids as fertilizer and creates a carbon-storage sink that leads to fewer greenhouse gas emissions. Over the lifetime of this project, Calgary will see a cumulative reduction of about 200,000 tonnes of greenhouse gas emissions—equivalent to removing approximately 61,000 cars from the road for one year.

Leading by example

The City of Calgary is leading by example in our own operations. The City's operations represent about four per cent of overall emissions. The City is not able to achieve the community mitigation targets through our own activities alone, but we look to raise the profile of pilot projects and invite industry collaboration.

An update to the existing Corporate Energy Plan was in development in 2020 and will be completed in 2021, in coordination with the major operating business units that use the majority of corporate energy. This will be a ten-year plan to focus The City's energy use and emissions with an interim goal of 40 per cent GHG reduction by 2030 on the path to our 2050 climate goal. There still exists a significant gap between planned actions and the corporate GHG target for 2030. The Plan will address this gap by proposing additional actions, costs to implement, and potential savings.

Corporate Analytics & Innovation published an updated set of Design Guidelines for City of Calgary Funded Buildings, which includes guidelines for lighting and lighting control, building envelop and mechanical equipment. The Sustainable Building Policy provided guidance for energy performance of new and existing facilities. In addition, Green Line Climate Lens reporting to federal government was completed early in 2020.

Informed by a comprehensive analysis of alternative fleet options commissioned by Waste and Recycling Services, Fleet Services, in collaboration with Environmental & Safety Management, secured \$800,000 in provincial and federal funding for two waste collection

truck pilot projects. Fleet Services acquired two electric vehicles--Chevy Bolts--to be incorporated into The City's fleet, and two electric ice-resurfacers and two electric shop-sweepers. Fleet Services continues to evaluate the potential to increase use of biodiesel for the fleet.

The Haskayne Pavillion is The City of Calgary's first net-zero annual energy and emissions building, generating all its heat and power needs onsite using solar photovoltaics and a ground source heat exchange. Solar photovoltaic systems were also installed at Bridlewood affordable housing units, and Shepard Solar Park Phase 2 on a former brownfield site, which generates equivalent energy to supply 900 homes per year.

New sources of revenue and savings of \$4.5 million were generated from carbon offset and renewable energy certificate sales, which can be used for future energy efficiency projects.

Additional initiatives and further detail on the progress in implementing the Mitigation Action Plan is detailed in Appendix 2 – Climate Mitigation.

Progress summary: Climate change adaptation

The Climate Resilience Strategy includes a broad goal of reducing corporate and community climate-related risk, however, unlike the Mitigation Action Plan, the Adaptation Action Plan currently has no defined targets nor is it measurable by a specific reduction target. This challenge is not unique to The City, as many municipalities in Canada and around the globe are still working on benchmarking corporate and community climate-related risk, defining the boundaries of climate risk assessment, and developing the appropriate indicators and performance measures to assess adaptation progress.

Through a comprehensive best practices review conducted in 2020 on the most current methodology and practices related to measuring and evaluating climate adaptation, a framework for measuring adaptation progress is being developed for Calgary. The framework aligns with The City's Results-Based Accountability framework and includes a combination of climate-related risk indicators and program-based effort and effect-based performance measures. The measurement types include:

- Community risk indicators
- Adaptation performance measures
- Climate impact indicators

Detailed information on the framework can be found in Appendix 3 under Climate data and reporting.

Climate Adaptation Action Plan implementation

Understanding climate-related risk

In 2020 significant work was undertaken to improve our understanding of climate-related risk for The City. A detailed climate projection project was initiated, and Calgary's key climate hazards were refined in coordination with internal and external experts. Eight key climate hazards have been identified for Calgary: extreme heat, drought, wildfire, shifting seasons, heavy precipitation, severe storms, winter storms and river flooding. The interconnection of the occurrence of climate hazards, and exposure and vulnerability to the hazards characterizes the impact of climate change on critical human and natural systems. Progress has been made in 2020 to consider Calgary's exposure to climate hazards and to better understand our vulnerability. For example, the Community Climate Risk Index, to be completed in 2021, will provide an analysis of the degree to which Calgary communities are holistically at risk due to climate-related hazards.

People

As a municipal entity, it is the role of The City to support and enhance the ability of the public and City employees to cope with, recover from and respond to the impact of climate-related hazards such as severe storms, extreme heat and flooding. The goals of the programs within this theme are to protect the health, safety and security of individuals and communities by reducing Calgarians and City employees' exposure and vulnerability to the impacts of climate change.

In recent years, The City has been making great strides in disaster risk reduction planning through key programs such as the Corporate Business Continuity Program, Corporate Infectious Disease Management Plan, Calgary Critical Infrastructure Network, Ready Calgary community outreach program, Critical Service Provider Network and the Corporate Disaster Risk Assessment Program. During the COVID-19 health emergency in 2020, The City provided support to Calgary communities and the corporation's response to the global pandemic. This work included development of targeted communication tools and processes, increasing community engagement, strengthening civic partnerships and community-level response networks, developing new flood response procedures and creating a new urban heat island map and tool that will display surface temperature patterns throughout Calgary.

Built infrastructure

New public infrastructure will have a service life until the end of this century, when the full force of climate change will be apparent. For this reason, it is important to incorporate strategies to manage climate risk through City design standards, guidelines and practices to build and maintain climate adaptable assets. In 2020, The City moved forward with integrating climate considerations into built infrastructure design, such as updating City design guidelines to conform to the National Bridge Design Code (CSA S6:19). A Public Infrastructure Risk and Resilience Assessment process was developed to identify and manage climate risk in new public infrastructure. For existing infrastructure, The City's, high risk building registry supports

the assessment of buildings at greatest structural risk due to climate and other hazards, and completed over 200 Building Condition Assessments. A new building asset planning tool has been implemented which utilizes these assessments, including climate impact factors, to inform lifecycle planning and building performance improvements.

To prepare for future energy grid disruptions, investments in backup power for municipally owned critical infrastructure are ongoing and largely complete. There is a supply of backup power available to critical City facilities.

Natural infrastructure

Climate adaptive benefits provided by natural infrastructure include flooding reduction, urban heat island reduction, and capturing carbon from the atmosphere. Natural infrastructure must be preserved and restored, so that the services and multiple benefits they provide can continue to reduce climate-related risks. The City protects these assets through regulatory frameworks, technology improvements, restoration and maintenance. Key progress in 2020 included updates to the Municipal Development Plan (MDP) to protect critical ecological areas, strengthen the tree canopy targets and incorporate natural infrastructure into land use decisions; development of The Community Involvement Guide and Habitat Restoration Program Manual; development of the Natural Environment Park (NEP) prioritization tool; the launch of the Roadside Naturalization Pilot Project and continued progress on important natural infrastructure projects and public education programs such as the Bioengineering Demonstration and Education Project.

The City is also moving forward with a Natural Asset Valuation Project to value the services provided by natural assets in Calgary. When this is completed in 2021, we will be among the first urban municipalities in Canada addressing the importance of natural infrastructure in climate resilience.



Watershed management

Supporting growth in the Calgary region requires a safe, reliable, and secure water supply. The region is prone to drought and future water security will be impacted by a changing climate, which can increase pressures between water supply and demand. A changing climate introduces uncertainty of water quality and quantity in the future, particularly around disruptive and costly events such as drought and wildfire. The One Calgary One Water Security Framework addresses climate impacts to both water quality and quantity and allows us to continue to take actions to address these challenges. The Framework was approved by City Council in January 2020. To protect our water supply from the pressures of growth, contamination of drinking water, and a changing climate, the Source Water Protection Plan and Policy was approved by City Council in October 2020.

To build resiliency to river flooding, critical projects continued in 2020, including completion of the Glenmore Dam gates to control Elbow River flooding. The new higher gates also double water storage at the Glenmore Reservoir, providing future water

supply resilience. The Government of Alberta's Springbank Off-Stream Reservoir is currently under regulatory review. Once completed, the Springbank Reservoir will work with the Glenmore gates to fully mitigate against a 2013-sized flood on the Elbow River. The City also made progress on community flood barriers to increase community-level flood protection.

The City is working to reduce risk from stormwater flooding through stormwater system upgrades and improvements, integration of green stormwater infrastructure, and efficient operations and maintenance practices. Development of an updated Stormwater Management Strategy is underway that will guide the transformation of Calgary's stormwater management for the next 20 years and establish strategic actions that will direct short to long term business plans and investment decisions. Community scale stormwater flood risk mapping commenced in 2020 to identify priority areas for more intensive investigation.

More detail on the implementation of the Adaptation Action Plan can be found in Appendix 3.



The road ahead

While Calgary has made progress in implementing the Climate Resilience Strategy, work remains to holistically implement the actions identified in the Climate Mitigation and Adaptation Action Plans. Ensuring Calgary is taking action on climate change will require not only the successful achievement of the Climate Resilience Strategy but the integration of GHG emissions considerations and climate-related risk into standard City and community practices. Improving City resilience also requires collaboration with other orders of government, industry, academia, environmental organizations and citizens.

The success of the strategy is dependent on active prioritization by Administration, including supportive funding and resourcing. Continued measurement, verification of targets, identification of external impacts and feedback-loops are also vital.

In addition to the continued implementation of the Climate Mitigation and Adaptation Plans, key projects for 2021 include:

- Formalizing climate change governance at The City of Calgary, in line with the administrative realignment.
- Updating the Climate Resilience Strategy and Action Plans to consider the resources and effort needed to achieve the 2050 net-zero target, to be brought forward to Council in 2022.

- Establishing a city-wide carbon budget.
- Further developing and implementing the Growth and Development Climate Framework to integrate climate considerations throughout the planning approvals continuum.
- Exploring the integration of climate-related financial disclosure into The City's Annual Financial Reporting utilizing the TCFD framework.

The City's progress thus far is a reflection of the commitment of The City's leaders and staff working with citizens, local communities and partner organizations to make Calgary a more resilient and prosperous city for the citizens we serve. Addressing the causes and impacts of climate change is a complex multi-faceted problem that is not solved in a short timeframe. Tackling this complex problem requires a fundamental shift in the way things have been done, which requires immense internal and external support, collaboration and time. The path toward an 80 per cent GHG reduction by 2050 and reducing climate risk to The City and community will require both financial and organizational commitments to ensure Calgary is a low-carbon economic hub and a climate-resilient city that is attractive to investment.

Appendix 1 – Climate governance and outreach

Climate governance

Climate governance refers to decision making structures as well as The City’s accountability and transparency on climate action and risk. Achieving The City’s climate targets and goals will require successful climate governance across the organization. There are five important areas of focus for successful organizational climate governance.

Strategic prioritization

The Calgary Climate Resilience Strategy and its Mitigation and Adaptation Action Plans were approved by Council in 2018. In November 2020, Council further directed Administration to integrate climate change into The City’s growth and development decision making processes. This elevation into long-term strategic thinking will be further supported by the integration of climate policies into the Calgary Regional Municipal Growth Plan in March of 2021.

Accountability

To be internally and publicly accountable for taking climate action, it is necessary for the organization to develop and utilize transparent reporting mechanisms with defined targets and goals and to evaluate and measure progress. A strategic and future-focused approach to climate adaptation and mitigation has been adopted that prepares The City to better support economic growth, attract new investors, reduce potential costs and damages, and build more resilient communities.

Annual report on Climate Resilience Strategy

The Climate Resilience Strategy annual update report provides a progress report on the evolution of climate governance at The City, the implementation of the cross-corporate actions within Climate Mitigation and Adaptation Action Plans and the measurement and evaluation methodologies for reporting progress towards the climate goals and targets.

Climate related financial disclosure (CRFD)

CRFD is the disclosure of an organization’s governance around climate-related risks and opportunities; the actual and potential impacts of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning; how the organization identifies, assesses, and manages climate-related risks; and the metrics and targets used to assess and manage relevant climate-related risk and opportunities. Climate-related risk includes the physical impacts of climate-related hazards (i.e. severe weather events, drought, extreme temperatures) on Calgary’s natural environment, built environment, human systems (community wellbeing), City operations and service delivery and their associated socio-economic costs. Climate-related risk is also associated with the transition to a lower-carbon economy, legal and policy risk, technology change, market response, and reputational considerations.



The City is collaborating with other large Canadian cities on aligning and progressing municipal CRFD. The cities of Vancouver, Montreal and Toronto are leading this work in Canada and are several years into the evolution of their CRFD, setting precedent for municipal reporting in Canada through the Task Force on Climate-Related Financial Disclosure (TCFD) recommended framework. For the first time, The City is including a Climate Related Disclosure section within the Discussion and Analysis section of The City's 2020 Annual Financial Report, which identifies that in 2021, The City will explore application of, and potential commitment to, the TCFD recommended framework for the future integration of climate related financial disclosure in The City's annual financial reports.

Carbon Disclosure Project

The Carbon Disclosure Project (CDP) is a global disclosure system for investors, companies, cities, states and regions to report climate change mitigation and adaptation data and progress on actions. The City of Calgary has been reporting into the Carbon Disclosure Project since 2014. We submitted our CDP report in August 2020. For the third year in a row, Calgary was one of five Canadian cities recognized on CDP's 'A List'. The 'A list' in 2020 included 88 cities worldwide and recognizes high quality submissions from cities that demonstrated strategic best practice for climate action in 2020.

Policy, regulation and process alignment

This section of the annual report outlines progress that has been made to integrate climate change mitigation and adaptation considerations into high-level policy and planning processes.

Policy alignment

Policy alignment work has continued since the 2018 Council approval of the Climate Resilience Strategy. The City can tailor plans and policies for existing and future communities to reduce GHG emissions and the impact of extreme weather events and long-term climatic changes that are expected to affect each area.

Below are summaries of the major active planning policy initiatives that incorporate climate policy in alignment with the Climate Resilience Strategy:

Calgary Municipal Regional Growth Plan (Growth Plan)

Throughout 2020 and into 2021 the Climate Team continues to advocate for enhancing climate actions at the regional scale through the draft Growth Plan with a particular focus on a regional approach to managing and mitigating the impact of climate change.

Municipal Development Plan (MDP) and Calgary Transportation Plan (CTP)

Through the process of developing the MDP/CTP 2020 (otherwise known as the Next 20 Project), amendments were approved by City Council that introduced new policies to better align the MDP and CTP with the Climate Resilience Strategy. A new sub-section was introduced within Part 2.6 (Greening the City) entitled "Climate Change and Energy". Specific policies address enhancing climate resilience; support energy-efficient transportation and land-use planning; improve air quality; enable energy efficient buildings; support a climate-resilient economy; and enhance food assets. The new policies are considered an important first step in integrating the Climate Resilience Strategy into the MDP/CTP, and are expected to be built upon in future iterations of the document(s). The Climate Team will continue to work with the Planning & Development department on revisions to MDP and CTP indicators through 2021 and 2022.

Guide for Local Area Planning

The Guide for Local Area Planning is a compendium of best practices in community planning. As an administrative tool, it will be referred to by Administration's community planning teams to guide the creation of local area plans that advance the implementation of the MDP. The Guide recognizes the need to increase resilience in response to the changing climate. It supports climate resilient building and landscaping practices, identifying opportunities for comprehensive energy planning, undertaking community climate risk assessments, and identifying strategies to mitigate climate change. The Guide suggests that local area plans should 'incorporate climate change policy that contributes to achieving and implementing Calgary's Climate Resilience Strategy' and encourages them to 'conduct a climate risk assessment and identify strategies to mitigate climate change'.

Local Area Planning

The City is developing a new generation of multi-community plans to replace the existing patchwork of planning documents (Area Redevelopment Plans or ARPs). The Climate Team is collaborating with Planning & Development to pilot new climate-lens tools to support the development of the plans. These tools include the Community Climate Risk Index (CCRI) and Integrated City Energy Map (ICEM), and are expected to inform land-use concepts, policies and investment decisions that will support the goals and objectives of the Climate Resilience Strategy. Pilot results will inform decisions to incorporate these tools into additional local area plans.

Advancing place: Calgary's Greater Downtown Plan (Greater Downtown Plan)

The Greater Downtown Plan (formerly the Centre City Plan) is a strategic document that provides direction for place-making in the heart of Calgary over the next decade. It incorporates 'Climate Mitigation and Adaptation' as a core principle of the plan. The plan includes significant short-, medium- and long-term actions to reduce vulnerability to high-risk climate hazards and long-term climate impacts, and to improve energy use and reduce GHG emissions in buildings and infrastructure. Key actions proposed in the plan include implementation of an energy performance standard for new buildings and major renovations to achieve net-zero emissions by 2050, and preparation of a green infrastructure adaptation strategy to reduce risks from climate hazards.

Process alignment

Planning & Development applications

In 2020, Planning & Development began piloting the Climate Resilience Inventory Form. This form is an awareness tool that is required for a wide range of planning applications and development applications. The form is being used on a pilot-basis and engagement with the development industry is ongoing. The form captures current development industry practices on climate mitigation and adaptation and aims to raise consciousness amongst the development industry and encourage climate resilient best practices. Transferable learnings can potentially be applied to the development of other tools in future.

Corporate Planning Applications Group now regularly circulates applications to Calgary Emergency Management Agency in order to increase the integration of disaster risk reduction practices applicable to the built environment and support additional emergency preparedness considerations across the planning continuum.

Integrated decision making and responsibility

In 2020 the Climate Team retained Mantle314, an interdisciplinary strategic consulting firm, to conduct best practices research on climate governance in local government and a gap analysis on climate governance at The City of Calgary. The recommendations included suggestions on how best to establish structures to integrate and formalize climate action across the organization. Work will continue into 2021 to implement robust climate governance structures for The City.

Collaborative action

External collaboration

In 2020, the Calgary Climate Panel grew from 18 to 22 members that represent a range of sectors including the University of Calgary, Building Industry and Land Development (BILD) Calgary Region, Building Owners & Managers Association (BOMA), the Calgary Airport Authority, ENMAX, ATCO and Intact Insurance; it also added representation from Indigenous and youth perspectives to the panel.

During 2020, three Climate Panel working groups were active:

- The Calgary Schools for Climate Action Working Group is dedicated to delivering high quality climate education to K-12 students, with participation from the school boards, the University of Calgary, local climate educators, and engaged students. This group has successfully planned and launched a new online platform called EcoSchools.
- The Utility and Buildings Working Group is focused on achieving the long-term greenhouse gas target by developing scenarios, actions, and investment plans for energy efficiency and renewable energy. A new energy map will be forthcoming based on this work.
- In 2020, a new Climate Adaptation Working Group was also created that provides advisory and support services to the Climate Panel and The City of Calgary Climate Adaptation Program. The working group will provide industry knowledge and feedback on climate adaptation initiatives including insurance and finance, climate projections, public health and climate risk reduction and disclosure, etc.

The panel has prepared an independent report on its view of The City's progress on climate change, which is included as a separate attachment.

Internal collaboration

The Climate Adaptation Cohort, a cross-corporate group of leaders and subject matter experts that are responsible for and support the implementation of climate adaptation measures was convened in 2020. The intent of the cohort is to build an adaptation network across the organization, to improve knowledge and resource sharing, and serve as a collaborative multi-specialist group to support climate adaptation planning and implementation.

In the development process for a Corporate GHG and Energy Plan, managers and experts from the major energy-using service lines met for a series of workshops in 2020. All the current and planned actions that have GHG reduction impact were included to build a 10-year forecast and plan for the corporation.

Climate communications, education and outreach

Internal climate change education for City staff

Climate change training for City Planning staff

Starting in early 2020, Climate Program staff, in collaboration with Planning & Development, facilitated Climate Change 101 training for all Community Planning staff as well as some Corporate Planning Application Group (CPAG) partners. This training educated planners on the science of climate change and on how to integrate a climate lens into planning applications work. Climate Change for Policy Planners training has been offered to all Planning & Development staff involved in developing City policy.

Lunch and Learn sessions for City staff

In February 2020, Climate Program staff offered a series of lunch and learn sessions to educate City staff about local climate change projections, City action on climate change and actions City staff can take to respond to climate change. The sessions attracted 137 City employees.

Climate change eLearning for City Staff

During the latter part of 2020, Climate Program staff developed a climate change eLearning module available for all City staff. This training is designed to increase climate literacy amongst City staff, share information about The City's commitment and approach to minimize and prepare for risks from a changing climate, inform employees about how City work impacts climate change, provide practical suggestions for climate actions and solutions, and familiarize City staff with the Climate Resilience Strategy. This course will be offered as an eLearning module available to all City staff in early 2021.

External climate change outreach, education and communications activities

Annual Calgary Climate Symposium

The 2020 Calgary Climate Symposium was postponed to 2021 because of public health orders limiting gatherings due to the COVID-19 pandemic. Instead, the Climate Team put together a series of online webinars (see below). The 2021 Calgary Climate Symposium was hosted virtually on March 25 and 26. The symposium explored how to prepare for the impacts of a changing climate; how Calgary can leverage economic recovery from the COVID-19 pandemic to unlock new business opportunities and strengthen climate change resilience; and innovative solutions to climate change.

Mayor's Environment Expo and Eco-Leader's Program

Climate change was the theme for the 2020 Mayor's Environment Expo. The Expo was hosted virtually on June 9, 2020, with 7,080 attendees during the one-day event, with more than 100,000 impressions on social media channels and 6,377 visits to calgary.ca/mee.

The Eco-Leaders Program was a youth environmental leadership initiative that helped school-based student teams research, design and implement curriculum-linked projects in their community to contribute to addressing climate change challenges. The 2019-2020 program chose thirty student teams to implement projects related to climate change mitigation or adaptation. Climate change was the overarching theme of The City's two-day Eco-Leaders Conference in January 2020, which hosted 320 students (grades 3 to 12) and teachers. For the 2020-21 school year, The City of Calgary will deliver the EcoSchools Program in partnership with the Alberta Council for Environmental Education (ACEE), which replaces the Eco-Leaders Program.

2020 public events

The Climate Program participated in a day-long climate change symposium at the Calgary City Teacher's Convention, to explore with teachers what climate change means for Calgary and how to engage their students in this topic.

The Climate Program hosted a booth at the Calgary Home and Garden Show in February 2020 to increase awareness about the local impacts of climate change and to inform residents in preparing their homes and properties for climate-related impacts.

Webinar series

Climate Program staff offered a series of six climate change webinars over the lunch hour to educate City staff and citizens to increase awareness and knowledge about climate change, electric vehicles, home energy efficiency and more. The sessions attracted 919 attendees and made 37,466 social media impressions.

Climate actions for citizens






The Climate Program identified individual actions that Calgarians can take to prepare for a changing climate (climate change adaptation) and created a webpage with that information at calgary.ca/climateaction. This information compliments existing content created in 2019 informing citizens about actions to take to help limit climate change (climate change mitigation).

Appendix 2 – Climate Mitigation Action Plan

The City of Calgary has committed to reducing city-wide greenhouse gas emissions to 80 per cent of 2005 levels by 2050. Key actions, required to get the city-wide emissions on track, is identified in the Mitigation Action Plan, which is organized into five themes, and ten key program areas. This section of the annual report will outline the progress in each theme and program area in 2020, as well as highlight the priority work to be completed in 2021.

A total of 69 actions were identified in the Climate Mitigation Action Plan.

Of these, 48 are in progress, 8 actions are complete and 13 are not started.

THEME		PROGRAM
	Buildings and energy systems	<ol style="list-style-type: none"> 1. Energy performance standards in new and existing buildings 2. Energy consumption information 3. On-site and neighbourhood scale renewable and low carbon energy systems
	Transportation and land use	<ol style="list-style-type: none"> 4. Electric and low emissions vehicles 5. Low or zero-emissions transportation models 6. Land-use and transportation planning
	Consumption and waste	<ol style="list-style-type: none"> 7. Consumption and waste reduction 8. Waste management to minimize greenhouse gas emissions
	Natural infrastructure	<ol style="list-style-type: none"> 9. Green spaces and natural areas to support mitigation
	Leadership	<ol style="list-style-type: none"> 10. The City of Calgary as a leader in climate change mitigation



THEME 1: Buildings and energy systems

Energy use in buildings and infrastructure accounts for approximately two thirds of city-wide greenhouse gas emissions. To improve building energy performance in new and existing buildings in Calgary, the Climate Mitigation Plan prioritizes action in three key program areas: improving energy performance standards energy, measuring and disclosing consumption information, and supporting the development of on-site and neighborhood scale renewable energy systems.

Achieving an 80 per cent reduction in emissions from the buildings sector by 2050 requires a complete transformation of both new and existing buildings in Calgary. The actions identified in the 2018 Climate Mitigation Plan are only the first steps to get on track to achieving our emissions reduction target; the identified actions alone will not be enough to fully meet our target. Particularly as global and national targets and regulations move towards achieving net-zero emissions, more actions will need to be identified to put Calgary on track. Many of the actions described below are foundations steps to building a more comprehensive and impactful approach to reducing emissions in the building sector.

PROGRAMS	DESCRIPTION	KEY OBJECTIVES
1. Energy performance standards in new and existing buildings	Energy performance standards refer to improving the minimum energy performance requirements that are achieved in both new and existing buildings. The City's work in this program area is designed to; push energy performance codes beyond the minimum requirements of the energy code, prepare to meet the forthcoming federal regulations and enable the implementation of better performing buildings through incentives and innovative financing.	<ul style="list-style-type: none"> • Improve building performance requirements beyond current building code in new and existing buildings • Establish monetary and non-monetary incentives to improve building performance • Enable innovative financing mechanisms to fund improved energy performance
2. Energy consumption Information	You can't manage what you don't measure. Understanding with precision where our emissions are coming from across the city is vital and will allow us to develop well informed and effective programs to reduce GHG emissions for the lowest cost.	<ul style="list-style-type: none"> • Improve building performance requirements beyond current building code in new and existing building • Improve energy literacy and capacity-building
3. On-site and neighborhood scale renewable and low carbon energy systems	Along with improving energy efficiency, it is also necessary to decrease the carbon intensity of energy sources for buildings. This can be achieved through the implementation of renewable energy and low carbon energy technology including: solar photovoltaic (PV), combined heat and power and district energy (and other technologies where appropriate). These technologies can be implemented on-site for a particulate development, or at a larger neighbourhood-scale to enable greater reach and participation.	<ul style="list-style-type: none"> • Enable the implementation of onsite renewable and low carbon energy systems • Support alternative ownership models for renewable and low carbon energy systems

Partners: Calgary Building Services, Calgary Growth Strategies, Calgary Neighbourhoods, Community Planning, Corporate Analytics & Innovation, Environmental & Safety Management

2020 Progress: Program 1

Energy performance standards in new and existing buildings

INITIATIVE	KEY ACTIONS IN 2020
<p>Participate in the development of an energy step code</p>	<p>CBS representatives continue to sit on the federal committees responsible for writing tiered energy codes, providing input and expertise to develop draft documentation on how a tiered energy code. The current drafts have been published and are out for public review. CBS's close involvement with the committee means that when adopted into code, The City is well prepared to train industry and staff on these changes and accelerate the transition to improved building performance.</p> <p>CBS is also considering alternative compliance methods to best understand their application for the development for step codes. One method, Passive House Planning Package (PHPP) software package is considered an acceptable means to demonstrate energy code compliance. In 2020, Calgary Building Services staff were trained and informed on this option. Following a thorough review, feedback was provided to Passive House Alberta for industry coordination.</p>
<p>Participate in the development of a retrofit building code</p>	<p>CBS representatives have positioned themselves for effective consultation and development of a retrofit building code. CBS representatives have technical and voting positions on the Canadian Standards Association Committee. This committee is writing the existing building retrofit standards, and this therefore gives The City a strong voice to help design this work.</p>
<p>Develop a Low Carbon Financing Program</p>	<p>The City is pursuing an innovative Low Carbon Finance Program, and this work aligns with the Economic Resilience Task Force (ERTF), which has received proposals for several low carbon finance initiatives as a method for generating capital investment and industry jobs to support economic recovery.</p> <p>In July of 2020, Alberta Ecotrust and The City of Calgary submitted a funding application to the Federation of Canadian Municipalities grant in community efficiency financing. The goal of this work is to design low carbon finance programming for Calgary that will provide access to funding and a favourable repayment mechanism to boost the renovation rate in the residential sector.</p> <p>In August 2020, the Economic Resilience Task Force requested The City of Calgary to conduct a review of three proposals on low carbon finance and energy efficiency retrofits they received from industry. Administration prepared a Low Carbon Financing Assessment Report that considered the viability of those proposals. The ERTF asked The City to proceed with further work in this area. In Phase 1 – Program design and feasibility – the climate team began assessing how to design a Low Carbon Finance Program. The team engaged industry experts and the proponents of the ERTF proposals (reSEED, Municipal Climate Change Action Centre and QUEST). The climate team had resources approved through Council's budget deliberations in November 2020.</p>

2020 Progress: Program 2 Energy consumption information

INITIATIVE	KEY ACTIONS IN 2020
<p>Commercial building benchmarking</p>	<p>The Commercial Building Benchmarking Program was designed to assist building owners and operators in measuring and tracking the energy performance of their portfolios. The goal of the benchmarking program is to help building owners and operators make investment decisions for energy upgrades. In April 2020, a dedicated Energy Advisor was hired through federal funding, to assist in program development, promotion and management. The program was officially launched to the public on October 2, 2020. The first year of the program is set to run until the end of April 2021. As of December 2020, there were 170 properties signed up to the program from 12 different participants – of those properties 72 are City-owned.</p> <p>Other participants include real-estate investment trusts, property management companies, the Calgary Board of Education and Bow Valley College. Combined, the properties in the database accounted for 2.9 million m² of floor space, 4.3 million gigajoules of energy/year and 382,000 tonnes CO₂e/year.</p> <p>Recruitment of program participants is ongoing, improving the quantity and diversity of participants provides an accurate source of consumption information and engages some of our largest emitters to think more carefully about energy performance. With greater rates of penetration this program can also feed into other City projects as an accurate source of information.</p>
<p>Residential building labelling</p>	<p>Energy labelling is a foundational action to achieving improved knowledge of energy consumption in the residential sector. In 2020, an internal study was completed that detailed the options for mandatory residential labelling based on programs across North America. This scoping and feasibility document will be used as the basis for a working group in residential labelling, planned for 2021. The City has also engaged BILD Calgary on their own model for achieving mandatory labelling and intend to work in collaboration with BILD to best define and model that can be developed in 2021.</p>
<p>Integrated City Energy Mapping (ICEM)</p>	<p>The Integrated City Energy Map (ICEM) was formally initiated in May 2020. The goal of the ICEM project is to map and model emissions in Calgary from the buildings and transportation sectors and therefore, aims to map 99 per cent of community emissions. The ICEM was first conceptualized through the Utility and Buildings Working Group of the Calgary Climate Panel – with core members of ATCO, ENMAX and BILD Calgary. It will allow The City and its utility partners to map where our emissions come from today and also to model the trajectory to 2050.</p> <p>Once complete, the ICEM will allow the climate team to model different mitigation actions and the effect they have on emissions and will provide an understanding of the level of change required to meet our GHG goals. It will also assist in reporting on mitigation plan metrics in the future and tracking progress in key action areas. It's expected the ICEM will be completed by Q1 of 2021.</p>

2020 Progress: Program 3

On-site and neighbourhood-scale renewable and low carbon energy systems

INITIATIVE	KEY ACTIONS IN 2020
Midfield mobile home park renewable energy feasibility study	The terms of reference were developed for the Midfield feasibility study, a large on-site renewable energy feasibility study. The study was undertaken for the redevelopment of Midfield Mobile Home Park (a.k.a Mountainview Village). This has been a milestone project, developing a pilot implementation approach for renewable and low carbon energy projects that could serve as template for broader deployment in the future
The solar dashboard	The City began development of a new interactive solar potential map (the solar dashboard) that will be added to The City's web site in 2021. It will help Calgarians assess the economics of implementing a solar photovoltaic (PV) system on their own homes. This updates the existing map to create a more user-friendly experience and improve our service offering with more information available to residents on the financial viability of solar it helps to drive support and investment in this valuable resource. The website is intended to serve as a jumping off point for Calgarians who are exploring PV – a soft launch of the solar dashboard is expected in April 2021.
District energy	The City of Calgary is also keen to promote and expand the role of district energy in Calgary, however, there is limited progress to report in 2020. The existing downtown district energy system saw minimal growth in 2020 and ENMAX District Energy Center was purchased by Atlantica in November 2020. The City of Calgary hopes to work with Atlantica as they look to promote and expand district energy in Calgary. In the past, price competitiveness of the system has been a key issue that has limited expansion, however, the efficiency gains from switching to district energy could be key to helping us reach our GHG mitigation goals.
Renfrew Community Solar Carport Project	<p>A detailed feasibility study was commissioned by the community of Renfrew in the development of a community owned and/or operated renewable power project. This feasibility study focused on cooperative ownership or investment models that would support direct community investment in renewable electricity generation.</p> <p>Also included is an evaluation of how to reinvest revenues earned from these projects to deploy additional renewable electricity projects in Calgary. The feasibility study enabled The City to solicit funding through the Municipal Stimulus Program (\$3.9M) and the Renfrew Community Solar Carport Project is currently under development at the Spark Science Centre, which will generate over \$130,000 in anticipated annual revenues for reinvestment in community owned generation assets across Calgary. This project will also provide education and outreach to the public on energy and environmental literacy as an integrated part of programming at the Science Centre.</p>



THEME 2: Transportation and land use

Emissions from the transportation sector account for roughly one third of Calgary’s city-wide greenhouse gas emissions. These emissions are primarily from the use of diesel and gasoline fuels. Reducing emissions from this sector relies primarily on switching to lower carbon-intensity fuels (such as biofuels and electricity), switching to lower carbon-intensity modes of transportation (such as walking, cycling or transit) or decreasing individual vehicle trips (through transit, shared-use mobility services or working from home). Land-use planning decisions are also critical to limit sprawl and to avoid further lock-in to a high-carbon transportation system.

PROGRAMS	DESCRIPTION	KEY OBJECTIVES
4. Electric and low emissions vehicles	Vehicle manufacturers and global markets are promising more and more aggressive targets for electric vehicle adoption. The City of Calgary is working to encourage and facilitate this vehicle technology transition.	<ul style="list-style-type: none"> • Support and enable the update of privately-owned electric vehicles • Support and enable the uptake of electric and low emissions vehicles in commercial fleets
5. Low or zero-emissions transportation modes	Shifting the mode split in Calgary by increasing the number of people walking and wheeling is key to reducing emissions from vehicles, reducing infrastructure costs and realizing a healthier population. The City is also working on increasing the use of Calgary transit, walking and wheeling modes, as well as undertaking ride-sharing, carpooling and working from home initiatives.	<ul style="list-style-type: none"> • Enable increased walking and cycling • Enable increased use of Calgary Transit • Enable increased use of ride-sharing, car-pooling and working from home
6. Land-use and Transportation Planning	Planning and policy decisions on land use, transportation, city infrastructure and services can exacerbate emissions and energy consumption in Calgary. Integrating climate change considerations into land-use and transportation planning decisions, strategies, plans and processes plays a crucial role in understanding the impacts of development in relation to emissions and energy use.	<ul style="list-style-type: none"> • Incorporate policies regarding climate risks and greenhouse gas reductions that may impact land use development and transportation infrastructure or services into the update of the Municipal Development Plan and Calgary Transportation Plan • Develop methodologies to integrate GHG reduction potential into growth management decisions and transportation assessments
Partners: Calgary Transit, Environmental & Safety Management, Transportation Planning		

2020 Progress: Program 4 Electric and low-emissions vehicles

INITIATIVE	KEY ACTIONS IN 2020
Peaks to Prairie EV fast charging network	ATCO and FLO (an equipment supplier and charging network operator in Canada) were hired to install, own and operate the Peaks to Prairies EV fast charging network on behalf of The City and the other regional partners. The installation of 20 Direct Current Fast Charging (DCFC) and Level 2 charging stations was completed in autumn 2020, including three stations located within Calgary. This network is critical to extending the reach of electric vehicles in Alberta.
Research collaboration	Research is currently being conducted with the City of Edmonton on EV readiness. Calgary and Edmonton jointly hired ICF Canada to conduct best practice research and stakeholder engagement on EV readiness in new and existing homes and workplaces. The final report was delivered in March 2020; however, some additional analysis is required in 2021 to refine aspects of the recommendations. Further to this, a consultant will be engaged to provide preliminary concepts and recommendations for publicly-accessible community charging hubs. The City is now exploring technical requirements and market interest to pilot community charging infrastructure. The City has also continued to track and assess potential future transportation technology such as autonomous vehicles and delivery drones.
Federal EV policy development	The City of Calgary is also involved in the development of federal EV policy and continues to participate in NRCan working groups on EV infrastructure retrofits, grid readiness and regional charging. In October 2020, the City also participated in a discussion on federal EV policy with Pollution Probe. The City of Calgary is also actively involved in Canadian Urban Transit Association (CUTA) and Canadian Urban Transit Research & Innovation Consortium (CUTRIC) to exchange information on evolving technologies, products, and practices such as state-of-art and innovations in e-buses and associated charging infrastructure.
Public education and outreach	Public education and outreach is a key pillar of the EV transition, and in 2020 The City of Calgary EV strategy website was updated regularly and the development of EV communication material is underway. In fall 2020, The City of Calgary hosted a public webinar on electric vehicles and there are also ongoing discussions between The City, ENMAX, the Community Energy Association and Plug'n'Drive about a Calgary-based or movable Alberta EV Discovery Centre. The City of Calgary provided written support to Plug'N'Drive for an NRCan funding application for this initiative in Q3 2020.
Goods Movement Strategy	Goods Movement Strategy: COVID-19 has meant a change in how goods move around the city. There has been, for example, an increase in home deliveries, and understanding how goods movement has changed and may change further post-pandemic has been identified as a subject of interest in the City of Calgary's COVID-19 recovery scenarios. In 2020, as part of the Goods Movement Strategy, Transportation Planning worked with the University of Calgary on a project entitled "Smart Route Recommender System for Transporting Goods in Extreme Weather". Transportation Planning is also working with Mount Royal University on "An Artificial Intelligence-powered Digital-Twin for Trucks". The Truck Travel Improvement Study is underway to address network movements and delays for trucking, with implications including GHG emissions, for completion by Q1-2021 and subsequent implementation subject to funding. A proposed action for 2021 is to identify more proactive actions to reduce delivery-related GHG emissions.

2020 Progress: Program 5

Low or zero-emissions transportation modes

INITIATIVE	KEY ACTIONS IN 2020
<p>Step Forward, the Cycling Strategy and Complete Streets</p>	<p>The City of Calgary tracked its progress implementing the Step Forward, and Cycling Strategy while continuing to implement the principles of Complete Streets. It was found that for Step Forward around 20 per cent of actions are complete with a further 45 per cent underway and for the Cycling Strategy, 70 per cent of actions are complete with 20 per cent underway. All three policies are implemented through Community Mobility Improvement retrofit projects like 2nd Street S.W., Main Street projects like Bowness Road, and major roadway or interchange projects. Enhancing the safety and accessibility of walking and cycling for all citizens is a key part of this work. Corridor, spot improvement and community-wide projects through the Community Mobility Improvement program enhance the safety and accessibility of walking and cycling through the installation of sidewalks, wheelchair ramps, bike ramps, shorter pedestrian crossings with islands or curb extensions, marked crosswalks, overhead and side-mounted pedestrian flashers, bike lanes, protected bike lanes and sidewalk-level bike paths. New style of bollard lighting installed on the new pathway approaching the Bow Trail signalized pedestrian crossing south of 77nd Street S.W.</p> <p>The City's dedication to safety and mobility is best illustrated by:</p> <ul style="list-style-type: none"> • The 42nd Avenue S.E. multi-use pathway project broke ground in 2020, the former roadway with bus stops but missing sidewalks and no pathway is partially complete (approximately 2.9 km, from 1A Street S.W. to 12th Street S.E.), and will include a sidewalk along 12th Street S.E. (42nd to 46th Avenue). • In Ramsay, installed approximately 500 metres of asphalt sidewalk along 11th Street S.E. from 21st Avenue South to 26th Avenue South/Crossroads Market, was a missing sidewalk link with a bus stop. • Three rapid flashing beacons are being installed at pedestrian crossings along 2nd Street S.W. in Mission. • One pedestrian overhead flasher is being installed along 11th Street at 11th Avenue S.E. • Two rapid flashing beacons are being installed along 24th Avenue N.W., west of Crowchild Trail. <p>Twelve schools were active in the first round of the Active and Safe Routes to School program, which started in fall 2019. Another 10 schools were on-boarded in fall 2020. Work was modified during COVID-19 to include student mapping of school walking routes while students learning remotely.</p>
<p>RouteAhead Strategic Plan implementation</p>	<p>Budget reductions in 2019 and COVID-19 service reductions in 2020 have affected both transit service and RouteAhead targets and no transit priority work was completed in 2020, however, work is planned for 2021.</p>
<p>Green Line Light Rail Transit (LRT)</p>	<p>For Green Line, Phase 1 is in the design/analysis phase with Light Rail Vehicle (LRV) procurement in process. During this process, climate lens reporting to federal government was also conducted and subsequently completed early in 2020.</p>

INITIATIVE	KEY ACTIONS IN 2020
Regional transit co-ordination	The Calgary Metropolitan Region Board Transit Service Subcommittee is also working on regional planning around transit services. They are currently exploring with City of Chestermere MAX Purple BRT extension from Calgary – outcomes to be finalized by March 2021. All of the above actions demonstrate The City's dedication to expand public transit systems and also reduce the carbon intensity of transit offerings for Calgary.
COVID-19 transition to work-from-home	In March 2020, The City of Calgary supported the transition of around 5,000 employees to work from home due to the COVID-19 pandemic. The support to work-from-home will continue into 2021, at least until public health guidelines allow for a return to the office. Effectively enabling City employees to work from home reduces the number of vehicle kilometers driven for commuting and results in a decrease in our transportation emissions. Although this is a temporary measure, it may also yield changes in norms and behavior which mean a greater number of Calgarians will work from home in the future.
Shared-use mobility options	Ride sharing promotes reduced vehicle ownership and theoretically fewer kilometers travelled through single occupancy passenger vehicles. CommunAuto carshare began operation in Calgary in 2020 with 150 vehicles available for short-term rental. Unfortunately, Car2Go no longer operates in Calgary however, some Car2go microstalls at end-of-block have been converted to shared e-scooter parking zones in the inner city – this further promotes mode switching from single occupancy passenger vehicles. The City is continuing to assess innovations in micro-mobility and a pilot project has been completed assessing e-scooter use. A report and recommendations were brought forward to committee in December 2020. While shared mobility partnerships involving e-bikes and e-scooters have also been piloted (October 2018 through October 2020).
On-demand ride share	In 2019, Calgary Transit initiated a one-year On-Demand shared-ride transit pilot in the communities of Carrington and Livingston, testing the ability of this alternate transit service to provide connectivity to the Primary Transit Network. The initial pilot has concluded with a report to Council in September 2020, with overall positive feedback on the service and some lessons learned. The On-Demand service in the north continues as of November 2, 2020. In October 2020, On-Demand service was initiated in existing service areas in the southwest to target low ridership areas (four routes) during the pandemic.

2020 Progress: Program 6 Land-use and transportation planning

Please see Appendix 1 - Climate governance and outreach for a complete summary of progress in this program area.



THEME 3: Consumption and waste

The waste we create and how we dispose of it can have a significant impact on GHG emissions. Currently, our GHG inventory accounts for methane emissions from our waste and wastewater facilities, which accounts for about 1 per cent of the GHG emissions in Calgary. However, there are GHG emissions that are embedded in the products that we use and dispose of in Calgary. We don't currently measure these emissions, but based on analysis from other cities, embedded emissions could double the emissions that we account for in our inventory. The Waste and Consumption theme of the Calgary Mitigation Plan is focused on improving Calgary's measurement of consumption-based emissions, reducing waste generation, and then appropriately managing waste to minimize greenhouse gas emissions.

PROGRAMS	DESCRIPTION	KEY OBJECTIVES
7. Consumption and waste reduction	This program is focused on reducing consumption and waste generation in Calgary, with the goal of reducing total waste generation in both the residential and commercial sectors.	<ul style="list-style-type: none"> • Reduce total waste generation in the residential and commercial sectors • Improve access to local food
8. Waste management to minimize greenhouse gas emissions	Waste in Calgary is appropriately managed to minimize greenhouse gas emissions	<ul style="list-style-type: none"> • Reduce methane from Calgary landfill by diverting organic material from the landfills • Capture methane from Calgary landfills and wastewater treatment processes

Partners: Calgary Growth Strategies, Environmental & Safety Management, Water Services, Waste and Recycling Services

2020 Progress: Program 7 Consumption and waste reduction

INITIATIVE	KEY ACTIONS IN 2020
Waste composition studies	The first step to reducing waste generation is to better understand the composition of waste generated in Calgary. A garbage stream waste composition study was completed for all sectors in 2019, and a Green Cart waste composition study was completed in 2020. The results of these studies are being used to inform programs and education changes, including reducing food waste in garbage. Waste reduction messages have been incorporated in all education and outreach materials.
Tag-a-bag program	Pay-as-you-throw programs charge households based on the amount of garbage put out for collection. The core principle is that households that generate less waste pay less. As a result, pay-as-you-throw programs encourage people to reduce waste and divert materials to help maximize existing programs like blue and green cart. On October 1, 2020, The City introduced a Tag-a-Bag program that requires residents to purchase garbage tags for extra bags that do not fit inside the black cart.
Single-use plastic reduction strategy	The City is developing a strategy for reducing waste from single-use items that will align with actions proposed by the federal government. In October 2020, the federal government proposed a ban on six single-use plastic items: plastic checkout bags, stir sticks, six-pack rings, cutlery, straws and food service ware made from problematic plastics. These plastics are considered harmful to the environment, difficult or costly to recycle, and readily available alternatives exist. The federal government is aiming to have regulations in place by the end of 2021, after consultation with Canadians.

INITIATIVE	KEY ACTIONS IN 2020
Extended producer responsibility	The City continues to advocate for Extended Producer Responsibility (EPR) regulations for paper and packaging products. A collaborative study between municipalities, government, and industry was presented to Council in Q3 2020. This study shows that EPR would increase recycling across Alberta and reduce GHG emissions equivalent to taking 15,000 cars off the road each year. Following from this advocacy work, the Government of Alberta is conducting stakeholder engagement in 2021 to inform regulations that will enable EPR.
Urban agriculture	<p>The spread of COVID-19 in March 2020 affected Calgary’s food system with both short-term disruptions and long-term impacts. During 2020, demand for spaces to grow food dramatically increased as people looked for opportunities to access fresh healthy food for themselves and others, as well as to improve their wellbeing. Backyard gardens, community gardens and urban farms all helped to meet the immediate and longer-term need. Regardless of scale, urban agriculture as green infrastructure provides critical ecosystem services for our city biodiversity, water management, clean air and carbon sequestration. In 2020, The City of Calgary supported food growing in four main areas:</p> <ul style="list-style-type: none"> • Access to land • Capacity building and practical support for food growing • Supportive local land use planning policies to enable urban agriculture projects • Partnerships and support for increasing urban agriculture opportunities across the city

2020 Progress: Program 8 Waste management to minimize greenhouse gas emissions

INITIATIVE	KEY ACTIONS IN 2020
Residential green cart program	This program is focused on appropriately managing the waste that is generated in Calgary to minimize greenhouse gas emissions from our landfills. This is achieved primarily by diverting organic materials from our landfills. City of Calgary programs and the Waste Bylaw continue to support and encourage diversion of organic materials from landfill. The residential green cart program diverted more than 110,000 tonnes of food and yard waste from landfill in 2020, reducing methane emissions and producing valuable compost. Proactive inspections of businesses for Waste Bylaw diversion requirements show high rates of compliance.
Explore opportunities to convert landfill gas to usable energy	The City has secured funding from the federal government’s Low Carbon Economy Challenge for a project to generate electricity from landfill gas and offset electrical power consumption at City of Calgary facilities. This project is currently in the design phase.



THEME 4: Natural infrastructure – carbon sinks

This theme was originally called Natural infrastructure in the Calgary Mitigation Plan. In this annual report, it is referred to as Natural infrastructure – carbon sinks to reflect that the key focus of this theme is to improve our understanding of how well-managed natural infrastructure assets can remove carbon from the atmosphere. Please see Theme 4: Natural infrastructure in Appendix 3 for a complete description of the work supporting this theme.

PROGRAMS	DESCRIPTION	KEY OBJECTIVES
9. Manage green spaces and natural areas to support climate change mitigation	The ability of natural infrastructure to sequester carbon is being valued as one of the key services it provides. This program seeks to gain a better understanding of the sequestration potential in Calgary.	Maximize the carbon sequestration potential of Calgary’s natural infrastructure.
Partners: Calgary Parks, Calgary Roads, Water Utility, Environmental & Safety Management		

2020 Progress: Program 9 Manage green spaces and natural areas to support climate change mitigation

INITIATIVE	KEY ACTIONS IN 2020
Valuation and integration of carbon sequestration into greenhouse gas accounting	<p>Work to integrate the value of natural infrastructure (i.e., grasslands, wetlands, riparian areas, urban forests, etc.) to absorb GHG emissions into Calgary’s annual greenhouse gas inventory has not yet started. The City has continued to engage with the province and external stakeholders on the potential for a carbon offset program for natural infrastructure.</p> <p>The integration of climate change mitigation within project implementation is occurring across The City. For example, Parks has integrated climate change considerations into the implementation actions with the Biodiversity Action Plan, and uses the carbon sequestration potential of naturalized landscapes to inform their work. The roadside naturalization project, which explores the use of native grasses for road rights of way, has the potential to improve carbon sequestration, and decrease ongoing maintenance, for over 1000 hectares of land as there would be much greater biomass than the turfgrass presently used.</p>
Willow farm expansion	In 2020, The City received \$2 million in funding from the federal government’s Low Carbon Economy Fund for the expansion of our willow tree plantation. The willow tree plantation uses biosolids as fertilizer and creates a carbon-storage sink that sequesters greenhouse gas emissions. Over the lifetime of this project, Calgary will see a cumulative reduction of about 200,000 tonnes of greenhouse gas emissions—equivalent to removing approximately 61,000 cars off the road for one year.



THEME 5: Leading by example

Demonstrating leadership is a critical role for The City. The City of Calgary's corporate operations account for about four per cent of Calgary's overall GHG emissions. These result from delivery of services like maintaining roads, street lighting, transit, treating and distributing drinking water, and providing protective and recreation services. It also includes services that manage the impacts of community activities, like wastewater treatment and solid waste handling through landfills, composting and recycling facilities. The City aims to demonstrate leadership in how we build, how we deliver services and how we communicate with the public.

PROGRAMS	DESCRIPTION	KEY OBJECTIVES
<p>10. Reducing emissions in our own operations</p>	<p>This program is focused on demonstrating how The City of Calgary is leading by example in our own operations. The City is not able to achieve the city-wide mitigation targets on our own, but we look to manage our own corporate emissions in line with our reduction targets, and to raise the profile of pilot projects and invite industry collaboration.</p>	<p>The City of Calgary is a Canadian leader in how we manage GHG emissions from our own operations</p>
<p>Partners: Calgary Transit, Calgary Roads, Transportation Planning & Infrastructure, Calgary Parks, Recreation, Corporate Analytics & Innovation, Environmental & Safety Management, Fleet Services, Facility Management, Waste & Recycling Services, Water Utility, Supply Management</p>		

2020 Progress: Program 10 Reducing emissions in our own operations

INITIATIVE	KEY ACTIONS IN 2020
Update Corporate Energy Plan	<p>An update to the existing Corporate Energy Plan was in development in 2020 and will be completed in 2021. This will be a ten-year plan to focus The City's energy use and emissions with an interim goal of 40 per cent GHG reduction by 2030 on the path to our 2050 climate goal. The plan will also support The City to better manage our carbon risks from a budgetary view as Canadian carbon pricing potentially rises from \$30 to \$170 per tonne CO₂e by 2030. Key drivers for the work include policy alignment across The City's other plans and strategies to provide guidance for budgeting; reducing impacts of the current and future carbon pricing, which will drive GHG reductions; and alignment with Calgary's City Charter, which requires an annual update and multi-year GHG reduction plan.</p>
Improve energy efficiency and conservation in buildings, facilities, infrastructure and fleet	<ul style="list-style-type: none"> • Calgary Transit optimized indoor bus storage in 2019-2020 to reduce cold weather idling of diesel buses, saving 100+ tonnes of CO₂ annually. • Combined heat and power systems were installed and made operational at Spring Gardens and Stoney Compressed Natural Gas Transit facilities for energy efficiency. • Secured grant funding to conduct a pilot in 2021 involving the installation of snow detection systems and thermostats to automate switches on LRT track switch heaters to reduce natural gas use and emissions. • Corporate Analytics & Innovation (CAI) published an updated set of Design Guidelines for City of Calgary Funded Buildings, which includes standards for building envelope and mechanical equipment performance. • Sustainable Building Policy provided guidance for energy performance of new facilities. • Facilities Management and CAI initiated an energy efficiency program across ten fire facilities that focused on LED lighting and energy efficient appliance replacements, with the objective of generating energy and operating cost savings. Once complete, this program will reduce lighting related energy consumption by as much as 30 per cent in Calgary Fire's facilities, with building vintages spanning 1970 through 2000. • Facilities Management undertook planning and cost estimation towards a future commissioning of energy audits of older, energy heavy City facilities. • Green Line Climate Lens reporting to federal government was completed early in 2020. Ongoing project planning and design work by The City and consultants are addressing energy efficiency and resilience. Project tender documents introduce provisions to incentivize energy efficiency and resilience by the project company.
Install renewable energy generation at City facilities and land	<p>Solar photovoltaic systems were installed at the Haskayne Pavillion, Bridlewood affordable housing units and Shepard Solar Park Phase 2 on a former brownfield site, which generates equivalent energy to supply 900 homes per year.</p>

INITIATIVE	KEY ACTIONS IN 2020
<p>Add electric and low-carbon fleet vehicles</p>	<ul style="list-style-type: none"> • The City of Calgary secured \$800,000 in provincial and federal funding for two waste collection truck pilot projects – one-diesel hybrid and one battery electric. • In 2020 Q1, Fleet Services acquired two electric vehicles--Chevy Bolts--to be incorporated into The City's fleet. In addition, Fleet Services acquired two electric ice-resurfacers and two electric shop-sweepers. • A study by Fleet Services in collaboration with Waste and Recycling Services evaluating the use of alternative fuels in waste collection trucks was completed and published in March 2020. The report recommended that The City incorporate biodiesel as an alternative fuel in collection trucks. • In 2020 Q2-Q3, Fleet Services in collaboration with Waste & Recycling and Supply Management successfully piloted the use of biodiesel-20 fuel (B-20) in five side-loader waste collection trucks. The pilot project confirmed that B-20 results in a substantial reduction in GHG emissions. • Fleet Services is acquiring both light and medium electric construction equipment (skid steers, backhoes, and loaders). The RFP for this equipment was underway in Q4 2020. • The City of Calgary continues to replace our ageing diesel bus fleet with new CNG buses with bike racks installed. Thus far, 80 buses have been replaced in 2019 and 30 more in 2020. The rate of lifecycle replacement was reduced due to budget restraints.
<p>Identify opportunities for carbon offsets</p>	<p>New sources of savings and revenue of \$4.5 million were generated from carbon offset and renewable energy certificate sales, which can be used for future energy efficiency projects.</p>

Next steps for climate mitigation

Buildings and energy systems

Providing better energy use and reduction opportunity information will be a key priority for 2021. The Integrated City Energy Map project will improve the strategic planning capability of the climate team and improve our ability to assess the impact of future climate mitigation programs, policies and planning decisions. The public launch of the solar dashboard which will allow the citizens of Calgary to assess the financial viability of solar on their rooftops. The continued implementation of the commercial benchmarking program and the initial development of residential building labelling will also progress in 2021. Exploration of a Green Building Standard to improve the minimum energy performance of Calgary buildings is also a priority for 2021. Finally, work will progress to develop a low carbon finance program for energy efficiency retrofits in Calgary.

Transportation and land use

In transportation systems there will be investigation into the use of renewable natural gas and e-buses with a pilot study of e-buses planned with ENMAX. A pilot in 2021 to automate track heaters will save on natural gas consumption during periods of snowy weather. Truck travel is also an area of focus and there is a proposed action to identify more proactive measures to reduce delivery-related GHG emissions as the Truck Travel Improvement Study (TP) is being finalized.

Electric vehicles will feature heavily and The City is supporting a grant application by Plug'n'Drive to host a mobile EV test drive centre in Calgary. Also, work is ongoing on the installation of twenty level 2 charging stations at a mix of park-and-rides and recreation centres. In co-ordination with the City of Edmonton, The City plans to create an EV readiness best practices website.

Waste and consumption

Work will continue on waste management and diversion. The City will participate in consultations related to single use plastic and EPR regulations. There are plans to review CalgaryEATS! Food Action Plan with an enhanced climate resilience lens and develop a Food Resilience Plan.

Natural infrastructure – carbon sinks

The core work ongoing in this field for 2021 is the valuation of our natural assets as carbon sinks. This work confirms our desire to have a holistic understanding of the drivers and mitigating measures to curb GHG emissions and ties well with our work in energy mapping as well as quantification of scope 3 consumption emissions.

Leading by example

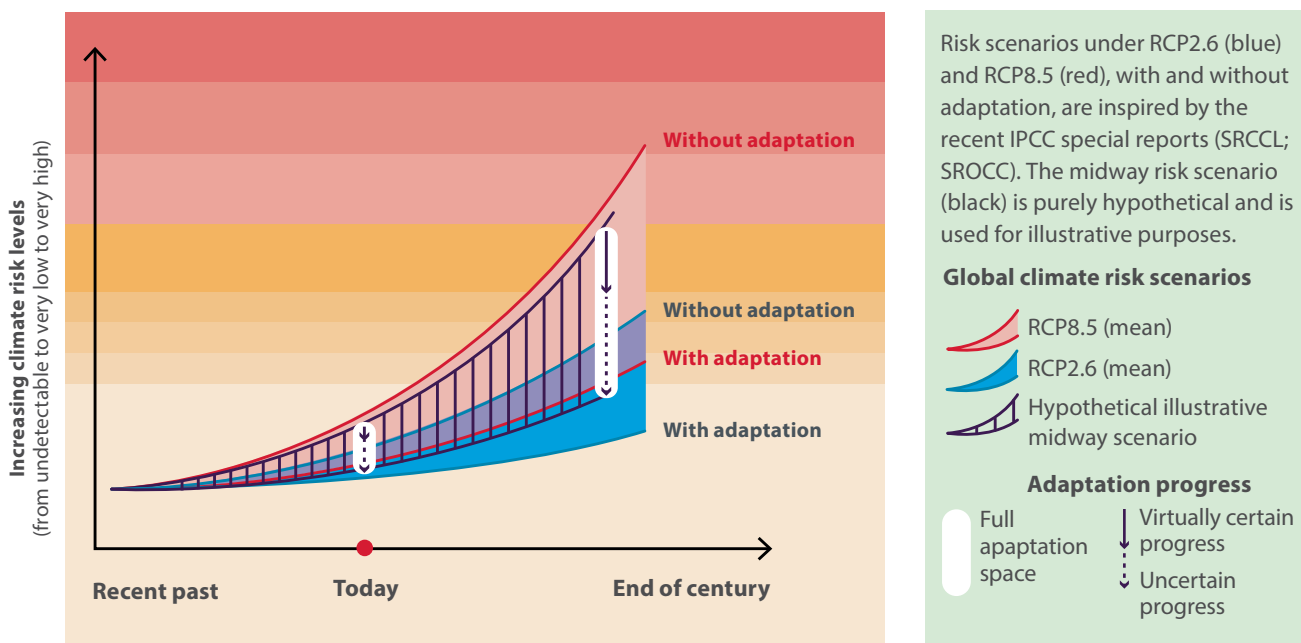
Calgary Roads is planning a pilot project for concrete with carbon capture (i.e. CO₂ mineralization) in 2021. The development of a Green Fleet Strategy in 2021 will establish how and when The City will “green” its fleet and will consider effective strategies that promote affordable, reliable and renewable technology solutions that are sustainable. Waste & Recycling Services has four alternative fuel vehicle assessments concluding in 2021, one hybrid electric vehicle and one or more battery electric vehicles will be in service in Q2 and Q3 2021. The City has also committed to reduce idling of City vehicles and equipment by up to 80 per cent in 2022, and is implementing green driving reports and a dashboard called the Green Driving Dashboard to identify vehicles that idle and provide information needed for key operational decision-making. Corporate Analytics & Innovation and Facilities Management are also working on a roll out of additional cogeneration power systems small aquatic centres as part of the 2021–2022 Action Plan. Several major infrastructure projects being designed in 2021 will include GHG and climate resilience assessments. These include buildings, road infrastructure, and urban spaces. The City will explore integrating assessments into the capital infrastructure investment process in future years.

Appendix 3 – Climate Adaptation Action Plan

Climate change is increasing the frequency and severity of local climate hazards, with the potential to impact our built infrastructure, natural environment, and human and economic well-being. GHG reduction and climate adaptation are complementary approaches for reducing climate risk over different geographic and time scales. Climate adaptation refers to the processes, policies, and implementation of measures which can reduce the negative impacts that climate hazards pose to the built environment, the natural environment, and people, while benefitting from potential new opportunities. In the absence of climate adaptation, the detrimental impacts of climate change will be far more dramatic.

Adapting to climate change requires targeted interventions and strategies to reduce climate-related risk to infrastructure, services, the environment and the economy. Various analyses in Canada and internationally have indicated that for every dollar invested in climate adaptation avoided costs may be approximately six dollars.

Climate adaptation



Conceptual visualization of progress in adaptation at the national level against different climate risk scenarios. Source: United Nations Environment Programme (2021). Adaptation Gap Report 2020 – Executive summary. Nairobi

Calgary's key climate hazards

The Calgary Disaster Risk Assessment (DRA) presents an overview of all hazards relevant to Calgary, analyzes the level of risk for the more immediate five to ten years and identifies current risk trends. Of the fourteen priority hazards identified in the 2020 DRA, eight are being made more likely and/or severe due to climate change. The role of the Climate Adaptation Team is to focus specifically on these hazards to identify and communicate the future projections associated with these hazards based on future climate modelling (considering the influence of increased atmospheric greenhouse gases), and to work with stakeholders, such as CEMA, to reduce risk associated with these future climate hazards.

In 2020, the climate adaptation team refined Calgary's key climate hazards based on updated climate projections for the 2050s (2041-2070) and the 2080s (2071-2100). Climate hazards are amplified by climate change-driven shifts in temperature and precipitation, and include acute events (such as severe storms), and long-term trends (such as changing seasonality). The eight key climate hazards include:



Extreme heat: Calgary will experience increasingly hot summers with more frequent and longer heat waves.



Heavy precipitation: More precipitation is falling as short-duration, high-intensity storms (SDHI) which can lead to overland flooding.



Drought: Drought conditions may become more common, prolonged and widespread.



Winter storms: Damaging winter storms, heavy snow, blizzard conditions and freezing rain will continue to be hazards as core winter months will remain below 0°C.



Wildfire: A longer and drier fire season will lead to more frequent, larger and intense wildfires.



Severe storms: Hail, high wind events and tornadoes are likely to occur more frequently and over more months of the year.



Shifting seasonality: Winters are getting shorter, spring is arriving earlier, summers are longer and fall is arriving later.

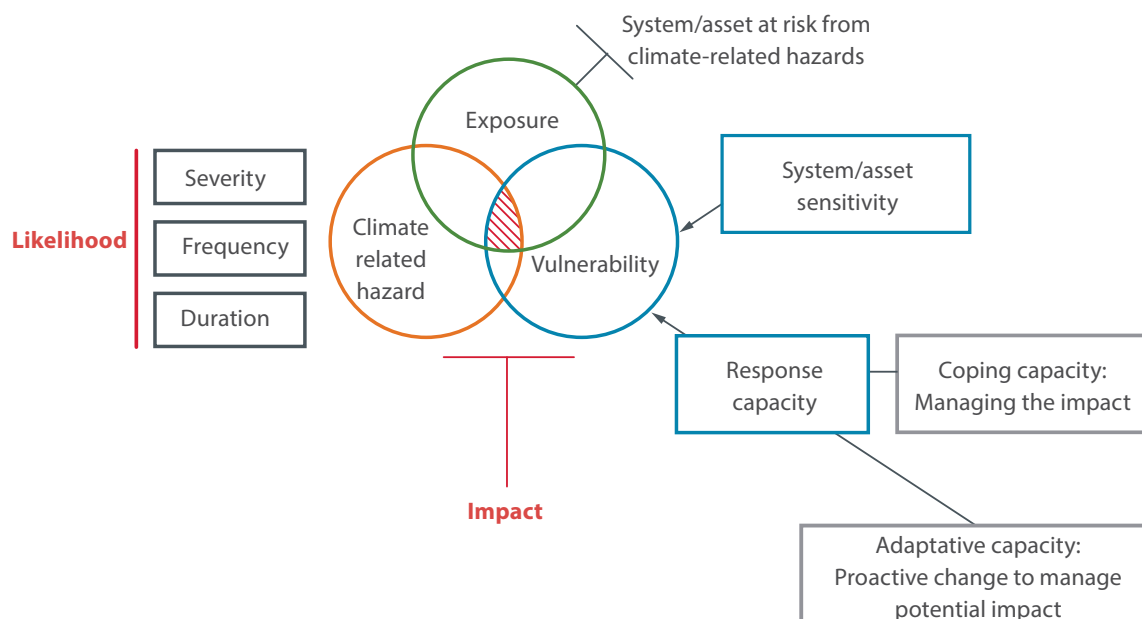


River flooding: Flood timing, intensity and frequency is likely increasing.

Adverse climate-related impacts

Climate events may occur as isolated incidents or as long-term changes in conditions, both of which will have impacts on the natural environment, the built environment (assets and services), and human well-being (health, safety and security). The interconnection of climate hazards, exposure and vulnerability leads to these impacts, and adaptation is a key strategy to reduce the magnitude of an impact. Progress has been made in 2020 to consider Calgary’s exposure to climate hazards and to better understand vulnerability.

Adverse climate related impacts



Community Climate Risk Index

The Community Climate Risk Index, to be completed in 2021, will provide an analysis of climate risk at the community scale. Using a suite of exposure and vulnerability indicators to identify hazard-specific and overall climate-related risk, it will provide each community with a “community climate risk score” and “community hazard risk scores”. This will help to convey the drivers of vulnerability within the social, built, and natural environments, and begin to build the toolbox for targeted adaptation interventions. This information will be provided to planning teams working on Local Area Growth Planning Projects so informed decision making can improve community climate resilience.

Climate adaptation planning in Calgary

Since Calgary's Adaptation Action Plan was initially developed, there have been shifts in understanding and best practices for climate adaptation. To follow current adaptation planning best practices, we are progressing climate adaptation across five main theme areas and updating our reporting format to better align with The City's results-based accountability framework:

- Theme 1: Climate data and adaptation reporting
- Theme 2: People
- Theme 3: Infrastructure
- Theme 4: Natural infrastructure
- Theme 5: Watershed management

A summary of our 2020 progress on our climate adaptation actions is included in this section of the report, organized by these theme areas.

A total of 175 actions were identified in 2017 during the preparation of the Climate Adaptation Action Plan.

Of these, 114 are in progress 33 actions are complete and another 28 have not been started.





THEME 1: Climate data and reporting

While it is impossible to predict the precise extent or timing of climate hazards, developing and maintaining regional climate data and translating that data into evidence-based decision-making is critical for improving climate adaptation implementation. The City is using a data-driven approach to identify the climate hazards most relevant to Calgarians.

PROGRAMS	DESCRIPTION	KEY OUTCOMES
<p>1. Climate data and defining climate risk</p>	<p>Evidence, and risk-based decision making requires access to regionally appropriate and up-to-date climate projections and future climate indices. This must be communicated to technical staff and decision makers so they understand the Corporations' exposure and sensitivity to climate hazards..</p>	<ul style="list-style-type: none"> • Improved understanding of how global climate projections lead to current and future climate hazards. • Informed decision making incorporates Calgary's exposure and sensitivity to climate hazards. • Understanding the Corporations' exposure and sensitivity to climate hazards to inform decision making.
<p>2. Climate adaptation reporting</p>	<p>Long-term monitoring, evaluation, and results reporting are important for setting program direction and measuring success. However, the ability to measure adaptation progress adequately has challenged governments around the world. First steps have been completed in developing a Calgary-specific framework for climate indicator monitoring, as well as performance reporting.</p>	<p>Climate-related indicators and performance metrics are developed to measure, evaluate and report on corporate and community climate adaptation.</p>
<p>Partners: Corporate Analytics & Information, Calgary Emergency Management Agency, Finance, Water Utility, Environmental & Safety Management</p>		

2020 progress: Program 1 Climate data and defining climate risk

INITIATIVE	KEY ACTIONS IN 2020
<p>Climate data Complete regionally specific climate data projection analysis and disseminate the findings</p>	<p>A detailed climate projection project commenced in 2020 and will be completed in 2021 in coordination with the Calgary Airport Authority. This analysis will predict how climate change will shift the regions' overall climatic patterns, including temperature, precipitation, and wind patterns. Results will be used in climate risk assessments and will support adaptation planning, operational planning, and detailed design for multiple sectors.</p> <p>An overview of this data will be made available through a public report which is currently being developed, while the data itself is available for project managers, design teams, consultants and researchers on request.</p>
<p>Climate hazards Develop and maintain regional climate hazard and climate vulnerability mapping tools</p>	<p>Calgary's key climate hazards were refined in 2020, and work began to map these hazards in close coordination with internal and external experts. Final deliverables will be available in 2021 and these tools will support targeted implementation of climate adaptation and risk reduction practices.</p>
<p>Support for decision-making Develop decision-making support tools that integrate climate risk</p>	<p>A Climate Risk Primer was produced for internal use and has been circulated to interested stakeholders. This living document attempts to create common language and a basic understanding of Calgary's climate risk, and can be used to support climate risk assessments.</p>

2020 progress: Program 2 Climate adaptation reporting

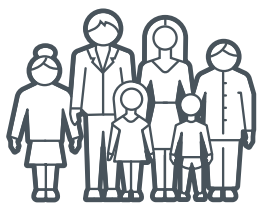
KEY INITIATIVES	CLIMATE ADAPTATION ACTIONS
<p>Climate indicator monitoring Develop a climate indicator monitoring program and track of key climate indicators, including occurrence of extreme weather events.</p>	<p>The adaptation team selected adaptation indicators and metrics in 2020 based on a literature review and has recommended a number to include in annual reporting to show progress on climate adaptation. These indicators and metrics are outlined below under Institutional Climate Risk Management Indicators. Monitoring and reporting is in place in some areas, with notable gaps in others that require resourcing and collaboration with information owners.</p>
<p>Adaptation performance reporting Develop performance reporting framework for climate adaptation following international best practice and City’s Results-Based Accountability (RBA) model.</p>	<p>A reporting framework was conceptualized in 2020, including the use of international practices such as the International Institute for Environment and Development’s (IIED) Tracking Adaptation and Measuring Development (TAMD) framework and The City’s RBA process.</p>
<p>Corporate engagement Corporate engagement to collaborate, implement and measure and report on adaptation actions.</p>	<p>The Climate Adaptation Cohort, a cross-corporate group of leaders and SMEs that are responsible for and support the implementation of climate adaptation measures, was convened in 2020. The intent of the cohort is to build an adaptation network across the organization, to improve knowledge and resource sharing and serve as a collaborative multi-specialist group to support the cross-corporate implementation of climate adaptation actions.</p>

Institutional Climate Risk Management Indicators

Through a comprehensive best practices review conducted in 2020, on the most current methodology and practices related to measuring and evaluating climate adaptation, the following framework has been developed. This framework aligns with The City's Results-Based Accountability framework and includes a combination of climate-related risk indicators and program-based effort and effect-based performance measures.

MEASURING AND EVALUATING CLIMATE ADAPTATION			
MEASUREMENT TYPE	PURPOSE	USE	IMPLEMENTATION PROGRESS
Community risk indicators	Measures the susceptibility of Calgary communities to being harmed (i.e. assessing exposure, adaptive capacity and sensitivity across time at sub-city scales).	Completing Community Climate Risk Assessments for each Calgary community.	<ul style="list-style-type: none"> • Focus of 2020 work (cross-corporate initiative) • Indicators to be presented as compound climate risk indices through a Community Climate Risk Index in 2021 (progress detailed in the Climate Adaptation section of this report)
Adaptation performance measures	<p>Effort-based performance measures: Measures progress toward implementation of actions.</p> <p>Answers the questions: How much did we do? (quantitative) How well did we do it? (qualitative)</p>	Monitoring and reporting annually on Adaptation Action Plan progress.	Developing comprehensive performance measures (qualitative and quantitative) in 2021 in alignment with the updated Climate Action Plan. Context specific performance measurements to be identified with internal stakeholders at each of the Adaptation Action Plan's Theme and Program areas.
	<p>Effect-based performance measures: Measures the impact of our adaptation services/programs on direct customers (changes in skills, behaviours, attitudes, etc.)</p> <p>Answers the question: Is anyone better off? (qualitative and/or quantitative)</p>		
Climate impact indicators	To identify and track key impacts of concern. They can help in measuring how adaptation actions and processes have contributed to reducing harm.	Recorded annually to identify and track the problem. They support why we are doing the work.	To be developed in 2021 in partnership with internal and external stakeholders.

MEASUREMENT TYPE	PURPOSE	USE	IMPLEMENTATION PROGRESS
<p>Institutional Climate Risk Management Indicators</p>	<p>Used to assess the extent and quality of institutional processes and mechanisms for addressing climate-related risks.</p>	<p>To measure the advancement of institutionalizing climate change considerations into organizational governance and decision-making</p>	<p>Based on global best practices review, the Tracking Adaptation and Measuring Development (TAMD) scorecard created by the International Institute for Environment and Development (IIED) was piloted in 2020 as a self-assessment to benchmark The City’s progress in advancing and integrating climate risk and climate adaptation considerations into various levels of organizational accountability, alignment, decision-making and collaboration processes. The pilot will inform the 2021 update of the Climate Adaptation Action Plan.</p>



THEME 2: People

As a municipal entity, it is the role of The City to support and enhance the ability of the public and City employees to cope with, recover from, and respond to the impact of climate-related hazards such as extreme weather events, extreme heat, and poor air quality, which can all have a negative effect on human health and safety. People-related climate adaptation actions are therefore focused on achieving specific outcomes related to the health, safety, and security of the public, as well as employee health and safety.

PROGRAMS	DESCRIPTION	OUTCOME AREAS
1. Public health, safety and security	Reduce Calgarians' exposure and vulnerability to the impacts of climate change. The City has committed to a number of short- and long-term actions that support and enhance the public's ability to cope with and adapt to the impacts of climate-related hazards.	<ul style="list-style-type: none"> • Enhanced public coping capacity • Enhanced public adaptive capacity
2. Employee health and safety	Develop and implement corporate climate risk reduction measures to protect and support City employees. The City's Occupational Health and Safety Management System (OHSMS) includes emergency preparedness and response planning for extreme events to achieve key program initiatives.	Reduced climate risk to City employees
Partners: Environmental & Safety Management; Calgary Neighbourhoods; Recreation; Affordable Housing; Calgary Emergency Management Agency (CEMA); Waste & Recycling Services; Calgary Growth Strategies		

2020 progress: Program 1 Public health, safety and security

INITIATIVE	KEY ACTIONS
<p>Regional response coordination Coordinate a regional response to climate-related hazards.</p>	<p>Throughout 2020, The Calgary Emergency Management Agency (CEMA) continued to work with its agency members and regional partners from the public and private sectors to ensure a state of readiness for the Calgary region. CEMA is a member of numerous regional committees and mutual aid agreements that are focused on response, including the South Central Emergency Response Committee and Municipal Emergency Management Partnership. Canada Task Force 2 (CAN-TF2) resides within CEMA and is an all-hazards disaster response team that can be deployed to assist communities across the province, including a 2020 deployment to support the Regional Municipality of Wood Buffalo with flood response.</p> <p>During the months of the COVID-19 pandemic, Calgary Neighbourhoods strengthened partnerships with specific networks and partners around community-level emergency response. For example, in 2020 the Critical Service Provider Group, Emergency Wellness Response Team and other non-profit networks such as the Calgary Local Immigration Partnership were heavily engaged. Focus was placed on supporting vulnerable populations through coordination and communication with non-profit organizations that provide services to these populations. Regional emergency response networks are important for increasing community coping capacity to climate-related hazards at the community scale. Communication was also increased with The City's civic partners to help them manage the impact of the pandemic, and continue to provide programs and services to Calgarians where possible.</p>
<p>Emergency event communications Communicate before, during and after climate-related emergencies*.</p>	<p>A civic partner emergency contact list has been established (including The City's largest partners that receive significant City investment, such as the Calgary Zoo, Telus Spark and Calgary Public Library). In March 2020, a Civic Partners Emergency Communication and Coordination Protocol was drafted and put in place and is being refined based on learnings during the pandemic. The protocol outlines an emergency response communication and coordination process.</p> <p>In 2020, a crisis communication plan was created to ensure that Calgary Recreation customers and partners receive the most up-to-date and accurate information directly from The City during an emergency event, including during extreme weather events such as extreme heat, storms, heavy precipitation, etc.</p> <p>Processes to inform Calgary Recreation staff and park visitors on extreme weather events have been consolidated in an Extreme Weather Procedures Protocol document. A Community Services Inclement Weather Program Cancellation Process is also in place to guide cancellation communication for Calgary Recreation and Calgary Neighbourhoods activities, and a heat response plan for City services users has been implemented.</p> <p>* This is in addition to CEMA's Crisis Communications Plan and processes.</p>

INITIATIVE	KEY ACTIONS
<p>Climate hazards that impact public health Improve our support systems, tools and processes to help Calgarians cope with and recover from climate-related hazards that impact public health.</p>	<p>CEMA and The City have established programs in place to support citizens impacted by hazardous events and disasters, including the Emergency Social Services (ESS) Program and the Critical Service Provider Network. A campaign in early 2020 boosted participation in the Emergency Social Services (ESS) program, and the new members were identified in the updated Calgary Neighbourhoods Business Continuity Plan. The Critical Service Provider Group, a non-profit network that provides services to specific populations, was engaged heavily during the COVID-19 response.</p> <p>Calgary Neighbourhoods works in collaboration with the Calgary Board of Education and community associations to ensure there is access to indoor shelter space for special events and programs. During the 2020-2021 school year, however, Calgary Neighbourhoods has had no access to schools as a result of COVID-19.</p> <p>The City has a debris management plan in place, and simulation exercises are designed and implemented to practice various responses, including extreme weather events. In 2020, procedures for flooding occurring simultaneously to the COVID-19 pandemic were developed and this information will be included in future updates to the debris management plan.</p>
<p>Improving long-term resilience to impacts caused by extreme heat Improve long-term resilience to impacts caused by extreme heat.</p>	<p>Installing and/or enhancing shade structures and water stations in public parks are considered as a part of capital lifecycle programs. For example, Haskayne Park was developed with a pergola, enhancing shading opportunities.</p> <p>In 2020 The City partnered with a data analytics company to create an urban heat island (UHI) map and tool for Calgary that will display historical surface temperature patterns throughout Calgary.</p> <p>The City has evaluated the need to upgrade existing transit vehicles and infrastructure to provide air conditioning (AC) – all new transit vehicles come with standard AC, light rail vehicles provide separate AC units for operators to optimize climate control and new maintenance facilities have AC to LEED (Leadership in Energy and Environmental Design) standard while older facilities remain difficult to retrofit.</p>
<p>Community engagement to increase adaptive capacity Increase community adaptive capacity through outreach, education and engagement.</p>	<p>In fall 2020, The City offered an online webinar to the public, discussing actions that citizens can take to prepare for impacts associated with a changing climate.</p> <p>The City of Calgary’s third annual Climate Symposium is meant to share best practices and innovative solutions to climate resilience with Calgarians and the Calgary business community. The symposium was postponed from fall 2020 until March 2021 due to the COVID-19 pandemic. Details about the 2021 Climate Symposium will be shared in the 2021 Update Report.</p> <p>In late 2020, The City began to develop a Climate Resilient Home Guide designed to educate homeowners about measures they can take to build resilience into their homes and properties. The guide will be available to the public prior to the 2021 storm season and will be accompanied with a robust public communication campaign.</p> <p>CEMA’s youth-focused Ready Squad program teaches kids about which emergencies occur in Calgary and how to prepare for them. This type of training empowers kids to be more resilient and knowledgeable about hazards in Calgary, including those impacted by climate change. In 2020, over 4,000 youth accessed the Ready Squad program and 91 per cent felt more prepared after taking the course.</p>

INITIATIVE	KEY ACTIONS
<p>Food systems Improve long-term food resilience.</p>	<p>During 2020, demand for spaces to grow food dramatically increased as people looked for opportunities to access fresh healthy food for themselves and others, as well as to improve their wellbeing. Backyard gardens, community gardens and urban farms all helped to meet the immediate and longer-term need. Additional details on progress for urban agriculture and the Food Systems Resilience Plan can be found in Appendix 2 under Climate mitigation.</p>

2020 progress: Program 2 Employee health and safety

INITIATIVE	KEY ACTIONS
<p>Reducing risk of poor air quality to city employees Reduce risk of extreme heat and poor air quality to City employees.</p>	<p>The City has a Poor Air Quality Response Plan to provide information to employees and supervisors during poor air quality events, and corporate guidance is provided for staff addressing the hazard posed by wildfire regarding air quality during active fires.</p>
<p>Reducing risk of other climate hazards to city employees Reduce risk of other climate hazards to City employees.</p>	<p>Environmental & Safety Management (ESM) continues to work with CEMA to enhance corporate standards, guidance and procedures for weather hazards. Emergency protocol can be found online at myCity. The City continues to build educational materials for weather-related communications to employees.</p> <p>As a result of the June 2020 hail storm, a safety bulletin was created for City staff (and the public) outlining safety measures to take during severe spring and summer weather. A review of related City of Calgary safety protocols began in Q4 2020 and severe weather response hazard assessments of storm risks will be completed.</p>



THEME 3: Infrastructure

As a municipality, The City of Calgary is not positioned to demonstrate quick completion of climate adaptation for infrastructure as there are a number of jurisdictions, regulatory requirements and timelines to consider. However, ongoing reporting to Council on the implementation of plans and performance demonstrate how The City is steadily and meaningfully addressing climate risks and considerations in our investments and operations.

Asset management practice considers five major portfolios of municipal infrastructure at The City; Engineered structures, Buildings, Land improvements, Vehicles, and Machinery and equipment, all of which must consider the impacts of climate change.

PROGRAMS	DESCRIPTION	OUTCOME AREAS
1. Building new infrastructure to be climate resilient	As stipulated in the Design Guidelines for City of Calgary Funded Buildings, new public infrastructure will have a service life until the end of this century, when the full force of climate change will be apparent. For this reason, it is important to incorporate strategies to manage risks associated with climate change and climate hazards through City design standards, guidelines and practices to build new public assets and services that are adaptable to the future climate.	Climate change and climate hazards are incorporated into City design standards, guidelines and practices to build new public assets and services that are adaptable to the future climate.
2. Reducing risk to existing infrastructure	Climate risk assessments for infrastructure assets can be used to direct the implementation of risk reduction measures. However, these assessments are only considered on a case-by-case basis and not for all maintenance, renovations, or retrofit projects. Improving resilience of existing infrastructure is an area that will need an increasing focus in order to avoid level of service reduction.	Tailored adaptation/risk reduction/operational changes and retrofit plans are developed and implemented for our City's public infrastructure to reduce climate risk.
3. System redundancy for public infrastructure	Cascading impacts including loss of power have been noted as a key risk due to climate change and the increasing frequency and intensity of extreme events, the effect of high temperatures on power grids, and the vulnerability of electrical infrastructure. Risk due to power loss is assessed and measures such as backup power sources are implemented for public infrastructure to deliver continuous services.	Risk due to power loss is assessed and measures such as backup power sources are implemented for public infrastructure to deliver continuous services.
Partners: Transportation, Facility Management, Corporate Analytics & Innovation, Planning & Development, Calgary Emergency Management Agency, Water Resources, Environmental & Safety Management		

2020 Progress: Program 1 Building new infrastructure to be climate resilient

INITIATIVE	KEY ACTIONS
<p>National standards Collaborate on national standards updates and/or development to integrate climate adaptation as necessary.</p>	<p>In 2020 City subject matter experts participated on national working groups to develop or update National Standards to incorporate climate change including:</p> <ul style="list-style-type: none"> • Environment & Climate Change Council and related technical committees of the Transportation Association of Canada (TAC), current vice-chair. • Standards Council of Canada’s Climate Resilient Infrastructure “Standards in Action” campaign to identify gaps in standards regarding climate change.
<p>City design guidelines Assess City design guidelines and practices and integrate climate adaptation as necessary.</p>	<p>City of Calgary Guidelines for Bridges and Structures was updated in 2020 to conform to the national Bridge Design Code (CSAS-6) and national guidelines (TAC Sustainability Considerations for Bridge Design, which The City contributed to).</p>
<p>Facility design Source equipment and design facilities that can adequately respond to the changing climate.</p>	<p>The Green Line LRT project adopted the Envision™ sustainable infrastructure framework and rating system for the planning, design and construction of the Green Line LRT project to optimize project resilience and sustainability performance. In 2020 a Climate Risk/Resilience Assessment was completed for Green Line Segment 1 and submitted to the federal government.</p> <p>The City’s Facility Management business unit supports sustainable construction practices whereby City new building and renovation projects adhere to The City’s sustainable building policies, as well as Leadership in Energy and Environmental Design (LEED) certification, WELL building certification and other green build and passive house approaches.</p> <p>By performing design reviews and advisory services, Corporate Engineering is supporting climate adaptation goals.</p>
<p>Public Infrastructure Climate Risk and Resilience Assessment Conduct climate risk assessments during infrastructure design and implement adaptation measures.</p>	<p>The Public Infrastructure Climate Risk and Resilience Assessment process was developed in 2020. The process identifies project-specific climate risk so that targeted resilience measures can be implemented to reduce risk and improve infrastructure resilience to climate hazards.</p>

2020 progress: Program 2 Reducing climate risk to existing infrastructure

INITIATIVE	KEY ACTIONS
<p>Climate risk assessment Conduct climate risk assessments and implement adaptation measures in conjunction with infrastructure maintenance, renovations, and retrofits.</p>	<p>Building Condition Assessments (BCAs) are critical to understanding the status and condition of existing City buildings. Over 200 BCAs have been completed since 2018. In 2020, Facility Management completed an additional 101 BCAs.</p> <p>A high-risk building registry has been developed to conduct detailed investigations beyond typical BCA's on high profile buildings most at risk of structural failure due to climate-related and other hazards.</p>
<p>Asset management Integrate climate risk into existing infrastructure condition assessment and asset management processes.</p>	<p>The City is adopting a consolidated approach to facility management through the Corporate Coordinated Operations and Maintenance Program (CCOM). In 2020, Facility Management's portfolio of buildings indicated 74 per cent in fair to excellent condition, with 18 per cent yet unknown. BCAs are continuing to be applied to facilities transferred through the CCOM process.</p> <p>A new building Asset Planning Tool has been implemented which utilizes building data, including through BCAs, to apply logic and data driven analytics, including climate impact factors, for lifecycle planning and building performance improvements.</p>

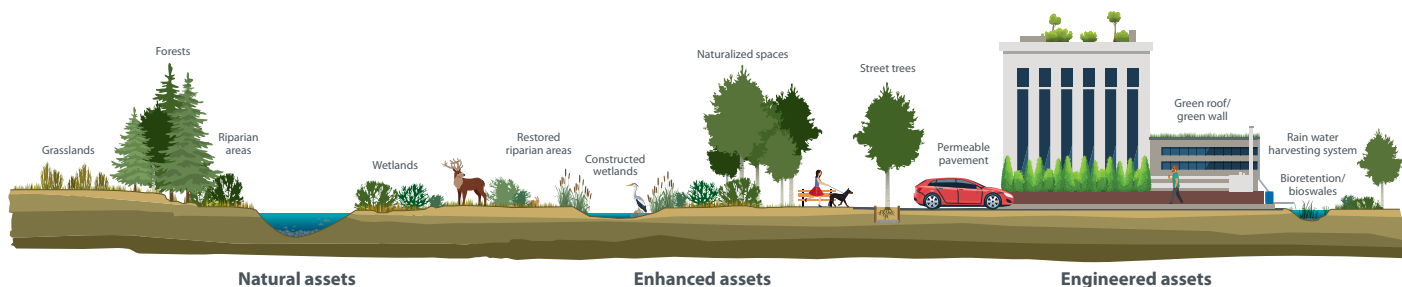
2020 progress: Program 3 System redundancy for public infrastructure

INITIATIVE	KEY ACTIONS
<p>System redundancy Assess system redundancy requirements for City systems, infrastructure and facilities.</p>	<p>Investments in backup power for municipally owned critical facilities are ongoing and largely complete. There is an extensive supply of backup power available to critical City facilities.</p>
<p>Asset management Upgrade or install back up power equipment where necessary to minimize negative impacts of climate hazards.</p>	<p>A full review of all actions taken during the 2013 flood by Calgary Transit was completed. Action plans were developed and procedures that capture lessons learned from 2013 are in place, e.g. staff coverage during emergency events, remote work capabilities and coordination of platform duties.</p> <p>Building Management Systems (BMS) are being installed to control and monitor mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems and security systems. In the event of power failures, BMS allow for remote troubleshooting and system adjustments and mitigation of building damage.</p>



THEME 4: Natural infrastructure

Natural Infrastructure includes a range of assets, from natural through engineered, which rely on ecological and hydrological processes to provide municipal and ecosystem services as well as social, economic and environmental benefits that improve the resilience of the city and region. Climate adaptive benefits provided by natural infrastructure include flood attenuation, urban heat island reduction and carbon sequestration. Natural infrastructure itself is vulnerable to the impacts of climate change, so implementing practices to reduce climate risk to natural infrastructure are also necessary.



PROGRAMS	DESCRIPTION	OUTCOME AREAS
<p>1. Preservation and restoration of natural infrastructure</p>	<p>Natural assets including grasslands, wetlands, riparian areas and forests provide a multitude of critical ecosystem and municipal services including flood attenuation, habitat to support biodiverse plant and animal populations, carbon sequestration and significant areas for nature-based recreation. Natural infrastructure must be preserved and restored, so that the services and multiple benefits they provide can continue to reduce climate related risks.</p>	<p>Natural infrastructure is preserved and restored, so that the services and multiple benefits they provide can continue to reduce some climate related risks.</p> <p>Regionally appropriate species, methods and practices are used in developing and maintaining natural infrastructure to enhance their ability to thrive under future climate conditions.</p>
<p>2. Building and maintaining natural infrastructure</p>	<p>This program supports the construction and maintenance of natural infrastructure as a multi-benefit solution to reduce the impacts of climate change on City assets and on the community.</p>	<p>Natural infrastructure is built as a climate adaptable multi-benefit solution.</p> <p>Natural infrastructure is well maintained to reduce impacts of a changing climate on environmental systems and our community.</p>

PROGRAMS	DESCRIPTION	OUTCOME AREAS
<p>3. Valuing the benefits of natural infrastructure</p>	<p>Natural infrastructure is a pillar for building a resilient city, as described in the Resilient Calgary Strategy (2019). Natural systems provide numerous social, economic and environmental benefits, however, these benefits lack representation and are undervalued in municipal financial planning and reporting. Ascribing financial value to the services and benefits of natural assets will assist The City in developing a more holistic view of natural infrastructure and the services it provides as a key part of building a resilient city. In alignment with the Resilient Calgary Strategy, The City has committed to a number of short- and long-term actions to value the benefits provided by natural infrastructure and integrate this understanding into City decision making processes including asset management.</p>	<p>Natural infrastructure and their services are valued, understood and integrated into asset management and decision-making processes to support the implementation of climate adaptive regulatory, management, educational and operational practices.</p>
<p>Partners: Parks; Transportation; Water Utility, Planning & Development, Corporate Analytics & Innovation, Environmental & Safety Management, Calgary Emergency Management Agency, Resilience & Infrastructure Calgary</p>		

2020 progress: Program 1

Preservation and restoration of natural infrastructure

INITIATIVE	KEY ACTIONS
<p>Regulatory policy Integrate the consideration of natural infrastructure in land-use planning and strengthening regulatory policy for protection/preservation of natural areas and trees.</p>	<p>2020 updates to Calgary’s Municipal Development Plan includes policies to protect critical ecological areas, to strengthen the tree canopy targets including in riparian areas and to incorporate principles of natural infrastructure into land use decisions.</p> <p>In October 2020, Calgary City Council unanimously approved a new Source Water Protection Policy. The Policy directs The City to integrate and embed watershed protection into land use decisions within Calgary and the broader region.</p> <p>A study on the loss of Environmentally Significant Areas (ESA) was completed in December 2019 and ESA loss is now included in all Biophysical Impact Assessment applications. In the future, reporting on ESA loss to the Planning Commission may help to improve protection of ESAs, resulting in greater areas of habitat preservation.</p>
<p>Habitat Restoration Program Continue to support and advance the Habitat Restoration Program because biodiverse and regionally adaptive landscapes improve climate adaptability.</p>	<p>The habitat restoration program continues to be unfunded, and relies on inter-departmental collaboration and external funding sources to resource and implement restoration. Building net new habitat through restoration is necessary to meet City targets. The Community Involvement Guide and Habitat Restoration Program Manual were developed in 2020 to improve habitat restoration outcomes. The delineation of the ecological network and development of the Natural Environment Park (NEP) Prioritization tool was completed in 2020. The tool identifies NEPs most in need of management action, and has assisted in identifying restoration priorities for 2020/21.</p>
<p>Riparian restoration Continue the riparian restoration program for riverbanks and wetland riparian areas, including the use of native plants and seed and bioengineering to increase resilience against climate hazards.</p>	<p>As of November 2020, there are approximately 55 active riparian restoration projects including bioengineering and planting projects to build resilient stream banks. The Bioengineering Demonstration and Education Project (BDEP) website was published in 2020 for the general public as well as more technical audiences. More than 90 riparian health inventory sites continue to be monitored on behalf of The City to evaluate the efficacy of various riparian restoration techniques and project success.</p> <p>In early 2021, The City signed an agreement with Alberta Environment and Parks that allows The City to spend the collected wetland compensation funding as per the Wetland Conservation Plan. This allows The City to implement projects that will help fulfill The City’s obligations for wetland restoration and other related work. The amount collected totals \$34.5M and obligates The City to restore 84.6 hectares of essential wetlands throughout Calgary. Restoring wetlands is important for carbon sequestration, mitigating flood risk; improving water quality, and mitigating the impacts of drought.</p> <p>The City provided expert review to the new Code of Practice for Wetland Replacement, released by the Government of Alberta in January 2021.</p>

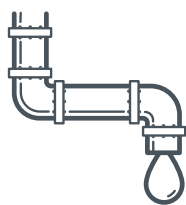
2020 progress: Program 2 Building and maintaining natural infrastructure

INITIATIVE	KEY ACTIONS
<p>Green Stormwater Program Develop a scalable GSI program to use natural infrastructure and its multiple benefits to better manage stormwater in a changing climate.</p>	<p>The Green Stormwater Program continues to be hindered by resource challenges. Initiatives are underway to implement low impact development practices in established areas, and to include GSI within the Stormwater Strategy. The City actively participates in the Alberta Low Impact Development Partnership to build support for the effectiveness of low impact development in the Calgary context.</p>
<p>Guidelines and references for climate adapted landscapes Document landscape guidelines and reference material that highlights the importance of soil management, species selection and native landscapes to adapt to a changing climate.</p>	<p>With support from the Council Innovation Fund, a collaborative pilot project was launched involving a 10 hectare treatment area and city-wide assessment of conventional and alternative landscaping for road right-of-ways. Insight learned on the costs, benefits, and operational considerations may shift new development and ongoing management of over 1000 hectares of roadside land.</p> <p>Soil handling recommendations, Calgary plant lists, Calgary seed mixes were in place this year to provide guidance on how to make our natural infrastructure more adaptable to new climate conditions.</p>
<p>Operational practices Continue implementing operational practices including tree assessment/pruning, invasive species management and improved turf management that maintain climate adaptive natural infrastructure.</p>	<p>In order to maintain a vibrant landscape in a changing climate The City continues to replace tree vaults with more adaptable infrastructure such as tree trenches, soil cells and passive irrigation systems in major capital projects. The tree nursery and improved asset tracking have increased tree survivability in Calgary's changing climate.</p> <p>Over 140,000 tree seedlings and whips have been planted in roadways since 2019. Roads has committed that these trees will be protected from redevelopment for at least 10 years.</p> <p>Many naturalization projects progressed, including an area adjacent to Memorial Drive east of 14th Street in 2020. While many potential sites have been identified through the Habitat Restoration Prioritization Process, progress on naturalization projects has been slow due to lack of funding.</p> <p>Changes in mowing practices have likely reduced GHG emissions from equipment, increased carbon capture stored in grasses and herbaceous plants, and increased biodiversity (e.g., plants, pollinators).</p>

INITIATIVE	KEY ACTIONS
<p>Education and public engagement Public education and engagement initiatives are implemented that build support for natural infrastructure on both private and public land.</p>	<p>The Branching Out Program provided 500 trees to citizens to plant on private residential land and plotted them on the public tree map. This map is continuously updated with the City’s tree inventory to give the public an accurate idea of the trees in their community, their financial value and the ecological values they provide the community. The program’s e-learning modules and tree workshops on planting, pruning, and general care continued to be offered online during 2020.</p> <p>Presentations to university classes, Parks School and industry practitioners on resilience, ecosystem services and natural infrastructure targeted over 300 individuals in 2020.</p> <p>Education on pollinators was launched in 2020 including:</p> <ul style="list-style-type: none"> • Launched the “Bee a Polli Neighbour” website calgary.ca/pollinator. • Over 20 000 pollinator-friendly, native wildflower seed packs were delivered by mail. • 25,000 people submitted over 60 entries for the “Bee Ready for Winter” campaign. • Pollinator signage and displays are being developed for Prairie Winds, Ralph Klein Park and rehabilitation areas. • Provided teacher education and curriculum resources on importance of pollinators.

2020 progress: Program 3 Valuing the benefits of natural infrastructure

INITIATIVE	KEY ACTIONS
<p>Natural Asset Valuation Project Complete a valuation, including financial value of services provided by natural assets.</p>	<p>The climate team is leading a cross-corporate project to value the services provided by natural assets in Calgary. When this is completed in 2021, we will be one of the first urban municipalities in Canada addressing the importance of natural infrastructure in adapting to climate change.</p>
<p>Integration of natural infrastructure into asset management Integrate natural infrastructure into asset management.</p>	<p>Calgary’s 2020 Infrastructure Status Report includes a section describing natural assets for the first time, their value to Calgarians and future work to evaluate the condition of natural assets. As an example, public tree assets are inventoried as they are planted or changed to City possession and existing tree asset conditions are continually updated with all operational work completed on them. Tree valuation remains in line with industry best practices, and with the integration of natural infrastructure more holistically into asset management Calgary will be a leading Canadian municipality in this area.</p>



THEME 5: Watershed management

Climate change impacts every aspect of watershed management. The Water Utility’s responsibility includes mitigating treatment plants emissions, providing reliable clean drinking water, adapting to increased risk of floods or droughts and managing the impacts of increasingly intense local storm events.

PROGRAMS	DESCRIPTION	OUTCOME AREAS
<p>1. River flood management</p>	<p>Climate change is shifting precipitation patterns and causing an earlier melting of the mountain snowpack, which is predicted to lead to an increased risk of river flooding in the Bow and Elbow watersheds. The City’s Flood Resilience Plan relies on a combination of upstream, community and property level measures to reduce Calgary’s flood risk. The City has committed to a number of short- and long-term actions under the Climate Adaptation Plan and Calgary’s Flood Resilience Plan to reduce the impact of river flooding from the Bow and Elbow rivers.</p>	<p>Reduced risk from river flooding through upstream and local flood mitigation infrastructure and operations measures, strengthening flood policy, property level resiliency, and improving flood response.</p>
<p>2. Stormwater management</p>	<p>Temperature and precipitation regimes are shifting through the influence of climate change, with a consequent projected increase in rainfall volumes and short duration, high intensity (SDHI) storm events. The City is working to reduce risk from stormwater flooding due to climate-amplified SDHI rain events through community and local drainage improvement programs, improvements in stormwater system design, integration of green stormwater infrastructure, and efficiency in operations and maintenance practices. A new Stormwater Management Strategy under development will guide stormwater management over the next 20 years.</p>	<p>Reduced risk from stormwater flooding due to climate amplified short duration high intensity (SDHI) rain events through drainage improvement programs, improvements in stormwater system design, integration of green stormwater infrastructure, and operations and maintenance practices.</p>

PROGRAMS	DESCRIPTION	OUTCOME AREAS
<p>3. Water supply management</p>	<p>Sustainable management of water resources is one of Calgary’s most significant resilience challenges in terms of water quantity and quality. It is predicted that snowpack melt and spring runoff will occur earlier in the year and summer and fall river flows will decrease leading to more frequent droughts. Large, widespread wildfires are also likely to become more frequent. Wildfire can impact water quality in several ways that can pose significant challenges to water treatment as run-off from burned landscapes can contaminate water supplies. Population growth and a longer and hotter outdoor water use season will increase the demand on these climate-impacted water resources.</p> <p>The One Calgary One Water Security Framework addresses climate impacts to both water quality and quantity and allows us to continue to take actions to address these challenges. The Framework was approved by City Council in January 2020. To protect our water supply from the pressures of growth, contamination of drinking water, and a changing climate, the Source Water Protection Plan and Policy was approved by City Council in October 2020.</p>	<p>Ensure water security is maintained into the future by understanding future water supply scenarios – address water license limits, collaborate on a regional solution for water security, advocate for new upstream reservoir on the Bow River, implement a new Drought Management Plan and the Source Water Protection Plan and Policy.</p>
<p>Partners: Water Utility, Calgary Emergency Management Agency</p>		

2020 progress: Program 1 River flood management

INITIATIVE	KEY ACTIONS
<p>Flood policy updates Flood policy and regulation is reviewed and updated, including consideration of the impacts of climate change.</p>	<p>The City continues to collaborate with the Government of Alberta, who have released updated flood inundation maps. These maps show where flooding may occur over a range of water levels, which can help to inform climate adaptation action. The Province is currently updating Calgary’s flood hazard area (FHA) maps to reflect the latest understanding of how a 1:100 flood would impact Calgary and the new FHA zone classifications for river communities. The City will review municipal policy and regulation with extensive community engagement and include the new FHA maps.</p> <p>Recent land use planning processes have incorporated climate change impacts on the risk of flooding, including the Ricardo Ranch Flood Fringe Study, to inform land use planning.</p>
<p>Flood mitigation measures Watershed and community-level flood mitigation measures (e.g. Springbank Reservoir, community flood barriers) are constructed and maintained to reduce flood risk</p>	<p>Upgrades to the Glenmore Dam’s gate system were completed in 2020, doubling the capacity of the Glenmore reservoir, providing the dual benefit of reducing community flood risk from intermediate flood events on the Elbow River and providing more seasonal water supply storage.</p> <p>Flood barriers were completed, including at Heritage Drive at Deerfoot Meadows in 2020, improving flood resilience for this transportation corridor. The 9th Avenue bridge reconstruction is underway to improve hydraulic efficiency and improve flow in high water conditions.</p> <p>The City also made progress on the downtown flood barrier and Upper Plateau Separation projects to increase community-level flood protection.</p> <p>The provincial Springbank Off-Stream Reservoir is currently under regulatory review. Once completed, the Springbank Reservoir will work with the Glenmore gates to fully mitigate against a 2013-sized flood on the Elbow River.</p>
<p>Monitoring Comprehensive river levels/ flood risk is regularly monitored in close collaboration with provincial partners.</p>	<p>The rivers and creeks monitoring program continues to improve through collaboration with provincial and academic partners to our understanding of river flow and flood conditions. This information can be important during planning, infrastructure engineering, and in emergency preparedness and response to reduce flood risk. Flow monitoring is now being conducted on the lower Bow River at Pine Creek.</p>
<p>Flood preparedness and education Flood emergency response plans and practices continue to be reviewed and updated and citizen awareness of flood risk is improved.</p>	<p>A review and update of flood response planning documentation and guidelines was conducted in light of the additional risks due to COVID-19 in 2020. A flood education framework was developed in 2020 that focused on identifying opportunities to support citizens in taking an active role in flood awareness and strengthening community capacity. In 2021, work will focus on understanding communities’ readiness to act, identifying engagement opportunities, and designing and developing educational tools and approaches that are tailored to individual community needs.</p>

2020 progress: Program 2 Stormwater flood management

INITIATIVE	KEY ACTIONS
<p>Stormwater Management Strategy Updated stormwater management strategy that will guide how stormwater is managed for the coming decades and includes consideration of climate change impacts.</p>	<p>Public engagement on the Stormwater Management Strategy continued in 2020, and developing the strategy is well underway. Considerations for climate change, densification and public priorities have been key discussions in the process.</p>
<p>Community drainage improvement Continue to reduce stormwater flooding risk in existing neighbourhoods through analysis and targeted stormwater system improvements.</p>	<p>Community scale flood risk mapping and detailed hydrologic modelling was completed in 2020, with priority areas identified for more intensive investigation. The 24th Street Stormwater Trunk Diversion and Bebo Grove Stormwater pond were completed in 2020, improving the community stormwater level of service and providing a naturalized amenity space.</p>
<p>Monitoring Rainfall monitoring program provides data to support analysis, informed decision making and technical information.</p>	<p>Rainfall monitoring continued at over 40 stations across the city and region. A pilot study using an acoustic rain gauge, commenced in 2020 to improve the coverage of the existing network to over 800 “virtual rain gauges.”</p>
<p>Maintenance Maintenance is proactively conducted to ensure the stormwater system remains functional and supports future resilience.</p>	<p>Sediment removal was completed at two stormwater ponds, including the Royal Oak and Shepard Regional Center ponds, regaining the designed settling and storage capacity to support function during increasingly severe storm events driven by the changing climate.</p>

2020 progress: Program 3 Water supply management

INITIATIVE	KEY ACTIONS
<p>Water Security Framework Manage long-term water supply risks from climate change through the six priority actions from the Water Security Framework (2019). This framework outlines drought mitigation and water use reduction measures and source water protection.</p>	<p>Developing Future Water Supply Scenarios: Global Water Futures presented preliminary results of a complex climate change and hydrologic modelling study of the Bow River.</p> <p>The Government of Alberta completed Phase 1 of a feasibility study of three potential locations for a water supply and flood mitigation reservoir on the Bow River upstream of Calgary.</p> <p>The <i>Guide to Building Resiliency to Multi-year Drought</i> was completed by the Alberta Water Council with The City serving as the representative, reviewer and content adviser for large urban municipalities.</p>
<p>Monitoring and operational practices Water Efficiency Plan update evaluates program choices to be prioritized based on alignment with drought, climate change, stormwater and water efficiency priorities.</p> <p>Monitoring, modeling and analysis for treated wastewater effluent quality to maintain Bow River water quality in a changing climate.</p>	<p>The City of Calgary Drought Monitoring Team routinely monitored flows in rivers and creeks, precipitation, infrastructure operations, water demand and regional activities that would signal an increased risk of drought. Drought conditions did not develop in 2020.</p> <p>Water reduction initiatives were collaboratively identified to increased corporate preparedness and customer trust during drought conditions. A training program was developed for Community Standards to deploy in anticipation of a drought triggered outdoor watering restriction.</p>
<p>Source Water Protection Implement the recently approved (2020) Source Water Protection Plan and Policy to protect watershed health and resilience, and safeguard source drinking water quality.</p>	<p>The Source Water Protection Plan and Policy was approved by Calgary City Council on October 5, 2020 to protect watershed health and resilience, and safeguard source drinking water quality. Work began in late 2020 on the Watershed Investment Strategy to develop a strategic means to identify and protect lands critical to drinking water quality.</p> <p>Following a collaborative Wildfire-Source Water Partnership Task Force Report, The City has begun implementing priority management strategies to reduce the risk of large-scale wildfires. This includes initiating work to develop an emergency and preparedness plan for wildfires in the upper watersheds, and water quality monitoring following the Devil’s Head wildfire in the M.D. of Bighorn in the fall of 2020.</p>

Next steps for climate adaptation

Climate risk, research and adaptation reporting

Looking ahead to 2021, The City will be focusing on strengthening our understanding of current and future climate-related risk through enhanced adaptation monitoring and reporting, including adaptation research and analysis projects such as a Calgary Climate Indices Report.

People health, safety and security

Critical work will continue in 2021 through the refinement of emergency communication and deployment protocols and plans for Civic Partners; a business continuity planning toolkit for non-profits being created with Carya, Calgary Neighbourhoods, and CEMA; updated Emergency Response Plans (ERP) for affordable housing units; structural assessments for Calgary Housing buildings to identify heavy snowfall vulnerabilities; and the creation of a Food Resilience Plan by CalgaryEATS!. CEMA, ESM and Facilities Management (FM) will also continue the Best Available Refuge Area (BARA) project which will identify spaces in City-owned, leased and operated facilities that could serve as shelter in high winds or tornado situations.

Built infrastructure

Key infrastructure projects will be assessed for Climate Risk/Resilience in 2021, including Green Line Segment 2; the Calgary Event Centre, and Glenbow Museum. In order to better integrate climate risk into existing processes the Facility Management team is working with the climate adaptation team to consider a more robust analysis of climate change risk throughout their portfolios and processes.

Natural Infrastructure

A Naturalization Prioritization tool is currently in development which will identify and prioritize areas of The City for naturalization. Development of the Aquatic Health Indicator tool continues and will be designed to work with the current terrestrial Habitat Condition Rating tool to enable a health condition score for both terrestrial and aquatic Natural Environment Parks. Major wetlands restoration projects will be implemented in 2021, as per the requirements of the wetland compensation funding. A draft framework and implementation plan for a Watershed Investment Strategy is underway in 2021 to examine options for the protection of land critical to watershed health and source water protection. Completion of the natural assets valuation project in late 2021 will help The City retain and protect important natural assets for a more resilient Calgary.

Watershed management

The planning and construction of critical river and stormwater flood management projects will move forward in 2021, including the Sunnyside flood barrier, Downtown flood barrier, and various stormwater system improvements under the Community Drainage Improvements Program. The Government of Alberta's Springbank Reservoir is currently under federal and provincial regulatory review and will require approval before it can be constructed. The draft Stormwater Management Strategy will be completed in 2021 as well along with an update to the Stormwater Management and Design Manual, likely in 2022. The ongoing development of a Drought Management Plan in 2021 will consider effective strategies for public engagement and communication. In tandem, options for addressing water license limitations will be evaluated. The City will continue to advocate for a new upstream reservoir on the Bow River, and implement actions from the Wildfire-Source Water Partnership Task Force report.

