



AGENDA

SPC ON UTILITIES AND CORPORATE SERVICES

June 23, 2021, 9:30 AM
IN THE COUNCIL CHAMBER

Members

Councillor W. Sutherland, Chair
Councillor P. Demong, Vice-Chair
Councillor G. Chahal
Councillor D. Colley-Urquhart
Councillor J. Davison
Councillor D. Farrell
Councillor S. Keating
Mayor N. Nenshi, Ex-Officio

SPECIAL NOTES:

*Public are encouraged to follow Council and Committee meetings using the live stream
<http://video.isilive.ca/calgary/live.html>*

Public wishing to make a written submission and/or request to speak may do so using the public submission form at the following link: [Public Submission Form](#)

Members may be participating remotely.

1. CALL TO ORDER
2. OPENING REMARKS
3. CONFIRMATION OF AGENDA
4. CONFIRMATION OF MINUTES
 - 4.1. Minutes of the Regular Meeting of the Standing Policy Committee on Utilities and Corporate Services, 2021 May 26
5. CONSENT AGENDA
 - 5.1. DEFERRALS AND PROCEDURAL REQUESTS

- 5.1.1. Deferral Request–Plan for Piloting Variable Set-Out for Black Cart in response to UCS2019-1142 deferred to no later than 2022 Q4, UCS2021-0991

5.2. BRIEFINGS

- 5.2.1. Status of Outstanding Motions and Directions – Q2 2021, UCS2021-0926

6. POSTPONED REPORTS
(including related/supplemental reports)

None

7. ITEMS FROM OFFICERS, ADMINISTRATION AND COMMITTEES

- 7.1. Calgary Environment Strategy, UCS2021-0841
- 7.2. Climate Resilience Strategy and Action Plans Annual Report 2020, UCS2021-0842
- 7.3. Building Lasting Change – Update on Calgary’s Investments in Sustainable Infrastructure, UCS2021-0867
- 7.4. Minimizing Negative Impacts of Waste and Recycling Sites – Officer, UCS2021-0903

8. ITEMS DIRECTLY TO COMMITTEE

- 8.1. REFERRED REPORTS
None
- 8.2. NOTICE(S) OF MOTION
None

9. URGENT BUSINESS

10. CONFIDENTIAL ITEMS

10.1. ITEMS FROM OFFICERS, ADMINISTRATION AND COMMITTEES

- 10.1.1. Proposed Lease (Belvedere) – Ward 9 (250 East Hills SQ SE), UCS2021-1003
Held confidential pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials) and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*.

Review By: 2022 January 01 except for Attachment 4 which shall remain confidential.

- 10.1.2. Developer Delivered Civic Facilities and Delegated Authorities, UCS2021-1000
Held confidential pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials) and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*.

Review By: 2031 July 01 except for Attachments 3 and 5 which will remain confidential.

- 10.1.3. Proposed Method of Disposition – (East Shepard Industrial) – Ward 12 (Point Trotter Industrial Park Phase 2), UCS2021-0999
Held confidential pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials) and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*.

Review By: 2021 June 29 except for Attachments 4, 5, and 6 shall remain confidential.

- 10.1.4. Proposed Lease (Varsity) – Ward 1 (3304 33 ST NW), UCS2021-1004
Held confidential pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials) and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*.

Review By: 2022 January 01

- 10.1.5. Summary of Green Line Real Property Transactions – First Quarter 2021, UCS2021-0995
Held confidential pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials) and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*.

Review By: 2021 June 29 except Attachments which shall remain confidential until reviewed on 2029 February 12

- 10.1.6. Summary of Real Estate Transactions – First Quarter 2021, UCS2021-1001
Held confidential pursuant to Sections 23 ((Local public body confidences), 24 (Advice from officials) and 25 ((Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*.

Review By: 2021 June 29

10.2. URGENT BUSINESS

11. ADJOURNMENT



MINUTES

SPC ON UTILITIES AND CORPORATE SERVICES

**May 26, 2021, 9:30 AM
IN THE COUNCIL CHAMBER**

PRESENT: Councillor W. Sutherland, Chair
Councillor P. Demong, Vice-Chair (Remote Participation)
Councillor G. Chahal (Remote Participation)
Councillor D. Colley-Urquhart (Remote Participation)
Councillor J. Davison (Remote Participation)
Councillor D. Farrell (Remote Participation)
Councillor S. Keating (Remote Participation)

ALSO PRESENT: A/General Manager C. Arthurs (Remote Participation)
Legislative Advisor L. Gibb
Legislative Advisor J. Palaschuk

1. CALL TO ORDER

Councillor Sutherland called the Meeting to order at 9:30 a.m.

2. OPENING REMARKS

Councillor Sutherland provided opening remarks.

ROLL CALL

Councillor Chahal, Councillor Davison, Councillor Demong, Councillor Farrell, Councillor Keating, Councillor Colley-Urquhart and Councillor Sutherland.

3. CONFIRMATION OF AGENDA

Moved by Councillor Demong

That the Agenda for the 2021 May 26 Standing Policy Committee on Utilities and Corporate Services be confirmed.

MOTION CARRIED

4. CONFIRMATION OF MINUTES

4.1 Minutes of the Regular Meeting of the Standing Policy Committee on Utilities and Corporate Services, 2021 April 28

Moved by Councillor Demong

That the Minutes of the 2021 April 28 Regular Meeting of the Standing Policy Committee on Utilities and Corporate Services be confirmed.

MOTION CARRIED

5. CONSENT AGENDA

5.1 DEFERRALS AND PROCEDURAL REQUESTS

None

5.2 BRIEFINGS

None

6. POSTPONED REPORTS

None

7. ITEMS FROM OFFICERS, ADMINISTRATION AND COMMITTEES

7.1 The City of Calgary 2020 Infrastructure Status Report, UCS2021-0754

A presentation entitled "The City of Calgary 2020 Infrastructure Status Report, UCS2021-0754" was distributed with respect to Report UCS2021-0754.

Moved by Councillor Davison

That with respect to Report UCS2021-0754 the following be approved:

That the Standing Policy Committee on Utilities and Corporate Services recommend that Council receive the City of Calgary 2020 Infrastructure Status Report for the Corporate Record.

For: (7): Councillor Sutherland, Councillor Demong, Councillor Chahal, Councillor Colley-Urquhart, Councillor Davison, Councillor Farrell, and Councillor Keating

MOTION CARRIED

7.2 Reserve Bids for Properties in the 2021 Tax Sale, UCS2021-0797

Moved by Councillor Demong

That with respect to Report UCS2021-0797 the following be approved:

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council:

1. Authorize the Recommendations as outlined in Attachment 1;
2. Approve the Reserve Bids for properties in the 2021 Tax Sale as outlined in Attachment 3; and
3. Direct that Attachment 3 remain confidential pursuant to Sections 23, (Local public body confidences), 24 (Advice from officials), and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of*

Information and Protection of Privacy Act until the report is published in the Council agenda.

For: (7): Councillor Sutherland, Councillor Demong, Councillor Chahal, Councillor Colley-Urquhart, Councillor Davison, Councillor Farrell, and Councillor Keating

MOTION CARRIED

8. ITEMS DIRECTLY TO COMMITTEE

8.1 REFERRED REPORTS

None

8.2 NOTICE(S) OF MOTION

None

9. URGENT BUSINESS

None

10. CONFIDENTIAL ITEMS

Moved by Councillor Demong

That pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials) and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*, Committee now move into Closed Meeting at 10:28 a.m., in the Council Boardroom, to discuss confidential matters with respect to the following Item:

- 10.1.1 Proposed Method of Disposition – Various Properties, UCS2021-0798

MOTION CARRIED

Committee reconvened in public meeting at 10:56 a.m. with Councillor Sutherland in the Chair.

ROLL CALL

Councillor Chahal, Councillor Davison, Councillor Demong, Councillor Farrell, Councillor Keating, Councillor Colley-Urquhart and Councillor Sutherland.

Moved by Councillor Demong

That Committee rise and report.

MOTION CARRIED

10.1 ITEMS FROM OFFICERS, ADMINISTRATION AND COMMITTEES

- 10.1.1 Proposed Method of Disposition – Various Properties, UCS2021-0798

Administration in attendance during the Closed Meeting discussions with respect to Report UCS2021-0798:

Clerks: L. Gibb and J. Palaschuk. Law: B. Graham. Advice: C. Arthurs, F. Snyders, T. Benson, C. Berry and S. McClurg.

A confidential presentation was distributed with respect to Report UCS2021-0798.

Moved by Councillor Demong

That with respect to Report UCS2021-0798 the following be approved:

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council:

1. Authorize the Recommendation as outlined in Attachment 2;
2. Direct the Recommendations, Report, Attachments 1, 2, and 3, presentation and Closed Meeting discussions remain confidential pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials), and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act* until the sale transactions have closed; and
3. Direct that Attachments 4 and 5 remain confidential pursuant to Sections 23 (Local public body confidences), 24 (Advice from officials), and 25 (Disclosure harmful to economic and other interests of a public body) of the *Freedom of Information and Protection of Privacy Act*.

For: (7): Councillor Sutherland, Councillor Demong, Councillor Chahal, Councillor Colley-Urquhart, Councillor Davison, Councillor Farrell, and Councillor Keating

MOTION CARRIED

10.2 URGENT BUSINESS

None

11. ADJOURNMENT

Moved by Councillor Demong

That this meeting adjourn at 10:59 a.m.

MOTION CARRIED

The following items have been forwarded on to the 2021 June 21 Combined Meeting of Council:

CONSENT

- The City of Calgary 2020 Infrastructure Status Report, UCS2021-0754
- Reserve Bids for Properties in the 2021 Tax Sale, UCS2021-0797

- Proposed Method of Disposition – Various Properties, UCS2021-0798

The next Regular Meeting of the Standing Policy Committee on Utilities and Corporate Services is scheduled to be held on 2021 June 23 at 9:30 a.m.

CONFIRMED BY COMMITTEE ON

CHAIR

ACTING CITY CLERK

UNCONFIRMED

BRIEFING

Page 1 of 1

Item # 5.2.1

Utilities & Environmental Protection Briefing to

SPC on Utilities and Corporate Services
2021 June 23

ISC: UNRESTRICTED
UCS2021-0926

Status of Outstanding Motions and Directions – Q2 2021

PURPOSE OF BRIEFING

This briefing summarises the status of the Department of Utilities and Environmental Protection's outstanding motions and directions for Standing Policy Committee (SPC) on Utilities and Corporate Services (UCS) as of 2021 June 23.

SUPPORTING INFORMATION

On 2007 February 06, the Personnel and Accountability Committee approved PAC2007-05 Status of Outstanding Motions and Directions, directing Administration to bring forward as an item of business to each Standing Policy Committee, a list of tabled and referred motions and reports for each committee; such lists to be reviewed by each Standing Policy Committee on a quarterly basis.

There are no current or future capital or operating budget implications associated with this status report.

ATTACHMENT(S)

1. Attachment 1 – Status of Outstanding Motions and Directions – Q2 2021

Status of Outstanding Motions and Directions – Q2 2021



ITEM	DATE OF REQUEST	APPROVAL	SUBJECT	MEETING DATE
Bowness Barrier Recommendations	2020 Apr 15	UCS2020-0372	Administration to report back to SPC on UCS no later than Q4 2020 with recommendations regarding the Bowness barrier project. <i>*Deferred to Q2 2021 (as per C2020-0698)</i> <i>*Deferred to Q4, 2022 (as per email memo to council May 12, 2021)</i>	2021 Q4
Single Use Items Reduction Strategy and Implementation Plan	2019 May 15	UCS2019-0370	Administration to develop a single-use items reduction strategy and implementation plan to return to Committee with a strategy no later than Q3 2020. <i>*Deferred to 2021 (as per C2020-0698).</i>	2021 Q4
Annual Water Efficiency Plan update (<i>renamed to Annual Watershed Management Plan</i>)	2005 December 12 2019 Dec 18	UE2005-55 UCS2019-1539	Administration to report back to the SPC on Utilities and Corporate Services annually with updates on progress towards "30 in 30" goal. Report on water security annually as part of the Water Utility update to the Standing Policy Committee on UCS.	2022 Q2
Flood Resiliency and Mitigation annual report	2014 Dec 02	PFC2015-0777	Administration to report back to the SPC on Utilities and Corporate Services annually on progress related to the recommendations from the Expert Management Panel on River Flood Mitigation. (Expert panel recommendation 6f).	2022 Q2

Status of Outstanding Motions and Directions – Q2 2021 Continued

ISC: Unrestricted



ITEM	DATE OF REQUEST	APPROVAL	SUBJECT	MEETING DATE
Extra Strength Surcharge Parameters for Wastewater	2018 Jul 30	UCS2018-0884	Administration to report back on rates and limits for wastewater extra strength surcharge parameters no later than 2020 November. <i>*PFC2020-1140 Directed Administration to report back on rates and limits for wastewater extra strength surcharge parameters by Q2 2022</i>	2022 Q2
Annual Corporate Environmental Management Performance	2019 May 15	UCS2019-0460	Direct Administration to change environmental and safety performance reporting frequency from biannual to annual and provide separate corporate performance reports on the following service lines going forward as part of One Calgary: <ul style="list-style-type: none"> • Environmental management. • Organizational health, safety and wellness. 	2022 Q3
Annual Organizational Health, Safety and Wellness Performance	2019 May 15	UCS2019-0460	Direct Administration to change environmental and safety performance reporting frequency from biannual to annual and provide separate corporate performance reports on the following service lines going forward as part of One Calgary: <ul style="list-style-type: none"> • Environmental management. • Organizational health, safety and wellness. 	2022 Q3

Status of Outstanding Motions and Directions – Q2 2021 Continued



ITEM	DATE OF REQUEST	APPROVAL	SUBJECT	MEETING DATE
Fulfillment of Providing Services to Hamlet of Shepard and Surrounding Area	2020 Sept 14	PFC2020-0995	<p>NOW THEREFORE BE IT RESOLVED, That Utilities and Corporate Services develop an estimate of the costs and a preliminary plan to provide services to this area.</p> <p>AND FURTHER BE IT RESOLVED, The city and/ or Utilities and Corporate Mangement investigate other areas of that could be combined for a holistic approach. <i>*timeline not specified</i></p>	
Detailed Pilot Plan for Variable Set-Out for the Black Cart Program	2018 Dec 18	UCS2019-1142 UCS2021-0991	<p>Administration to report back to the SPC on UCS no later than Q2 2021 with results from the review of customer behaviour and a detailed pilot plan including proposed pilot communities, rates that will be piloted, a detailed cost estimate, and a plan for funding the pilot. <i>*Deferred to Q4, 2022 (as per UCS2021-0991)</i></p>	2022 Q4
Variable Stormwater Rate Structure	2018 July 30	UCS2018-0884	<p>Administration to develop an implementation plan for a variable stormwater rate structure and report back to Council by Q4 2020 for potential implementation for the 2023 to 2026 business cycle. <i>*Will be proposing a deferral to Q2 2022 at Dec. 16 2020 UCS meeting.</i></p>	2022
Water, Wastewater and stormwater rates for 2023-2026	2018 July 30	UCS2018-0884	<p>Administration to develop water, wastewater and stormwater rates for 2023-2026 that recover 100% of the cost of service for each customer class.</p>	2022

Calgary Environment Strategy

RECOMMENDATION(S):

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council approve the *Calgary Environment Strategy* (Attachment 2).

HIGHLIGHTS

- The *Calgary Environment Strategy* (the Strategy) is our roadmap to protect and steward the natural environment (air, land, water and biodiversity) for all Calgarians over the next decade and beyond. It provides a unifying, city-wide guiding document for environmental issues, opportunities and priorities with one overarching strategic focus for a healthy and green city.
- *What does this mean to Calgarians?* Calgarians care and are concerned about the environment. Healthy natural areas and systems, clean air and water, and access to nature are important values to the quality of life of Calgarians. The Strategy will facilitate an increased understanding of Calgary's natural environment and provides visibility to citizens that The City is making well-informed, collaborative and transparent decisions to protect the environment.
- *Why does it matter?* Negative impacts on the environment are increasing around the globe from a decline in species to declining air quality. Cities and specifically Calgary, can play a significant role in protecting the environment. The natural environment should be viewed in a holistic manner to understand cumulative impacts and make integrated decisions that will protect the natural environment.
- As acknowledged in Council's Notice of Motion C2019-0285, The City has a number of specific environmentally themed strategies, policies, and plans, but lacks a unifying environment strategy that defines the environmental direction for The City as a whole. The proposed Strategy is designed to bring interrelated strategic focus to environmental work across The City, concentrate efforts on key focus areas and facilitate environmental policy and program implementation that is more synergistic and effective
- Administration is collaborating across business units and with key stakeholders and decision-makers to protect land, transform or restore urban natural areas and assets to be more resilient, improve air and water quality and protect ecological health to maintain biodiversity.
- The conceptual framework and actions of the Strategy align with The City's Municipal Development Plan and Calgary Transportation Plan to make Calgary a sustainable, connected city of great neighbourhoods.
- The Strategy defines how The City can improve how it measures, reports, communicates and educates on the environment through the proposed action plan work.
- The Strategy aligns with Council's Citizen Priority of a healthy and green city.
- Background and previous Council direction is included as Attachment 1.

DISCUSSION

Emerging global and local issues of environmental concern require that all cities, including Calgary, establish clear, comprehensive and integrated approaches to addressing environmental challenges. Fortunately, The City of Calgary has had a long-standing commitment to environmental stewardship and protection reinforced by an extensive range of environmental programs, plans, guidelines and strategies. The Strategy was designed to bring

Calgary Environment Strategy

this work together, help build corporate momentum and concentrate efforts on key focus areas, as well as facilitate implementation that is more collaborative and effective. The Strategy consolidates and supplements this city-wide direction with actions to provide an integrated view of Council and community supported environmental priorities.

Purpose

The Strategy:

- Provides The City a unifying environment strategy with defined environmental direction.
- Identifies connections between environmental subject areas.
- Defined ways to implement environmental policies and strategies.
- Measures, monitors and reports on the environment holistically.
- Facilitates consolidated knowledge sharing on environmental information and stewardship within the corporation and community.

Calgarians have communicated the importance of protecting and stewarding the environment (Attachment 4). Highlights Calgary's environmental progress, areas of success and leadership, both within the community and at The City, to help advance partnerships and access future funding opportunities for environmentally related work and programs. It also supports focused efforts and opportunities to create a city where all people benefit from our environmental achievement.

Key components of the Strategy include:

- i. An overarching mission, principles and core values statements for environmental protection and stewardship.
- ii. Defined broad environmental goals, outcomes and measures.
- iii. A consolidation and summary of key corporate environmental initiatives and actions underway.
- iv. Recommendation for the development of an action plan to provide ongoing implementation mechanisms with practical tools to improve environmental monitoring, reporting, communication and education.

Research and Evaluation

A background study was also completed to identify environmental challenges and opportunities facing Calgary (Attachment 2 – *Calgary Today: Environment Background Study*). Informed by and created collaboratively with inputs from cross-corporate working groups, this report presents a summary of key issues, opportunities, and trends, organized under key focus areas (water, air, biodiversity and ecosystems, climate change mitigation and adaptation and waste) that the City can influence and take action on. This study is intended to help advance ongoing stakeholder collaboration and future state environmental progress reporting for improving accountability and environmental outcomes.

Next Steps - *Building a Better and Shared Understanding about the Natural Environment*

Going forward, Administration will deliver an action plan with the following items: *Citizen Environmental Dashboard, Environmental Progress Report and Community Outreach Program*. This work will support a unified voice at The City for the consideration and inclusion of environmental outcomes in plans, programs and processes.

Calgary Environment Strategy

Furthermore, Administration will continue to look to local and international cities for best practices, and for innovative solutions that can be imported and adapted to the Calgary context.

STAKEHOLDER ENGAGEMENT AND COMMUNICATION (EXTERNAL)

- Public Engagement was undertaken
- Public Communication or Engagement was not required
- Public/Stakeholders were informed
- Stakeholder dialogue/relations were undertaken

The Environment Strategy engagement was focused on understanding perspectives about what it means for Calgary to be *a healthy and green city*. In total, the online engagement process in 2021, including broad public participants and targeted stakeholder organizations, interacted with over 5,648 people, with contributions from over 908 Calgarians and 33 local organizations. Administration also consulted with the Social Well-being Committee.

Community members, businesses, and organizations will play a critical role in the success of this Strategy. Administration will continue to engage and work together with key City staff, partner organisations and the community to refine the solution areas, performance measures and determine how best to achieve the goals, while building support for necessary actions. More information on the engagement process and outcomes can be found in Attachment 4.

IMPLICATIONS

Social

The Strategy establishes a framework for accommodating more equitable decision-making that supports environmental benefits to all Calgarians. There is a strong correlation between people's health and wellbeing and the proposed environment strategies. The Strategy work will align environmental and urban human health initiatives and priorities, as well as apply a strong social lens to all of the goal areas. This will include directing the application of an equity and affordability analysis.

Due to the constraints of COVID, particularly on stakeholder engagement, and recognizing that more work is needed and critical to the successful implementation of the Strategy and action plan, Administration will engage a more diverse audience, including youth and First Nations communities in ongoing public outreach and environmental stewardship programs.

Environmental

The Strategy includes broad direction to protect the health of natural areas and assets, including our rivers, ecologically significant areas and urban forest. The development and implementation of an action plan to achieve set goals, outcomes and established targets will make a significant contribution to City-wide environmental performance on key issues like air and water quality, the conservation and resilience of biodiversity and healthy, functioning ecosystems. The Strategy supports the integration of natural infrastructure and assets within developments and communities that are complete compact, walkable and transit friendly.

Calgary Environment Strategy

Economic

Environmental leadership is closely associated with economic leadership and attracting talent and investment. Having a clear environmental mission and program could support Calgary's ability to access large economic recovery investments from higher levels of government and other means, for example the Canadian government's recent allocation of funding for natural infrastructure projects and stronger environmental stewardship. Investing in environmental protection is considered best practice from a municipal finance perspective. What happens to the environment has a direct impact on our economy.

Service and Financial Implications

Existing operating funding – base

All actions currently underway have had the financial implications integrated into ongoing operational and capital budgets.

RISK

Growth and development decisions are complex and involve a multitude of City stakeholders, all with varying needs. The potential future costs of not adequately protecting natural environment today are significant. Administration will take an iterative approach to build the data-driven content summaries that will further support informed environmental decision-making.

There is a reputational benefit for cities that embrace environmental protection, performance and stewardship practices. Calgary's future success relies on achieving the vision of a healthy and green city- a place where people want to live, stay, set up business and visit. Without a unified mission and strategic focus for the environment, decisions around programs, policies and investment may be reactive and less focused. Not having a unified corporate environmental direction could also impede Calgary's ability to access potential funding and attract innovation.

ATTACHMENT(S)

1. Attach 1 - Previous Council Direction
2. Attach 2 - Calgary Environment Strategy
3. Attach 3 - Background Study - *Calgary Today: Environment Background Study*
4. Attach 4 - What We Heard Reports
5. Attach 5 - Calgary Environment Strategy- Presentation

**Utilities & Environmental Protection Report to
SPC on Utilities and Corporate Services
2021 June 23**

**ISC: UNRESTRICTED
UCS2021-0841
Page 5 of 5**

Calgary Environment Strategy

Department Circulation

General Manager/Director	Department	Approve/Consult/Inform
Michael Thompson	Utilities and Environmental Protection	Approve
Stuart Dagleish	Planning and Development	Consult
Executive Leadership Team	ELT	Approve

Previous Council Direction



Report Number: C2019-0285
Meeting: Combined Meeting of Council
Meeting Date: 2019 March 18

NOTICE OF MOTION

RE: CITY-WIDE ENVIRONMENTAL STRATEGY AND ACTION PLAN

Sponsoring Councilor: COUNCILLOR COLLEY-URQUHART AND MAYOR NENSHI

WHEREAS the environment is the community's most valuable asset to build a sustainable future that is healthy and resilient, underpinned by a strong economy that is vibrant and attractive for investment;

AND WHEREAS One Calgary highlighted the many important, yet disparate, pieces of the environmental work across The Corporation;

AND WHEREAS Calgary does not have a unifying long-term Environmental Strategy and Action Plan (Environmental Strategy), that comprehensively brings together the environmental direction for the City as a whole;

AND WHEREAS The absence of a unifying over-arching Environmental Strategy, presents challenges for decision-making on environmental matters for both Council and the Community;

AND WHEREAS The City's existing planning documents provide direction for specific matters such as water, waste, climate change and biodiversity separately and without the support of an overall comprehensive Environmental Strategy;

AND WHEREAS An Environmental Strategy should include assessing current and future environmental risks, providing citizens with a higher quality products and services, and ensuring Calgary remains an economically competitive and attractive Smart City;

AND WHEREAS a clearly defined Environmental Strategy will allow for clear communication between national and local priorities, reinforce Calgary's strategic positions and further support The City's position as an environmental leader;

AND WHEREAS the Environmental Strategy will provide the direction necessary to achieve the Council Priority of *A Healthy and Green City*, aligning to the Municipal Government Act (MGA) and The City's Environmental Policy, while guiding other existing key environmental plans and policies within one overarching framework;

AND WHEREAS the process for developing the Environmental Strategy and Action Plan will include engagement with the community, stakeholders and City staff to establish a long-term vision for the environment in Calgary.

NOW THEREFORE BE IT RESOLVED THAT COUNCIL:

Direct Administration to:

1. Develop a City-wide Environmental Strategy and Action Plan; and
2. Report back through the SPC on Utilities and Corporate Services no later than December 2020.

Environment Strategy

June 2021



Contents

Land acknowledgement	1
Introduction	2
Mission	2
Core values	4
Environmental goals and outcomes	5
Approach	7
About Calgary's Environment Strategy	7
Why we need a strategy	8
Components of the Environment Strategy	8
The City's role	11
What we set out to do	12
Achieving better environmental outcomes and meeting our commitments	13
Integrated decision-making	14
Appendix 1: Solutions and measures	16
Appendix 2: Glossary	27



Land acknowledgment

In the Blackfoot language, Calgary is Moh'kin'stis; in Stoney Nakoda, Wiçispa Oyade; in Tsuut'ina, Gu'tsi'tsi and in Métis, it is Otokwunee. For each of these Indigenous languages, the words translate to 'Elbow,' representing the confluence of the Bow and Elbow rivers. This is where the story of Calgary begins as the confluence has been a trading hub for Indigenous peoples for millennia and the site where they celebrated natural abundance, ceremony, culture, and partnerships.

This plan acknowledges the traditional lands of the Treaty Seven Nations – the Blackfoot confederacy, (Siksika, Kainai, Piikani), the Tsuut'ina, the Îyâxe Nakoda Nations (Bearspaw, Chiniki, Wesley), the Métis Nation of Alberta, Region 3, and all people who have made Calgary their home. This plan honours their long history and deep connections to this land.

The strength and energy of Calgary comes from the land it was built on, as well as the Indigenous people and newcomers whose footsteps have marked this territory.

Introduction

For over two decades, The City of Calgary has strategically developed several environmental plans, policies and strategies across multiple departments to guide the protection of public health and the environment for present and future generations.

The City of Calgary is committed to achieving community environmental sustainability.

~ The City of Calgary's Environmental Policy

It was in 2006 that imagineCALGARY, a vast citywide, public engagement initiative, charted the aspiration of our community and businesses to be an environmental leader. The Calgary Environment Strategy (the Strategy) will renew and strengthen this commitment to the legacy of a sustainable and thriving city and communities. This Strategy sets out a clear direction – our mission, core values, goals and outcomes for improving Calgary's environment. The Strategy defines how The City measures, reports, communicates and educates on the environment.

Mission

An environmentally sustainable and resilient city where people and nature thrive.

A healthy and green city – Council and citizen priority

Calgary is a leader in caring about the health of the environment and promotes resilient neighbourhoods where residents connect with one another and can live active, healthy lifestyles. To achieve this priority, this Strategy builds on the work accomplished and sets out a unified direction that will further lead and inspire actions to conserve, protect and enhance the environment. Additionally, it aims to increase Calgarians' connections to nature and provide a strong future and competitive advantage for Calgary to thrive in the global economy.

Calgary has forged a strong tradition of environmental stewardship and conservation. Calgarians have made it clear that a city with vibrant, healthy natural spaces and strong environmental performance is a top priority.



What is environmental sustainability?

Environmental sustainability is the responsibility to conserve, protect and reduce our impact on and use of the planet's natural resources; it reflects the need to live within the planet's carrying capacity to ensure quality of life, human and ecological health and well-being is maintained and thrives now and in the future.

Environmental sustainability is concerned with issues such as:

- Long-term health of ecosystems.
- Intergenerational decision-making.
- Protection of species diversity and ecological structure.
- Properly valuing environmental resources (air, land, water, biodiversity, and energy) for the services they provide to sustain nature and people.
- Protection of environmental and human health and wellbeing.
- Equitable access to and use of natural resources.
- Advancing renewable resources.
- Reducing the risk caused by global climate change.



Core values

Calgary's strategy for the environment is guided by three core values for integrated decision-making: Sustainability, resilience and livability.

Maintaining a healthy natural environment, moderating our city's impact on the environment, and adapting to chronic stresses and acute shocks is a crucial part of making our city more environmentally resilient. Together sustainability and resilience provide the ability for our environment to renew itself even after stresses, shocks, and challenges weaken various systems. Enhancing Calgary's livability, the health and well-being of Calgarians, by improving urban and natural systems and access to nature is also a core value. The Environment Strategy links these core values together for the greatest possible conservation efforts and outcomes.

Sustainability
Healthy natural environment
Protect the natural balance of environment and reduce our environmental impact today and in future.

Resilience
Vital, resilient communities and economy
Increase opportunities for jobs, green businesses and resilient ecosystems.
Reduce climate change impacts.

Livability
Healthy, inclusive city and communities
Increase access, quality and stewardship of natural areas and assets for all Calgarians.





Environmental goals and outcomes

This Strategy identifies specific key focus areas that reflect Council priorities and established, community supported, corporate environmental direction and objectives. Each focus area contains a goal for City projects and programs to achieve through the pursuit of the outlined environmental outcomes. The goals will act as a yardstick for monitoring progress and evaluation. These long-term environmental goals and desired outcomes define The City's environmental direction and demonstrate our accountability for environmental stewardship and protection – work that delivers multiple benefits for Calgarians.

ENVIRONMENTAL GOALS AND OUTCOMES		
	Nature and healthy ecosystems	<p>Protect, restore and enhance natural areas, parks and trees, and provide access to nature</p> <ol style="list-style-type: none"> 1. Natural and urban ecosystems are protected, restored and connected with the capacity to recover from disturbance and adapt to change. 2. Natural areas, open spaces and trees are valued and accessible to everyone. 3. Citizens have more opportunities to connect with, learn about, and be stewards of nature resulting in increased conservation and improved health, well-being and quality of life. 4. The integration of natural systems and natural infrastructure to maximize the ecosystem services they provide is prioritized in City planning, development and management.
	Watershed management	<p>Protect our water supply, use water wisely, protect the health of our rivers and build resilience to flooding</p> <ol style="list-style-type: none"> 5. Risks to our source water are reduced and our water supply is protected. 6. Water use efficiency is optimized to protect our water resources. 7. Calgary's rivers are kept healthy now and for future generations. 8. Calgary communities are more resilient to river flooding.
	Clean air	<p>Protect and improve air quality</p> <ol style="list-style-type: none"> 9. Air quality is protected and sustains healthy ecosystems and human health.
	Zero waste	<p>Waste less and conserve more resources</p> <ol style="list-style-type: none"> 10. Less waste is generated, and more resources are conserved.
	Sustainable transportation and land use	<p>Plan for a compact city and complete communities with a convenient, safe and highly integrated transportation system that reduces energy usage, conserves natural resources (including land), and minimizes environmental impacts</p> <ol style="list-style-type: none"> 11. Reduce the release of harmful emissions from the transportation system. 12. Reduce the consumption of energy associated with travel within Calgary by prioritizing high-frequency public transit and expansion of walking and wheeling networks. 13. More housing choices in Calgary communities, with densities that support high-frequency public transit and other services and amenities. 14. Significant natural areas and features are protected, restored through improved design and conditions and managed and integrated into new and existing developments as key assets in Calgary's ecological network. 15. Our performance in preventing pollution, reducing the use of harmful substances and managing contaminated sites is improved.
	Climate change and energy	<p>Prepare for and adapt to climate change, improve energy management and reduce greenhouse gas emissions</p> <ol style="list-style-type: none"> 16. Exposure and vulnerabilities to severe weather and current, emerging and long-term effects are reduced. 17. Energy and resource management is improved, and greenhouse gas emissions released into the atmosphere are significantly reduced.
	Green government	<p>Lead by example and reduce our corporate impact on the environment</p> <ol style="list-style-type: none"> 18. The City delivers on its commitments to Calgarians by complying with legislation, managing environmental risk and continually improving The City's environmental performance. 19. The City supports the sustainable use and management of resources in our operations and services, while protecting the environment.



Approach

About Calgary's Environment Strategy

This is Calgary's first unified environment strategy for the environment. It brings together approaches to key aspects of the environment, integrating the areas of land, air, water, energy, and biodiversity. It will facilitate an increased understanding of emerging environmental issues, trends and opportunities, and provide assurance that The City is making consistent, collaborative, and transparent decisions to protect and act as steward of the environment.

In combination with supplementary research, The City examined and outlined the critical

environmental challenges and risks that Calgary faces today and in the coming years. These include threats to water and air quality, habitat loss and decreasing biodiversity, and a growing urgency for effective climate action paired with the strategies needed to address them.

Why we need a strategy

The environmental challenges we collectively face are complex and interrelated, demanding a comprehensive strategy and a coordinated set of solutions and long-term response and commitments.

The strategies and actions required to manage these challenges and achieve the vision of a healthy, green city, are considered in today's context. This includes an increasing population, fiscal constraints, destabilizing climate, and changing technology and global economies, as well as the City's ability to respond to the diverse and changing needs of all citizens.

This is an opportunity for Calgary to establish a leadership role in our fast-changing world, where its profitable to protect the environment. A healthy and green city is also a city that attracts talent, new investment, and innovation.

Components of the Environment Strategy

The Calgary Environment Strategy is made up of a strategic framework and an action plan. This reflects the two phases of the project – a comprehensive project planning phase and a strong commitment to an effective and ongoing implementation program.

Strategic Framework

This guiding document informs on current environmental challenges and opportunities facing Calgary and outlines a strategic framework that is intended to be used as a tool for enhancing capacities and improving decision-making on the environment.

Action Plan: Reporting and communication tools

Along with the strategic framework, an implementation program (action plan) comprised of critical components provides the essential elements of a structured and systematic process. These initiatives provide practical tools including monitoring and evaluation methods and ongoing implementation mechanisms to ensure better communication, education and other successful outcomes.



The Environment Strategy is comprised of the following components, as shown in Figure 1: Components of the Environment Strategy.

1. Strategic Framework

The strategic framework details our mission, principles and core value statements aimed at making Calgary a more sustainable, resilient and livable city.

It also outlines eight themed focus areas. Each area includes:

- Defined environmental goals, outcomes and measures.
- A consolidation and summary of current solutions – Calgary’s key environmental initiatives and actions underway.

2. Environment Strategy Report and website

A report that outlines and expands on The City’s key environmental strategies, solutions, comprehensive environmental baseline and trends data corresponding to the respective goals. An accompanying website will inform Calgarians on the Strategy, implementation status and milestones, engagement opportunities, and highlight corporate and community key environmental initiatives underway and planned.

3. Citizen Environmental Dashboard

An online platform that visually tracks and provides Calgarians with a summarized and user-friendly view of environmental progress. It will enable users to explore city-wide environmental progress and trends through interactive maps and charts, simplifying complex environmental data, and providing context and additional information on the Environment Strategy’s key indicators.

Figure 1: Components of the Environment Strategy



4. Environmental Progress Report

A report to The City and our communities to ensure that progress on our commitments continues and that new environmental challenges and opportunities are identified as they arise. This report will comprehensively evaluate Calgary's environmental performance and progress using a results-based accountability approach.

5. Environmental Management System (EnviroSystem)

The Environmental Management System links our Environmental Policy to procedures that help assure compliance and reduce environmental

impacts in the corporation's day-to-day operations. The design of our system was informed by the International Organization for Standardization (ISO) 14001 standards that specifies requirements for effective environmental management.

6. Community Outreach

An Outreach Strategy for stakeholders and citizens for relevant Environment Strategy initiatives. Sharing information on The City's environmental progress with the public and engaging and mobilizing citizens to undertake their own actions is critical to our success.



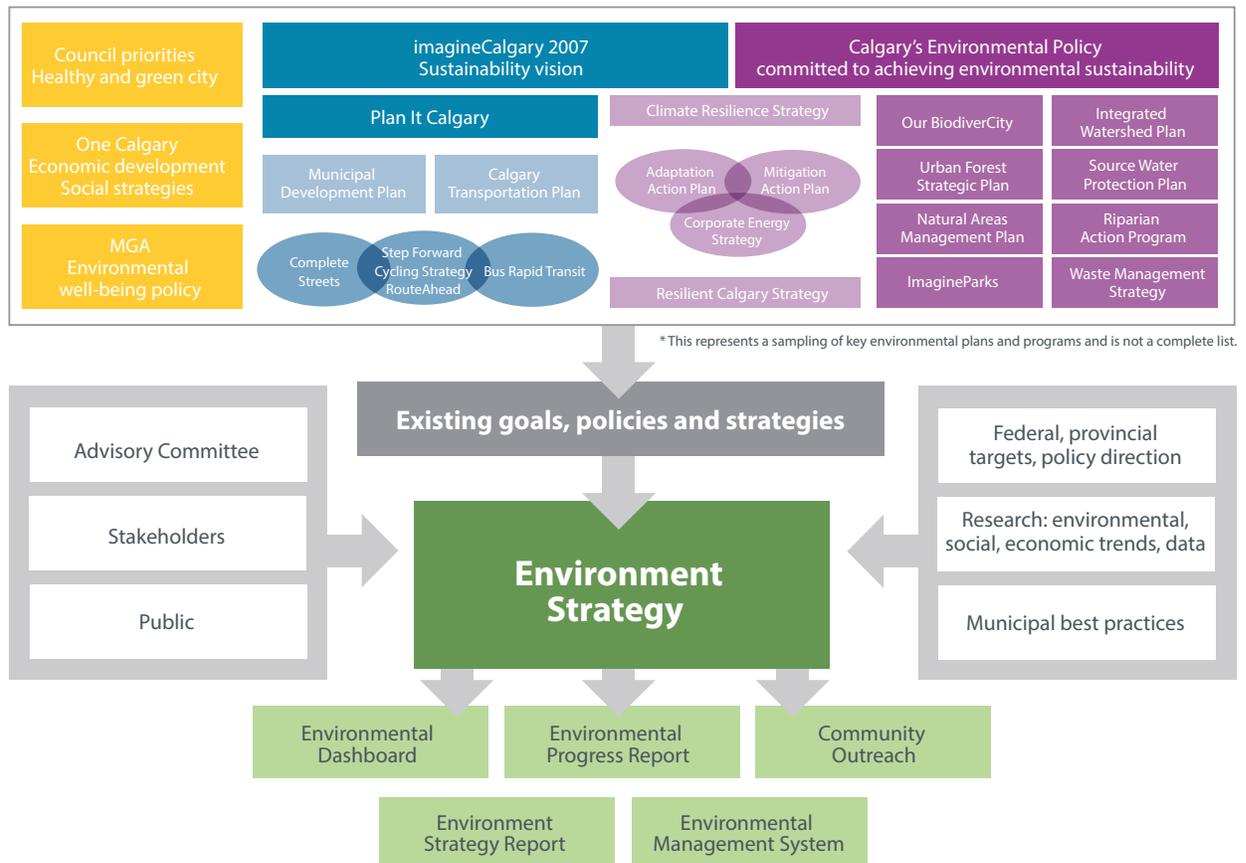
The City's role

We have already set many ambitious targets to help us shape Calgary's environmental performance but in some areas these targets need to be improved or expanded.

As shown in Figure 2: Environment Strategy approach, the work to develop the Strategy included internal and external engagement for a long-term environmental vision, best practice research, and gap analysis, in alignment with existing process and projects. Public engagement will continue to be an integral process in shaping our environmental work as it progresses.

Building on the work already underway, while combining insights and data, will help to better understand and inform on environmental impacts and Calgary's well-being. This work will help strengthen integration amongst environmental programs making it easier to assess, set priorities, and measure overall progress towards our commitments.

Figure 2: Environment Strategy approach



What we set out to do

1. Provide a clear, unified vision and identify polices, programs, and actions that have the greatest impact in responding to environmental challenges, increasing sustainability.
2. Build an improved and shared understanding about the environment by providing research and baseline data that illustrates the current state of Calgary's environment and existing environmentally themed plans and strategies.
3. Advance shared civic environmental goals through work that is strategic, practical, and aligned to citizen values, as well as local and national priorities.
4. Provide an assessment of current and future environmental risks and help to identify opportunities and create solutions that can make a measurable difference.
5. Advance a more environmental outcome-based approach by providing a more complete set of targets and performance measures, and a related data management system.
6. Make direct connections between Corporate actions and programs, and short, medium, and long-term outcomes to help identify and address gaps in The City's environmental work and strengthen integration amongst environmental programs.
7. Help identify best practices and partnerships for success.

Guiding principles

This Strategy is guided by the following principles:

- **Evidence-based decisions** – Collaborate on and use the best, accessible, up-to-date data and scientific information available, and local understanding to inform a long-term perspective for development and policy and decision-making.
- **Integrated** – Identify and leverage a systems-based approach and strategies that build on existing programs or policies.
- **Collaborative** – Provide co-benefits with other community priorities and are coordinated with provincial and federal initiatives.
- **Maximization and coordination of effort** – Build a shared understanding about the environment to help identify opportunities, constraints, and potential partnerships across Corporate programs and with community partners.
- **Adaptable** – Promote flexible and adaptive management approaches that maintain human and environmental health and the integrity of ecosystems.
- **Comprehensive** – Bring mainstream environmental and broader environmental protection and conservation considerations into day-to-day City business, across sectors and communities.
- **Innovative** – Willingness to consider and pilot initiatives and prototype to identify the best and creative solutions.
- **Equitable and resilient** – Consider and advance equitable and resilience outcomes. Commit to inclusiveness and accessibility in our environmental programs and initiatives.
- **Transparent** – Set goals that can be measured, reported, verified, and evaluated. Openness in plans, decisions, actions and results.

Achieving better environmental outcomes and meeting our commitments

This work encompasses all aspects of the environment, including improving and maintaining clean air, clean and safe water, healthy soils and more biodiversity, by supporting sustainable practices for energy, waste, emissions, trees, urban forests and vegetation, transportation networks, and community design and construction – all areas that impact the ecological integrity and health of natural areas.

The Strategy recognizes that there are various conditions that reflect the full range of **a healthy**

and green city – addressing what it means to be a healthy society living in a sustainable way. These include:

- Maintaining and improving biophysical conditions of our city such as clean air and water, healthy soil, responsible use of resources and materials and clean and renewable energy.
- Supporting community well-being and good quality of life as well as a culture of sustainable communities.



Source: Calgary Today: Environment Background Study

Integrated decision-making

Goals

The goals describe what must be accomplished for Calgary to be a sustainable and resilient city.

Solutions

Clear and defined solutions to our most pressing problems. These are the key initiatives and actions that must be taken to achieve the goals.

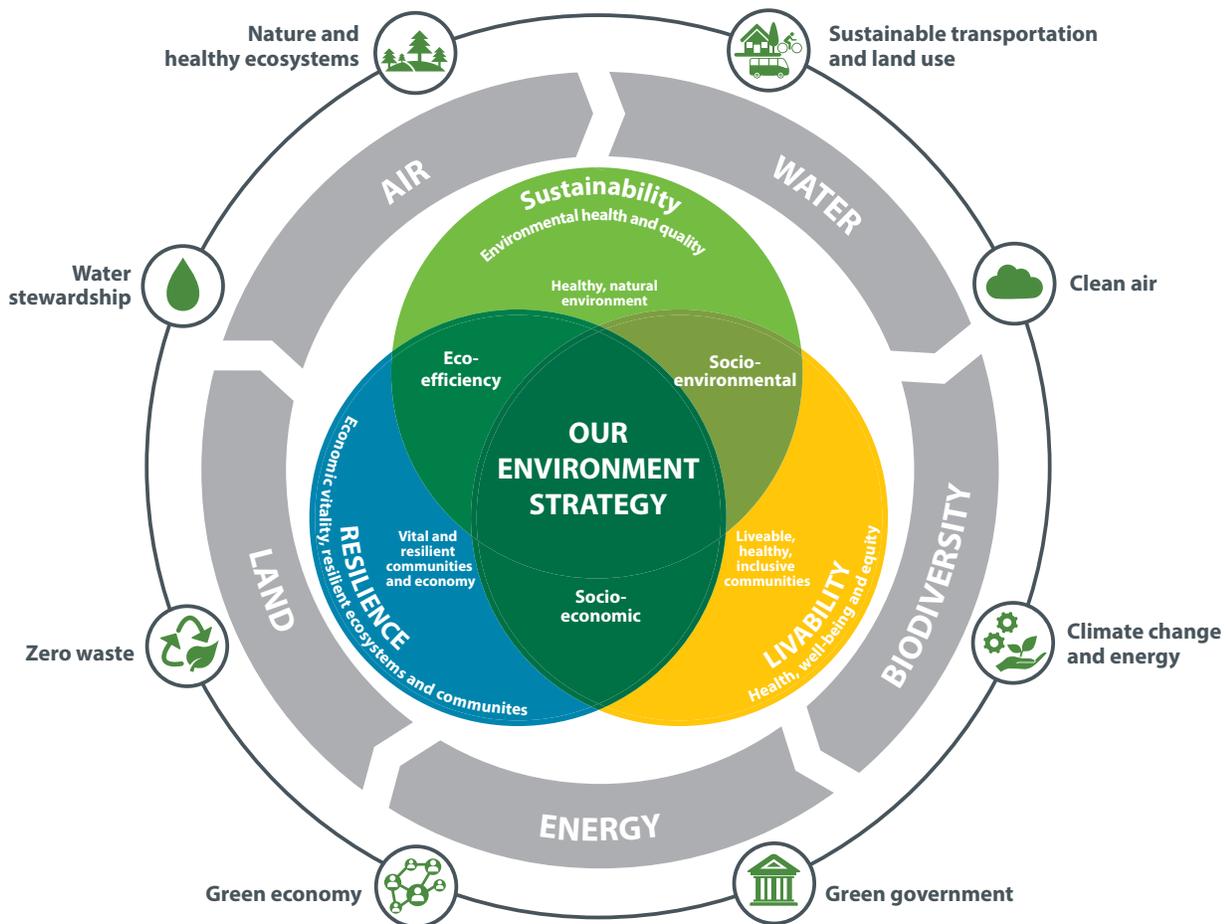
Outcomes

Measurable achievements towards reaching our goals.

Metrics

Measures and key indicators, based on observable characteristics or changes, that allow us to gauge our progress, course correct, and share our story.

Figure 3: Integrated decision-making



This Strategy is focused on environmental challenges and opportunities. Economic development, social well-being, health, and equity lenses are also reflected to ensure that we are considering critical sustainability and resilience issues as we move ahead with the work and envision the transformative and better future of our city.

Supporting effective implementation tools and processes are key to achieving successful environment outcomes and achieving the City's overall environmental commitments. We've outlined our path to success - to comprehensively inform on environmental plans, policies and initiatives that are transitioning Calgary towards a sustainable, greener future together.





Appendix 1

Our environmental solutions and measures

The City of Calgary business units responsible for different environmental portfolios provided the main actions and initiatives outlined in this section. These actions are currently underway or planned. A comprehensive corporate policy review, best-practice research and data-based analysis also informed the organization of themed solution areas.

Nature and healthy ecosystems

Protect, restore and enhance natural areas, parks and trees and provide access to nature

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Protect natural areas and open spaces

- Improve the understanding of current status of natural areas and open spaces.
- Identify key areas for protection.
- Acquire land for the primary purpose of protecting beneficial ecosystem functions.
- Improve intermunicipal cooperation to protect natural areas and open spaces.
- Develop an implementation plan for the protection of priority natural areas, based on the ecological network mapping and associated tools.
- Create a strategy to require the offset of unavoidable impacts to natural areas.
- Develop a strategy and secure funds, as permitted under *Municipal Government Act*, to purchase conservation reserve.

- Hectares of environmental reserve, environmentally significant areas (ESAs) and natural area wetlands retained during the development process
- Intermunicipal agreements in place to protect natural areas
- Amount of funding for identifying key areas for protection, evaluating ecosystem health, including assessment, and improved data collection and management

Restore and connect natural areas and open spaces

- Develop a corporate Habitat Restoration Framework.
- Fund key restoration projects that have been prioritized using the ecological network and habitat restoration prioritization tools.
- Accelerate habitat connectivity by protecting, restoring and connecting floodplains and diverse habitats that support biodiversity.
- Increase the resilience of natural systems to respond to drought conditions, increased temperatures and shifts in seasonal precipitation.
- Prioritize native, drought-adapted species for development and municipal projects.

- Hectares of active and completed restored natural area and open space
- Habitat connectivity metrics
- Habitat condition rating
- Overall best practices score
- Percentage of tree canopy cover

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Create thriving, valued and accessible natural areas and open spaces

- Reinforce the development of an expanded, strengthened and connected green network of natural areas and open spaces, which provides contact with nature and appropriate recreation.
- Provide equitable opportunities for experiences in parks and open spaces across the city.
- Provide a variety of passive and active recreation opportunities within natural areas and open spaces to meet citizen expectations while protecting ecosystems.

- Amount of green space per resident
- Percentage of people within 450 metres walking distance of a multifunctional park or open space
- Customer Level of Service (CLOS) rating

Create more opportunities for citizens to engage with and be stewards of nature

- Increase public understanding of Calgary’s natural heritage, biodiversity and ecological processes to encourage personal stewardship and positive actions that support environmental conservation.
- Collaborate internally and externally to establish conservation and biodiversity values and practices into City planning, management and operations and within Calgary neighbourhoods.

- Percentage of people who have connected with parks and open space in the last three months
- Number of users spending more than 20 minutes in parks and open space
- Number of environmental education programs and opportunities
- Kilometres of pedestrian and cycling pathway infrastructure to natural areas and open spaces
- Number of community volunteers and volunteer groups participating in habitat creation and enhancement activities

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Nature and healthy ecosystems are prioritized in city planning, development and management

- Continue to strengthen collaboration and integration across city departments to achieve improved outcomes for nature and ecosystems.
 - Increase sustainable and resilient practices in planning and managing natural areas and open space.
 - Increase the use of natural infrastructure throughout the city; including its demonstrated use within development applications and the application of the mitigation hierarchy approach.
 - Incorporate environmental cost management into design and operation of City capital projects, including implementation of natural asset valuation.
 - Develop minimum standards for natural infrastructure requirements for development applications
 - Increase consideration of ecological process and function in infrastructure design.
- Projects that utilize sustainable practices such as Low Impact Development (LID) principles
 - Development applications that use natural infrastructure and mitigation hierarchy approach

Watershed management

Protect our water supply, use water wisely, protect the health of our rivers and build resilience to flooding

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Protect our water supply

- Implement priority actions from The City’s Water Security Framework, including:
 - Finalize the Drought Management Plan to build resiliency to drought.
 - Implement the Source Water Protection Policy and Plan to manage source water risks.
 - Analyze future water supply scenarios to build understanding of climate change impacts on the Bow and Elbow river watersheds.
 - Address The City’s water license limits.
 - Collaborate regionally on ensuring water security.
 - Advocate for a new provincially-owned upstream reservoir on the Bow River for flood mitigation and water supply management.

- Federal Water Quality Index (WQI)
- Future additional measures to be developed

Use water wisely

- Reduce water consumption to support population growth and reduce water supply pressures.
- Reduce daily per capita water demand to meet the Water Efficiency Plan targets.
- Reduce peak day demand to remain below the operating capacity of our water treatment plants.

- Litres per capita per day used by all residential, industrial, commercial and institutional customers

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Keep our rivers healthy

- Reduce impacts to river health through investments and efficiencies in wastewater treatment plants.
- Reduce the impacts of city-building on river health through effective stormwater management.
- Utilize an integrated watershed planning approach to protect the watershed and manage the relationship between watershed protection and land use.
- Protect and restore riparian areas, wetlands and aquatic habitat.
- Consider and reduce the stormwater quantity and quality impacts from a changing climate and development on the environment and stormwater infrastructure.
- Reduce the total suspended solids and phosphorous in the Bow River to continue to meet or exceed environmental standards and improve river health for downstream users.

- Loadings (kg/day) of Total Suspended Solids (TSS) in the Bow River from stormwater and treated wastewater
- Loadings (kg/day) of phosphorous in the Bow River from stormwater and treated wastewater
- Average city-wide Riparian Health Score

Build resiliency to flooding

- Implement Calgary’s Flood Resilience Plan, which includes a combination of upstream, community and property-level flood mitigation to make Calgary more resilient to river flooding considering climate uncertainty and continued urban development.
- Advocate for the Province to implement upstream mitigation on the Bow and Elbow Rivers.
- Continue to work with communities on flood mitigation barriers to mitigate river flood risk.
- Enhance planning policy and regulations in flood risk areas to protect citizens, property, and Calgary’s river valleys.
- Enhance flood risk awareness and education programming to support citizens.

- Number of properties at risk of a 1:100 flooding on the Bow and Elbow rivers

Clean air

Protect and improve air quality

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Reduce the level of air contaminants

- Collaborate across the region and province on air quality monitoring and management and support the implementation of regional and provincial air quality management plans.
- Reduce air contaminants emitted from the transportation system, homes and buildings, and industry.

- National and provincial air quality standards, objectives and guidelines
- Air Quality Health Index (AQHI)

Zero waste

Waste less and conserve more resources

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Reduce waste and increase diversion

- Provide programs and education to help Calgarians reduce and divert their waste.
- Work with partners in the community to help Calgarians reduce and divert their waste.
- Advocate for government policy and legislation that support and enable waste reduction and diversion.
- Manage waste and waste management facilities to protect public health and the environment.

- Waste diverted from landfill

Sustainable transportation and land use

Plan for a compact city and complete communities with a convenient, safe and highly integrated transportation system that reduces energy usage, conserves natural resources (including land), and minimizes environmental impacts

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Optimize the transportation system and accelerate the shift to low carbon mode choices and transportation fuels to minimize emissions and environmental impact

- Plan, design, construct, and operate the transportation system deliberately to reduce emissions and minimize environmental impacts.
- Undertake initiatives and investments in support of shared-use mobility services.
- Support the shift to zero emission vehicles.
- Collaborate with regional partners on initiatives to reduce the environmental impacts of goods movement.

- Greenhouse gas emission from transportation sector
- Publicly accessible electric vehicle charging stations
- Shared mobility use

Design our city and neighbourhoods to make walking and cycling preferred choices in more places, through better street design, complementary land uses and augment this with public transit for longer trips

- Plan and design communities and the transportation system to improve conditions for walking and wheeling, and support improved transit service and user experience.
- Focus on convenience, physical safety, and sense of safety on walking and wheeling routes, and invest in dedicated facilities and supporting infrastructure.

- Percentage of person-kilometers travelled by public transit, walking or wheeling
- Accessibility to public transit for people with low incomes

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Increase the diversity of land uses and choice of housing types at urban densities supportive of quality, frequent transit

- Plan for complete and transit supportive communities and the 15-minute-city.*
- Prioritize investment in transit-oriented development around transit stations.
- Prioritize and facilitate growth in existing communities.
- Link infrastructure investment to sustainable land uses.
- Promote sustainable building and neighbourhood design.

- Population density in built up area

Protect and actively promote ecosystem integrity and connectivity and integrate natural infrastructure in new and existing developments

- Plan and design neighbourhoods to conserve and enhance the health of natural systems and areas of environmental significance.
- Design and integrate natural infrastructure into new and existing developments.
- Incorporate naturalized spaces in new developments
- Focus on greening grey infrastructure (reducing the effective impervious area, increasing vegetative cover, increasing the tree canopy).
- Plan and develop in way that improves energy and water efficiency and protects local ecosystems.
- Integrate watershed management in land use planning.

- Naturalized areas in new and existing development

Prevent the pollution of lands, groundwater and surface water, manage the use of pesticides and support the remediation of contaminated sites to ensure safe and healthy communities

- Sustainably manage land and prevent the pollution of lands, air, water: promote the responsible management of environmental risks, including the use of harmful substances, preventing pollution.
- Manage the use of pesticides.
- Remediate contaminated sites.

* The concept of the 15-minute city is being adopted by cities around the world – pushing to transform neighbourhoods where all of life’s necessities are within a 15-minute reach by foot or bike, and walkability is prioritized above all.

Climate change and energy

Prepare for and adapt to climate change, and reduce energy consumption and greenhouse gas emissions

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Prepare Calgary to adapt to climate change and reduce climate-related risks

- Reduce Calgarians’ vulnerability to the impacts of climate change through preserving, restoring, and enhancing natural assets and systems.
- Strengthen the resilience of our natural infrastructure to adapt to climate change.
- Value the multiple services provided by natural infrastructure and integrate this understanding into City processes to inform climate aligned decision-making.

- Natural assets incorporated in The City’s asset management plans
- Natural asset valuation

Improve energy and resource management and reduce greenhouse gas emissions

- Improve energy performance in new and existing buildings.
- Increase energy generation from renewable and low-carbon energy systems.
- Integrate greenhouse gas reduction potential into transportation assessments and growth management decisions.
- Conserve and manage green spaces and natural areas to support climate change mitigation.

- Community wide GHG emissions by sector
- Community-wide GHG emissions by energy type

Green government

Lead by example and reduce our corporate impact on the environment

SOLUTIONS – MAIN INITIATIVES AND ACTIONS

MEASURES

Deliver on our commitments to Calgarians by complying with legislation, managing environmental risk and continually improving The City’s environmental performance

- Review and improve The City’s environmental policies for relevance and effectiveness.
- Identify, understand, and manage The City’s environmental risks and opportunities.
- Maintain The City’s compliance with regulatory and voluntary environmental requirements.
- Report on The City’s environmental performance consistently and transparently to both administration and the public.

- Corporate performance targets
- Corporate environmental risk profiles and risk registers
- Environmental mitigation plans
- Non-compliances and non-conformities
- Provincial and federal enforcement actions and corrective actions for environmental impacts

Support the sustainable use and management in The City’s operations and services, while protecting the environment

- Establish corporate environmental objectives, targets, and measures to create a roadmap for reducing the impact on the environment from City operations.

- Corporate environmental objectives, targets and measures established for: air, water, land, biodiversity, emissions, consumption and governance.



Appendix 2

Glossary

Biodiversity: Variability among living organisms from all sources, including, terrestrial, marine and other aquatic ecosystems, as well as the ecological complexes of which they are part; includes diversity within species, between species and of ecosystems.

Ecological processes: The physical, chemical and biological actions or events occurring in ecosystems, connecting organisms and their environments (e.g. wildlife migration, predation, nitrogen cycling).

Ecosystem: A dynamic complex of plant, animal and micro-organism communities and their non-living, abiotic environment interacting as a functional unit.

Ecosystem-based approach: A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.

Ecosystem services: Benefits that humans gain from healthy, properly functioning ecosystems. These benefits take the form of supporting services (e.g. nutrient cycling, soil formation), provision services (e.g. food supply, flood regulation, water purification), regulating services (e.g. carbon sequestration, waste decomposition), and cultural services (e.g. spiritual and cultural connections, recreation, education).

Environmental sustainability: The responsibility to conserve, protect and reduce our impact on and use of the planet's natural resources; it reflects the need to live within the planet's carrying capacity to ensure quality of life, human and ecological health and well-being is maintained and thrives now and in the future.

Natural infrastructure: A range of assets from natural through engineered elements which rely on ecological and hydrological processes to provide municipal, ecosystem and social services as well as resilience benefits.







Calgary Today: Environment Background Study

Environmental Approaches, Information, and Ideas

May 2021



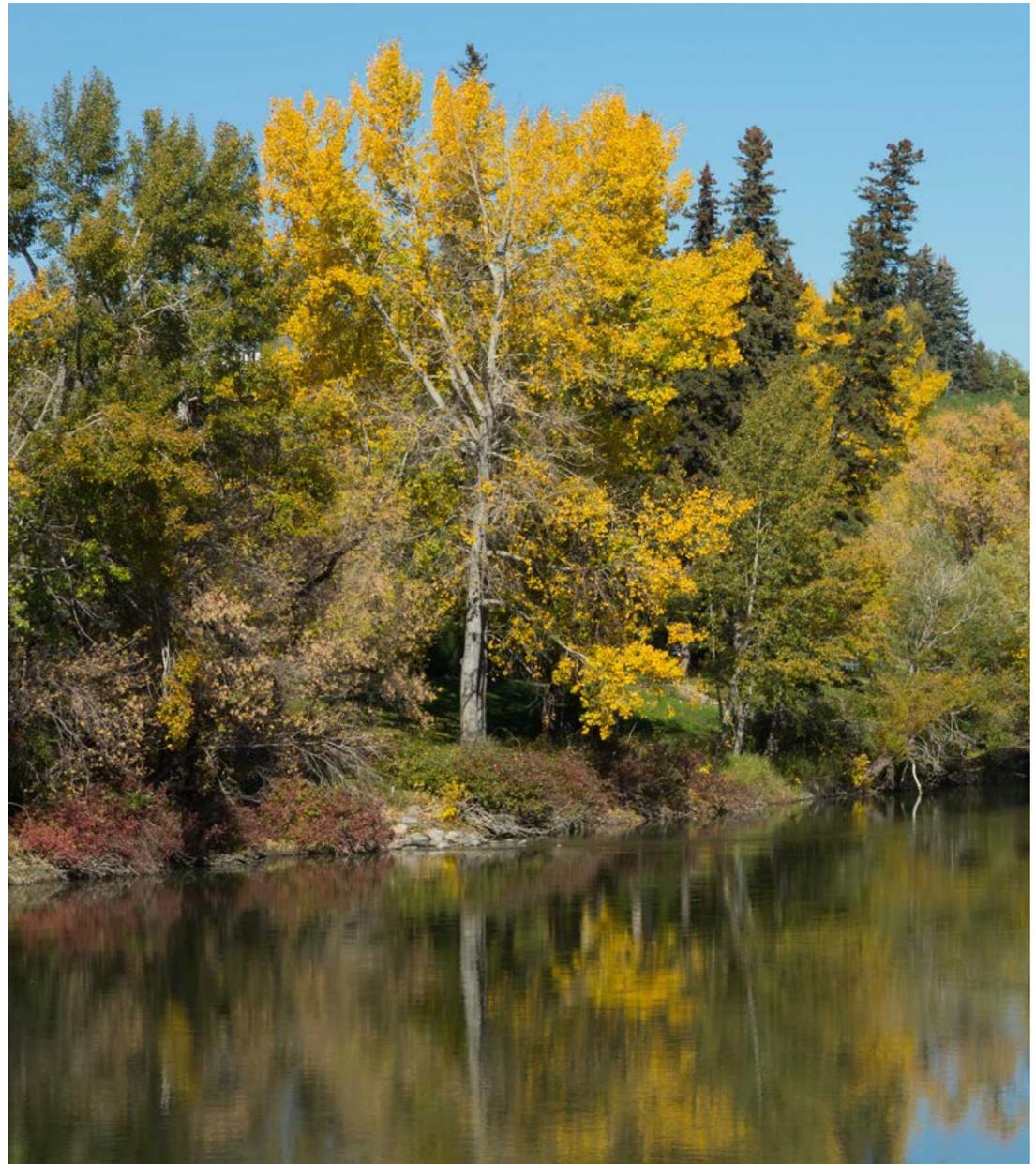


Land Acknowledgement

In the Blackfoot language, Calgary is Moh'kin'stis; in Stoney Nakoda, Wiçispa Oyade; in Tsuut'ina, Gu'tsi'tsi and in Métis, it is Otokwunee. For each of these Indigenous languages, the words translate to 'Elbow,' representing the confluence of the Bow and Elbow Rivers. This is where the story of Calgary begins as the confluence has been a trading hub for Indigenous peoples for millennia and the site where they celebrated natural abundance, ceremony, culture, and partnerships.

This plan acknowledges the traditional lands of the Treaty Seven Nations – the Blackfoot confederacy, (Siksika, Kainai, Piikani), the Tsuut'ina, the Îyâxe Nakoda Nations (Bears paw, Chiniki, Wesley), the Métis Nation of Alberta, Region 3, and all people who have made Calgary their home. This plan honours their long history and deep connections to this land.

The strength and energy of Calgary comes from the land it was built on, as well as the Indigenous people and newcomers whose footsteps have marked this territory.





Calgary Today: Environment Background Study	6	The Benefits of a Healthy Environment	37
A Healthy and Green City	7	The Benefits of a Healthy Environment	38
Healthy and Green Cities	8	The Environment and the Economy	39
Calgary's Vision for a Healthy and Green City	10	Calgary's Role in Achieving a Healthy Environment	40
Environmental Challenges Facing Calgary Today	11	Green Success and Innovation	41
Transforming Recovery into Resilience	14	Key Concepts and Approaches to Environmental Sustainability	43
Transforming Recovery into Resilience	15	Living within the Limits of the Environment	44
International Environmental Commitments	18	Natural Systems and Services	45
International Environmental Commitments	19	Environmental and Climate Change Adaptation	46
Cities and Environmental Stewardship	21	Nature and Natural Systems within Cities	47
City Building and the Environment	22	Economic Opportunities through Environmental Sustainability	48
Community Design and the Environment	23	Livable, Inclusive Communities	49
Nature within the City	24	Environmental Focus Areas	50
Calgary's Municipal Development Plan Targets	25		
Calgary's Growth	26		
Calgary's Environment	27		
Calgary's Natural Environment	28		
Calgary's Environment Today and into the Future	33		
Improving Calgary's Environmental Outcomes	34		
Calgary's Economy and the Environment	35		
The Calgary Environment Strategy	36		

 Biodiversity + Ecosystems 51	Fact Sheet Total Suspended Solids 81	 Climate Change Mitigation 108
Biodiversity and Ecosystems Overview 52	Fact Sheet Flood Resiliency 83	Climate Change Mitigation Overview 109
Targets City Targets 55	Targets International Commitments 84	Targets City Targets 111
Fact Sheet Park Space and Tree Canopy Trends 57	Benchmarking How Calgary Compares 85	Targets The Impact of Reducing Greenhouse Gases 112
Fact Sheet Park Space Provision 58	 Air 86	Fact Sheet Cumulative Energy Cost Savings 2008-2018 for City of Calgary Buildings 113
Fact Sheet Biodiversity Cores and Ecological Network Connectivity 59	Air Overview 87	Fact Sheet Trends 114
Fact Sheet Overall Diversity 62	Health Impacts of Poor Air Quality 90	Fact Sheet Overall Greenhouse Gas Emissions 115
Fact Sheet Wildlife Conflicts 63	Targets City Targets 91	Fact Sheet Reducing Greenhouse Gas Emissions 116
Fact Sheet Restoration Projects 64	Fact Sheet Air Quality 92	Fact Sheet Reducing Greenhouse Gas Emissions 117
Fact Sheet Natural Areas Land Coverage 65	Fact Sheet Trends 93	Targets International Commitments 118
Fact Sheet Habitat in Parks 66	Targets International Commitments 96	Benchmarking How Calgary Compares 119
Targets International Commitments 67	Benchmarking How Calgary Compares 97	
Benchmarking How Calgary Compares 68	 Waste 98	 Climate Change Adaptation 120
 Water 70	Waste Overview 99	Climate Change Adaptation Overview 121
Water Overview 71	Targets City Targets 101	Targets City Targets 125
Protecting the Water Supply 73	Fact Sheet Waste Management 102	Fact Sheet The Impacts of Climate Change 126
Targets City Targets 74	Fact Sheet Household Waste 103	Fact Sheet Climate Change Modelling 127
Fact Sheet Calgary's Drinking Water 75	Fact Sheet Landfill Gas 104	Fact Sheet Trends 128
Fact Sheet Water Usage 76	Fact Sheet Recycling and Composting 105	
Fact Sheet Water Usage 77	Targets National Commitments 106	
Fact Sheet Water Quality Management 78	Benchmarking How Calgary Compares 107	
Fact Sheet Stormwater Management 79		
Fact Sheet Total Phosphorus Loading 80		

Calgary Today: Environment Background Study

Calgary and its environment are intertwined. How people live directly impacts the health of the environment and the environment directly impacts the well-being of individuals and the community. Calgary has access to fresh air, clean water, and abundant natural areas. This enables Calgarians to reap the benefits of the city's setting while remaining appreciative and good stewards of this rich environment. To maintain a healthy relationship with the environment, Calgary needs to strive to become a healthy and green city that focuses on maintaining and improving its performance in the following areas: biodiversity and ecosystems, water, air, waste, climate change mitigation and adaptation.

This report provides a high-level overview of Calgary's performance in each of the environmental focus areas using the latest available data. It also ties each of these areas together into Calgary's environmental story and contextualizes Calgary within a global environmental context.

The report is extensive, but the intent is that it can be read as one document or broken up into component modules focused on a specific area or concept. This modular approach will enable specific content to be updated, removed, or added as new information becomes available allowing this Environment Background Study to remain current and up to date.

Most of the information and photos in this report come from the City of Calgary. When external sources and photos are used, they have been noted.

Environmental Focus Areas



Biodiversity + Ecosystems



Water



Air



Waste



Climate Change Mitigation



Climate Change Adaptation

A Healthy and Green City



Healthy and Green Cities

When Calgary sets a priority of becoming a “healthy and green city,” what does it hope to achieve? A healthy and green city is an urban environment that features well-connected natural spaces throughout the city. These natural spaces not only provide wildlife habitat, biodiversity, and ecosystem health, but they also create opportunities for people to connect with nature in their own backyard. A healthy and green city’s natural assets also deliver many services to the community, including water filtration, cleaner air, and sinks for greenhouse gases.

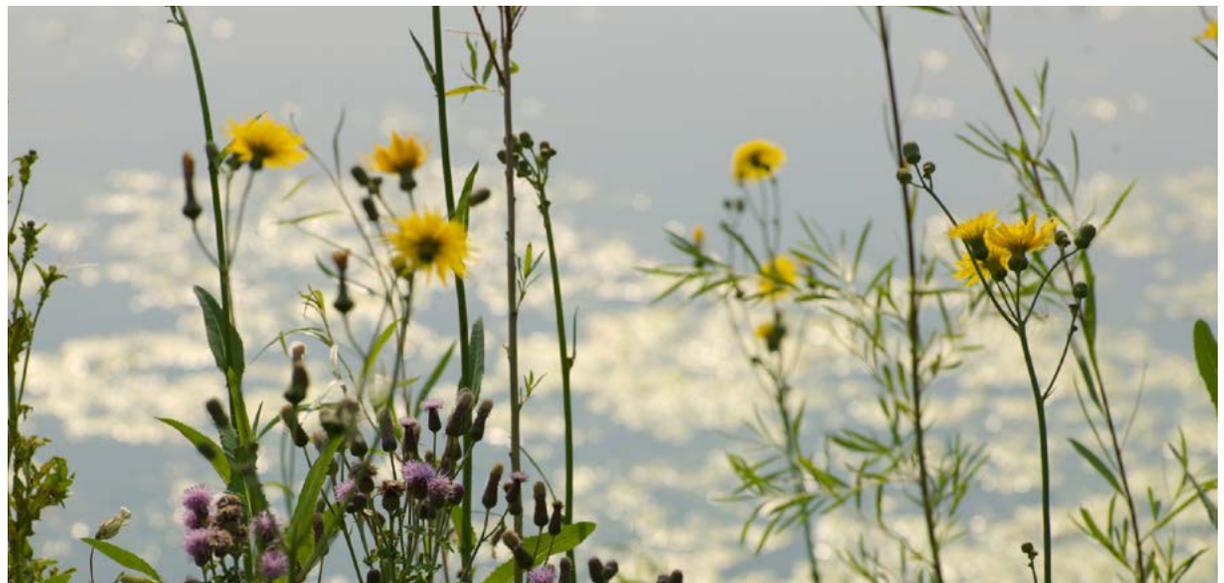
Healthy and green cities use land efficiently, both to protect natural areas and to concentrate development and services, improving the efficiency of operations for the entire city. More efficient land use reduces habitat loss and fragmentation, saves money, and enables healthy lifestyles. Weaving trees, greenery, and other open spaces through every community beautifies and enriches residential neighbourhoods and main streets alike, while also filtering pollution, absorbing stormwater, reducing flooding, and providing habitat for wildlife.

Efficient land use also means locating housing near or within areas for shopping, working, and playing, which provides people with greater choice in how they go about their daily activities and requiring less travel. This freedom of movement supports a healthy and green city by allowing more people to walk, ride bicycles or take transit, further reducing emissions and improving air quality.

Building a healthy and green city involves constructing and servicing buildings to further support a healthy environment. Increased building efficiency can reduce greenhouse gas emissions, produce cost savings, improve water conservation, and create more comfortable homes and workplaces. Using renewable energy can reduce emissions even further.

Waste reduction and reuse initiatives can provide raw materials and a second life for goods while reducing pollution, requiring fewer new resources, and redirecting waste away from landfills.

A healthy and green city does not just protect the environment for future generations. It makes urban life better today. Everyone benefits from clean air and water and the improved quality of life that comes with easy access to nature. There is also time and money to be saved by having more choices in how to live and move around the city. An enhanced natural environment also helps cities to weather storms and droughts, creates more beautiful communities, and increases leisure opportunities.





Calgary's Vision for a Healthy and Green City

Calgary's City Council is committed to creating a Healthy and Green City. Here is how it has been defined:

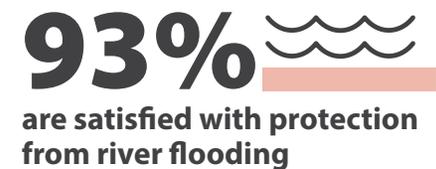
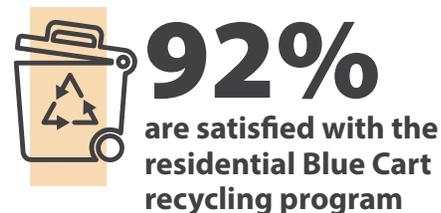
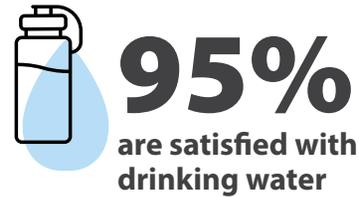
"Calgary is a leader in caring about the health of the environment and promotes resilient neighbourhoods where residents connect with one another and can live active, healthy lifestyles."

Source: Calgary 2019-2022 Service Plan

Citizen Satisfaction Survey, Environmental Highlights

Calgarians feel a deep connection to their natural environment and value The City's environmental stewardship.

A 2020 Citizen Satisfaction Survey (conducted from August 17 to September 6) asked 2,500 Calgarians aged 18 years and older how they feel about municipal services. The survey indicated very high levels of satisfaction with The City's stewardship to date. Here are the results of questions related directly to The City's record on environmental management:



Environmental Challenges Facing Calgary Today

The world is currently facing significant global environmental challenges, including climate change, the biodiversity crisis, pollution, and resource depletion. Calgary has already begun to feel the impacts of environmental challenges on people's lives and livelihoods. These include three major natural disasters in the last ten years:

- In June 2020, a ferocious hailstorm inflicted more than \$1.2 billion in property damage in Calgary in a few short hours—the fourth most expensive natural disaster in Canadian history.¹
- The summer of 2018 was the smokiest on record in Calgary, with over 322 hours of dangerous smoke haze from major wildfires in British Columbia filling the city's skies.²
- In 2013, Calgary endured its largest flood since 1932, leading to mass evacuation of most inner city neighbourhoods and \$3.5 billion in property damage.

These recent disasters have proven to Calgary that global environmental challenges, like the increase in frequency and severity of extreme weather events due to climate change, have harmful local impacts in the near term, obliging the city to change and adapt. The complexity and scale of these challenges require an examination

of how local actions that cause pollution and other environmental harms deepen the problem, as well as how the negative consequences affect populations here in Calgary and beyond unequally. Given the interconnection of all environmental systems, these challenges can only be addressed by understanding how actions have ripple effects on the planet, people's health, and the economy.

What Cities like Calgary can do to Address these Challenges³

They can accelerate action to keep pace with the ongoing "great acceleration" in both environmental impacts and technological innovations. They can limit impacts by becoming better stewards of urban natural areas and apply ecological thinking, recognizing that all living systems are connected and ensuring a holistic, environmentally sound approach is taken to managing challenges. Cities can grow more sustainably using principles of sustainable urbanism such as concentrating development, locating amenities closer together, and using land more efficiently. Cities can think creatively, breaking from established patterns to integrate environmentally beneficial systems.

¹ Hailstorm damage in Calgary tops \$1.2B, making it 4th costliest natural disaster ever in Canada <https://calgary.ctvnews.ca/hailstorm-damage-in-calgary-tops-1-2b-making-it-4th-costliest-natural-disaster-ever-in-canada-1.5016161#:~:text=The%20most%20expensive%20natural%20catastrophe,caused%20%241.49%20billion%20in%20damage>.

² 322 hours of smoke makes 2018 Calgary's smokiest year on record <https://www.cbc.ca/news/canada/calgary/calgary-smokiest-year-2018-forest-fires-1.4791785>

³ People and nature in an urban world (<https://theecologist.org/2020/feb/26/people-and-nature-urban-world>)

"All the cities of the world are going to expand. We need to have a better understanding of what makes good urban habitat for people. We have an obligation to make the new places more livable, more sustainable, more healthy. We have the tools."

— Jan Gehl

Calgary Today

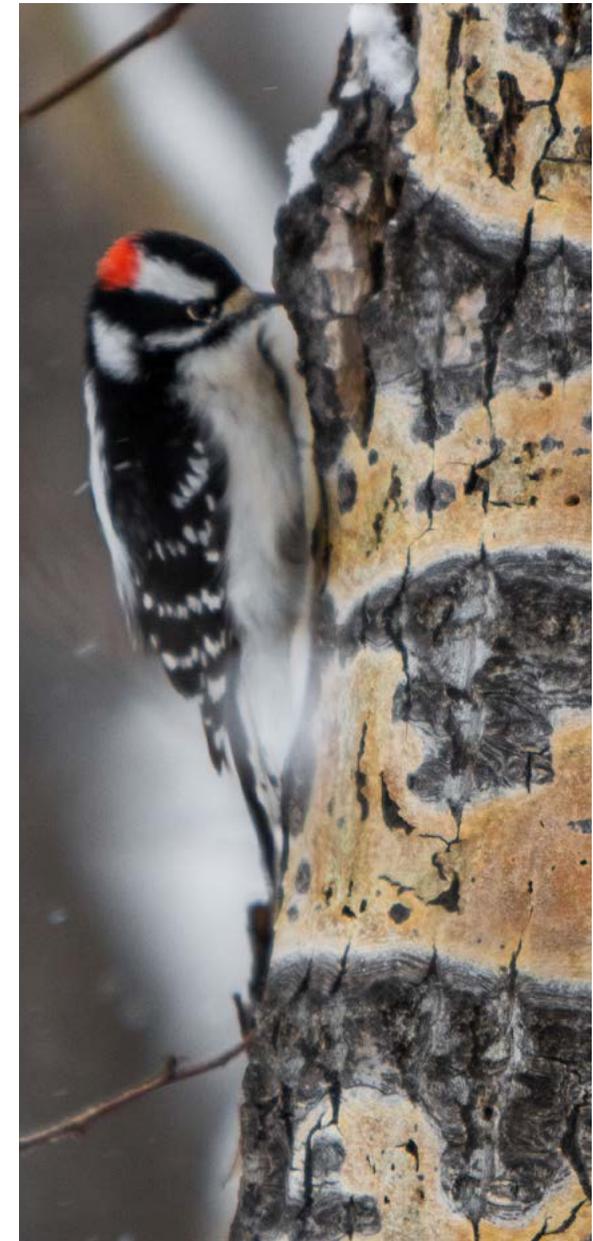
Calgary aspires to be a healthy and green city; how is it doing? Here is a quick look at how Calgary is performing in biodiversity and ecosystems, water, air, waste, climate mitigation and climate adaptation, .

¹ CRAZ Air Quality Management Planning Committee and the CRAZ Engagement Committee. (2020). *Health Impacts of Air Pollution in the CRAZ Region*

² Calgary Region Airshed Zone. (2019). *Calgary Region Airshed Zone Air Quality Management Plan*.

WHAT TO DO	CITY DIRECTION	WHAT DOES THIS MEAN FOR CALGARIANS?	TRENDS
<p>BIODIVERSITY + ECOSYSTEMS</p> 	<p>The City set out targets for 2025 in its Our BiodiverCity Strategy to restore 20 per cent of Calgary's current open space to support the conservation of biodiversity. The Riparian Action Program is also an important contributor to protecting Calgary's biodiversity.</p>	<p>Biodiversity loss impacts community and economic health due to the loss of important ecosystem services. Replicating the water storage and filtration services of wetlands alone has cost Calgary millions of dollars.</p> <p>The City of Calgary has undertaken significant restoration work, especially around waterways, but there is still a lot of work to do to protect and restore natural areas.</p>	<p>Calgary has seen declines in plant and animal species diversity in recent years. Outward growth of the city has encroached on natural spaces, leading to habitat loss, fragmentation, and an increase in the spread of invasive species.</p>
<p>WATER</p> 	<p>By 2033, Calgary is aiming to reduce water consumption to 350 litres per capita per day.</p>	<p>Single-family residential demand was estimated to be 197 litres per capita per day in 2019, the lowest on record for this customer group. This shows that customers are doing their part, and The City's water conservation programs are working.</p>	<p>In 2019, Calgary's overall water use, including all residential, business and municipal demand, was 356 litres per capita per day—on track to meet The City's 350 litres per capita per day target.</p>
<p>AIR</p> 	<p>Calgary is part of the Calgary Region Airshed Zone, which has its own Air Quality Management Plan. The City must also meet the air quality objectives of the South Saskatchewan Regional Plan (SSRP), including targets for particulate matter, ozone, and nitrogen dioxide.</p>	<p>Human caused air pollution in the Calgary Region contributes to higher occurrences of respiratory diseases, such as asthma and approximately 377 premature deaths annually. In addition to this, Calgary sees about three restricted activity days per year per person.¹</p> <p>Reducing air pollution to background levels in the region would save many lives and \$161 million dollars a year by reducing the economic impact of restricted activity days and reducing healthcare costs.</p>	<p>Though the Calgary Region is meeting the overall air quality standards in the regional plan, the city has exceeded some proactive air quality triggers. Calgary should investigate these trends further and determine mitigating actions to ensure that air quality does not worsen.²</p> <p>Thresholds will also be lowering, meaning Calgary needs to be proactive in managing the airshed to meet the lower limits coming in the future.</p>

WHAT TO DO	CITY DIRECTION	WHAT DOES THIS MEAN FOR CALGARIANS?	TRENDS
<p>WASTE</p> 	<p>Calgary's target is the diversion of 70 per cent of waste from landfills by 2025. The City's overall long term goal is zero waste, where all discarded materials become resources that can be reused (recycled, composted, repurposed, etc.), and no garbage is sent to landfills.</p>	<p>Although Calgarians have made great strides, the city still sent 545,000 tonnes of garbage to City of Calgary landfills in 2020. One of the next steps for Calgary is to reduce the contamination of recyclable and organic materials collected.</p>	<p>Calgarians have supported waste diversion and have been recycling and composting. The City has implemented Blue Cart recycling (2009) and Green Cart food and yard waste collection (2017), which significantly reduced the amount of garbage ending up in landfills.</p>
<p>CLIMATE MITIGATION</p> 	<p>The City is aiming for an 80 percent reduction in city-wide emissions from 2005 levels by 2050.</p>	<p>Calgary has one of the highest per-capita GHG emissions of any major city in Canada. About two thirds of greenhouse gas emission come from energy use in buildings, about one third from fuel use in vehicles, and one percent from landfills and wastewater treatment facilities. To meet the GHG reduction targets, Calgary needs to significantly reduce emissions across all sectors.</p>	<p>Prior to 2020, Calgary's emissions had been trending up; however, the impacts of the COVID pandemic have resulted in a reduction of emissions to slightly above 2005 levels.</p>
<p>CLIMATE ADAPTATION</p> 	<p>The City is working to reduce its vulnerabilities and exposure to severe weather and long-term climate effects as part of its Climate Resilience Strategy. The City has identified 175 adaptation actions that should be initiated within the first 5 years of the Strategy (2018-2022) by The City's business units, related to people, infrastructure, natural infrastructure, water management, and governance.</p>	<p>Calgary can expect to see more frequent and severe weather events in the future due to climate change. Proactive disaster management and resilience planning will be essential to ensure that individuals, communities, and the city as a whole are prepared. The city also needs to consistently improve resilience as it recovers from natural disasters.</p>	<p>First steps have been completed in developing a Calgary-specific framework for climate adaptation and performance monitoring. The TAMD (Tracking Adaptation and Measuring Development) Scorecard is the first indicator developed under the framework which evaluates how far and how well climate risk is being managed. The City's cumulative progress score for 2020 was 36/80.</p>



Transforming Recovery into Resilience



Transforming Recovery into Resilience

All over the world, 2020 was a year of great and unexpected change. The COVID-19 global pandemic has left irrevocable marks on every society, including a devastating loss of life, social upheaval, and economic turbulence. Canada and the rest of the world will be recovering, socially and economically, for many years to come. This immense recovery process is already underway as global leaders strive to resolve the impacts of COVID-19 and parallel environmental challenges related to climate change. Cities remain at the centre of recovery efforts to balance both economic and environmental challenges. In addition to the COVID-19 recovery, cities need to build ecological resilience and minimize the impacts of human activity to reduce additional stressors on ecological health.

To recover from the pandemic, there are ways to make cities and economies more resilient, sustainable, and future-proof. This idea of using recovery as a catalyst for much needed environmental and social change is a growing movement across Canada and around the world. It involves strategic investments in new green technologies, sustainable development, and better solutions for the natural environment. In the face of disaster, cities can choose to launch a much better era.

The pandemic has already begun to point the way in how to address the climate crises and environmental challenges. One of the lessons relearned in the pandemic lockdowns has been the value of outdoor space and nature for individual and civic health and well-being. Since the start of the pandemic, researchers have noticed a large increase in the numbers of visitors to urban forests and parks.¹

The forced shutdowns of large portions of the global economy have also shown how quickly air quality improves when emissions are reduced at wide scale. Measurements from the European Space Agency's Sentinel-5P satellite showed decreased levels of nitrogen dioxide (NO₂) from the 2019 levels by as much as 40 per cent over cities in Asia and Europe from late January and early February 2020.¹ Throughout 2020, Calgary also saw a decrease in its overall greenhouse gas emissions compared to 2019, with the overall effects on air quality not yet known. The return of clear skies and clean air in much of the world was a welcome improvement in the midst of the devastating pandemic and a glimpse of the sort of positive transformation that strong action can bring.

¹ *Cities and pandemics: towards a more just, green and healthy future* https://unhabitat.org/sites/default/files/2021/03/cities_and_pandemics-towards_a_more_just_green_and_healthy_future_unhabitat_2021.pdf

² *Here's how lockdowns have improved air quality around the world* <https://www.weforum.org/agenda/2020/04/coronavirus-lockdowns-air-pollution>

Recovery to Resilience in Canada

The Canadian government, both through its COVID recovery task force and its new climate plan, is endorsing large investments in clean energy, energy efficiency, electric vehicles, mass transit, and stronger environmental stewardship. The Independent Task Force for a Resilient Recovery has recommended that Canada follow the lead of the European Union, which has pledged more than \$1 trillion in recovery funds with an emphasis on climate-friendly solutions.

These bold recovery plans could mean big opportunities for Calgary. Greener, healthier cities are better prepared to weather the intensifying storms of climate change and thrive in the emerging low-carbon economy. The expenses that come with a shift in this new direction are far outweighed by the risks of failing to act and the opportunities for economic growth in new technological sectors. Enhancing environmental stewardship and taking stronger action on climate change represents some of the best ways for cities to recover after the pandemic and enhance their resilience.

Canada Healthy Communities Initiative¹

About \$31 million in existing federal funding is being provided through The Canada Healthy Communities Initiative (CHCI). Funding for this initiative is being repurposed to support communities in dealing with the challenges posed by COVID-19. The Canada Healthy Communities Initiative supports projects under three main themes:

1. Creating safe and vibrant public spaces

The focus of this theme is to support projects that encourage safe physical and cultural activities through new or adapted parks, main streets and indoor spaces.

2. Improving mobility options

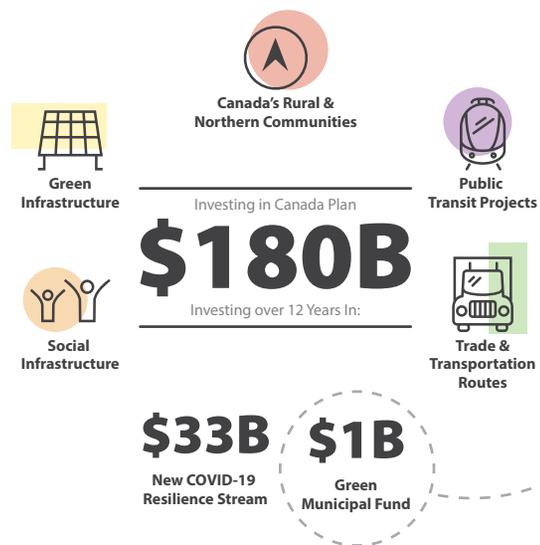
Projects that permit physical distancing through permanent or temporary changes that make it easier for people to get around in their communities, whether by walking, biking, accessing public and private transit, or using other modes of transportation.

3. Digital solutions

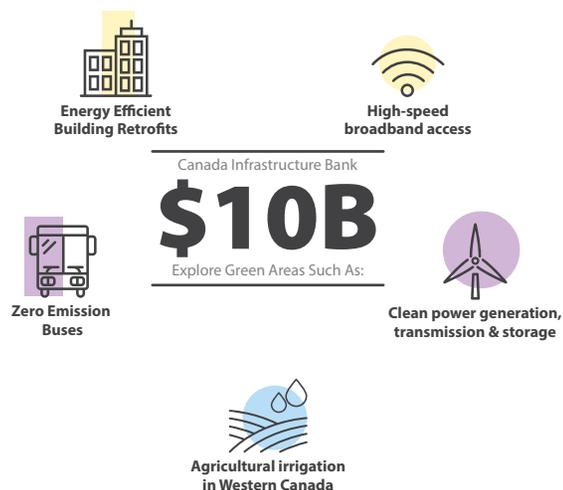
Innovative digital projects that address changing community needs using data and connected technologies.

¹ <https://www.infrastructure.gc.ca/chci-iccs/index-eng.html>

FEDERAL GOVERNMENT INVESTMENT THAT SUPPORTS BUILDING BACK BETTER:



source: infrastructure.gc.ca



source: bloomberqint.com

GREEN MUNICIPAL FUND IS INVESTING IN TWO CITY OF CALGARY PROJECTS:



Will determine if electric vehicles could replace other heavy duty vehicles (ex. dump trucks & plows)



By testing track switch heaters with a snow detection system and rail thermostats

source: canada.ca/en/office-infrastructure

International Environmental Commitments



International Environmental Commitments

Canada has committed to a wide range of international agreements, conventions, treaties, plans, and protocols in pursuit of better environmental stewardship. This list highlights a selection of important agreements in the areas most relevant to this environmental assessment.

FOCUS AREA

COMMITMENTS

BIODIVERSITY + ECOSYSTEMS



United Nations Convention on Biological Diversity

This convention focused on:

- Expanding terrestrial and marine protected areas.
- Enhancing protection for species at risk.
- Adopting an ecosystem approach with an emphasis on precaution.
- Exchanging information, technology, and capacity building in developing countries.
- Mobilizing significant resources for conservation and sustainable use.
- Promoting the fair and equitable sharing of genetic resources.
- Adopting two protocols – the Cartagena Protocol on Biosafety and the Nagoya Protocol on Access and Benefit Sharing.

Biodiversity and Ecosystem Services: Intergovernmental Platform

In 2019, the Platform released a biodiversity ecosystem services assessment with a rolling work programme up to 2030. The assessment provides evidence that worldwide, natural systems are deteriorating rapidly as a result of human activities. This affects economic health, food security, public health, and quality of life. The report stresses that it is not too late to reverse this trend by addressing the root causes of nature deterioration.

WATER



Canada-US Boundary Waters Treaty

This treaty identifies more than 100 boundary water issues to address through control boards, pollution boards, watershed boards, advisory boards, and study boards.

FOCUS AREA

COMMITMENTS

AIR



Gothenburg Protocol to Reduce Transboundary Air Pollution

To fulfill its commitments to this protocol, Canada has implemented a comprehensive approach for reducing air pollution called the Air Quality Management System (AQMS). The number of Canadians living in areas that meet the Canadian Ambient Air Quality Standards under this protocol increased from 60 per cent in 2007 to 70 per cent in 2017.

Montreal Protocol on Ozone Layer Depletion

As a result of countries fulfilling their obligations under this protocol, the ozone layer is expected to recover fully over most of the globe – by mid-century in the Arctic and mid-latitudes and a little later for the Antarctic hole. The ozone layer is 2 per cent below the 1980 benchmark on the global scale and about 3.5 per cent below the benchmark over the north mid-latitudes, which includes most of Canada.

Canada-US Air Quality Agreement

This agreement commits both countries to reduce their transboundary air pollution. In areas covered by the agreement:

- Sulphur dioxide has decreased by 63 per cent from 1990 to 2014.
- Nitrogen dioxide has decreased by 53 per cent from 2000 to 2014.

WASTE



Canadian Government Plastic Waste Action Plan

The Government of Canada created a plastic waste action plan in June 2019. This plan includes six priority areas and actions that governments can consider when reducing plastic waste. They are:

- Extended producer responsibility.
- Single-use and disposable plastic products.
- National performance requirements and standards.
- Incentives for a circular economy.
- Infrastructure and innovation investments.
- Public procurement and green operations.

CLIMATE MITIGATION



Paris Agreement United Nations Convention on Climate Change

The Pan-Canadian Framework on Clean Growth and Climate is Canada's plan to meet the national emissions reduction target for the Paris Agreement of 40-45 per cent below 2005 levels by 2030 and net zero by 2050. The Framework has four pillars: pricing carbon pollution; complementary actions to reduce emissions; adaptation and climate resilience; and clean technology, innovation, and jobs.

In addition to these international commitments, there are several other international standards to help support ecologically healthy cities, including:

EcoCity Standards offer a framework for transforming cities from an unhealthy status quo to an ecocity. The framework includes 18 standards, such as access to amenities within walking distance, safe and affordable housing, environmentally friendly transportation, green building, air/water/soil health, energy, and food.

UN Sustainable Development Goals were adopted by all UN member states in 2015 and tie together health, education, quality of life, and economic growth with climate change, ocean and forest protection.

100 Resilient Cities is a Rockefeller Institute Initiative focused on creating and implementing urban resilience strategies. Calgary was selected as a 100R City in 2016.

The C40 cities climate leadership group is a group of 97 cities committed to taking climate action and together have achieved the following:

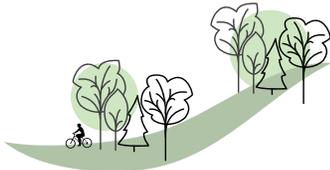
- 53 have reached or are expected to reach their peak emissions by the end of 2020.
- 18 have banned or restricted single-use, non-recyclable plastics.
- 17 have restrictions on high-polluting vehicles.
- 82 have implemented cycle hires.

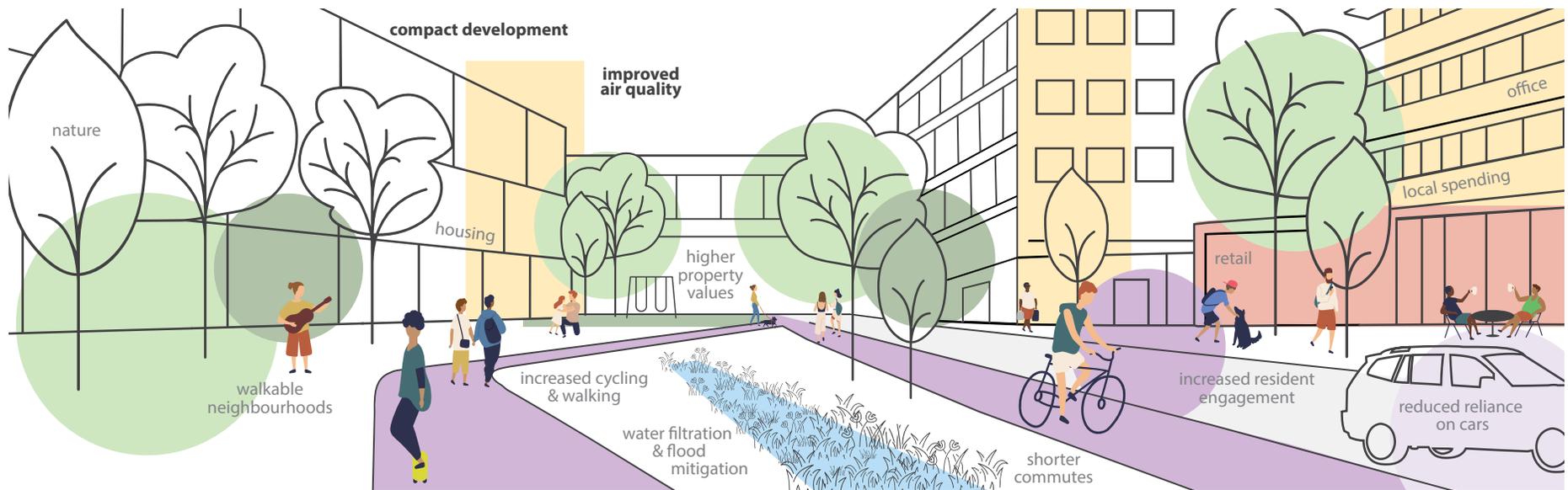
Cities and Environmental Stewardship



City Building and the Environment

To grow in harmony with the natural environment, cities can encourage urban forms and provide services that support environmental objectives:

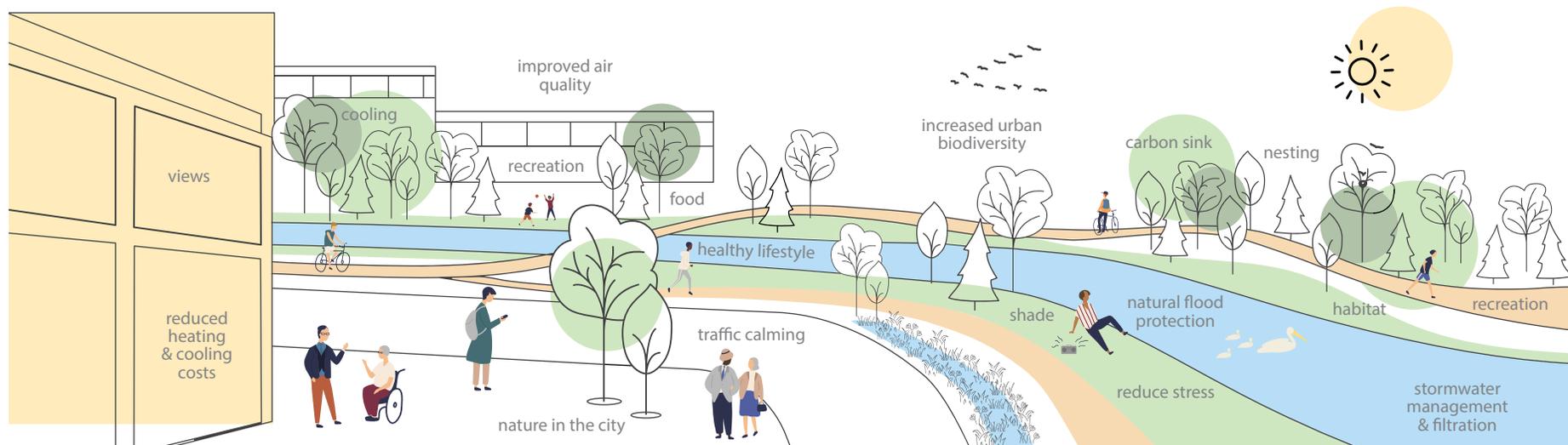
WHAT TO DO	HOW DOES THIS HELP THE ENVIRONMENT?	RELATED FOCUS AREAS	
	<p>Directing growth to already built out areas</p>	<ul style="list-style-type: none"> Protects natural areas and farmland at the city's borders. Concentrates uses and increases density to protect more green spaces. 	
	<p>Mixing land uses and amenities</p>	<ul style="list-style-type: none"> Allows more people to choose transit, walking, or cycling, lowering emissions. Improves access to parks and recreational opportunities. 	
	<p>Connecting open spaces, parks, natural areas, and natural infrastructure</p>	<ul style="list-style-type: none"> Improves air and water filtration. Improves food production. Creates healthier ecosystems. Improves wildlife movement and habitat. Improves flood resilience. 	
	<p>Improve the efficiency of servicing and waste collection</p>	<ul style="list-style-type: none"> Reduces litter and other contaminants that end up in the environment, harming human and wildlife health. Reduces greenhouse gases. Improves water quality. Reduces pollution. Reduces waste. 	



Community Design and the Environment

The design of Calgary's communities can provide better options for how Calgarians spend their time and move around the city, while connecting people more closely with the environment. A more walkable community design, integrating a mix of uses, facilitates walking and wheeling, which can improve physical and mental health and result in better air quality.

Benefits of natural and green infrastructure in the city



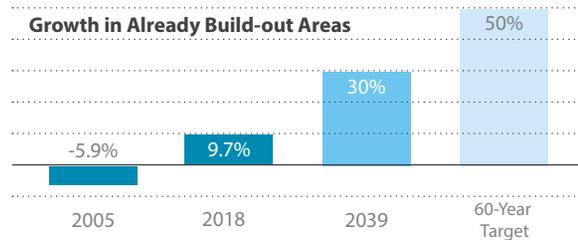
Nature within the City

Calgary is an impressively green city, with plentiful parks, natural areas and trees citywide. Weaving natural elements and features into every community has many benefits for health and wellbeing, while also lowering heating and cooling costs and reducing the amount the municipal government needs to spend on infrastructure to replace the functions that nature provides for free.

Calgary's Municipal Development Plan Targets

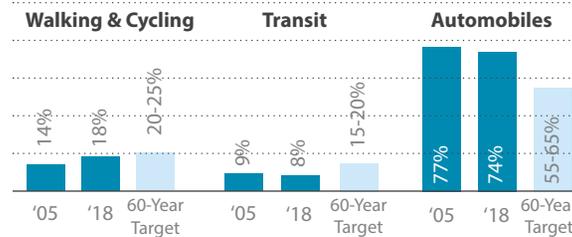
Calgary's Municipal Development Plan (MDP) identifies 14 core indicators to measure progress toward a more sustainable city that meets the needs of Calgary's diverse population. Here are the five indicators most relevant to environmental goals:

■ 60-Year Trend ■ 60-Year Target



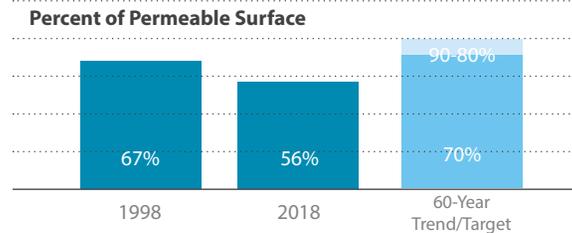
Urban Expansion

Calgary's population within existing developed lands is no longer declining (as it was in the middle 2000s), however, the population growth in the developed areas is not occurring fast enough to meet the 60-year MDP target of 50 per cent growth. Greenfield development continues to make up most of Calgary's growth.



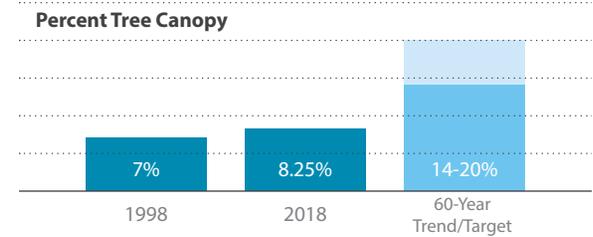
Transportation Modal Split

Though walking, cycling, and driving are trending toward their targets under the MDP, transit's share of total transportation is not growing, which creates challenges for reducing emissions and air pollution and meeting the 15-20 per cent target for that mode.



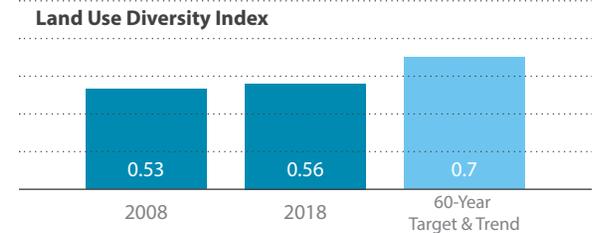
Watershed Health

The area of Calgary covered by permeable surfaces is trending away from the MDP target. Less permeable surfaces mean that less stormwater is absorbed and filtered by the land, instead collecting pollutants from urban surfaces and depositing them into the city's waterbodies, resulting in negative impacts on the health of these ecosystems and reduced water quality.



Urban Forest

Calgary is trending toward the lower end of the 60-year MDP target. Trees can provide enormous value for urban life by regulating urban temperatures, improving air quality, improving water quality, providing habitat, and sequestering carbon.



Land Use Mix

As with urban expansion, Calgary's land use mix has begun to increase, though not fast enough at present to meet the MDP's 60-year target. Diverse land uses within a community provide people with more transportation options, favouring lower emissions modes such as walking, cycling and transit.

Calgary's Growth

Calgary is a relatively young city that has seen rapid growth in a short period of time. This growth has ebbed and flowed along with the boom and bust cycles of the provincial economy. Through ongoing growth, Calgary has an opportunity to better align growth and development outcomes with environmental outcomes.

Calgary's Size

The City of Calgary comprises a large amount of land area for a city its size, consisting primarily of low-density residential development. Because Calgary is surrounded by rural municipalities, farmland and natural areas across a relatively flat topography, greenfield development is relatively straightforward. But this expansion comes at the cost of losing natural areas and farmland around the city and an increasing dependence on cars for travel within the city, which increases greenhouse gas emissions and impacts air quality, water quality, biodiversity, and ecosystem health.

Calgary's Population

Calgary's population has grown rapidly over the last few decades and continues to increase even though the economy has slowed. Population growth can stress existing built and natural systems through increased use. While Calgary grows, it is important to account properly for environmental impacts to ensure Calgary remains resilient and welcoming, with a high quality of life.

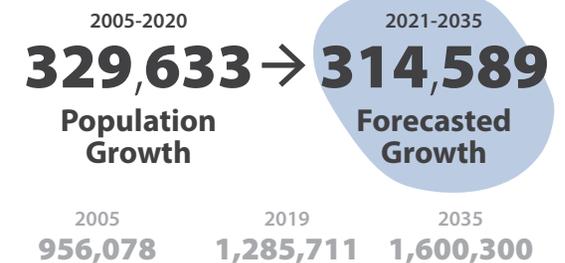
Calgary's Economy

Calgary's economy has been one of the primary engines of Canadian prosperity in recent years, but it is subject to wrenching boom and bust cycles. Diversification will help stabilize Calgary's economy and help foster a more holistic view in which a healthy environment and a strong economy are no longer viewed as competing objectives but instead as mutually supporting goals. Sustainable practices are increasingly seen as important for global competitiveness, and Calgary is well-positioned with considerable access to natural resources, capital, skills, and expertise to thrive in this new clean economy.

PHYSICAL SIZE



POPULATION



DWELLINGS



JOBS



Calgary's Environment



Calgary's Natural Environment

Calgary and its surrounding natural landscape consists of a unique, irreplaceable mix of prairie grassland, aspen forests, wetlands, riparian areas, and riverine ecosystems. Despite generations of residential, industrial, and agricultural development in the region, these ecosystems continue to support diverse natural habitats and make important contributions to the ecological, cultural, and economic health of southern Alberta.

Calgary's Climate

Calgary has a prairie steppe climate, with abundant sunshine, even in winter, and the region is prone to drought and flooding. These summer rains are vital for agriculture and water supply. Summers also include periodic violent hailstorms, causing property and crop damage. Calgary's sunny, dry climate is prone to rapid and unpredictable weather changes. It is also characterized by strong winds, owing to its prairie surroundings with few natural barriers. Warm, westerly Chinook winds out of the Rocky Mountains, capable of raising the temperature as much as 30°C in a few hours, make southern Alberta weather highly variable in winter.

Calgary's Watersheds

Watersheds are areas consisting of a single river basin fed by multiple waterways. They are

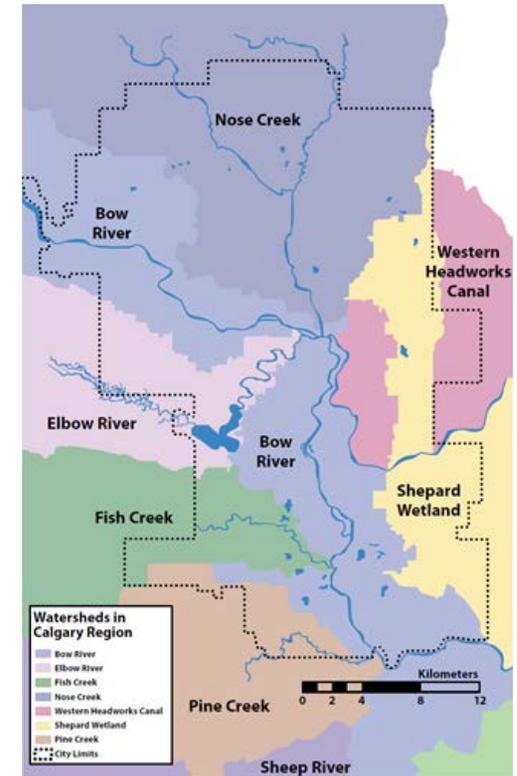
catchment areas that collect and direct water from precipitation. Calgary lies within the South Saskatchewan watershed and is located at the confluence of several smaller sub-watersheds: the Bow River, the Elbow River, Nose Creek, Fish Creek, the Shepard Wetlands, and Pine Creek.

Maintaining a healthy watershed is vital to the survival of all plant and animal species. Watersheds support ecosystems and wildlife as well as providing the following services:

- Supplying drinking water.
- Providing habitat.
- Providing critical inputs for agriculture, including water to irrigate crops, feed livestock, and maintain operations.
- Supporting industrial activity by supplying water for production, cooling, and cleaning.
- Providing natural beauty and space for recreational activities such as fishing, boating, and swimming.

Calgary's creeks and rivers together comprise a defining feature of the city's character, giving a strong sense of place and creating abundant opportunities to access nature within the city limits.

Calgary's watersheds are urban. An urban watershed differs from a natural watershed because there is less vegetation and more hard, impermeable surfaces. In a natural watershed, a significant amount of water infiltrates into the ground rather than flowing directly into water



bodies. In urban watersheds, there is more surface runoff, meaning, in some cases, more than twice as much water flows overland and directly into stormwater systems and water bodies than into the ground. This also means that water does not benefit from the filtering effects of vegetation, resulting in more pollutants and sediment entering water bodies directly.



The Bow River

The Bow River sub-watershed covers more than 25,000 square kilometres and makes up about 23 per cent of the South Saskatchewan River watershed. The Bow River's path begins in the Rocky Mountains at Bow Lake, flowing through Banff National Park, the foothills, several dams, and the City of Calgary before joining the Oldman River to form the South Saskatchewan River. Primarily fed by snow melt, glacial melt and rain, the Bow River's flow varies significantly throughout the year, with high river flows in the spring and summer and reduced flows in the fall and winter. At times of reduced flow, groundwater supplements the supply, but it contributes only about 20 percent of the river's annual flow.

The Bow River is the most populated and regulated river in Alberta. Access to its water is a significant resource issue that requires balancing environmental management with regional economic development. The City of Calgary is the largest municipal water user of the river, and ensuring a sufficient supply of clean water will pose a major challenge in the future as the city and the region grow.



The Elbow River

From its headwaters in the front range of the Rocky Mountains, the Elbow River sub-watershed, which is over 1,235 kilometres squared, extends eastward to where it joins with the Bow River in Calgary.

The Elbow River has provided drinking water since 1909. Today, the river supplies water to nearly half a million people, making it a unique example of a small river supporting such a large population. Although it is one-tenth the size of the Bow River, the Elbow provides drinking water to one in six Albertans. The river's core challenges include source water protection, flooding, drought, recreational impacts, and a growing population.



Nose Creek

The Nose Creek sub-watershed extends north from the centre of Calgary to Crossfield, passing through northern Calgary, Airdrie, and Rockyview County. The cumulative effects of increased residential and commercial development, industrial growth, stormwater discharge, agricultural activity and channelization are placing increased pressure on Nose Creek.

Image Source: Dawn from Flickr



Fish Creek

Fish Creek runs through Fish Creek Provincial Park, one of the largest urban parks in North America, stretching 19 kilometres from east to west. The park is bordered on all sides by human settlement—including the new Ring Road and the territory of the Tsuu T’ina First Nation. Fish Creek is home to abundant wildlife, including elk, deer, moose, bear, coyote, cougar, squirrel, porcupine, beaver, blue herons, snakes, amphibians, and fish.

Many Calgarians use Fish Creek Park for recreation, including educational programs, bird watching, mountain biking and running. Managing this heavy use, as well as agricultural and stormwater runoff, is critical to the park and creek’s health. To manage stormwater, Fish Creek Provincial Park contains one of Canada’s largest networks of engineered wetlands, which help to improve the quality of the stormwater runoff into the creek.



The Shepard Wetlands

The Shepard Wetlands in eastern Calgary are home to a wide range of birds, plants, and animals. The wetlands were formed by groundwater feeding into “kettle” depressions and draining very slowly. As a result, most of the water evaporates, leaving the groundwater’s mineral salts behind and creating a unique habitat. As Calgary has expanded eastward, many of these wetlands have been incorporated into urban development, with water draining into Calgary’s stormwater infrastructure and then flowing into Ralph Klein Park’s water treatment wetland and then on into the Bow River.



Pine Creek

Pine Creek originates in the forested lands west of Calgary and flows east through the largely rural areas of the Municipal District of Foothills before entering Calgary. Pine Creek eventually drains into the Bow River just east of Heritage Pointe.

The Pine Creek corridor is a steep ravine and remains largely undeveloped at present, with a large portion of the corridor retained as open space during the development of the Legacy subdivision.

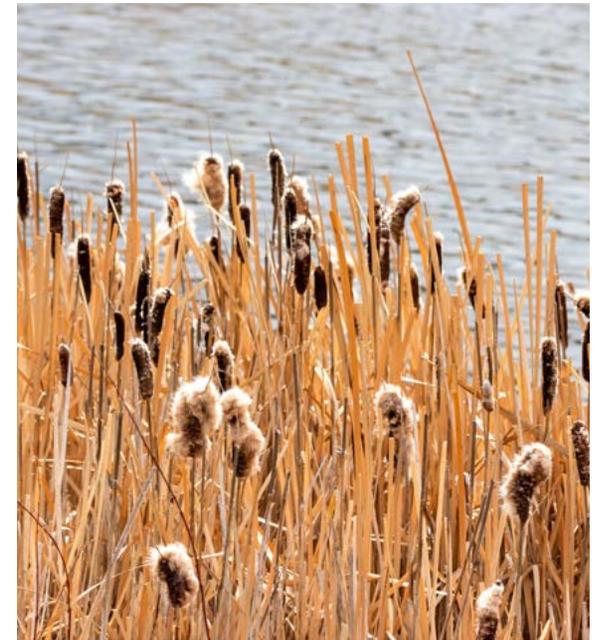
Calgary's Natural Features

Natural areas and open spaces are a defining feature of Calgary as a city, providing a strong sense of place and myriad opportunities for recreation, tourism, and education, as well as moments of quiet solitude in areas of natural beauty. Calgary's scenic waterways, mountain views, and prairie grasslands invite reflection, admiration, and wonder at the beauty of the environment.



Wetlands

Healthy wetlands slow water flow during floods, are vital to protecting Calgary's natural areas, and supplying ecosystem services that would otherwise require costly infrastructure. They also hold water during droughts and replenish the water in the atmosphere through evaporation. Additionally, they are natural filters, removing sediment and pollutants such as bacteria, fertilizers, pesticides, vehicle fluids, metals, and road salt. Wetlands are vital habitats for a diverse range of plants and animal. For example, more than 46 species of birds have been identified at Ralph Klein Park alone. All of this emphasizes the value of wetlands in Calgary justifying their retention as important community and city-wide assets.



Riparian Areas

Riparian areas—the lands that border creeks and rivers—function as natural filters. They improve water quality by trapping and storing sediment and filtering contaminants and nutrients from upland areas, helping to provide Calgary and downstream communities with fresh, clean drinking water. Riparian lands also store water and recharge aquifers through the slow release of water.

Riparian areas are among the most biologically diverse and productive ecosystems on the planet. Their nutrient-rich soils nurture plant communities that store water and support a lush diversity of life, providing critical urban habitats for fish and animal populations and functioning as important wildlife corridors for yearly migrations.

Healthy riparian areas provide Calgarians with recreation and education opportunities, enhance quality of life, and improve public health. They also help communities adapt to the impacts climate change by reducing the impact (and costs) of floods and droughts. Keeping riparian lands healthy reduces the need for intervention and investment in water quality improvement, stormwater management, erosion protection, and other infrastructure.

Prairie Grasslands

Fescue prairie grasslands are one of North America's most endangered ecosystems, and Alberta is the only place on the continent that is home to all three types of rough fescue (plains, foothills, and northern). These grasslands support biodiversity and provide critical habitat to the many species-at-risk in southern Alberta, where 80 percent of the province's endangered and threatened species reside. Many prairie species require large grassland areas to survive, one example being the swift fox.

Healthy fescue grasslands are also vital for the ranching industry and play important roles in Alberta's culture, heritage, and economy. In addition to protecting air, soil and water, grasslands, provide

sustainable livelihoods for Alberta ranchers, allow visitors to experience nature through low-impact recreation (including hiking, hunting, and photography), and serve as iconic settings for Alberta's film industry.

More than half of Alberta's unique grasslands have already been lost. Once native prairie has been converted into cropland, it is exceedingly difficult to restore. But grasslands remain underrepresented within the province's protected area network. Preserving and restoring these lands is crucial for enhancing biodiversity.



The Foothills

The foothills region, west of Calgary, is a transitional ecosystem, beginning at the eastern edge of the Rocky Mountains and fading northward into the boreal forest. This region is characterized by both steeply sloping and gently undulating hills. Southern Alberta's foothills are home to the largest populations of moose in North America and also provide habitat for snowshoe hare, beaver, muskrat, wolf and black bear.

Calgary's Environment Today and into the Future



Improving Calgary's Environmental Outcomes

The staggering complexity of environmental systems can make wise stewardship seem daunting. Restoring nature while meeting Calgary's current needs requires a bold vision that ties together the many facets of the environment—climate, air, water, waste, biodiversity—with how the city grows and meets its needs. The preservation of nature and the reduction of damage to the natural world should be a priority for all decision makers, not just specialized conservation organizations.

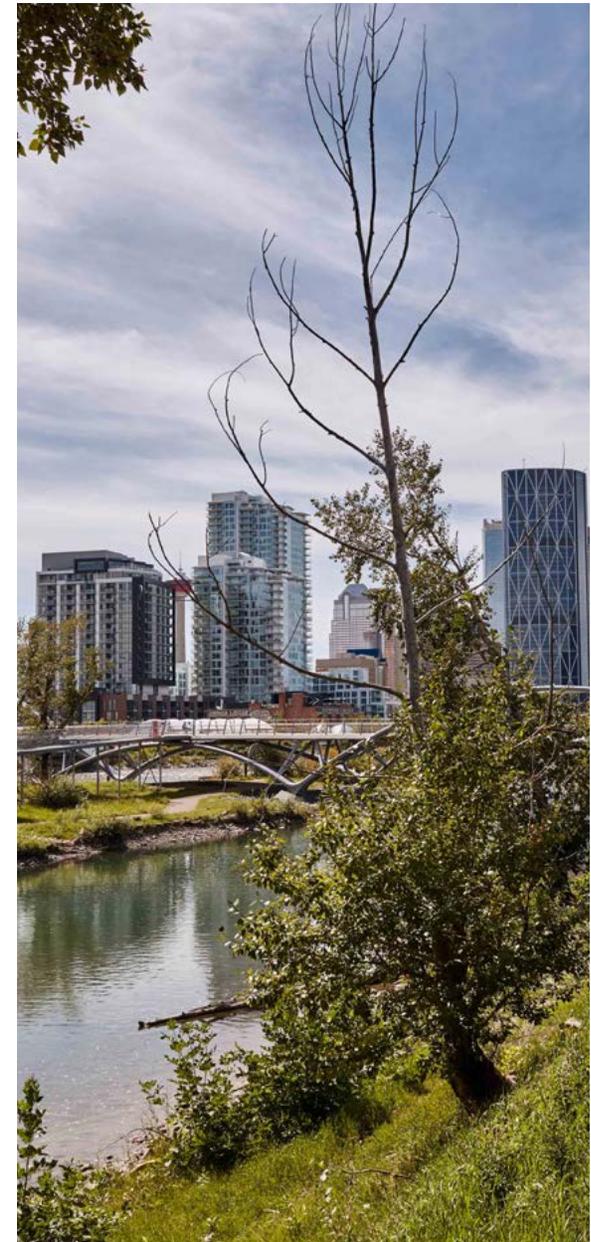
The '4 Rs' provide a framework to focus decision-making processes on addressing environmental needs:

- 1. Refrain:** Avoid negative impacts on nature.
- 2. Reduce:** Minimize the harm caused by any unavoidable impacts.
- 3. Restore:** Act to quickly counteract any harm caused to nature.
- 4. Renew:** Work to improve damaged ecosystems.¹

The City of Calgary has many options for contributing to individual stewardship efforts, from public outreach and education to direct infrastructure improvements and supportive grant programs. In addition to financial contributions, City-led initiatives can encourage wise individual actions by providing information and decision-support tools. Supporting these efforts makes good economic sense because they reduce long-term maintenance costs, build stronger and more resilient communities, support locally-owned businesses, and reduce the consequence of natural hazards by maintaining healthy natural areas.

Source(s):

¹*Four steps for the Earth: mainstreaming the post-2020 global biodiversity framework* <https://linkinghub.elsevier.com/retrieve/pii/S2590332220306576>



Calgary's Economy and the Environment

Calgary's recurring boom-and-bust cycle, driven by the oil and gas industry, can put added pressure on the city's natural assets during a boom cycle and make new investments harder to access in a bust. But the current bust highlights the need to for enhancing stability and diversity in Calgary's economy, and the environmental sector in Alberta presents opportunities to do so. The environmental sector is expected to grow rapidly in the coming decade, expanding by 14 per cent overall and resulting in 14,400 new jobs to 2029.¹ This job growth will be driven by investment in clean technologies, emissions reduction, and renewable energy.²

Transforming Calgary into a renewable energy hub and centre for innovative clean technologies is perfectly suited to the city's population and the phenomenal renewable energy resources available in Alberta.

¹ *From Recession to Recovery: Environmental Labour Demand Outlook* <https://www.eco.ca/research/report/environmental-labour-demand-outlook/>

² *Environmental sector jobs to see growth in spite of pandemic, report says* <https://esemag.com/news/environmental-sector-jobs-growth-report/>

Traverse Solar Project, Vulcan County, AB

- Secured via a **\$500-million investment**.
- Upon its completion in 2021, it will be the **largest solar farm in Canada**.
- The project will consist of **1.5 million solar panels**, and will generate approximately **800 million kWh per year**, enough to **power more than 100,000 homes**.



The Environmental Strategy

The Calgary Environment Strategy (Strategy) provides a comprehensive overview of the natural processes, emerging challenges, and unique opportunities facing Calgary and its residents. The Strategy will highlight what Calgary must preserve, improve, and celebrate to ensure that the city remains healthy and green. Calgarians are facing complex environmental challenges in the coming decades, and this strategy will help tie together The City of Calgary's strategic efforts to manage the biodiversity, water, air, waste and climate resources in a much more integrated way.

Without an overarching environmental strategy, it can be hard for a city and its residents to understand the cumulative impacts of their decisions, increasing the risk of irreparable damage to the natural landscapes of the region. The Calgary Environment Strategy is a roadmap and long-term commitment to protect and steward the environment as follows:

"The Environment Strategy and Action Plan (the Strategy) will renew and strengthen this commitment to the legacy of sustainability and improving quality of life and health in our communities and city. The strategy will set out a clear vision for improving Calgary's environment for all Calgarians."

The Strategy is drawing on extensive public input, expert advice, and research into best practices from cities around the world to preserve and showcase Calgary's unique natural assets. These irreplaceable elements make Calgary what it is, and the actions Calgarians take today will have a lasting influence on tomorrow's environmental health. Practically speaking, this means developing policies and plans to maintain and improve the natural conditions of the city and region, including:

- Clean air and water.
- Healthy soil.
- Responsible use of resources and materials.
- Expanded use of clean and renewable energy.

The Strategy will also support social and cultural amenities to improve community well-being, enhance quality of life, and foster a culture of sustainability citywide.

As Calgary has grown in recent decades, a number of smart decisions have helped preserve many of its most valuable natural features. A wide range

of community groups and individual Calgarians have enhanced the city's quality of life by acting to protect its green spaces and river valleys.

The new Strategy reframes and unites these efforts, and it also brings together the wide range of strategic plans created in recent years under a single banner of sustainability. These ongoing efforts are now focused on three linked corporate values:

1. A healthy environment.
2. A strong and vital economy.
3. Livable, inclusive communities.

These three values are consistent with the United Nations Environment Programme's description of a sustainable city as one that is "low-carbon, resource-efficient and socially just." It puts those values at the centre of Calgary's decision-making. In the age of climate change awareness, this will require a robust action plan to reduce the city's carbon footprint and build climate resilience and adaptation into every aspect of daily life.

By building on its legacy of stewardship with this Strategy, Calgary will continue to be a beautiful and inviting place that supports long-term economic growth and attracts visitors and new residents alike. The Strategy will help bring the city together as a thriving, vibrant, and sustainable home for all in the decades to come.

The Benefits of a Healthy Environment



The Benefits of a Healthy Environment

A healthy, resilient, and thriving natural environment is a valuable objective on its own—a way to maintain biodiversity, minimize pollution, manage waste and protect wildlife. But Calgarians also benefit directly from a healthy environment in many other ways, summarized here.

INDIVIDUAL AND PUBLIC BENEFITS

Allow future generations to meet their needs and enjoy enhanced quality of life

- Ensure reliable and clean water for drinking, fishing, and recreation.
- Support traditional use of land.
- Reduce infectious diseases (e.g. Lyme disease).
- Improve physical and mental health.
- Maintain clean air.
- Provide opportunities for Calgarians to enjoy nature in the city.
- Protect Calgarians from harmful substances.
- Support child development.
- Enable healthier homes and energy efficiency.
- Avoid premature deaths due to emissions and pollution.

CITY BENEFITS

Create resilient and green cities that exist in harmony with the natural environment

- Reduce the frequency and intensity of environmental emergencies.
- Reduce flood risk (for both river and stormwater flooding).
- Improve food security.
- Store carbon.
- Build resilient infrastructure.
- Improve adaptability to climate change.
- Integrate green spaces and natural infrastructure throughout the city.
- Decrease greenhouse gas emissions.
- Create low-carbon, climate-resilient buildings and communities.
- Reduce waste.

ECONOMIC BENEFITS

Ensure Calgary is competitive in innovative clean energy and cleantech sectors

- Attract talent and firms.
- Stimulate local innovation, entrepreneurship, and diversification.
- Capitalize on existing energy infrastructure and skills.
- Save money and time (individually and collectively).
- Increase global economic competitiveness.
- Transition to a low-carbon economy.
- Increase productivity.
- Add green jobs.
- Improve housing and transportation affordability.
- Enhance Calgary's national and international brand.

The Environment and the Economy

The cities that will thrive in the twenty-first century will be the ones that take bold action now to prepare for it—by weaving sustainable practices, low-carbon technologies, and climate resilience measures into everything they do. Cities can also encourage economic diversity and technological innovation by attracting investment in the work of building an equitable and green pandemic recovery.

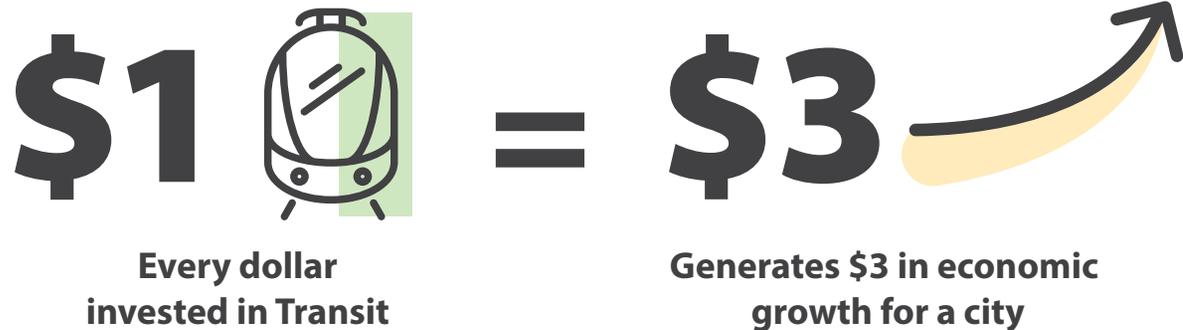
Caring for the environment can also help reduce costs for government and residents alike. A federal government study found that simply maintaining and enhancing wetlands in an urban setting can reduce disaster costs by 38 per cent.¹ The environmental sector is also a high growth sector. The cleantech industry is already a trillion-dollar business sector worldwide, and further growth in investment, new business activities, and jobs in clean technology is expected to accelerate in the years to come likely exceeding \$2.5 trillion by next year.²

Natural systems and the environment also provide significant value to communities. Policies and initiatives to expand green space and nurture biodiversity are not just about a healthy environment—they add enormous value through a range of ecosystem services, from reducing the impacts of floods to helping keep cities cool in the warmest months.

Sustainability is simply good business and an excellent investment in Calgary's quality of life.

¹ When the big storms hit <https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2017/07/When-the-Big-Storms-Hit.pdf>

² Accelerating clean innovation in Canada <https://institute.smartprosperity.ca/cleaninnovation>



Source: Federation of Canadian Municipalities

Calgary's Role in Achieving a Healthy Environment

There is a tendency to think of environmental challenges as mostly distant from daily urban life. When many people think of “the environment,” they imagine outdoor scenes in untouched nature far away from the city, defining it by the absence of urban amenities. With the challenges the world now faces—the climate crisis paramount among them—cities must come to be understood as the main engines of environmental stewardship and climate action.

The tools of urban sustainability all reinforce healthy lifestyles, enhance quality of life, and create new economic opportunities in every community. By reframing environmental challenges to address individual choices and the local context in Calgary, the ability to create lasting change and shift markets becomes much closer at hand.

Expert analysis around the world confirms that many of the most vital tools for climate action and are also the tools of **urban sustainability**. These include:

- Reducing food waste.
- Improving walkability and cycling networks.
- Expanding transit.
- Building new net zero buildings.
- Retrofitting existing buildings for improved efficiency.

As individuals, Calgarians can choose to use the tools of urban sustainability and demand their improvement so that choosing them becomes second nature. Examples include:

- Reducing food waste and composting organic household waste.
- Walking or using the cycling network.
- Riding public transit.
- Seeking out net zero buildings when buying a home and making these standards important market selling features.
- Retrofitting homes to improve heating or cooling costs.
- Supporting businesses who are choosing to follow sustainable practices.
- Demanding changes to make it easier for all Calgarians to choose sustainable options.

Green Success and Innovation

The past decade has seen the development of cost-effective tools to reduce impacts on the planet's natural systems. The cost of clean energy technologies such as wind and solar power has plummeted to a point where they are the cheapest sources of power in much of the world. Entirely electric cars are fast becoming a mainstream option, while mass transit and active transportation have seen renewed investment and enthusiasm. Enormous gains have been made in energy efficiency, green building design, electrified transport, and many other fields. Advances in waste management are facilitating a shift to a more "circular economy," where the ongoing repair, reuse, and recycling of commercial products avoids the inevitability of the landfill.

Although a clear path has now emerged toward a more sustainable way of life, much of the world (and much of Calgary) remains dependent on outdated technologies and established infrastructure. The increasing support for sustainable options in Calgary represents an opportunity to accelerate the transition to cleaner technology, while encouraging more efficient and sustainable ways of living. The City of Calgary can assist in helping individuals and organizations understand the costs and benefits of the range of available innovations.



Electric car market share growth

Calgary is part of the Peaks to Prairies Network, which will establish a network of 20 fast charging stations along with back-up "level 2" stations across southern Alberta. This will improve electric vehicle transportation northward to Edmonton and westward into the BC interior, linking up with other networks like the Accelerate Kootenays charging network.

Fun Fact: Ford anticipates electric vehicles will outsell fossil-fuel powered ones at some point in the next decade.¹

Image Source: Lynn Dombrowski from Flickr



Circular economy

Calgary has set a long-term goal of zero waste (in which all goods and services are designed for perpetual reuse in a closed loop) through recycling, composting and diversion programs. Some circular initiatives are already in place. These include:

- Recycling for packaging and paper products.
- Potable water re-use projects.
- Sustainable building policies.
- Tool- and appliance-sharing platforms, repair shops, and zero-waste retailers.
- Antique shops, thrift stores, consignment, and on-line platforms.

Fun Fact: Alberta has the highest participation rate in the second-hand economy in Canada, with a total second-hand spending of \$4.4 billion in 2017. The second-hand economy also supports 46,000 jobs in Alberta.²

Image Source: Steve Snodgrass from Flickr

¹ Governments unveil details of \$590M investment to help Ford Oakville plant make electric cars <https://www.cbc.ca/news/business/ford-oakville-government-1.5754974#:~:text=Business-,Governments%20unveil%20details%20of%20%24590M%20investment%20to%20help%20Ford,to%20start%20making%20electric%20vehicles.>

² City of Calgary Roadmap Summary <https://recycle.ab.ca/city-of-calgary-circular-cities-roadmap/>



Utility-scale renewable energy

Alberta's deregulated electricity market and the provincial government's commitment to phase out coal for power generation combine to create an outstanding opportunity for renewable energy. The Calgary area is in one of the sunniest regions in Canada, boasts abundant wind resources, and has excellent geology for geothermal energy. Pair these natural resources with a well-established service sector and a reputation as an energy leader, and Calgary is poised to lead in the renewable energy sector.

Fun Fact: Currently, Calgary has 241 renewable energy companies and 108 energy storage companies.³



Cleantech

Clean technology—often called simply “cleantech”—is a broad industrial category comprising companies and technologies that improve environmental sustainability. The field includes both companies that develop new technologies and those focused on reducing the negative impact of existing technologies and industrial processes.

Fun Fact: Calgary was ranked one of the world's top 15 cleantech ecosystems in 2019 with more than 70 per cent of Alberta's cleantech head offices located in Calgary. Many of these companies focus on oil and gas, electricity generation, and food and agriculture.⁴

Image Source: Kate Field from Flickr



Green building design

The City of Calgary's Sustainable Building Policy ensures that all City-owned and City-financed facility planning, design, construction, management, renovation, operation and demolition is carried out in a sustainable manner and takes triple bottom line impacts into account. The policy enhances The City of Calgary's reputation as a fiscally responsible municipal government and addresses the health and well-being of the people who use and occupy the buildings.

In addition to greening its facilities, The City of Calgary is also committed to sustainable infrastructure. Various Low Impact Development (LID) and water saving features, such as rain gardens, are being incorporated into City projects.

Fun Fact: As of 2018, 390 buildings in Calgary have achieved LEED certification, with more than 90 of those certified as LEED Gold.

Image Source: NNECAPA from Flickr

³Alberta could lead Canada in wind and solar power by 2025, expert says <https://www.cbc.ca/news/business/alberta-wind-and-solar-future-1.5728757>

⁴Cleantech <https://calgaryeconomicdevelopment.com/sectors/focus-areas/energy/cleantech/>



Key Concepts and Approaches to Environmental Sustainability

Living within the Limits of the Environment

The concept of “ecological limits” is vital for understanding many of the environmental challenges Calgary is facing today. Living within the ecological limits requires working to decrease ecological footprints and promote ecological integrity.

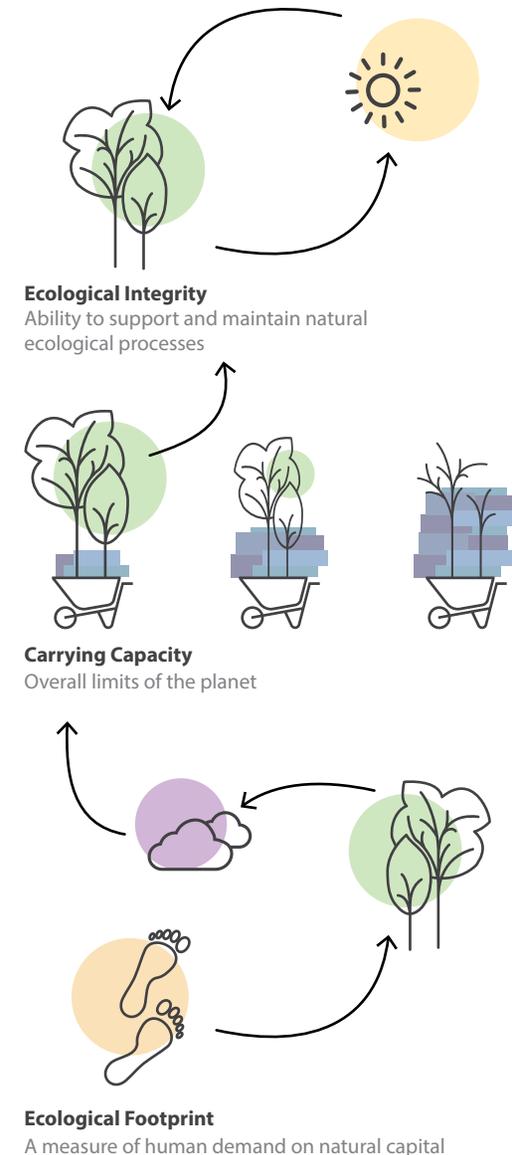
¹ Carrying Capacity <https://worldpopulationhistory.org/carrying-capacity/>

² Ecological Footprint <https://www.footprintnetwork.org/our-work/ecological-footprint/>

Ecological integrity refers to the ability for an ecosystem to support healthy habitats and maintain ecological processes. Though there are many “renewable” resources on the planet, these can only regenerate as long as their overall ecological integrity remains intact. When resources are over-harvested, such as fish or forests, it can destroy this integrity and cause ecological collapse. This means that the system is depleted past the point where it can recover. The same is true of the amount of waste or pollution a system can absorb before it is detrimentally affected.

The overall limits of the planet are often referred to as **carrying capacity**. Carrying capacity is the maximum population of a species that can be sustained in a specific environment without compromising its ecological integrity. There are over 7.8 billion people living on the planet, and that figure is expected to grow to 9.5 billion by 2050.¹ This large and growing population brings with it a very large ecological footprint.

An **ecological footprint** is a measure of the human demand on natural capital or “biocapacity.” That demand includes the amount of land needed, the resources consumed, and the waste generated. Compared to the overall capacity of the planet, humanity is using more than the Earth can give. In fact, together humanity is using about 1.75 Earths of capacity annually.² This means that the Earth takes a year and eight months to regenerate what everyone consumes globally in a year.



Natural Systems and Services

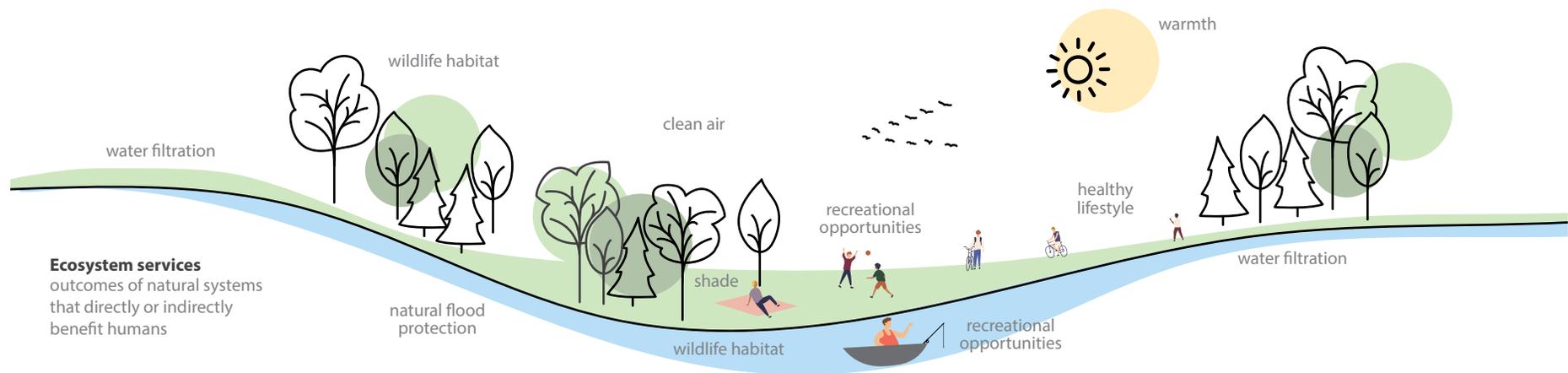
To learn to live within ecological limits, cities must focus on the services supplied by natural systems and find ways to integrate these functions into all decision-making processes. The multitude of natural systems that urban populations rely on for health and wellbeing can easily be taken for granted, in part because it can be hard to quantify their value against other economic and social priorities. Ecosystem services and natural capital are two frameworks for quantifying the value of natural systems so that they are factored properly into the decisions organizations and governments make.

Ecosystem services are the services, outputs and processes of natural systems that directly or indirectly benefit human populations.

Natural capital measures the economic value of natural systems and the ecosystem services they provide. Calculating natural capital requires taking inventories of natural assets and their functions and then estimating the cost of the infrastructure required to match those services.

In addition to determining the value of natural assets as infrastructure, cities can also develop ways to measure the social and cultural value of natural systems as part of their natural capital accounting. Spending time in nature is beneficial for physical and mental health, and parks and open spaces

are significant sources of tourism and recreation revenue. Proximity to nature and its aesthetic value should also be considered. By considering all these factors, natural capital measures the total economic and social value of a city's natural infrastructure and assets.



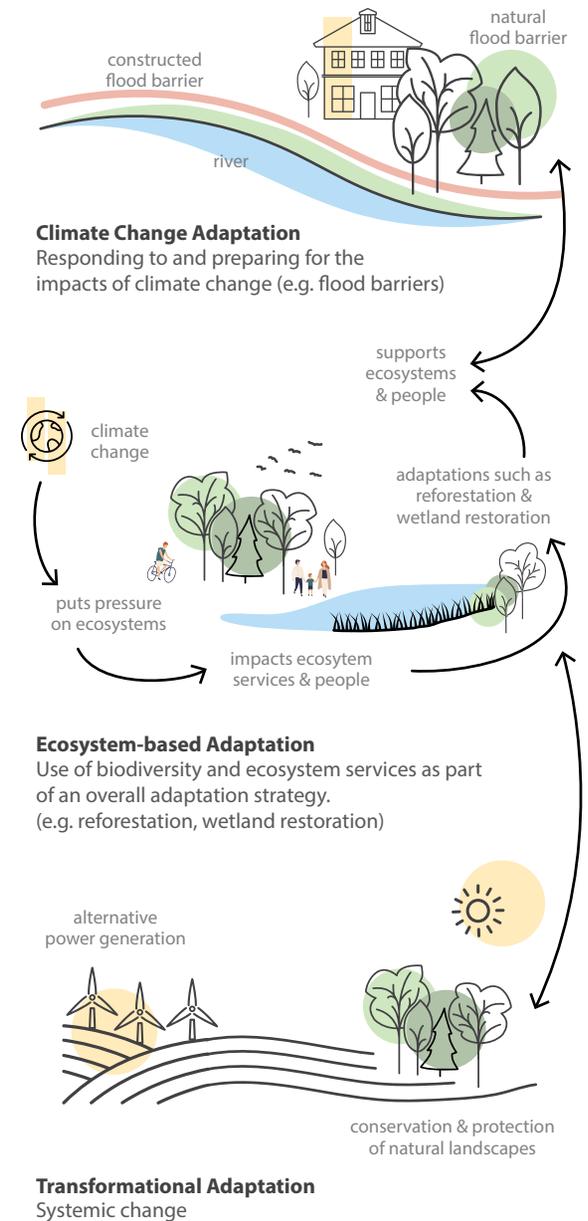
Environmental and Climate Change Adaptation

Communities have been adapting to climate variability for centuries, but today their established coping mechanisms are being outpaced by the rapidly changing climate. Climate change is happening at a faster pace and scale than has ever been seen before, due to the magnitude of human emitted greenhouse gases in the atmosphere. The impacts of climate change, including more frequent extreme weather events, loss of biodiversity, and environmental disasters, are only likely to magnify, with serious near-term implications for health, well-being, and livability in every city.

Calgary must begin preparing today for a significantly altered climate, building resilience and adaptation into both human and natural urban systems so they are ready for the challenges created by dramatic changes in climate, weather, social patterns, and economic trends. The approaches to adaptation to be considered include:

- **Climate Change Adaptation**, referring to the process of responding to and preparing for the impacts of climate change (e.g. flood protection).
- **Transformational Adaptation**, a deeper level of adaptation that results in the systemic change of social, economic, and ecological systems to safeguard people and infrastructure.
- **Ecosystem-based Adaptation**, which involves enhancing ecosystem services (through conservation, management and restoration) and nature-based solutions to reduce a community's vulnerability and increase its resistance to climate change (e.g. better forest management to reduce the risk of wildfires).¹

¹ Ecosystem-based Adaptation <https://www.iucn.org/resources/issues-briefs/ecosystem-based-adaptation>



Nature and Natural Systems within Cities

“Nature-based systems”—the process of harnessing nature’s assets to meet the needs of urban populations—is a vital response to climate change pressures in cities. An ecosystem-based adaptation approach involves recognizing and capitalizing on natural systems to work with nature rather than against it and build a healthier environment.

To design in harmony with nature is to become a **biophilic city**—a nature-loving city where planning and design incorporates the natural world into the daily lives of residents.¹

Natural infrastructure involves harnessing natural landscapes, such as wetlands and riparian

areas, to minimize flood damages, treat and store stormwater, and reduce urban stormwater runoff through naturally occurring ecological processes or engineered infrastructure intended to mimic a natural process. In addition to stormwater management, natural infrastructure can support biodiversity, protect habitats, facilitate climate change adaptation, and sequester carbon.

Carbon sequestering is a process of carbon dioxide removal (CO₂) from the atmosphere through techniques such as carbon capture, re-forestation (replacing lost trees) and afforestation (adding trees where they didn’t exist before).

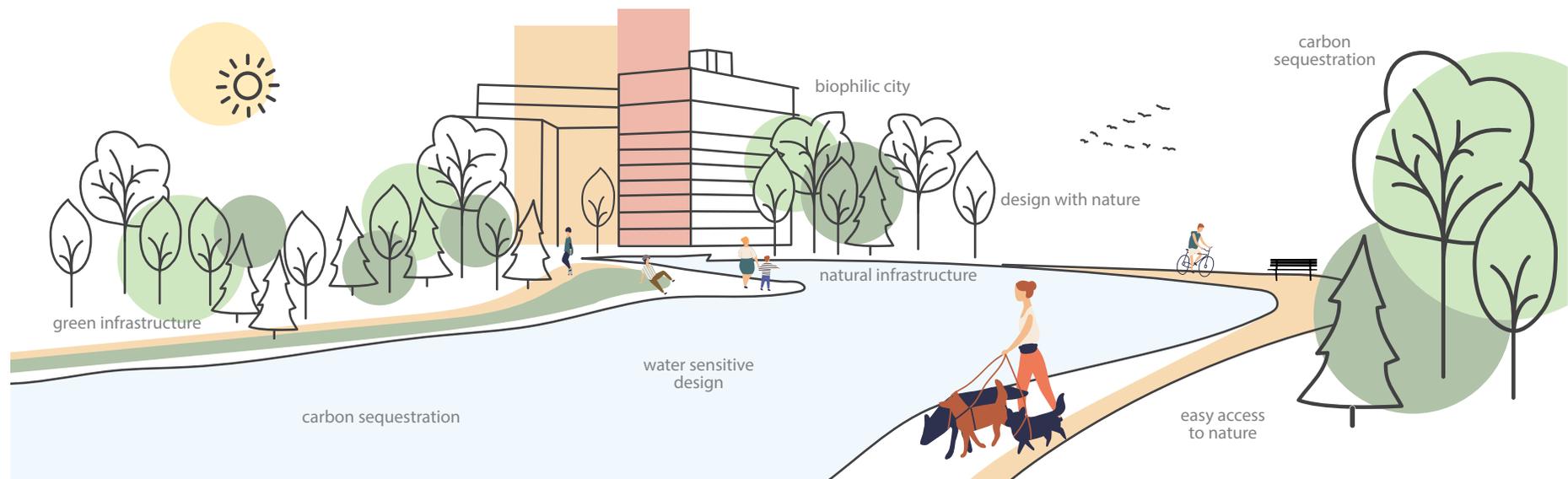
Green infrastructure uses vegetation, soil, and other elements to restore natural water management processes by filtering and absorbing stormwater. This includes small interventions such

as rain gardens and bioswales as well as preserving larger natural areas. In addition to cleaning water, green infrastructure offers flood protection, provides habitat, and improves air quality.

Water-sensitive urban design integrates stormwater, groundwater, wastewater and water supply into land-use planning, engineering, and urban design to minimize environmental degradation and beautify the urban environment.

Integrated watershed management includes co-ordinated water and land management that achieves economic and social benefits without compromising ecosystem sustainability.

¹ *The rise of biophilic – or nature friendly – cities* <https://thehill.com/changing-america/resilience/smart-cities/482752-the-rise-of-biophilic-or-nature-friendly-cities>



Economic Opportunities through Environmental Sustainability

Research confirms that some of the biggest strides toward Calgary’s climate goals can be met in ways that also strengthen the city’s economy—generating clean energy, radically enhancing energy efficiency, embracing green economies, reducing waste, and adopting the principles of a circular economy.

A **green economy** is an economy based on reducing environmental risks and supporting sustainable development. It also accounts for the economic value natural capital and ecosystem services. Investing in and expanding the development of the green economy will introduce more employment opportunities for Calgary that have a direct, positive impact on the environment. A green economy also creates **green jobs**, which includes work related to renewable energy, energy efficiency, and environmental management.

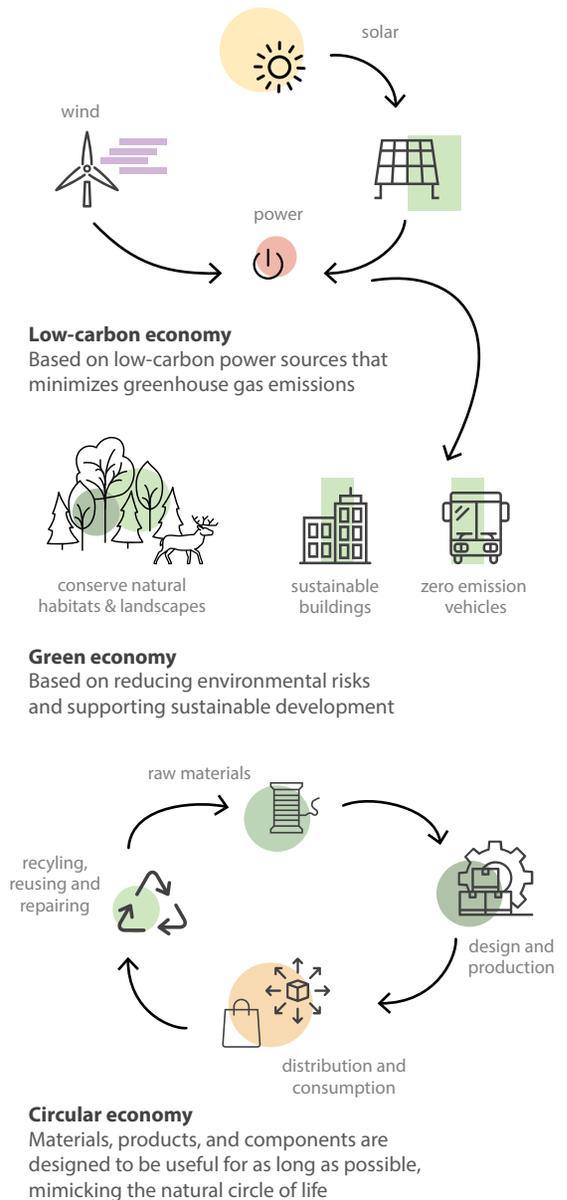
The **low-carbon economy** is an approach to developing a green economy based on low-carbon power sources that minimizes greenhouse gas emissions, with a focus on power generation and distribution tools such as renewable energy and smart-grids.

A **smart grid** is an electrical grid that incorporates operational and monitoring technology such as smart meters, smart appliances, renewable energy resources, and energy efficient resources to allow for much more precision and efficiency in the production and distribution of electricity.

Full-cost accounting determines the complete end-to-end cost of producing products and services. This type of accounting can help ensure informed decision making.

The principles of the **circular economy** shift manufacturing processes away from the current linear model of raw materials (input) to consumption to waste (output), by adopting a circular model where materials, products, and components are designed with perpetual reuse and recycling in mind. This can help the city work towards **zero waste**.

The cities that will thrive in the twenty-first century are the ones that are taking bold action now to prepare for change by weaving sustainable practices, low-carbon technologies, the circular economy, and climate resilience measures into everything they do.



Livable, Inclusive Communities

The infrastructure of cities—parks and green spaces, utilities, streetscapes and neighbourhood designs—can enhance resilience, better preparing cities for the impacts of climate change even while this infrastructure improves quality of life by creating healthier communities, better public spaces, and reduced pollution. Expert analysis around the world confirms that many of the most vital tools for climate action and are also the tools of urban sustainability.

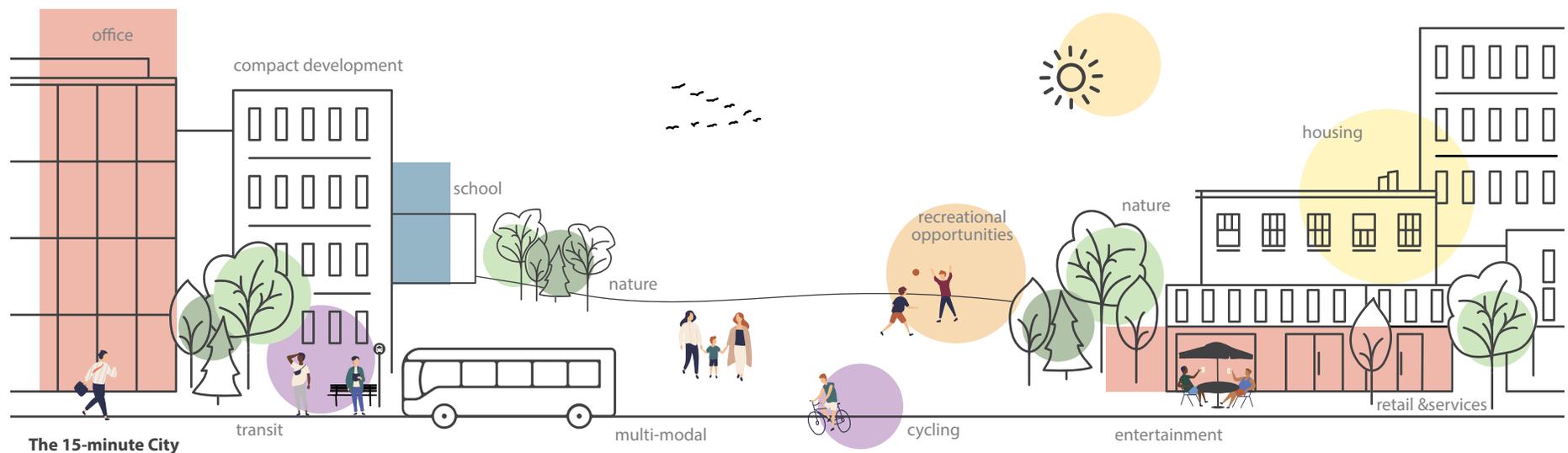
Urban sustainability leaders have recently integrated these livable-city tools into a holistic

approach called the “**15-minute city**”—the concept of building a city where every resident is never more than fifteen minutes from all the necessities of life, from work to shopping to school. This concept, also known as a **complete community**, echoes longstanding urban sustainability principles regarding the value of complete streets, walkability, public spaces, and mixed-use buildings. The value of complete communities was emphasized by the hardships endured during the pandemic, particularly the increased demand for nearby public spaces and parks.

Integral to the establishment of a 15-minute city is compact development and the provision of multi-modal mobility options. **Multi-modal transportation systems** emphasize improving

walkability and cycling networks, expanding transit, and providing multiple mobility options in a safe, comfortable, and seamless manner.

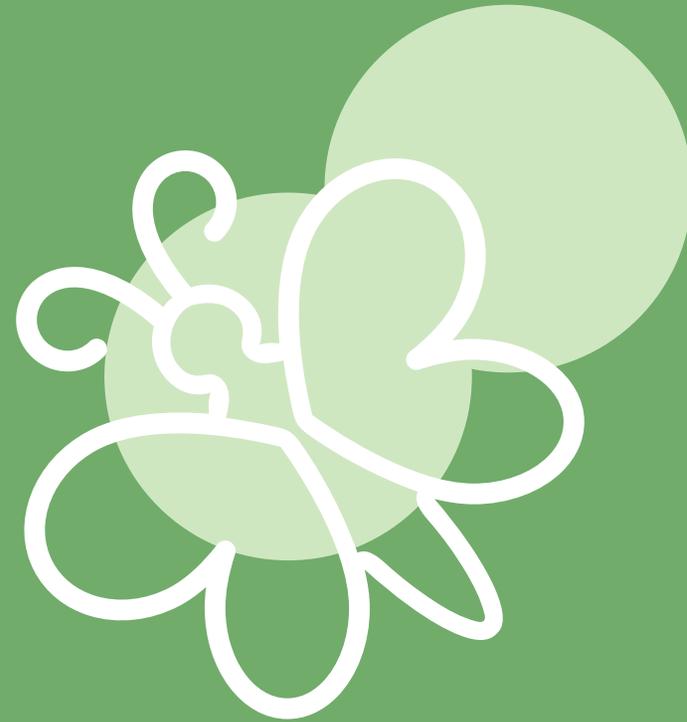
Compact development focuses on efficient land use through higher density development, infills, clustered development, mixed land uses, and brownfield development. This maximizes the use of existing infrastructure and reduces maintenance and operations costs for municipalities, helping cities better use scarce resources.



Environmental Focus Areas



Biodiversity + Ecosystems



Biodiversity and Ecosystems Overview

Natural systems are an essential component of healthy and thriving human environments.

Over the years, natural systems have been altered as Calgary has developed and urban areas expanded. Though some natural areas have been retained and protected, some have been modified greatly from their original functions. Others have been entirely lost to development. In general, habitat has become fragmented, resulting in less connectivity between natural areas, making it harder for wildlife to move from one place to another, and leading to greater human and wildlife conflicts.

Balancing the conservation of natural systems with development priorities is a challenge facing all cities. In addition to development pressures, Calgary's natural areas face pressures from climate change, recreational activities, and invasive species, which also alter their function and ability to adapt.

Recognizing the importance of these areas to the health and wellbeing of Calgarians, The City has been working to repair many of these natural spaces through stream restorations, riparian buffer plantings, living shoreline projects, habitat

restorations, and the care of urban forests. The protection and restoration of natural areas will continue to be a significant priority in the future in response to climate change and a growing need for strengthened natural infrastructure.

Measuring Biodiversity

One of the primary ways to assess the overall health of natural systems in Calgary is to examine biodiversity. Biodiversity is the variability among the species of animals, plants, and habitats on land and in waterways. The more diversity there is within and between species and ecosystems, the healthier and more resilient a natural system is.

Calgary measures its biodiversity in a variety of ways. An important measurement is the quality and quantity of natural areas and open space. Calgary has both natural areas and parks, which serve different functions. Natural areas are habitats that have been conserved or protected from development to retain their original ecosystem functions. Parks, though they may contain natural habitats, have been modified to provide recreation and other amenities and, as a result, do not provide the same quality of habitats as natural areas do.

Biodiversity

the variability among living organisms

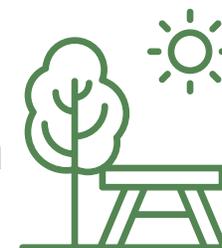


Natural Areas

habitats conserved or protected from development to retain original ecosystem functions

Parks

has natural habitats, but have been modified to provide recreation and other amenities



Natural areas are more biodiverse and provide greater ecosystem services than parks because there has been less disturbance to the landscape. Disturbance affects the quality of habitat, reflecting the level of change from the original ecosystem and its functions. Disturbances can be from human actions, severe weather events, or the spread of invasive species.

Disturbance can be counteracted through restoration, which is when work is conducted to help restore a landscape to a more natural state to support biodiversity and ecosystem functions. The City of Calgary tracks how much habitat has been restored as one of the indicators of ecological health.

In some cases, there are also opportunities to further naturalize the city's parks. This means returning some areas to a more natural state through tactics such as establishing wild grasses rather than mowing or manicuring spaces. These naturalized spaces will still not achieve the same ecological functionality as the original or restored natural areas, but they will provide greater ecological functionality than a more formalized park. Though parks are more disturbed landscapes, they still provide valuable ecosystem services as green spaces, including stormwater management, carbon sequestration, air filtration and passive recreation opportunities.

Disturbance

affects quality of habitat, reflecting level of change from the original ecosystem

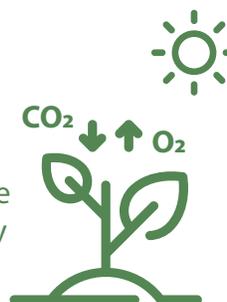


Restoration

when work is conducted to help restore a landscape to a natural state

Naturalize

returning areas to a natural state through tactics to provide greater ecological functionality (e.g. carbon sequestration, air filtration)



Another indicator of ecological health is the percentage of impervious surfaces in Calgary. Impervious surfaces include asphalt and other paved surfaces that do not allow water to soak through into the ground, which can cause increased stormwater runoff and send higher volumes of pollutants flowing into creeks and rivers.

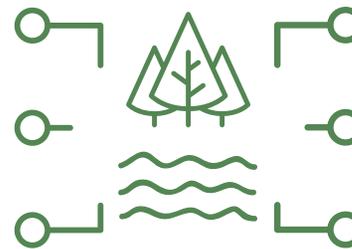
When there are a lot of impervious surfaces, they can also contribute to the urban heat island effect, which is when the ground retains heat and increases local temperatures. The more impervious surfaces inside the city, the less vegetated surfaces and potential habitat available.

Tree canopy is another important measure of ecological health. Trees provide a range of habitat functions as well as ecosystem services that benefit people, including reduced air pollution, cooling and shade, and improved aesthetics.

Finally, it is essential to analyze the ecological connectivity of Calgary's natural areas. This involves assessing natural areas as part of an overall interconnected system. High connectivity supports greater biodiversity by providing a larger land area in which species can mix and travel. In contrast, fragmented habitats become islands within the city, making it difficult for species to travel and reducing the amount of genetic variability in a species. This fragmentation can be compounded by other infrastructure barriers which often lead to human-wildlife conflicts, such as vehicle and animal collisions.

Ecological Connectivity

viewing our natural areas as a part of an overall interconnected system



Urban Heat Island Effect

when ground retains more heat and results in a local increase in temperature



Impervious surfaces that do not enable water to infiltrate into the ground



Tree Canopy provides a range of habitat functions as well as ecosystem services that benefit people (e.g. shade)

Targets | City Targets

GOALS

One of the goals of Calgary's Municipal Development Plan (MDP) is to:

Conserve, protect and restore the natural environment.

The MDP sets out the following objective to fulfill this goal:

Maintain biodiversity and landscape diversity, integrate and connect ecological networks throughout the city.

TARGETS

The MDP sets out a series of Core Indicators. These include the following long term (60 year) targets:

- Reduce total city impervious surface to 10-20 per cent.
- Increase tree canopy to 16 per cent.
- Direct 50 per cent of population of growth to within developed areas.

In addition to the MDP, The City prepared a 10-year biodiversity strategy in 2015 called Our BiodiverCity. This strategy directs:

- Restoring 20 per cent of Calgary's current open space to increase biodiversity by 2025.
- Establishing of conservation targets for ecological cores and corridors.
- The development of strategies for the management of invasive species.

Fact Sheet | Trends

Though Calgary has been continuously adding land to its parks system each year with new development, the rate of population growth means that over time, the amount of park space available per person has declined, decreasing by four per cent from 2013 to 2019. In 2019, the average park area per person was 67 square metres.

Approximately 642 hectares has been added to the parks system between 2013 and 2019. About 34 per cent of this was maintained or manicured park and the other 66 per cent was natural area

Calgary has been gradually increasing its tree canopy in recent years. In 1998, the city had a seven per cent tree canopy coverage, which increased to eight per cent by 2019. This one per cent increase over 20 years indicates The City has a way to go to meet its long range target of a 16 per cent tree canopy.

Calgary is not on track to meet its target for the percentage of impervious surfaces in the city. The City's long-term goal is to reduce impervious surfaces to 10 to 20 percent of total land area, while increasing the amount of vegetated spaces. In 1998, 33 per cent of Calgary was covered by impervious surfaces, and this has increased to 44 per cent by 2016. Significant additional effort will be needed to reverse this trend.

↓ **4%**

decrease in parkland available per 100,000 people from 2013 to 2019

approximately

642 ha

added to the parks system between 2013 and 2019

34%

was maintained or manicured parkland



66%

was natural parkland



in 2019, the city had an

8%

tree canopy coverage



in 1998, the city's coverage was **7%**

by 2016, the city's impervious surfaces have increased to

44%



in 1998, impervious surfaces were at **33%**

Fact Sheet | Park Space and Tree Canopy Trends

INDICATOR	TREND	AMOUNT OF CHANGE	CURRENT LEVEL	TARGET
Total Maintained Park Area	↑	+427 hectares since 2008		N/A
Maintained Park Area Added Annually	→	-0.5 hectares since 2008	61.52 hectares added in 2019	N/A
Total Natural Park Area	↑	+857 hectares since 2008		N/A
Natural Park Area Added Annually	↓	-22.09 hectares per year since 2008	39.57 hectares added in 2019	N/A
Total Amount of Parks (Natural, Maintained and Other)	↑	+1320 hectares since 2008	8554 hectares	N/A
Total Park Area per Person	↓	-28 hectares per 100,000 people since 2013 (-4 per cent)	665 hectares per 100,000 people in 2019	N/A
Tree Canopy	↑	+1.2 per cent since 1998	8.2 per cent in 2019	16 per cent
Trees Planted Annually			25,000 planted in 2019	N/A
Impervious Surface	↑	+12 per cent since 1998	44 per cent in 2018	10-20 per cent

Fact Sheet | **Park Space Provision**



8554 ha
total managed park space in 2020

2299 ha
total site area with high potential
for naturalization



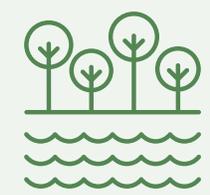
99.8%
citizens within a 450 m walk
of a park space in 2020

Total percent of parkland in 2019

44%
manicured



56%
natural



Fact Sheet | Biodiversity Cores and Ecological Network Connectivity

Within the ecological network, there are two main types of habitats: core habitats and stepping stones. Core habitats are larger areas of natural or semi-natural habitat greater than 30 hectares in size. These areas provide temporary or permanent resources for breeding, feeding, shelter, and movement for a variety of species. Core habitats are primarily City-owned land, with the exception of Fish Creek Provincial Park. All other core habitats are classified as Natural Environment Parks.

Stepping stones are smaller natural areas, usually five to 30 hectares in size. These areas are used by species to seek shelter, find food, or rest. These form the backbone of the secondary corridors (described later). All stepping stones are City-owned natural areas.

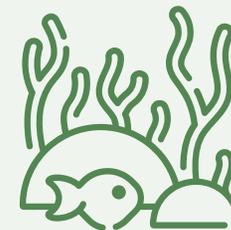
In Calgary, the most significant ecological network corridors are the region's rivers. These are classified as primary corridors. They provide the greatest level of contiguous ecological connection through the city to the region, and although fragmented by development in places, the primary corridors provide opportunities for wildlife movement and connected habitats.

Secondary corridors are relatively linear stretches of landscape elements connecting core habitats to each other or core habitats to the primary corridors (rivers and creeks). Secondary corridors offer some potential for safe journeys from one core area to another, but high fragmentation can reduce corridor integrity. Both types of corridors contain lands from a mix of ownership.



Stepping Stones

small, natural area nodes that are more fragmented, usually 5 to 30 hectares in size



Core Habitats

larger areas of natural or semi-natural habitat greater than 30 hectares in size



Primary Corridors

provide the greatest level of movement for wildlife and provide the most connected habitat (i.e. rivers and creeks)

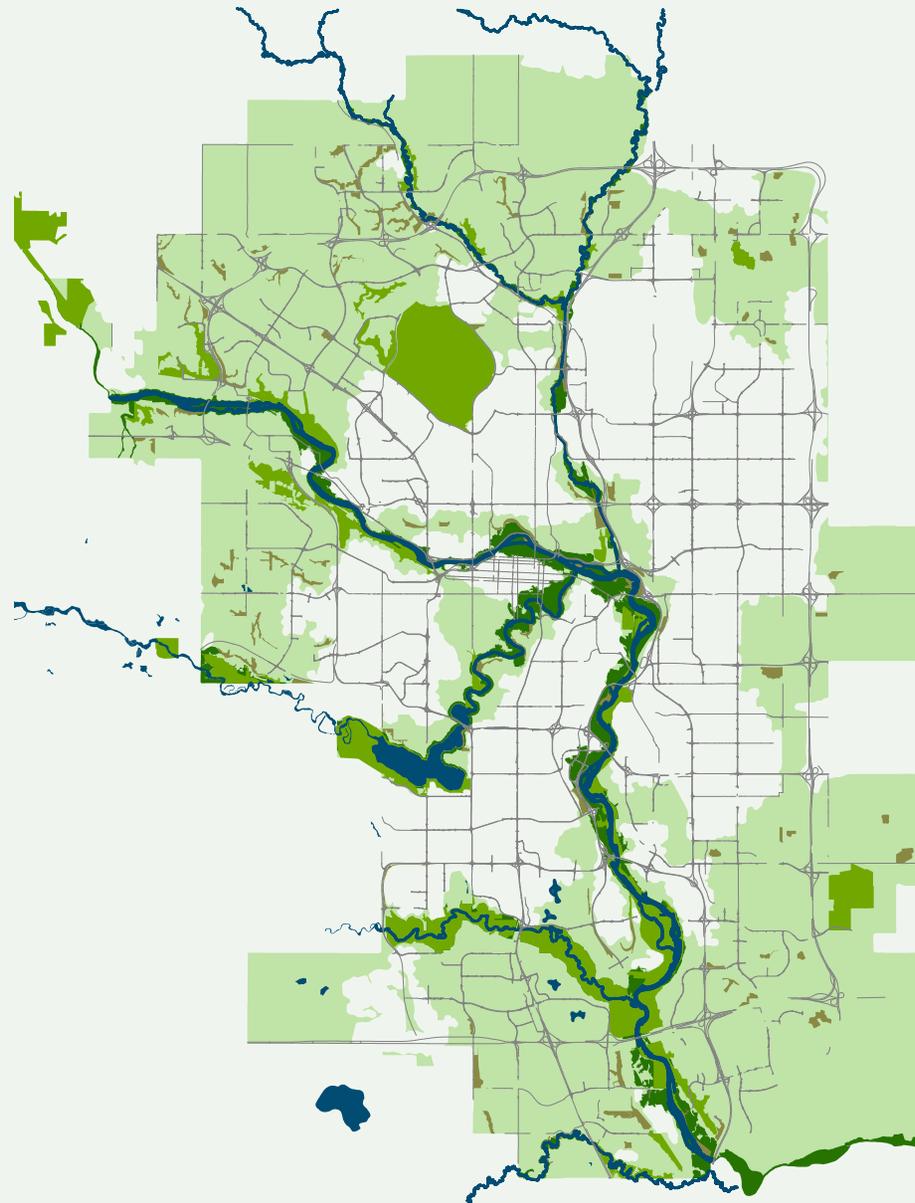
Secondary Corridors

linear stretches of landscape elements connecting core habitats to each other or core habitats to primary corridors

CALGARY'S HABITATS AND CORRIDORS

Legend

- Road
- Open Water
- Core Habitat
- Stepping Stone
- Primary Corridor
- Secondary Corridor
(linear stretches of parks and private lands)



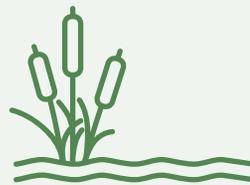
Fact Sheet | Impacts of Biodiversity

Connecting with nature is scientifically proven to be beneficial to overall health and wellness. Access to good quality green space and living in neighbourhoods with abundant trees and vegetation can have a big impact on quality of life. Calgary’s natural areas, parks, and open spaces are places where Calgarians can exercise, meet, socialize, and relax. Connecting with nature also helps develop a greater understanding of natural systems and the need to conserve them.

In addition to directly influencing individual mental health and the beauty of Calgary, natural systems also clean the air, soil, and water. The ecological processes that occur in natural areas benefit other species and wildlife, while at the same time providing ecosystem services that take some of the pressure off of city infrastructure. For example, healthy riparian areas and wetlands help to store rainwater and mitigate flooding. Trees and vegetated spaces help to reduce overall heating costs, provide shade and retain moisture. In many ways, natural areas can be thought of as natural infrastructure.

In the future, natural infrastructure will be critically important to help Calgary adapt to climate change. Healthy and biodiverse ecosystems are the most resilient to change. Loss of these important systems, and their replacement with engineered solutions

make the city less able to adapt to the increasing frequency and severity of weather events, rising temperatures, and other impacts of climate change. Engineered infrastructure also often costs more, because this infrastructure requires more frequent replacement and repair than a natural system which sustains itself.



Natural Infrastructure

natural areas that provide habitat, flood protection, cleaner air and water (e.g. wetlands)



A natural system is self-sustaining



natural infrastructure takes pressure off of engineered infrastructure and costs less

Healthy riparian areas



mitigate flooding



store and filter rainwater

when an ecosystem is healthy and biodiverse, they are the most resilient to change

Fact Sheet | Overall Diversity

SPECIES IN CALGARY (2015)

INDICATOR	TOTAL	NON-NATIVE	STATUS
Mammals	52	2	100
Birds	365	8	71
Reptiles	4		4
Amphibians	6		3
Fish	22	2	1
Vascular Plants	845	148	53
Non-vascular Plants	101		7

Bird Friendly City

In the last 50 years, bird populations in North America have dropped by a quarter. This means approximately three billion birds have disappeared during this time. Much of this can be attributed to human causes, such as domestic house cat ownership, significant habitat loss, and collisions with building windows and vehicles. To combat this alarming trend, Nature Canada created a new certification called ‘Bird Friendly Cities’ to encourage and recognize the efforts that municipalities are undertaking to make cities safer for birds.

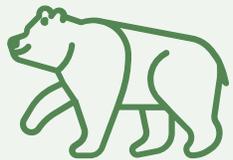
Calgary was recognized as a Bird Friendly City in 2021 by Nature Canada. The criteria that earned Calgary’s designation were its efforts towards:

- Reducing human-related threats to birds
- Habitat protection, restoration, and climate resiliency
- Community outreach/education

Source: <https://naturecanada.ca/bfc/><https://naturecanada.ca/bfc/>

Fact Sheet | **Wildlife Conflicts**

17,405 animals killed on Calgary roadways
between 2015-2019 including:



1 Bear



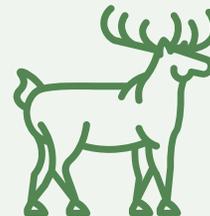
1 Cougar



398 Coyotes



1631 Deer



18 Moose

\$45,376,600 estimated financial cost
of collisions

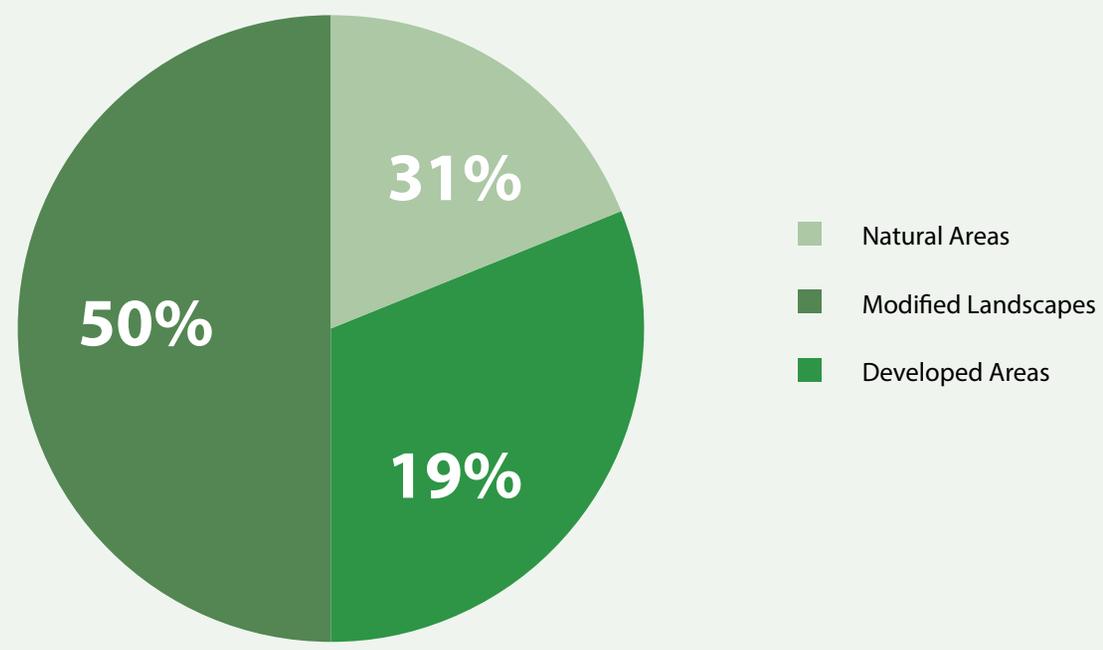
Fact Sheet | Restoration Projects

LEVEL OF COMPLETION	COUNT (#)	PER CENT OF TOTAL COUNT	AREA (HECTARES)	PER CENT OF TOTAL AREA
Active	159	42.6 per cent	234.8	35.2 per cent
Complete	82	22.0 per cent	88.3	13.2 per cent
Identified	110	29.5 per cent	321.1	48.1 per cent
On Hold	22	5.29 per cent	23.8	3.6 per cent
TOTAL	373		667.9	

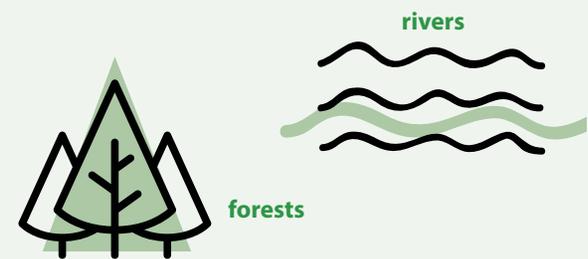
Fact Sheet | **Natural Areas Land Coverage**

Natural areas make up 19 per cent of Calgary's total area. These natural areas include forests, grasslands, natural wetlands, shrub lands, streams, and rivers. Developed areas, including paved surfaces and buildings, represent 31 per cent of Calgary's total land cover. The remaining 50 per cent of Calgary's area is made up of modified landscapes, which include agricultural areas, bare land, golf courses, anthropogenic (man-made) wetlands and water features, and other manicured or modified lands.

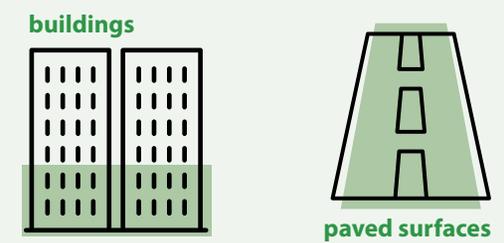
LAND COVER TYPE IN CALGARY



Natural infrastructures include



Developed areas include



Modified landscapes include



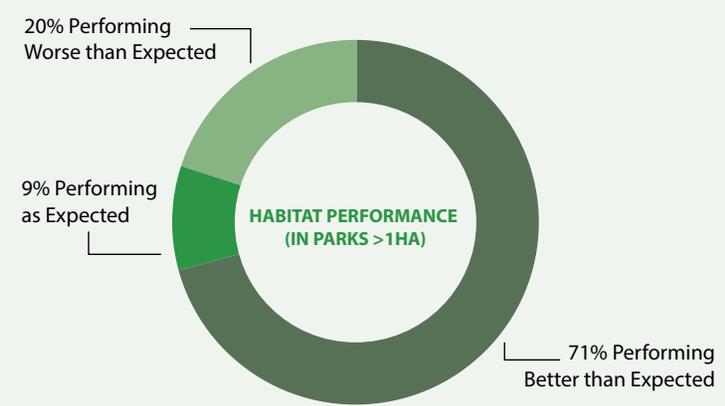
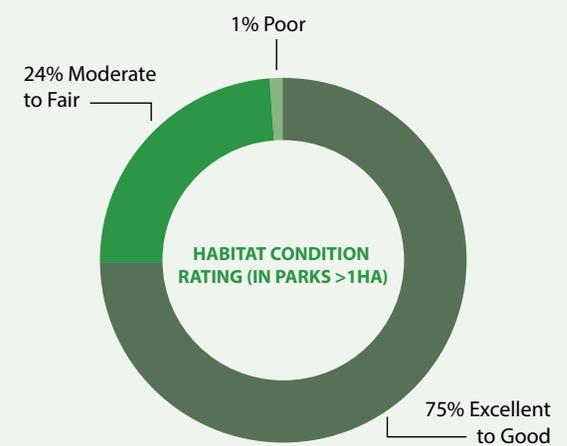
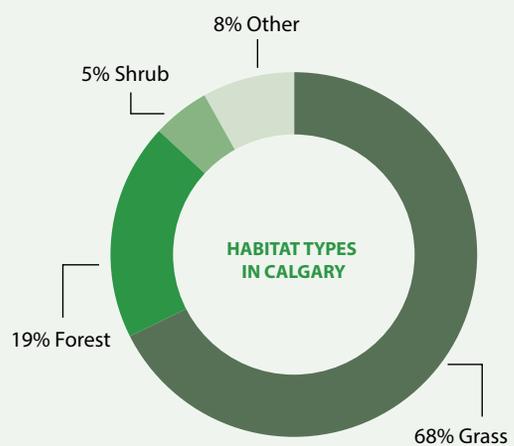
Fact Sheet | **Habitat in Parks**

Calgary's parks contain a range of habitat types. The majority of habitat in parks is grass (68 per cent) with the next greatest area being forest (19 per cent). Shrub makes up only 5 per cent.

The City of Calgary measures both Habitat Condition Rating and Habitat Performance in all parks larger than one hectare in size. In 2020, 75 per cent of habitat in large parks was in excellent to good condition, with only 24 per cent in moderate to fair condition and 1 per cent in poor condition.

Habitat condition is generally higher when there is a lower level of disturbance to habitat. Using habitat disturbance information, The City can estimate what condition it thinks habitat should be in certain areas. When this estimate is compared to the actual assessment of habitat condition rating, this determines its habitat performance.

Overall, 71 per cent of park habitat is performing better than expected and nine per cent as expected. Approximately 20 per cent are performing worse than expected.



Targets | **International Commitments**

In 2011, Calgary formally joined Local Action for Biodiversity (LAB), a global urban biodiversity program coordinated by Local Governments for Sustainability (previously International Council for Local Environmental Initiatives).

In 2016, Calgary signed the Durban Commitment: Local Governments for Biodiversity.¹ By signing the Durban Commitment, The City acknowledges its accountability and responsibility for the health and well-being of Calgary neighbourhoods through protecting, sustainably using, and managing biodiversity while recognizing biodiversity's role as the foundation to a healthy community. The LAB program prescribes the following five-step process to create and act upon biodiversity protection:

1. Develop a biodiversity report documenting the current state of biodiversity and its management in Calgary.
2. Ensure long-term commitment by Council to sustainable biodiversity management through formally signing a local government biodiversity declaration.
3. Develop a 10-year biodiversity strategic action plan and framework that includes commitments to biodiversity implementation plans and integration within broader city plans.
4. Have Council formally accept the 10-year biodiversity strategic action plan and framework.
5. Implement three new on-the-ground biodiversity initiatives by the end of the 10-year program.

These steps are included in The City's Our Biodiversity Strategy. Calgary has completed the first four steps in the process, and it is in the midst of implementing stage 5.

¹ICLEI. (2016). *Mayor of Calgary Signs Durban Commitment*, available: <https://cbc.iclei.org/mayor-calgary-signs-durban-commitment/>

Benchmarking | How Calgary Compares

When compared to several cities in Canada, Calgary has one of the higher provisions of total park area per total city area (10.1 per cent), with only Toronto (12.8 per cent) and Montreal (10.2 per cent) having more in 2019.¹

When comparing the area of parks per population, Calgary falls just below the average of 770 acres at 665 acres per 100,000 people; however, it has more park area per population than seven of the 11 cities compared. Calgary had more natural park area per 100,000 people at 367 acres than all other municipalities surveyed in 2019, except for Sudbury (1617 acres), Thunder Bay (1484 acres), and London (416 acres).

Maintained park area includes hectares where the municipality is responsible for the direct and non-recoverable costs to maintain the space that are available for public use. This could include hectares owned by the municipality or school boards (if a reciprocal agreement is in place) and/or those leased from other third parties (through a formal lease agreement) as long as they are made available for public use.

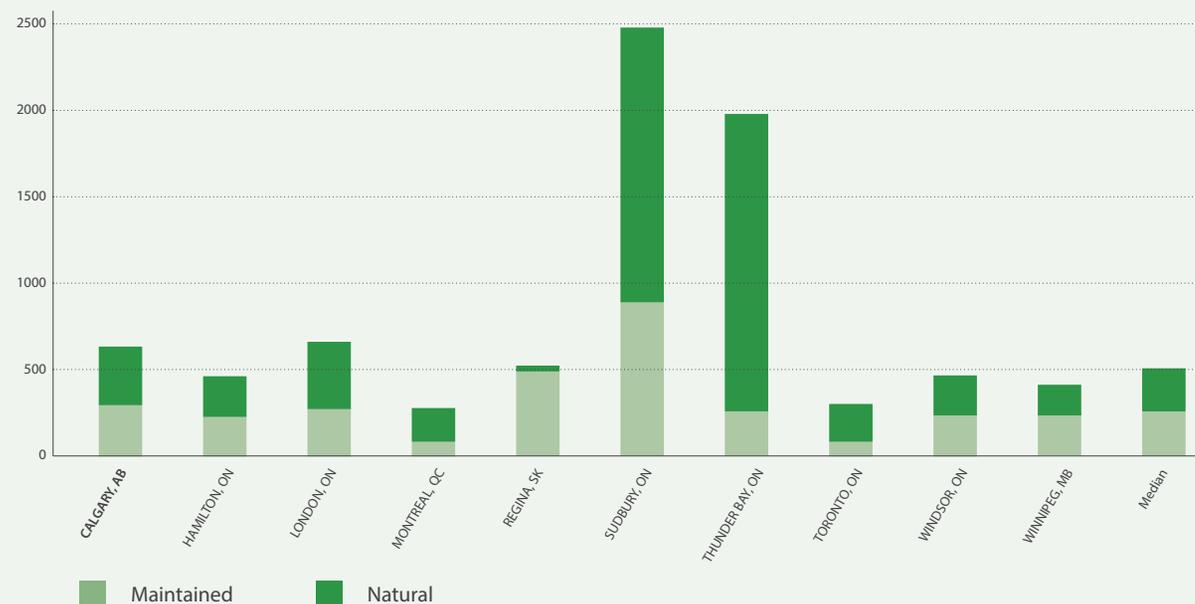
Natural park area includes forests, meadows, stormwater management buffer areas above the waterline (unless they are maintained to a high standard). These include the land surrounding ponds and rivers if these areas are part of the trail system or open space system and are available for public use.

In many cases, there is little to no change in the number of hectares reported year over year, therefore only 2019 data is presented.

External Sources:

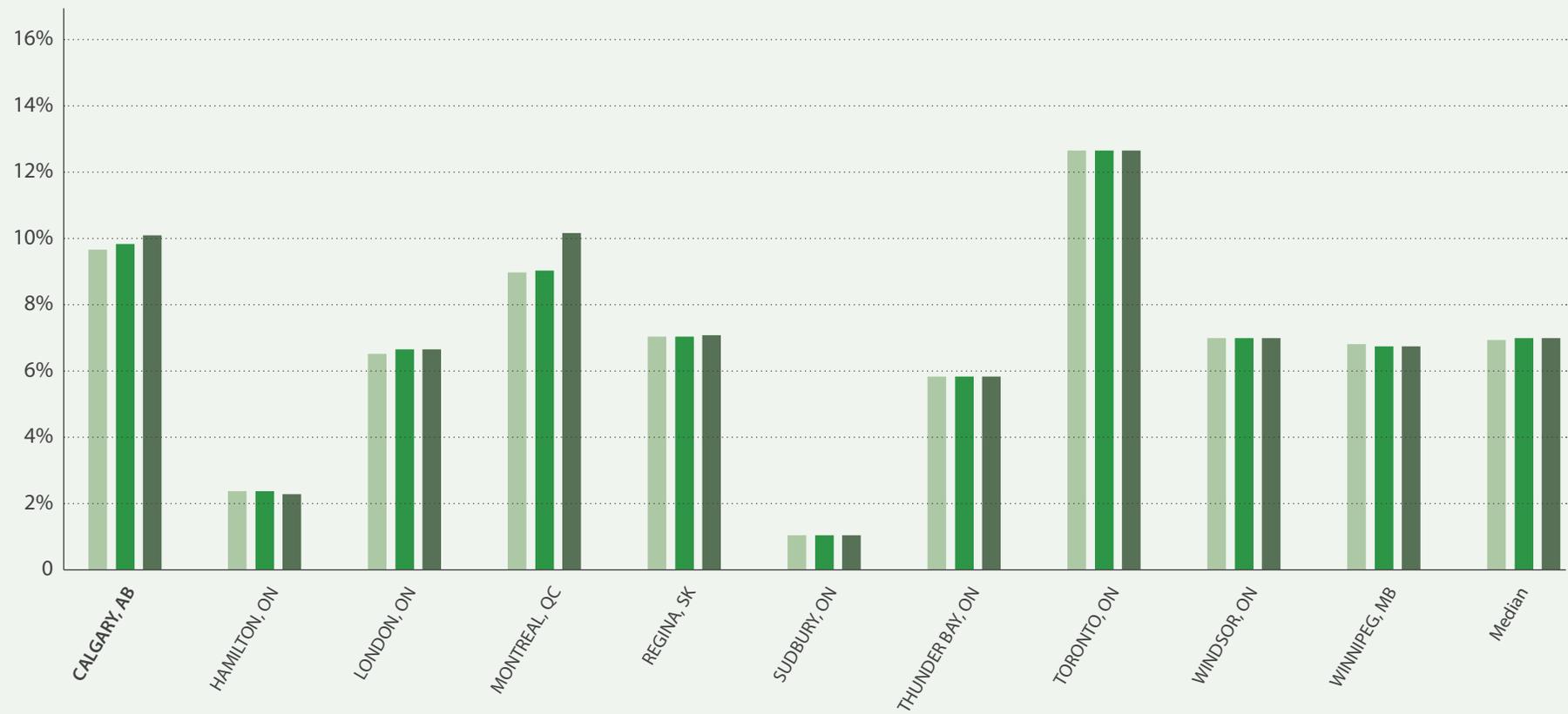
¹ MBNCanada Performance Measurement Report <http://mbncanada.ca/app/uploads/2021/03/2019-Performance-Report-full-mar-19-2021.pdf>

HECTARES OF MAINTAINED AND NATURAL PARKLAND IN MUNICIPALITY PER 100,000 POPULATION



	CALGARY	HAMILTON	LONDON	MONTREAL	REGINA	SUDBURY	THUNDER BAY	TORONTO	WINDSOR	WINNIPEG	MEDIAN
MAINTAINED	298	235	290	148	491	867	257	149	243	250	253
NATURAL	367	214	416	118	65	1617	1484	124	192	142	203
TOTAL	665	449	706	266	556	2484	1741	273	435	392	503

ALL PARKLAND IN MUNICIPALITY AS A PERCENT OF TOTAL AREA OF MUNICIPALITY



	CALGARY	HAMILTON	LONDON	MONTREAL	REGINA	SUDBURY	THUNDER BAY	TORONTO	WINDSOR	WINNIPEG	MEDIAN
2017	9.6%	2.4%	6.5%	8.9%	7.2%	1.1%	5.7%	12.8%	6.7%	6.4%	6.6%
2018	9.9%	2.4%	6.6%	9.0%	7.2%	1.1%	5.7%	12.8%	6.7%	6.3%	6.7%
2019	10.1%	2.3%	6.6%	10.2%	7.3%	1.1%	5.7%	12.8%	6.7%	6.3%	6.7%

Water



Water Overview

Calgarians value healthy river areas, reliable safe drinking water, and the management of their wastewater. Calgary strives to be a city that maintains high quality drinking water, uses water efficiently, builds resiliency to flooding and protects watershed health.

The Calgary area has been inhabited for at least 11,000 years and is sustained by the Bow and Elbow rivers that join together here and continue on into the prairie. Calgary is in the heart of traditional Blackfoot territory, on land called Moh'kinsstsis in the Blackfoot language. The word translates to "elbow," in reference to this meeting of the Elbow and Bow Rivers.

In 1787, cartographer David Thompson spent the winter with a band of Peigan encamped along

the Bow River, the first recorded European to visit the area. Since then, the Calgary area has seen a constant influx of new people who have made their homes along the banks of the Bow and Elbow rivers. Over time, the city has grown outwards, creating a significant impact on the natural flow of water through this area.

Calgary lies near the headwaters of a vast watershed stretching east across the prairies. As a large part of the waters flow out of the glaciers of the Rocky Mountain's Eastern Slopes, the supply of fresh water has been instrumental in shaping Calgary's communities. The peaks and lows of this flow has sustained the city, while also periodically bringing challenging droughts and flood events.

As the climate changes, the routines Calgarians have become accustomed to change with it, requiring a more diligent and effective approach to managing the use and development of Calgary's waterways. The city shares the water with many users upstream and downstream, which means that solutions must be developed in cooperation and coordination with other municipalities, industries, and jurisdictions.

City of Calgary Lines of Service



Water treatment & supply

Treatment and delivery of drinking water, ensuring public health and long-term sustainability of a precious resource.



Wastewater collection & treatment

Collection and treatment of Calgary's wastewater; protects public health, property, and the environment.



Stormwater management

Collection and management of rain and snow/ice melt, protecting you, your property and our environment.

Water Security

Water security is having enough safe water for human well-being, ecosystem resilience, and economic activities now and in the future. Water security also ensures a suitable supply of water that exceeds demand.

Today, The City has a secure water supply serving 1.3 million people daily. The security of this service is achieved by managing Calgary's source water supply, managing demand through water conservation and investing in operational efficiencies in the water treatment and distribution systems. Calgary's future water security outlook will deteriorate if it does not respond to three key risks:

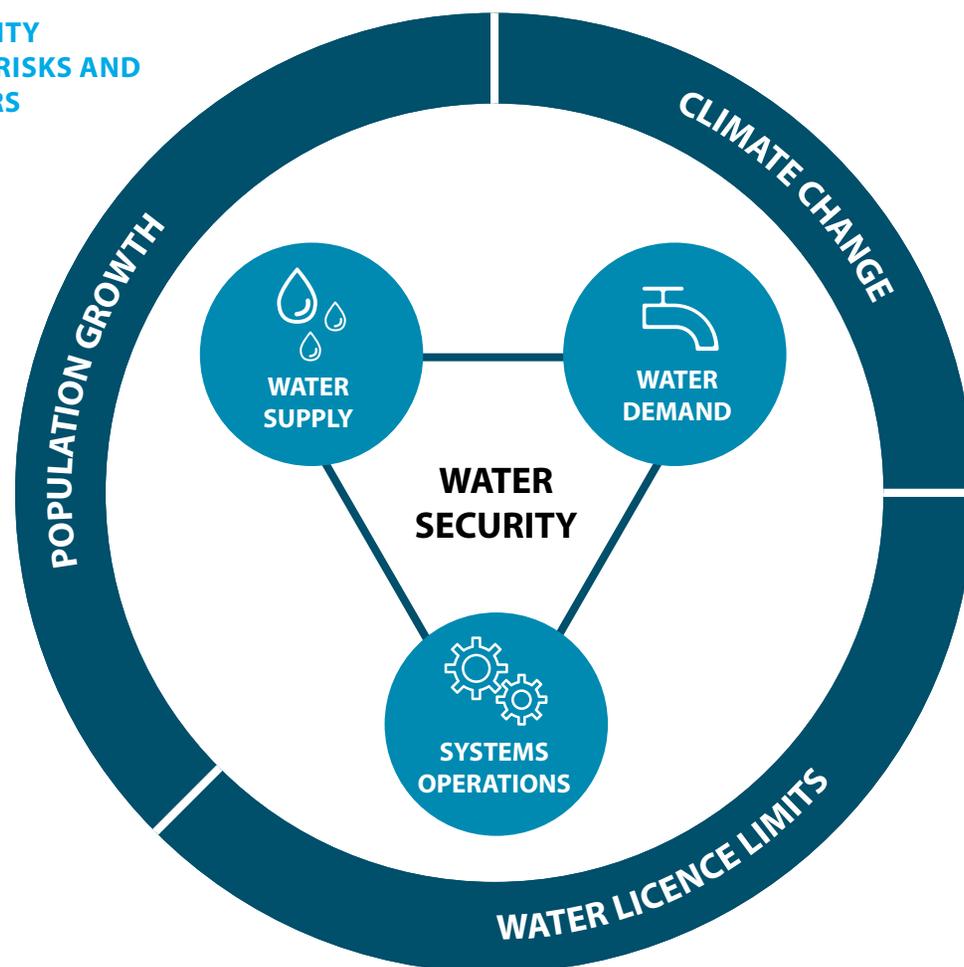
- A changing climate.
- Water licence limits.
- Population and economic growth pressures.

The One Calgary One Water framework provides guidance around the critical question of water security: will there be enough safe clean water to meet the needs of Calgarians while preserving the environment and ensuring a sustainable economy in the future? The framework outlines six priority actions to address these risks to ensure water security is maintained into the future:

1. Develop future water supply scenarios.
2. Address water licence limits on high demand days.

3. Ensure collaboration on a regional solution for water security.
4. Advocate for a new upstream reservoir on the Bow River.
5. Finalize the Drought Management Plan.
6. Implement the Source Water Protection Plan and Policy.

WATER SECURITY FRAMEWORK RISKS AND ACTION LEVRS



Protecting the Water Supply

Calgary's water supply is dependent on the quality and quantity of the source water upstream of its two water treatment plants, and the ability to withdraw source water to meet water demand.

Calgary has two sources of drinking water. The Bow River supplies the Bearspaw Water Treatment Plant and the Elbow River, which flows into the Glenmore Reservoir, supplies the Glenmore Water Treatment Plant.

Our water supply is fundamentally changing. River flows and water quality seen in the past will be different in the future because of a changing climate. Population and economic growth also put pressure on Calgary's water supply, so we need to ensure growth, land use and other decisions include water supply and water quality considerations.

Calgary's Source Water Protection Plan vision is that "Our source watershed continues to provide clean, high quality water to the region, through proactive stewardship and management". As Calgary's population continues to grow, so does the demand and impacts on the rivers.



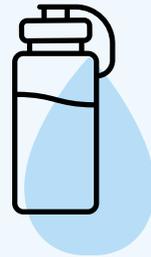
Targets | City Targets

GOAL	OUTCOMES	TARGETS
Protect our water supply.	Risks to our source water are reduced so that our source watershed continues to provide clean, high quality water to the region. Water security ensures enough safe water for human well-being, ecosystem resilience and economic activities now and in the future.	<ul style="list-style-type: none"> ▪ Maintain Federal Water Quality Index (WQI) at 'Good' or 'Excellent' in Calgary's source water. ▪ Future targets to be developed.
Use water wisely.	Effective water efficiency and conservation programming enables The City to continue to supply all Calgarians with the water they need, even as the population increases over time.	<ul style="list-style-type: none"> ▪ Reduce per capita water consumption by 30 per cent from 2003 levels, to 350 litres per capita per day, by 2033. ▪ Keep The City's total water withdrawals from the Bow and Elbow rivers below the 2003 benchmark of 212,500 megalitres per day.
Build resiliency to flooding.	Public and private lands are protected from overland flood damage, and the risks and potential impacts of flood events are clearly understood by residents.	<ul style="list-style-type: none"> ▪ Zero properties at risk of overland flood damage in a 1:100 flood by 2032.
Keep rivers healthy.	Healthy riparian and aquatic ecosystems are commonplace throughout Calgary's river valleys. Urban development and human activity has negligible impact to the health of the rivers.	<ul style="list-style-type: none"> ▪ Average Riparian Health Score of 72 per cent by 2026. ▪ Keep Total Suspended Solids (TSS) loadings below Provincial loading objectives (remain below 52,920 kilograms per day in the Bow River from stormwater and treated wastewater). ▪ Keep total phosphorus loadings from The City below 340 kilograms per day.

Fact Sheet | **Calgary's Drinking Water**

97 per cent of Calgarians are satisfied with their drinking water quality. The City works hard to ensure all Calgarians have a safe and reliable supply of drinking water through Calgary's water treatment plants that operate 24 hours a day, 365 days a year.

As water travels from the mountains and foothills, through the water treatment plants, across the city through the distribution system and to customer taps, Calgary's water is tested at every step to ensure its quality is maintained and meets or exceeds the Guidelines for Canadian Drinking Water Quality.



97%
of Calgarians are satisfied
with drinking water quality

Fact Sheet | **Water Usage**

In the mid 1980s, The City was planning its expansion of the Bearspaw Water Treatment Plant to produce more drinking water. At that time, demand was 750 litres per capita per day. It was clear that the ability to service at that demand level was unsustainable. Since that turning point, The City has invested over \$700 million to improve efficiencies through water treatment plant upgrades, water metering, leak detection, main replacement, and educational programs. These actions have helped ensure Calgary's water security despite population growth and a changing climate and today the per capita target is 350 litres per capita per day.

In 2020, Calgary's per capita water demand was 354 litres per capita per day, keeping Calgary well on track to meet the 2033 target.

The one day in a year that customers use the most water is referred to as the peak day demand. This typically occurs in the summer months, as water demand can spike from outdoor watering activities and cooling. In 2020, Calgary's peak day water demand was 655 megalitres which occurred on August 17. This amount remains below the 950 megalitres threshold which is the current capacity of Calgary's water treatment plants. This means Calgary can continue to provide water for 1.46 million people on a peak day.

Per capita water consumption target

350L/Day by 2033

Calgary is on track to meet the target with the per capita water demand reaching

354L/Day in 2020

Calgary has invested

\$700 million +
over the last several decades



Peak Day Demand

usually happens in the summer

Calgary's water treatment plants can produce a maximum of:

 **950 mega litres/day**

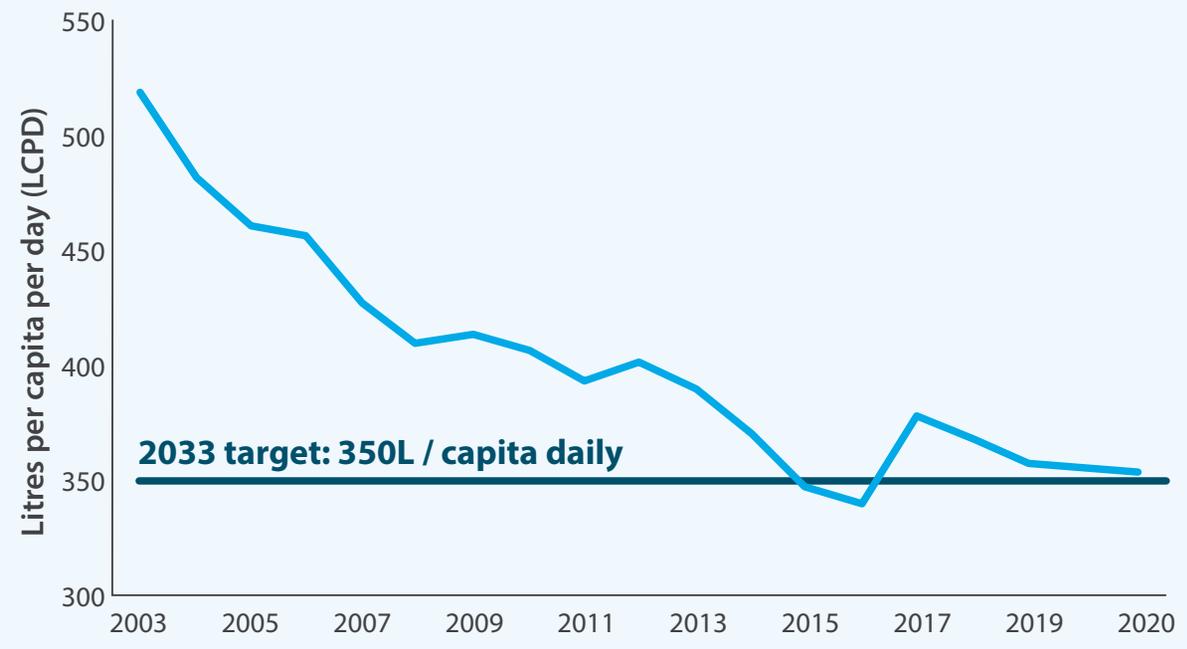
Meaning, Calgary can provide water for

1.46 million


people on a peak day

Fact Sheet | **Water Usage**

LITRES PER CAPITA PER DAY



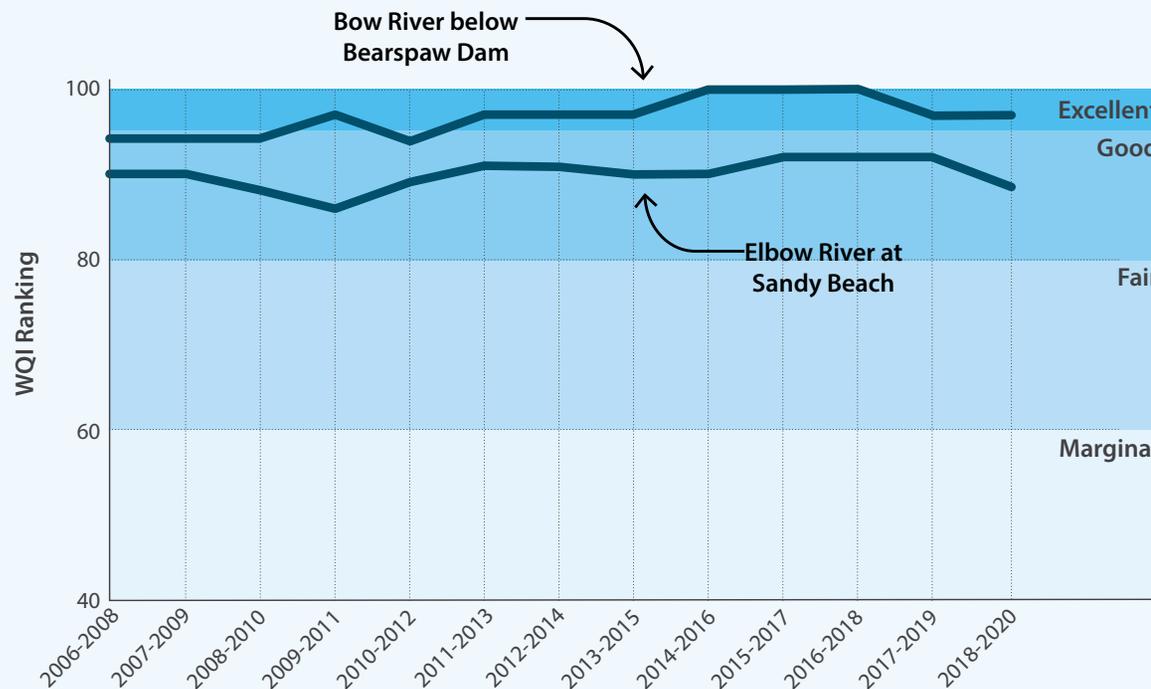
Fact Sheet | **Water Quality Management**

Calgary's Source Water Quality

The federal Water Quality Index (WQI) translates data from multiple water quality parameters into a single score. The WQI measures dissolved oxygen, pH, conductivity, total nitrogen, and total phosphorus. Both the Bow River near the Bears paw Dam and the Elbow River near the Glenmore Reservoir provide a very high-quality water supply to The City's water treatment plants.

The Bow River typically has 'Excellent' water quality, while the Elbow River typically has 'Good' water quality. The lower flow rates of the smaller Elbow River result in higher sensitivity to water quality conditions, so guidelines are more often exceeded. Over the last decade, consistently high WQI ratings have been observed near The City's water treatment plants. This means the water is easier to treat before it goes to customer taps.

WATER QUALITY INDEX RANKING



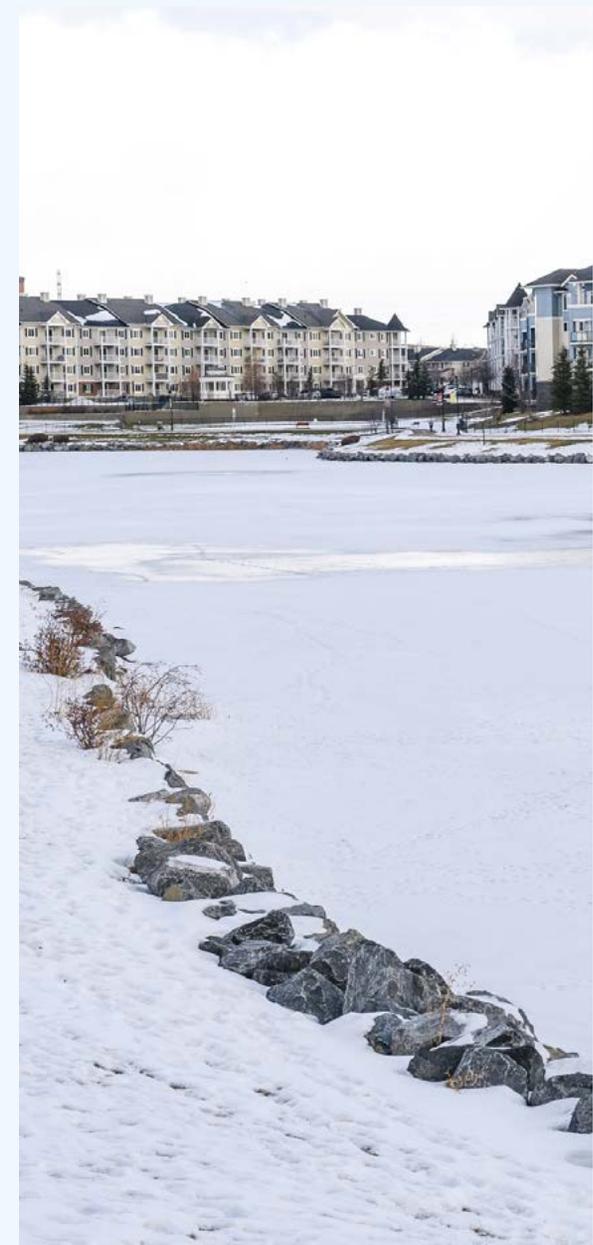
Fact Sheet | **Stormwater Management**

The city's expansion creates a huge catchment area for stormwater falling within the city's borders. The Water Utility manages water from rain or snow/ice melt by either collecting, storing, or moving it into the nearest river or creek through storm drains, pipes, and ponds. Parts of Calgary's stormwater system are designed to limit the sediment going into the river, ensuring healthy rivers and riverbanks and allowing the quality of the rivers to be maintained for Calgarians and downstream users. Stormwater management is a key component in the design of vibrant, safe, and resilient communities.

Calgary's stormwater drainage system contains over 300 wet and dry storage ponds. These ponds reduce the amount of sediment and other pollutants entering the rivers. They also provide some localized flood mitigation by holding stormwater during high rainfalls, releasing it slowly back into The City's stormwater system.

The City's Stormwater Pollution Prevention program ensures customers and City staff plan, implement, and monitor effective practices to reduce stormwater pollutant loadings from construction activity and ensure regulatory compliance. Construction activity in Calgary exposes highly erosive subsoil, which is easily transported by wind and water. Ongoing management and monitoring is necessary to protect the watershed and infrastructure from the impacts of construction site sediment.

The City constructs stormwater quality retrofit projects such as wet ponds or constructed wetlands to improve water quality by removing solids and other pollutants before it enters our rivers. These projects help improve stormwater management in established communities.

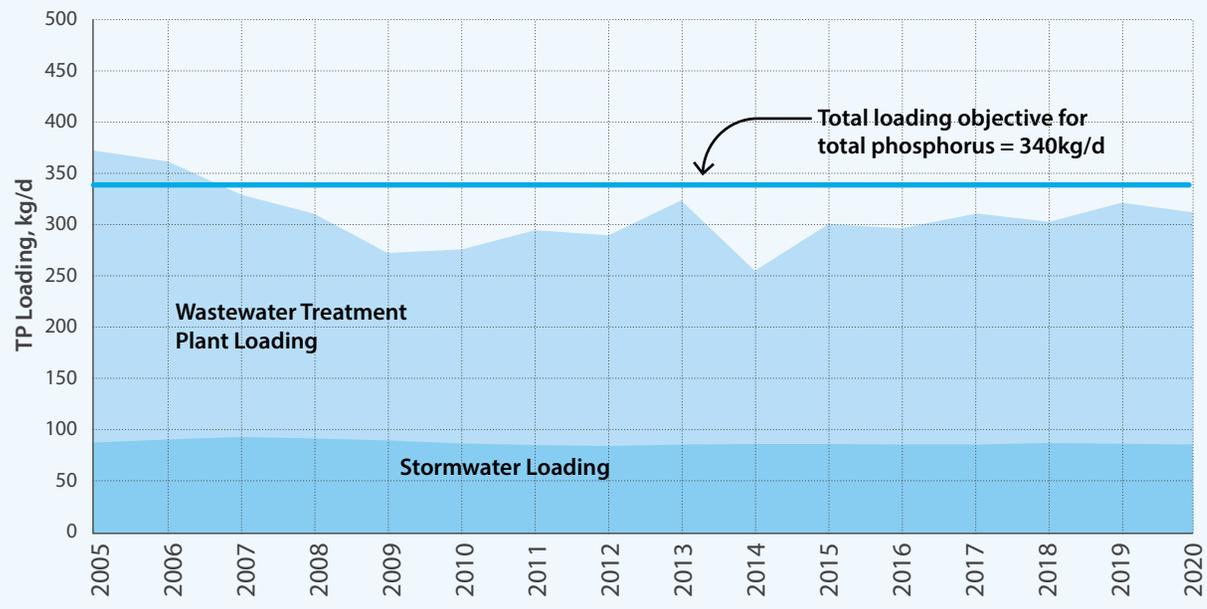


Fact Sheet | Total Phosphorus Loading

Phosphorus is an essential element for plant life, but when there is too much of it in water, it can over stimulate algae growth in water bodies. Algae blooms can use up available oxygen supplies, threatening the survival of fish and other aquatic organisms.

The primary source of phosphorus entering the Bow River in Calgary is from treated wastewater effluent, with the remaining amount contributed by stormwater. In 2020, the Total Phosphorus (TP) entering the river from both stormwater and wastewater remained below the Provincial objectives, demonstrating that Calgary's wastewater treatment continues to be effective. Treated wastewater contributes more than double the amount of phosphorus to the Bow River compared to stormwater, and The City's wastewater treatment plants ensure phosphorus loading into the rivers is limited.

TOTAL PHOSPHORUS LOADINGS FROM THE CITY

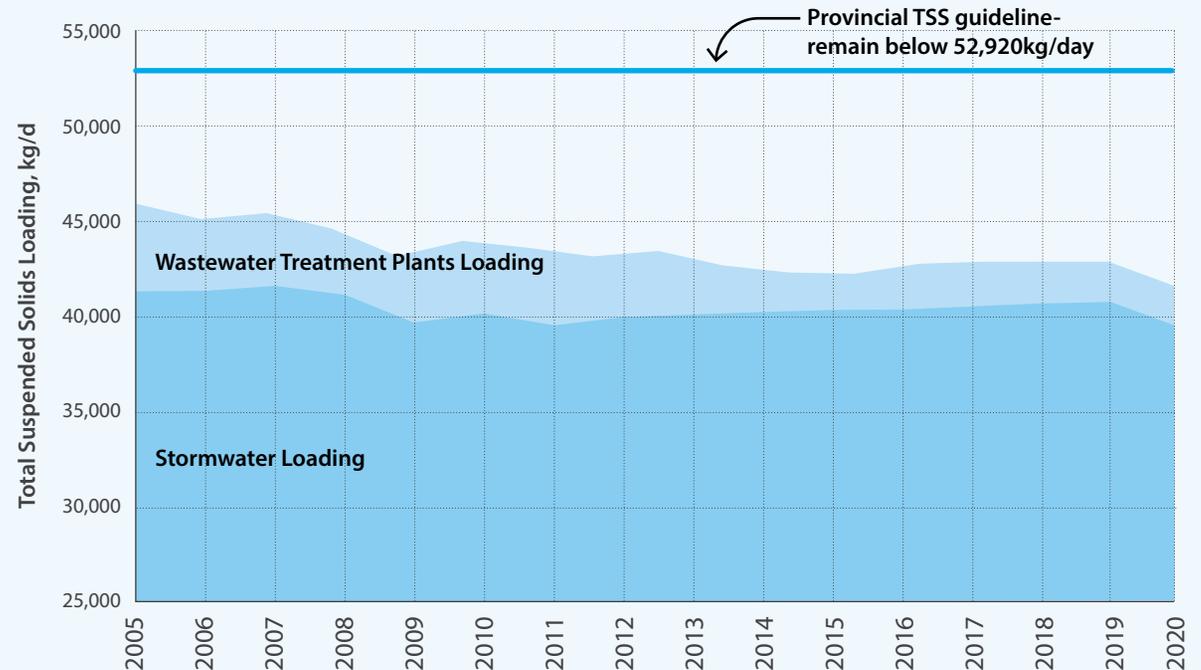


Fact Sheet | Total Suspended Solids

Stormwater and treated wastewater contain total suspended solids (TSS), which include organic and inorganic materials, specifically, anything drifting or floating in the water, from sediment, silt, and sand to plankton and algae. Total suspended solids are a significant factor in the clarity of water. The more solids present in the water, the less clear it is. Murky water can impact fish habitat, and reduce the beauty of the rivers.

Urban runoff from stormwater contributes a significantly higher proportion of total suspended solids to the Bow River compared to wastewater effluent. In 2020, estimated TSS loadings from stormwater to the Bow River were 39,471 kilograms a day, which is below The City's 2005 benchmark. This demonstrates the effectiveness of The City's stormwater quality investments and pollution prevention programming, especially accounting for the pressures placed on the stormwater system from growth and urban expansion.

TOTAL SUSPENDED SOLIDS LOADING



Fact Sheet | **Riparian Area Health**

Riparian areas are the areas along the edges of creeks, rivers and other water bodies. They are transitional areas between the land and aquatic systems. The City's Riparian Action Program is a comprehensive and coordinated approach to protect riparian areas in Calgary. Healthy riparian areas mitigate flood impacts, and provide a buffer that helps with water quality by trapping sediment, reducing erosion, and filtering or absorbing nutrients and contaminants before they reach the rivers.

Riparian areas are also important wildlife corridors and storehouses of biodiversity, especially within an urban context. The riverfront parks in Calgary are cherished places where people can relax, play, and commute. By ensuring riparian areas are well-managed and well-maintained, these natural areas will continue to provide valuable ecosystem benefits to all Calgarians.

Riparian restoration projects lead to more resilient natural infrastructure that provides protection against floods and erosion and improves water quality. The City continually works to improve riparian health and restore riparian areas through bioengineering and riparian planting projects. Bioengineering is an approach to riverbank engineering that incorporates living plants with natural and synthetic support materials to stabilize

slopes and reduce erosion. Riparian planting projects use native vegetation with deep-rooted plants that stabilize riparian areas.

The City also monitors changes in city-wide riparian health conditions along the Bow River, Elbow River, Nose Creek and West Nose Creek. The City uses the Cows and Fish Riparian Health Inventory methodology which draws on vegetation, soil, and waterway inventories to produce a single score for key riparian areas.

2020 marked the third year of The City's 5-year Riparian Monitoring Program. The City tracks progress towards its 2026 riparian health restoration target and prioritizes future restoration and conservation efforts as part of an adaptive management approach. Over 100 sites are being monitored to evaluate riparian health trends. The 2020 analysis showed an improvement in riparian health compared to baseline (2007-2010) conditions. These results demonstrate that the restoration investments made by The City are improving the health of the waterways.

65%
Average riparian health score

72%
Target riparian health score by 2026

Fact Sheet | **Flood Resiliency**

The City's Flood Resilience Plan relies on a combination of upstream, community, and property-level flood mitigation measures to ensure that Calgary becomes more resilient to river flooding, despite climate uncertainty and continued urban development. The activities in the Plan include both actions by The City and major projects upstream of Calgary by the Government of Alberta to mitigate the risk of flooding to at least a 2013-level flood throughout Calgary. The Plan aims to balance the safety and resilience of river communities while ensuring they remain great places to live.

Since 2013, significant progress has been made to reduce flood risk in Calgary by approximately 50 per cent. The installation of the new gates at the Glenmore Dam was completed in 2020, doubling the water storage capacity and reducing flood risk on the Elbow River. Also on the Elbow River, the Province anticipates that the Springbank Reservoir will be completed in three years. This will provide significant flood protection to Elbow River communities and the downtown. The City continues to support the Province's work towards an upstream reservoir on the Bow River.

The City continues to focus on implementing community mitigation in areas with the highest flood risk. In addition to completing the Heritage

Drive Flood Barrier in 2020, progress continues on the Downtown Flood Barrier which will protect the downtown to a 1:200 flood level, and construction is anticipated to start in 2021 on the Sunnyside Flood Barrier. These are just a selection of the initiatives implemented to improve the flood resiliency of Calgary and its river communities.

In addition to river flooding, The City continues to reduce the risk of stormwater flooding in communities through its Community Drainage Improvements program and smaller Local Drainage Improvement projects. The City's investments in stormwater retrofits, Drainage Improvement Programs, and green stormwater infrastructure help manage the impacts of climate change and a growing city as well as reducing the impacts of localized and river flooding on residents and businesses.



Targets | **International Commitments**

The UNESCO 2030 Agenda and Sustainable Development Goals (SDGs) bring water quality issues to the forefront of international action by setting Goal 6 specifically aiming to:

“Ensure availability and sustainable management of water and sanitation for all”.

Water quality is also addressed under other SDGs such as the goals on health, poverty reduction, ecosystems and sustainable consumption and production, recognizing the links between water quality and the key environmental, socioeconomic and development issues (Goals 1, 3, 12, 15 and Targets 1.4, 3.3, 3.9, 12.4, 15.1). The clear focus on water quality in the SDGs demonstrates growing attention on the urgent need to improve water quality worldwide.



Benchmarking | **How Calgary Compares**

The Municipal Benchmarking Network Canada provides an overview of comparable municipalities in the 2019 MBN Canada Performance Measurement Report. This report focuses on infrastructure spending per capita, scaled by the number of treatment facilities. Comparisons are made to municipalities that have full responsibility for all water activities including treatment, transmission, storage and local distribution.

Overall, Calgary spends less on its water treatment and distribution than the median cost for other municipalities in Canada.

	TOTAL COST FOR CALGARY	MEDIAN COST FOR COMPARABLE CANADIAN MUNICIPALITIES
Treatment and Distribution / Transmission of drinking water treated	\$824	\$1,120
Distribution / Transmission of drinking water per kilometer of water distribution pipe relative to the number of water pumping stations operated	\$17,465	\$20,999

Air



Air Overview

The City of Calgary protects and improves air quality.

Clean air, though often taken for granted, is essential to human health and functioning ecosystems. Calgary is fortunate to have relatively good air quality most of the time; however, there are some poor air quality days throughout the year that can result in adverse health impacts.

Every Calgarian contributes air pollution as a byproduct of their day-to-day lives. The amount of air pollution Calgarians generate is influenced by the design of the city and the choices made about how to get around, how to heat and power the city's homes and buildings, and what products to buy.

Calgarians have experienced the consequences of air pollution firsthand in recent years when blankets of smoke from wildfires have settled over the city, making it hard to see and breathe and limiting the ability to participate in outdoor activities. But there are also less visible impacts of air pollution—day-to-day levels of harmful airborne particles and emissions that cause respiratory problems, particularly for children and seniors. This section will discuss, in greater detail, the air quality trends affecting Calgary and what can be done to improve air quality and health in the coming years.



Measuring Air Quality

There are several ways for cities to measure air quality. The first is monitoring ambient air quality. This involves continuously monitoring the levels of particles and gases in the air that are bad for human health. The ones most commonly measured are: fine particulate matter (PM_{2.5}), ozone (O₃), nitrogen dioxide (NO₂), and sulphur dioxide (SO₂). The government of Canada sets Canadian Ambient Air Quality Standards which determine the acceptable limits and triggers for each indicator based on impacts to human health and the environment.¹

¹Canadian Ambient Air Quality Standards <https://www.alberta.ca/canadian-ambient-air-quality-standards.aspx>

4 main particles and gases measured to determine air quality



Ozone



Sulphur Dioxide



Nitrogen Dioxide



Fine Particulate Matter



To help jurisdictions manage air quality, Canada also established a national air quality management system. This system uses the limits and triggers from the Canadian Ambient Air Quality standards to identify four management levels of action required when an indicator surpasses a threshold. This serves as a warning system, identifying air quality issues early so that actions can be implemented to resolve them. Red, or Level 4, is the most serious level, meaning that a limit has been exceeded. These levels are used in the management plan for the South Saskatchewan Region, which includes Calgary.¹

Environment Canada’s Air Quality Health Index is the most familiar measurement to the general public, as it is widely reported when wildfire smoke impacts the city.² This is an additional tool providing real-time measurements of ambient air pollution, as well as offering health guidance in the event of elevated air quality risks. The index provides a scale of lowest to highest risk from 1 to 10.

Calgary is in the Calgary Region Airshed Zone (CRAZ), which monitors Calgary’s air continuously at three stations: Central/Inglewood, Southeast, and Varsity (which just replaced the former Northwest station in 2018).

AIR QUALITY HEALTH INDEX



MANAGEMENT LEVEL	AIR QUALITY OBJECTIVE
● Green	To maintain good air quality through proactive air management measures to keep areas clean.
● Yellow	To improve air quality using early and ongoing actions for continuous improvement.
● Orange	To improve air quality through active air management and prevent exceedance of the CAAQS.
● Red	To reduce pollutant levels below the CAAQS through advanced air management actions.

MONITORING STATIONS IN THE CALGARY REGION



¹ South Saskatchewan Regional Plan <https://open.alberta.ca/publications/9781460139417>

² Air Quality Health Index Messages https://weather.gc.ca/air_quality/healthmessage_e.html

Health Impacts of Poor Air Quality

In 2019, Health Canada conducted a study of overall health impacts from poor air quality across the country. The study showed that reducing ambient air pollution in Calgary and the surrounding area could save lives and an estimated \$2.94 billion in economic losses and healthcare costs. On average, 377 people die prematurely each year in the Calgary region from the impacts of air pollution. Poor air quality also intensifies chronic respiratory diseases such as asthma and bronchitis, which affects almost one in ten Canadians (or roughly 147,000 people in the Calgary region). People suffering from respiratory diseases will experience an average of nine symptomatic days per year due to human caused air pollution, costing the regional healthcare system \$21.7 million per year to address.

Even people free from chronic respiratory conditions are still affected by air pollution. Calgarians experience an average of three restricted activity days per year due to human-caused air pollution. This costs the economy approximately \$28.3 million per year.

Reducing air pollution in the region would result in fewer restricted activity days and decreases in respiratory and asthma symptom days, bronchitis cases, hospital visits, and premature deaths.

370+ 
die prematurely from impacts of air pollution

**Reduce ambient air pollution
saves lives
& money**

Estimated \$2.94 billion in economic losses and healthcare costs

Approximately
9% 
of Canadians suffer from respiratory diseases, and experience an average of 9 symptom days/ year from air pollution

**9 symptom days costs the healthcare system
\$21.7 million/year**
approximately

**The average Calgarian experiences 3 restricted activity days per year from air pollution, resulting in
\$28.3 million/year**
in economic losses

Targets | City Targets

GOAL	OUTCOMES	TARGETS
<p>Calgarians recognize the importance of air quality to their health and wellbeing and are working collaboratively to protect the airshed (2020 Sustainability Direction).</p>	<p>Air quality is maintained and protected, and it sustains healthy ecosystems. Calgarians value the quality of clean air, have access to relevant air quality information, and are made aware of any related health risks.</p>	<ul style="list-style-type: none"> ▪ Calgary’s air quality meets or surpasses national and provincial air quality standards objectives, and guidelines. ▪ Calgary’s air quality is consistently measured as “low risk” to human health, using the Air Quality Health Index (AQHI). ▪ Air contaminates from City of Calgary operations are reduced.

Calgary is part of the **South Saskatchewan Regional Plan**, which sets out targets and management levels for air quality. Currently, the overall air quality objectives and limits identified in the South Saskatchewan Regional Plan are being met. However, Calgary is exceeding some of the proactive triggers, meaning that **action is required to maintain concentrations below the limits.**

Fact Sheet | Air Quality

Ambient Air Quality Sources and Trends

The following table provides a summary of recent trends in air quality in Calgary. The trends are influenced by meteorological changes and changes to monitoring standards, and are not a statistically significant indication of trends over time.

MEASURE	MAIN SOURCES	STATIONS	ANNUAL TREND (2014-2018)	MANAGEMENT LEVEL
Fine Particulate Matter (PM2.5)	Construction and Transportation	Central / Inglewood	↑	No data
		NW	↑	● Level 3 (2013)
		Varsity	No data	Opened June 2018 (no data)
		SE	↑	No data
Ozone (O3)	This is not directly emitted, but forms as a result of chemical reactions between sunlight, NO2, and Volatile Organic Compounds.	Central / Inglewood	↓	● Level 2 (2018)
		NW	↑	● Level 2 (2018)
		Varsity	No data	Opened June 2018 (no data)
		SE	↓	● Level 2 (2018)
Nitrogen Dioxide (NO2)	Combustion sources including Transportation and Upstream Oil and Gas (such as power generation)	Central / Inglewood	↑	● Level 3 (2013)
		NW	↑	Decommissioned May 2018 (no data)
		Varsity	No data	Opened June 2018 (no data)
		SE	↑	● Level 2 (2018)
Sulphur Dioxide (SO2)	Primarily industrial sources and Upstream Oil and Gas	Central / Inglewood	No data	(no limit set)
		NW	No data	
		Varsity	No data	
		SE	↑	

Fact Sheet | Trends

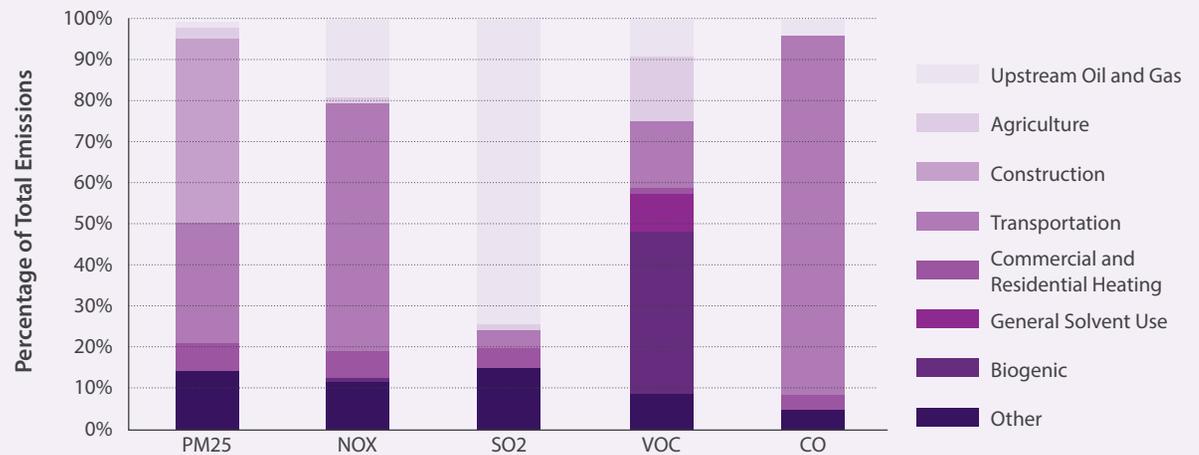
Trends from 2014 to 2018 indicate that although the region did not exceed any air quality limits, there were increases in particulate matter and nitrogen dioxide. The sources of this pollution are emissions generated from transportation, construction, and heavy industry/burning of combustibles. It is important to note that changes in levels for these indicators are also influenced by meteorology and changes to the standards.

Particulate matter (PM) concentrations from 2015 to 2017 earned a Level 3 (orange) rating in one of the stations within Calgary (NW Calgary), meaning the levels approached the trigger and proactive action was needed to prevent further increases.¹

All three stations in Calgary, Central/Inglewood, Southeast, and Northwest (before it was replaced by Varsity), also received a Level 2 (yellow) management level for Ozone (O3) from 2015 to 2017 indicating that additional knowledge and understanding of these trends is needed.² Further action may be required to ensure that levels do not rise. Management levels for particulate matter and ozone are not yet available for 2016 to 2018.

Calgary's monitoring station at Central-Inglewood measured ambient concentrations of nitrogen dioxide (NO2) above the upper range trigger for management Level 3 (orange) in 2018. This indicates that action is needed to prevent exceeding the limit.³ Calgary Southeast Station,

EMISSION SOURCES IN THE CRAZ REGION (2008)



meanwhile, surpassed Level 2 (yellow) for nitrogen dioxide, an early warning that concentrations are rising and action is needed.⁴

Currently there is only one station monitoring sulphur dioxide (SO2) concentrations - the Southeast Calgary station, and there has not been a threshold established. Data from that station between 2014 and 2018, however, indicates this measure has also been increasing since 2016.⁵

The Air Quality Health Index indicates that Calgary sees reduced air quality events most often from May to August. Significantly reduced air quality was seen during this period in 2015, 2017, and 2018.

¹ Alberta Air Zones Report 2015-2017 <https://open.alberta.ca/publications/9781460145692>

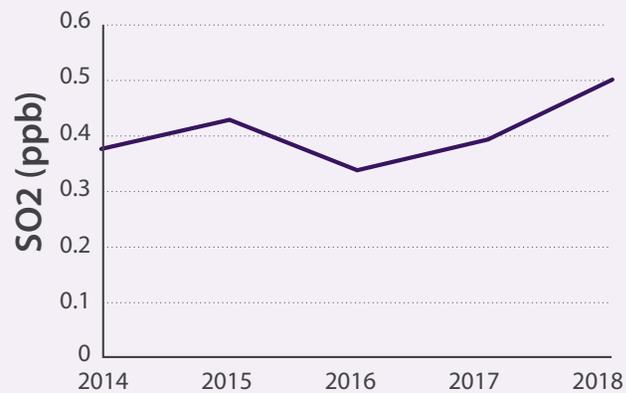
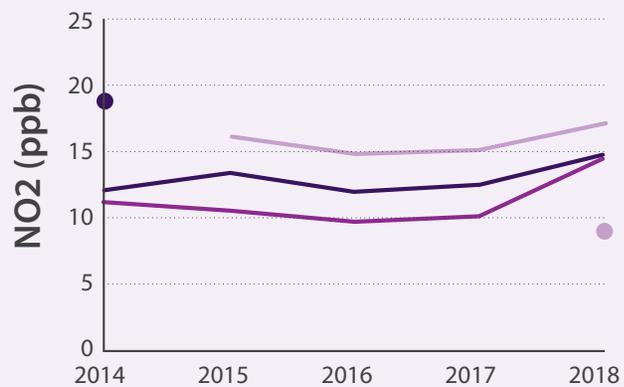
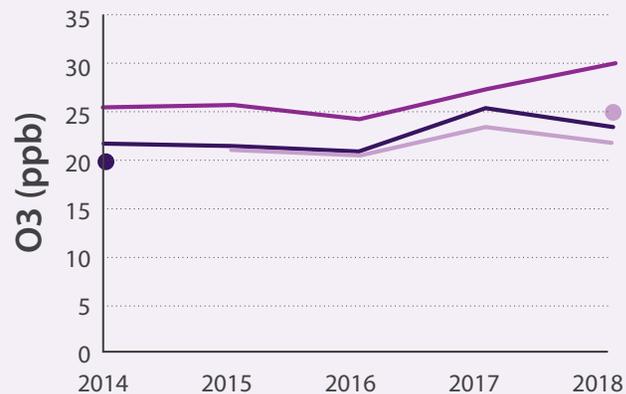
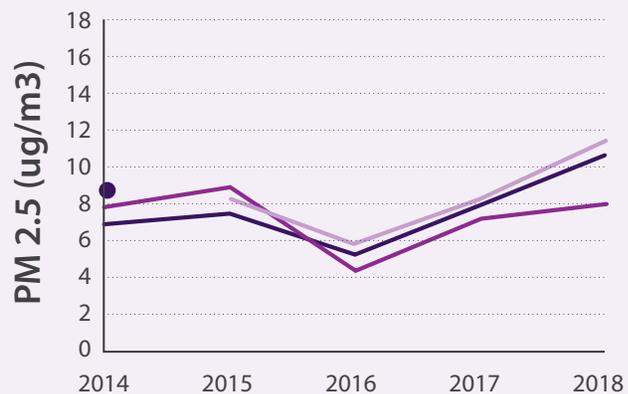
² Alberta Air Zones Report 2015-2017 <https://open.alberta.ca/publications/9781460145692>

³ Alberta Environment and Parks (2020). 2018 Status of Air Quality South Saskatchewan Region.

⁴ Alberta Environment and Parks (2020). 2018 Status of Air Quality South Saskatchewan Region.

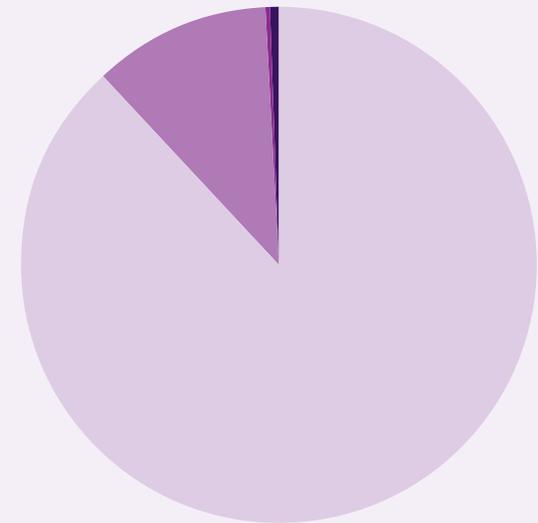
⁵ Calgary Region Airshed Zone. (2019). Calgary Region Airshed Zone Air Quality Management Plan.

MONITORING TRENDS (2014-2018)

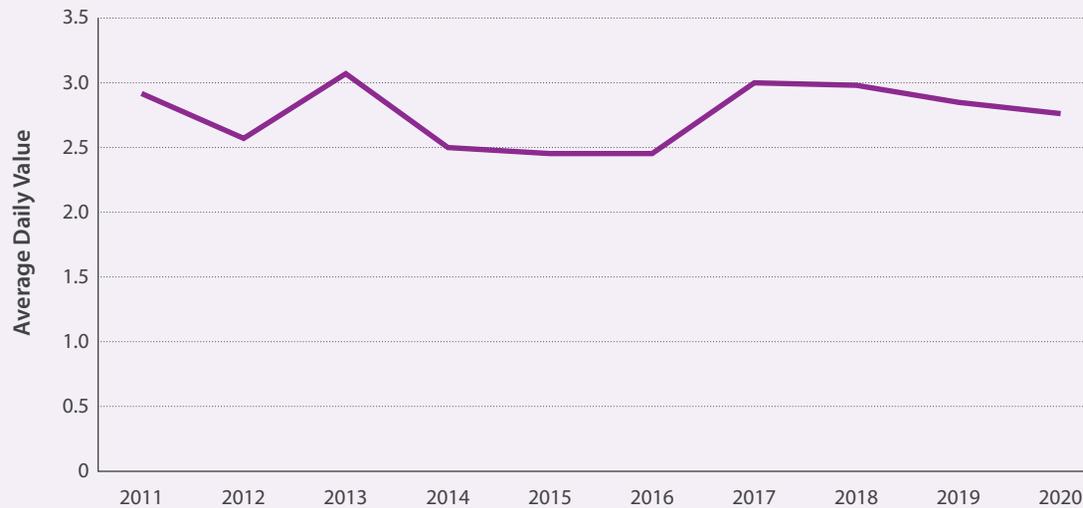


- Calgary Central
- Calgary Varsity
- Calgary Inglewood
- Calgary Northwest
- Calgary Southeast

As mentioned earlier, an air quality level between 1.0 and 3.0 is low risk and the graph below shows that Calgary's air quality largely falls within that risk category. Looking at 2019, the pie chart to the right, there is a small percentage of time that air quality exceeds the low risk category.



AIR QUALITY HEALTH INDEX OVER TIME



2019 PERCENT OF DAYS PER RISK LEVEL

- 0.3% High/Very High
- 0.2% Very High
- 0.1% High
- 11.1% Moderate
- 88.3% Low

Targets | **International Commitments**

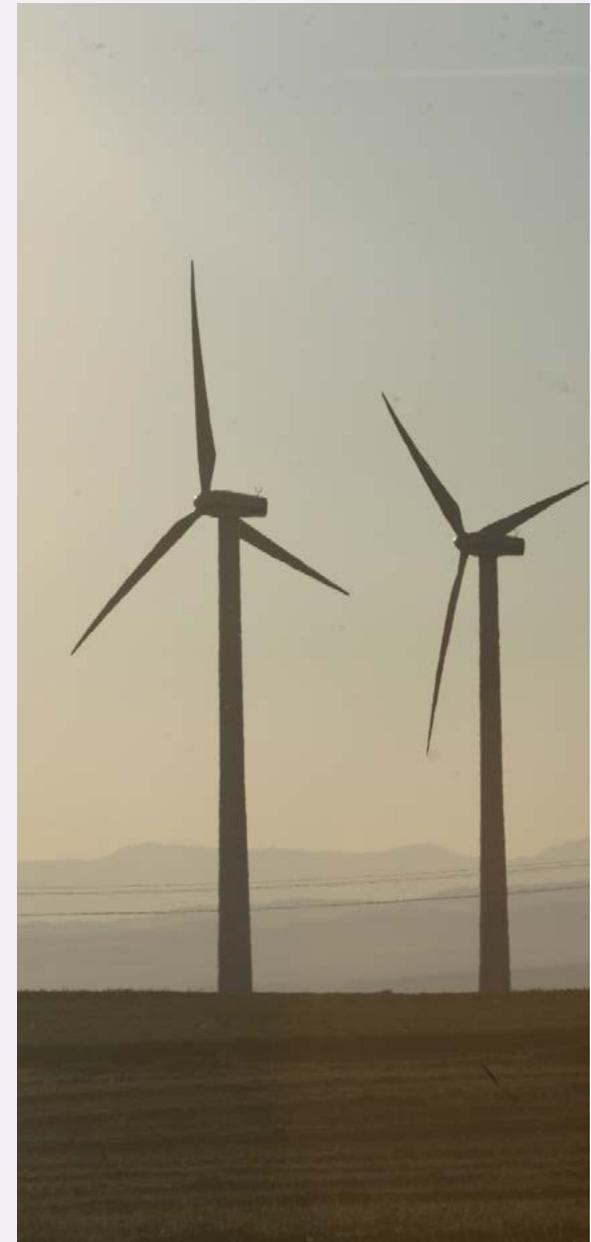
The City of Calgary is a party to a number of international commitments to protect air quality, both on its own and as part of larger federal pledges.

The City has signed the **World Energy Cities Partnership Calgary Climate Change Accord**, committing Calgary to support actions that will reduce municipal greenhouse gas emissions to 20 per cent below 2005 levels by 2020.

Canada is party to the **Gothenburg Protocol to Reduce Transboundary Air Pollution**, which has involved implementing a comprehensive approach to reducing air pollution, the Air Quality Management System (AQMS). The AQMS has established standards for fine particulate matter, ozone, nitrogen dioxide and sulphur dioxide and informed regulatory changes for air quality management in Canada.

The **Canada-US Air Quality Agreement** is a commitment to reduce transboundary air pollution. Under the agreement, sulphur dioxide pollution has decreased 63 per cent from 1990 to 2014, and nitrogen dioxide has decreased 53 per cent from 2000 to 2014.

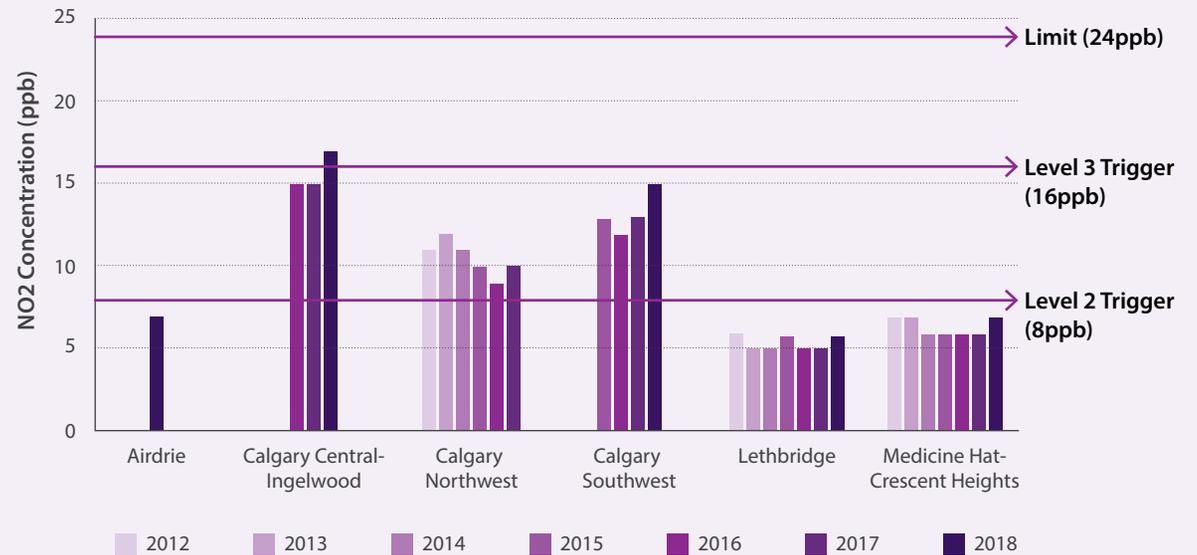
Canada is a lead signatory of the **Montreal Protocol on Ozone Layer Depletion**, an international commitment to reduce the use of ozone-depleting chemicals called chlorofluorocarbons (CFCs). As a result of the Montreal Protocol, the ozone layer is expected to recover over most of the globe—by mid-century for the Arctic and mid-latitudes and a little later for the Antarctic region. The ozone layer is two per cent below the pre-1980 benchmark (indicating a minimum recovery threshold) on the global scale and about 3.5 per cent below the benchmark over the north mid-latitudes which includes most of Canada.



Benchmarking | How Calgary Compares

Air quality at Calgary’s three air monitoring stations saw the highest levels of nitrogen dioxide in the South Saskatchewan Region, compared to measurements in Airdrie, Lethbridge, and Medicine Hat.

ANNUAL AVERAGE OF THE HOURLY DATA (2012-2018) FROM AIR MONITORING STATIONS IN THE SOUTH SASKATCHEWAN REGION FOR NO2



Waste



Waste Overview

The City of Calgary is committed to a long-term target of zero waste and works collaboratively with customers and partners in the community in pursuit of that goal.

Alberta generates and disposes of more waste per capita than any other province in Canada. In 2020, Calgary disposed of 417 kilograms of waste per capita.

When waste ends up in landfills or in the environment, it takes up land and creates pollution. Lands remain contaminated for many years as it takes a long time for garbage to break down. Landfills also release greenhouse gases, including methane, which is a significant contributor to climate change. Additionally, water passing through landfills creates leachate, a harmful liquid garbage that must be contained and treated. Calgary is better able to contain this contamination and cap landfills so that they can be used for other purposes, but constant monitoring is still required to ensure they are not impacting surrounding areas and natural systems.

The City has made significant progress on reducing the amount of waste sent to its landfills. The City introduced household recycling collection with its Blue Cart program in 2009 and expanded into household compostable waste pickup with its Green Cart program in 2017. Through these two initiatives and other programs to encourage waste reduction, Calgary has decreased the amount household waste going to landfills by 46% per cent from 2014 to 2019—a significant step forward for waste reduction. Commercial and industrial waste have also been trending downward. Much work remains, however, to meet The City’s ambitious long-term goals of becoming a zero waste city and shifting to a circular economy.

Waste per capita

417kg
Calgary, 2020*

*does not include waste disposed in private landfills



Blue Cart

2009



Green Cart

2017



Resulted in a

46%

reduction in household waste going to the landfill



Measuring Waste

When looking at waste and its environmental impacts, it is important to understand the waste management hierarchy. The waste management hierarchy prioritizes management actions by their ability to minimize the impact of the waste.

First, products and systems can be redesigned to generate less waste. Next, The City is looking to reduce the overall amount of waste created. The City can track this by monitoring how much waste is disposed of in Calgary each year. Ultimately, this is the starting place for lowering the city's environmental footprint. The less waste the city produces, the less space and resources needed for waste facilities and the less pollution generated.

Total waste is measured in tonnes, and can be looked at from a city-wide perspective, or as an average amount per person. The City also tracks waste generation by sector to understand which activities create the most waste. Different sectors produce different types of waste, such as household waste, commercial waste, construction waste, and industrial waste. It is often difficult to measure non-household waste, however, because it is not directly collected by The City and may sometimes be disposed of in private landfills or diverted to private processors of recyclables and organics.

The next levels on the waste management hierarchy are reuse and recycling/composting. To measure these, The City monitors how much waste diverted

from the landfill by tracking where it is going instead. Specifically, The City tracks how much waste is going to City recycling and composting programs. One challenge with measuring diverted waste is that it is difficult to track how much of the diverted waste is contaminated. Often the recycling and compost collected in Green and Blue Carts have items that should not be in them, and this can sometimes lead to entire batches of waste being unable to be recycled or composted. This waste ends up having to go to the landfill anyways.

Finally, The City tracks how much waste falls into the last management category: recover/dispose. This means the amount of waste in The City's landfills or the energy able to be recovered. Landfills can only hold so much waste before they must be capped and a new landfill created. When all of the other actions on the management hierarchy are prioritized, it can prolong the lifespan of existing landfills.

What goes into the landfill?



household waste



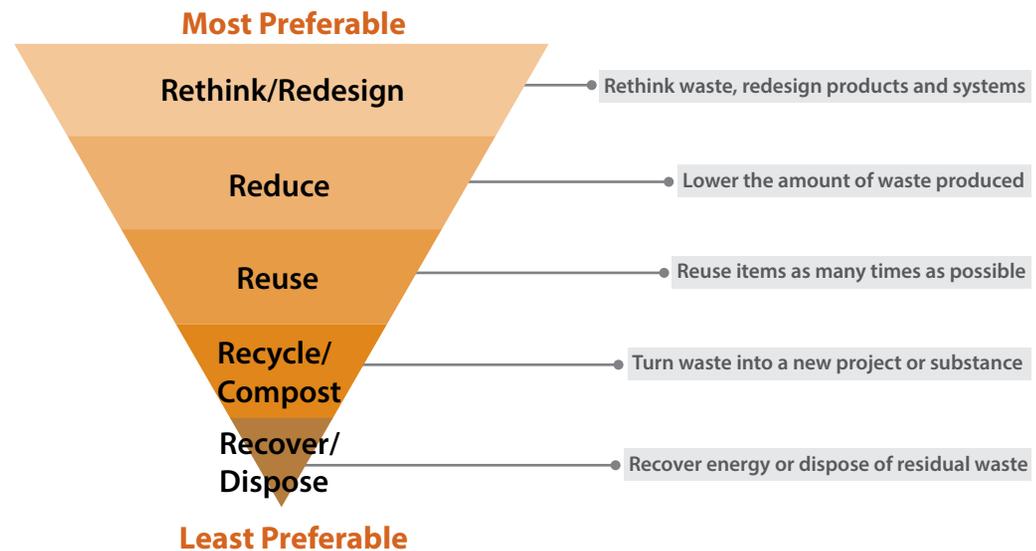
commercial / mixed-use waste



construction waste



industrial waste



Targets | City Targets

GOALS

Reduce waste and increase diversion.

- Provide programs and education to help Calgarians reduce and divert their waste.
- Work with partners in the community to help Calgarians reduce and divert their waste.
- Advocate for government policy and legislation that support and enable waste reduction and diversion.
- Manage waste and waste management facilities to protect public health and the environment.

TARGETS

Divert 70 per cent of waste from landfill by 2025 (Citywide)

- Single family – 70 per cent.
- Multi-family – 65 per cent.
- Business and organizations (Industrial, Commercial and Institutional) – 75 per cent.
- Construction and demolition – 40 per cent.

The City's **Sustainable Building Policy** guides all City-owned and City-financed facility planning, designing, constructing, managing, renovating, operating, and demolishing and includes a requirement for **diverting at least 80 per cent** of non-hazardous construction and demolition waste from landfill.

divert

70%

of waste from the landfill by

2025



70%
single family



65%
multi-family



75%
business &
organizations



40%
construction &
demolition

Fact Sheet | Waste Management

	TREND	TOTAL CHANGE	CURRENT AMOUNT
Total municipal waste to landfill	↓	Down 27 per cent since 2010	545,000 tonnes (2020)
Black cart waste per household to landfill	↓	Down 46 per cent since 2014	378 kg/household (2020)
Total household collected waste (Blue, Green, and Black Carts)	↑	Up 13 per cent since 2010	284,000 tonnes (2020)
Compostable waste left in Black Carts			45 per cent of total Black Cart waste (2019)
Recyclable waste left in Black Carts			16% Blue Cart recyclables 11% other recyclables (electronics, paint, textiles, etc.)
Landfill gas captured	↑	Up 534 per cent since 2010	8,600,000 cubic metres (2020)

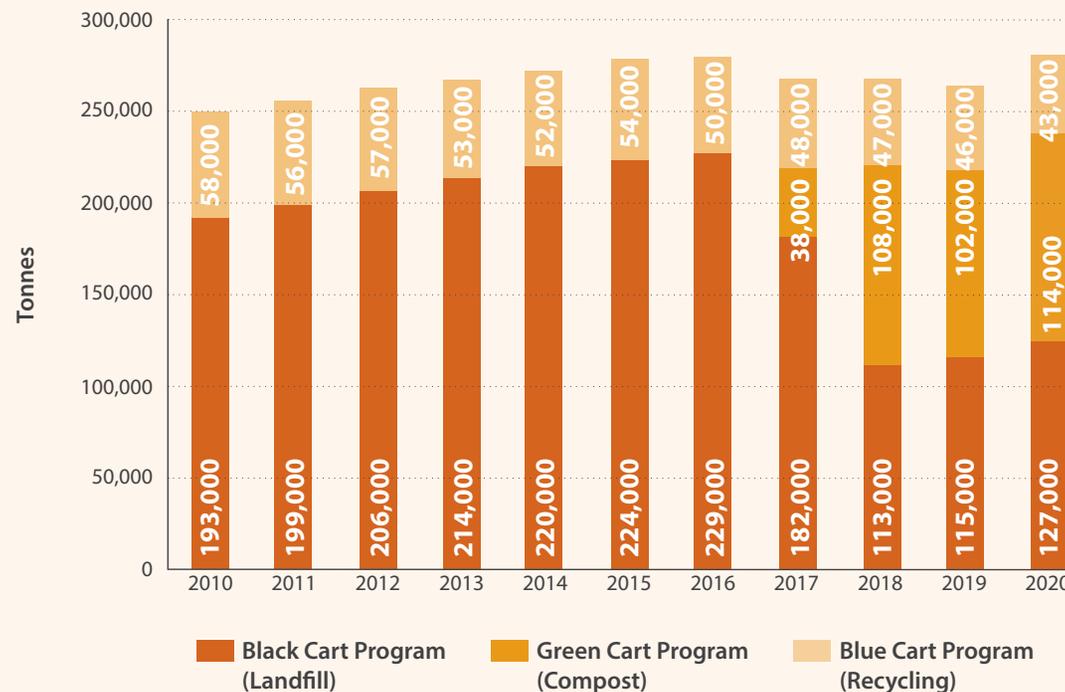
Fact Sheet | Household Waste

Although Calgary’s growing population has increased the overall amount of waste, the portion going to landfills has declined by 46 per cent per household from 2014 to 2020. This is an encouraging trend towards a more circular economy, with more of the household waste the city produces being repurposed into recycled products or compost rather than ending up in the landfill.

From 2010 to 2016, overall household waste collected through the curbside pickup of the Black, Blue, and Green Carts increased. In 2016, the amount of household waste collected peaked at 279,000 tonnes. Approximately 50,000 tonnes of that household waste was diverted as recycling with 229,000 tonnes going to the landfill that year.

From 2016 to 2019, curbside household waste was decreasing; however, it increased again in 2020. However, a much greater percentage of waste is being diverted to Blue and Green Cart programs. The amount of household waste going to the landfill in 2020 was 34 per cent less than it was in 2010. Note that these trends do not account for waste that households took to the landfill themselves.

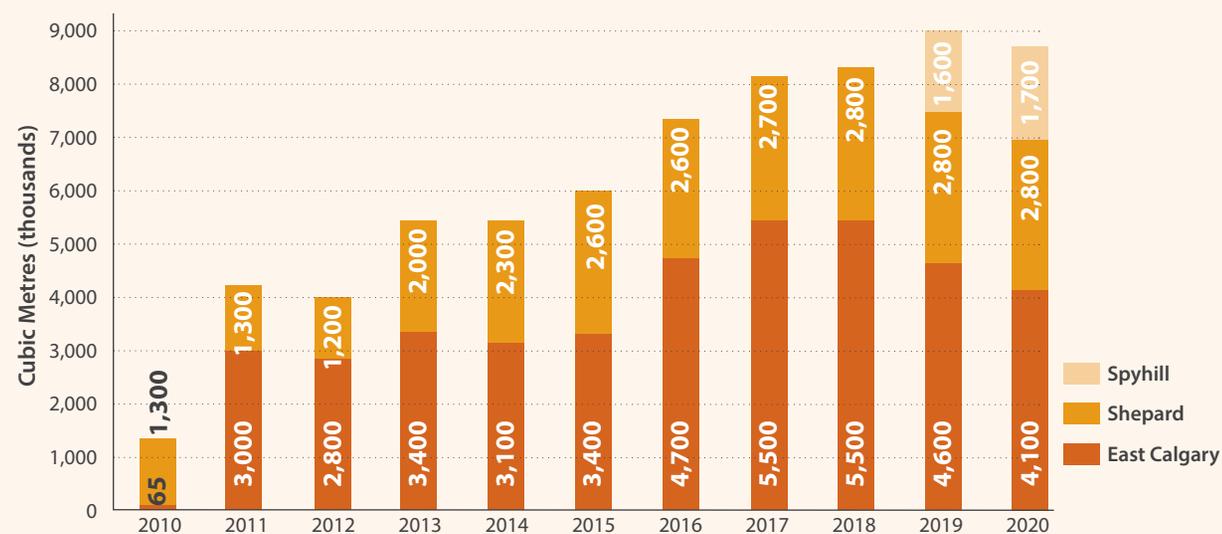
WASTE COLLECTED BY RESIDENTIAL COLLECTION CREWS



Fact Sheet | Landfill Gas

Through advances in technology, Calgary is becoming more efficient at gas capture and conversion systems. The City now has gas capturing systems on all three of its landfills, which reduce greenhouse gas emissions by approximately 70,000 tonnes of carbon dioxide equivalent (CO₂e) annually.

LANDFILL GAS COLLECTED IN CALGARY



Reduces greenhouse gas emissions by
70,000 tonnes
of CO₂ equivalent / year

Fact Sheet | Recycling and Composting

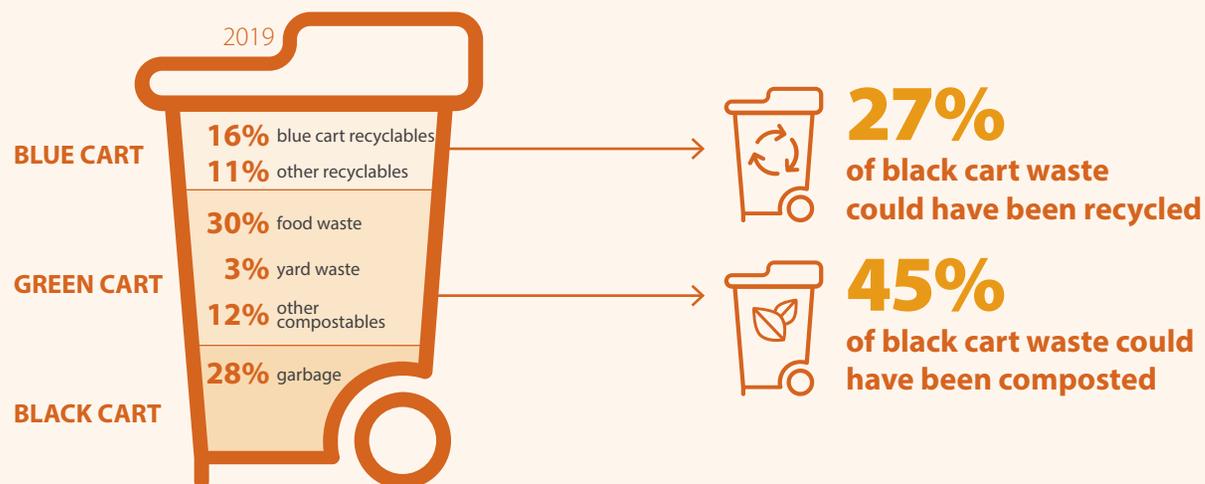
Two of the most significant challenges Calgary faces in pursuit of its zero-waste target are reducing the amount of recyclable and compostable materials that are still sent to landfills and reducing the contamination of recycled and composted waste.

In 2019, approximately 27 per cent of the household waste sent to landfills could have been recycled, and 45 per cent could have gone in Green Carts. Most of the compostable material that ended up in Black Carts was food waste. There are also increasing amounts of non-recyclable and non-compostable waste ending up in Blue and Green Carts, which can contaminate a significant amount of properly sorted material and result in it ending up in the landfill.

Both challenges result from improper sorting and increasingly challenging packaging materials. Greater awareness and education on waste streams would help to further reduce the amount of Calgary's landfill waste.

The City continues to advocate for the Government of Alberta to enable an Extended Producer Responsibility (EPR) framework, in which producers

fund and manage recycling programs for the packaging and paper products they supply into the marketplace. This EPR regulation would reduce Blue Cart program costs, potentially eliminating Blue Cart fees for single-family households. Following from this advocacy work, the Government of Alberta is conducting stakeholder engagement in 2021 to inform regulations that will enable EPR.



Targets | **National Commitments**

The Government of Canada created a plastic waste action plan in June 2019. This plan includes six priority areas and actions that governments can consider when reducing plastic waste. They are:

1. Extended producer responsibility.
2. Single-use and disposable plastic products.
3. National performance requirements and standards.
4. Incentives for a circular economy.
5. Infrastructure and innovation investments.
6. Public procurement and green operations.

Phase 2 (2020) focuses on:

7. Improving consumer, business and institutional awareness
8. Reducing waste and pollution from aquatic activities
9. Advancing science
10. Capturing and cleaning-up debris in the environment.
11. Contributing to global action

Source: <https://www.canada.ca/en/treasury-board-secretariat/services/innovation/greening-government/guidance-reduction-plastic-waste-meetings-events.html>

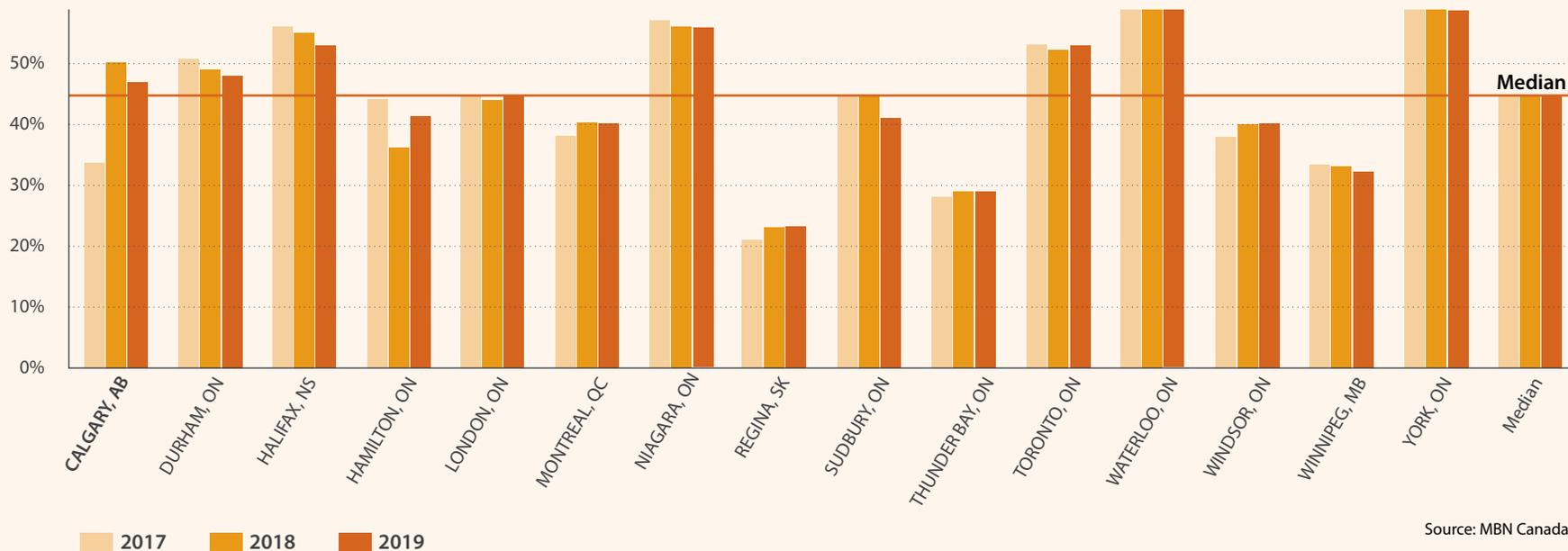


Benchmarking | How Calgary Compares

Calgary started its Green Cart program in 2017. Because of this, it saw the greatest change in its waste diversion rates out of all of the municipalities surveyed from 2017-2019 as part of the Municipal Benchmarking Initiative. It is still behind several communities for waste diversion, including Toronto, Waterloo, and Hamilton, but has recently pulled ahead of the median.

PERCENT OF RESIDENTIAL SOLID WASTE DIVERTED

This measure demonstrates the percent of residential waste diverted away from landfills and incineration through programs such as organics, blue box, leaf and yard, municipal hazardous or special waste and other recyclable materials (e.g. wood, metal, tires).



Source: MBN Canada

Climate Change Mitigation



Climate Change Mitigation Overview

The planet’s climate is changing. There is a protective layer of greenhouse gases in the Earth’s atmosphere that acts as an insulator, trapping incoming heat from the sun. This “greenhouse effect” is an important natural process that keeps the planet livable, but it has been amplified dramatically by human-produced emissions of greenhouse gases, particularly the burning of fossil fuels.

Before 1880, concentrations of greenhouse gases remained relatively constant at around 280 parts per million of CO_{2e} - for 10,000 years.¹ With the dawn of the Industrial Revolution in the 1800s, human emissions began to increase the CO_{2e} concentration significantly through the burning of fossil fuels, such as coal and petroleum, and the industrialization of agricultural activities.

In addition to increased emissions, land-use changes removed many natural systems that take carbon from the air and store it, such as forests and wetlands. The result has been a dramatic increase in greenhouse gas concentrations in the earth’s atmosphere, causing a rise in global temperature of approximately 1°C since 1880. Most of this warming has occurred in the last 50 years, which coincide with the highest concentrations of greenhouse gases in the atmosphere.² In 2017, the total concentration of greenhouse gases in the earth’s atmosphere reached 454 parts per million CO_{2e}.



Before 1880, concentrations of greenhouse gases remained relatively constant around

280 ppm of CO_{2e}

for ten thousand years

in 2017, the total concentration of greenhouse gases in the atmosphere has reached

454 ppm of CO_{2e}

¹ CO₂ is carbon dioxide gas and CO_{2e} stands for carbon dioxide equivalents and is a measure of the greenhouse gas effect by converting various greenhouse gases into their equivalent amount of carbon dioxide.

² Atmospheric greenhouse gas concentrations <https://www.eea.europa.eu/data-and-maps/indicators/atmospheric-greenhouse-gas-concentrations-6>

The temperature change associated with the 1°C global increase has been more severe in some parts of the world, including Canada. Alberta has already warmed by approximately 1.4°C since 1880, with warming expected to increase at approximately twice the global average.¹ Globally, a warming of 4°C above pre-industrial levels (1880) is expected by 2100 unless dramatic reductions in human generated emissions are implemented.²

Though this may not seem like a significant change on a household thermostat, a global increase of this magnitude has far-reaching consequences for both natural and human environments.

Climate change is both a local and a global issue, presenting the most challenging and complex environmental, social and economic problem of today. Action on climate change will be twofold:

1. **Mitigating** how much the climate will change by reducing emissions and thereby avoiding the most catastrophic impacts of climate change.
2. **Adapting** infrastructure and cities to respond to changes in climate that are already occurring and will continue to occur.

Understanding how the climate is changing and how human populations are contributing to those changes enhances efforts to mitigate climate change. Mitigation involves changing activities and practices to reduce emissions and to store or remove carbon from the atmosphere to slow the pace of climate change. This section will focus on The City of Calgary's efforts to mitigate climate change.

Measuring Emissions

The main greenhouse gases emitted by human activities are carbon dioxide (CO₂) and methane (CH₄). Both the level of emissions being generated and the activities generating the most emissions can be tracked. Usually this is calculated as carbon dioxide equivalent (CO₂e), which measures all greenhouse gases and then translates them into the amount of CO₂ that would create the same amount of atmospheric warming.

Another way to report emissions is per capita. This measure accounts for the size of the population emitting greenhouse gases and then calculates the average emissions produced per person.



Since 1880, the global temperature has risen by 1°C

Alberta has already warmed up by approximately **1.4°C**

A warming of **4°C** is expected by 2100

unless dramatic reductions in human generated emissions are implemented



Warming is expected to increase in Alberta at **2x** the global average approximately

¹ Alberta's climate future: final report 2019 <https://open.alberta.ca/publications/albertas-climate-future-final-report-2019>

² Climate Change 2014 Synthesis Report: https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf

Targets | **City Targets**

GOALS

- Improve energy efficiency and reduce GHG emissions.
- Support the low-carbon economy.

TARGETS

- 80 per cent reduction in city-wide emissions below 2005 levels by 2050.

The **Calgary Climate Change Mitigation Plan** is Calgary's action plan for reducing city-wide greenhouse gas emissions in line with the 2050 target. It identifies actions in five theme areas: Buildings and Energy Systems; Land-use and Transportation; Consumption and Waste; Natural Infrastructure - Carbon Sinks; and Leadership.

Targets | **The Impact of Reducing Greenhouse Gases**

Reducing greenhouse gas emissions will have significant benefits in the long run in addition to mitigating the severity of climate change and its consequences. Changing how people heat their homes, travel, produce food, and design cities will also have significant economic, social, and health benefits by making systems more efficient, less wasteful, and more comfortable.

For example, The City of Calgary has, since 2008, made a priority of increasing the energy efficiency of municipal buildings. In 2018, The City saw cumulative savings of more than \$1.6 million through this effort, which included pursuing LEED (Leadership in Energy and Environmental Design) certification for 31 buildings.¹ The amount of energy saved through Calgary's energy efficiency efforts was enough to supply more than 3,700 houses, and the amount of greenhouse gas emissions avoided was equal to taking more than 1,800 vehicles off the road.

Reducing emissions and switching to cleaner energy sources is also better for public health as it will reduce air pollution. Harnessing the capacity of ecosystem services, through the integration of natural systems through natural infrastructure, will help Calgary to realize its low carbon future while also making the city a more attractive place to live.

The City of Calgary saw cumulative savings of **\$1.6 million**



by increasing the energy efficiency in municipal buildings from 2008-2018

31



Leadership in Energy and Environmental Design (LEED) certified buildings included in this effort

The amount of energy saved through The City of Calgary's focus on energy efficiency was the equivalent of:

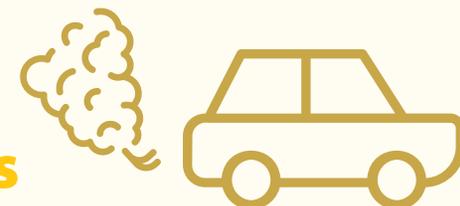


powering

3720 houses

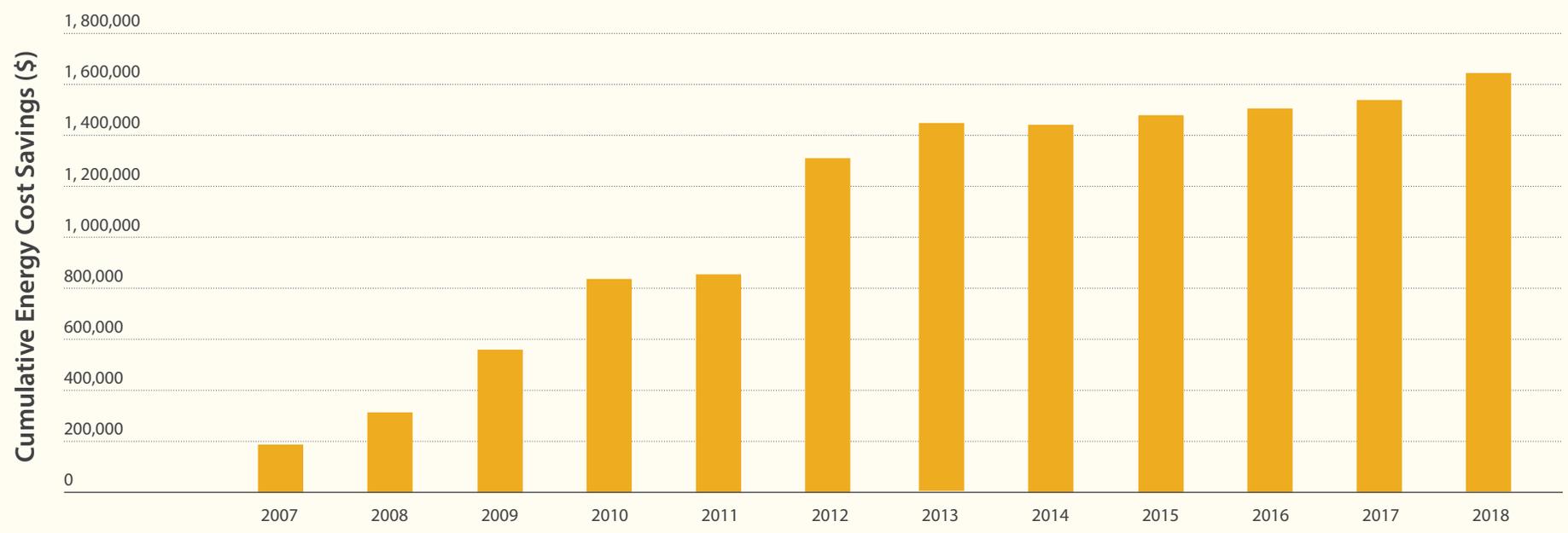
taking

1842 vehicles
off the road



¹ LEED certification is an internationally recognized green building certification program that rates buildings for their environmental sustainability.

Fact Sheet | Cumulative Energy Cost Savings 2008-2018 for City of Calgary Buildings



Notes: The avoided cost each year is converted into the present value of 2018 based on a 3 per cent escalation rate.

Greenhouse gas (GHG) emission factors for natural gas and electricity includes upstream (extraction, processing) emissions as per the Carbon Offset Emission Factors Handbook published by Government of Alberta in 2015.

Cumulative avoided cost/energy/GHG are aggregated based on a total of 31 City of Calgary LEED New Construction projects certified between 2008 to 2018.

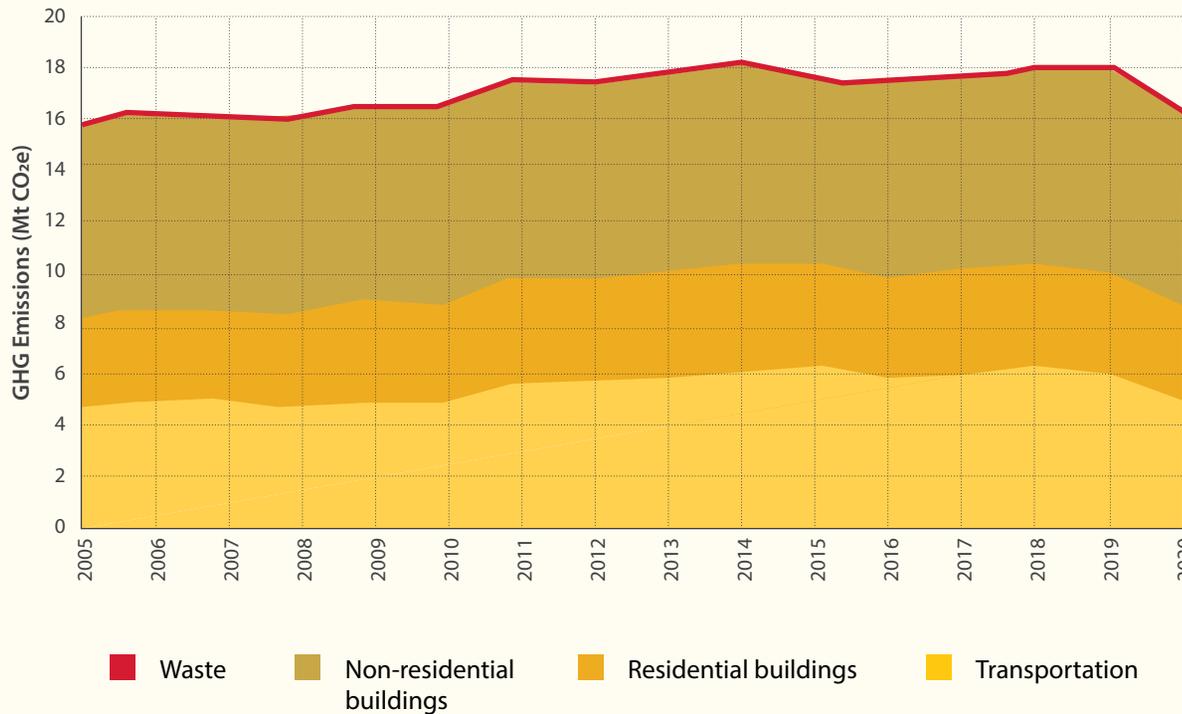
<https://www.calgary.ca/cs/iis/green-building/ghg-emissionsavings.html>

Fact Sheet | Trends

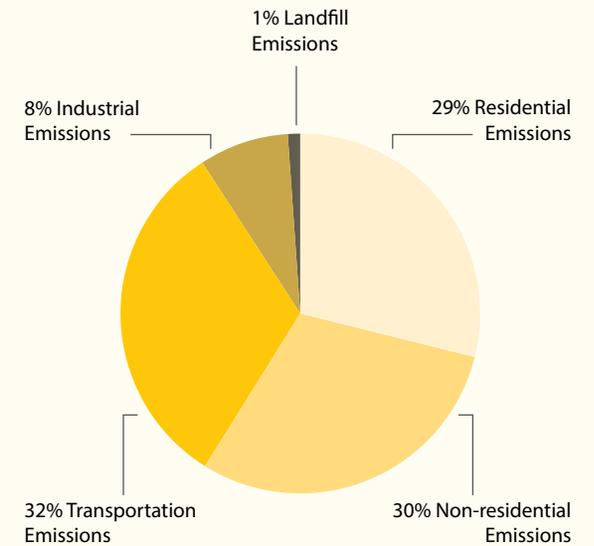
	TREND	TOTAL CHANGE (2005 -2020)	CURRENT AMOUNT (2020)	PER CENT OF TOTAL EMISSIONS
Total Emissions	→	No change (0.4 percent below 2005 emission in 2020)	15.8 megatonnes	(100 per cent)
Residential Emissions	↑	Increased 0.6 mega tonnes (+15 per cent)	4.6 megatonnes	29 per cent
Non-residential Emissions	↓	Decreased 1.2 mega tonnes (-17 per cent)	6.0 megatonnes	38 per cent
Transportation Emissions	↑	Increased 0.5 mega tonnes (+13 per cent)	5.1 megatonnes	32 per cent
Landfill Emissions	→	No change	0.1 megatonnes	1 per cent
Per Capita Emissions	↓	Down 4.52 tonnes per person (-27 per cent)	12 tonnes per person in 2020, down from 16.52 in 2005	

Fact Sheet | Overall Greenhouse Gas Emissions

CALGARY COMMUNITY-WIDE GHG EMISSIONS



TOTAL EMISSIONS BY SECTOR IN 2020



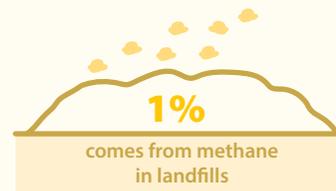
Fact Sheet | Reducing Greenhouse Gas Emissions

Approximately two-thirds of the total greenhouse gas emission in Calgary are caused by heating, lighting, and power demands in buildings. The other third of emissions are due to transportation emissions (gasoline and diesel usage) and the remaining one percent of emissions in Calgary come from methane from landfills and wastewater treatment facilities. City of Calgary operations (city-owned buildings, infrastructure, fleet, landfills and facilities) represent only four per cent of Calgary's overall emissions.

approximately

2/3

of total greenhouse gas emissions in Calgary are caused by heating, lighting and power demands in buildings



4%

of total emissions are represented by these City of Calgary operations



buildings



facilities



fleet



landfills

Fact Sheet | Reducing Greenhouse Gas Emissions

From 2005 to 2020, total emissions in Calgary rose to a peak of 19 megatonnes in 2014, but have since returned to just below 2005 levels of 15.73 megatonnes in 2020. Calgary's emissions decreased by 14 per cent in 2020, an unprecedented change. COVID-19 restrictions impacted energy use across all sectors in 2020, the provincial electricity supply became cleaner, and warm weather reduced the demand for heating. This resulted in a notable departure from the long-term trend in Calgary.

Though Calgary's population has been increasing, per capita emissions have decreased to 12 tonnes per person, a change of 27 per cent since 2005.

Calgary has a long way to go to reduce emissions by 80 per cent below 2005 levels by 2050, and that gap may grow if the city's emissions start increasing again, as they were before the COVID-19 pandemic. Strategic action is needed now to begin reducing these emissions to the 2050 target, and eventually to transition to net zero, where Calgary's economy and urban systems generate no net CO₂ emissions. The Calgary Climate Mitigation Plan outlines The City's key priorities for action.

-0.4%
emissions declined slightly
from 2005 levels

Emissions peaked in 2014, but decreased in 2020 with the COVID-19 pandemic



Since 2005,

- ↓ decrease in emissions from non-residential sectors
- no change to emissions from landfills



despite population growth, per capita emissions are trending downward

Targets | **International Commitments**

The **Paris Accord** is an international agreement with the goal of limiting global warming to well below 2°C, ideally 1.5°C, compared to pre-industrial levels. Canada signed the agreement in 2015, committing the country to reducing greenhouse gas emissions and working towards a low-carbon future.

As part of this agreement, **Canada's Mid-Century Long-Term Low-Greenhouse Gas Development Strategy** was formulated in 2016. The strategy establishes an emissions abatement pathway for reducing net emissions to 80 per cent below 2005 levels by 2050. This target was chosen with the understanding that it was consistent with the Paris Agreement's 2°C to 1.5°C temperature goal.

Some analyses, however, indicate that 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, and the current trajectory could lead to global temperatures temporarily exceeding 1.5°C above pre-industrial levels by 2024.

To strengthen its climate strategy, the Canadian government introduced the **Canadian Net-Zero Emissions Accountability Act** in November 2020, setting a goal of achieving net-zero emissions by 2050. The Act creates a legislative requirement for Canada to meet this target. This is in line with more than 120 countries who have also pledged to achieve net zero by 2050.¹



The Canadian Net-Zero Emissions Accountability Act was introduced to achieve

net-zero emissions by 2050

More than

120

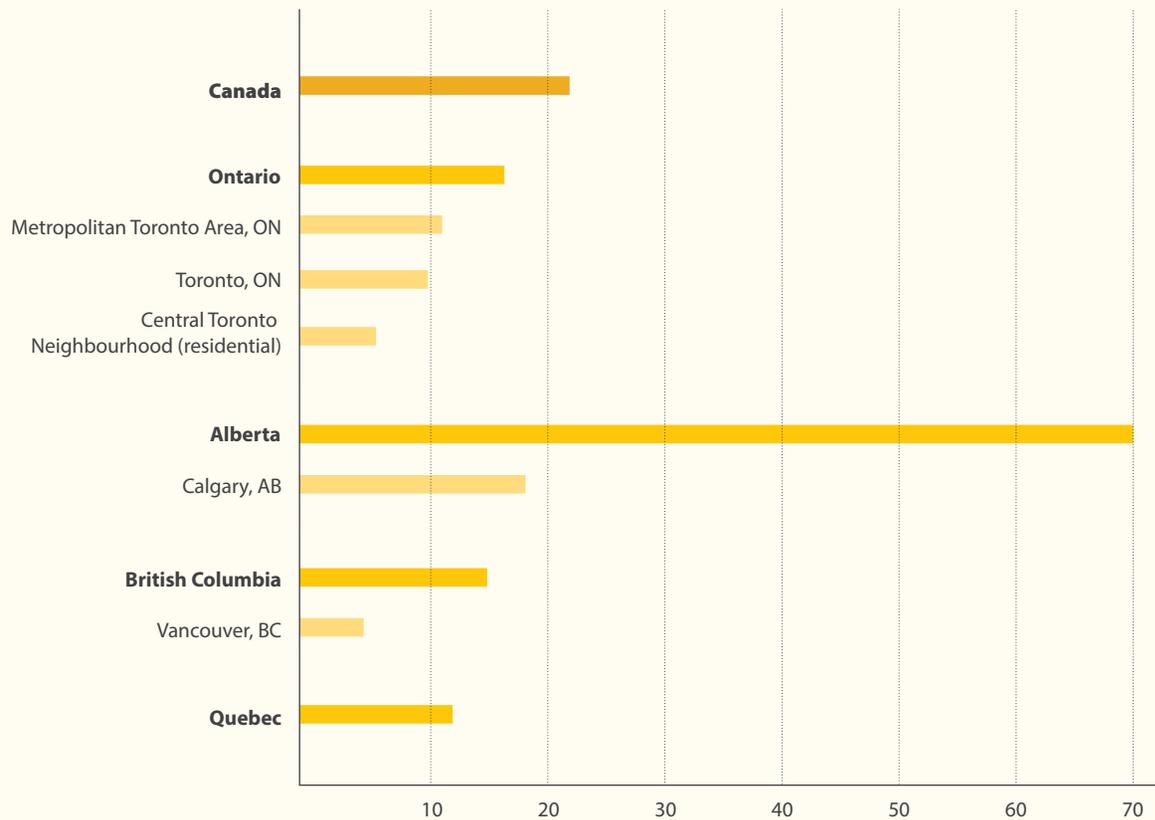
countries have pledged to do the same



¹ Global update: Paris Agreement Turning Point <https://climateactiontracker.org/publications/global-update-paris-agreement-turning-point/>

Benchmarking | How Calgary Compares

Calgarians have a large per capita carbon footprint compared to many cities across Canada and around the world. In 2010, Calgary had the fifth highest emissions per capita compared to 50 other C40 Cities¹. Alberta and Calgary also have higher per capita emissions than the rest of Canada. The main reason for this is that most of Calgary's electricity is generated by fossil fuels, whereas provinces like BC and Ontario have a greater proportion of hydroelectricity. The phasing out of coal power is anticipated to help lower Alberta and Calgary's emissions.



In 2010, Calgary ranked

5th highest per capita

for greenhouse gas emissions when compared to 50 other C40 cities

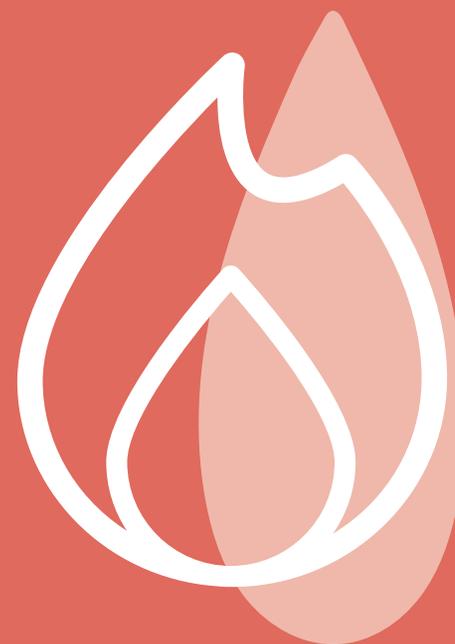
Alberta and Calgary heavily rely on fossil fuels for power, making the province and city's per capita GHG emissions higher than the rest of Canada



other provinces like BC and Ontario have lower per capita GHG emissions because they have a greater proportion of hydroelectricity

¹ C40 Cities: a leadership group of 97 cities committed to taking climate action

Climate Change Adaptation



Climate Change Adaptation Overview

Calgary has already experienced the impacts of climate change, particularly the increasing frequency and severity of extreme weather events.

Calgarians saw firsthand the devastating impact of flooding in 2013 across southern Alberta, caused by heavy rainfall on melting snow pack in the Rocky Mountains. The flood cost \$3.5 billion in insured damage, with a total of \$409 million in damages to City of Calgary infrastructure alone. Other local costs included \$55 million to cover the emergency response and \$323 million in recovery costs.

More recently, Calgary experienced the fourth costliest insured natural disaster in Canadian history when a hailstorm in June 2020 resulted in significant 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.

The impact of the 2013 flood across southern Alberta

\$3.5 billion
in insured damage

\$409 million
in damages to City of Calgary infrastructure



other Calgary costs include

\$55 million
to cover the emergency response

\$323 million
in recovery costs

On June 13, 2020 Calgary experienced the

4th costliest natural disaster in Canada's history

the impact of the 2020 hailstorm in NE Calgary had an estimated

\$1.3 billion in insurance claims



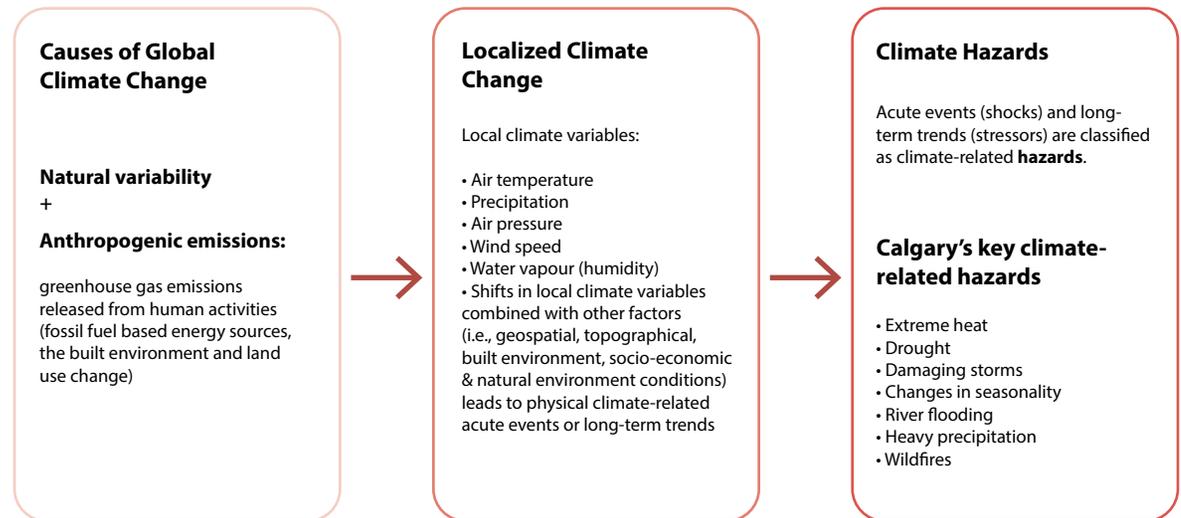
golf-ball sized hail damaged buildings, shattered windows and damaged vehicles

more vehicles were written off due to this one event than are bought in all of Alberta in an entire year



These extreme weather events are anticipated to increase in the future because of climate change and global temperature increases. Calgary’s climate-related hazards include higher temperatures in every season, an increase in the frequency and magnitude of river and stormwater flooding, higher likelihood of drought, and an overall shift in seasonal patterns of heat and precipitation.

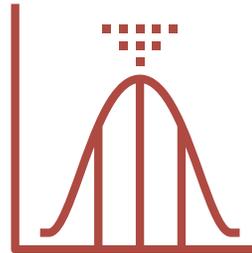
Though mitigation efforts and emissions reductions are critical to reduce the magnitude of climate change consequences, it is essential to acknowledge that the climate is still going to change in the foreseeable future, and Calgary must prepare for this change. Adapting to climate change risk requires targeted interventions and strategies to make infrastructure, services, the environment, and the economy more resilient.



Modeling Climate Change, Risk, and Vulnerability

Climate refers to the average weather conditions of a region over a long period of time. The main weather conditions that make up climate are temperature, precipitation, and wind. Usually, these weather conditions are observed over a period of 30 years to determine averages and extremes.¹ Overall climate trends are related to the weather experienced day-to-day but are determined by a much longer range of patterns.

Scientists can predict climate change through modelling. This modelling accounts for trends in the levels of greenhouse gases emissions and historical climate patterns to predict future climate variations. Climate modelling looks at several of the same weather conditions over time, including mean (average) annual precipitation and mean (average) annual temperature, as well as the impact of changes these patterns have on soil moisture and natural ecosystems.



Climate is the average of weather conditions in a region over a long period of time

The main weather conditions that make up climate are



temperature



precipitation



wind

To determine averages and extremes, weather conditions are observed for

30 years

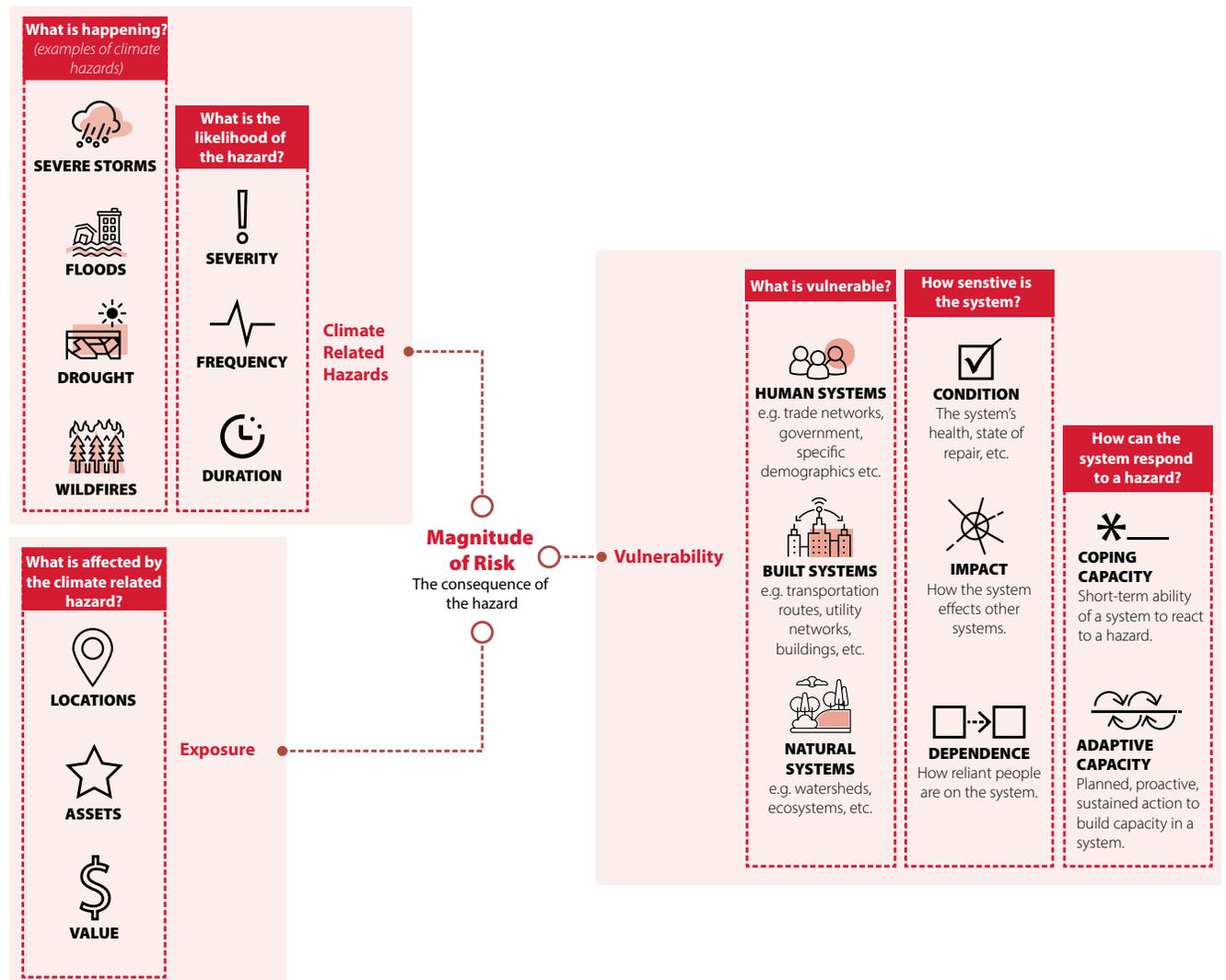
our overall climate is related to the weather we experience day-to-day but looks at a longer range of trends



¹ Definition of Terms Used Within the DDC Pages https://www.ipcc-data.org/guidelines/pages/glossary/glossary_r.html

Climate change modelling enables the identification and assessment of future climate risks and opportunities. It is important to estimate the magnitude of both risks and opportunities, as well as their likelihood of occurring. But because climate hazards are so complex, there are often downstream effects to systems beyond the initial event. For example, the hailstorm in Northeast Calgary not only caused damage from the physical ice pellets, it also clogged storm drains, leading to local flooding.

Part of this risk assessment involves looking at existing systems and their vulnerability. Vulnerability refers to the degree to which a system may be adversely affected by an external force, its level of susceptibility to harm and its capacity to respond. The more resilient or adaptive something is, the less vulnerable it is to the negative consequences of change. This is a key concept in planning for climate adaptation.



Targets | City Targets

GOALS

- Reduce exposure and vulnerability to severe weather and long-term climate effects.
-

While Calgary has made progress in implementing the Climate Resilience Strategy since it was approved in June 2018, much work remains to implement the actions identified in the Climate Mitigation and Adaptation Action Plans. Ensuring Calgary is a climate resilient community will require not only the successful achievement of the Climate Resilience Strategy but the integration climate-related risk into standard City and community practice. Improving resilience will also require collaboration with other levels of government, industry, academia, environmental organizations, and communities.

Calgary's **Climate Resilience Strategy** outlines The City's strategies and actions to:

1. Reduce the contributions to climate change by improving energy management and reducing greenhouse gas emissions.
2. Respond to a changing climate by implementing risk management measures to reduce the impact of extreme weather events and climatic changes on infrastructure and services.

Improving city resilience will require collaboration with



other levels of government



environmental organizations



industry



academia



citizens

Fact Sheet | The Impacts of Climate Change

Climate change has significant impacts on public health and wellbeing. While there are several potential positive outcomes of a warmer climate, such as longer growing seasons, these benefits are outweighed by the costs of the climate hazards that Calgary is already facing. This includes the increased risk of injury and loss of life from severe weather events such as hailstorms, heat waves, floods and wildfires. In addition to the physical harm these climate events cause, they have significant economic consequences given the costs associated with the response and recovery from disasters. Lastly, climate events are detrimental to mental health.

With temperatures increasing in Alberta, so are the ranges of various diseases. Examples of these are Lyme disease from ticks and the West Nile virus carried by mosquitoes. Changing conditions will also impact both local and global food systems, with more frequent flood and drought events that damage crops and can disrupt supply chains.

Climate change is a tough problem to fix because it is so far reaching and complex. However, there are many things to reduce the harm it will have on Calgary's communities. The objective is to create resilience in The City's infrastructure and systems, enabling Calgarians to adapt to change as it occurs. This can be done by ensuring that land use planning considers increasing flood risk and other hazards, redundant/back up systems are

POTENTIAL POSITIVE IMPACTS OF CLIMATE CHANGE IN CALGARY

Warmer seasonal temperatures

- Reduced cold-related injuries and illnesses.
- Increased recreational, active-transportation and tourism opportunities.
- Decreased demand for space heating in winter.
- Shift in viable plant species and agricultural opportunity.
- Extended construction season.
- Extended growing season.
- Decrease in frost events and lengthened frost-free season.

Increased precipitation in spring, fall and winter:

- Shift in snow-related tourism opportunities.
- Earlier spring growing season

ONGOING NEGATIVE IMPACTS OF CLIMATE CHANGE IN CALGARY

Extreme heat - Calgary will experience increasingly hot summers with heat waves (a heat wave is three days in which a daytime high reaches above 29°C) occurring more often and for longer periods of time.

Drought - Drought is a lack of adequate precipitation over an extended period of time, resulting in a water shortage. Increased summer temperatures and decreased summer precipitation indicate that meteorological drought conditions may become more common, prolonged, and widespread.

Shifting Seasonality (higher average temperatures) - Calgary is experiencing and will continue to experience higher average annual temperatures which affects the length of the seasons. Winters are getting shorter, spring is arriving earlier, summers are longer and fall is arriving later.

Wildfire - Wildfire risks will continue to intensify as climate change makes the fire season longer and drier leading to more frequent, larger, and intense wildfires.

Heavy Precipitation - The nature of individual storm events are changing, with more precipitation falling as short-duration, high-intensity storms, which can lead to overland flooding.

Winter Storms - This includes a greater risk of damage associated with heavy snow, blizzard conditions and freezing rain.

Damaging Storms - This includes hail, high wind events and tornadoes, often accompanied by rain and lightning.

River Flooding - Climate change is exacerbating the conditions that lead to river flooding, continuing to influence the likelihood of Calgary experiencing major flooding on a reoccurring basis.

in place, and natural systems are integrated into infrastructure planning and design. Embedding greater resilience within Calgary's communities will enable the city to bounce back more quickly when disaster does strike.

Fact Sheet | Climate Change Modelling

CLIMATE INDICATOR (ANNUAL)	TREND	1981-2010 NORMALS	2050S MEAN CHANGE (2041-2070)	2080S MEAN CHANGE (2071-2100)
Temperature	↑	4.4°C	7.4 C (+3°C)	9.3°C (+4.9°C)
Mean Daily Maximum Temperature	↑	9.9°C	12.9°C (+3°C)	14.9°C (+5°C)
Mean Daily Minimum Temperature	↑	-1.5°C	1.7°C (+3.2°C)	3.8°C (+5.3°C)
Maximum Temperature	↑	31.8°C	36.3°C (+4.5°C)	38.9°C (+7.1°C)
Days Above 29 (°C) threshold for heat wave	↑	6 days	27.5 days (+21.5 days)	48.7 days (+42.7 days)
Precipitation	↑	416 millimetres	444 mm (+28 millimetres)	455 mm (+39milimetres)
Snowfall	↓	100 centimetres	72 cm (-28 centimetres)	59 cm (-41 centimetres)

Fact Sheet | Trends

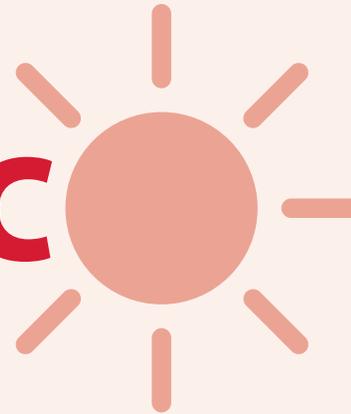
Historic climate trends in Calgary indicate that local temperatures have steadily increased over the past century, and projections strongly indicate that regional warming is expected to continue at an accelerated rate over the next century. More warming is expected during the cooler seasons (winter, late autumn and early spring) and in nighttime temperatures throughout the year. Changes in temperature extremes (e.g. heat waves and high heat days) are significantly more pronounced than seasonal or annual averages.

Currently, Calgary experiences approximately six days of heat greater than 29°C per year. By the 2050s, it's projected that there will be 18.9 to 38.2 additional days warmer than 29°C. By 2080, projections indicate that there will be between 30.9 to 68.9 additional days that reach temperatures greater than 29°C.

Calgary currently experiences 6 days above

29°C

approximately



Changes in temperature extremes (i.e. heat waves and high heat days) are significantly more pronounced than seasonal or annual averages

It is projected that by 2050, there's an additional

18.9 - 38.2 days greater than 29°C



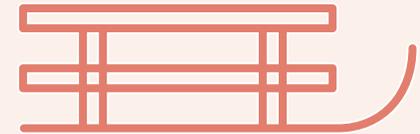
and **30.9 - 68.9** days by 2080

Average winter temperatures are projected to increase but remain below 0°C. Calgary's climate will remain cold enough to be subject to snowfall events, and these warmer winter temperatures in combination with the projected increases in winter precipitation may result in increased snow events during the winter months.

The winter season itself will be shorter, as "shoulder season" temperatures in the spring and fall will more often be above 0°C. Freeze-thaw cycles are expected to decrease as more of the year, especially during the spring and fall, will see temperatures above 0°C.

Despite increasing average winter temperatures, they are projected to remain below

0°C



warmer winter temperatures in combination with increases in winter precipitation may result in increased snow events

Winter itself will be shorter as 'shoulder season' temperatures in the spring and fall will be above 0°C



freeze-thaw cycles are expected to decrease as more of the year, especially during the spring and fall, will be spent at temperatures above 0°C



Warmer air holds about seven per cent more water for every degree of temperature increase. This means that as temperatures rise, there is potential for increased precipitation in Calgary. Warming can affect both increases in extreme rainfall during warm season storms and lead to greater volumes of precipitation in the form of snow during the colder seasons.

Precipitation is based on several factors, so, although a slight annual increase in precipitation is projected for Calgary, seasonal precipitation will be affected by climate change in different ways.

**warmer air
holds about**

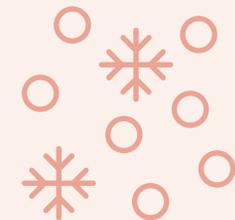
7%

**more water for
every degree of
temperature
increase**

increased precipitation
in Calgary is likely as
temperatures rise



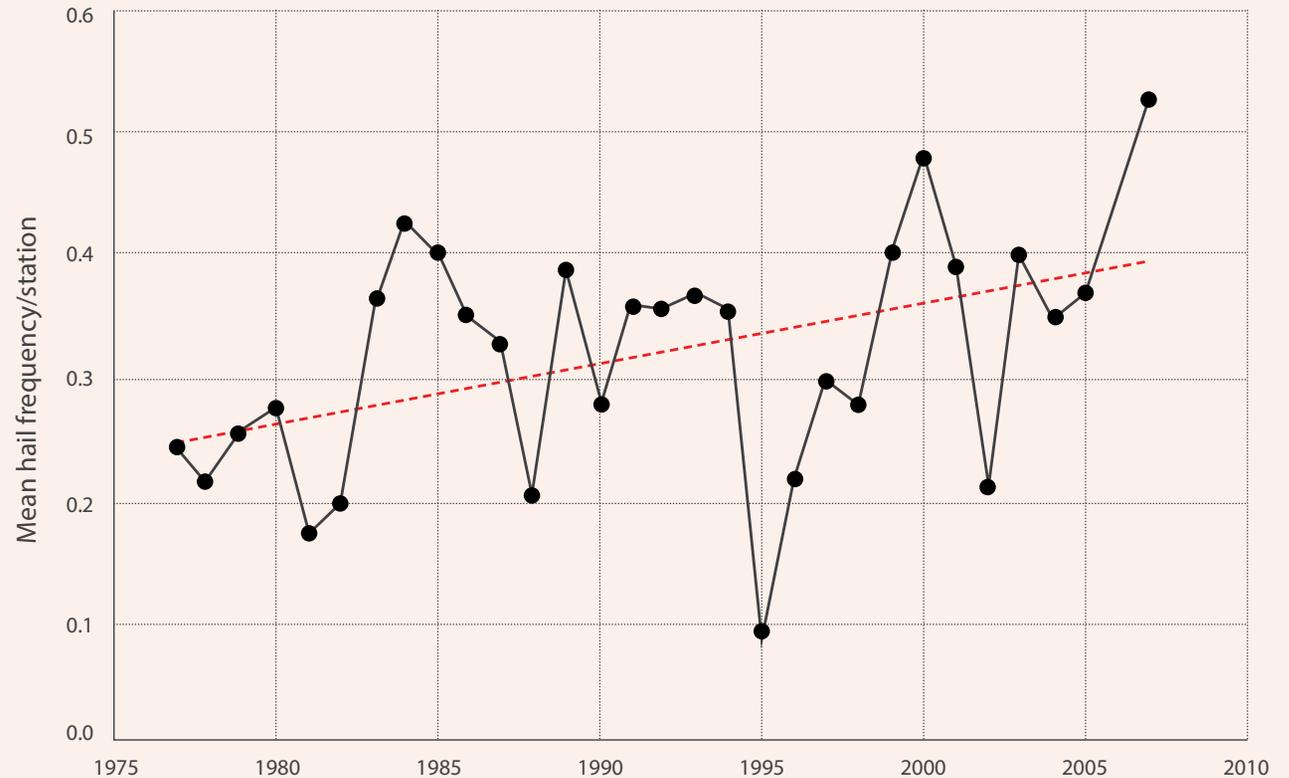
warming affects both increases in extreme rainfall during warm seasons and leads to greater volumes of precipitation in the form of snow during cold seasons



There is an increasing trend in hail events in Alberta from 1975 to 2010. Although climate projections for hail cannot be definitively determined, it is expected that the upward trend will continue based on the increase in temperature, severe precipitation, and increasing atmospheric energy. Additionally, the increasing duration of the “hail season” or convective storm season will likely contribute to Calgary experiencing more hail events, and buildings will experience greater impacts.

In general, Calgary will continue to see increased climate-related hazards, including higher temperatures across all seasons, an increase in the frequency and magnitude of river and stormwater flooding, a higher likelihood of drought, and an overall shift in seasonal patterns of heat and precipitation.

TRENDS IN ALBERTA HAIL FREQUENCY (MAY-SEP)



Targets | **International Commitments**

Part of the **Paris Accord** agreement, signed by Canada and 195 other countries, involves resilience building and adaptation strategies. Canada created the **Pan-Canadian Framework on Clean Growth and Climate Change**, which sets out direction for adaptation in the following areas:

- Translating scientific information and Traditional Knowledge into action.
- Building climate resilience through infrastructure.
- Protecting and improving human health and well-being.
- Supporting particularly vulnerable regions.
- Reducing climate-related hazards and disaster risks.

This report was created in collaboration with O2 Planning and Design, Chris Turner and The City of Calgary.



Given the modular style of the report, as new information becomes available, sections can be removed and updated as needed. This will ensure that the *Calgary's Environment Report* remains a resource for The City and the public on an ongoing basis.





ENVIRONMENT STRATEGY

WHAT WE HEARD REPORT (PHASE THREE)

An overview of the project, engagement activities, range of input received and the themes that were raised in phase three.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Contents

- Executive Summary3
- Project overview5
 - Project background.....5
 - Project alignment.....5
- Engagement overview.....6
 - The engagement process6
 - Stakeholders.....7
 - How we communicated.....7
- What we asked.....7
- What we heard7
- Next steps8
- Summary of Input.....9
 - Phase 1 (youth)9
 - Phase 2 (public).....9
 - Phase 3 (external targeted stakeholders).....10
 - Section 111
 - Section 212
 - Theme.....12
 - Detailed explanation.....12
 - Section 313
 - Theme.....13
 - Detailed explanation.....13
- Verbatim Comments.....16
- Appendix A – Council Directives.....18
- Appendix B – Engagement Principles19



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Executive Summary

Motion C2019-0285 recognized that The City has a number of specific environmentally themed strategies, policies, and action plans, but lacks a unifying long-term environmental strategy that defines the environmental direction for The City as a whole. The Environment Strategy and action plan will provide the direction necessary to achieve the Citizen Priority of ‘A Healthy and Green City’.

Engagement for this project is occurring in four phases. This engagement approach ensures that The City, Calgarians and external organizations are working collaboratively towards a shared future state. The chart below outlines the overall engagement strategy for the project to date.

Phase	Target audience	Date	Tactics	Communications	Number of participants (interacted with the project)	Number of contributors (provided input)
Phase 1	Youth	June 4 – 6, 2019	9 workshops at Mayor’s Environment Expo	Email to teachers; marketing at event for drop-in	250	250
Phase 2	Public	Jan. 12 – 26, 2021	Online (Public page)	Email to 350+ programs/agencies; YouTube pre-roll video ads; website ads; social media	5,298	685
Phase 3	External Targeted	Feb. 16 – Mar. 15, 2021	Online (Hidden page)	Email to 130+ industry programs/ organizations	102	33 (combination of individual and team contributions)
Phase 4	Public	2021/2022	Online (Public page)			

Phase one engagement focused on developing a vision for Calgary’s environmental future. It intended to set the tone for the Environment Strategy and provide a foundation for the next phase of engagement. Themes from phase one are listed below with bolded themes being those that resonated most with the public in phase two.

- **The environment is an important resource for other things in our lives**
- We are depleting environmental resources and should take action to replenish what we have used.
- We are rooted in the environment.
- We have a symbiotic relationship with the environment and should continue to respect and honour our interconnectedness.
- There is beauty in our environment
- **Make thoughtful, creative and proactive changes to improve the health of the environment because the decisions we make today affect our future.**



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

- **While we all have a responsibility to improve the health of the environment, government should lead by working with people, creating policies/rules and supporting environmental initiatives.**
- Achieving the dream for a healthier environment would elicit feelings of pride, joy and a sense of peace.

In phase two engagement, Calgarians were invited to share what environmental factors matter most and are most concerning to them and confirm our shared values related to Calgary's environmental future.

Participants identified key actions we could take to achieve a healthy and sustainable future. These are:

- Control the city's growth and make better use of space.
- Government is an important leader with the resources and authority to implement policies and regulations.
- Establish better processes for reducing waste and redirecting away from landfills.
- Conserve existing natural spaces and plan for more.

Actions that people shared they would take if no barriers existed included more eco-friendly modes of transportation; more effort towards reducing waste; eco-friendly home renovations; and, supporting the city's natural environment. Primary barriers included the built environment, budget, access to resources, municipal policies and regulations, and lack of awareness.

In phase three engagement, targeted external subject-matter experts were invited to identify issues and opportunities to refine Calgary's proposed environmental framework and actions.

The two main focus areas that targeted stakeholders indicated we should focus our efforts and resources were Water Stewardship and Healthy Ecosystems. The following list outlines the actions targeted stakeholders indicated should be The City's highest priority in the next year.

- Establish a strategy that is built on strong leadership, reduces redundancies and has sufficient resources
- Prioritize preservation and protection of natural spaces
- Prioritize waste reduction

Targeted stakeholders also identified the following opportunities we should focus on in the next decade.

- Grow the low impact business sector;
- Encourage production and access of local products and services; and,
- Encourage the development industry towards green infrastructure, engineering and construction including, but not limited to, building green facades and roofs.

The Environment Strategy and action plan will help renew and strengthen our commitment to achieve the Citizen Priority of '*A Healthy and Green City*'; support The City to be responsive to the diverse and changing environment within Calgary's context; and, set out a clear vision, direction and goals for improving Calgary's environment for all Calgarians.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Project overview

The City of Calgary is consolidating our environmental strategies to provide an updated vision for protecting and improving Calgary's environment into the future.

We understand that the challenges we collectively face are complex and significant. This initiative will combine and strengthen our departmental strategies to leverage and support our strategic efforts and actions to manage our land, biodiversity, water, energy, and waste resources in a much more integrated way.

The Environment Strategy will provide us with a better understanding of the critical environmental challenges Calgary faces so we can plan and design for a future that creates a healthy population, flourishing environment and a prosperous city today and for generations to come.

The project has outlined focus areas that will help define and guide Calgary's Environment Strategy:

- **Climate Adaptation** - Prepare for and adapt to climate change impacts
- **Efficient Energy Use and Buildings** - Reduce energy consumption and greenhouse gas emissions
- **Clean Air** - Manage and protect air quality
- **Sustainable Transportation** - Make walking, cycling and public transit preferred choices
- **Sustainable Neighbourhoods** - Plan for a compact city and complete, healthy communities
- **Healthy Ecosystems** – Protect, restore and enhance natural areas, parks and trees and provide access to nature
- **Water Stewardship** - Support integrated watershed management: protect and improve the watersheds, improve water quality, reduce water consumption and flood risk
- **Zero Waste and Responsible Consumption** - Reduce consumption and waste generation

Calgary has a long history of environmental conservation through both community-led and corporate-led work and volunteerism. The Environment Strategy can build on these efforts by identifying where we need to focus action into the future. The action plan will outline our progress to date and our approach to achieving The City's established targets to improve Calgary's environment over the next ten years.

Project background

At the 2019 March 18 Combined Meeting of Council, City Council unanimously supported Notice of Motion C2019-0285 and directed Administration to develop a City-wide Environment Strategy and action plan (Environment Strategy). The motion recognized that The City has a number of specific environmentally themed strategies, policies, and action plans, but lacks a unifying long-term environmental strategy that defines the environmental direction for The City as a whole.

Project alignment

This work will provide the direction necessary to achieve the Citizen Priority of **A Healthy and Green City** which states:

Calgary is a leader in caring about the health of the environment and promotes resilient neighbourhoods where residents connect with one another and can live active, healthy lifestyles.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

This project responds to the Council Directives outlined in [Appendix A](#).

Engagement overview

In phase three engagement, we invited targeted stakeholders to identify issues and opportunities to refine Calgary’s proposed environmental framework and actions.

Engagement for this project is in four phases. These are:

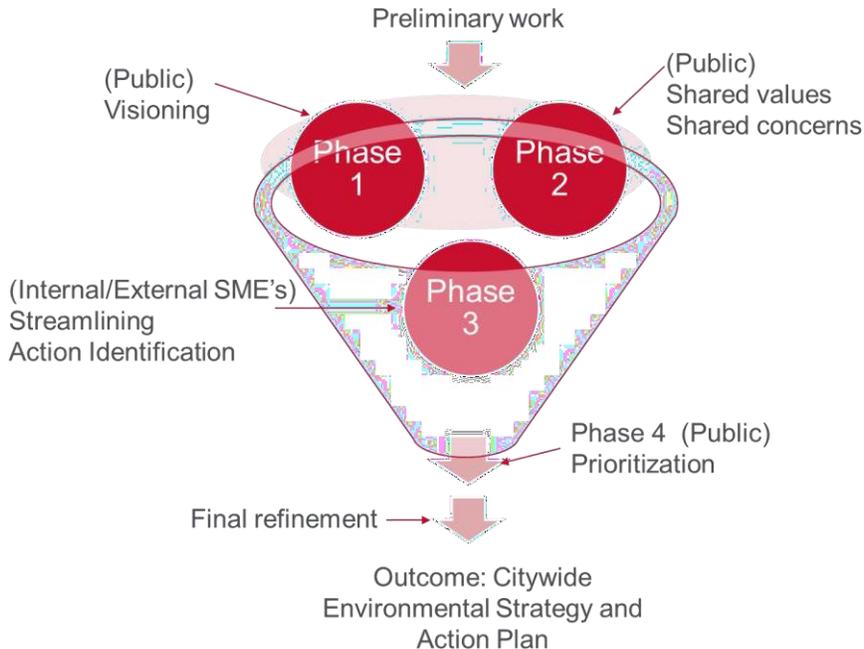
Phase 1 – Visioning - Engagement with children/youth attending The Mayor’s Environmental Expo focused on developing a vision for Calgary’s environmental future to set the tone for the strategy and the next phase of engagement.

Phase 2 – Confirming - Engagement seeks to understand what environmental factors matter most and are most concerning to Calgarians and confirm our shared values.

Phase 3 – Streamlining and Identifying - Using public input and other data sets, internal and targeted external subject-matter experts will identify issues and opportunities to refine Calgary’s proposed environmental framework and actions.

Phase 4 – Gathering insights - Using input from Phase three, engagement will seek public input for prioritization of proposed actions.

The engagement process



To see the engagement principles used in shaping and executing the engagement process see [Appendix B](#).



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Stakeholders

The stakeholders for the overall project were grouped into the following categories:

- Public
- Internal (multiple business units across multiple departments at The City of Calgary)
- Targeted Stakeholders include representatives from:
 - Business and Development sector
 - Non-governmental organizations / Academia
 - Regional and Regulatory sector
 - Community groups
 - Environmental groups

Phase three, and therefore this report, is geared towards targeted stakeholders.

How we communicated

Since this was targeted engagement to industry representatives, we reached out to organizations directly through emails sent from both Environmental and Safety Management and the Engage Resource Unit.

What we asked

This engagement asked for industry representatives' input on a range of ideas, including:

- what environmental actions should be prioritized;
- the biggest challenges that are anticipated;
- what actions have already had a positive impact on our environment;
- what actions could have a positive impact on our environment; and,
- opportunities for a green economy

A hidden portal page was developed for industry stakeholders. It was private and designed so that responses were visible to one another. It encouraged interaction among participants and facilitated dialogue in an online forum.

What we heard

The following is a summary of what we heard in phase three engagement.

The two main focus areas that targeted stakeholders indicated we should focus our efforts and resources were Water Stewardship and Healthy Ecosystems.

Actions that targeted stakeholders indicated should be The City's highest priority in the next year are:

- Establish a strategy that is built on strong leadership, reduces redundancies and has sufficient resources;
- Prioritize preservation and protection of natural spaces; and,
- Prioritize waste reduction.

Climate impacts was identified as the biggest challenge facing Calgary in the next 10 years.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

A range of ideas that could have positive impacts towards improving environmental wellbeing in Calgary were identified. Details for each are included in the summary of input or by clicking on the links below.

- [Climate Adaptation](#)
- [Efficient Energy Use and Buildings](#)
- [Clean Air](#)
- [Sustainable Transportation](#)
- [Sustainable Neighbourhoods](#)
- [Healthy Ecosystems](#)
- [Water Stewardship](#)
- [Zero Waste and Responsible Consumption](#)

A range of actions, including both City- and community-led initiatives were identified as having had a positive impact on our environment. The full list can be found on page 13 of this report.

Targeted stakeholders also identified the following opportunities we should focus on in the next decade.

- Grow the low impact business sector;
 - Encourage production and access of local products and services; and,
 - Encourage the development industry towards green infrastructure, engineering and construction including, but not limited to, building green facades and roofs.
- For a detailed summary of the input that was provided, please see the [Summary of Input](#) section.
- For a verbatim listing of all the input that was provided, please see the [Verbatim Responses](#) section.

Next steps

Engagement is one input in a project's decision. Inputs into this project include research, literature reviews, public opinion and subject-matter expertise.

Input heard in all phases of this project, along with feedback from internal stakeholders will be reviewed and used to develop proposed environmental actions. The proposed Environment Strategy will be presented to the Executive Leadership Team before being presented to the Standing Policy Committee on Utilities and Corporate Services June 23, 2021 followed by City Council July 26, 2021. Actions will then be brought back to the public in phase 4 engagement before being brought back to industry representatives and internal stakeholders to make a final refinement to identify strategies and initiatives of greatest impact that the corporation and community can action.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Summary of Input

The following summary of input will provide quick overviews of what we heard in the first and second phases of engagement and then focus in more detail on the third phase of engagement which involved targeted industry representatives.

To see the detailed What we Heard Reports from phases one and two, visit www.engage.calgary.ca/environment.

Phase 1 (youth)

Phase one engagement focused on developing a vision for Calgary's environmental future. Using graphic recording, a technique that records conversation through text and graphics, youth attending the Mayor's Environment Expo 2019 were invited to share their ideas of what they imagined for Calgary's environmental future. This work intended to set the tone for the Environment Strategy and provide a foundation for the next phase of engagement. Themes from phase one are:

- The environment is an important resource for other things in our lives
- We are depleting environmental resources and should take action to replenish what we have used.
- We are rooted in the environment.
- We have a symbiotic relationship with the environment and should continue to respect and honour our interconnectedness.
- There is beauty in our environment
- Make thoughtful, creative and proactive changes to improve the health of the environment because the decisions we make today affect our future.
- While we all have a responsibility to improve the health of the environment, government should lead by working with people, creating policies/rules and supporting environmental initiatives.
- Achieving the dream for a healthier environment would elicit feelings of pride, joy and a sense of peace.

Phase 2 (public)

Building on phase one engagement, Calgarians shared which themes resonated most with them. These are:

- The environment is an important resource for other things in our lives
- Make thoughtful, creative and proactive changes to improve the health of the environment because the decisions we make today affect our future.
- While we all have a responsibility to improve the health of the environment, government should lead by working with people, creating policies/rules and supporting environmental initiatives.

Calgarians were also invited to share what environmental factors matter most and are most concerning to them. Participants identified key actions we could take to achieve a healthy and sustainable future. These are:

- Control the city's growth and make better use of space.
- Government is an important leader with the resources and authority to implement policies and regulations.
- Establish better processes for reducing waste and redirecting away from landfills.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
 May 13, 2021

- Conserve existing natural spaces and plan for more.

We wanted to understand what actions Calgarians are most inspired to act on that would reduce their impact on the local environment and what is standing in the way of them achieving this. The chart below is a summary of what we heard.

Action	Barrier
Would consider more eco-friendly modes of transportation	<ul style="list-style-type: none"> • The built environment does not support environment-friendly actions • Need complete communities that make walking and cycling easier • Budget, especially in relation to purchasing an electric vehicle
Would put more effort into reduction waste	<ul style="list-style-type: none"> • Local government should advocate for reduced packaging • Need more garbage and recycling containers in public spaces • Limited range of what can and cannot be recycled in Calgary’s processing facilities • Budget, in relation to the cost of buying items in recyclable or compostable packaging
Renovate home to be more eco-friendly	<ul style="list-style-type: none"> • Budget to make improvements • Cost-saving measures (e.g. minimal heating bill) often outweigh home improvements (e.g. expensive window replacement) • Condo companies who are responsible for their building exteriors, rental properties, and municipal government regulations • Unsure what improvements will have the greatest impact
Support the city’s natural environment	<ul style="list-style-type: none"> • Municipal policies and regulations

Phase 3 (external targeted stakeholders)

Phase three engagement invited targeted external subject-matter experts to identify issues and opportunities to refine Calgary’s proposed environmental framework and actions. This included industry representatives with:

- Business and Development sector
- Non-governmental organizations / Academia
- Regional and Regulatory sector
- Community groups
- Environmental groups

This engagement asked for industry representatives’ input on a range of ideas, including:

- what environmental actions should be prioritized;
- the biggest challenges that are anticipated;
- what actions have already had a positive impact on our environment;
- what actions could have a positive impact on our environment; and,
- opportunities for a green economy



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Section 1

This section identifies information about the participating organizations and recommendations regarding where we should be allocating resources moving forward.

Chart 1 indicates which focus area(s) is the organization's primary mandate. A few indicated that their organization works within multiple focus areas. Chart 2 indicates which focus areas subject-matter experts thought are most important for us to be focusing our efforts and resources towards.

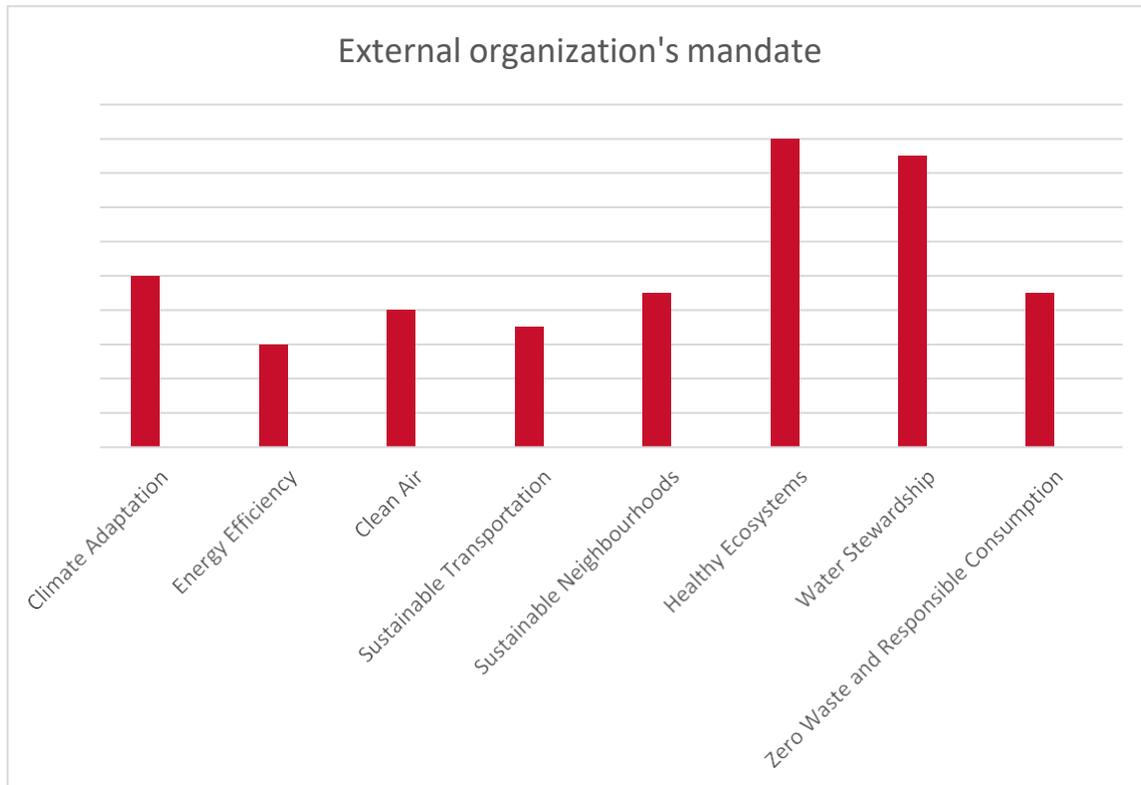


Chart 1

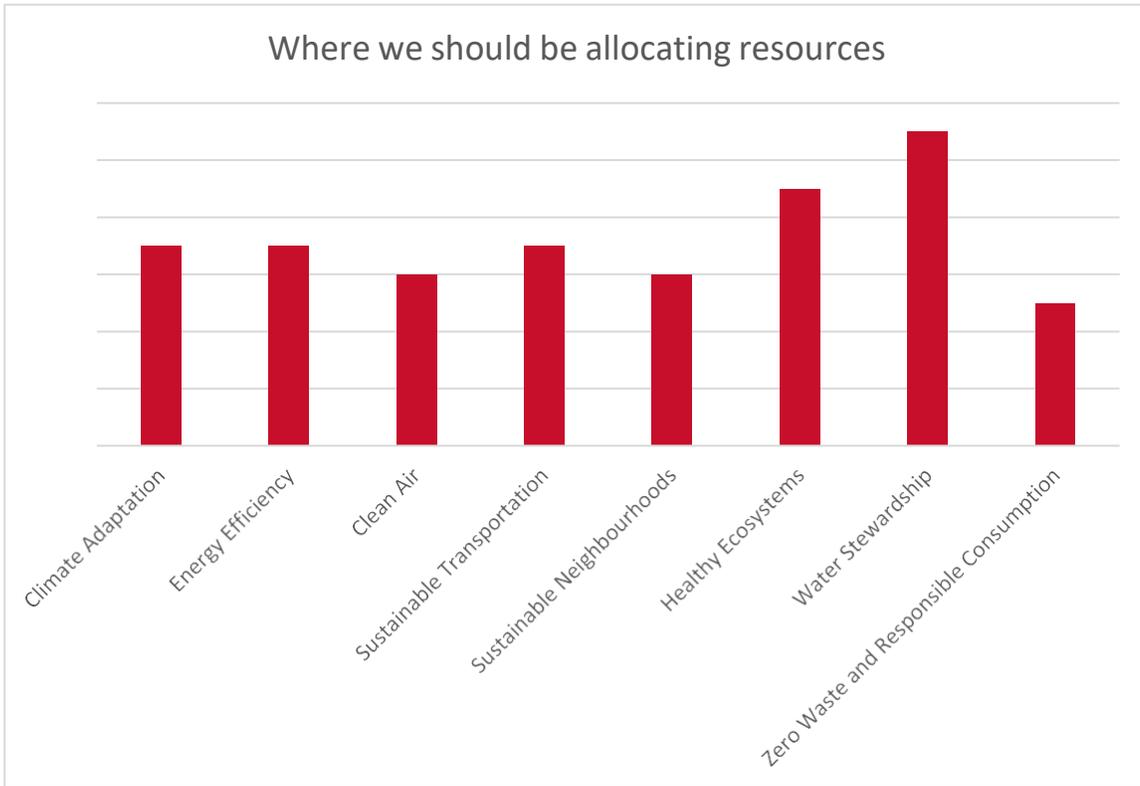


Chart 2

Section 2

Phase two engagement identified complete communities, strong leadership, better waste reduction processes and increased support for Calgary’s natural environment as key actions we need to take to achieve a healthy and sustainable environmental future.

Building on this, Table 1 outlines what we heard from industry stakeholders regarding what actions they think should be the highest priority for Calgary’s environment in the next year.

Table 1

Theme	Detailed explanation
Establish a strategy that is built on strong leadership, reduces redundancies and has sufficient resources	This theme focuses on our collective responsibility and suggests that a unified plan that draws on existing work and is founded in a collaborative approach is vital. It suggests that The City of Calgary’s role should be based in collaborative partnerships, both internally and externally; should consider a regional lens; and should be a strong advocate to, and with, other levels of government. It highlights opportunities for The City of Calgary to lead by example, set clear expectations and be an advocate for things such as sustainable transportation goals and changes to packaging practices.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
 May 13, 2021

<p>Prioritize preservation and protection of natural spaces</p>	<p>This theme focuses on the value of taking proactive steps to preserve and protect natural spaces. It suggests that it is important to protect wetlands, green spaces and environmentally significant areas, keeping spaces undeveloped as much as possible, including returning degraded sites to their natural conditions. It further highlights that ecological restoration, habitat connectivity, riparian health, turning more land into regenerated ecosystems and enhancing linear open spaces across urban landscapes are important actions. Additionally, this theme indicates that it is important to consider the surrounding areas so the impacts upstream and downstream are managed appropriately.</p>
<p>Prioritize waste reduction</p>	<p>This theme focuses on prioritizing waste reduction through initiatives such as extended producer responsibility; further exploration of circular economy for plastics; increasing waste diversion and reducing unnecessary packaging.</p>

Section 3

The following section outlines the remaining questions we asked of industry stakeholders. Questions are **bolded** and followed up with summaries of what we heard.

A review of local, national and international studies on environmental issues has uncovered the following four challenges as the ones that Calgary is most likely to encounter in the next 10 years. Which of these do you anticipate is the biggest challenge facing Calgary? Please explain your response.

Table 2

Theme	Detailed explanation
<p>Climate impacts</p>	<p>The rationale provided for selecting <i>climate impacts</i> as the biggest challenge facing Calgary in the coming years range from reducing impacts to biodiversity to levels of accountability, including instituting levies and better adherence to building standards.</p>
<p>Waste and Consumption: consumption patterns and the impacts of waste</p>	<p>The reasons that <i>waste and consumption</i> was selected as the second biggest challenge of the four include the need to take actions towards eliminating single-use plastics and supporting a culture shift towards sustainability; collectively using resources more responsibly.</p>
<p>Growth Pressures: encroachment on Calgary’s natural spaces and wildlife habitat</p>	<p>The rationale for selecting <i>growth pressures</i> third primarily focused on the increased usage of natural spaces during the COVID-19 pandemic and seeks to find more balance between our needs and that of nature. Additional reasons included the impacts of urban sprawl on natural spaces and wildlife habitat.</p>



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Pollution: changes to air, water and soil quality	The primary reason behind selecting <i>pollution</i> was in regards to the number of wildfires, resulting in increased exposure to particulates found in the smoke.
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What actions do you believe could have the most positive impact to improve environmental wellbeing in Calgary?

See each of the **focus areas** below for recommended actions we heard from industry. These are not in any particular order.

- **What actions do you believe could have significant positive impact on our environment for Clean Air?**
 1. Take steps to reduce emissions. This includes activities such as tailpipe emissions testing, trade-in or buy-back programs for poor performing vehicles, transitioning Transit vehicles to electric, and giving incentives to those with electric or hybrid vehicles.
 2. Plan for needed infrastructure to support alternative and active modes of transportation and minimize vehicle use, including working from home.
 3. Reduce urban sprawl and plan for complete communities which would decrease commuting and improve air quality.
 4. Add trees, vegetation and green infrastructure to filter air and reduce emissions from vehicles.
 5. Promote air quality education initiatives and offer better erosion and sediment control enforcement.
- **What actions do you believe could have significant positive impact on our environment for Climate Adaptation?**
 1. Take actions to improve our natural assets and aquatic ecosystem health. This includes:
 - a. protect and restore riparian areas;
 - b. stormwater management;
 - c. restoration of wetlands and river systems for flood mitigation;
 - d. be water efficient, including use of greywater, rainwater harvesting and low impact design;
 - e. landscaping practices that support flood and drought management; and,
 - f. increase, protect and restore natural assets, including planting more trees and use natural infrastructure.
 2. Support initiatives that enhance local economics, including shop local, produce local, farm to table.
 3. Promote low impact development and green building design.
 4. Take actions to reduce car dependency and increase use of transit and active modes of transportation.
- **What actions do you believe could have significant positive impact on our environment for Energy Efficiency?**
 1. Establish high energy efficiency standards and renewable power mandates better understand the long-term impacts of energy use. Monitor energy consumption with a goal of phasing out activities that waste energy.
 2. Set minimum green building standards and give incentives for those who meet these standards.
- **What actions do you believe could have significant positive impact on our environment for Healthy Ecosystems?**



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

1. Support natural assets, including:
 - a. protect environmentally sensitive areas and open spaces;
 - b. protect seasonal and rain-dependant streams and uncover buried streams;
 - c. improve riparian protection and setbacks to encourage wildlife movement;
 - d. land conservation;
 - e. create buffer zones around natural areas; and,
 - f. establish wildlife corridors, including evaluative streetscapes for this purpose.
2. Reduce things such as urban sprawl, use of pesticides on City property and in residential areas, and depositing pollutants on roads.
3. Put minimum ecological standards in place for landscaping.

➤ **What actions do you believe could have significant positive impact on our environment for Sustainable Neighbourhoods?**

1. Enhance neighbourhoods by:
 - a. using naturalized elements in neighbourhood design, including green spaces;
 - b. using placemaking to capitalize on local assets and amenities;
 - c. turning back alleys into pollinator corridors;
 - d. reducing street width requirements to slow down traffic and adding curb cuts at every street corner;
 - e. ensuring parking and building developments are not impervious; and,
 - f. ensuring developers meet a higher environmental standard for developments no matter the scale.
2. Create complete communities that are more walkable.
3. Encourage more natural space on private and public land, including food forests, rain garden projects, and include pollinator-friendly plants.

➤ **What actions do you believe could have significant positive impact on our environment for Sustainable Transportation?**

1. Ensure the built environment supports transit and active transportation, including improved pathway systems, bike lanes added to new road construction, improved multimodal transport and road closures in busy areas.
2. Improve the transit system by expanding the network and exploring digital payment options.
3. Promote people working from home.

➤ **What actions do you believe could have significant positive impact on our environment for Water Stewardship?**

1. Implement higher standards for design options that support healthy water management, primarily low impact design.
2. Promote alternative water collection strategies, including rainwater harvesting, greywater use, and fit-for-purpose reuse of water.
3. Be proactive about watershed and stormwater protection. This includes actions such as addressing the impacts of road pollutants and land conservation programs that address aquatic ecosystem health.

➤ **What actions do you believe could have significant positive impact on our environment for Zero Waste and Responsible Consumption?**



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

1. Reduce or ban single-use plastics.
2. Advocate for the reduction of plastic packaging and increased use of alternative packaging options.
3. Advocate for extended producer responsibility which puts the accountability for disposal of products on the producer.
4. Use a circular economy model.

➤ Other

Food security and urban food production as well as wildlife movement and habitat connectivity were top themes when we asked what other topics you believe should be added to the Environment Strategy and action plan.

Tell us what actions you believe have had a significant positive impact on our environment.

A range of actions, including both City- and community-led initiatives were identified. Some of these included actions that:

- Promoted partnership and cross-industry and cross-government opportunities;
- Built on grassroots initiatives;
- Supported higher environmentally-friendly building standards;
- Supported policies around environmental health and safety, food production, salvage, and water management;
- Changed consumption and transportation habits resulting from the pandemic;
- Supported placemaking;
- Constructed stormwater wetland projects and other stormwater management initiatives;
- Promoted treatment of greywater and stormwater reuse;
- Restored naturalization of sensitive lands;
- Cleaned up parks and pathways; and,
- Encouraged circular economy through sell, share, and trade community initiatives.

Efforts to reduce environmental impact and boost sustainability worldwide are driving the creation and growth of a green economy. What opportunities would your organization consider as the strongest ones for Calgary in the coming decade?

The three main opportunities were:

1. Grow the low impact business sector. This includes supporting an environment that is desirable for investment and creates conditions that make it fair for businesses to compete in the current and future market.
2. Encourage production and access of local products and services. This builds on the positive behaviour exhibited during the pandemic.
3. The built environment needs to better contribute to a healthy ecosystem. Encourage the development industry towards green infrastructure, engineering and construction including, but not limited to, building green facades and roofs.

Verbatim Comments

Verbatim comments include all feedback, suggestions, comments and messages that were collected online through the engagement described in this report. All input has been reviewed and provided to the project



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

team to be considered in decision making for the project. The verbatim report will be posted to www.engage.calgary.ca/environment in June 2021.



Environment Strategy

Stakeholder Report Back: What we Heard (Phase three)
May 13, 2021

Appendix A – Council Directives

- Calgary needs to address climate change in a way that engages Calgarians, resonates with the majority, and doesn't alienate people. We need to lever incentives that focus on the economic benefits of addressing climate change (such as business diversification, job creation, opportunities for small businesses and all Calgarians) and align The City's climate change strategies with other orders of government and industry initiatives.
- Calgary and The City should become nationally and internationally competitive by embracing a low carbon economy, fostering alternative energies and developing strategies to reduce adverse impacts and vulnerabilities resulting from climate change.
- Integrated watershed management is essential to protect public health and the environment, while strengthening our resiliency to a changing climate. Calgary must develop our communities with a focus on achieving future water security and a sustainable water supply. Accordingly, watershed management must be integrated into our land use policies, plans and decisions. Accomplishing sustainable, effective watershed management within Calgary and the region will also require working collaboratively with other orders of government, adjacent municipalities, residents, landowners, developers, businesses, and the First Nations.
- We must also develop strategies to create communities that support healthy lifestyles and interaction amongst residents (walkability, pedestrian, bike and public transit connections) to reduce and prevent social isolation. Partnerships with community groups, not-for-profits and businesses will encourage the development of public meeting places that can be used by Calgarians of all ages, abilities and during all seasons.
- We need to continue to implement a range of accessible and affordable recreational programs and opportunities that encourage active daily living. Continuous investment in indoor and outdoor recreation facilities that address the changing needs of Calgarians will be important to support healthy lifestyles for all.
- Finally, we must continue to make parks and green spaces a priority and proactively seek to increase green space in neighbourhoods.

Appendix B – Engagement Principles

At the City of Calgary engagement means, purposeful dialogue between The City and stakeholders to gather information to influence decision making. Engagement is:

- **Citizen-centric** focusing on hearing the needs and voices of both directly impacted and indirectly impacted citizens;
- **Accountable** upholding the commitments that The City makes to its citizens and stakeholders by demonstrating that the results and outcomes of the engagement processes are consistent with the approved plans for engagement;
- **Inclusive** making best efforts to reach, involve and hear from those who are impacted directly or indirectly;
- **Committed** allocating sufficient time and resources for effective engagement of citizens and stakeholders;
- **Responsive** acknowledging citizen and stakeholder concerns;
- **Transparent** providing clear and complete information around decision processes, procedures and constraints.

The City's commitment to transparent and inclusive engagement processes is outlined in the *engage!* Policy



Calgary Environment Strategy

An environmentally sustainable and resilient city where people and nature thrive.

Dick Ebersohn
Manager, Environmental and Safety Management

Report #UCS2021-0841
Attachment #5
ISC: Unrestricted

Recommendations

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council:

1. Approve the *Calgary Environment Strategy* (Attachment 2).
2. Accept the Background Study - *Calgary Today: Environment Background Study* (Attachment 3) for the Corporate Record.

Notice of Motion

Need for a unifying long-term Environmental Strategy and Action Plan to support:

- decision-making
- communication
- environmental leadership
- environmental risks and supporting the economy





Environmental Challenges

Biodiversity + Ecosystems



↓ **4%**

decrease in parkland available per 100,000 people from 2013 to 2019

approximately

642 ha

added to the parks system between 2013 and 2019

34%

was maintained or manicured parkland



66%

was natural parkland



in 2019, the city had an

8%

tree canopy coverage



in 1998, the city's coverage was **7%**

by 2016, the city's impervious surfaces have increased to

44%

in 1998, impervious surfaces were at **33%**



17,405

animals killed on Calgary roadways between 2015-2019 including:



1 Bear



1 Cougar



398 Coyotes



1631 Deer



18 Moose

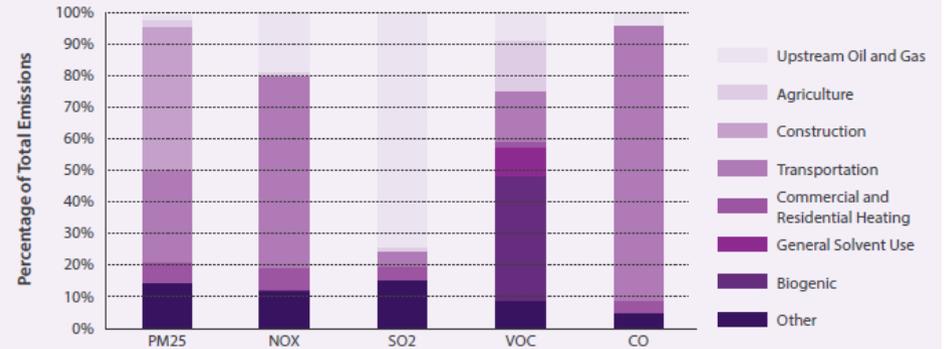
\$45,376,600

estimated financial cost of collisions

Air



EMISSION SOURCES IN THE CRAZ REGION (2008)



370+

die prematurely from impacts of air pollution

Reduce ambient air pollution
saves lives & money

Estimated \$2.94 billion in economic losses and healthcare costs

Approximately

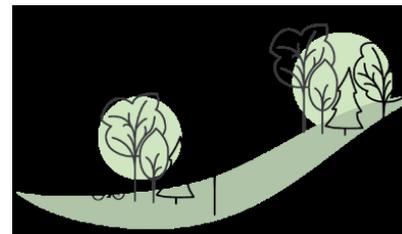
9%

of Canadians suffer from respiratory diseases, and experience an average of 9 symptom days/year from air pollution

9 symptom days costs the healthcare system
\$21.7 million/year approximately

The average Calgarian experiences 3 restricted activity days per year from air pollution, resulting in
\$28.3 million/year in economic losses

Best Practices and Key Concepts



Addressing Environmental Needs

1. **Refrain:** Avoid negative impacts on nature.

2. **Reduce:** Minimize the harm caused by any unavoidable impacts.

3. **Restore:** Act to quickly counteract any harm caused to nature.

4. **Renew:** Work to improve damaged ecosystems.

- Living within the limits of the environment
- Natural systems and services
- Environmental adaptation
- Nature and natural systems in cities
- Economic opportunities
- Livable, inclusive communities



How was the Strategy Created?



*This represents a sampling of key environmental plans and programs and is not a complete list.





The Environment Strategy

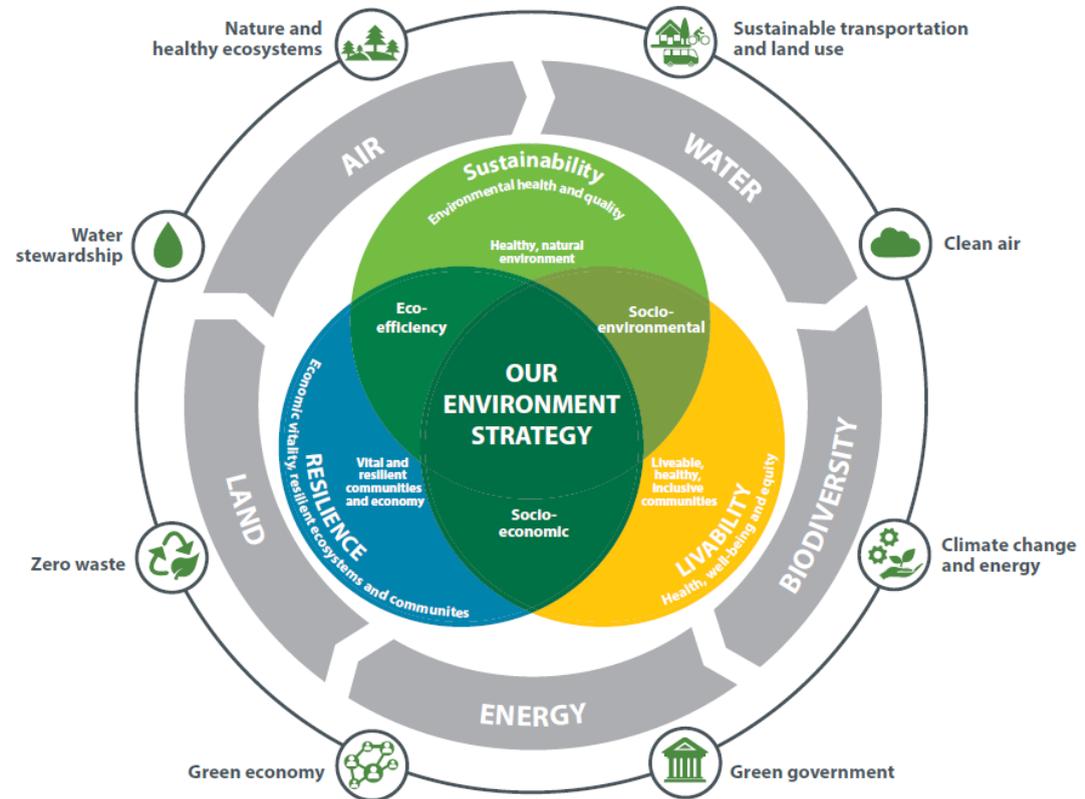
Council Priority: A healthy and green city

Mission: An environmentally sustainable and resilient city where people and nature thrive

Core Values: Sustainability, Resilience and Livability

Goals

Protect, restore and enhance natural areas, parks and trees, and provide access to nature	Protect our water supply, use water wisely, protect the health of our rivers and build resilience to flooding	Protect and improve air quality
Waste less and conserve more resources	Plan for a compact city and complete communities	Prepare for and adapt to climate change, improve energy management and reduce greenhouse gas emissions
Lead by example and reduce our corporate impact on the environment	Advance the green economy	



Roadmap

Pathways to a unified story:

- Where we're at today (Background Study).
- Where we want to get to and why that matters (Strategy).
- How we can get there (Action Plan).

Recommendations

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council:

1. Approve the *Calgary Environment Strategy* (Attachment 2).
2. Accept the Background Study - *Calgary Today: Environment Background Study* (Attachment 3) for the Corporate Record.

Climate Resilience Strategy and Action Plans Annual Report 2020

RECOMMENDATION(S):

The Standing Policy Committee on Utilities & Corporate Services recommend that Council:
1. Direct Administration to return to Council in 2022 with an updated Climate Strategy.

HIGHLIGHTS

- The purpose of this report is to provide Council with an update on the progress made in 2020 to implement the Climate Resilience Strategy and Action Plans, approved by Council in June 2018 (UCS 2018-0688). This is the second annual progress report, as required by the Calgary City Charter (Section 615.4(2)) and directed by Council. Two years into implementation, most actions are underway, with many actions now 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 were not yet started.
- What does this mean for Calgarians? Climate Change is impacting Calgary and cities around the world are transitioning to a low carbon economy. All Calgarians will be impacted by the effects of climate change, and will be impacted by the pace and scale of societal shift needed to limit global climate change to 1.5 degrees below pre-industrial levels.
- Why does this matter? It demonstrates the City of Calgary's commitment to taking action on climate change, identifies successes and where progress is needed. Calgary is part of the economic shift and could capitalize on this opportunity by taking a leadership position on climate change action while attracting investment in clean technologies and increasing the city's reputation.
- In partnership with internal business units and community partners, the reported 2020 actions include efforts to establish climate change governance; integrate and align climate change considerations and practices into City services, policies and processes; implement outreach and education programs; reduce community and City greenhouse gas (GHG) emissions (climate mitigation); and reduce climate-related risk (climate adaptation).
- In 2020, Calgary's city-wide greenhouse gas (GHG) emissions were 15.73 megatonnes of carbon dioxide equivalent (CO₂e). This is a decrease of 14 per cent compared to 2019, an unprecedented change. The decrease in emissions can be attributed to 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. Even given this large decrease in 2020, Calgary's emissions were only 0.4 per cent below 2005 levels, indicating we are not yet on track to meet the target.
- Strategic Alignment to Council's Citizen Priorities: A healthy and green city
- The Annual Report is summarized in Attachment 1. The Calgary Climate Panel, an external advisory network made up of representatives from 22 stakeholder organizations in the community, has provided their annual report including recommendations in Attachment 2.

DISCUSSION

The key target in the Climate Mitigation Action Plan is The City of Calgary's target to reduce city-wide GHG emissions by 80 per cent below 2005 levels by 2050. This target requires an overall reduction in emissions even as we expect the population and economy to continue to grow. Calgary is not currently on track to meet its 2050 emissions target.

Climate Resilience Strategy and Action Plans Annual Report 2020

The Adaptation Action Plan currently has no defined targets as adaptation cannot be measured 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 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. A climate risk and adaptation measurement framework for Calgary is currently being developed.

Implementation of the Calgary Resilience Strategy and Action Plans is intended to help do Calgary's part to reduce global greenhouse gas emissions and help reduce Calgary's vulnerability to the impacts of climate change. To continue the momentum in 2020, key projects will be advanced in 2021 and 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.
- 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.
- Updating the Climate Resilience Strategy and Action Plans will be brought forward to ELT and Council in 2022.

Improving City climate resilience requires collaboration with other levels of government, industry, academia, environmental organizations, and citizens. 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 on Calgary's Climate Strategy are required to ensure Calgary stays on track to meeting its obligations.

STAKEHOLDER ENGAGEMENT AND COMMUNICATION (EXTERNAL)

- Public Engagement was undertaken
- Public Communication or Engagement was not required
- Public/Stakeholders were informed
- Stakeholder dialogue/relations were undertaken

There is a variety of public and stakeholder engagement needs for the projects reported on in the annual report. For the development of the Climate Resilience Strategy and Action Plans Annual Report itself, direct public engagement was not undertaken or required at this stage.

This report is a compilation of the climate work being done across The Corporation. Fifty-two staff from 22 business units directly contributed to the development of the content for this report.

The Calgary Climate Panel was kept informed throughout 2020 through quarterly panel meetings and advised Administration on key projects. The Climate Panel provided an independent report as an attachment to this report with recommendations pertaining to its governance, alignment to new targets and more.

Climate Resilience Strategy and Action Plans Annual Report 2020

In the City of Calgary's Fall 2020 Citizen Satisfaction and Quality of Life Survey, of a representative sample of 2,500 Calgarians, 80 percent stated that they are "concerned about climate change" (up from 76 percent in 2019) and 79 percent agreed with the statement "I think we need to act now to address climate change" (up from 77 percent in 2019). This is an indication of increased awareness and concern for climate action amongst Calgarians.

Collaborations were sought with other organizations to bring energy and climate risk information to Calgarians, a key strategy in both the mitigation and adaptation plans. These included a Fall webinar series, updated webpages and Calgary Climate Panel sessions. Due to COVID-19 restrictions, outreach activities had to move to online platforms.

In addition, internal engagement provided an opportunity to develop climate education for business units to apply climate tools in their service to Calgarians, including offering climate change training for all business units in planning and development and a webinar series offered to all staff.

IMPLICATIONS

Social

The latest report of the Intergovernmental Panel on Climate Change (IPCC) warns that global warming is becoming irreversible. While it is still possible to limit global warming to the critical threshold of a 1.5C increase, meaningful climate action is urgently needed around the world.

The detrimental impacts of climate change are socially inequitable at both the global and local scale, as the most vulnerable communities often lack the resources to mitigate and/or adapt to climate change. Climate change also brings serious concerns around intergenerational equity. The current Climate Resilience Strategy and Action Plans were not written with an equity lens; however, we intend to use equity as a guiding principle in the 2022 update to the Climate Resilience Strategy and Action Plans.

Environmental

Climate change also impacts the natural environment. Alberta has already experienced an annual mean temperature increase of 1.4 degrees Celsius. This has an impact on Alberta's ecosystems, and the pace and scale of the climactic changes make it difficult (or sometimes impossible) for the natural environment to adapt. The Climate Resilience Strategy and Action Plans are intended to do our part to reduce Calgary's GHG emissions to help avoid the most catastrophic impacts of climate change, as well as reduce climate related risks.

Economic

Many of the climate change solutions proposed in the Climate Resilience Strategy and Action Plans will help transition Calgary to a low carbon economy, while reducing the detrimental and costly impacts to Calgary's socio-economic system from acute and chronic climate-related events. Investment in carbon reductions and energy management creates jobs in the trades, energy and technology sectors. Preparing the Calgary market for this investment opportunity is critical to attract jobs and associated economic development. An example is the Federal Government's announcement of several billion dollars in post-COVID recovery funds – a large portion going to programs such as building retrofits which is a key feature in GHG reductions.

\$2.6 billion is spent on energy each year in Calgary. By 2030 this could rise to \$6 billion through expected increases in energy prices and the growth of economic activity. Reducing carbon

Climate Resilience Strategy and Action Plans Annual Report 2020

emissions directly translates to reduced energy use and energy bills across the city. Residents and businesses within Calgary will enhance their energy security through investments in energy efficiency and low carbon options. Additionally, recovery from the impacts of climate change (such as the \$1.3 billion in insurance claims from the June 13th, 2020 severe hail storm) will continue to be costly, and will put a financial strain on citizens and The City.

Service and Financial Implications

No anticipated financial impact

There are no operating budget impacts associated with the preparation and distribution of this report and on-going annual reporting. The preparation of subsequent actions may require continued funding.

There are no capital budget impacts associated with the preparation and distribution of this report and on-going reporting. The facilitation of infrastructure investment may require capital funding to serve as seed funding and attract additional investment from other level of government or the private sector.

RISK

The City of Calgary is required by the Calgary City Charter (Part 16.1) and by City Council to report progress annually for both climate mitigation and climate adaptation plans. It ensures accountability and transparency as The City works towards achieving the objectives of the Climate Resilience Strategy and Action Plans.

Municipalities taking ambitious action on climate change is now an expectation of citizens, the international business community and other orders of government. This creates reputational, economic and political risks if Calgary does not take appropriate action. Investment from other levels of government and the private sector are increasingly requiring that cities have established climate action plans with clear targets, and that cities demonstrate progress in implementation.

ATTACHMENT(S)

1. Attach 1 – Climate Resilience Strategy and Actions Plans Annual Report 2020
2. Attach 2 – Calgary Climate Panel Annual Report
3. Attach 3 – Climate Resilience Strategy and Actions Plans Annual Report 2020 Presentation

Utilities & Environmental Protection Report to
 SPC on Utilities and Corporate Services
 2021 June 23

ISC: UNRESTRICTED
 UCS2021-0842
 Page 5 of 5

Climate Resilience Strategy and Action Plans Annual Report 2020

Department Circulation

General Manager/Director	Department	Approve/Consult/Inform
Michael Thompson	Utilities and Environmental Protection	Approve
Stuart Dalgleish	Planning and Development	Consult
Christine Arthurs	Deputy City Manager's Office	Inform
Katie Black	Community Services	Inform
Carla Male	Chief Financial Officer Department	Inform
Doug Morgan	Transportation	Inform



Climate Resilience Strategy and Action Plans

Annual Report 2020





Contents

Executive summary	1
Introduction.	4
The context of climate change	5
The Climate Resilience Strategy progress check	9
Progress summary: Climate governance and outreach.	10
Progress summary: Climate change mitigation.	11
Progress summary: Climate change adaptation	16
The road ahead.	19
Appendix 1 – Climate governance and outreach	20
Appendix 2 – Climate Mitigation Action Plan	26
Appendix 3 – Climate Adaptation Action Plan	42



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.

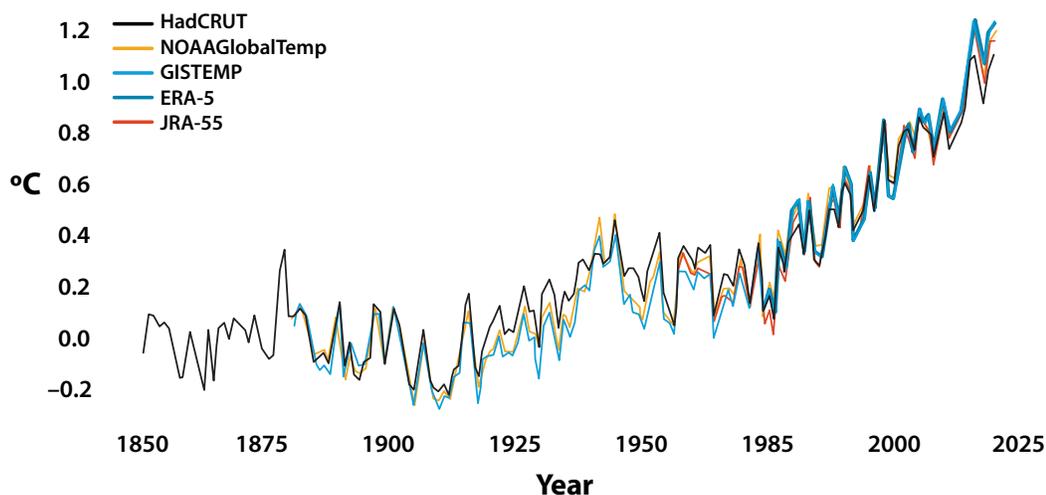
On December 21 and 22, a record-breaking 27 cm of snow was recorded at the Calgary Airport, topping the previous record snowfall for these two days at 8.4 cm and 12.7 cm respectively. The snow buried streets, resulting in vehicle collisions and City transit and emergency response vehicles being unable 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

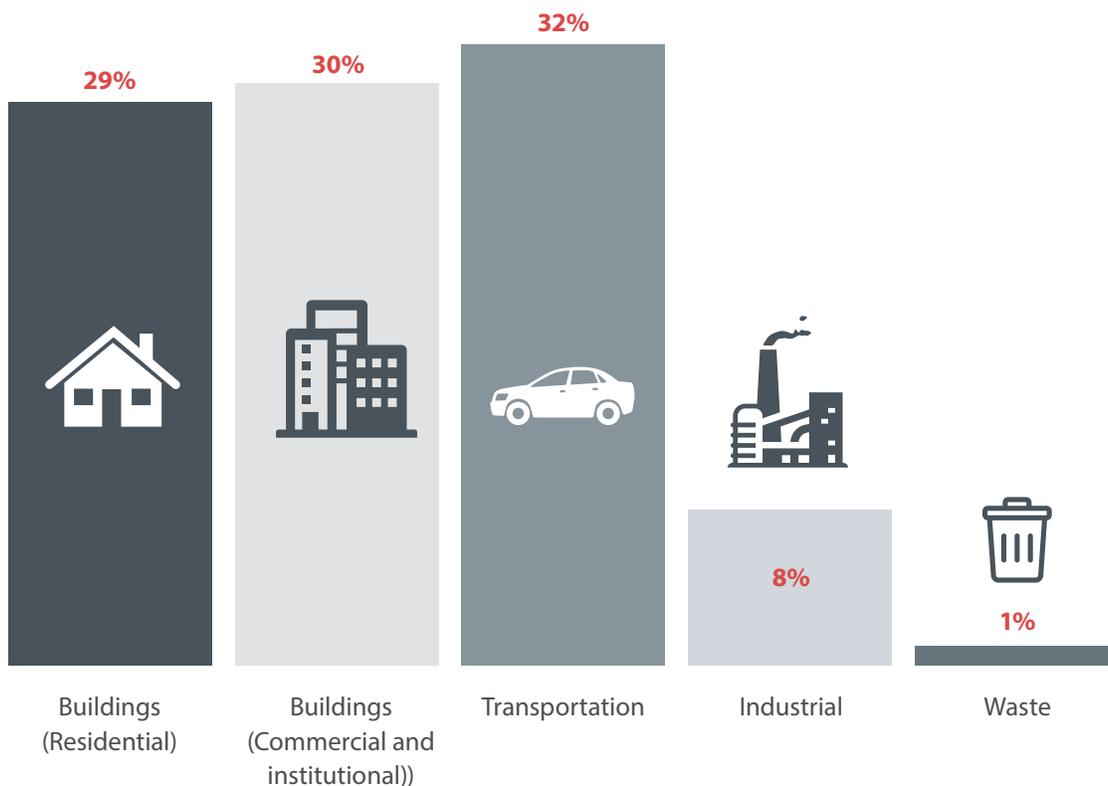
The City of Calgary has a target to reduce city-wide GHG emissions by 80 per cent below 2005 level by 2050. This target requires an overall reduction in emissions even as we expect the population and economy to continue to grow.

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

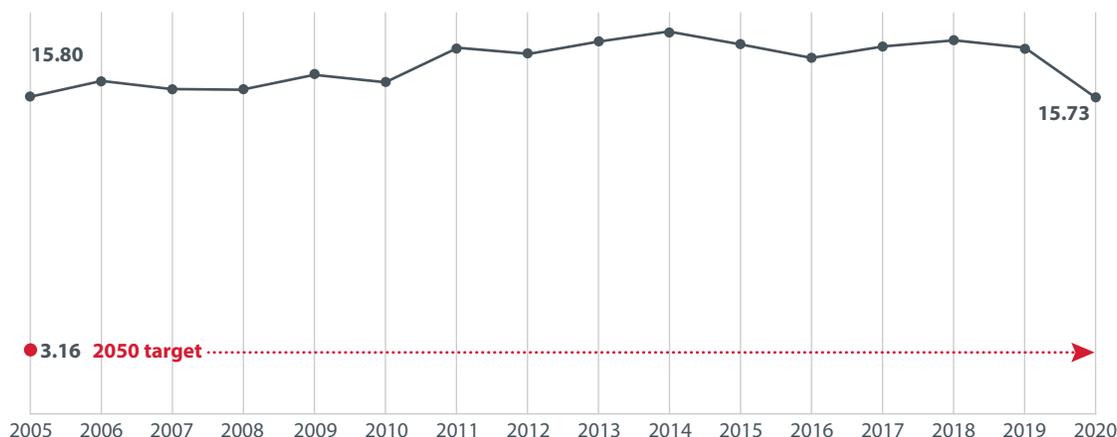
cleaner, and warm weather reducing the demand for heating. Even given this large decrease, Calgary's emissions were still only 0.4 per cent below 2005 levels last year; we are not yet on track to meet our target.

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
Commercial building benchmarking	<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>
Residential building labelling	<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>
Integrated City Energy Mapping (ICEM)	<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
Step Forward, the Cycling Strategy and Complete Streets	<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>
RouteAhead Strategic Plan implementation	<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>
Green Line Light Rail Transit (LRT)	<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

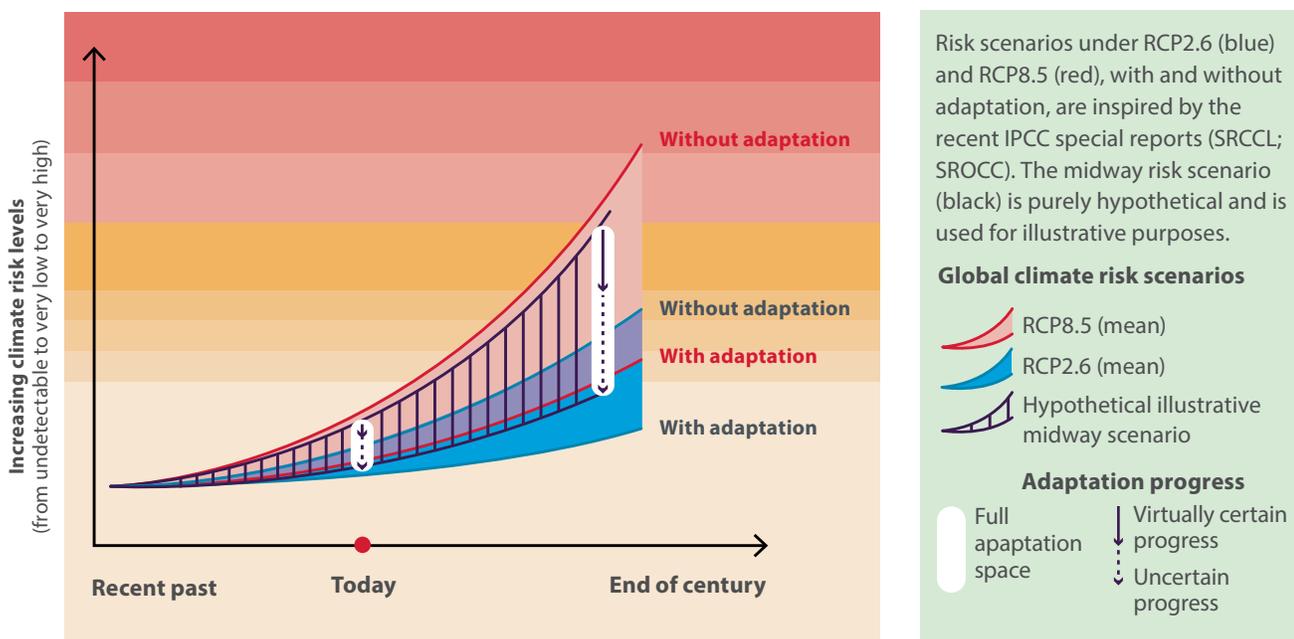
Calgary Roads is planning a pilot project for concrete with carbon capture (i.e. CO₂ mineralization) in 2021. The development of a Green Fleet Strategy in 2021 will establish how and when The City will “green” its fleet and will consider effective strategies that promote affordable, reliable and renewable 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.

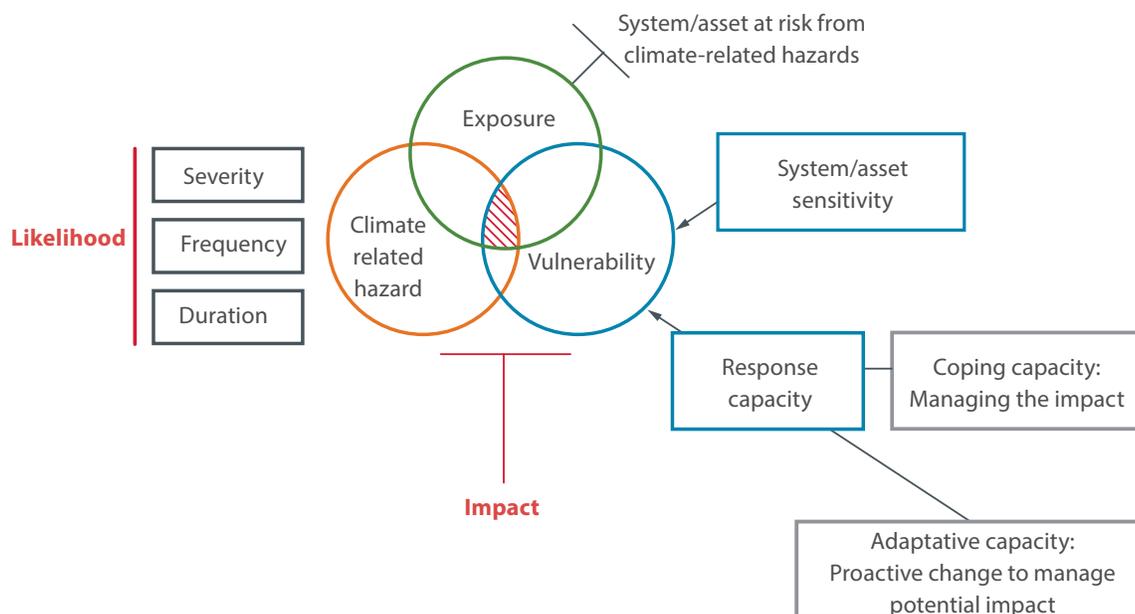


River flooding: Flood timing, intensity and frequency is likely increasing.

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
<p>1. Building new infrastructure to be climate resilient</p>	<p>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.</p>	<p>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.</p>
<p>2. Reducing risk to existing infrastructure</p>	<p>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.</p>	<p>Tailored adaptation/risk reduction/operational changes and retrofit plans are developed and implemented for our City's public infrastructure to reduce climate risk.</p>
<p>3. System redundancy for public infrastructure</p>	<p>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.</p>	<p>Risk due to power loss is assessed and measures such as backup power sources are implemented for public infrastructure to deliver continuous services.</p>
<p>Partners: Transportation, Facility Management, Corporate Analytics & Innovation, Planning & Development, Calgary Emergency Management Agency, Water Resources, Environmental & Safety Management</p>		

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>

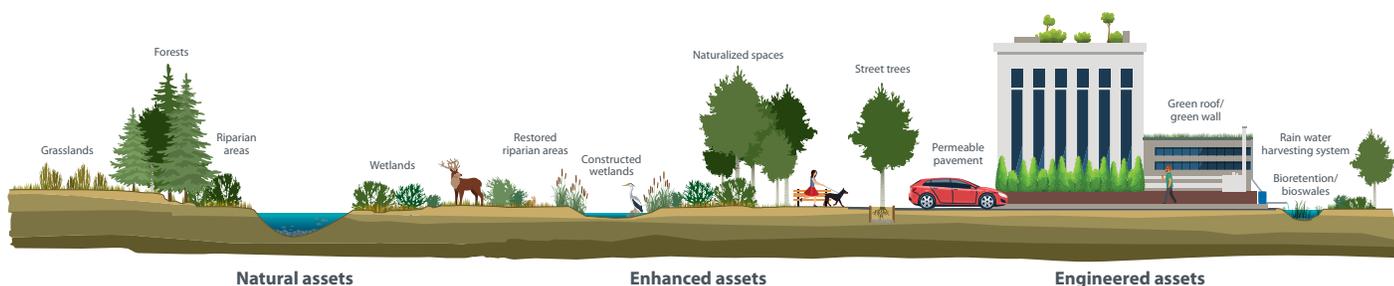
2020 progress: Program 3 System redundancy for public infrastructure

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

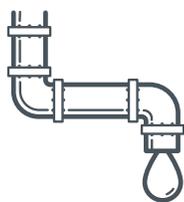
INITIATIVE	KEY ACTIONS
<p>Green Stormwater Program Develop a scalable GSI program to use natural infrastructure and its multiple benefits to better manage stormwater in a changing climate.</p>	<p>The Green Stormwater Program continues to be hindered by resource challenges. Initiatives are underway to 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 in 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.





CALGARY CLIMATE PANEL

ANNUAL REPORT

2020

EXECUTIVE SUMMARY

The Calgary Climate Panel's (the Panel) annual report provides a temperature check on climate action progress in Calgary. It is intended to provide feedback to Council and the public on strengths, challenges, and opportunities in achieving climate adaptation and mitigation goals.

The main findings for 2020 are:

1. **Action in specific areas is positive:** Significant work has been led by The City of Calgary (The City) and community partners to develop broad strategies, and inventory risks and opportunities in specific areas of climate action, namely energy efficiency, alternative fuels and vehicle electrification, and water resource management.
2. **Partnerships in climate communication and education are effective:** Partners on the Panel continue to collaborate effectively to advance public awareness and youth education around climate action.
3. **Quantitative targets are critical for assessment:** The *Climate Resilience Strategy* and implementation initiatives do not have appropriate quantifiable targets and monitoring metrics at the right scale and scope for the Panel to provide data-driven advice on progress. Without metrics, it is difficult to identify and prioritize specific opportunities for action, partnerships, and investment.
4. **There is a need to accelerate development of a more comprehensive strategy, policy, and implementation framework:** An integrated strategy with clear policy, implementation tools, metrics, and financial supports for implementation is required to avoid maladaptive decisions; and to quicken the pace of action.



Calgary has significant opportunities for climate action innovation, yet many initiatives are still in their infancy compared to leading communities.

KEY RECOMMENDATIONS FOR ACTION ARE:

1. Establish implementation strategies, quantitative targets, performance measures, and monitor impacts:

The City should immediately update the *Climate Resilience Strategy* to include current, global standards for targets including:
 - A net zero emissions target by 2050;
 - Investigate the applicability of a fair-share of emissions target by 2030 similar to other Canadian jurisdictions; and
 - Best practice for adaptation targets and outcomes.
2. Develop policy, regulatory frameworks and programs to support the prioritization and formalization of climate resilient and low-carbon behaviours.
3. Accelerate investment and implementation of financial tools to support climate action.
4. Implement comprehensive climate action across Calgary and ensure integration across climate themes.
5. Continue building on public engagement successes.
6. Strengthen Calgary Climate Panel governance.



TABLE OF CONTENTS

1.	REPORT PURPOSE AND CONTEXT	4
2.	COVID-19, ECONOMIC RECOVERY AND CLIMATE ACTION.....	5
3.	ABOUT THE CALGARY CLIMATE PANEL.....	6
3.1	2020 Panel Membership.....	6
4.	EVALUATING PROGRESS - OVERVIEW	7
4.1	Data-Driven Advice.....	7
4.2	Climate Leadership Insight	8
5.	EVALUATING 2020 PROGRESS –THEMATIC REVIEW	8
5.1	Buildings and Energy Systems:	8
5.2	Transportation.....	10
5.3	Planning and Land Use:.....	12
5.4	Natural Systems (including Water)	14
5.5	People and Economy:.....	15
6.	OVERALL PACE AND SCALE OF PROGRESS	17
7.	RECOMMENDATIONS.....	18
	END NOTES.....	21
	APPENDIX	22
	PHOTO CREDITS.....	26

I. REPORT PURPOSE AND CONTEXT

The annual Calgary Climate Panel report provides a temperature check on climate action progress in Calgary. Given the timing of this report, the focus is primarily on progress in 2020, however, important events and decisions in early 2021 are also included. Given the mandate of the Panel and its accountability to The City, a major focus is placed on providing a commentary on progress of The City's *Climate Resilience Strategy*. This report is intended for both Calgary City Council and the public. The Panel's annual report focuses on strengths, challenges, and opportunities that Calgary has in advancing climate action.

This report does not provide quantitative metrics for climate action in various sectors or for specific initiatives because they have not yet been developed for Calgary at this scale. The *qualitative assessment* provided herein is based on knowledge gained through the Panel meetings in 2020, The City's *Climate Resilience Strategy and Action Plans Annual Report 2020*, and the collective knowledge of panel members as climate change mitigation and resiliency leaders within their respective organizations and professions. The Panel's annual report is intended to be read as a companion report to the *Climate Resilience Strategy and Action Plans Annual Report 2020* (prepared by administration) and The Panel's report provides an independent perspective on Calgary's progress.

In framing Calgary's progress, it was necessary to look beyond our city to see how progress elsewhere is advancing. Lessons can then be drawn about the way forward for Calgary. Key highlights that should inform Calgary's context for climate action are:

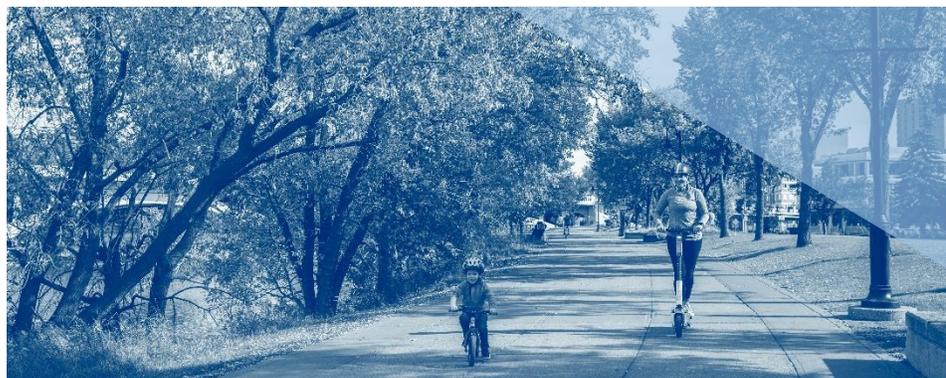
- As of May 14, 2021, 1,940 jurisdictions in 34 countries have declared a climate emergency, enabling them to take decisive action to address emissions and build resiliency. This includes 512 jurisdictions in Canada.ⁱ
- Most of Canada's major cities have set, not only a goal of being net zero by 2050, but by cutting emissions up to 50% of levels seen in the 1990s or early 2000s by 2030. These goals are also based on a "fair share of emissions" approach and emphasize enabling equitable access to climate actions within their communities.ⁱⁱ



- At the national and provincial levels, there have been some changes to infrastructure and community design standards and guidelines to improve climate resilience.ⁱⁱⁱ While new assets will need to comply with new standards, the challenge for most Canadian cities remains addressing climate vulnerabilities for existing assets and communities.
- Funding for specific climate change mitigation and adaptation investments announced by the Federal government in late 2020 is now being made available through the recent 2021 budget.^{iv} This funding will influence investment trends in the technologies and practices that drive climate action in Canadian communities over the coming years.

2. COVID-19, ECONOMIC RECOVERY AND CLIMATE ACTION

COVID-19 has greatly impacted all aspects of Calgary and the lives of Calgarians. While it has had a profound and tragic effects, it has also highlighted Calgary's resiliency including the creativity and adaptability of businesses, individuals, and community services. These are assets of our community that can have profound positive impacts on achieving our climate goals. Calgary's 2020 Greenhouse Gas (GHG) emissions represent a 13.6% reduction from 2019 (*Climate Resilience Strategy and Action Plans Annual Report 2020*) – a scale of reduction never before seen. Calgary and The City should leverage the climate-positive behaviours that have worked for citizens throughout 2020. For example, Calgarians requested road closures for pedestrian use; worked from home; and connected with natural areas more than ever. Where feasible and practical, efforts should be considered that support these and other similar initiatives for the longer term as we enter the recovery phase of the current global pandemic.



3. ABOUT THE CALGARY CLIMATE PANEL



The Panel was created by The City as the first major action following adoption of its *Climate Resilience Strategy* in 2018. The *Climate Resilience Strategy* is City-led and supported. It requires significant community and industry effort to implement. Panel members support the *Climate Resilience Strategy* and have committed to The Panel's dual roles as: (1) as advisors to The City; and (2) as partners and collaborators in implementation.

As an advisor, the Panel provides guidance to The City on climate opportunities, risks, policy options and priorities. The Panel provides insights on climate action that administration may not be aware of and offers industry and community perspective on implementation opportunities and challenges. As a partner, the Panel members join with The City in climate action and, through their leadership, strengthen the climate actions of their own organizations.

The Panel membership is a diverse group of stakeholders with a variety of perspectives on climate actions. The Panel members are experienced and represent a range of professional disciplines including science and engineering, public policy and planning, medicine and public health, finance and economics, and community development.

3.1 2020 PANEL MEMBERSHIP

Academic Advisor
 Alberta Council for
 Environmental Education
 Alberta Ecotrust
 Alberta Health Services
 ATCO
 BILD Calgary Region
 BOMA Calgary
 Calgary Airport Authority
 Calgary Board of Education
 Calgary Chamber of
 Commerce

Calgary Climate Hub
 Calgary Emergency
 Management Agency
 ENMAX
 Fuse Collective
 Indigenous Member
 Intact Insurance
 Public Member
 Siemens Canada
 The City of Calgary
 University of Calgary
 Youth Member

4. EVALUATING PROGRESS - OVERVIEW

In evaluating progress, the Panel's expectation was to have access to robust data and information on the actual or projected impact of actions on emissions reduction and climate adaptation goals. Unfortunately, this level of data and information is not yet available. As such, the majority of this report is focused on providing independent qualitative insight.

4.1 DATA-DRIVEN ADVICE

The current *Climate Resilience Strategy*, its embedded action plans and the annual updates do not provide sufficient quantitative targets and data at the action or thematic/sector scales to identify gaps, opportunities and highlight progress. No mitigation or adaptation data is available at a project level for the Panel to provide objective, data-driven comments. Once metrics and data are available, the Panel will be able to comment on the quantitative climate impact of the *Climate Resilience Strategy*.

Key Recommendations:

1. The City should immediately update the Climate Strategy to include current standards for targets including:
 - A net zero emissions target by 2050;
 - Investigate the applicability of a fair-share of emissions target^v by 2030, similar to other Canadian jurisdictions; and
 - Best practices for adaptation targets and outcomes.
2. Climate actions require a Climate Budget and Climate Accounting Framework to assign targets and enable a comparison of overall progress to established targets. When quantifying the impact of climate action, affordability and equity metrics should also be used. These tools should be adopted by The City and where possible by Calgary organizations with significant GHG emissions.



4.2 CLIMATE LEADERSHIP INSIGHT

While the *Climate Resilience Strategy* and related work has not yet developed quantitative metrics, the Panel's membership is able to offer *qualitative assessments* based on the information available. The intent of this qualitative assessment is to recognize strengths and challenges of the climate action being taken in Calgary to-date, and to make overarching recommendations for future work.

The Panel's annual report identifies five themes that incorporate action in the areas of both GHG emission reduction and climate adaptation. The five themes cover most themes within The City's *Climate Resilience Strategy*. There are strong interlinkages among the five themes in the current report, and many are dependent on one another.

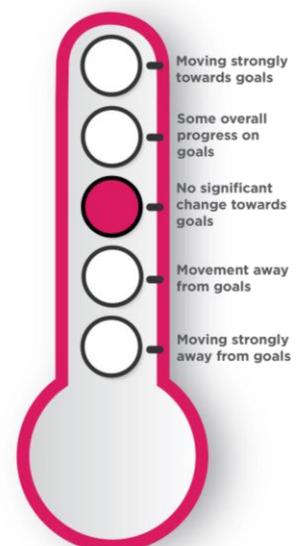
The results presented in Section 5 represent a consensus view of the Panel. Details on the methods used to develop the report are included in Appendix A.



5. EVALUATING 2020 PROGRESS – THEMATIC REVIEW

5.1 BUILDINGS AND ENERGY SYSTEMS:

Of all the Climate themes, The City, developers and building owners/operators prioritized Buildings and Energy Systems for action in 2020 and early 2021. Private and non-profit sector leaders are creating net zero and net zero ready buildings and energy systems. While action is happening, policies, regulations, and approaches should be reviewed and revised to support climate action, increase awareness, enable innovation, and address the impact on affordability. Regulators need to work with technical experts, industry leaders and end-users to advance technological innovations and behaviours that change how Calgarians are able to meet their energy needs in a low-carbon manner. To enable this, solutions need to be affordable and equitable while improving the climate-adaptiveness of Calgary's building stock and energy systems. This theme has the potential to greatly impact climate adaptation and emissions reduction goals.



STRENGTHS:



- Net zero technologies are being explored by the building and energy sector and are a leading action for Calgary. Once data is available, the Panel will be able to comment on the quantitative climate impact.
- The City has made good progress with retrofitting public-owned/operated buildings; education/awareness campaigns; and mapping/benchmarking initiatives.
- Calgary stakeholders developed good examples of climate positive actions such as the University of Calgary's MacKimmie Tower, the University's first net zero carbon building; BOMA's program BOMA BEST (a national green building certification program); and the Renfrew Solar Coop.
- The City undertook an internal climate hazards assessment initiative providing a good foundation for adaptation.
- Community stakeholders provide a range of financial supports (e.g., ATCO, ENMAX), and The City approved funding in 2020 for the acceleration of low carbon financing mechanisms. Additional financial supports are being investigated by The City and partners.

CHALLENGES:

- Climate vulnerability and risk information is lacking for existing buildings and energy systems and must be better understood, particularly for critical facilities.
- The pace of progress is challenging. Calgary needs to learn from other comparable jurisdictions and move more quickly and effectively towards the adoption of net zero or net zero ready buildings and high efficiency energy systems and designs.
- There is a major gap between the ability of new versus existing buildings and energy systems to achieve net zero emissions and ensure climate-resilient features are incorporated into retrofit projects.

OPPORTUNITIES:

- Calgary should engage with industry and where appropriate adopt regulations from other comparable jurisdictions that support best practices.

- Efforts should be taken to ensure equity among Calgarians with respect to access to affordable low-carbon and climate-adaptive building technologies. Calgarians require accelerated financial incentives and examples of case studies to actively pursue these choices. Programs such as the Clean Energy Improvement Program (Alberta's answer to Property Assessed Clean Energy financing) should be available to the public, with one of the first steps being the establishment of a bylaw, a requirement of the enabling legislation.
- Public agencies should provide leadership by requiring net zero ready or net zero standards on major infrastructure (i.e., new arena, the fieldhouse, the *Sustainable Building Policy*).
- Active participation in the development of more efficient, robust, and comprehensive building standards for new and existing buildings that support low carbon designs that are applicable to the Calgary/Alberta environment.



5.2 TRANSPORTATION

Many initiatives are underway to support both climate change adaptation and emissions reduction in Calgary's transportation networks, including carsharing, developing networks of EV charging and LRT planning. Major transportation emitters, such as logistics, air, and commercial transportation, are also identifying technologies and practices needed to reduce emissions and ensure that transportation services remain strong as the climate changes.

Transportation is of critical importance to Calgarians and highly impacts climate mitigation. It is important to accelerate Calgary's understanding of and support for technologies, operational practices and transportation-related behaviours that promote emissions reduction and are climate adaptive. Equity is an important part of the climate story for transportation. Carbon reduction initiatives must be implemented city-wide, and care should be taken to ensure access and acceptance by groups of all cultures, economic status, and locations.





STRENGTHS:

- Climate mitigation progressed in areas of: carsharing, LRT planning, multi-modal and EV infrastructure, and active transportation.
- Continued implementation of pedestrian, cycling and transit strategies.
- In the scheme of Calgary's climate progress, priority is on low-carbon solutions: electrification of personal vehicles, establishment of charging networks and ride sharing or short-term vehicle rental options.

CHALLENGES:

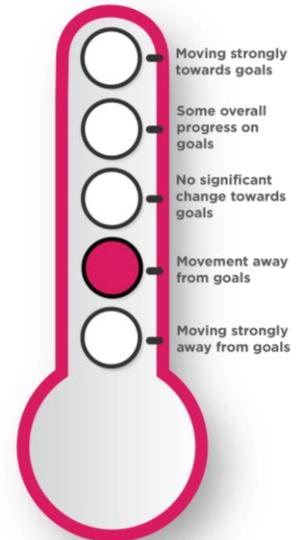
- Calgary has a strong driving culture built into the existing urban structure that significantly impacts emission reduction goals. As a result, decisions that support traditional single occupancy vehicle infrastructure may be contrary to the other emission-reducing actions if these two pathways are imbalanced (i.e., ring road, delays in Green Line LRT may encourage more driving versus commitment and funding of the 5A Cycling Network).
- Logistics and transportation networks are highly complex systems, dependent on many external factors. This makes understanding making climate change vulnerabilities, particularly challenging.

OPPORTUNITIES

- Initiatives that promote alternative fuels or increased efficiencies should similarly be supported and encouraged including hydrogen and natural gas fuel options. Only through a full understanding of current and emerging technologies, will there be a clearer understanding of the opportunities for carbon reductions.
- Adapting goods movement and particularly last mile delivery is an important pathway to achieve mitigation goals.
- Calgary requires additional investment and incentive programs for quicker adoption of low-carbon transportation technologies and behaviours by the public.
- Progress on adaptation in the transportation sector needs to be addressed. A climate risk infrastructure assessment for critical assets and transportation networks must be undertaken.

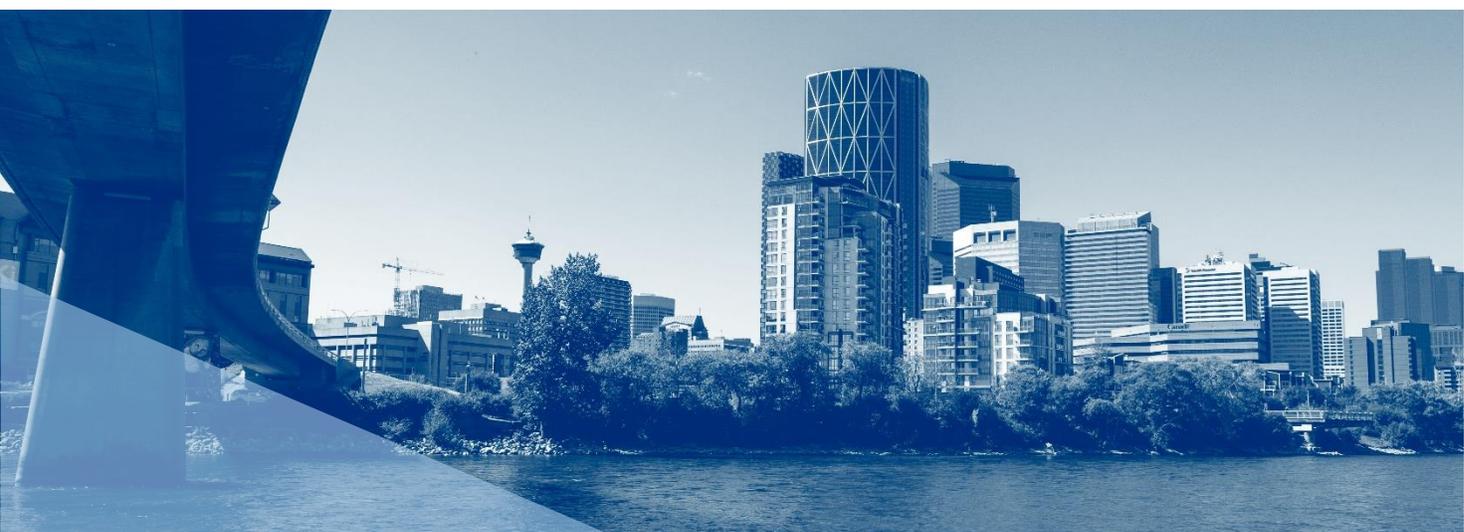
5.3 PLANNING AND LAND USE:

Although changes were made to planning policy in 2020, significant opportunities to formalize climate adaptation and GHG emission reduction were missed, some of which occurred in early 2021. In particular, *The Guide for Local Area Planning*, which was adopted as a guide instead of statutory policy in 2021, did not include clear policy supporting climate-adaptive and low-carbon design and land use. The planning regulatory framework (Land Use Bylaw) was not significantly updated to reflect low-carbon and climate adaptive regulations. Although some moderate climate-positive policy and applications updates were made, the impact on climate goals are not understood.



STRENGTHS:

- Minor climate updates to planning studies and development application forms were completed including Local Area Plans (i.e., North Hill, Beltline and Winston Heights Village), and the climate resilience inventory form.
- A baseline assessment of community climate vulnerability was undertaken to support data driven climate adaptive planning policy.
- The City identified climate-related hazards for water, wastewater, and road infrastructure.



CHALLENGES:

- Calgary's established areas were designed and developed under previous statutory policy plans. The result is a carbon-intensive built form in the established communities that is based on historical assumptions about climate loads and climate hazards.
- Climate is vaguely referenced in most new planning policy including *The Guide for Local Area Planning*; however, strategies for implementation and managing cost require further development.
- There is evidence that supply could be outpacing demand for higher-density housing in some parts of Calgary^{vi}.

OPPORTUNITIES

- Investment, initiatives, and policy revisions should be aligned to eliminate barriers to promote retrofits and renovations to existing homes and businesses using technologies and practices that support lower carbon footprints.
- To support climate action goals, infrastructure and roadways need to be right-sized (i.e., not oversized), low-carbon and climate-adaptive design needs to be a requirement, and the pace of development should not outstrip demand.
- There is a need for investment in and prioritization of Main Streets and Activity Centres as development areas and improving energy efficiency and renovations that support climate resiliency in Calgary's building stock. This should also be done in a manner that supports equitable access to low-carbon and climate-adaptive housing.
- The Land Use Bylaw is an influential implementation tool for affecting climate action. Climate action amendments to this regulatory tool will have substantial impacts on advancing climate action.
- The City needs clear metrics and a carbon budget to understand the impact of land use decisions on GHG emissions. It should be recognized that The City has recently directed administration to develop a Carbon Budget^{vii} (decision made in March 2021). To operationalize the carbon budget, The City should develop a carbon accounting framework.
- Planning decisions have another role to provide choice for consumers that both mitigate climate impacts and promote individual choices.
- The policy and regulatory environment should promote innovative solutions to both increase climate efficiencies in established communities and respect diverse individual choices and economic capacity.
- Climate adaptation adoption is focused on Low Impact Development (LID) at the property scale. Implementation of watershed-scale LID will be required to achieve the climate goals.



5.4 NATURAL SYSTEMS (INCLUDING WATER)

The Natural Systems theme has a good foundation because of strategy and baseline assessments that have been established. These will enable the integration of climate adaptation in natural system management and decision-making. However, action on the ground has been limited to-date and the scale tends to be geographically limited. A regional ecosystem planning lens needs to be adopted if Calgary wishes to strengthen its adaptation to climate change and maximize the climate mitigation potential of natural systems. Other jurisdictions have a combination of regulatory requirements and incentives for naturalization embedded into their land use, infrastructure and development policies/strategies that have prioritized climate adaptation and support net zero emissions reduction planning^{viii}.



STRENGTHS:

- Important initial work was undertaken including establishing a target of 16% tree cover by 2060. Currently, tree cover is 8%.
- Internal City of Calgary directives, tools and assessments were completed on ecosystem services.
- A range of significant community-specific flood mitigation initiatives occurred that have climate adaptive elements and strengthen ecosystem health.

CHALLENGES:

- Lack of adaptation and mitigation targets, implementation strategies, and data to measure performance.
- No clear strategy for addressing climatic changes and their associated impacts on natural systems or leveraging their role in climate change mitigation.

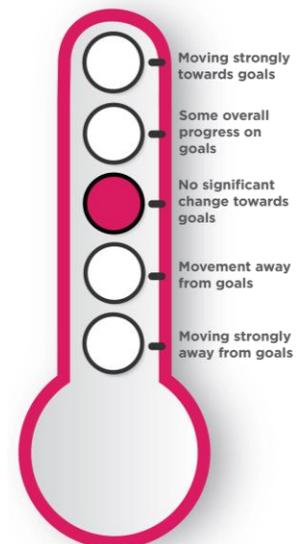
OPPORTUNITIES:



- Naturalization actions should go beyond localized or project specific areas to consider how they integrate into the city-wide naturalized lands and regional land uses. There is potential for maladaptive investments if there is no regional strategy/map to ensure individual naturalization projects provide their fully potential benefits and are not just “islands” of natural area or features that might limit the extent of benefits.
- Land use policy must consider healthy natural ecosystems as an element for improving community resilience to climate hazards.
- Current natural system actions lack integration with agricultural practices and rural land uses. This integration is important given the benefits that strong forests and the prairie ecosystems can provide to agriculture in areas of carbon management and climate resiliency.^{ix}
- To support the previously identified opportunities, there is a need to determine the carbon sequestration potential of the city’s natural and parks assets. The gain and loss of this sequestration potential should be tracked within Calgary’s community greenhouse gas inventory^x.

5.5 PEOPLE AND ECONOMY

The City and the private sector have been taking positive steps forward - even when faced with a declining economy and the threat from COVID-19. Education initiatives are highlights of considerable success. Calgary needs to transition away from a hydrocarbon-based economy: comprehensive training for a carbon-neutral future; implementation of financially positive carbon-reduction measures; and adoption and/or refinement of policies that support innovation for low-emission and climate-resilient action. Currently, Indigenous perspectives and knowledge on climate action are largely absent from this dialogue and climate actions tend to be reserved for more socio-economically privileged groups. The shift toward more equitable climate action will enable stronger progress toward Calgary’s climate action goals.





STRENGTHS:

- A key priority in 2020 was climate education. Several successful climate education initiatives were implemented by educational institutions, the non-profit sector, and The City such as Calgary Ecoschools, Community Climate Conversations, Climate Symposium. These programs lead to greater public understanding and innovation. Climate results of education are hard to measure, but impact change, nonetheless.
- Disaster Risk Management considers climate vulnerability as a core consideration. Extreme weather events are prominent in the Disaster Risk Assessment for The City and the Calgary Emergency Management Agency (CEMA). It is a key element of all Disaster Risk Management decisions.
- The City developed the community climate risk index that is currently being used to understand climate-related vulnerabilities at the neighbourhood scale.

CHALLENGES:

- Diverse audiences across Calgary are not being sufficiently engaged in climate action awareness and education initiatives.
- There is a lack of clear information on public health adaptations in The City's planning, infrastructure, and programs. Little information is available about how extreme weather, vulnerabilities and inequities in health care, social services, and food systems are considered in service delivery.
- Climate-related disasters are costly for Calgarians. Calgarians are financially at risk from climate disasters (i.e., 2020's hailstorm).

OPPORTUNITIES

- Calgary requires a clear economic roadmap to identify pathways for decarbonizing the local economy and creating employment for low carbon jobs. This should also include a carbon budget for a just and equitable transition that increases the social equity and economic prosperity for all Calgarians.
- Development and building standards must consider the increasing potential for extreme and severe events and mitigate these impacts.
- Community non-profits will be key to ensuring the resiliency of people to climate change risks and this group should be explicitly engaged. There is an opportunity to learn from the experience of other cities in engaging the social service sector in climate action.
- The City's education initiatives should target youth and go beyond the classroom to engage all segments of society.

6. OVERALL PACE AND SCALE OF PROGRESS

Calgary's GHG emissions for 2020 were 15.73 megatonnes of CO₂e (*Climate Resilience Strategy and Action Plans Annual Report 2020*). This is a 13.6% reduction in emissions from 2019. The reduction is a result of many factors as outlined in *Climate Resilience Strategy and Action Plans Annual Report 2020* including COVID-19. While the 2020 emissions are a slight decrease from 2019, Calgary's emissions are only 0.4% below 2005 levels and not on track to achieve the current target of 80% reduction by 2050.

Now is the time. We are poised for economic, cultural, and institutional shifts as we recover from COVID-19. Calgary needs to take a strong position that investment in climate action is a strategy for economic prosperity, social wellbeing, and ecological health. We must build on the momentum of work accomplished in 2020 that set a solid foundation and capitalize on action that will have real impacts on reducing GHG emission and making Calgary climate-adaptive.

The *Climate Resilience Strategy* was adopted later than many other cities and progress is being made, but we are lagging. Our one climate target is outdated: the GHG target is to reduce city-wide GHG emissions by 80% below 2005 levels by 2050. Leading Canadian cities have adopted fair-share targets of approximately 50% reduction over 1990-2000 emissions by 2030 and net zero targets for 2050. Calgary has no targets or data for climate adaptation (see Section I for references).

Persistent focus on implementation is the next step. Science-based targets and clear project level data is necessary to know whether we are on the right track.



7. RECOMMENDATIONS

Progress has been made on The City's *Climate Resilience Strategy* and the COVID-19 pandemic has highlighted many of the strengths and assets of our community. Many lessons have been learned that will be important to support climate action going forward. The Panel has identified the following overarching recommendations for Calgary:

- 
- 
-
- 1. Establish implementation strategies, quantitative targets, performance measures, and monitor impacts.**
- a. Develop implementation strategies, clear data-driven targets and performance measures based on science and expert advice that also track social and financial impacts of the plan.
 - b. Ensure targets are community- and sector-based.
 - c. Targets should reflect federal and provincial changes in target setting and align with other comparable jurisdictions. This should include a net zero emissions target by 2050. Calgary should also investigate the applicability of a fair-share target for 2030, similar to other Canadian jurisdictions. Best practices for adaptation targets and outcomes should also be pursued.
 - d. City decisions should be data-driven. Carbon Budgets and Carbon Accounting Frameworks offer tools to support transparent climate decisions (i.e., transportation, planning and others), and enable monitoring.
-
- 2. Develop policy, regulatory frameworks, and programs to support the prioritization and formalization of climate resilient and low-carbon behaviours.**
- a. Net zero or net zero ready commitments should be made for all City infrastructure.
 - b. The City and other public agencies must provide leadership through demonstrated practices that support climate action and develop industry/private-sector capacities.
 - c. The City's regulatory tools should be streamlined and updated to support the transition to a low carbon economy and enable climate action for all aspects of municipal jurisdiction.

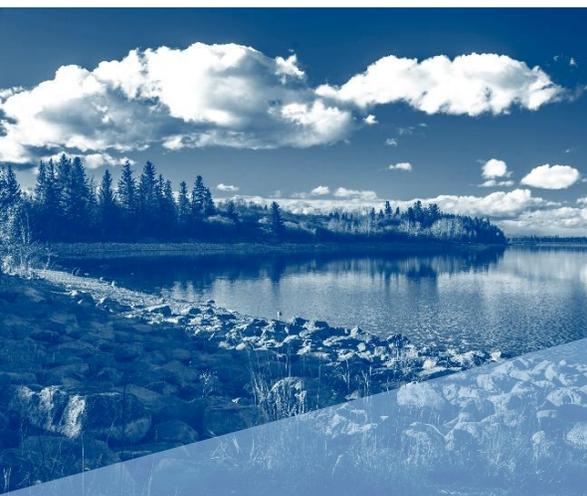
- d. Financial tools and programs must be consistent with the regulatory framework.
- e. Accelerate The City's action on the energy awareness program to inform homeowners, renters, and prospective homebuyers about the energy benefits and costs in housing choices such as their carbon footprint.

3. Accelerate investment and implementation of financial tools to support climate action.

- a. Additional investment is required to achieve the climate goals in a timely manner. The City must ensure appropriate funding is available for City initiatives and work with stakeholder organizations and businesses to develop accessible financial instruments to expedite investment in both residential and commercial/industrial low-carbon retrofits.
- b. Be ready to access and maximize future federal and provincial funding on climate actions to help refocus Calgary's economy and provide new opportunity to those who are un- or under-employed.
- c. The City should adopt best practices from comparable jurisdictions to expedite action (i.e., goods movement; land use bylaw regulations; Clean Energy Improvement Program Bylaw (Alberta's PACE program) and other financial models; climate economic roadmap).

4. Implement comprehensive climate action across Calgary and ensure integration across climate themes.

- a. Implement a comprehensive adaptation program that impacts all themes and moves from assessment to integration of climate-resilient principles and data into policy. Ongoing updates to water resource management design standards are a good example.
- b. Adopt a city-wide approach to bridging the gap between goals/targets and actions. Currently, there are many small-scale initiatives in each theme, but no overarching implementation strategies to link these sometimes-disconnected initiatives. Exceptions to this are in the Building and Energy Systems theme, where there seems to be a good start.
- c. Develop action plans and policies based on the interlinkages between climate adaptation and mitigation. Without addressing the interconnectedness, maladaptive decisions will result.



5. Continue building on public engagement successes.



- a. Build on the success of the Calgary Schools for Climate Action initiative, “Calgary Ecoschools” by enhancing community education offerings, and creating a positive common narrative. The City should target education programs for youth.
- b. Create a shared sense of commitment through meaningful stakeholder and public engagement. Communicate effectively and regularly with stakeholders and the public.
- c. Diverse perspectives and knowledge on climate action, including those of Indigenous people, are largely absent from climate action dialogue and climate actions. All organizations involved in climate action should make deliberate steps to ensure, where possible, that actions are accessible to all segments of Calgary’s population and that diverse perspectives, such as traditional knowledge, are incorporated into climate engagement work.

6. Strengthen Climate Advisory Panel governance.

In 2020, the Panel identified two significant challenges in fulfilling their mandate: a) four meetings per year limits the information that is provided to the Panel members, and b) the lack of direct connection to Council reduces the potential impact.

- a. The Panel should provide credible, strategic and independent advice to inform Council. The Panel recommends a Climate Committee of Council be created to formalize the advisory relationship and be directly accountable to Council.
- b. Meetings should be increased in frequency, as should access to information on official projects/initiatives being led by The City.

END NOTES

ⁱ <https://climateemergencydeclaration.org/>

ⁱⁱ This includes, but is not limited to Toronto (<https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/transformto/>), Montreal (<https://montreal.ca/en/articles/montreal-climate-plan-objective-carbon-neutral-2050-7613>), Edmonton (https://www.edmonton.ca/city_government/environmental_stewardship/ghg-emissions-reduction-plan.aspx), Ottawa (<https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/climate-change-master-plan>), Vancouver (<https://vancouver.ca/green-vancouver/vancouver-climate-emergency.aspx>), Halifax (https://www.halifax.ca/sites/default/files/documents/about-the-city/energy-environment/HRM_HaliFACT_vNew%20Logo_.pdf). Much of this work comes from the C40 Cities Network.

ⁱⁱⁱ See the National Research Council's Climate-Resilient Buildings and Core Public Infrastructure Initiative <https://www.infrastructure.gc.ca/plan/crbpci-irccipb-eng.html>

^{iv} 2020 Announcement: <https://pm.gc.ca/en/news/news-releases/2020/12/11/prime-minister-announces-canadas-strengthened-climate-plan-protect>

2021 Budget: <https://www.canada.ca/en/department-finance/news/2021/04/government-of-canada-highlights-budget-2021-investments-to-create-a-healthy-environment-for-a-healthy-economy.html>

^v There is currently no established definition of "fair-share" for Calgary. Other Canadian cities that have adopted targets based on fair share of emissions have done so through the C40 Network (<https://www.c40.org/about>).

^{vi} City of Calgary Housing Reviews 2020 and 2021:

<https://www.calgary.ca/cfod/finance/corporate-economics/housing-review.html>

^{vii} Just as a fiscal budget sets a limit on how much money a city can spend, a carbon budget sets a limit on the emissions it can produce and an accounting framework tracks emissions produced and avoided.

^{viii} Examples include:

City of Toronto: 2008 Green Roof Requirement

Ottawa:

- [Urban Forest Management Plan](#) Adopted by their council in 2017. This is similar to Calgary's ReTree YYC program we refer to below but has slightly more detailed quantitative performance targets (pg. 61 in the report) and 26 cross departmental recommendations to adopt.
- [Greenspace Master plan](#),
 - o Creating parks and greenspaces within the urban environment.

Edmonton: Natural Connections Integrated Conservation Plan

https://www.edmonton.ca/city_government/environmental_stewardship/strategy-biodiversity-protection.aspx

^{xi}

<https://www.ourcommons.ca/Content/Committee/421/AGRI/Reports/RP9814809/agrip11/agrip11-e.pdf>; <https://prairieclimatecentre.ca/2016/06/research-and-collaboration-adapting-our-forests-to-climate-change/>

^x This is referred to as Basic+ under the protocol. Edmonton and other municipalities already use this approach.

APPENDIX A

METHODS USED TO DEVELOP CLIMATE LEADERSHIP INSIGHTS

The Panel used a consensus approach and qualitative methods in developing the annual report. The insights offered represent the collective view of the Calgary Climate Panel members, as both representatives of their organizations and professionals with experience in climate change mitigation and adaptation across a broad range of disciplines and sectors.

The Climate Resiliency Strategy is based on 10 themes. The Panel's 2020 annual report focuses on five themes that were considered to have the highest influence this year, and to keep the report concise. The five themes based on a combination of Climate Strategy's adaptation and mitigation themes.

In developing the report, a weight-of-evidence approach was used and focused on reviewing actions, investments, and decisions at a theme level to identify major influences. This was not a granular review of every single climate action being taken, but an evaluation of Calgary's progress as a whole. The intent was to identify strategic areas for next steps, as opposed to project-specific decisions or investments.

The results are reported using a qualitative graphic to show visually whether Calgary is moving towards or away from the Climate Resiliency Strategy's goals based on the scope, maturity, and pace of climate action in each theme. Each theme section is accompanied by a summary of key strengths, challenges and opportunities for advancement.

Legend:

- Moving strongly away from goals: based on the scope and pace of action. Current action will be detrimental to achieving goals.
- Movement away from goals: based on the scope and pace of action. Current action may not be detrimental to achieving goals but may not be comprehensive or rapid enough.
- No significant change towards goals: no directional change. Current action is resulting in no noticeable net positive or negative impact to achieving goals.
- Some overall progress on goals: based on the scope and pace of action. Current action may be helpful to achieving goals but may not be comprehensive or rapid enough.
- Moving strongly towards goals: based on the scope and pace of action. Current action will be positive in achieving goals.

The Panel members provided individual responses for each theme. All feedback was reviewed and assessed by the report subcommittee. The Panel members collectively agreed to the final graphic representation.

To provide individual responses, a list of projects undertaken in 2020 was provided to the Panel members.

The full list is provided on the following pages.

NATURAL SYSTEMS INCLUDING WATER

City Initiatives:

- Updated climate-related hazards based on local data
- Natural asset valuation and integration into asset management framework
- Flood mitigation along Bow and Elbow River (multiple locations, including Glenmore upgrade) (City initiative)
- Stormwater Strategy Update
- Watershed Investment Strategy
- [City water licence](#)
- Public Infrastructure Assessment Process
- Urban forestry / canopy replacement and expansion
- Parks management

Community Initiatives & Context:

- Rain gardens, mowing strategy, xeriscaping (Alberta Low Impact Development Partnership)
- Nose Creek Watershed Partnership watershed modelling work
- Elbow River Watershed Partnership Restoration and Monitoring Work
- Cows and Fish Riparian Management
- [Stormwater Management Cooperative](#)
- Riverwatch Community Monitoring
- Springbank Offstream Reservoir consultation and studies
- Record presence of over-wintering waterfowl

TRANSPORTATION

City Initiatives:

- Continued implementation of pedestrian, cycling, and transit (RouteAhead) strategies to facilitate mode shift away from single occupancy vehicles
- Review of transportation network and design/procedure updates and changes for climate adaptation and resilience
- Continued shift to lower carbon transportation with CNG fleet, electric bus pilot, and investments in EV infrastructure
- Green Line LRT: climate resilience and GHG mitigation assessments completed, and Envision sustainable infrastructure framework adopted to guide design and build

- Ongoing exchange of best practices/technologies in climate action with partners (e.g., industry associations), material/service suppliers (e.g., cement, concrete, asphalt), and peers (e.g., Transportation Association of Canada, Canadian Urban Transit Association)
- Updated climate-related hazards based on local data
- Parking minimum changes
- Public Infrastructure Assessment Process
- Transit Oriented Development
- Complete streets installation/design (new or retrofiting)

Community Initiatives & Context:

- [Neighbourhood Active Transportation Network](#) (Sustainable Calgary)
- Carsharing changes in Calgary
- Calgary Airport Authority climate change risk assessment

PLANNING AND LAND USE

City Initiatives:

- MDP/CTP Review
- Guidebook for Great Communities, renamed The Guide for Local Area Planning in 2021, (including specific large-scale brownfield site requirements)
- Local Area Plans and projects – climate policies (i.e., North hill, Beltline ARP, Winston Heights Village)
- Climate Resilience Inventory Form - Climate information required in CARL for new land use, DPs, and Outline Plan applications. Information also included in CPC and Council reports
- Main Streets program investment and implementation
- Established Areas Infrastructure Investment Fund
- Updated climate-related hazards based on local data
- Suburban water, wastewater, and road designs (See Amendment #9 to PFC2020-0963 for roads)
- Surface permeability tracking (parcel coverage and/or installed technology)
- Neighbourhood 'metabolism' (energy in, energy out)
- Street tree requirements

Community Initiatives & Context:

- Update to the Airport Vicinity Protection Area

BUILDINGS AND ENERGY SYSTEMS

City Initiatives:

- Energy Benchmarking Program
- Integrated City Energy Mapping
- Solar Potential Map
- Climate Resilient Home Handbook for Calgarians
- Public Infrastructure Assessment Process
- Updated climate-related hazards based on local data
- [Sustainable Building Policy](#) (City of Calgary)

Community Initiatives:

- Boma Best Benchmarking and Certifications
- The Canadian Home Builders' Association are building awareness, understanding on best practices in net zero construction and energy efficient home renovations, and providing education initiatives to bridge the knowledge gap.

PEOPLE AND ECONOMY

City Initiatives:

- Community Climate Risk Index
- Updated climate-related hazards based on local data
- CEMA Ready-Calgary online training course

Community Initiatives:

- What do Calgary's K-12 students feel – and know – about climate, energy, and environment?
- Community Climate Conversations ([Climate Hub](#))
- Climate of Change webinar ([Climate Hub](#))
- [Accelerating CCS Technology \(ACT\) Program from Emissions Reduction Alberta](#)
- [Industrial Energy Efficiency, Carbon Capture Utilization and Storage from Alberta Environment and Parks](#)
- [NRCan industrial energy management projects financial assistance](#)
- [Alberta Green Infrastructure program](#)
- Climate Innovation Fund

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• Jayman Built.....	Page 08
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• City of Calgary	Page 12
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Climate Resilience Strategy and Action Plans

Annual Report 2020

Dick Ebersohn
Manager, Climate Change and Environment

Report #UCS 2021-0842
Attachment #3
ISC: Unrestricted

Recommendations

That the Standing Policy Committee on Utilities and Corporate Services recommend that Council:

1. Receive the reports for information.
2. Direct Administration to return to Council in 2022 with an updated Climate Strategy.

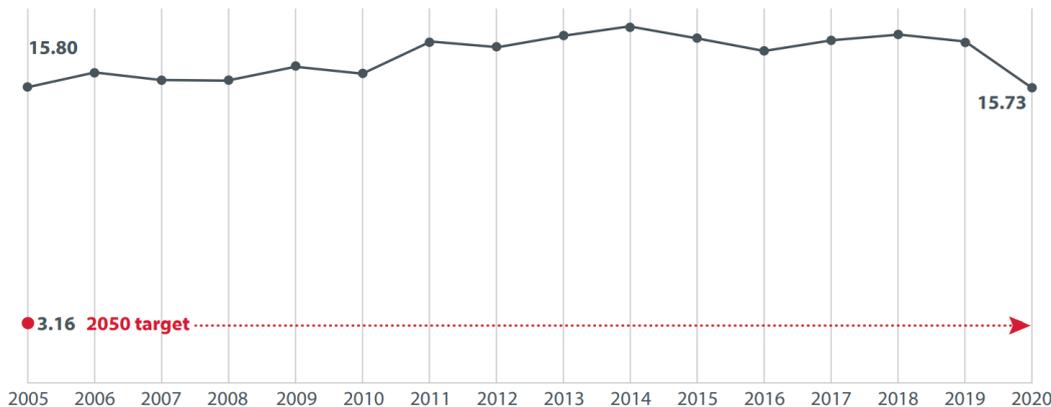


What is the problem we are trying to solve?



Climate change is accelerating

Calgary community-wide GHG emissions (megatonnesCO₂e)



GHG emissions declined – not on track



Collaboration and Support



of Calgarians are concerned about climate change



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



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





Actions in 2020



Climate Resilience Strategy

Mitigation & Adaptation Action Plans

Calgary 2018



Examples of Actions



Buildings and Energy

Transportation

Land Use Planning

Carbon sinks

Leading by Example

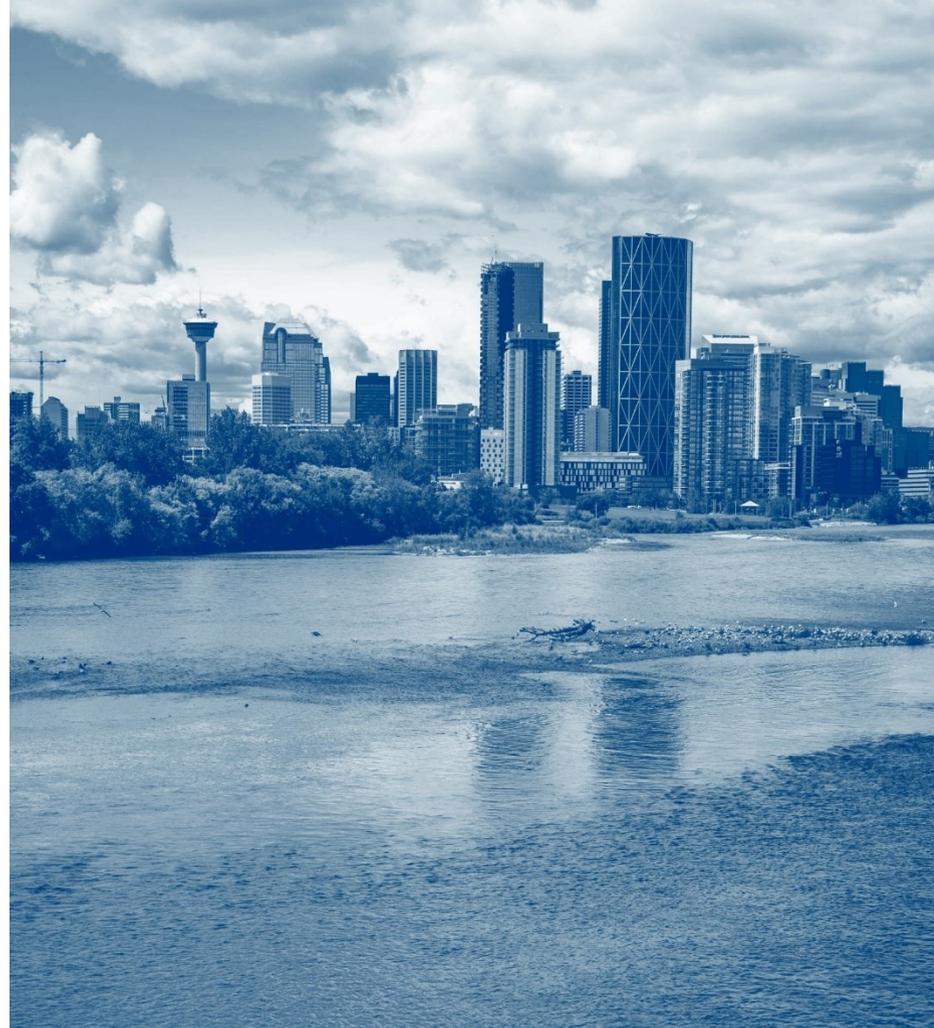
Built infrastructure

People

Natural infrastructure

Climate Panel Report

- Action in specific areas is positive
- Partnerships in climate communication and education are effective
- Quantitative targets are critical for assessment
- There is a need to accelerate development of a more comprehensive strategy, policy, and implementation framework



CALGARY CLIMATE PANEL

ANNUAL REPORT
2020

Building Momentum

- COVID-19, economy and climate intersection
- Accelerated actions
- Increased funding and investment
- 2022 Climate Action priorities toward Net Zero target
- Climate Related Financial Disclosure
- City-wide Carbon Budget





Towards 2022

Council
Approval of
Climate
Resilience
Strategy and
Action Plans
June 2018

Update to
Climate
Resilience
Strategy and
Action Plans
Q2 2022

80%
reduction
below 2005
GHGs
2050



Annual
Report to
Council
June 2021

Integratation
into One
Calgary 2023
- 2026
Q3-Q4 2022



Recommendations

That the Standing Policy Committee on Utilities and Corporate Services recommend that Council:

1. Receive the reports for information.
2. Direct Administration to return to Council in 2022 with an updated Climate Strategy.

Building Lasting Change – Update on Calgary’s Investments in Sustainable Infrastructure

RECOMMENDATION(S):

That the Standing Policy Committee (SPC) on Utilities & Corporate Services (UCS) recommend that Council approve the proposed amendments to the Sustainable Building Policy (CS005) to ensure the Policy better aligns with the Climate Resilience Strategy.

HIGHLIGHTS

- This report will update Council on performance metrics related to the state of sustainable infrastructure and buildings owned and operated by The City of Calgary, as directed by the Sustainable Building Policy (CS005) (the Policy), where, Administration is to report back to the Standing Policy Committee on Utilities & Corporate Services on a biennial basis.
- This report includes a recommendation to amend the Sustainable Building Policy (Version 2019) to better align the Policy with the Council approved Climate Resilience Strategy and Action Plan (2018).
- What this means for Calgarians is that The City continues to demonstrate value and measurable benefits for investments made in sustainable infrastructure while ensuring Council Policies are equipped to address evolving internal and external drivers, including direction from other levels of government, evolution of building code, emerging funding opportunities, and advancements in technologies and green building practices.
- This report includes a summary of select triple-bottom-line performance metrics providing an assessment of the efficacy and impacts of the Policy.
- The Policy Stewards are responsible for purchasing and managing energy for all users across The Corporation, therefore, this report also includes a performance assessment of investments in energy conservation, efficiency, and distributed renewable energy and provides updates on The City’s electricity and natural gas procurement strategies.
- This report and the associated recommendations are strategically aligned to Council’s Citizen Priorities, including: A healthy and green city
- Attachment 1 provides Background and Previous Council Direction and the proposed amendments to the 2019 version of the Policy.
- Attachment 2 highlights the performance metrics noted above.

DISCUSSION

The Performance of the Sustainable Building Policy

The Policy Stewards work closely with City business units and Civic Partners to provide technical guidance, engineering support, design recommendations, and the oversight of design consultants. The Policy Stewards help ensure that new infrastructure developments and major renovations reflect the objectives of the Council approved Sustainable Building Policy and the associated Sustainability Principles. 2020 performance outcomes include:

- Eight major projects LEED certified in 2020 representing more than 1.2 million square feet bringing The City’s total to 68. The City of Calgary continues to demonstrate leadership in the green building sector, including Canada’s first LEED Version 4 (latest

Building Lasting Change - Update on Calgary's Investments in Sustainable Infrastructure

version) certified new construction projects: The Calgary Composting Facility and Stoney Bus Maintenance Facility. For more information, visit www.calgary.ca/greenbuildings.

- Sixteen affordable housing units certified under LEED for Homes which is a new certification program being piloted at City of Calgary.
- The annual energy saved by certified green buildings is enough to power more than 8,500 Calgary homes.
- The annual GHG emissions avoided by certified green building is equivalent to taking more than 4,400 vehicles off the road.
- The revised approach to addressing sustainability adopted by the Policy Stewards in 2019 has resulted in a more positive and collaborative relationship with Project Sponsors as well as Calgary's consulting and construction industry, contributing to better performance outcomes.
- Growth over time in the number of green buildings, annual cost avoidance, and GHG emissions avoidance are shown in Attachment 2.

The Performance of Energy Management

The Corporate Energy Management Office (EMO) collectively manages the contract and billing with ENMAX to secure energy supply (natural gas and electricity) and regulate energy cost for the Corporation for all energy commodities.

The City's total energy cost that EMO managed was \$93.5 million in 2020 for electricity and natural gas, with over 1,750 bills processed every month. These bills are reviewed, data consolidated in an energy information system, information is trended with energy use reports distributed to all energy consumers, and corrections are made where required. Seventy-five City buildings also link their energy information through a city-wide public Building Energy Benchmarking program to lead the building disclosure efforts.

As energy and environmental commodities specialists, the EMO also helps generate value for The City, aligning with the Council Priority of a Well-Run City. For example, The City commercialized over \$4.3 million in renewable energy and emissions reduction credits in 2020, generating revenue from Calgary's investments in sustainability. This team continues to support multiple partners in securing grants for sustainable infrastructure projects, including, but not limited to, \$6 million for distributed solar power generation projects, \$7 million for electric/low-emissions vehicles, \$225,000 for EV charging network expansions, and \$3.7 million for landfill gas to power generation systems. Securing funding for net-zero emissions ready buildings, along with investment in renewable energy (development will be the focus of this team into the future.

Collaborating with City businesses and Civic Partners, the EMO identifies and implements cost saving and GHG-mitigating projects A few highlights include:

- \$600,000 in avoided costs in 2020 from power generated across The City's fleet of solar PV power plants with additional work on the development of landfill gas to power and renewable natural gas generation at City landfills underway. Calgary is leading the way in Alberta with solar PV and other renewable energy projects generating enough electricity to power over 1,000 average Calgary homes per year while reducing over 5,000 tonnes of greenhouse gas emissions (tonnes CO₂e) annually;

Building Lasting Change - Update on Calgary's Investments in Sustainable Infrastructure

- Over \$55,000 in energy cost savings from power factor correction projects at four facilities in 2020 with additional facilities targeted in 2021;
- A building systems tune-up in 2020 (retro-commissioning) at the Southland Leisure Centre is helping save \$70,000 per year by optimizing the sequence of operation and scheduling. Building systems investigations and tune ups were also completed at the Water Centre, helping achieve The City's first Energy Star Certification, demonstrating the outstanding energy performance of Calgary's iconic green building. Building operations and maintenance certifications such as EnergyStar and BOMA Best are being evaluated for other City facilities in 2021 and beyond.
- During the pandemic, EMO was able to identify the monthly/annual utility impacts on different municipal infrastructures and business units to inform future planning. The EMO is currently leading a Solutions for Achieving Value and Excellence (SAVE) project related to energy budgeting, with an anticipated net budget impact of \$1,292,910 in 2021, and \$1,783,050 in 2022.

Future Revisions and Focus

The efforts of our team are guided by an understanding of the trends affecting sustainable infrastructure at The City of Calgary. We seek to develop infrastructure that is equipped to meet the evolving needs of today and is prepared to tackle the challenges of tomorrow. To ensure our infrastructure is equipped to meet the evolving needs of today, we are focusing our efforts on the theme of human-centered design. Key components of this work include:

- Intersectionality – Infrastructure is developed for all Calgarians prioritizing accessibility, diversity, inclusivity, and leveraging approaches such as gender-based analysis (GBA+).
- Health/Wellness – Infrastructure safeguards the physical and mental health of occupants and is prepared to respond to future health challenges taking lessons learned from the COVID-19 pandemic while ensuring the mental health and wellness of occupants is considered.
- Performance – occupant behaviors significantly impact the building operation and energy performance, despite the best design intentions. Sustainable, human-centered design understands tenant preferences, allows for control and flexibility, educates and co-evolves with its occupants.
- At the same time, we strive to build infrastructure that is ready to meet the challenges of tomorrow the focused efforts on cultivating future-facing development. Key components of this work include:
 - Resilience – Infrastructure is built and retrofitted to respond to chronic stresses and acute shocks associated with climate change.
 - Durability – Infrastructure development considers long-term, life-cycle cost impacts of design decisions, and balances the financial impacts today with future requirements.
 - Pathway to Zero Carbon – Infrastructure is designed and retrofitted to enable passive-first designs that support a future transition to low or no-carbon operation.

In response to evolving market conditions and changing demands for energy products (electricity, heat, and liquid fuels), the EMO is actively working on innovative procurement methods to reduce costs, provide greater flexibility to adjust to changing demands, and secure a

Building Lasting Change - Update on Calgary's Investments in Sustainable Infrastructure

new supply of low-carbon energy sources into the future. In the short term, this will result in reductions in the supply of renewable electricity, as procurement contracts are adjusted to realize budget savings opportunities and prepare for new supply agreements. The EMO forecasts renewable electricity supplies ranging from 25 to 100 per cent of total metered electricity demand for the period spanning 2020 through 2026 as contract negotiations evolve. Updates on The City's electricity and low-carbon energy supply strategies will be provided to Council in early 2022.

STAKEHOLDER ENGAGEMENT AND COMMUNICATION (EXTERNAL)

- Public Engagement was undertaken
- Public Communication or Engagement was not required
- Public/Stakeholders were informed
- Stakeholder dialogue/relations were undertaken

In consultation with the Stewards of the Climate Resilience Strategy and Action Plan and Facility Management, amendments to the Sustainable Building Policy are recommended.

Social

A focus on human-centered design and future facing developments will:

- Enable the best out of our people by creating fantastic built environments, while supporting the short- and long-term health and wellness of our communities;
- Ensure long term performance of buildings and infrastructures by designing for and adapting to the occupants needs;

Environmental

The proposed revisions to the Policy will:

- Strengthen the Sustainability Principles related to energy efficiency, GHG reductions, and designing for resilience to changing environmental conditions; and
- Support The City in meeting climate related goals, including the design and construction of resilient infrastructure and renewable energy systems that address the risks of a changing climate.

Economic

The Policy and The City's approach to sustainable infrastructure will continue to:

- Build and maintain Calgary's sustainable building stock and municipal infrastructure, and stimulate/diversify the economy as a result;
- Minimize the Corporation's operating and life cycle costs through energy efficiency, renewable generation, and avoided cost of carbon;
- Minimize the cost of future capital renewal by ensuring buildings built today are equipped to perform competitively over their lifespan.

Service and Financial Implications

Building Lasting Change - Update on Calgary' s Investments in Sustainable Infrastructure

Operational savings are generated by investing in energy management and infrastructure sustainability. These benefits are addressed in the budgeting process for infrastructure energy requirements along with SAVE program processes. The capital implications of addressing sustainability in the construction and operations of infrastructure are addressed in the planning and budget setting process with the additional capital required often raised from various grants, incentive programs, and innovative financing arrangements.

RISK

There are no perceived risks associated with the recommendations in this report.

ATTACHMENTS

1. Sustainable Building Policy, CS005 (Version 3, 2019) with recommended 2021 amendments
2. Corporate Analytics & Innovation Energy & Sustainability 2020 Snapshot

Department Circulation

General Manager/Director	Department	Approve/Consult/Inform
Darrel Bell, Director	Facility Management	Consult
Christopher Collier, Director	Environmental & Safety Management	Consult



Council Policy

Policy Title: Sustainable Building Policy
Policy Number: CS005
Report Number: UCS2021-0867
Adopted by/Date: Council / Date Council policy was adopted
Effective Date: 2004-09-13
Last Amended: 2019-04-17
Policy Owner: Corporate Analytics and Innovation

NOTE: Policy amendments redlined below and also summarized in Section 7 on Page 7

1. POLICY STATEMENT

- 1.1 The City of Calgary plans, delivers, and maintains infrastructure that demonstrates smart infrastructure investment beyond initial construction cost, by addressing the lifecycle impacts on operating cost, **climate change considerations**, the environment, and the people who use the infrastructure.
- 1.2 The City of Calgary refers to the Sustainability Principles, outlined in Schedule 1, as the definition of sustainability and develop performance specifications that address these principles, while referring to the Sustainable Building Guidance Document found at www.calgary.ca/greenbuildings for further information on recommended minimum performance standards in addition to updates on the performance of the Policy.

2. PURPOSE

The purpose of this Council Policy is to:

- 2.1 Ensure all City-owned and City-financed facility planning, design, construction, management, renovation, operating, and demolition is carried out:
 - a. In a sustainable manner;
 - b. **Integrating climate mitigation and adaptation measures;**
 - c. Considering economic, social, and environmental impacts;
 - d. Enhancing The City of Calgary's reputation as a long-term fiscally responsible municipal government;
 - e. While addressing the health and well-being of the people who use and occupy City-owned and City-financed buildings.

3. DEFINITIONS

In this Council policy:

- 3.1 **"Adaptation" in the context of climate change, refers to the processes and actions that manage actual and projected climate risk to reduce effects on built infrastructure, the natural environment and people.**

- 3.2 “Alternative Transportation” refers to the methods of transportation other than single occupancy vehicles.
- 3.3 “Biodiversity” means the promotion of wildlife, vegetation and landscapes.
- 3.4 “Building” refers to a structure with a roof and walls and its associated components including the building envelope, mechanical systems, electrical systems, controls, interior finishes, accompanying site and any additional infrastructure included in the scope of a project.
- 3.5 “Certification Selection Tool” refers to a tool in the Sustainable Building Guidance Document, developed by CAI, to assist a project’s Strategic Planning Team / Project Sponsor and the Policy Steward with the selection of an appropriate green building certification program.
- 3.6 “Construct” refers to the process of constructing or renovating a building.
- 3.7 “Council Policy Program CC046” refers to a City of Calgary Council Policy outlining procedures and requirements for all Council policies.
- 3.8 “GHG emissions” means greenhouse gases that impact The City’s carbon footprint directly or indirectly.
- 3.9 “Green Building Certification” refers to third-party programs that confirm buildings are designed and/or constructed to industry accepted sustainability standards.
- 3.10 “Green Stormwater Infrastructure” means treating stormwater as a resource and managing it at or as close to the source of its creation using vegetation, soils or other elements.
- 3.11 “Minimum Sustainability Performance Requirements” refers to a list of minimum requirements included in the Sustainable Building Guidance Document.
- 3.12 “Occupant Comfort” means that comfort in buildings may be experienced in the physiological sense (thermal, visual, air quality, acoustics, etc.) as well as in the psychological, behavioural and social senses of well-being or contentment.
- 3.13 “Optimize for energy efficiency and conservation” means the improved energy performance of a building over a theoretical or measured energy consumption baseline.
- 3.14 “Mitigation” in the context of climate change, refers to processes and actions which stabilize or reduce greenhouse gas concentrations in the atmosphere.
- 3.15 “Passive Design” refers to the use of natural forces for the benefit of a building such as solar heat gain, daylighting and cooling through operable windows.
- 3.16 “Policy Steward” means Corporate Analytics & Innovation administration responsible for managing, proposing updates and compliance reporting on the Sustainable Building Policy and the Sustainable Building Guidance Document.
- 3.17 “Project Management Policy for Capital Projects” refers to a City policy approved by The City of Calgary’s Administration Leadership Team.
- 3.18 “Project Management Practices Guide” refers to one of the fundamental reference sources for City project management practitioners managed by The City’s Corporate Project Management Centre.

- 3.19 “Project Manager” as defined by the Project Management Policy for Capital Projects, means the project manager is the person accountable and responsible for project leadership, key results, deliverables and administration on a day-to-day basis.
- 3.20 “Project Sponsor” as defined by the Project Management Policy for Capital Projects, means the project sponsor provides strategic guidance and defines, promotes and supports the key results of the project. The project sponsor has overall accountability for the initiative, including the securing of financial resources.
- 3.21 “Project Team” means the design, construction and operation team members for a project that include but are not limited to the Project Sponsor, the Project Manager, the Policy Steward, architects, engineers, contractors, and building operators.
- 3.22 “Provide Access” means ensuring City facilities are accessible to all Calgarians following the Calgary Corporate Accessibility Policy
- 3.23 “Regularly Occupied Building” means a building where one or more people spend a continuous hour, or more, in a day.
- 3.24 “Resilience” refers to the capacity of City buildings to survive, adapt and grow no matter what kind of chronic stresses and acute shocks they experience.
- 3.25 “Site Selection” means the process of considering the sustainable properties of the location of a building including but not limited to access to existing amenities and alternative transportation methods, the impacts on rivers and streams, an evaluation of green fields verses brown fields etc.
- 3.26 “Social Wellbeing” refers to design and operating parameters that impact the health and wellbeing of the users of a building.
- 3.27 “Strategic Planning Team” refers to a team referenced in The City of Calgary’s Project Management Practices Guide that is responsible for pre-project activities with the Project Sponsor.
- 3.28 “Sustainable Building Guidance Document” developed by the Policy Stewards within CAI, refers to a document outside the Council approved Sustainable Building Policy that supports the intent of the Policy.
- 3.29 “Sustainability Principles” refers to a list of eight guiding concepts to be evaluated in the planning, design, construction and operation for projects where the Sustainable Building Policy is applicable.

4. **APPLICABILITY**

- 4.1 The Policy applies to the planning, design, construction, operations, maintenance, renovation, and de-commissioning of all buildings that are City-owned and/or City-financed where The City provides a minimum funding contribution of 33 per cent of total project costs and The City contribution is equal to \$1,000,000 or more (not including project development costs, design costs, and land).

4.2 Compliance with the items listed in the table below is required.

¹Project Type	Design & Construction Requirements	Operations & Maintenance Requirements
New Construction <i>Regularly occupied building with a project floor area $\geq 500 \text{ m}^2$.</i>	<ul style="list-style-type: none"> • ²Evaluate and include strategies to address the applicable <i>Sustainability Principles</i>. • Plan, design and <i>construct</i> the building as per the <i>Sustainable Building Guidance Document</i>, including but not limited to the <i>Minimum Sustainability Performance Requirements</i>. • ³Conduct a Public Infrastructure Climate Risk & Resilience Assessment and a GHG Mitigation Assessment and implement recommendations as directed in the <i>Sustainable Building Guidance Document</i>. 	<p>Building Stewards shall:</p> <ul style="list-style-type: none"> • Sustain or improve building performance through operations. • Utilize energy consumption tools provided by the Energy Management Office to monitor, analyze, and benchmark building performance.
Addition or Major Renovation <i>Regularly occupied building with a project floor area in scope $\geq 500 \text{ m}^2$. Additions with a new separate mechanical system are classified as New Construction.</i>		
Affordable Housing Housing projects delivered by the Calgary Housing business unit or delivered by partner organizations receiving funding from The City. See Scope and Applicability for funding thresholds.		
Interior Renovation <i>Regularly occupied building with a floor area in scope $\geq 500 \text{ m}^2$. Under the Policy, Interior Renovations do not include building envelope or primary HVAC systems in scope. Projects that include these components are classified as a Major Renovation.</i>		
All Other Building Projects Projects $<500\text{m}^2$ in scope and unoccupied facilities including those that house automated and industrial processes, transit stations and platforms and +15 structures. Industrial processes themselves are exempt.		

1. Linear infrastructure projects, including roads, bridges, track and way, potable water, stormwater, and waste water conveyance are out of scope.
2. Where applicable depending on project scope.
3. Where applicable and depending on project scope, as supported by Climate Resilience Strategy and Action Plan Team

4.3 Green Building Certification provides value to The City of Calgary through third-party confirmation that buildings are designed and constructed to industry accepted sustainability standards. The green building certification industry has evolved considerably since the 2008 Sustainable Building Policy update and numerous worthwhile certification programs exist in the market. The building type and project scope will dictate which, if any, certification program is most appropriate for each

specific building project. The Certification Selection Tool within the Sustainable Building Guidance Document shall be completed by the Strategic Planning Team / Project Sponsor with the Policy Steward to determine appropriate certification targets during the pre-design stage of a project. The most current Sustainable Building Guidance Document can be found at www.calgary.ca/greenbuilding.

5. **PROCEDURE**

5.1 **Roles, Responsibilities, Governance and Reporting**

5.1.1 **Roles & Responsibilities of Corporate Analytics and Innovation as Policy Steward:**

- Work with and support the *Strategic Planning Team / Project Sponsor* to set Policy targets and objectives, including *Minimum Sustainability Performance Requirements* and certification targets.
- Support the *Project Manager* with delivering on Policy targets and objectives.
- Manage and update the Sustainable Building Policy and the *Sustainable Building Guidance Document* as needed. Policy updates are to adhere to The City of Calgary's *Council Policy Program CC046*.
- Report on Policy outcomes to the Accommodation and Infrastructure Steering Committee (AISC) annually and S.P.C on Utilities and Corporate Services on a biennial basis.
- Approve any changes to Policy targets throughout the project, in agreement with the *Strategic Planning Team / Project Sponsor*.

5.1.2 **Roles & Responsibilities of the Strategic Planning Team / Project Sponsor:**

- The function and responsibilities of the Strategic Planning Team / Project Sponsor are defined by the Project Management Policy for Capital Projects and the Project Management Practices Guide.
- Accountable for ensuring in scope buildings comply with the Sustainable Building Policy and the Sustainable Building Guidance Document
- Work with the Policy Steward to set Policy targets and objectives, including Minimum Sustainability Performance Requirements and certification targets.
- Ensure the project team understands Policy requirements at the commencement of the project.
- Approve any changes to policy targets throughout the project, in agreement with the Policy Steward.
- In the event of non-compliance with a Policy objective or target, prepare a written rationale for the Director of CAI and the project sponsoring business unit explaining the cause of non-compliance with the Policy.

5.1.3 **Roles & Responsibilities of the Project Manager:**

- Application of and compliance with the Sustainable Building Policy and the Sustainable Building Guidance Document.
- Follow the Policy targets and objectives established by the Strategic Planning Team / Project Sponsor and the Policy Steward.
- Work with the Policy Steward to further develop Policy targets and objectives during the Project Initiation, Project Planning, Project Execution and Project Monitoring and Controlling stages of the project as defined in the Project Management Practices Guide.
- Ensure the project design and construction teams produce and submit all required deliverables to The City prior to the Project Closure stage, as defined in the Project Management Practices Guide.
- In the event of non-compliance with a Policy objective or target, the Project Manager shall work with the Project Team to prepare a written rationale for the Strategic Planning Team / Project Sponsor and Policy Steward explaining the cause of non-compliance with the Policy.

5.1.4 Roles & Responsibilities of the Director of Corporate Analytics and Innovation and the Director of the Strategic Planning Team / Project Sponsor:

- Provide executive direction on the applicable policy compliance path in the event of a disagreement between the Policy Steward and the Strategic Planning Team / Project Sponsor. The Director of the project sponsoring business unit will have final decision-making power.

5.1.5 Roles & Responsibilities of the Accommodation and Infrastructure Steering Committee:

- Receive reports on policy outcomes from the Policy Steward on an annual basis.

5.2 Governance

5.2.1 The Policy Steward and the Strategic Planning Team / Project Sponsor set and sign-off on Minimum Sustainability Performance Requirements and green building certification requirements. This is initially done during the pre-design stage. Targets can be amended through the design and construction process, if necessary, by signatures from the Policy Steward and the Strategic Planning Team / Project Sponsor.

5.2.2 In the event of a disagreement on Minimum Sustainability Performance Requirements or green building certification requirements, the decision is escalated to the Directors of CAI and the project sponsoring Director for a decision. The project sponsoring Director has final authority.

6. SCHEDULE(S)

6.1 Schedule 1 – Sustainability Principles

7. AMENDMENT(S)

Date of Council Decision	Report/By-Law	Description
2008-02-25	UE2008-01	All City-owned and City-financed facilities are operated and maintained in a sustainable way including the appropriate adherence to sustainable building Rating Systems when developing new and occupied facilities, when redeveloping Brownfield sites and when undertaking all major building renovations, including those of an affordable housing nature.
2014-07-21	UCS2014-0426	Reporting period by Infrastructure and Information Services to the SPC on Utilities and Corporate Services from an annual to biennial basis.
2021-06-23	UCS2021-0867	<ol style="list-style-type: none"> 1. Update to Policy Statement and Purpose to add climate change considerations to both. 2. Addition of the terms 'resilience' and 'mitigation' to definitions section. 3. Addition of requirement for a Public Infrastructure Climate Risk & Resilience Assessment and a GHG Mitigation Assessment where required and depending on project scope and size, as directed by the Climate Resilience Strategy and Action Team.

8. REVIEWS(S)

Date of Policy Owner's Review	Description
2019-04-17	<p>Major update to the Sustainable Building Policy to improve Policy clarity and to increase the value of Policy outcomes for The City of Calgary. Specifically, the following revisions have been applied:</p> <ol style="list-style-type: none"> 1. The addition of guiding <i>Sustainability Principles</i> 2. The removal of mandatory certification requirements 3. The introduction of the Sustainable Building Guidance Document 4. The inclusion of non-regularly occupied buildings in Policy scope, excluding industrial processes 5. The introduction of roles and responsibilities 6. A clarified and revised governance model.

Schedule 1
Sustainability Principles

Sustainability is a term with a broad definition. By specifying Council and Corporate priorities, project teams can better identify sustainability strategies to be considered as The City develops new infrastructure and maintains and improves existing assets. The following *Sustainability Principles*, further defined in the Definitions section of this policy and described in detail in the *Sustainable Building Guidance Document*, are intended to help guide the *Project Team* in determining relevant project requirements and performance objectives. The most current version of the Sustainable Building Guidance Document can be found by visiting www.calgary.ca/greenbuildings

Sustainability Principles

 Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions	 Reduce potable water use through conservation and efficiency measures
 Encourage the integration of green stormwater infrastructure	 Maintain and improve biodiversity
 Address occupant comfort, provide access, and maintain social wellbeing in design and operations	 Select sites that have access to alternative transportation and consider the impact of site selection on the environment, people and the building
 Design for resilience to changing economic, social, and environmental conditions	 Divert waste from landfills during construction, occupancy and demolition



Energy & Sustainability 2020 Snapshot

We provide corporate directions and initiatives to advance The City's energy supply, sustainable infrastructure and energy efficiency goals and policies.

Energy supply management



Reduced Energy Costs by better managing commodities such as electricity & natural gas and regulated cost components.

Corporation's total energy cost in 2019/2020 was **\$93.5M**

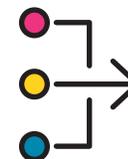
Utility bill management for electricity and natural gas



1750

bills processed every month, 21,000 annually, by streamlined bill processing and validation.

Retro-commissioning (RCX) process



Optimizing the sequence of operation and scheduling at Southland Leisure Centre **saved \$70,000**

Forecasting and Energy Budgeting



\$1,292,910 anticipated net budget impact in 2021, and \$1,783,050 in 2022.

Infrastructure energy efficiency



Identified power quality issues and power factor correction projects achieving cost savings for:

Emergency Operations Centre
saved **\$10,000/year**

Max Bell Centre
saved **\$15,000**

Village Square Leisure Centre
saved **\$20,000/year**

Southland Leisure Centre
saved **\$11,000/year**

8 major projects certified in 2020 representing more than 1.2 million ft²



16 affordable housing units certified under LEED for Homes



The annual energy saved by certified green buildings is enough to power more than **8,500** Calgary homes

The annual GHG emissions avoided by certified green building is equivalent to taking over **4,400** vehicles off the road



68 projects certified since the launch of The Sustainable Building Policy, setting an example for industry with many firsts.

Minimizing Negative Impacts of Waste and Recycling Sites – Officer

RECOMMENDATION(S):

That the Standing Policy Committee on Utilities and Corporate Services recommend that Council:

1. Approve a one-time operating budget of \$80,000 in 2021 and \$150,000 in 2022 to be funded from the Budget Savings Account Reserve (operating); and
2. Direct Administration to report back no later than Q3 2022 through the appropriate Standing Policy Committee.

HIGHLIGHTS

- Waste and recycling sites currently do not have clear operating or development standards set by the Province or The City. This can lead to negative impacts on adjoining properties. Notice of Motion PFC2021-0222 directed Administration to establish a cross-corporate work group and appoint a lead officer to investigate solutions.
- **What does this mean to Calgarians?** Investigating and providing solutions to this issue will minimize the risks that waste and recycling sites can create on the site of operation, and to Calgarians, neighbouring property owners, and The City.
- **Why does this matter?** Appropriate operations are important to the health and safety of people on and around the site. They ensure the site does not disturb adjoining properties or public spaces and does not become an environmental hazard.
- This initiative was not anticipated in the work plans for the responsible service lines and it is necessary to obtain additional resourcing and commensurate funding. In addition, leading this initiative requires a skillset and expertise that may not be available amongst current employees and external hiring is most likely necessary. Recruitment has begun for a Senior Planner based on the job description in Attachment 2
- Funding of \$80,000 in 2021 and \$150,000 in 2022 has been requested from the Budget Savings Account Reserve (operating). To accommodate the 24-month position, an additional \$70K will be requested at a later date for the 2023 budget.
- Not wishing to delay this important work prior to the Senior Planner arrival, this report was prepared by utilizing an internal cross corporate stakeholder work group and temporarily shifting resources. The Calgary Fire Department continues with regular site inspections of subject sites.
- Council directed Administration to present the job description for the lead officer to the Standing Policy Committee on Utilities and Corporate Services and to recommend funding should external hiring be required.
- Strategic Alignment to Council's Citizen Priorities: A well-run city
- Background and Previous Council Direction is included as Attachment 1. This report fulfils directions 1 and 2 of the Notice of Motion as listed in Attachment 1.

DISCUSSION

Within the waste management industry, various companies operate sites in Calgary where non-hazardous waste materials are collected, sorted, stored temporarily, and then sold for recycling or sent to a landfill or composting facility. At some of these sites, poor operational practices have resulted in:

Minimizing Negative Impacts of Waste and Recycling Sites - Officer

- Non-compliance with the Alberta Fire Code, and resulting fires;
- Inappropriate stockpile height, content and separation of waste; and
- Debris being blown from the site onto adjoining properties or public lands.

Thousands of metric tons of waste, recycling and other materials are stored on some of these sites. These sites do not currently have clear operating standards set by The Province or The City of Calgary and have found a largely unregulated space in which to conduct their operations.

There is a concern for public safety, the potential for environmental contamination of the site and its surroundings and risk of The City having financial responsibility in the event of companies abandoning their sites.

In February of 2021, Council approved Notice of Motion PFC2021-0222, Minimizing the Negative Impacts of Waste and Recycling Sites. It directed Administration to establish an interdepartmental work group to address this issue and to appoint an officer to lead this work.

Delivering on this direction will require contributions from business units across the corporation. This work was not anticipated in the work plans of the responsible service lines and in order to deliver it without impacting previously directed work, Administration must obtain additional resourcing and commensurate funding for the officer. Administration has determined that a new Senior Planner position combines the required skillsets for the officer who is to lead the work group. The position would be for a limited term of up to two years to complete the assignment.

The work group has been formed; an enhanced application circulation, review process and team is in place; and Calgary Fire and City Enforcement inspections have been undertaken as steps to address direction number 5 of the Notice of Motion (Attachment 1). Recruitment is currently underway for the officer and it is anticipated they will be able to commence leading the group at the end of 2021 July.

The Senior Planner (the officer) will have experience in leading interdisciplinary planning projects with a technical/operations focus related to policy, regulations and systems integration. Primary duties will include:

- Coordinating the investigation of an enforceable compliance strategy and development and operating standards, addressing nuisance, community standards, land use regulation and safety;
- Developing project plans, coordinating teams, setting priorities, assigning work to team members, providing progress reports and making recommendations on project delivery to management and Council;
- Identifying and coordinating with internal and external stakeholders to shape and communicate solutions and build support for their implementation; and
- Presenting recommendations to Council.

The job description is contained in Attachment 2.

As the work proceeds, an external consultant may be needed. Depending on the scope of work to be determined, funding for this work may be available in the existing consulting budget or it may require the identification of an additional funding source. If additional funding is needed, Administration will return to the Standing Policy Committee on Utilities and Corporate Services with a business case and funding recommendation.

Minimizing Negative Impacts of Waste and Recycling Sites - Officer

STAKEHOLDER ENGAGEMENT AND COMMUNICATION (EXTERNAL)

- Public Engagement was undertaken
- Public Communication or Engagement was not required
- Public/Stakeholders were informed
- Stakeholder dialogue/relations were undertaken

No public engagement was conducted for this analysis and review.

IMPLICATIONS

Social

Setting clear operational expectations will benefit Calgarians by mitigating the risk that improper operations of waste and recycling sites can pose to people on and around the site and on adjoining properties or public lands.

Environmental

Establishing clear operating and development expectations will reduce the risk of improper site operations. This mitigates the potential risk of environmental contamination of the site and the adjoining area, which otherwise could pose an immediate risk to public health and safety as well as create financial responsibility to The City in the event of environmental damage over time.

Economic

Poorly operated sites can negatively impact the viability and attractiveness of adjoining properties and businesses, which may reduce property values, business revenues and The City's property tax base. The potential risk of operators abandoning their sites may also place financial responsibility on the City for removal or remediation expenses.

Service and Financial Implications

This work and the appointing of a dedicated officer was not anticipated in the work plans or approved service plans and budgets of the responsible services, for example, the City Planning and Policy Service. The services may have to adjust their work plans to reassign staff and budget or reschedule other work to accommodate this initiative.

New operating funding request

\$300,000

The cost for this two-year term position is \$300,000. A budget of \$230,000 is being requested to be funded from the Budget Savings Account Reserve (operating) for 2021 and 2022. Additional funding of \$70,000 will be required as part of the next budget cycle (2023-2026) and will be requested at the appropriate time.

RISK

The key risks of improperly operated sites are public safety, environmental contamination, negative effects on nearby properties and financial impact to The City.

Minimizing Negative Impacts of Waste and Recycling Sites - Officer

Improper site operations can lead to unsafe conditions and fires or storage pile collapses. Without proper regulation, stored or processed materials may create an environmental hazard that can contaminate the site, its surrounding area or the groundwater. Abandoned sites may require intervention and financial commitment by The City to protect citizens' health and safety and remediate environmental damage.

ATTACHMENT(S)

1. Background and Previous Council Direction
2. Minimizing Negative Impacts of Waste and Recycling Sites-Officer Job Description

Department Circulation

General Manager/Director	Department	Approve/Consult/Inform
Stuart Dalglish	Planning and Development	Approve
Michael Thompson	Utilities & Environmental Protection	Approve
Josh White	Planning and Development	Approve

Background and Previous Council Direction

Below is the Notice of Motion directing this report.

Previous Council Direction

On 2021 March 1 Council approved Notice of Motion, PFC2021-0222 which directed Administration to appoint an Officer to lead an interdepartmental work group in addressing the resolutions contained in the motion.

The Notice of Motion directed Administration to:

1. Appoint an Officer, be they internal or external, to lead an interdepartmental work group;
2. Present their internal Officer or present the job description and their recommendations for funding should they be external, to Utilities and Corporate Services Committee no later than Q2 2021;
3. Examine the financial and environmental liability The City would incur in the case of these companies abandoning their sites, (to say what potential liabilities and fees would be incurred by The City through 1,000 M/t increments), and the management of these sites;
4. Develop an enforceable strategy for bringing all sites, that store and process waste, recycling and other materials into better compliance (pile height, screening, fire code, environmental, LUB, etc.), minimizing the potential risks they pose;
5. Combine the research in a report back through the Utilities and Corporate Services Committee no later than Q4 2021, outlining an initial set of recommendations for how to create enforceable development and operating standards and an enforcement strategy for targeting problematic sites that store and processes waste, recycling and other materials; and
6. Prepare a comprehensive list of recommendations, to submit with their report, on the tools available to Administration, should the enforcement strategy not be an adequate solution to managing the risk associated with these sites., environmental, LUB, etc.), minimizing the potential risks they pose.

This report fulfills direction 1 and 2.

Minimizing Negative Impacts of Waste and Recycling Sites-Officer Job Description

The following is the scope of work and job description that is being used in the recruitment of the Senior Planner who will serve as the officer leading the cross-departmental working group to investigate minimizing negative impacts of waste and recycling sites in Calgary. Council directed Administration through Notice of Motion PFC2021-0222 to create this officer position and present the job description to the Standing Policy Committee on Utilities and Community Services by 2021 Q2.

Scope of Work

Many companies in Calgary store and process waste, recycling and other materials. Some sites are effectively operating as unlicensed and unregulated landfills instead of operating as a temporary processing facility. As these sites do not currently have clear operating standards enforced upon them by The Province or The City of Calgary they have found a largely unregulated space in which to conduct their operations. Subsequently there is the possibility of operational practices that may increase Calgarians' exposure to risks and nuisances.

To address the concerns regarding these sites' operations, Administration has been directed to establish a work group, and to appoint an officer to lead the group in researching, analyzing and reaching (a) conclusions on administratively implementable solutions, and (b) recommendations for Council which may include advocacy to the provincial government for support in implementing any proposed solutions.

Specific direction is to:

- Examine the financial and environmental liability The City would incur in the case of these companies abandoning their sites, and the management of these sites;
- Develop an enforceable strategy for bringing all sites, that store and process waste, recycling and other materials into better compliance (pile height, screening, fire code, environmental, LUB, etc.), minimizing the potential risks they pose;
- Undertake research and outline an initial set of recommendations for how to create enforceable development and operating standards and an enforcement strategy for targeting problematic sites that store and processes waste, recycling and other materials; and
- Prepare a comprehensive list of recommendations on the tools available to Administration, should the enforcement strategy not be an adequate solution to managing the risk associated with these sites, minimizing the potential risks they pose.

Work on this initiative is envisioned to occur in phases:

Phase	Content	Duration
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1	Kick-off, work group establishment	Underway
2	Situational assessment and research/ Stakeholder engagement	3 months
3	Development of options and recommendations	9 months
4	Reporting to committee and council	3 months
5	Implementation of recommendations	9 months
		24 months

Because this initiative requires cross-departmental collaboration, understanding of legislative and land use aspects and stakeholder outreach, Administration has determined that the skillset of a Senior Planner can provide the base requirement for the officer. In addition to this base skillset, the successful candidate should also have additional expertise in waste management facility operations, policies, and related Provincial regulations.

The following job posting is being used in The City's recruitment process:

Senior Planner – Calgary Growth Strategies

If you are committed to public service and enjoy collaborating with others, sharing our values, and having a desire to learn and grow, join The City of Calgary. City employees deliver the services, run the programs, and operate the facilities that make a difference. We support work-life balance and offer competitive wages, pensions and benefits. Together we make Calgary a great place to make a living, a great place to make a life.

We are looking for a Senior Planner to lead an interdisciplinary working group to minimize the negative impacts of waste and recycling sites in the City of Calgary. While these sites provide critical services, The City of Calgary is working to establish sound operational practices and development rules to ensure they can be well integrated into the land uses of the city. The position offers professional opportunities for individuals demonstrating strong leadership and teamwork abilities coupled with proven analytical and policy formulating skills.

The ideal candidate will have experience in leading planning projects with a technical/operations focus related to policy, regulations and systems integration.

Primary duties include:

- Leading a cross-corporate project to minimize the negative impacts of waste and recycling sites
- Coordinating the investigation of an enforceable compliance strategy and development and operating standards, addressing nuisance, community standards, land use regulation and safety.
- Develop project plans, coordinate teams, set priorities, assign work to team members, provide progress reports and make recommendations on project delivery to management.
- Conduct research and technical analysis and formulate recommendations.
- Identify and coordinate with internal and external stakeholders to shape and communicate policies and build support for the implementation.

- Prepare planning policies and technical reports and present recommendations to the appropriate approving authority.
- Provide professional planning advice to internal and external stakeholders; explain planning policies and decisions.
- Coach, direct and train staff on project structure, processes, methods and content, and overall professional planning development.

Qualifications

- A planning degree recognized by the Canadian Institute of Planners (CIP) OR; a related degree and a minimum of six years of progressively more responsible and varied planning experience.
- Eligibility for membership in the Canadian Institute of Planners (CIP) is required.
- Working knowledge of planning legislation and experience in a major urban municipality involving a broad range of projects connected to other levels of government.
- Experience and working knowledge of planning and analysis software including ArcGIS.
- Experience in waste management facility operations, policies, and related Provincial regulations.
- Experience with municipal processes, such as legislation, policy, and report writing, is an asset.
- Proven project management experience; bringing a structured approach to problem-solving and identifying a project's key questions and risks.
- Proven leadership skills; able to motivate staff and adapt to a variety of work environments.
- Strong verbal/visual communication skills.
- Demonstrated ability to work in a customer-oriented and collaborative environment while adhering to tight timelines and changing priorities.

Pre-employment Requirements

Successful applicants must provide proof of qualifications.

- Union: Exempt
- Position Type: Temporary position (Up to 24 months)
- Compensation Level: Level E \$77,891 - 117,609 per annum
- Hours of Work: Standard 35-hour workweek
- Audience: Internal/External
- Business Unit: Calgary Growth Strategies
- Location: 800 MacLeod Trail SE
- Days of Work: This position works a five-day workweek with one day off in a three-week cycle
- Apply By: TBD
- Job ID Number: 0000000